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HOW TO MAKE THE FARM PAY;

OR,

THE FARMER'S BOOK

OF

PRACTICAL INFORMATION

ON

AGRICULTURE, STOCK RAISING,

FRUIT CULTURE, SPECIAL CROPS,

DOMESTIC ECONOMY & FAMILY MEDICINE.

BY

CHARLES W. DICKERMAN,

MEMBER OF THE PENN. AGRICULTURAL SOCIETY, THE AMERICAN POMOLOGICAL SOCIETY,
AND THE PENNSYLVANIA HORTICULTURAL SOCIETY.

ASSISTED BY

HON. CHARLES L. FLINT,

Secretary Mass. State Board of Agriculture,

AND OTHER PRACTICAL AGRICULTURAL WRITERS.

ILLUSTRATED WITH ONE HUNDRED AND FORTY ENGRAVINGS

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TO
JOHN JOHNSTON,

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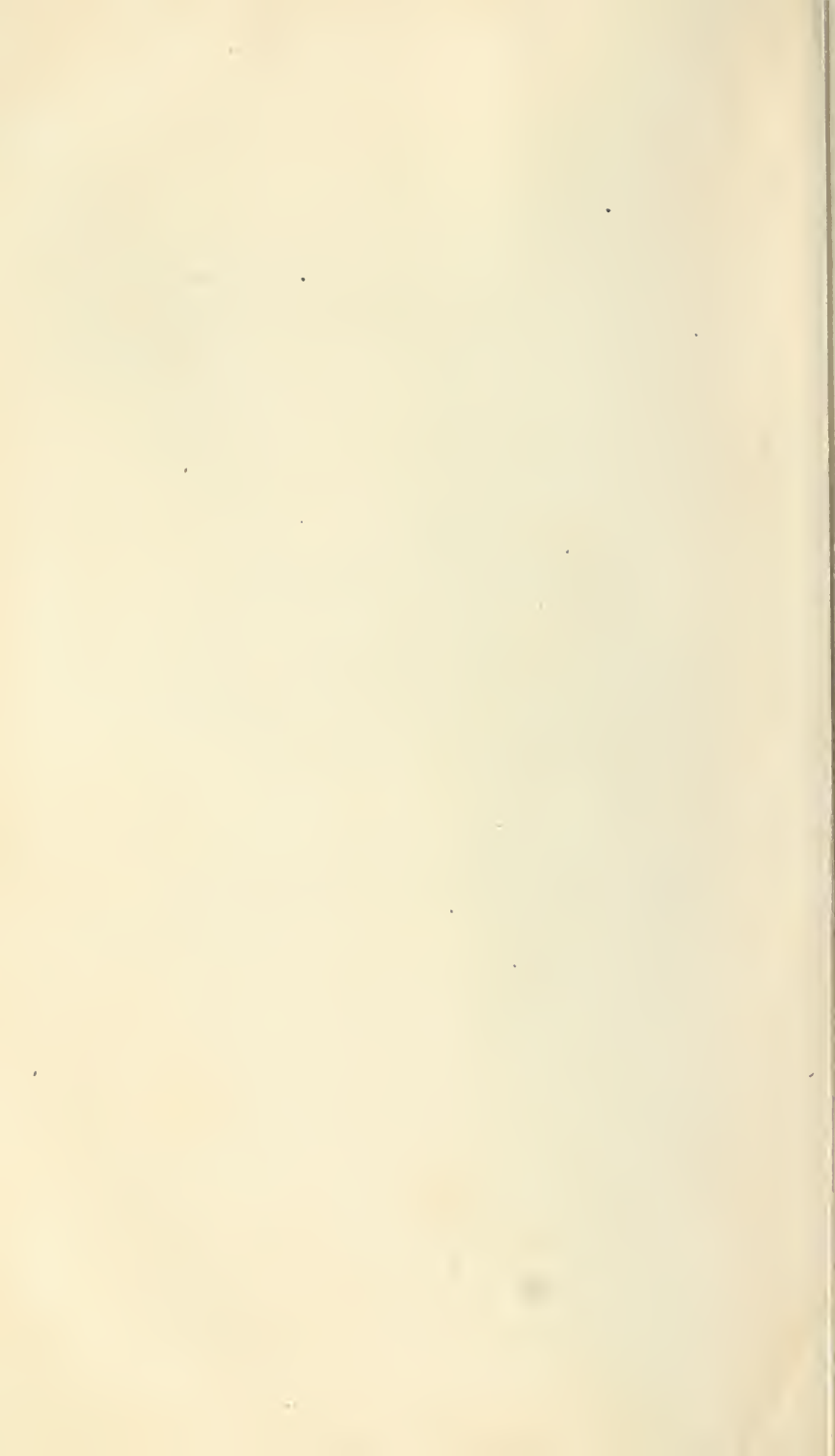
THE VETERAN PROMOTER OF ALL AGRICULTURAL

IMPROVEMENT IN THIS COUNTRY,

THIS VOLUME IS

DEDICATED WITH THE SINCERE ADMIRATION OF,

THE AUTHOR.



P R E F A C E.

NO one at this day doubts the importance of agricultural information. Knowledge in this department is not only power, but it is wealth, individual and national. That system of cultivation which produces two blades of grass or two kernels of grain where only one grew before; which produces two quarts of milk or two pounds of meat in place of one, must not only be a benefit to each individual producer, but of immense advantage to the country and the world. Great improvements have been made in the past twenty years. Underdraining, improved machinery, the better understanding of the rotation of crops, and the application of manures, and the improvements in the breeds of domestic animals, have all helped to raise Agriculture, from mere drudgery, to an important science. And improvement must still continue. Only a small proportion of the great body of farmers have adopted the advanced position in modern agriculture. The great mass of farmers are still laboring under the disadvantages of a false and ruinous system of agriculture, without knowing just how to better their position. It is the duty of those who do know, to bring their knowledge to the use of these their brethren in toil. Much of the best talent of the country is devoted to this object. Agricultural colleges are springing up on every hand. Men of genius, of the best scholarship, of great scientific attainments, are devoting their lives to the work of bringing forth the secrets of the soil. Enterprising young men of good abilities are putting their hands to the plow, and the plow to the furrow, resolved to

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leave the mark of improvement on the work of the farm. The labor of the farmer is thus elevated. What has always been claimed by a few, will soon be acknowledged by all, that the prosperity of a country depends upon the intelligent cultivation of the soil.

In this land of schools, where every child can have an education, knowledge is easily disseminated. Improved methods of culture can be spread broadcast over the land by means of books and papers. For these reasons American farmers are more intelligent than the same class in any other country. Few farmers are now so ignorant as to scoff at agricultural information. They desire it, and welcome it. The trouble has been and is, that it is not given them in a form adapted to their wants. There have been many technical and scientific works, containing most valuable information, but in language not readily understood. These works are very largely theoretical, and the practical is not so distinctly separated as to be easily applied.

They have performed a noble service, for without the information they have contained, but little advance would have been made.

The agricultural papers come down more nearly to the wants of the farmer, and we advise every farmer to take some agricultural paper. They furnish many useful hints and valuable suggestions, and serve to interest the younger members of the family in the labors of the farm. But agricultural papers are not wholly satisfactory. Of course, each number can refer to only a limited variety of subjects, and a farmer may take the paper for years before he gets information upon the very subject he wishes most to know about. Again, much that is in these papers is crude. Many theories are given that have not been sufficiently tried, and must be received with the greatest caution. The records of carefully conducted experiments are the most valuable part of these papers, if the farmer has the wisdom and patience to study them, and apply their principles to his practice.

There is another class of agricultural books, by our best writers, on specific subjects, the objection to them being their cost. In order to make a book, a great deal is put in that is curious and interesting, but not practical. For instance, one of our best writers has recently published a book on "Wheat Culture," which, while it contains nearly all that is practically worth knowing about the plant, is so full of other matters, as to be called by the editor of one of our agricultural papers, "The Romance and Curiosities of Wheat Growing." It is just the avoidance of these superfluities which is aimed at in the present work, while all the *practical* information is retained. To obtain information on all the subjects treated of, it would be necessary for the farmer to purchase books upon drainage, manures, implements, wheat culture, grasses, sheep-husbandry, milch cows and dairy farming, horses, cattle, fruit culture, market gardening, and numberless other books, large and small, requiring much money to purchase, and much time to read.

To make the present volume wholly reliable, it has been aimed to record nothing but what has been *proved* in practice, beyond a doubt. Mere theory has been rejected. Some valuable ideas have in all probability been thus lost, but it is the only safe course; the only course by which the farmer can be saved from disastrous mistakes. The results of practice in different sections and on different soils have been carefully compared with the recorded opinions of the oldest and best of our own writers; and much valuable assistance has thus been received from such able, careful, and practical men as the Hon. Charles L. Flint, Secretary of the Massachusetts State Board of Agriculture, (to whom the reader is indebted for the valuable chapters on Agricultural Implements and Dairy Stock, in this volume;) John H. Klippart, of Ohio; S. Edwards Todd, of New York; Professors Norton and Johnston, of Yale College; J. J. Thomas, of Albany, New York; Norman J. Coleman, of St. Louis, Mo.; Lewis F. Allen, of New York; Robert Stewart, M. D., V. S., author of "The American Farmer's Horse

Book;" Henry S. Randall, L.L. D., author of "The Practical Shepherd;" George H. Dadd, V. S.; Andrew S. Fuller, Peter B. Mead, and Dr. C. W. Grant, of New York; George Hussman, of Mo.; Edmund Morris, of New Jersey; Donald G. Mitchell, of New Haven, Conn.; Charles B. Williams, of Va.; Joseph B. Lyman, of La.; Fearing Burr, Jr., of Boston, author of "The Field and Garden Vegetables of America;" Marshall P. Wilder, Robert M. Copeland, Joseph Breck, and Edward S. Rand, of Boston; Patrick Barry, of Rochester, New York; L. L. Langstroth, of Ohio, and many others. To all these gentlemen the author tenders his most sincere acknowledgments.

In writing this volume, the author has kept steadily in view the requirements of the East, the West, and the South with her fields newly opening to agricultural enterprise. That it will fully meet the wants of every farmer is too much to expect; but that it will more fully meet them than any other single volume is his hope and belief. With the sole desire that it may be of permanent value to his brethren of the Plow, the author commits it to the Press.

NEAR PHILADELPHIA, }
October 1, 1868. }

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Diseases Come to All—Simple Remedies efficacious in the first Stages—Preventive Treatment—Arrestive—Curative—The First the most Important—Foundation of Disease laid in Infancy—The Mother's Care—Terrible Consequences of Ignorance—Advice to Mothers—Dr. King's Twenty-four Rules for the Care of Infants—Teething—Thrush; Symptoms, Treatment, and Remedies—Convulsions—Fits—Treatment—Worms—Symptoms—Remedies—Summer Complaints—Easily arrested if Treated at once—Treatment—Infantile Remittent Fever—Treatment—Scarlet Fever, Scarlatina, Canker Rash—Symptoms, Treatment, Remedies—Measles—Treatment—Lung Fever—Croup—Treatment—Whooping Cough—Treatment—Colds—How Prevented—How Cured—Fever in General—Symptoms and Treatment—Fever and Ague—Typhus Fever—Typhoid Fever—Brain Fever—Diseases of the Eyes—Quinsy—Symptoms, Treatment, and Remedies—Bronchitis—Catarrh—Diseases of the Lungs—Oxygenized Air—Diphtheria—Symptoms and Treatment—Inflammation of the Stomach—Gastritis—Pleurisy—Inflammation of the Bowels—Dysentery—Inflammatory Rheumatism—Apoplexy—Sun Stroke—Asthma—Heartburn—Cholera Morbus—Constiveness—Headache—Dyspepsia—Scrofula—Piles—Suffocation from Drowning or otherwise—Simple Rules for Recovery—The use of Liquors—Exercise—Benefits of Exercise—Modes of Exercise—Time for Exercise—Simple Rules in regard to Exercise—Sleep—How and when to Sleep—Simple Rules in regard to Sleep—Prescriptions for the various Diseases named..... 729-746

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The building in the back ground is a bank Barn, the ground plan and description of which will be found at page 627.

The side buildings are sheds, as recommended and explained in Chapter III.

The pump in the centre is the manure pump, the use of which is enforced in the Chapter on Manures. The stock is all grouped together in the yard, although we of course recommend separate yards and stables for the horses and sheep. The horses represented are carriage horses; we could not spare the farm team from their work long enough to have their pictures taken.

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4 *Horseshoe Tile.*

5 *Pipe and Collar Tile.*

6 *The Span.*

7 *Stone Drain.*

8 *do. do.*

9 *Drained Field.*

10 *Draining Shovel.*

11 *do. do.*

12 *do. Spade.*

13 *do. do.*

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15 *do. do.*

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INTRODUCTION.

AGRICULTURAL LITERATURE.

BY HON. CHARLES L. FLINT.

AGRICULTURAL Literature!" we can imagine we hear the reader exclaim; "what has the barnyard, the cart horse, the milk pail, the plough, or the corn field, homely objects, interesting, no doubt, but by no means literary, to do with literature?" Much, let me tell you. More than appears at first sight, for in these subjects are found the results of scientific knowledge, of the great and immutable truths of chemistry, of physiology, of the laws of breeding, of mechanics, of botany, of entomology, in fact, of every science and of many arts.

What literature has done for theology, for astronomy, for all the sciences that elevate and adorn humanity, she is ready to do for Agriculture, the art of arts, to which we owe all the comforts of civilized life.

Says the editor of the "*Rural World*":—

"*Book Farming—what is it?* It is simply the best farming put in books—yours, reader, if it is the best. A fool cannot write a book; an able man must do it—not a man of mere

accomplishments or learning—but one versed in the business he writes upon. It is thus that we have books by the best men in all the departments. These make our literature—and to be opposed to them, is to be arrayed against knowledge, against schools and newspapers. What is thought of the man who opposes education? And what is education, but to learn to know a thing? If the prejudiced reader, (prejudiced against book farming,) knows how to trim his vine, he is the man, if he has words for it, to write a book on the subject—the very man we want, for we are after facts, after the best mode. And yet this would be called ‘book farming.’ It is mere prejudice, depend upon it.”

It is one of the most striking and encouraging signs of the present period, in the history of Agriculture, that it has been able to call the highest talent to its aid, and that men of science, in all departments, have devoted their lives to investigations designed to promote its progress. We can remember the time when even farmers themselves were quite indifferent to the assistance which scientific investigations could offer them. All improvements were regarded merely as innovations, and were looked upon with distrust, not to say contempt. Farm work was done in the old customary way, or if any change was made, it was only with a vague hope of gain. No sound principle was followed in either case.

Happily, those days have passed. Men of the highest attainments in science now vie with each other in their efforts for the advancement of agriculture, and the practical farmer is ready and anxious to avail himself of their teachings. Mechanical ingenuity, too, has brought its tribute in the form of newly invented machines of inestimable value. Progress has fairly begun, and it must continue as long as the mind of man can devise and his hand can execute.

No one who has carefully watched this progress in Agriculture, for the last few years, can have failed to observe that it is constantly growing more scientific, though not, perhaps, less practical. Its standard is continually becoming higher. It is now the aim of all intelligent farmers to unite science and practical skill. These two powers are not antagonistic, but each will aid the other, and by their help we may make ourselves familiar with the mysteries of nature and remove the worst difficulties which have beset the farmer in his work. The thinker in his closet, the chemist over his crucibles, and the earnest experimenter in the field, are laboring together for the discovery of truth, and it is only by their united efforts that the highest truth can be obtained.

The tendency of the age is to change. All educational systems are changing. Scholastic and monastic education is vanishing, and even purely literary culture is waning to make way for more practical, more active, more scientific instruction, an instruction which shall have a more direct bearing upon the work of everyday life, and the time will, perhaps, come, when even the children in our common schools will be taught to recognize and to know by sight all the stones upon which they tread, all the plants, and animals, and reptiles, and birds, and insects which are to be found in their neighborhood, so that they will go better prepared to the higher schools of science. The study of nature, in a word, will lie nearer the foundation of our school system, and so permeate all our higher institutes of instruction till our literature becomes more agricultural in its character, for what branch of natural history is not linked and interwoven with the farm itself, and what better preparation could there be, for, that practical training which our age demands? The time may, indeed, come, when mathematics, when geometry, when astronomy, will be taught by men who

are trying practically to draw lightning from the skies, and to devote knowledge to some use, rather than to the purpose of merely training the human mind.

Agricultural literature is, of course, utilitarian. It would be of little account if it were not. It is an important guide to develop the boundless resources of our soil, and it will always be valued as one of the most powerful aids to improvement in practice. Much of it may still be crude. We are groping along in the dark, but it is not difficult to see that a brighter day is dawning. Science and mechanic art are solving one problem after another; a better system begins to prevail, and we are led to hope that the time will come when we shall know practically and positively what we are to do, and how to do it, when every process of the farm will be conducted with greater certainty of results, when practice itself will have more of the exactness which is supposed to belong to the applied sciences.

It is the true province of agricultural literature to indicate the processes and to record the triumphs of science and mechanic art as applied to the promotion of agriculture, to bring to the knowledge of the farmer all the suggestions and discoveries of the chemist, the geologist, and the botanist, which can be useful to him, to make known the results of experiments by which new theories of culture are tested, and to show how the highest knowledge may be applied to the improvement of the common processes of agriculture, thus aiding the ceaseless struggle to meet the ever increasing demands of growing populations. It records both the failures and successes of the past, and teaches alike by both.

Take, for example, the principles of breeding. The stock grower needs to keep a clear and definite aim in view, and to understand the surest means of attaining it. The experience of any one man will go but a little way toward acquiring a

knowledge of these principles. Indeed, a life-long experience, without the aid of the acquisitions of others, would fail to arrive at it. Now, we know, that vast achievements have been made in this direction. Long continued, extensive, and careful observation has established many facts, and discovered physiological laws from which sound principles have been deduced. Others, no doubt, still lie hidden from us, so that what we do not know, may far exceed the aggregate of what we know, but to ignore what has been fixed and acquired by laborious experiment and observation, would be like setting sail upon a vast and unknown ocean without chart or compass. Now these facts of vital importance to the interests of Agriculture must inevitably be lost unless recorded, and thus saved from oblivion, and Agricultural Literature has done this.

A faithful record of an experiment in Agriculture, well planned and carefully conducted, is a valuable addition to our stock of knowledge, and contributes to the substantial progress of the art. In this especially our modern agricultural literature differs from the ancient. The agricultural literature of the ancients, including that of Greece and Rome, extends over a period of more than eight centuries. In literary merit and in social estimation it may have excelled our own, but it is somewhat remarkable that in all these eight hundred years, which have transmitted to us many volumes of great interest and value relating to Agriculture, we seek in vain for any sign of real progress. We find a practice that is careful, exact, and saving, but it is the same, age after age; no new implements are adopted, no old custom abandoned for better. We may search every page, from Cato to Palladius, a period of nearly five hundred years, but there is no mention of any improvement in system or advance of any kind, and it is doubtful if the whole of that long period added as much to the real productive

power of the farmer as has been gained within the last ten years of our own history.

In English agricultural literature, we find many marked and striking evidences of progress. This is especially true of the works of the present century. Within this time the minds of all have been awakened to a wonderful activity. Scientific men have developed important theories, which experience has proved to be true, while cultivators of the soil have done their part by careful observation, and discoveries have followed one another in quick succession. Every step, moreover, has been recorded. Every new machine invented, and every new process carried through to success, has been published to the world, and thus we have a multitude of works by which a flood of light is thrown upon every department of farm economy.

Scientific discoveries in Agriculture are the property of the intelligent farmer everywhere, and those made abroad have had a material and important influence in promoting the advancement of practical agriculture among us. No one who desires to be even moderately skilful and successful can dispense with the use of books relating to his calling. It is much to the credit of the present time that old prejudices against books upon farming, which are the recorded experiences of careful observers and experimenters, are fast giving place to a generous appreciation of the labors of the inventor, the chemist, the geologist, the entomologist, the botanist, and the practical man who tries experiments and records results.

For some years after the public mind, in this country, began to discard its narrow prejudice against the use of books on farming, we relied chiefly upon the mother country. English works on Agriculture were our only resource. These were not in all respects adapted to our climate, our soil, and our circumstances, and, notwithstanding their great value for many

purposes, their directions and suggestions often misled. Even when based upon sound practice, it was not a practice with which most of us were familiar, and hence it was far less valuable to us than if it had passed through the crucible of the practical American brain. The only means of removing these difficulties was the creation of an agricultural literature of our own; and this we shall accomplish by patient labor. We have begun to think, to experiment, and to record results. By the publication of agricultural periodicals and books, and by means of our agricultural societies, national, state, and local, the results of our labors are made known to all who care to learn them, and our agricultural literature is assuming the dignity and importance which it deserves as the instrument and aid of the most important material interest of a great and powerful nation, capable, from its extent and boundless resources, of becoming the granary of the world.

We do not mean to say that farming can ever cease to be practical, or that such a state of things would be desirable, if possible. But it is certainly becoming more a matter of study and science. No amount of information can do away with the necessity of hard work, but a knowledge of principles and the application of scientific laws is of the utmost importance to the farmer. When these are well understood, and when sound reasoning and close calculation are substituted for that mixture of tradition and guess-work, which once guided all farm operations, we may expect to lighten labor and shorten its processes while we continually increase its products.

Agriculture cannot be made profitable simply by securing good crops and abundant products; but it is necessary to take into consideration, also, the judicious employment of the capital invested, the expenses to be incurred, the wages to be paid, the prices, and the varying state of the market. These matters

have a most important bearing on the general results, but they do not come directly within the cognizance of science, and actual experience is necessary for the solution of the questions continually arising in regard to them. He who depends wholly upon books, even if he be well read and have thoroughly mastered the general and well established principles of his occupation, may fail from want of this experience. But this is far from showing that no advantage is to be derived from well selected books. It is unreasonable to expect that tact and business ability can be obtained from any amount of study and reading. Experience itself does not always give them. To a great extent they seem to be intuitive and innate, and though familiarity with business affairs may sharpen the wits and quicken the perception, it does not always mature the judgment or create the skill which commands success in the market.

Practice and experience in the field should, therefore, be regarded as an essential part of an agricultural education. But the farmer should not, for these reasons, depreciate the aid he may gain from the man of science, the man of letters, or the faithful and accurate experimenter. The revelations of science will bring ever new and ever varied instruction to his mind. From year to year he may improve his practice, thus attaining greater and greater results; and no limit can be set to his upward progress. A simple record of experiments, carefully made and well described, will give him material for much improvement. By the exercise of judgment and discrimination he may separate the good and useful from what is of doubtful utility, and whatever he thus gets is so much positive gain. The actual results of an experiment are facts from which truth itself may be extracted. They are not mere vague conclusions, or the opinions or reflections of another, they are that which induced and enabled him to reflect.

It must be borne in mind that, as scientific investigation has advanced in modern times, it has brought its contributions to Agriculture from a great variety of sources, each of which brings something peculiar to itself. Chemistry has explained the composition of soils and manures. Botany has solved the mysteries of plant growth. Vegetable and Animal physiology have lent invaluable aid. Geology, Mineralogy, and, indeed, all the sciences, have done their share, and the farmer has only to use the knowledge so lavishly thrown out before him.

In considering the value and uses of a high standard of Agricultural Literature, it is not to be forgotten that it tends to create enthusiasm, and must exert a powerful influence to draw and to keep the young upon the farm, and to stimulate them to constant efforts to attain greater excellence and success. In this view, it is hardly possible to over-estimate the value and practical importance of well selected works on agricultural and horticultural subjects. When any one begins to read what has been written by others about any pursuit, and to reflect upon the facts and theories he finds stated, when he learns the results of investigations and experiments, and sees the labor and care bestowed upon them, he will soon become interested himself. As he proceeds his interest will grow into enthusiasm, and this enthusiasm will give him a love for his occupation and a strong desire to elevate it and attain a high position in it. Hence, he will gain vigor and energy which will insure success.

The young farmer, like other men, is subject to these influences. If he work in his calling with enlightened views, looking at its scientific and theoretical side while attending to its practical labors, he will acquire the strong interest in it, and love for it which is so essential to success. His enthusiasm will keep him upon the farm, and carry him through its

labors, and he will be able gradually to infuse into others the spirit by which he is himself animated. Enthusiasm is contagious, magnetic, and all powerful. If scientific investigation and well-written books on Farming and Gardening had done nothing more than create a love for rural pursuits, they would have rendered an invaluable service to mankind. This they have done already, and the feeling they have excited is constantly growing. We find to-day, in our farming community, a more earnest spirit of inquiry and more interest in agricultural pursuits than at any former period, and these alone will lead us steadily and surely to higher results.

And what an influence the progressive character of an Agricultural Literature has exerted in another direction! It has attracted the interest and awakened the kindest sympathies of the wealthy and educated classes. Men who, by their energy and foresight, have acquired property or position, who once saw little in the hard realities of farm life but drudgery and mechanical routine, and looked with pity upon the farmer as one compelled to toil without intellectual culture, shut out, almost, from the amenities of life, have been led, by the fascination which this class of writings has for cultivated minds, to find in farming ample scope for the highest intellect, and problems worthy of the greatest efforts of human genius. This kindly sympathy has elevated the farmer in the social scale, given his occupation the character and dignity of an intellectual pursuit, and introduced him to a common brotherhood with men of culture, science, and social position. And so it should be. Agriculture is the mother of us all. "Agriculture feeds; to a great extent it clothes us; without it we should not have manufactures, we should not have commerce. They all stand together like pillars in a cluster, the largest in the centre, and that largest is AGRICULTURE!"



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.

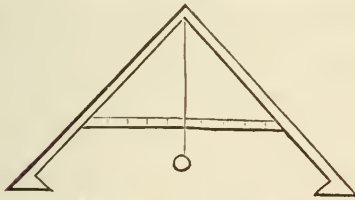


Fig. 6. THE SPAN.

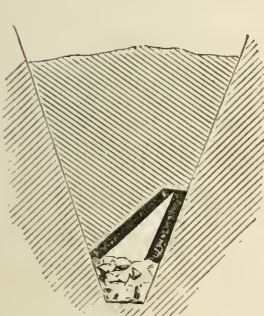


Fig. 7.

STONE DRAINS.

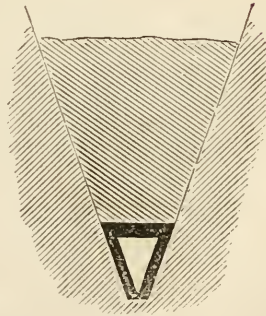


Fig. 8.

HOW TO MAKE THE FARM PAY.

CHAPTER I.

DRAINING.

UNDERDRAINING will improve three fourths of the land now under cultivation in this country; and full one half will abundantly pay for the expense. Drainage deepens the soil, assists vegetation, lengthens the season for labor and vegetation, precludes the necessity for replanting, prevents the freezing out of winter crops, promotes the absorption of fertilizers, supplies air to the roots of plants, improves the quantity and quality of crops and tends to prevent drought. These are facts established beyond all doubt, by multiplied experiments in nearly every state in the Union. The lesson this reads to every farmer is, *Drain your wet lands.*

The best of all materials FOR DRAINS is the round or pipe tile. See Figs. 1 and 2. Sole tiles, Fig. 3, are more expensive and more difficult to lay, and not as good as the pipe tile. Horseshoe tiles, Fig. 4, should never be used. The pipe tile is improved by having a collar, Fig. 5; but this can be dispensed with by putting a thin piece of board or slate under and a strip of turf over each joint, to steady it until its position is secured. Where tiles are scarce and high, and stones are plenty, resort

may be had to stone drains, which, if properly constructed, answer a very good purpose.

Where peat can be had for the digging, very good tiles can be made from it. Brush drains hardly pay for the making, and open drains are, as a general thing, a disadvantage rather than an improvement, as the expense of digging is the same; they take up a large portion of the land, render farming operations difficult, afford a harbor for muskrats and other pests, are liable to be tread in, or prove pitfalls for cattle, promote the growth of rank grasses and noxious weeds, and must be dug over every year.

THE DEPTH OF DRAINS, of whatever material constructed, should never, in the Northern States, be less than three feet, and if the soil is easily worked, four feet, while in the Southern States, where the frosts do not penetrate the ground, the depth may be lessened to two and a half or three feet.

WHAT LANDS REQUIRE DRAINING, and how it shall be determined, are questions we must answer before going further. Evidently swamps, marshes, and all visibly wet lands, require drainage before they can be profitably cultivated. All high lands holding too much water at any season of the year, require drainage. Most useful plants are drowned by being overflowed, even for a short time, and injured by stagnant water about their roots. Lands in which planting is delayed in the spring, by reason of their wetness, require drainage. In the Northern States nearly two weeks may be gained by thorough drainage, an advantage which only those can appreciate who have been obliged to haul their manure over soft ground, plow their land when too wet, and then find the season too short to mature their crops, and all because of a surplus of cold water in the soil. Land on which water stands and freezes in the winter should be drained.

In all these cases, thorough drainage will abundantly pay.

As we have before hinted, nearly all land will be improved by drainage; for the expense is a permanent investment, a brush drain will last ten to fifteen years, a well laid stone drain twenty to forty years, and there is no reason why a perfect tile drain may not last one hundred years. In all this time the crops are improved both in quantity and quality.

A distinction can be made in view of crops to be raised, as land that is too wet for root or grain crops, may do admirably for grass, and it is often well to keep such lands permanently in grass, maintaining their fertility by top dressing or by occasional plowing and re-seeding in the fall. The indications of too much moisture are, in grass, the growth of rushes and weeds; if it be in grain, there will be frequent spots of sparse, low, and sickly looking stalks. Root crops, in too wet soils, instead of growing straight down plump and even, divide into numerous small fibres just below the surface. Our corn fields are yellow and sickly, and our cribs filled with nubbins from the effects of too much water in the soil.

Drains should be laid as far as practicable, directly down the slopes. A fall of three inches in one hundred feet, is all that is absolutely necessary, and this can be secured on almost any field, however level it may seem to the eye. The best means of determining the slope is with the span, *Fig. 6*. This may be made of lath or inch boards, and should be sixteen and one half feet wide at the base. When set upon a perfectly level floor, and the plumb line applied at the top the line will cross the bar in the centre, put a block just one inch thick under one foot and mark the bar where the line now crosses it, this denotes a fall of one inch to the rod. This operation repeated, if done with care, will give a sufficiently accurate measure for the whole work of laying out and constructing the drains.

Next determine carefully the number and position of the drains. This is the most difficult part of the operation. A few general rules will aid you. As far as possible the drains should run parallel with the inclination of the slope. When laid three feet deep they should be forty feet apart; in sandy or light soils, they should never be less than four feet deep, and may be sixty feet apart. If other lands drain into the field, there should be a three-inch drain at the head across the whole field with which the smaller drains should be connected. For convenience we will call these, *head drains*, or *headers* and sub mains or *minors*; and the large drain into which they all enter, the *main drain*. If there are marshy places lower than the stream into which the drainage must be carried, they may be drained into wells dug at their lowest points. If you have no outlet in your own field, after it is drained into one main drain, it may be carried under a highway or a neighbor's field to some outlet, without great expense. If possible, there should be but one general outlet for the whole system of drains, as the outlets are the most exposed portion of the whole work. Having determined the proper point for an outlet, the whole work can be directed towards this point.

Fig. 9 represents an irregular field, which it seemed impossible at first sight to drain thoroughly, and as it illustrates the general principles of drainage, we shall describe it in detail, A was a sluggish stream almost stagnant; at the bottom of the field, *b* a knoll some nine or ten feet in height, *cc* an entirely useless swamp, *d* the main drain laid about forty feet from the brook, *EE* the minor drains sixty feet apart, and entering the main drain at an angle to prevent obstructions, *ff* wells into which the northwest and southeast corners were drained. It was thought at first that the southeast corner could not be drained, but on applying the span, it was found that there was

Fig. 7.

DRAINED FIELD.

a Brook.

b Knoll.

c Swamps.

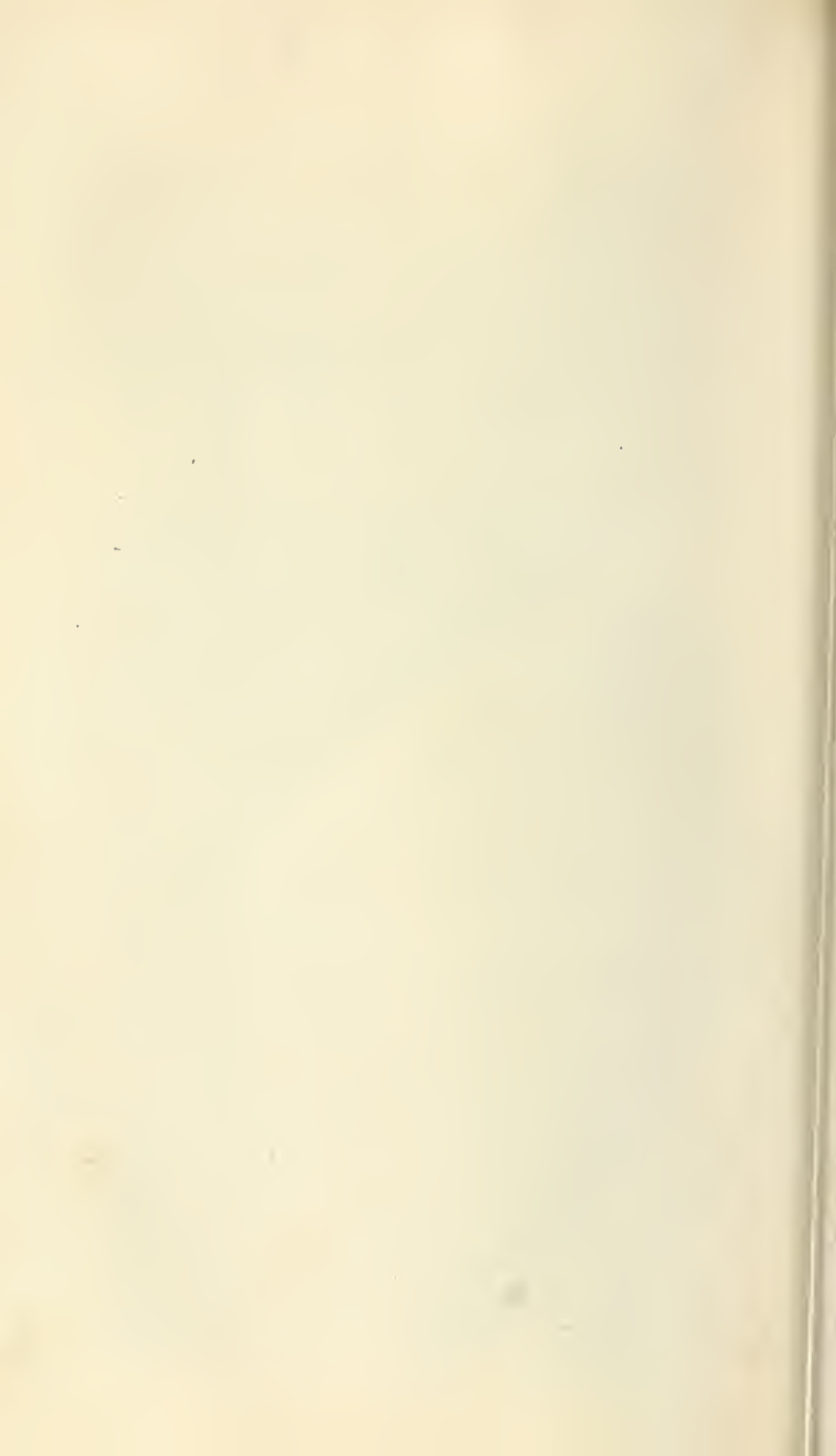
d Main Drain.

e Minors.

ff Wells.

g Highway.





a fall of six inches in one thousand feet, and by deepening the drains in the same proportion a fall of twelve inches was obtained, and during a very dry summer the well was dug and filled with cobble stones, and the minors connected with it. One drain which could not be connected with the main was carried under the highway, and connected with the brook at a lower point. The expense of draining this field of eighteen acres was,*

9600	1½ and 2 in. pipe tiles at 15.00,	say 150.00
3400	4 in. " " " 45.00,	" 150.00

The expense in cash \$300.00

51 days, work of 4 men, 6 days, work of 1 yoke of oxen.

The stones used in filling the wells, were dug out of the drains, and thrown to one side for that purpose. Much of the work was done at odd spells during two years. The increase in the crop paid the cash expense in two years, and the drainage is a permanent improvement for fifty years to come. If a peat bog had been at hand, a substitute for the clay tiles could have been procured for less than half the above cash expense. After careful measurement the positions for the drains should be staked out.

In opening the drain, a plow may be run through both ways, to turn over the turf and loosen the soil, and a sub-soil plow may be often used to advantage for this purpose, unless pipe tiles without collars are to be used, when the turf should be carefully cut in sods and laid quite to one side, for use in covering the joints. A drain to be three feet deep, may be commenced two feet wide, while three feet will be necessary for a four foot drain. Excavation must commence at the outlet,

* Of course only a small proportion of the drains is shown in this figure, but enough to show the general principles adopted.

the main drain being the first dug and the last laid. For a stone drain, cut one side nearly perpendicular.

Figs. 10, 11, 12, 13, 14, represent a series of spades used in digging drains; the ordinary shovel and spade answers, however, for the first three feet, but a narrow spade, like *Fig. 14*, is very desirable in cutting the last foot, while the bottom is fitted for the round tile by an instrument like *Fig. 15*. The instrument represented in *Fig. 16*, is used for shaping the bottom of the drain for sole tiles. Any old shovel or spade can readily be transformed, by the nearest blacksmith, into the required shape, and a long handle completes the tool. Much time and labor is saved by using tools of the proper shape, while it is necessary that the bottom of the drain should be as nearly uniform as possible.

It is desirable that the main drain should be from two to four inches lower than the minors, in order that they may enter it from above, rendering it less liable to obstruction at the junction. The slopes of all the drains should be as regular as possible, which may be regulated by the use of the span, *Fig. 6*. After completing the trenches, laying the pipe and collar tile (*Fig. 5*) is a simple operation of fitting one over the other, commencing at the highest point in all cases. With simply the pipe tile a small bit of shingle, slate, or thin board, should be put under, and a sod of turf over each joint, to hold them in place and prevent their settling, or the loose soil washing in at the joints. The earth will soon harden so as to obviate the necessity. Care should be taken to place the openings as nearly opposite as possible, in order that there may be no obstruction to the water. (With an instrument like *Fig. 17*, tile can be laid very rapidly.) Joint tiles should be used at the junction of the drains. The most accurate measurements



Fig. 10.



Fig. 11



Fig. 12.



Fig. 13.



Fig. 14.



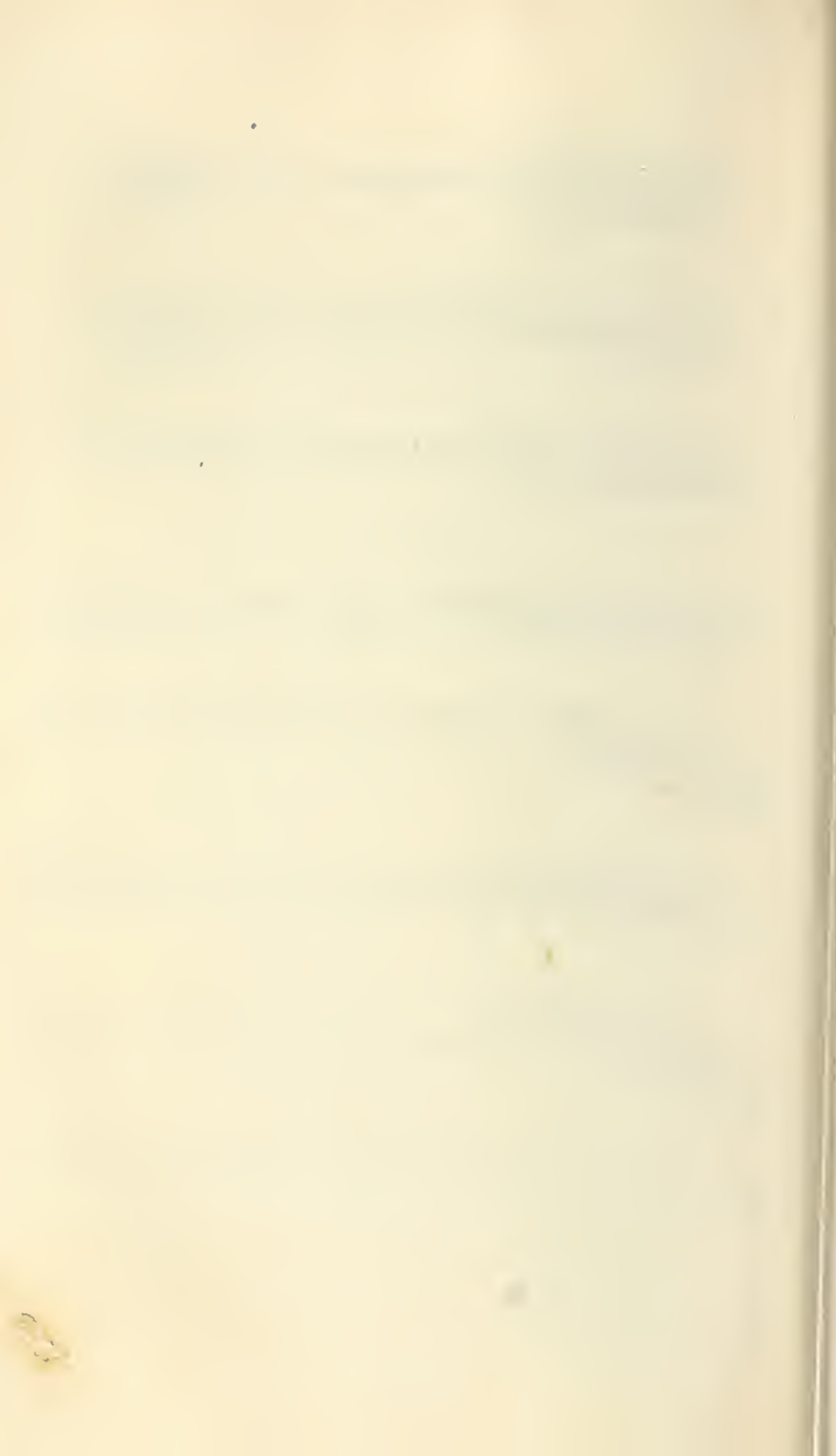
Fig. 15.



Fig. 16.



Fig. 17.



should be kept in order that the junctions may, at any time, be ascertained and readily opened should obstructions occur.

In covering the drain, the first foot of earth should be put in carefully, so that there may be no displacement of the tiles. Never fill in with stones, as is the custom with many. The water will enter at the bottom, and the water level be lowered to the bottom of the drain. In clay soils auger holes should be bored through the clay to some other soil at distances of not more than one hundred feet. If there is no header used, (*see Plate 9*), the upper ends of the drains should be carefully protected with a brick or stone, in order that no soil may be washed in, and particularly that neither moles, mice, or snakes, may find lodgment in them.

Of stone drains, only two styles that we have ever seen, are worthy of consideration in these pages. In the one represented in *Fig. 7*, the bottom is filled with cobble stones for a few inches. These are packed in with the pestle, forming a pretty solid foundation. Flat stones are then set up against one side, which is cut nearly perpendicular, other flat stones are leaned against these from the opposite side, the joints being broken as in laying shingles. If the fall is made uniform, the cobble stones packed evenly and hard, and the joints well broken, these form very serviceable and durable drains. Where the stones are to be had for the drawing, they are often the most economical. *Fig. 8* represents a drain made wholly of flat stones, and explains itself. Where the soil is firm, so that the stones will not be swallowed up, these make an excellent substitute for tile drains.

Where a peat bog is at hand, peat tiles may be made to answer the purpose of clay tiles. An open drain, from four to six feet deep, should be cut into the swamp for a short distance, and the surplus water removed. The upper surface

may then be removed to the barn yard, from twelve to eighteen inches of the top being useless for tiles. The simplest method of cutting out the peats is to lay out a plot, say twenty feet square on one side of the drain, then, with a sharp spade, cut this into strips, six inches wide from the drain, and these crosswise again eighteen inches long; then commencing inside the ditch cut out these peats at a depth of six inches. The peats will thus be six inches square and eighteen inches long, but will shrink in drying to about four by twelve inches. The inside of these peats must be hollowed out as soon as cut, and carefully laid out on boards to dry, with the hollow down.

Fig. 18.—Peat Cutter.

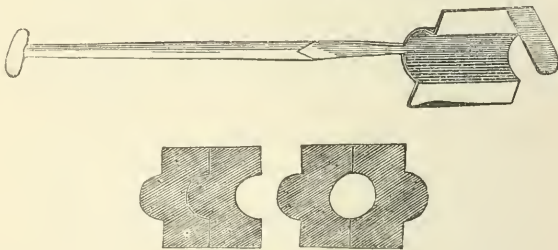


Fig. 19.—Peat Tiles.

An instrument for cutting peat tiles is shown at *Fig. 18*. This cuts the peats and hollows them at the same time, *Fig. 19*, and can easily be made from a stout piece of sheet iron. Drains are sometimes made by piling brush in the bottom of the trenches, and filling up with stones, but we doubt whether such drains last long enough to pay for the expense of ditching. They furnish a home to all sorts of burrowers, who soon obstruct them. This brings us to speak of the OBSTRUCTIONS TO DRAINS. As we have before hinted, all sorts of burrowers infest carelessly constructed drains. If the outlet is not protected, toads, frogs, snakes, muskrats, moles, and a host of

creeping things will soon take possession of them and render them worse than useless; but carefully protect the upper ends of the drain with bricks or flat stones, cover the joints with turf, or, in stone drains, with flat stones, and put an iron grating over the outlet, and you may feel pretty secure against obstructions. But the further precaution (as we have before stated) should be taken of accurately marking the entrance of each minor to the main, so that if there are obstructions their position may be ascertained. The outlet should be of stone so as not to be easily destroyed.

If it is nearly on a level with the bed of the stream into which it enters, a basin should be dug, in order that all sediment from the drain may be deposited in it and not set back into the drain. Care should be taken to have hard-burned tiles, as the crumbling of one tile will obstruct a whole drain, as will also a carelessly laid tile. Roots obstruct cobble stone and brush drains, but can hardly penetrate hard-burnt tiles or flat stones.

THE DRAINAGE OF SWAMPS sometimes requires very different treatment from that previously described. If the wettest part of the swamp is about the edges, a deep trench should be cut, not through the center, but around the outside, with an outlet at the lowest practicable point; after this drain has done its work of removing the surface water, shallower drains may be laid sixty to one hundred feet apart, and if the soil is clayey-auger holes should be bored down to the gravel beds. These auger holes should be a little to one side of the current of the drain. Thus far, we have been instructing the farmer to construct drains, with the means always at his command; we now come to the description of the various DRAINING MACHINES in use in different parts of our country.

THE MOLE PLOW works well in stiff clay soils free from

obstructions. It consists of a long wooden beam and stilts, but, instead of the share, has a long, thin iron shank, at the bottom of which is a short, pointed bar of iron, two, three, or four inches square, as the nature of the ground permits. This machine can be dragged through clay at a depth of from three to four feet, by means of a capstan and chain and a pair of horses or oxen, or by putting on five or six yoke of oxen. It leaves a narrow channel like a mole run, whence its name. A somewhat similar machine has been used, (and, we believe, may yet be perfected,) which also draws in the tile after it. A short section of trench is first dug, and then the tiles are strung on a rope and drawn through after the plow, and then the rope removed. We believe this to be entirely practicable, and we urge the propriety of continued experiments upon our western prairies until the idea is brought to perfection. There are various machines which cut a ditch two feet deep, leaving the last half of the ditching still to be done by hand.

In many hard limestone soils, where a regular system of drainage is impossible, there are points at which wells might be sunk and filled with cobble stones.

If these wells reach a substratum of porous soil they will drain quite an extent of ground. Experiments are required to prove the practical economy of this system of drainage.

THE SIZE OF DRAIN TILES is an important consideration, as prices increase with the size. The common mistake is too large minors and too small mains. One and one and a half inches is ordinarily large enough for minors, unless they are of great length, when the first half may be one and a half, and the latter half two inches. As the slope increases the necessity for size diminishes. The mains should be able to carry off all the water brought by the minors. But here, it should be remembered, that one three inch pipe is equal to nine one inch pipes

in capacity That is, all the water that can be brought by six one and a half inch pipes will be carried off by one three inch pipe. Taking the plan, *Fig. 9*, the first six minors discharge into a three inch main, the next six into a four inch main or into a second three inch.

Elaborate tables are prepared, by some writers, to show how many gallons of water will be discharged per minute by different sizes of pipe, but they are of no practical value to the farmer, as it is impossible to calculate the amount of water that they will be required to discharge in any given time.

The following tables give the number of tiles required per acre :

TABLE NO. 1.

Width between drains. Feet.	Length of drains. Rods.	No. of 13 inch tiles per acre.	No. of 18 inch tiles per acre.
20	132	2,011	1,452
30	88	1,341	968
40	66	1,006	726
50	52	805	581
60	44	671	484

TABLE NO. 2.

No. of acres.	No. of feet apart.	No. of rods of drain.	No. of acres.	No. of feet apart.	No. of rods of drain.
1	20	125	11	42	691
1	30	88	11	45	655
1	42	62	21	21	2,640
1	45	58	21	30	1,848
11	21	1,382	21	42	1,320
11	30	968	21	45	1,232

That is, in one acre with drains twenty feet apart, there will be about one hundred and twenty-five rods of drain requiring about two thousand thirteen inch tile.

TABLE NO. 3.

No. of rods of drain.	No. of 13 inch tile.	No. of rod of drain.	No. of 13 inch tile.
40.....	610	80.....	1,219
50.....	762	90.....	1,371
60.....	914	100.....	1,524
70.....	1,067		

Table No. 1 shows how many rods of drain are required in an acre at given distances, and how many tiles of given lengths are required. Table No. 2 gives the number of rods of drain in fields from one to twenty-one acres, with drains from twenty to forty-five feet apart. Table No. 3 shows the number of thirteen inch tile required for any given number of rods of drain.

NOTE.—We desire to return our thanks to George Jackson, *Superintendent New York State Drain Tile Works*, for assistance in illustrating this chapter, and to recommend to the farmers of that section the superior hard burned tiles made by that Company.

CHAPTER II.

PLOWING.

THE objects of plowing are, to pulverize the soil, to mingle the different portions, to kill weeds, to cover manures, and to keep the surface open and fresh.

The plowing which accomplishes these objects best, is the best plowing. Pulverizing being the most important, that system of plowing which pulverizes the most thoroughly and the deepest is the best. Gardeners understand this, and where they wish to raise fine vegetables and plants, they work the soil thoroughly and deep. Do the same on your farms. If you have been plowing twenty acres four to six or eight inches deep, make it forty acres by doubling the depth of your plowing; it is better and cheaper than to buy twenty acres. It is less work to raise thirty bushels from one acre, than from two or three. We do not mean by this, that eight inches of the sub-soil is to be turned to the surface, but that it is to be stirred up and broken up where it lies, by means of sub-soil plowing. If made with the common plow, the change from shallow to deep plowing would have to be made very gradually, as it will not do to throw more than an inch or two of the subsoil on the surface at a time, but even by deepening one or two inches each year, an entire change would soon be effected in the productiveness of our fields. Stronger implements and teams will be needed, but the increase of our crops will soon compensate us for the outlay.

Nearly every farmer in the country has a new farm under the old one: indeed if the desire for more land could be changed to a desire for deeper land, the number of acres under cultivation would soon be doubled. Root crops especially need deep culture. Those who plow six or eight inches and never subsoil, have but little idea of the size to which carrots, turnips, etc., will attain, when they have room to reach down. Try it. There are two kinds of deep plowing; trench plowing and subsoiling. The former often fails where the latter would be successful. Trench plowing is deep plowing, and turning the subsoil to the surface. This subsoil is often hard, cold, and wet, and it takes two or three seasons of manuring and cultivation, to render it productive. It is this kind of deep plowing which many have tried and condemned, for the reason above stated. But subsoiling is deep plowing and pulverizing, and stirring up the subsoil without raising it to the surface; this is always beneficial, except in the case of a very few sandy soils, with no basis of clay subsoil. Stiff clay soils are most benefited by deep plowing after thorough draining, but when filled with water, any kind of plowing in such soils is nearly useless. A wet clay cannot be pulverized, any more than so much dough. After a clay soil is drained, it should be plowed *always* in the fall, in order that the action of the frost may pulverize it. The later in the fall the better. Trench plowing on such land through two inches of snow has proved to be the most successful plowing we have ever done.

There are four ways of plowing sod ground, known as lapped furrow slices, flat furrow slices, round furrow slices, and trenching. To make lapped furrow slices with the common plow, shorten the traces, so as to just clear the heels of the horses when turning round. Adjust the guide so that the plow will run level and true, directly after the team. After turning

the first furrow which will be flat, drive the team close to the furrow slice, and lean the plow handles to the left until the furrow slice will just lap on the first one turned; after one round has been plowed, the plow can be gradually adjusted to cut just as wide or as deep as required, although on new land good execution cannot be done at a greater depth than seven inches. If greater depth is desirable, a double plow is better.

For turning flat furrow slices, a plow with a narrow base and broad at the top of the mould board, is the most desirable. The coulter should be set so as to cut under; and the handles inclined a little to the right. The slices must be twice as wide as their depth. This style of plowing is most suitable for bushy, rooty, and obstructed pastures, or other grass lands, where the double plow cannot be used to advantage. Trench plowing is done by putting a skim plow forward of the main plow on the same beam, which removes a thin sod, and lays it upside down in the bottom of the furrow, while the main plow turns up ten inches or more of the under-soil. This sort of deep plowing should be decided upon with caution. Except in light sandy soils, trench plowing should be done late in the fall. On most soils, two inches deeper each year is enough. The exceptions are light soils underlaid with clay, and old worn soils.

SOD AND SUBSOIL PLOWING is done with what is commonly called the Michigan Sod Plow, (an illustration of which, with all the plows, etc., mentioned, is given in the article on Agricultural Implements,) consisting of two plows on one beam; the forward, or skim plow, cutting not more than three or four inches deep, and the rear plow lifting the under soil to the depth of six or eight inches, raising it up, and laying it over the sod, breaking the soil well, and leaving a clean channel for the next sod. For the deep breaking up of all sod land, free enough of obstructions, this is the best method of plowing.

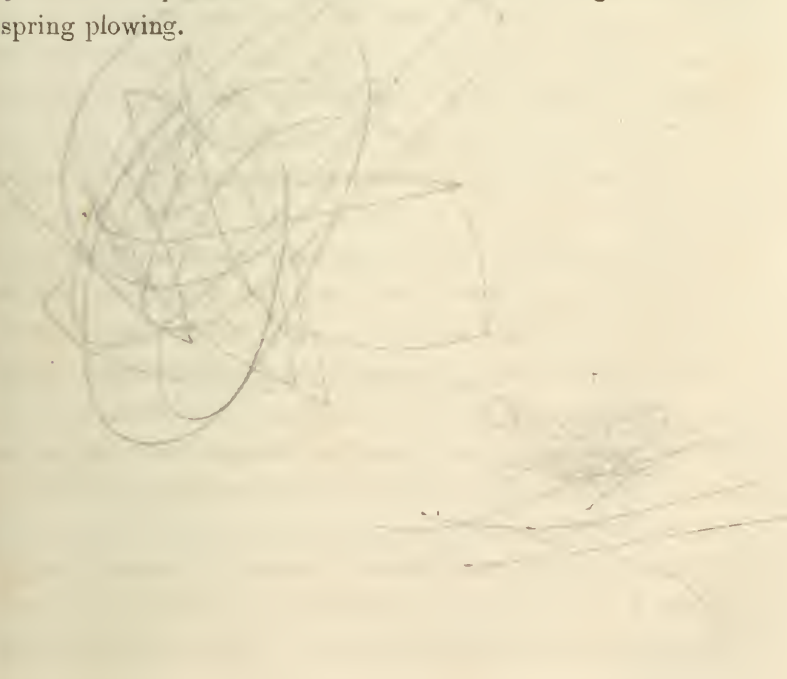
How to Subsoil. If you have but one team, plow one furrow round the field, or such portion of it as you wish to plow; then hitch to the subsoil plow, and go round again in the same furrow. As the subsoiler does not raise the earth to the top, but only pulverizes it where it lies, it can safely be run as deep as your team can draw it. A span of horses, or yoke of oxen, will draw a subsoiler from eight to fourteen inches deeper than the first cut. In preparing orchard grounds, the subsoiler is often run eighteen to twenty inches deeper than the first cut. When the plow cuts a wide furrow, the subsoiler must be run twice in the same furrow. It is all the better to use the subsoiler also in cross-plowing. Subsoiling in this way, for two or three years, will mellow the ground for fourteen to eighteen inches deep, and the subsoil may then be turned to the surface by trench plowing. In subsoiling, you must keep a sharp eye on your plow. It is of little use to subsoil wet, heavy lands, until they have been under-drained. Many valuable acres would be added to our farms if we would underdrain and subsoil these lands, at much less expense than to buy new acres.

Underdrain as soon as possible, but until your drains are completed, plow your wet lands up and down the slope, in narrow divisions, sixteen to twenty feet wide—not with flat furrow slices, which give the land no chance to drain, but with lapped furrow slices. After these divisions are completed, run the plow as deep as your team can draw it through the middle furrows. Then, with a round-pointed shovel, throw out the loose dirt from them, and you have free channels for the surplus water to run off. It is not so much extra work as it seems, and will abundantly pay.

The time for plowing has been hinted at in the preceding pages, but we would say distinctly, here, that all hard, heavy soils, inclined to be lumpy, should be plowed in the fall as late

as possible. The frost will pulverize the lumps, and the worms, hid in their winter quarters, will hardly have life enough to find their way back again. All soils, except light, sandy, or gravelly soils, that are already too porous, had better be plowed in the autumn.

Harrowing is fine plowing, and is only second in importance to it. The harrow is designed to complete the pulverization of the soils, and, as we have said before, the more completely this is done, the better, for many reasons, which we do not need to state. Be as particular to harrow, where the soil is in good condition, as to plow. Harrow your land until the lumps are gone. Lumps are as bad as stones. More so; for they hold plant food, that the plants will get at if the lumps are pulverized. If the harrow will not do it, roll it and harrow it until the object is accomplished. Use the roller also on light soils after spring plowing.



CHAPTER III.

MANURES.

NEXT to thorough draining, the great lack, in American farming, is a proper economy and application of manures and fertilizers. By manures, we mean that produced on the farm; and by fertilizers, guano, phosphates, and the like. And no farmer should buy any fertilizers until he saves and applies his manures. From extensive observation, we conclude that not one farmer in one hundred makes the most of his manures. The urine of a cow is as valuable as her dung; and not one farmer in one hundred saves it. The urine and excrement of each member of the family is as valuable as that of the cow; and yet it is not cared for.

Such waste of valuable food for crops cannot be too strongly condemned.

Our object, then, in this chapter, will be to show the farmer how to save and apply manure. And we begin where there is the most general and inexcusable waste—at the privy. The urine and excrement of each member of the family is abundantly sufficient to fertilize a half acre of land yearly. The simplest way to save this, where the vault can be opened, is to cover it with five or six times its bulk of peat or muck once a week. But a much better way, is to have a shallow vault, with a cemented or tight board bottom, sloping to one corner, from whence there should be an ample drain leading into a cesspool at convenient distance from the house. Into the upper corner

of the privy vault should run the drain from the sink, not only to save the washings of the sink, but also to keep the vault washed out, and to dilute the urine, which renders it more valuable. Of course, a brick or stone cesspool is the most durable, but an oil butt, or hogshead, sunk in the ground, forms an economical substitute. The place may be hidden from public view by a row of dwarf trees, pines, or spruces. Near it should be hauled peat, muck, leaves, straw—any kind of vegetable matter—and the contents of the cesspool poured on to it. For this purpose, a long-handled dipper may be constructed of a keg or firkin. When this heap is thoroughly saturated, fork it over, haul it away, and bring new material. Peat will absorb more ammonia than any other soil, and is therefore the most valuable for this purpose. The manure thus made will be worth more than the same amount of the best barnyard manure. Don't pay a dollar for fertilizers till you have made the most of this valuable matter right at your elbow. Proceed about it at once, for it is money wasting every hour before your eyes.

THE BARNYARD must always be the farmer's main source of supply for manures. And here, as in the previous case, the almost universal mistake is in the waste of the urine, the liquid manure. The urine of most animals is nearly, if not quite, as valuable as the solid manure; but it is usually allowed to go wholly to waste. And, more than this, it is allowed to carry away with it many elements of fertility from the solid manure. We protest, in the name of the hungry lands, against this waste of vegetable food, of the best quality. And we not only protest, but shall give practical directions for saving it.

Every farmer should soil his cattle in the stables or in the yard. A cow will produce about three and a half cords of solid and three of liquid manure; this, absorbed in twice its bulk

of peat or muck, makes twenty cords of manure worth from five to eight dollars a cord. This mixing can be done just as well in the yard, as to shovel the dirt in and out of the stables. All stables should have tight floors, and be so laid that the liquid will all run to one point, where there should be a manure well, which can be made by sinking a hog-head. The liquid is made more valuable by being diluted with water, and the stable-floors should be washed down occasionally with a few pailfuls of water. The barnyard should also be graded to one corner or to the centre, and another manure well sunk at the lowest point. Every barnyard should be surrounded on three sides by sheds with eave-troughs to carry off all the rain water, which would otherwise wash away the wealth of the yard.

Under these sheds, the solid manure of all the animals, together with the litter from the stables, with double its bulk of peat or muck, should be evenly spread every week, and the liquid manure from the wells dipped or pumped over it. Light troughs may be made to carry it from the pumps to any part of the yard.

The liquid manure is thus not only saved, but helps in the decomposition of the solid and prevents it from becoming heated or fire fanged. Manure thus treated will be doubled in quantity and doubled in quality. The yard should be kept well supplied with peat or muck. We repeat that no farmer can justify his purchase of fertilizers until he has used these simple and comparatively inexpensive means of increasing his home manufacture.

The Horse stable is especially apt to be the scene of this waste. The manure of the horse contains a large amount of ammonia, (which is the best of all fertilizers,) and less moisture than other manures, and is therefore much more likely to

neat and becomes fire fanged. When it becomes heated and mouldy its value is nearly all gone. It is hardly worth carting to the field. Horse manure should never be kept in a pile by itself, it should either be spread evenly with the other manures, or muck, and kept moist with the liquid from the manure well. Water and muck are the universal absorbents of ammonia, and should always be plentifully supplied to the manure heap.

The Piggery and Hennery should also be kept well supplied with peat or muck, which in the Hennery should be kept moist. The manure, both liquid and solid, of fattening pigs, being especially rich, should be especially cared for; enough soil should be shoveled in every day to absorb all the droppings; it should be protected from the rain and sunshine; and whenever practicable should be mixed with the barnyard manure before spreading.

The pig will work over the soil, pulverizing it and adding at the same time to each particle the most valuable fertilizing ingredients ready to be dissolved for the use of the plants; for it must be born in mind, that in the end nothing but liquid manures can be of any value to the plants. The roots can take up nothing but liquids. Every solid particle must be reduced to a liquid state before it will be available to the plants. Therefore the more thorough the decomposition of the manure the sooner and the more surely will it reach the plant; and the more moisture the manure absorbs the more readily will it dissolve in the soil and be taken up into the crops.

Barnyard manure, prepared as above, contains all the elements of nutrition needed by any crop.

It does not always contain them all in sufficient quantities for a succession of crops, and here is where the fertilizers come in as aids. But before discussing this subject we will speak of the application of manures to the soil.

The general principle of application is that manure sinks

into the soil, and the roots catch it and appropriate it on its way downward. Surface manuring is often very effective, and manure covered so deep as to be for the most part beyond the reach of the plants is valueless. It will never rise again to the surface, and is lost. Manure should be put, then, as nearly as possible where it is to do its work.

For light grasses it may be spread upon the surface and will soon reach the roots which are near the surface. Manure for this purpose should be as thoroughly pulverized and as evenly spread as possible, and applied in the fall before the frosts; if green manure is used, the unrotted straw, cornstalks, etc., should be raked off with a horse rake in the spring. We think this method gives the best results of any on light grass lands. Manuring such lands in the spring we have found to be very much less effective.

For nearly all other crops, manure should be well decomposed and plowed under, or thoroughly harrowed and cross-harrowed into the soil after plowing. No time can be set for applying manures, for every farmer has, more or less, to consult his own convenience as to the time.

Having recommended fall plowing, we recommend, as far as practicable, fall manuring with green manure, as it is at present managed: but if we could persuade every farmer to adopt the system we have advised, of thoroughly composting his manures, under cover, with peat and liquid manures, often forked over, and thus ready at once to give up their fertilizing elements to the plants, we could say emphatically, manure in the spring, except surface manuring of light grass lands. This housing of manure through the winter is the best economy. By actual and oft repeated experiments we have proved that manure thus protected will produce double the crop that unprotected manure will. This is nearly all clear gain; there is

no more expense for seed or tillage, but little more for cartage; the only increase of expense is in harvesting double the crop. Pitching manure and forking it over is very laborious work, but if our plan of mixing with muck, and keeping moist, is followed, it will fork over much more easily, and in the spring will be so thoroughly decomposed that it will readily fall in pieces, and the labor, both of loading and spreading, will be much lessened. There will be no hard, dry lumps to be knocked in pieces, or left like pieces of brick to retard rather than aid the growth of the plants. Try it, if you are incredulous, on a small scale at first, and you will find in it a new source both of pleasure and wealth.

We wish here to say a few words about pitching and spreading manure. Use a long handled dung fork in loading manure, using the handle as a lever across the knee. In distributing it in the field, never dump a whole load in a place. Many small heaps are better than a few large ones. They should never be more than a rod apart. If the manure is left on the field through the winter, do not leave any where the heap stood in the spring, as enough fertilizing material will have washed into the soil at that spot. If the manure has been composted according to our plan, it can be very evenly distributed, in spreading; but if it has lain and dried hard, the laborer who spreads it must go all over it a second time to knock the lumps in pieces. Once more we say, that, as the barnyard is the farmer's main source of supply, it is his bounden duty, as well as his greatest profit, to save and make the most of it. But there are many other materials on your farms that you must use before you can justify the purchase of fertilizers, and foremost among these is PEAT OR SWAMP MUCK. We shall use the term peat as covering swamp muck and marsh mud also. These are a valuable amendment to two entirely opposite kinds of soil, viz:

light, porous, sandy soils, and heavy, clayey soils. In the former the peat binds the soil together, acts as a sponge to hold moisture, manures, and gases for plant food, warms the soil by absorbing the sun's rays, while at the same time it cools more rapidly at night, and collects the dew so necessary to vegetation in hot weather. In clayey soils it separates the particles and renders them more porous. Its second source of value is as a compost with the manure of the yard. It absorbs and retains the ammonia, the most valuable element of manures; it also holds the moisture necessary to keep the manure heap from heating and becoming fire fanged.

By its use, and only by its use, the farmer is enabled to save the liquid manure. We do not hesitate to say that, properly composted with one half its bulk of solid and liquid stable manure, it makes an article each cord of which is equally valuable with any cord of the original manure.

The excavation and preparation, then, of the peat, is an important matter.

Every man's circumstances must determine the time and manner of getting out peat. The month of August, is all things considered, the best time. But most farmers will have to put it off till winter, as labor is cheaper, and there is less hurry with other matters on the farm. It should be thrown into a pile upon loose boards, and covered with loose boards, leaving it to the action of the air for several months before it is carted to the yard. An excavation should be begun at the border of the marsh in the autumn, and continued into it sufficiently wide for a cart path, and the muck thrown out in piles on each side. By the succeeding autumn this will be seasoned enough to cart away, and can sometimes be done on the surface, or waiting until the ground is frozen, can be readily hauled to the vicinity of the barnyard. It is better to get out enough at

one time to last for several years, and have it convenient for constant use.

RED CLOVER is one of the most convenient, effectual, and economical fertilizers that can be used for improving the fertility of an impoverished soil. Its long tap roots reach down into the soil, absorbing fertilizing influences that are beyond the reach of ordinary vegetation, and bringing them to the surface to form the stem and leaves. These roots make the soil more porous than before, and in decay leave a large amount of vegetable matter for the food of the succeeding crop. Its leaves absorb a large amount of ammonia from the atmosphere, and if plowed under at the proper time, this is all secured for the soil. For plowing under sow the large clover and plow it under when it is ripe, just as the blossoms begin to change color. Do not be tempted to cut the crop for hay. Lime or plaster should usually be sown with the clover in small quantities, and on many lands this is all the fertilizing that is needed. It is always an economical and valuable aid to the barnyard. On many barren hill-sides, red clover, plowed under, will effect a change in the soil which no other fertilizer could produce so quickly or so economically.

Every thing that can make manure should be saved. Leaves, litter, chip-dirt, saw-dust, ashes, bones, waste salt, soot, should all be put into the compost heap. Soap contains a large proportion of fertilizing matter. In a barrel of good soft soap there is enough to produce a half a ton of good hay, or several bushels of grain. After this soap has been through the wash tub, it is more valuable than before. It is in the very best possible condition to be applied to the soil, yet it is usually suffered to run off into some slough hole or stream and wasted. Construct your privy vault on the plan we have advocated, and run the sink spout into it, for such waste is inexcusable.

Wood ashes is a very valuable manure, and much of it can be saved at home. They are nearly as valuable after being leached as before, if they are used immediately. The longer they stand after being leached the less valuable they become. They are most valuable for sowing on grass lands, and for cereal grains. They give stiffness and strength to the straw; one hundred pounds of ashes being sufficient for the production of three thousand pounds of good straw. When sown they should be a little wet, or else sown on a misty, damp day, or they will blow away. When used on potatoes they should be thrown evenly all around the hill, where they will reach all the roots. When sown on any root-crops, care should be taken to put as little as possible in contact with the leaves or stems. There is no danger of using too much ashes; but their use should always be accompanied by manure, muck, or the turning under of clover. Ashes mixed in the compost heap assist in the decomposition of elements, which would otherwise be useless, without destroying their efficacy. We, therefore, advise this method of application, except when sown on grasses and cereal grains. Ashes give compactness to light, sandy soils, and render heavy clay soils light and friable. About the best use to which ashes can be put on the farm, is in dissolving bones. Put a layer of ashes in the bottom of a barrel, then a layer of bones, then another of ashes, and so on until the barrel is full, then keep the ashes wet with soap-suds, but not wet enough to leach.

Never deposit ashes in any bin, box, or barrel, until more than a week after they have been taken from the fire. Many a barn and farm-house has been destroyed by neglecting this precaution. The bottom of a dry cellar is a good place to keep wood ashes, but a bin of brick or stone is better. If put out doors they should be at a distance from any building or fence.

and covered with loose boards. Most insurance policies are forfeited by keeping ashes in wooden vessels.

Bones are the very cream of manures. Our best crops are all the time going into bones. Some way should be contrived to get it back. There are large manufactories where bone dust is prepared, but the best part of the bone is boiled out, and the remainder is adulterated with shells, lime, plaster, marl, sand, etc., and sold for sixty dollars per ton. Never buy any of this stuff. Put a molasses hogshead in your back yard, cover the bottom with peat, muck, or mellow soil, cover this again with ashes four or five inches deep, into this throw all bones from the kitchen, and all that you can hire the small boys to collect for you at ten or fifteen cents a bushel. All the large bones should be broken before they are put in. When there are eight or ten inches of bones, cover them with ashes, then soil, or muck, then a thin spreading of plaster. Let this mass be wet with soap suds occasionally. The alkali of the ashes dissolves the bones, and the muck and plaster absorb the gases. Contract at the slaughter house for the skulls and other bones, and furnish a sugar hogshead to receive them.

When there is a large quantity they must be crushed by machinery, an ordinary grain mill with horses will grind one thousand pounds per hour. The ground bone of commerce sells for three dollars per hundred, and the bones a farmer would collect and grind would be worth twice as much. One hundred pounds of bones contain enough phosphate of lime for twelve thousand pounds of hay. The finer they are ground, and the more thoroughly they are mingled with the soil, the better.

Some farmers can secure spent tan bark near home, and at little expense. It should never be used on light or porous soils. The true way to use it is as a litter. It should be put under cover until dry and then spread in the stables, or the pig pen.

It will absorb and retain a large amount of liquid manure. It makes excellent bedding for all animals except sheep, as it gets into their wool. When used in the piggery it makes a most valuable top dressing for grass or grain. In the preparation of the soil for root-crops, tan bark prepared in this way will supply an abundance of those salts essential to their rapid and luxuriant growth. The same remarks apply to saw dust, turning shavings, planing mill shavings, etc. They should never be put into the stable wet.

The carcasses of dead animals should never be left for the crows to pick. Cover the carcass six inches deep with muck, and allow it to decompose, which will take six months or a year. It may be placed within sight of the house, as, if covered thoroughly, the muck will absorb all the ammonia and other gases. Watch it a little at first, to see that dogs and crows do not uncover it. After having lain through a summer, fork over the mass, and throw out the bones, add a half bushel of plaster and another load of earth, and leave it another month or two; it is then fit for use and worth more than an equal bulk of barnyard manure. It should be spread very thin and well harrowed in.

Other green crops, besides clover, are turned in for manure, although we consider clover the best when it is to be turned in on the land where it is grown. Indian corn and buckwheat come next in value for this purpose. When fields are at a distance from the barnyard, this is often a most economical method of manuring. Four things must be observed in raising green manures. Those plants must be used whose seed is cheap; which are sure to succeed and grow very fast, which are deep rooted, and contain no substances which will be injurious to the succeeding crop. Usually five or six bushels to the acre of lime, plaster, or ashes, should be sown with the seed, or just before the crop makes its appearance on the surface. *Vetch* and

white lupine are valuable on all except limestone soils, turnips are good on all soils, either plowed under or fed to sheep on the land. Spurry is valuable on sandy soils, as it grows fast, and two or three crops can be secured in a season.

There are many plants which can be used for this purpose, both annual and perennial, the latter having the advantage of saving the seed after the first season. In plowing under crops on the soil where they are grown, a chain is attached to the end of the whiffletree of the off horse, or if oxen are used, to a stick bolted into the plow beam for the purpose, and the other end hitched to the beam near the standard; this will draw the plants into the furrow to be covered up by the furrow slice.

We take the following from the transactions of the New York State Agricultural Society on HUSBANDING MANURES:

“Where sufficient has been reserved for arable lands, barnyard manure may be spread upon pastures and meadows under the following restrictions. If spread early in the spring on pastures for immediate use, it should not be the droppings of that species of animals intended to be placed in the pastures. Coarse manures should never be spread upon meadows in the spring. It may be evenly spread on meadows any time after harvest, and bushed in. When spread the atmosphere should indicate the absence of high winds, the approach of rain, or damp weather. On rapidly sloping lands, a heavy top dressing should be applied near the summit. No manure should be applied to the surface of hill-sides in winter, when the ground is frozen, as it will be likely to be washed away.”

“On farms whose principal staple is grain, where the straw is in excess in the barnyard, it should be spread profusely, trodden down by the cattle, mixed with their droppings, kept moist with liquid manure from the manure tank, and thus thoroughly decomposed before it is applied to the soil, else the

straw of the crop will be in excess of the grain. Where there is a scarcity of straw, muck, leaves, tan bark, and sawdust, will take its place as absorbents, and stall feeding resorted to. Where there are many sheep, they should be kept under sheds, with small yards attached.

“By the use of peat, muck, etc., for soiling, the straw may be saved for food, cut up, mixed with feed, thoroughly wetted and allowed to stand a few hours before being fed, for which purpose it is twice as valuable as for litter.

“In this way a larger number of animals can be kept upon the farm, and a much larger mass of manure made. Horn piths, from the tanneries, waste from the woolen mills, scraps from the shoemakers, charcoal from the pits, and all vegetable substances, should be secured by the farmer for his crops.”

It is often desirable to use liquid manures for special crops, gardens, etc. It can always be made by soaking barnyard manure in several times its bulk of water, or by diluting urine with three or four times its bulk of water.

After having saved and made the best application of all his home manures, the farmer may be justified in purchasing fertilizers as aids, but seldom as a main reliance. When tempted to pay sixty dollars for guano, look carefully to see if the same amount of money cannot be better invested in the barnyard, in permanent improvements which will enable you, for years to come, to save the liquid manure. Where sixty dollars is wanted for bone flour, calculate if a much better article than the article of commerce cannot be made at home for less money. If poudrette calls for money, ask yourself if a less amount of money will not make the improvements we have suggested, by which the privy and sink spout shall be made to contribute their valuable supplies for many years to come. For every dollar you think of putting into super-phosphates,

can you not haul a load of muck to your privy, piggery, or barnyard? When you cannot, we recommend the use of fertilizers. We have no doubt of their value; and first among them, by common consent, is *guano*, or the droppings of sea fowl, which has been accumulating for ages on certain islands of the sea. In its pure state it is one of the most powerful of fertilizers, and should never be applied successively to land, unless with barnyard manure or green crops plowed under, as it will force such large crops as to exhaust the soil. The best and safest way to apply guano, is to dissolve it in water, a few pounds to a barrel of water, and apply it with a dipper, but this cannot be done on any extensive scale, and it must usually be sprinkled by hand. In either case, care must be taken that it does not come in contact with the leaves or stems. If applied before planting, a handful should be sprinkled over an area of at least eighteen inches, around where the hills are to stand, and dirt sprinkled over it. It is useless to drop a handful in a place or to leave it uncovered. Indeed it is positively injurious when applied in this way, and many crops of Indian corn have been spoiled, and guano brought into disrepute by such a course. Many fields, at a distance from the barnyard, may be kept in a state of fertility by the application of guano, alternating with the plowing under of clover or other green crops. We cannot recommend the practice of sowing it broadcast and harrowing it in until it becomes much cheaper than it now is. Hen manure is of the same nature as Peruvian guano, and when the droppings of the hens are absorbed in peat or muck, an article is formed worth more, pound for pound, than the adulterated guano of commerce.

Fish guano is the product of the millions of fish that are caught every year along our coasts, the oil being extracted from them by steaming and pressure. It contains much phos-

plate of lime and ammonia; composted with salt marsh mud, these fish are a valuable fertilizer.

LIME is a necessity in Agriculture. If the soil is destitute of it, it must be supplied. Of itself it gives no fertility, but it assists in decomposing the organic vegetable matter in the soil, in fixing and retaining the ammonia of the manures, in destroying the acidity of the soil, (the worst foe to productiveness,) in pulverizing granitic soils, in lightening heavy, clayey, peaty soils, and in other ways is a valuable assistant to the farmer. When a large amount is to be used upon a field, it may be dropped in small heaps, and slacked by the air, rain, and dew, and spread with shovels, but where only ten or twenty bushels are applied to the acre, it should be more thoroughly slacked. This may be done by spreading it on the cellar bottom about one foot deep, and let it air-slack for a few weeks, forking it over every few days, and sprinkling a little water on the large chunks. We advise spreading it on the cellar bottom, as much the best place, but if not convenient, a covered shed will answer the purpose. If it is to be sown with a machine, the flint and stones should all be raked out. Cooper's lime spreader, or some other machine of like character, spreads it more evenly than it can be done by hand, and is equally useful in sowing ashes or plaster. (See *fig. 45.*) The best plan is to sow fresh slaked lime, in the finest possible condition, and immediately harrow it in thoroughly. Do not plow it under. The amount of lime to be sown to the acre, can only be determined by experiment. A few bushels to the acre cannot injure any soil. On dry clay or peaty soils, it may always be used bountifully with good effect. Underdraining is the first requisite for wet clays and manures, and fertilizers are wasted until this is done. When the proportion of vegetable matter in a soil is so great that crops of grain go mostly to straw, a liberal

top dressing of lime will rectify the evil, and improve both the quantity and the quality of the grain.

All old pastures and grass lands may be improved by the application of lime or ashes, as a top dressing. Our western prairies, long cropped, will improve by liming. As we have said, when the soil is acid, a liberal supply of lime will destroy the acidity, and thus supply food for plants. It may be applied to potatoes, and other root crops, on almost any soil, with good effect. If lime is needed, and is near at hand, supply it bountifully, but if lime is not plenty, apply a few bushels, say ten or fifteen each year, rather than a large amount at once. None of it will then be lost. The heavier the soil, (except when wet,) the larger the quantity of lime that may be sown. On light and sandy soils, the application of ten or fifteen bushels per acre once in five years, alternating with the plowing under of green crops, is often all the manuring that is necessary to keep them in fertility, although an occasional dressing of barnyard manure, well composted with muck, is still better. A few cautions are necessary in regard to the use of lime. Do not apply water too fast when slacking. Do not use unslacked lime. Keep it near the surface. Mix it well with the soil by harrowing. When applied to growing crops, be careful not to bring it in contact with the leaves or stems. Sprinkle it thinly all about the plants, and not in small heaps.

Gas lime, which is often thrown away and wasted at the works, is the most valuable of all fertilizers. In compost with strawey manure, or mixed with barnyard manure when it is applied to the soil, it is better than fresh lime, as it comes from the purifiers powdered and highly charged with ammonia.

GYPSUM, PLASTER OF PARIS, SULPHATE OF LIME; substantially the same article under three different names, is an important addition to our already large list of fertilizers.

It should be ground very fine, the finer the better, as it must be dissolved before it can aid the growth of plants. It is used as a top dressing on pastures, grass, grain, and growing crops. The nature of the soil, as with other fertilizers, determines its value as a fertilizer. A soil already full is not benefited by more; an exhausted soil cannot be expected to become fertile by its application alone, but it will greatly aid barnyard manure; cold, wet soils must be underdrained before it will benefit them. But farms either sandy, gravelly, or loamy, if also well dunged, are greatly benefitted by plastering. Manuring a poor soil with nothing but lime or plaster is simply folly. Using plaster with manures is wisdom. Do these fertilizers exhaust the soil? Such is a very common opinion. We reply, nothing put into a soil can exhaust it. It is the increased crops that are taken off the soil that exhaust it. Barnyard manure or green crops should always alternate with any of the fertilizers. Whatever may be the article; guano, bone flour, poudrette, superphosphate, or gypsum; remember you pay a very large price for a very impure article and only use it where, after the most careful economy, your home-made manures fail to be sufficient. In applying any of these fertilizers, care should be taken that they are thoroughly incorporated into the soil. *Pulverizers*, such as effective harrows, clod crushers, and subsoilers, assisted by thorough drainage, may be made of greater benefit than all the guano that is imported.

Before leaving this subject, we will give our idea of the proper formation of the compost heap. When it is desirable to form a compost heap of weeds, straw, litter, leaves, etc., with muck, without the addition of much dung, ashes and lime, or plaster, should be sprinkled in at the rate of a bushel to each layer. We recommend the long narrow heap rather than the round one. Spread muck at the bottom six inches, then litter

or yard manure six inches, sprinkle with plaster, and cover with muck. Continue this until the pile is three feet high. If dung is added in any large proportion it must be forked over to prevent heating. One cord of muck exposed for one year to the action of air and frost, ten bushels leached ashes and five bushels crushed bones, is an excellent compost for the garden or orchard. Any thing that will decompose is valuable in the compost heap.

Our last words on this subject are, save every thing, solid or liquid, that will make manure; pulverize it as thoroughly as possible, incorporate it thoroughly with the soil, and abundant crops will rise up to reward you for your care and labor.

NOTE.—The ashes should be added to the compost heap, at the last forking over, just before spreading. If added before, they will tend to liberate valuable elements which will make their escape.

CHAPTER IV.

FARM IMPLEMENTS.

THE amount of capital now invested in farm implements in the United States, by a reasonable estimate, exceeds five hundred million dollars. No argument therefore is needed to show the importance of its being well invested. The difference in economy, between working at a disadvantage with poor tools, and the use of the modern appliances to lighten labor and save time, is clear to every farmer, of even ordinary comprehension.

There was a time in the earlier history of this country, and it continued with little change to within the memory of persons still living, when labor was cheap, when strong limbs and the power of endurance were the requisites chiefly sought for in the man on the farm, and when his work was paid for as so much brute physical force. Thought and skill found higher rewards in other callings, and the practical farmer was held to be sufficiently well informed if he was able to hold a plow, to mow, to sow, and to reap.

When labor, or the physical force necessary to carry on the simple operations of the farm, could be obtained so easily, a limited variety of implements was enough to satisfy the necessities of the times.

It was the custom for years, in some parts of the country, for any one owning a plow to go about and do the plowing for a considerable extent of territory. A town often paid a bounty

to any one who would buy and keep a plow in repair for the purpose of going out to work in this way. The old wooden plow then in use was so massive and clumsy that it required a strong and well fed team to move it through the soil; a heavy, muscular man to press it into the ground; another to hold, and another to drive. Other implements were of a similar rude description, and the various processes on the farm were conducted in a manner that was traditional, handed down from father to son, each one adhering to his prejudices in the strongest manner. Besides the plow there was the rude and heavy spade, the clumsy wooden fork, and now and then a harrow.

As the plows in use were made chiefly at the blacksmith's shop, without patterns, they assumed an almost infinite variety of forms, scarcely any two being precisely alike. Still, now and then a maker of a little more than ordinary skill would gain a local reputation which, in some cases, spread beyond the limits of his native village, and to some extent over the country. Hence we hear of the "Carey plow," in somewhat general use, the particular form varying almost as much as the skill and efficiency of each small manufacturer or blacksmith who made it. This had a clumsy wrought iron share, a standard made of wood, and a wooden mould board, often plated over in a rough manner with pieces of tin, sheet-iron, or pieces of old saw plates. The handles were upright, and held in place by two pins. A powerful man was required to hold it, and at least double the strength of team now used to do the same or better work. The "bar-side plow" and the "bull plow" were other forms that gained some general reputation, while the "shovel plow" was in use in the Southern States. In this, a rough hewn stick served for a beam, with another stick framed into it, upon the end of which a piece of iron, shaped like a sharp pointed shovel, was fastened. Two rough handles were

nailed or pinned to the sides of the beam, with a draught iron at the forward end of the beam. This plow, in a greatly improved form, is still extensively used there. (*Fig. 20.*)

In attempting to convey some idea of the wonderful improvements which have been effected in the implements of the farm within the last fifty years, it will be convenient to group them under several heads, according to the work they are designed to accomplish; such as the Cleaning and Preparation of the Land, Sowing the Seed, and Harvesting the Crops.

IMPLEMENTS FOR PREPARING THE LAND.—The preparation of land for crops varies with the state and character of the soil, the object being, in all cases, to secure a texture, or mechanical condition, most favorable to plant growth. The soil must be mellow, so that the roots and the air can penetrate it freely. The processes most commonly required are clearing, draining, ploughing, harrowing, and rolling, (for which the contrivance shown at *fig. 21* is very convenient.)

Clearing is required in a new country, or where new land or woodland is to be cultivated. Cutting down and removing the timber and brushwood is simple enough, but the greatest difficulty has always been to free the land from stumps and stones, which often present very serious obstacles to after cultivation, increasing the labor and expense at every step. Various simple powers have been devised to effect this end, by means of which a powerful leverage, or purchase, is gained, so as to raise a stump or a stone of several tons weight with comparative ease.

One of the simplest and cheapest forms of the stump puller is shown in the annexed cut. (*Fig. 22.*) For stumps of ordinary size it is very convenient. It is so well illustrated as hardly to need any explanation. For pulling the tangled masses of roots of bushes, etc., a simple and powerful grapple is very useful. (*Fig. 23.*)

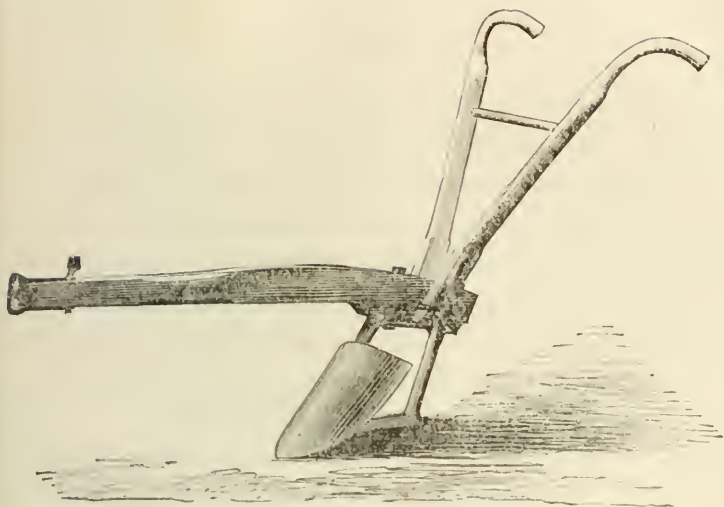


Fig. 20. SHOVEL PLOW.

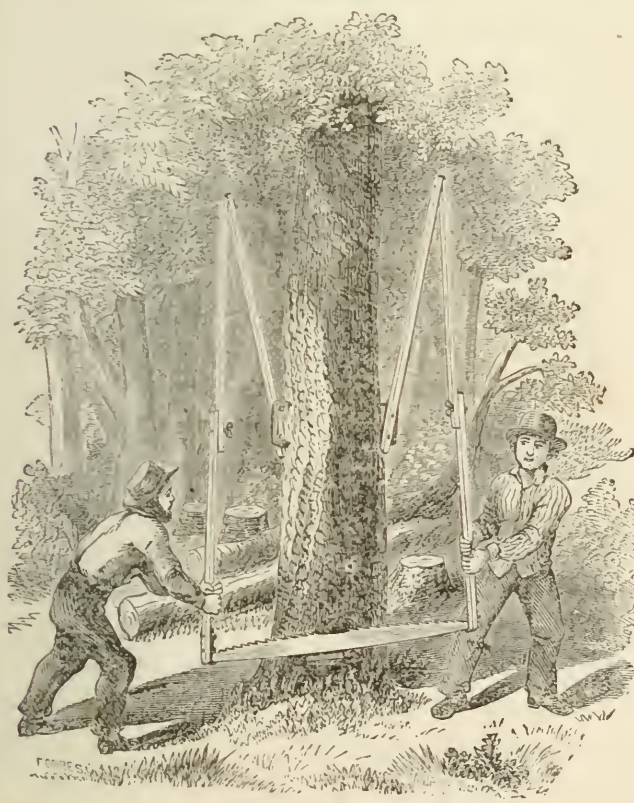
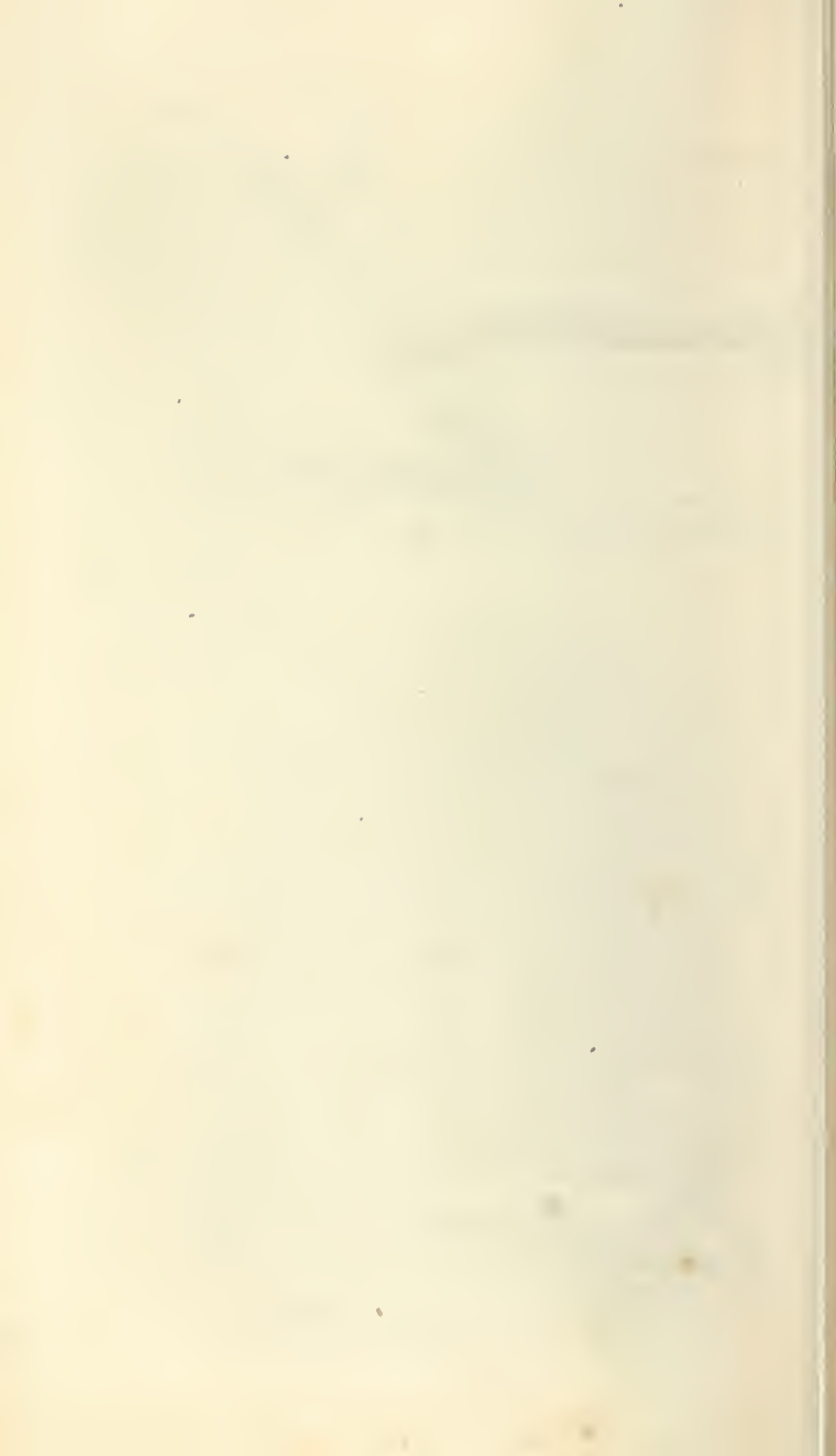


Fig. 21. TREE SAWING MACHINE.



For lifting and removing stones, we have found nothing equal to the Stone Lifter, as shown in the adjoining figure. *Fig. 24.*

This machine is easier to manage and less wearing upon the team than the two-wheel machine, while the double gearing at the top gives it great power. We have seen a lad of fifteen lift a stone of three tons from its natural bed with this powerful machine, while a single yoke of cattle was sufficient to move it off to be dumped into the foundation of a wall or elsewhere. The two-wheeled lifters, when heavily loaded and moving over uneven surfaces, cause unnecessary wear and tear upon the cattle. There is no patent upon this arrangement. The castings are easily made, and the wheels and wood work can be constructed by any wheelwright or carpenter.

The next operation in the way of preparing the soil for cultivation is that of drainage, which lies at the very foundation of all good husbandry on many classes of soils which are subjected to tillage. The importance of drainage, the various processes by which it is to be effected, the implements required, are fully explained in the chapter devoted to the subject.

PLOWS AND PLOWING.—We come now to the most important of all the operations of the farm, that of plowing, and here it is that the earliest improvements of modern agricultural mechanics have been displayed. The Plow has probably passed through more changes and transformations than any other implement of the farm. It has, from the first dawn of civilization, been regarded as the emblem, the great central figure and type of agriculture, and, indeed, of civilization itself. The fact that the ancients had many forms of the plow, adapted to a great variety of uses, shows the estimation in which it was held as compared with all other implements, for simple and rude as its construction must have been, as compared with the highly finished plows of our own times.

we know that they had plows with colters and without, with wheels and without them, with mould boards and without them, with broad painted shares and with narrow ones, plows adapted to light soils, and others adapted to clays.

The Roman's idea of a plow was that of a movable wedge, but he did not comprehend the necessity of combining the principles of the wedge and the screw which modern science has applied to the mould-board, and on which most of its improvements have been based.

It is apparent that by far the greater part of the draught of the plow, or the strength of team required, is due to friction in the soil. The cutting, raising, and turning over of the turf, are comparatively easy if the mould-board is properly constructed. The friction itself is somewhat increased, to be sure, by the weight of the plow, and this in turn is somewhat increased by the weight of the furrow slice as it is lifted from its bed, but the draught is not increased by an increase of speed, since this does not add to the friction, which remains nearly the same on the bottom of the furrow, on the land side and between the furrow slice and the mould-board, whether the motion be fast or slow. Now modern improvement has aimed to overcome the friction and resistance by an improved construction of the mould-board, and by the use of better materials, for it is now well settled, by practical experiment, that the draught depends less on the weight of the plow itself than on its construction. The draught is not increased in proportion to the increase of weight, and hence, though some have objected that our modern plows were too heavy, as compared with those in use half a century ago, it is universally admitted that they require much less strength of team to do far better work.

Every farmer is aware that no one form of plow can be

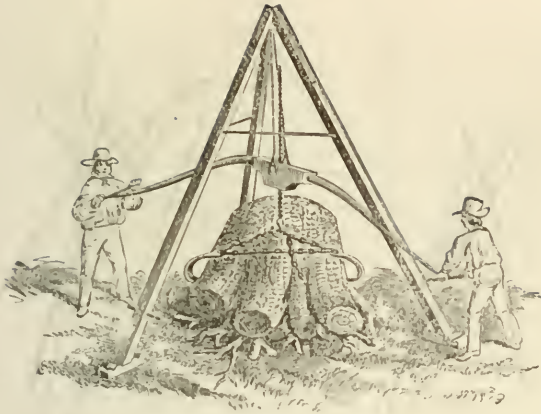


Fig. 22. STUMP PULLER.



Fig. 23. GRAPPLE.

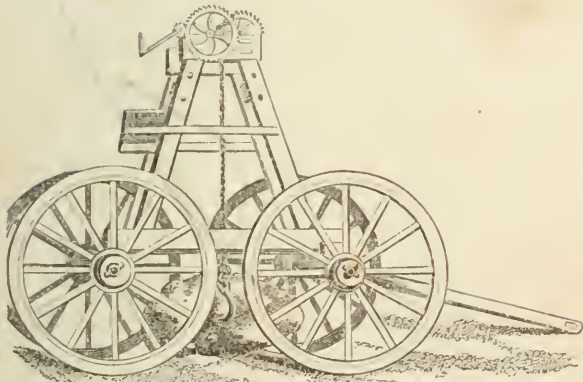


Fig. 24. STONE LIFTER.



adapted to all circumstances. The form, size, weight, and material, must necessarily vary with the infinite variety of soils and situations where a plow is to be used. Science, to be sure, has demonstrated that "the mould-board should be composed of straight lines in the direction of its length, with continually increasing angles to the line of the furrows, and these lines are severally straight, convex, and concave," and Ransome, one of the most distinguished of modern plow makers, says of the rule: "Although no one form of mould-board will or can be applicable to every variety of soil and circumstance, there is no description of soil for which a perfect mould-board may not be made by this rule in some of its modifications." Many plow manufacturers in this country make a great variety, some as many as a thousand or twelve hundred different kinds and sizes, and on more than a hundred different and well defined principles. It is quite impossible, of course, to do justice to them all by even an allusion to their comparative merits. A plow best adapted to breaking sod land can hardly be expected to be best adapted, also, to plowing stubble, and the best stubble plow would not, perhaps, be a good sod plow. Still, some plows, though not the best at either, are very good at both. In other words, some are adapted to a wider range of circumstances, and, as the farmer cannot always have both, it is often the best economy to choose one that will do good work in a great variety of soils, one that is well adapted to the widest range of usefulness.

Among the plows eminently adapted to the general purposes of farm work, that known as the "Doe Plow" has reached a high degree of popularity in many parts of New England. This favorite plow was, at first, manufactured at Concord, New Hampshire, but is now made by Whittemore, Belcher & Co., at Chicopee Falls, Massachusetts. It received

the first premium of the New England Agricultural Society, at Providence, in 1867, as a just recognition of its quality as a plow for general work.

The series of plows known as the Deep Tiller, (*fig* 26,) now manufactured by the Ames Plow Company, of Boston, is designed to embrace a variety of sizes and forms of the mould-board, adapted to every kind of soil and peculiarity of a varied agriculture.

The mould-board is formed by a series of straight lines, horizontally or in the direction of the movement of the furrow slice, but admits of all the variations required to produce a longer or a shorter mould-board, of a gentler or a more abrupt curvature, with straight or more or less concave lines laterally, as different soils or practices may demand. The mould-boards have a combination of curved lines and planes, having an equal bearing upon the furrow slice, and receiving an even polish upon their entire face, giving the furrow slice an equal and complete twist in turning over, laying it in the desired position, and in a mellow and disintegrated condition for the reception of the harrow.

For stubble land and stiff soils the same firm manufacture what is known as the "Telegraph No. 3," (*fig*. 27,) which is considered an improvement upon the Deep Tiller, in the form of the standard mould-board, and in securing the beam to the plow by a clasp instead of a bolt. This plow cuts a furrow from twelve to fourteen inches wide and eight inches deep, laying it flat and smooth. Both these plows received the highest premium of the New England Agricultural Society at the trial of plows at Amherst, in May, 1868, as the best in their respective classes.

Another form of mould-board is found in Allen's "Cylinder Plow." (*Fig*. 28.)

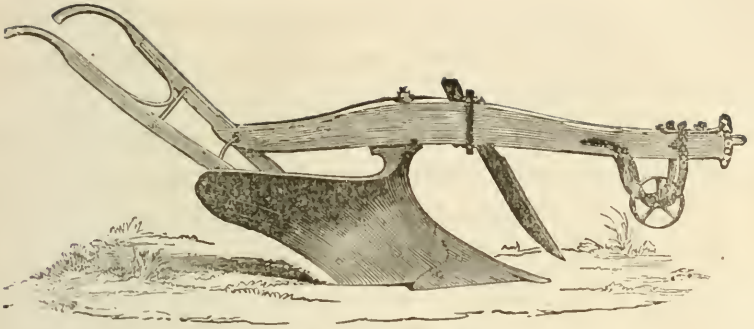


Fig. 25. DOE PLOW.

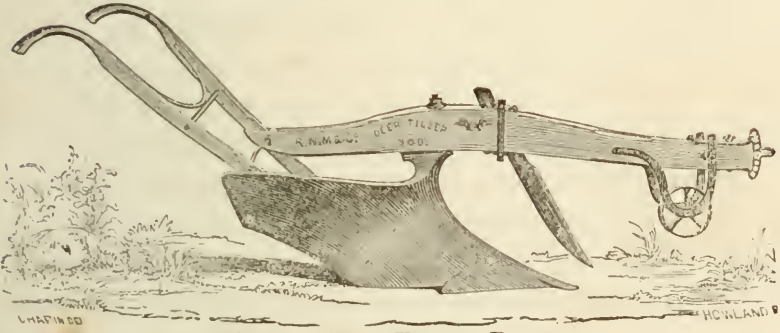


Fig. 26. DEEP TILLER PLOW.



Fig. 27. TELEGRAPH PLOW.



Here a second or smaller front plow is attached to the plain cylinder plow. By this arrangement the top sod is first cut and thrown into the furrow, where it is completely covered, leaving the plowed surface light and easily worked by the harrow into a mellow seed bed. It gives a general idea of what is known as the Michigan or double mould-board plow. The mould-board is made of a curvature to fit a perfect cylinder, and the plow is named from the principles on which it is constructed.

The "Conical Plow," invented and made by Solomon Mead, a practical plowman, of New Haven, Connecticut, is another instance of the adaptation of the various parts of the plow to mathematical principles. (*Fig. 29.*)

The mould-board is made to fit the frustrum of a cone with the base or larger end forward. A block of wood, rounded off in the form of a cone, will fit closely to the surface of the mould-board from the highest point to within about two inches of the cutting edge of the wing of the share. The angle of the share, for two or three inches of the cutting edges, is so slight that some inches of the furrow slice are completely separated before it rises much. This gives an easy separation of the furrow slice, since it rises slowly and gradually at first till it reaches a point higher up on the mould-board, where a more abrupt curve hastens it over. (*Fig. 30.*)

By this form of the mould-board, the furrows are more thoroughly pulverized and crumbled up, than when the board is made to fit the straight surface of a cylinder. The surface of the board of the conical plow is neither concave nor convex in a horizontal plane, so that the friction between the board and the furrow slice is uniform, no greater in one place than another. It cleans, therefore, more readily than a concave board can do, and the wear is evenly distributed over the su:

face. The draught of this plow is easy, and in light and medium soils it leaves the surface even and mellow. Being short on the sole it is well adapted to stony land. It is remarkably evenly balanced, and in stubble land it scarcely requires holding. This shows the plow to be made on true mechanical principles.

A plow has been constructed for the purpose of opening drills to plant corn or potatoes, and for ridging up for certain kinds of vegetables or root-crops. (*Fig. 31.*) It is a double mould-board, as shown in the foregoing cut, and throws the furrow out both ways. It has often been found convenient in digging potatoes.

A plow is often required for side hills, or rough and uneven land where the ordinary plow cannot readily be worked.

What is called the Swivel plow, (*fig. 32.*) is used for this purpose, the mould-board being constructed double, and so as to revolve from one side of the standard and beam to the other, making a right or left hand plow at pleasure, while the team is in the act of turning at the end of the land. The hook being lifted it turns of itself, or with only a slight effort, from one side to the other. The plowman may begin on the lower edge of a side hill, and turn his furrows all down the slope, or he may begin on one side of a level field, and lay his furrows all one way, and so avoid the dead furrow in the centre and the ridging on the sides. Now that the mowing machine has become so universal, it is quite important to keep the land level, and hence the Swivel plow is coming into general use upon well managed farms.

This plough, manufactured by the Ames Plow Company of Boston, received the medal, or highest premium, of the New England Agricultural Society, at the great plow trial at Amherst, in 1868.

In a fine, sticky mould, like the black friable soils of the prairies of the West, none but steel plows can be used, for the reason that no others will "scour," or run clear. In some sections the soil seems like putty in its adhesive properties, while often a very fine quartz sand will rough up the polished surface of even a steel plow, if made of ordinary sheet or cast steel, and not high tempered or sufficiently hardened.

Sheet steel plows have, therefore, been in use on the prairies of Illinois and other adjoining States for the last forty years, having been introduced as a matter of necessity. The first steel plow was made there by John Lane, near Lockport, Illinois, the sheet being taken from saw-mill saws and welded together to get a sheet broad enough for a mould-board. This plow scoured in the heavier prairie soils, and was a great and decided advance upon all iron and wooden mould-boards hitherto in use. Sheets of spring or blistered steel were afterwards rolled out, and thousands of plows were made from them, the plow makers forming them with the hammer on the anvil.

But even cast steel plows made in this manner were found to be defective. They could not be uniformly tempered. Many of them, therefore, would not scour perfectly and run clean. The process of hammering, rolling, and bending, would produce a strain upon the fibre of the steel. It would stay in shape only while it was cold. It would warp while heating to get the requisite temper, and warp still more while cooling off again. Very few, therefore, could be brought to a sufficient temper for a good scouring plow, so that even if it could stand the heat to produce a proper temper, the warping would ruin the form, so that the sections of the plows could not be duplicated, which is requisite in order to supply new shares in place of those broken or worn out.

To remedy these defects, a most important invention was made by Mr. F. F. Smith, of Illinois, in 1860, that of casting plows from molten steel in iron moulds, a process which was adopted by the Collins Manufacturing Company, of Collinsville, Connecticut, the same year. It was a process of casting cast steel, and hence the plows are known as cast-cast steel plows. (*Fig. 34.*)

Being cast to form, they will keep that form after receiving the highest temper. They can, therefore, easily be duplicated from molten cast steel. This process forms a hardened cast steel plow that the quartz sand, found in many prairie soils, does not scratch. The sections receive their temper kindly, because the metal is "set" in the iron moulds into which it is poured, and where it has no strain upon its fibre. They do not warp in heating or in cooling, so that the parts are duplicated perfectly. A cast-cast steel plow has all the advantages of cast iron, and hardened cast steel combined.

The Collins plow, though a comparatively recent invention, has rapidly gained popularity and favor, especially on the prairie farms of the West. When tempered hard, it never clogs, but clears perfectly in sticky soils, and hence its draught is light and easy. So far as its form and mechanical finish are concerned, it is all that could be desired. (*Fig. 35.*)

Among the advantages claimed for the Collins cast-cast steel plow, are: *First*, that it will last much longer than any other steel plow. Sheet steel is often "cut through" after a short wear in gritty soils: *Second*, that it will scour in the most difficult soils, where other plows fail, the extreme hardness of the steel preventing all scratching, and the high polish enabling it to shed the mould, however sticky it may be: *Third*, that it draws one fifth lighter than other plows cutting the same width and depth: *Fourth*, that the share can be sharpened, or a new steel



Fig. 28. ALLEN'S CYLINDER PLOW.

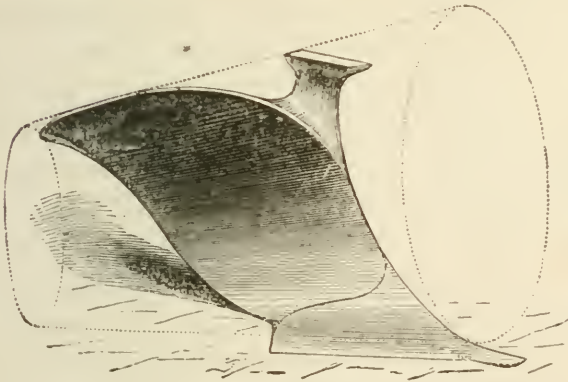


Fig. 29. CONE.

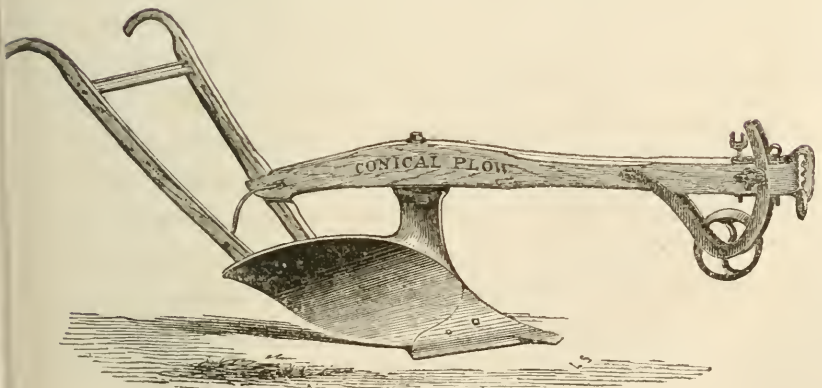
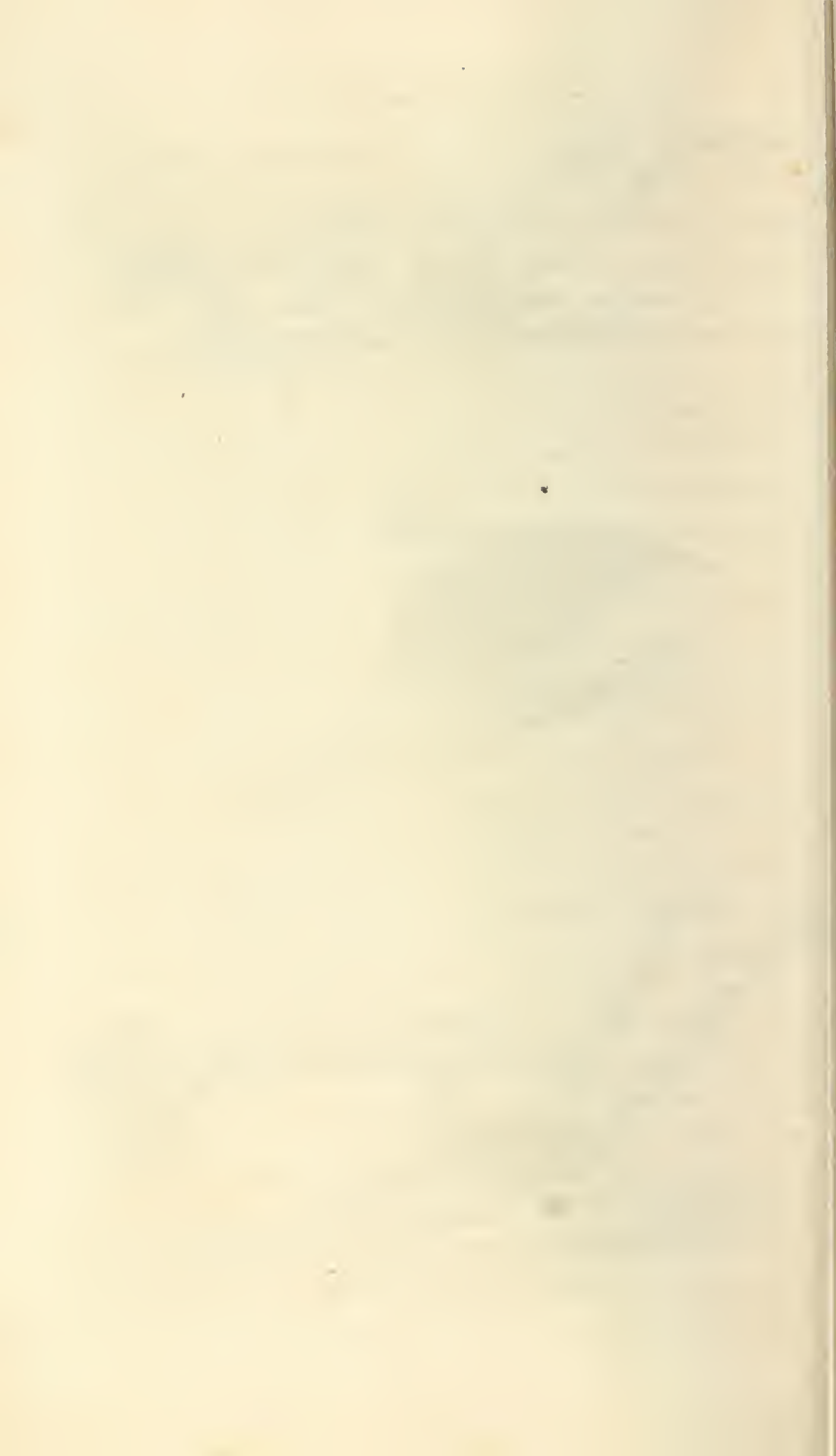


Fig. 30. CONICAL PLOW.



point welded on as readily as on the ordinary plow, by any blacksmith, the steel being perfectly malleable, and working kindly: *Fifth*, that any section can be duplicated or replaced, the share, land-side, and mould-board, being cast in moulds.

Though absolutely essential to the prairie soils of the West, a steel plow is equally servicable on many other soils, and many think it superior on account of its greater lightness of weight and of draught.

THE SUBSOIL PLOW. It is often desirable to break up and loosen the subsoil, to a greater depth than can be done with the common plow, without bringing it up to the surface where its effect would be injurious to vegetation. This loosening up admits the air and the surface water to work down through the lower strata, and so gradually to improve the whole soil. To effect this often a subsoil plow is used to follow in the furrow of the common plow. (*Fig. 36.*)

Subsoil plows are of various forms, the general principle of the wedge being adopted in them all. Sometimes the same object is effected by a subsoil attachment to the ordinary plow. In drained soils, and in soils where a hard pan has been formed just below the action of the common plow, subsoiling is highly beneficial.

A large variety of plows are exhibited and advertised by inventors and manufacturers. We can only name those we deem the best. Dreere's steel plow, manufactured at Moline, Illinois, (*fig. 37,*) has many good qualities, and the prairie farmer will not go amiss in purchasing it; a curved iron beam plow, is a late improvement by the same firm. Dr. C. W. Grant, the veteran grape culturist of Ionia, New York, has perfected a series of trenching plows, which, for preparing ground for root crops, and particularly for orchards and market gardening, are exceedingly valuable.

SKINNER'S GANG PLOW. In the wheat regions of the West, and in California, the Gang Plow has been introduced and worked to advantage. This is an arrangement by which one, two, or more mould-boards are attached to a frame with wheels, the plowman riding on a sulky seat. (*Fig. 38.*)

Skinner's Gang Plow, which is regarded as one of the best, met with eminent success last season, giving great satisfaction in many sections of the country. This machine is manufactured by the Ames Plow Company, of Boston. With two mould-boards, it requires three or four horses, which are worked abreast. The point of draught can be regulated to accommodate the team, and there is no side or down draught on the pole. The plow can also be set to run deep or shallow, and be changed in a moment without stopping.

THE STEAM PLOW. The efforts made within a few years to introduce the steam plow upon the prairie soils of the West, have not proved successful. Several trials have been made in the last ten years, chiefly in the State of Illinois, but they have been abandoned, and nothing of any practical importance has come of them. The success attending similar efforts in England, has been due to the use of fixed engines, working the common plow by means of wire cables. Iron machinery, coal, and labor, are cheaper there than in this country; and the same appliances that might be economical there, would perhaps result in failure here, so far as the saving of any expense is concerned. Intelligent, practical farmers, have, at any rate, come to the conclusion that the inventions offered to the country possess no economical advantages over the simple implements now in use.

The opinion is however still entertained, that steam plowing ought to be practicable upon the broad stoneless prairies of the West, and that it is destined, ultimately, to come into use there

COMSTOCK'S ROTARY SPADER. In the Rotary Spader, a dif-

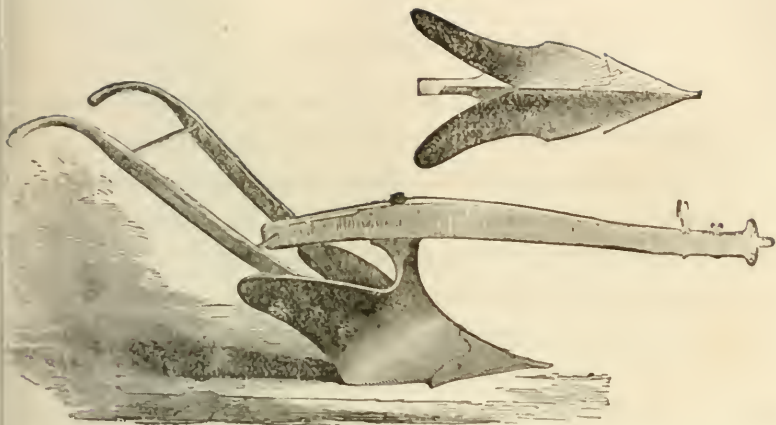


Fig. 31. DOUBLE MOULD PLOW.

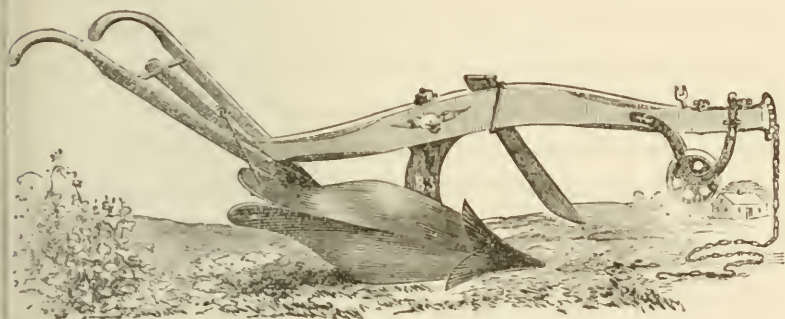


Fig. 32. SWIVEL PLOW.

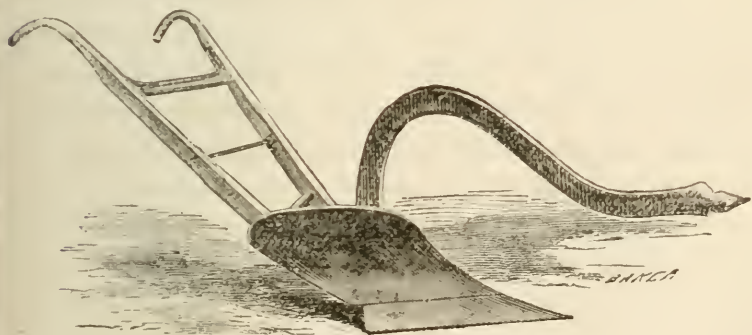
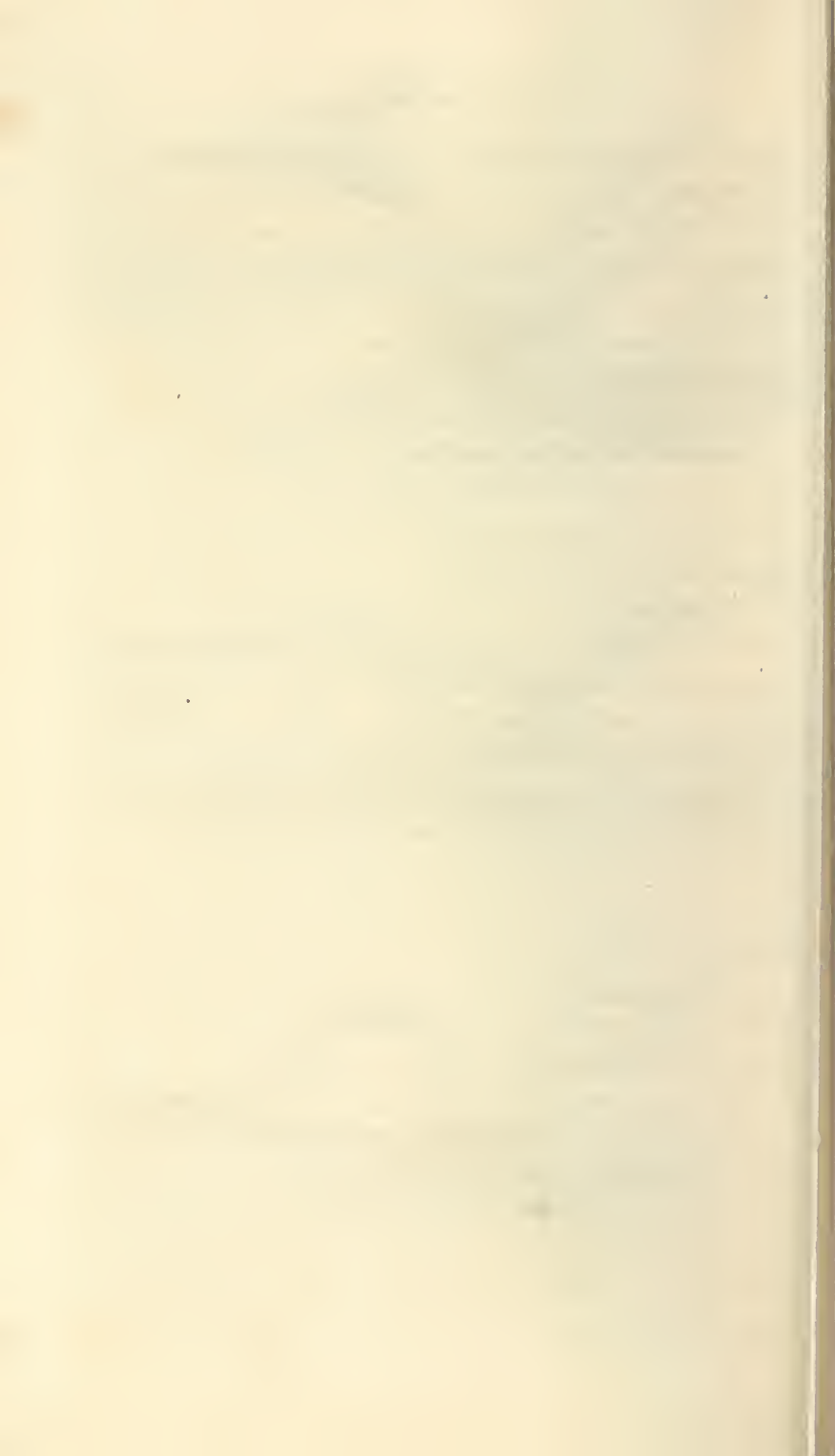


Fig. 33. IRON BEAM PLOW.



ferent principle is attempted. Instead of plowing, the Spader is designed to dig up and loosen the earth to a sufficient depth. This has not as yet succeeded to any extent in this country, unless we except the machine invented for this purpose by Hon. Cicero Comstock, of Milwaukee. His machine is somewhat complex and expensive, but it has been introduced into some parts of the West, more especially in Illinois, where it is said to have been used with some satisfaction.

In a clear, friable soil, the Spader will dig up a strip of land, three feet wide, to the depth of eight inches, and with a power of two or four horses, will spade about six acres a day. It seems probable that a digger, in some form, will eventually supersede the plow, as it appears to be more philosophically adapted to the end in view. It is proper to say, that Comstock's Spader made a successful trial at Paris in 1867, and that it is now being introduced into France, Belgium, and Great Britain, as the result of its success.

HARROWS. The harrow naturally follows the plow, and its object is to effect a more complete pulverization of the soil. It has, till quite recently, undergone less changes and modifications than most other farm implements; and, in fact, many forms of the wooden harrow bear some resemblance to those of the ancients, as illustrated on medals and sculptures. Though simple, the harrow, if properly constructed and worked, is hardly less important than the plow itself.

The triangular harrow is, perhaps, the most common. The Geddes Harrow, as shown in the annexed cut, is a modification of it. It is made of two pieces of frame work, joined by hinges in the centre, so as to adapt itself easily to uneven surfaces. One side can be raised to pass an obstruction without stopping the team, and without interfering with the operation of the other half. Each tooth makes its own impression, and the

extent and effectiveness of the work is dependent in part upon the number of teeth, which vary from twenty to fifty. (*Fig. 39.*)

THE HINGE HARROW. The improved Hinge Harrow is an effective implement in breaking up clods, disengaging roots, and pulverizing the soil. It is usually made so as to take a breadth of five feet. (*Fig. 40.*)

Two pieces of framework are connected by iron hinges, in the form of common barn door hinges, extending across the frame, and bolted to each bar, helping to strengthen the whole. This harrow may be folded double, or separated into two parts for transportation or other purposes. Like the Geddes Harrow, either side may be lifted, and it easily adapts itself to uneven surfaces, as in passing through hollows, and over knolls or ridges, so that it is always at work. It usually contains thirty teeth, so arranged that they are not liable to clog. The frame is made of white oak bars, three inches square. It may be drawn by either end, so as to relieve the wear on the teeth.

This, like any other harrow, should be moved rapidly over the ground. A light, sharp-toothed harrow, moved quickly, accomplishes far the best work. The work of the same implement, moved quickly or sluggishly over the ground, differs widely in its results. The implement should therefore be compact in form, not too light, and furnished with sharp steel-pointed teeth.

SHARES' HARROW. For some purposes, the form known as Shares' Harrow, is superior to all others. The advantage of this lies in the form of the colters, which are broad thin blades of cast iron; or, what is far better, of steel, because lighter, less easily broken, and less liable to wear dull. These teeth, or colters, incline forward, which prevents clogging with grass roots, stones, or clods. There is a mould-board attached to and forming the lower end of the colter. This harrow is six

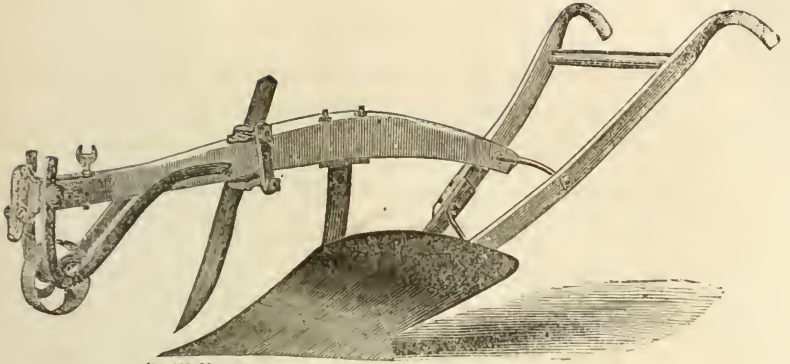


Fig. 34. COLLINS PLOW.

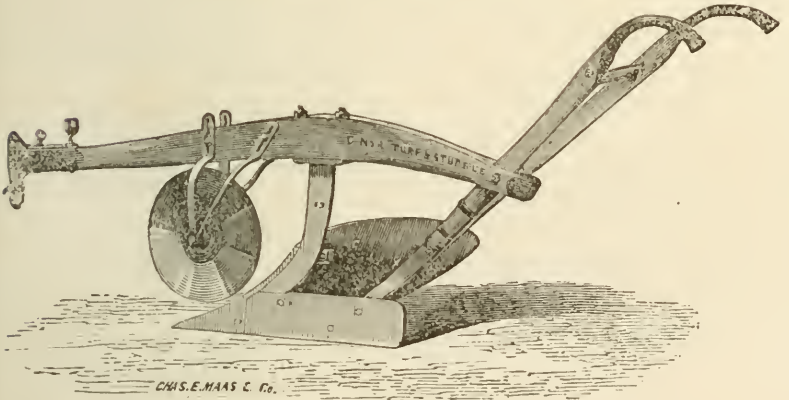


Fig. 35. COLLINS PLOW.

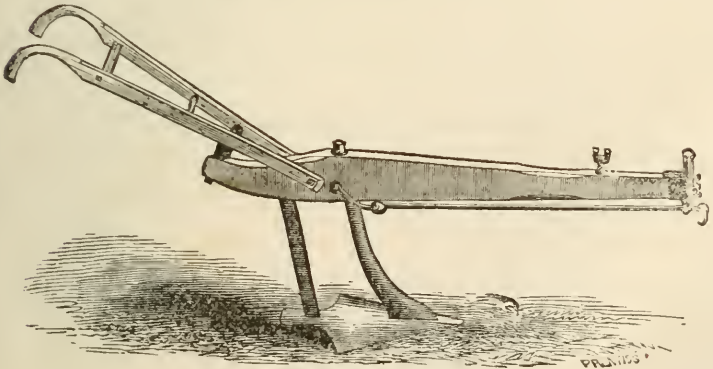


Fig. 36. SUBSOIL PLOW.

feet wide when expanded, but may be closed up to two feet, for transportation. It is usually made seven feet long, and weighs about one hundred and fifty pounds. (*Fig. 41.*)

For pulverizing the surface of sod land we have found no harrow equal to this. The sharp flat blades, or teeth, sloping backward like a sled runner, cut the soil very effectively, pass over and press down the sod, while, at the same time, shaving off and grinding up finely the upper surface. A single passage of this implement will mellow the surface more than twice as deeply as the ordinary harrow; acting also like a roller, to press and keep down the grassy sod.

Several forms of rotary harrows have been invented, but are not likely to come into general use.

HORSE HOES AND CULTIVATORS. Another class of implements combine the principles of the plow and the harrow. These are the Horse Hoes and the Cultivators, which have rendered very important aid both in the original preparation of the soil, and the after-cultivation between the rows of corn or other crops. (*Fig. 42.*)

One of the most useful of these is known as Knox's patent, as made by the Ames Plow Company, of Boston. It is designed to hoe or cultivate corn and root crops, cotton, and the hoed crops generally. It is very light, and easily managed, with the draught of one horse, and thoroughly pulverizes the surface, cutting up weeds, grass, etc. It is steadied by a forward tooth, or colter, the two middle teeth being miniature plows, which are easily changed from one side to the other, turning the earth from, or towards the rows, as may be desired.

The frequent use of the cultivator among hoed or drilled crops, cannot be too highly recommended. It is the easiest and quickest way to keep down the weeds. It has been said, with much show of truth, that one day's work in the cornfield, with

a horse and cultivator, is worth ten with the hand hoe, and if the farmer would use it oftener, as often as once a week in a dry time, he would find it pay in the result of the crop. To facilitate this work, the rows, of course, should run even and straight.

The Sulky Cultivator (*fig. 43*) has been gaining in favor for the last few years, and will very soon, no doubt, come into general use, as its advantages in cultivating corn on a large scale become more and more apparent. The driver is furnished with a seat sufficiently high to be in full view of his work, the forward shovels being some feet in front of him. This is made by Dreere & Co., of Moline, Illinois. Other modifications of the Sulky Cultivator are manufactured in other parts of the country.

SERRATED CLOD CRUSHER. The clod crusher is one of those implements that have made their way but slowly into public favor, partly because of their expense, and partly because they have failed to be appreciated as they deserve to be. But on some soils, particularly on stiff cloddy lands, dependent very much upon the season, it is really invaluable. (*Fig. 44.*)

In a wet season it often happens that strong lands cannot be worked to advantage. The soil turns up in solid lumps, which become as hard as a brick when dry. The clod crusher then becomes almost indispensable.

On light land farms, too, it may often be substituted to advantage for the common iron roller. Like the roller, it is usually cast in sections kept apart by washes on the main shaft. It pulverizes the lumpy soil, and breaks down the clods much more effectually, while on lighter soils it compacts the surface earth. No farmer who has once used the clod crusher so as to be able to appreciate its many advantages, would think of doing without it, and wherever it is used it will increase in favor.

COOPER'S LIME SPREADER. The use of lime as a manure is

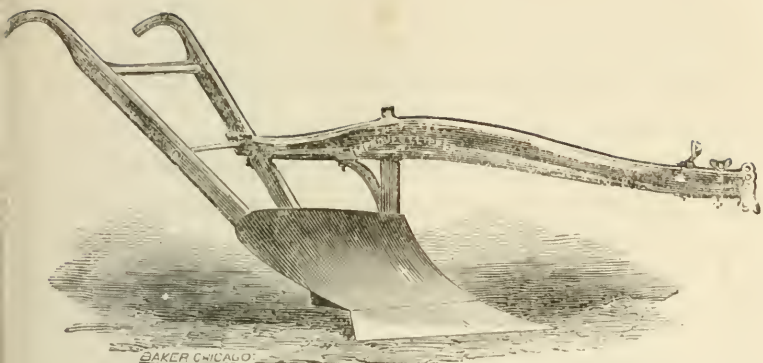


Fig. 37. DREER'S CAST-STEEL CLIPPER PLOW.

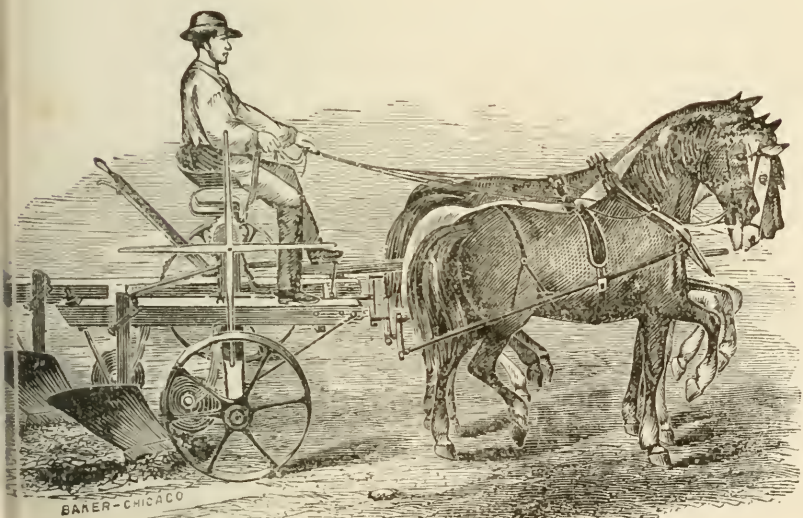


Fig. 38. SKINNER'S GANG PLOW.



very common in many sections of the country, especially in the wheat growing regions, and the necessity for it on some classes of soils is very generally admitted. It must be regarded as one of the most important fertilizers we have, after barnyard or stable manure, and the judicious application of it on a large proportion of the farms of the country would be attended with beneficial results. It should be sown fresh slacked, and in a fine condition, and immediately mixed with the soil by harrowing or plowing. The better practice is to plow first, spread the lime upon the furrows and harrow in.

It is a laborious and difficult operation to spread it uniformly over a large area. Cooper's Lime Spreader meets this difficulty and does its work with perfect evenness, saving a great deal of labor and time. It may be worked either with oxen, horses, or mules, may be loaded anywhere, and hauled to the field without waste, where it may be put in operation in a few seconds. The quantity per acre is easily regulated. The machine weighs no more than the common ox-cart, and it will carry as large a load, feeds itself, and crushes and pulverizes all lumps. (*Fig. 45.*)

One man and team can do as much with this spreader, as four men and two teams can do without it, while the manner in which it performs its work cannot be equalled by hand spreading. It is simple, strong, and durable, the operating parts being made of iron. It may be used to sow ashes and plaster as well as lime.

THE STAR DRILL. The practice of drilling in wheat is of comparatively recent origin, but the advantages of it are now so well understood that few English farmers would think of sowing wheat broadcast, and the best farmers of this country have adopted it. By means of the drill the seed may be dropped and covered uniformly, and, if in dry weather, deeply. Sown broadcast and harrowed in, during a period of drought

such as we often have at the time of sowing winter wheat much of the seed will fail to germinate. The kernels may absorb moisture at night, but the parching sun dries it out by day, and these alternations destroy the germ.

Besides, the amount of seed required per acre is considerably less, and the liability to winter-kill, by being thrown out by frost, is less. These and other advantages of drilling over broadcast sowing, are so apparent that the time cannot be far distant when the practice will become quite general, if not universal.

The Star Drill is manufactured by Ewell & Co., of Baltimore, Maryland. It combines the drill, the cultivator, and the roller. The seed is taken from the seed-box by a revolving distributor, and dropped just behind and in the furrow of the plow, and left to be covered by the next plow. The openings at regular intervals in the distributor provide for a continuous stream of seed, and the quantity is increased or diminished by the depth of the openings. (*Fig. 47*).

This machine may be worked separately, as a cultivator only, if the operator desires, the roller and seeding apparatus being readily detached.

Various other drills are manufactured in different sections of the country well adapted to the purpose in view, and we strongly advise their use on all grain farms.

SEED SOWERS. A great variety of smaller machines for sowing garden, and other minute seeds, have been invented and introduced. In principle they do not greatly vary, though some are no doubt more efficient than others.

One of the later inventions of this class is known as the Improved Danvers Seed Sower, made by G. E. Herrick, of Lynfield Centre, Massachusetts. (*Figs. 48 and 49.*)

It is to be recommended for its simplicity and cheapness, a

Fig. 40. IMPROVED HINGED HARROW.

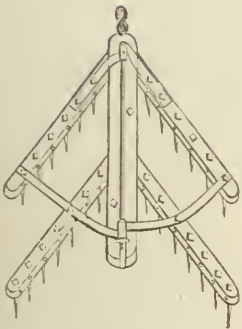
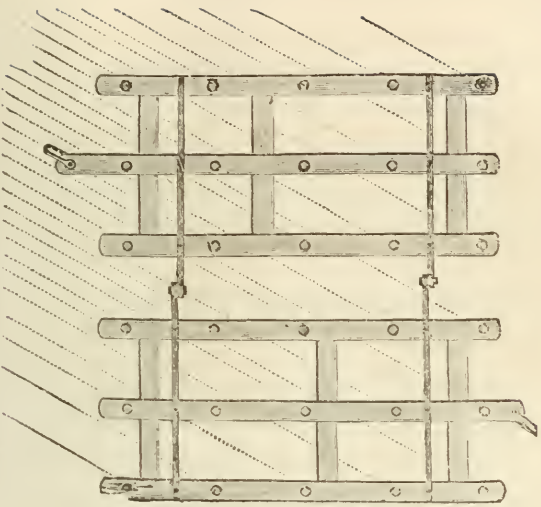
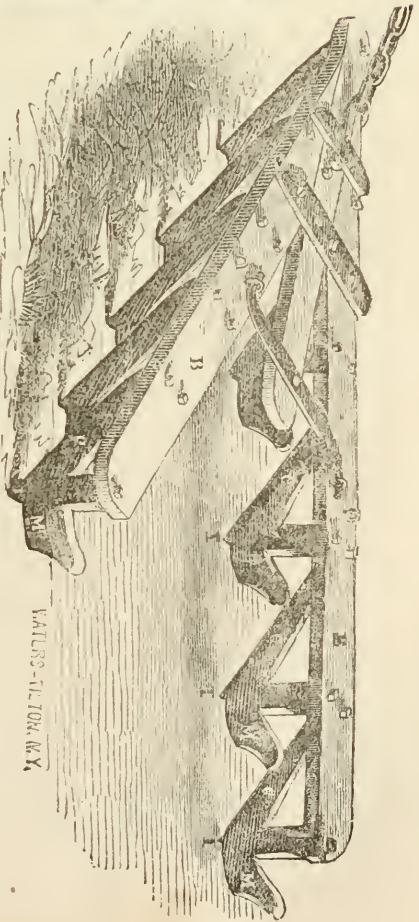


Fig. 39
GEDDES' HARROW.

Fig. 41. SHARP'S HARROW.



WATERS-TILTON, N.Y.

feature of some importance, since it insures its use in many lands, where a more expensive machine would not find its way. It sows onions, turnips and other similar seeds, with great uniformity, and mangolds, carrots, beets, etc., as well as any machine I have examined.

WEEDING HOES. The first American patent for improvement in hoes was granted in 1819, and for cast steel hoes in 1827, though cast steel hoes were made in Philadelphia, by two establishments, as early as 1823. The business in the manufacture of these and other small agricultural implements has grown up to immense proportions, employing a large number of hands. For lightness and high finish, combined with strength and durability, American hoes are unrivalled.

ALLEN'S WEEDING HOE. A simple but effective and valuable implement is a weeding hoe, invented by Geo. P. Allen, of Woodbury, Connecticut. (*Fig. 50.*)

It is a scuffle hoe, to be worked back and forth between the rows of vegetables, running just beneath the surface. It is one of the most useful little implements in the garden, and in cleaning walks. The zigzag edges of the blade greatly increase the cutting surface, and make it easy of operation and very useful in destroying weeds. It is appropriately named "the weed killer."

IMPLEMENTS FOR HARVESTING. But by far the most striking improvements in modern agricultural implements, are those connected with the harvesting of crops, particularly the grass crop and the smaller grains. So important have these become to the welfare of society, that if we could suppose them to be blotted out of existence, even for a single season, it would produce a shock, which would be felt all over the civilized world. And yet scarcely more than fifteen years have elapsed, since the practical economy of mowers and reapers became an

established fact, since their ultimate success and practicability was acknowledged.

The number of mowing machines made, and in use previous to 1850, was probably less than five thousand. Ketchum's mower, and Hussey's reaper, were the pioneers, the machines that did more to make it certain that grass and grain would finally be harvested by machinery, than any former patents, and yet when the former was tried at the show of the New York Society at Buffalo, in 1848, the large body of farmers who witnessed the trial were not prepared to admit that the work accomplished was good enough to be even tolerated in comparison with the hand scythes. Some thought it might work in straight coarse grass, but in finer grass it was sure to clog.

At a subsequent trial of reapers and mowers, instituted by the New York State Agricultural Society at Geneva, in 1852, seven machines competed as mowers, and nine as reapers, but not more than two or three of the former were capable of equalling the common scythe in the quality of work performed, and not one among them all, when brought to a stand in the grass, could start again without backing to get up speed. All the machines had a heavy side draught, some of them to such an extent as to wear seriously on the team. None of them could turn readily in any reasonable space, and all were liable to tear up the sward in the operation. The old Manning and the Ketchum machines, were the only ones, as mowers, that were capable of doing satisfactory work.

One or two of the reapers, like the Burrall, the Manning, and the Seymour & Morgan machines, did fair work, and the judges decided that, in comparison with the hand-cradle, they showed a saving of eighty-eight and three quarter cents per acre. Here was some gain; a positive advance. But still most of the reapers as well as the mowers, did very inferior work; the

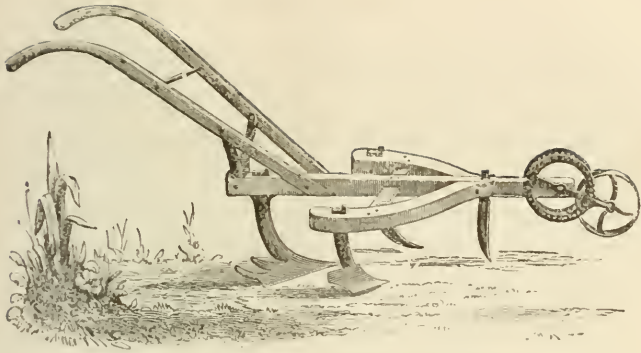


Fig. 42. KNOX'S HORSE HOE.

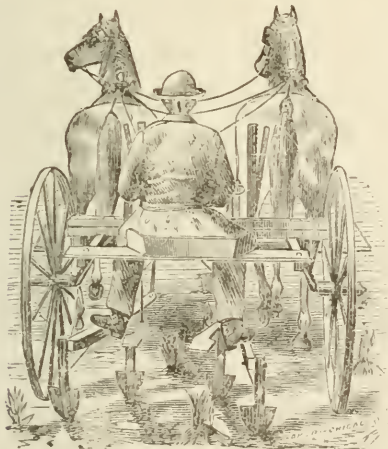


Fig. 43. DREER'S SULKEY CULTIVATOR.

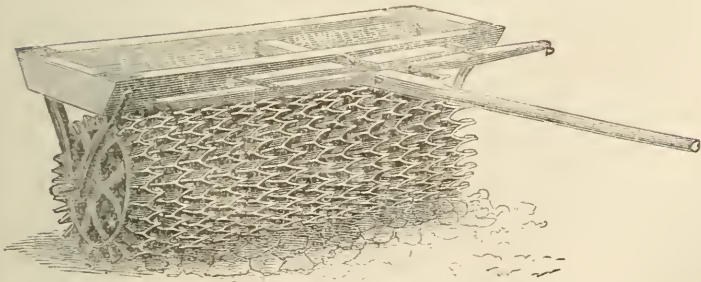


Fig. 44. ALLEN'S CLOD CRUSHER.

draught in all was heavy, and some of the best had a side draught sufficient to be destructive to the team.

In June of the same year, 1852, twelve reaping machines and several mowers, competed at the trial held by the Ohio State Board of Agriculture, among them McCormick's, patented first in 1834, and Hussey's, first patented in 1833; but according to the report of the judges, there appears to have been no very striking superiority in the merits of the different machines.

The importance of these early efforts to overcome the obstacles to the successful operation of new machinery, will be sufficiently clear when we consider that more than twenty million tons of hay are annually raised and cured in this country, and that the grass and hay crop is the true basis of our agriculture, since, without it, in a northern climate, we can have no cattle; without cattle, no manure; without manure, no crops. With the necessity we have for stall feeding, from three to five or six months of the year, for means of which we are dependent mainly upon hay, it is apparent that, in an economical point of view, this crop is one of the most important that can occupy the farmer's attention.

From this time the inventive genius of the country was stimulated to an extraordinary degree of activity. Patents began to multiply, and the rapid growth of this important branch of manufactures may be dated about the year 1855.

Local trials, to test the merits of the various machines, were held in different parts of the country nearly every year; but five years after the meeting at Geneva, a general desire was manifested to have another on a scale that should bring together all the prominent reapers and mowers in the country; and, accordingly, the United States Agricultural Society held a national trial at Syracuse, New York, in 1857. Here more than forty entries of mowers and reapers were made, and they were

brought to the test upon the field. Striking improvements had been made since the Geneva trial. The draught had been very materially lessened in most of the machines, though the side draught in some of them was still objectionably large. In the ability to cut fine and thick grass without clogging, there was manifest progress in most of the machines, and the two that stood first at Geneva had gained something in this point, but of the nineteen that competed as mowers, only three could start in fine grass without backing to get up speed. The Buckeye, patented in 1856, won its first great triumph here, and received the first premium.

New inventions and improvements now multiplied in quick succession, every year adding to the list. In 1859, the celebrated Wood mower was invented, and very soon took a high rank. In 1864, there were no less than one hundred and eighty-seven establishments in the country devoted to the manufacture of reapers and mowers, many of them of vast extent, substantially built, completely furnished with abundant power, machinery, and tools of the finest description, while the work had become wisely and beautifully systematized. The population directly sustained by these manufactories exceeded sixty thousand. The value of the annual product exceeded fifteen millions of dollars, and the number of machines made amounted to about one hundred thousand.

After the lapse of nine years from the Syracuse trial, it was thought desirable to hold another, which should be national in its character, machines from all parts of the United States being allowed to compete; and this was accordingly arranged under the direction of the New York State Society, at Auburn, in that state, in July, 1866.

For this trial the number of mowers which entered, single and combined, was forty-four, the number of reapers, thirty, in

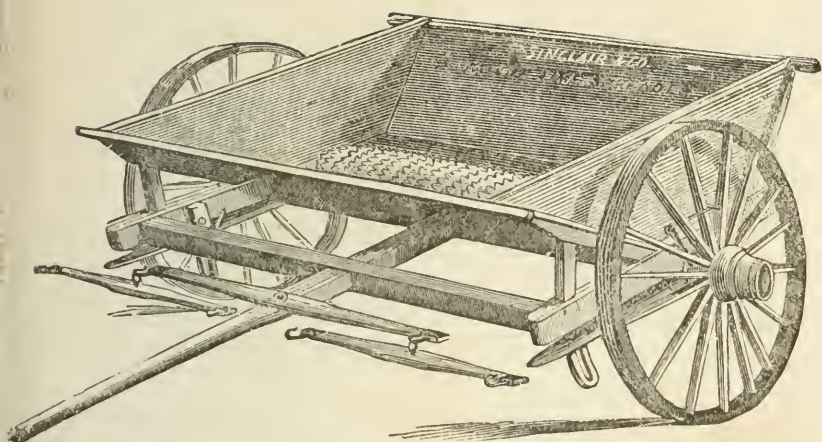


Fig. 45. COOPER'S LIME SPREADER.



Fig. 46. BUCKEYE MOWER.

all seventy-four. As compared with the machines at Syracuse, nine years previous, there was a decided improvement in workmanship and mechanical finish. The mowers were more compact, more simple in construction, lighter and equally strong. They ran with less friction, with easier draught, and generally with less noise. They cut the grass better, especially over uneven surfaces.

The following extract from the report of the committee will convey an idea of the general progress:—"Those who had been present at former trials, were astonished at the general perfection which had been attained by manufacturers of mowing machines. Every machine, with two exceptions, did good work, which would be acceptable to any farmer; and the appearance of the whole meadow, after it had been raked over, was vastly better than the average mowing of the best farmer in the State, notwithstanding the great difficulties that had to be encountered. At previous trials, very few machines could stop in the grass and start without backing for a fresh start. At the present trial, every machine stopped in the grass and started again without backing, without any difficulty, and without leaving any perceptible ridge to mark the place where it occurred."

In this trial the Buckeye, as at Syracuse, received the gold medal as a mower, a tribute alike to the genius of the inventor and the skill of the manufacturers, Messrs. Adriance, Platt & Co., of Poughkeepsie, New York. This machine is also manufactured, for a part of the New England States, by the Buckeye Mowing Machine Company, at West Fitchburg, Massachusetts.

The frame of the Buckeye is made of wood, this being regarded as, on the whole, the best material. Where iron is used the weight of the machine is increased, and, in case of breakage, it is not so easily repaired; in fact, a new frame is needed,

requiring the parts to be fitted anew. The driving wheels are thirty inches in diameter and run loosely on the axle. The draught is direct and easy, and it is capable of working in hollows and over ridges with a remarkable power of adaptation. The cutting is easy and uniform, the cutter bar entirely independent of the frame, and having nothing but its own weight to sustain under any circumstances. The Buckeye deserves its high reputation.

WOOD PRIZE MOWER. This machine, long a favorite in this country, has attracted a more than ordinary share of attention and interest by its triumphs at the great Paris Exposition of 1867, where, in competition with some of the best mowers in the world, it won two grand gold medals, and secured for its inventor, Walter A. Wood, Esq., the honorable distinction of a decoration of the Imperial Cross of the Legion of Honor. This gives it a national reputation, in which every American feels a just and national pride, for it has probably done more to establish and vindicate the high character of American agricultural mechanics abroad than any other machine, having taken the highest prizes offered in this or any other country, both for practical work on the field and perfection of mechanical construction. (*Fig. 54.*)

This is a jointed bar mower, running upon two driving wheels, each furnished with internal gear, so as to make each an independent driving wheel. These wheels are so placed as to run in the tracks made by the track clearer to avoid unnecessary injury to the crop. The spring seat is so placed as to balance the tongue, so as to leave no pressure on the necks of the team.

The frame is of wood, made of four timbers lying in the same plane, the middle line over the axle. The tongue is attached to the axle by a joint. The forward part of the shoe is attached

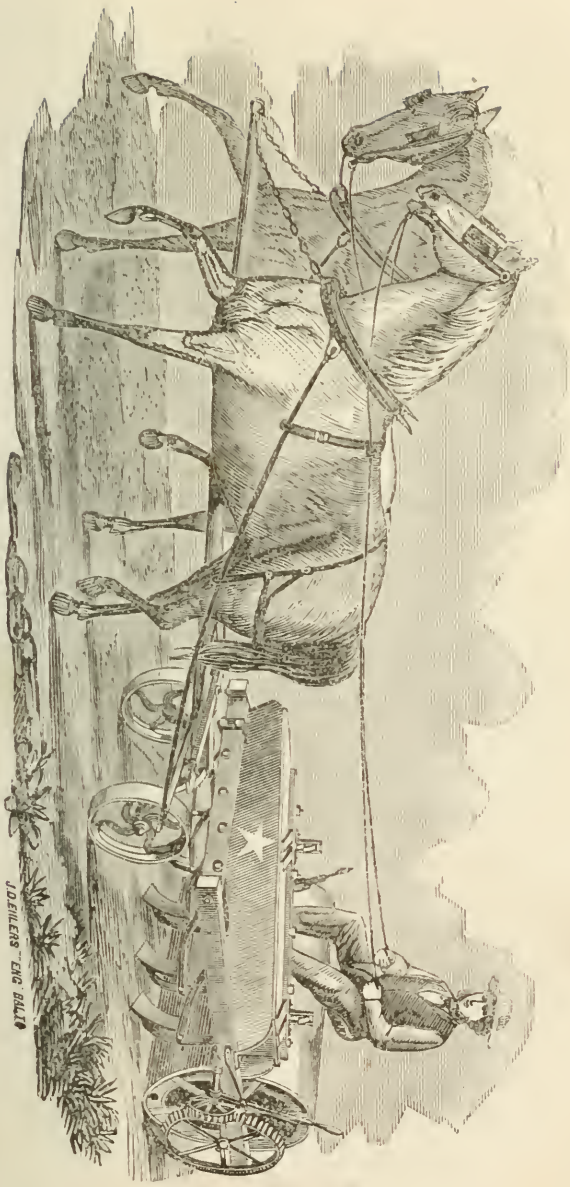
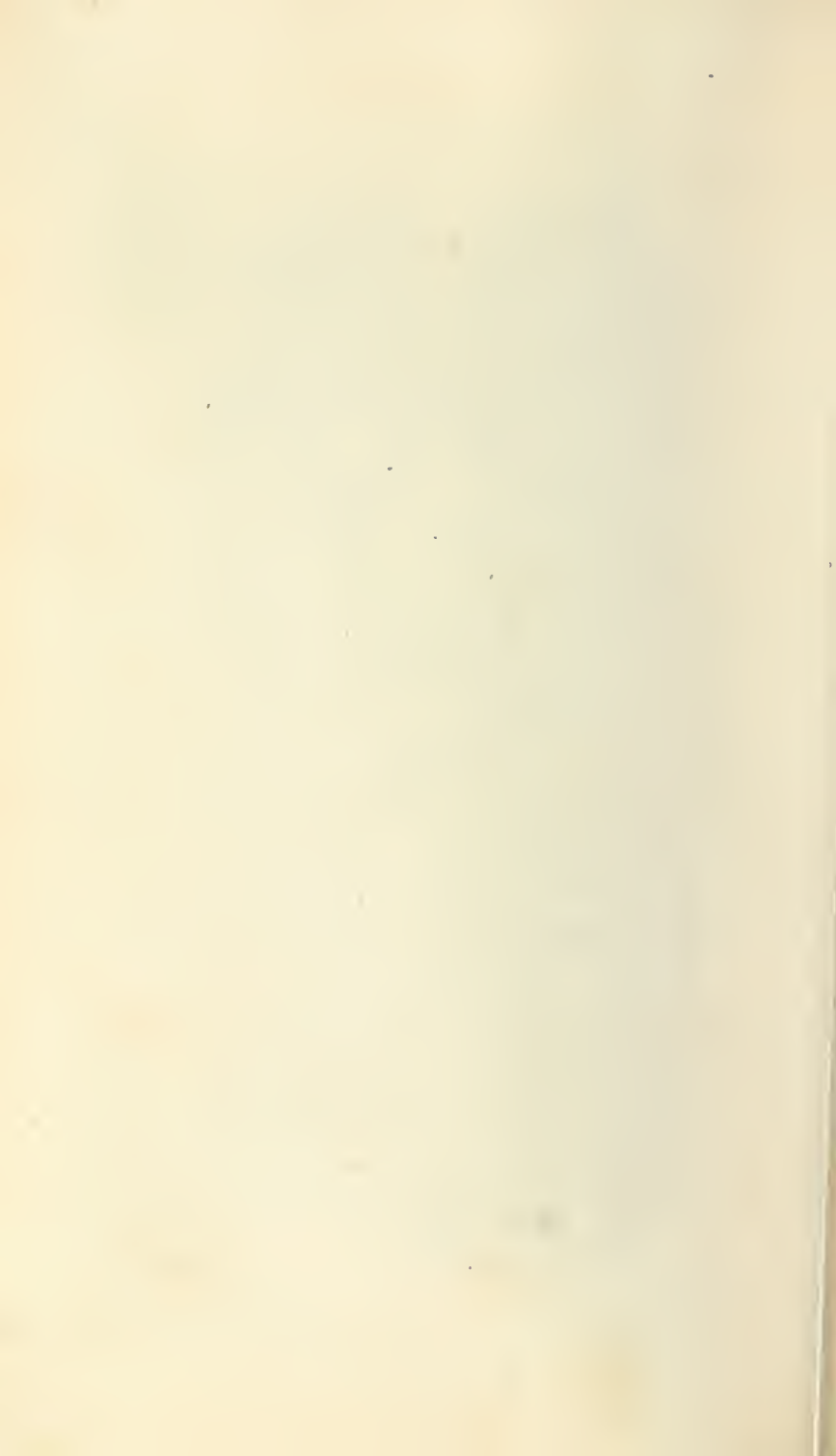


Fig. 47. STAR DRILL.

J. D. SILENS' ENG. BULL.



to a spring bar bolted to the underside of the left front corner of the frame. The connections on the shoe are by joints which allow the bar to be turned up to a perpendicular position. The outer shoe is sharp on the under side to part the grass, and has a wheel five inches in diameter adjustable to regulate the height. The holders on the finger bar are chilled at the bearings of the cutter bar. The guard fingers are made of malleable iron and faced with steel, securely riveted in. The cutter bar is raised with great ease to enable the machine to pass an obstruction. Lightness of draught is secured by a simple and direct application of power, all needless parts being dispensed with, so as to lessen the friction. The machine is light and elastic, and yet strong enough to stop the strongest team. Simplicity of construction insures durability.

This machine cuts with remarkable smoothness and uniformity, and is not liable to clog. It is manufactured by the Wood Mowing Machine Company, at Hoosick Falls, New York. About seventeen hundred machines a month on an average have been made at the old works, employing five hundred hands. The capacity of the works is now doubled. Fully one hundred thousand machines have been built, and fifty thousand were in the harvest fields last year. The sale abroad is also very large.

AMERICAN HAY TEDDER. The mower was an immeasurable step in advance upon the older methods of cutting grass. It comes in at a time when the work of the farm is peculiarly laborious; when labor is held at even higher than the usual high rate of wages, when the weather is often fickle and precarious, generally oppressively hot and trying to physical strength, and it relieves the severest strain upon the muscles during the time of harvest.

The invention of the horse rake preceded it in point of time.

and must be regarded as second only in importance in the economy of labor, taking the place of many men, and accomplishing a larger amount of work equally well, at a season when, if ever, time is money.

But there was still some new invention wanting. The farmer could now cut his grass rapidly enough, and, after it was sufficiently cured, he could gather it rapidly enough, but it was still difficult to handle and cure what the mowing machine could easily cut. Spreading hay by hand, though not so laborious as some other processes of haymaking, is slow work, and, notwithstanding the ease and rapidity with which the other work could be done, a strong force was still required to cure the grass. There was a want of balance in the new system, and here the Tedder came in to complete and round it out as it were. In this respect it must be regarded as of nearly equal importance with the mower and the horse rake.

After one or two attempts, which met with partial success, we have now the American Hay Tedder, as manufactured by the Ames Plow Company, of Boston. The draught of this machine is light and easy for the horse, the construction simple, the work effective. (*Fig. 55.*)

The forward action of the old English machine was too violent, and it handled the half made hay too roughly. Every farmer knows that, after grass is partially dried in the process of haymaking, a rough and violent action or handling is to be avoided. It breaks off the tender leaves of the clover, shakes out the seeds of such of the plants as have approached the period of maturity, and wastes many of the finer leaves of the natural grasses. The American Tedder has aimed to avoid this objection, while, at the same time, it lightens up the grass to the sun and air, and hastens the curing process without the

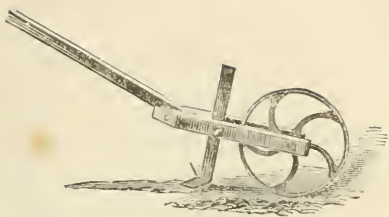
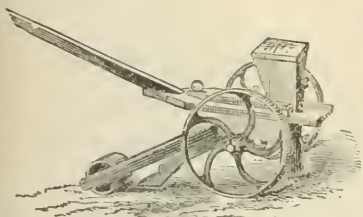


Fig. 48. DANVER'S SEED SOWER. Fig 49.

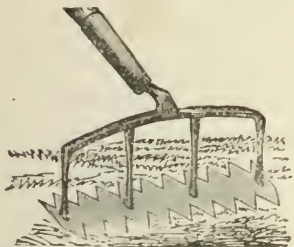


Fig. 50. ALLEN'S WEEDING HORN.

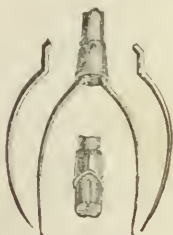


Fig. 51.

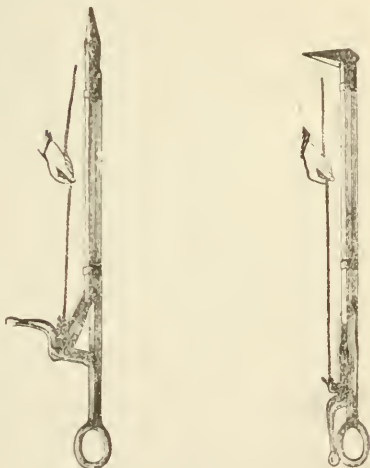
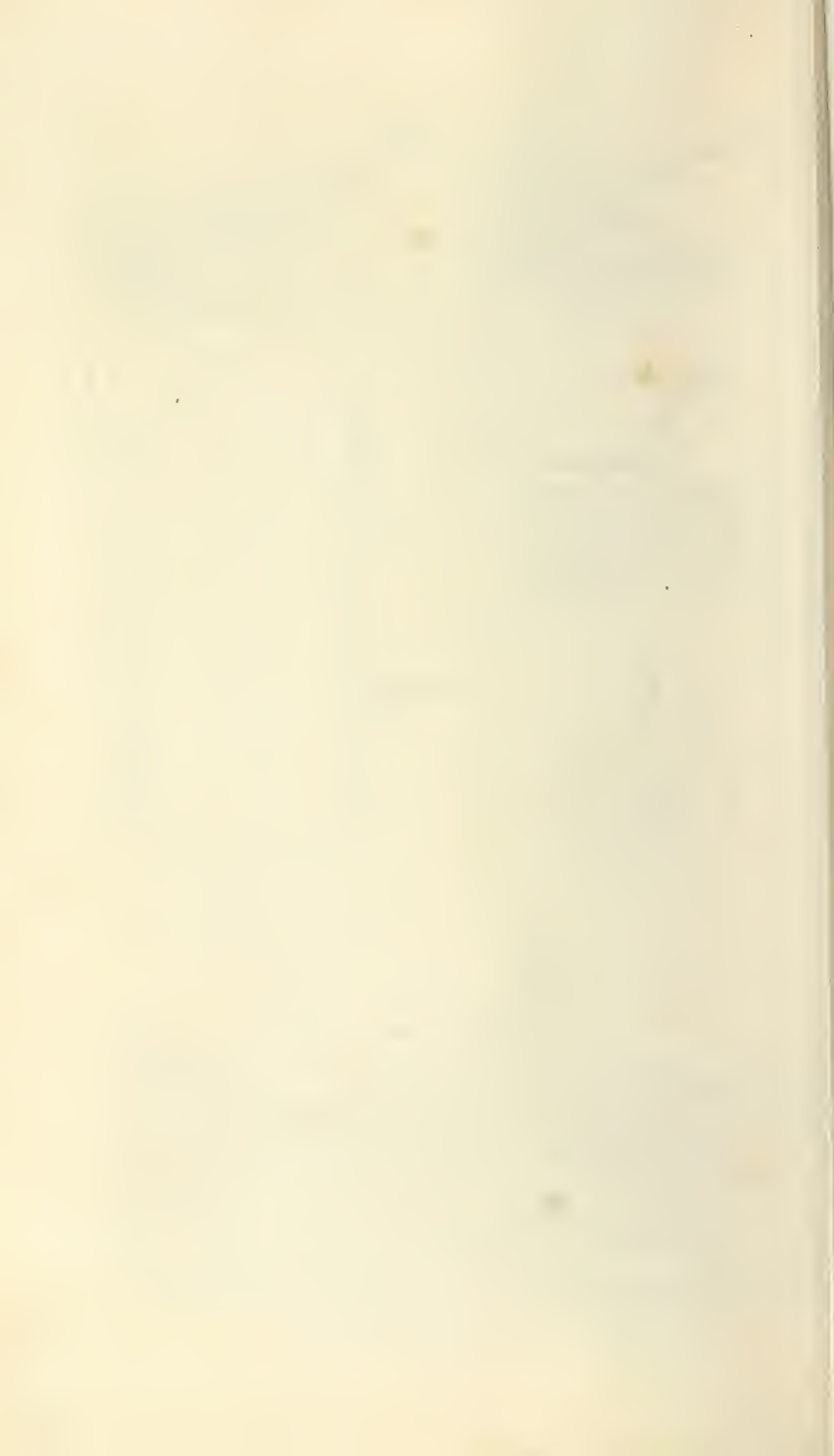


Fig. 52. HORSE FORK.



Fig. 53. SELF LOCKING RAKE.



waste which would follow a violent hurling into the air of wilted and partially cured grass.

This machine has been used very successfully and satisfactorily in New England and in some other sections of the country, and it supplies a want which has been felt since the introduction of the mower, even more than ever before. Those who have used it consider it quite indispensable.

THE HORSE RAKE. In raking hay the work to be performed, though slow, is comparatively light, and does not require the exertion of a great amount of physical strength. Here, as also in spreading or tending hay, the application of animal power is of the greatest advantage, since it multiplies the efficiency of the hand many times. The same is true in the case of the hand drills for sowing the smaller seeds, like turnips, carrots, beets, etc., where the labor by hand is slow, and, though light, is laborious and irksome.

It has been found, therefore, that the labor to be performed by a good horse rake, is equal to that of eight or ten men, in the same time, and that from twenty to thirty acres a day can be gathered by a single horse and driver, without over exertion.

Of the innumerable patents issued for horse rakes, within the last twenty years, it would be difficult to single out any one and say that it was the best, all things considered, or that the merits of all have been or could be united in one. Still, many of them work so perfectly that it is impossible to avoid the conclusion that they leave little, if any thing, to be desired in this direction.

The best judges have arrived at the conviction that wire or steel teeth have the preference on account of their wider range of usefulness.

The Bay State is a steel tooth, each tooth being hinged to the axle and held down by spiral springs. The ease with which

this rake is worked is quite wonderful. The driver has only to touch a lever with his foot, with a slight pressure, which any boy can apply, when the rake is lifted by the horse, and, by means of the cleaning rods, frees itself at once of its load. It is set so high that a large windrow can be gathered, and, if desired, the windrow can be cocked ready for loading.

This rake is independent in its action, that is, each tooth operates independently of the others in passing an obstruction, while the draught is light, and the material and workmanship are unsurpassed. It is made by the Buckeye Mowing Machine Company, at West Fitchburg, Massachusetts. (*Fig. 56.*)

A simple and effective machine has been introduced into New England, known as the Whittemore Self-Locking Rake. This may be worked either by the foot or the hand, and is easy of operation. The lock lever is arranged to hold the teeth to the ground in doing heavy work, when, in many machines, they are inclined to rise and scatter the hay. An easy spring seat is secured to the axle, so that the weight of the driver does not press upon the horse. It can be set with the teeth a little above the surface of the ground, when it becomes a very effective gleaner in grain stubbles. The teeth of this rake act independently also, and it is furnished with cleaners, which secure the instant unloading of the rake when it is lifted. It is manufactured by the Messrs. Whittemore, Belcher & Co., of Chicopee Falls, Massachusetts. (*Fig. 53.*)

No farmer can afford to be without a good horse rake. It saves labor and time at the most critical season of the year, and often when, without one, it would be impossible to avoid the injury from rain or exposure to foul weather. In the economy of labor, the horse rake must be regarded as second only in importance to the mower, and it is almost as essential on the farm as the plow itself.

Fig 54. WOOD JOINTED BAR MOWER.



THE MONTGOMERY FORK. A recent improvement in forks has been introduced by the Montgomery Fork Co., 254 Pearl St., New York city, by which the tines can be taken out and replaced without loss of time in case of breakage or other accident. All farmers know that in repairing a broken tine of the common fork, the other tine is usually made worthless, and so on the breakage of a tine the whole fork is thrown aside as lost.

By this arrangement, if the handle should get broken the tines are good and can be set in another handle in a few minutes, and the fork is as good as ever. The handle, instead of being tapered at the end near the fork, is made larger there, so that the whole strength of the wood is left. The ferule, easily removed by loosing a screw, binds the whole together, and holds the tines firmly in position. The process of manufacture secures a uniform texture of steel, and the weight of the fork is no greater than ordinary. This fork received the first premium at the New York State Fair of 1867. In many sections of the country it will be found to be good economy to use a fork of this description. (*Fig. 51.*)

THE HORSE FORK. Among the labor-saving implements designed to relieve the severe labors of hay making, few have met with greater popular favor than the Horse Pitchfork. It saves not only the violent strain upon the muscles, but a great deal of time, which, in the hurry of haying, is often of the utmost importance.

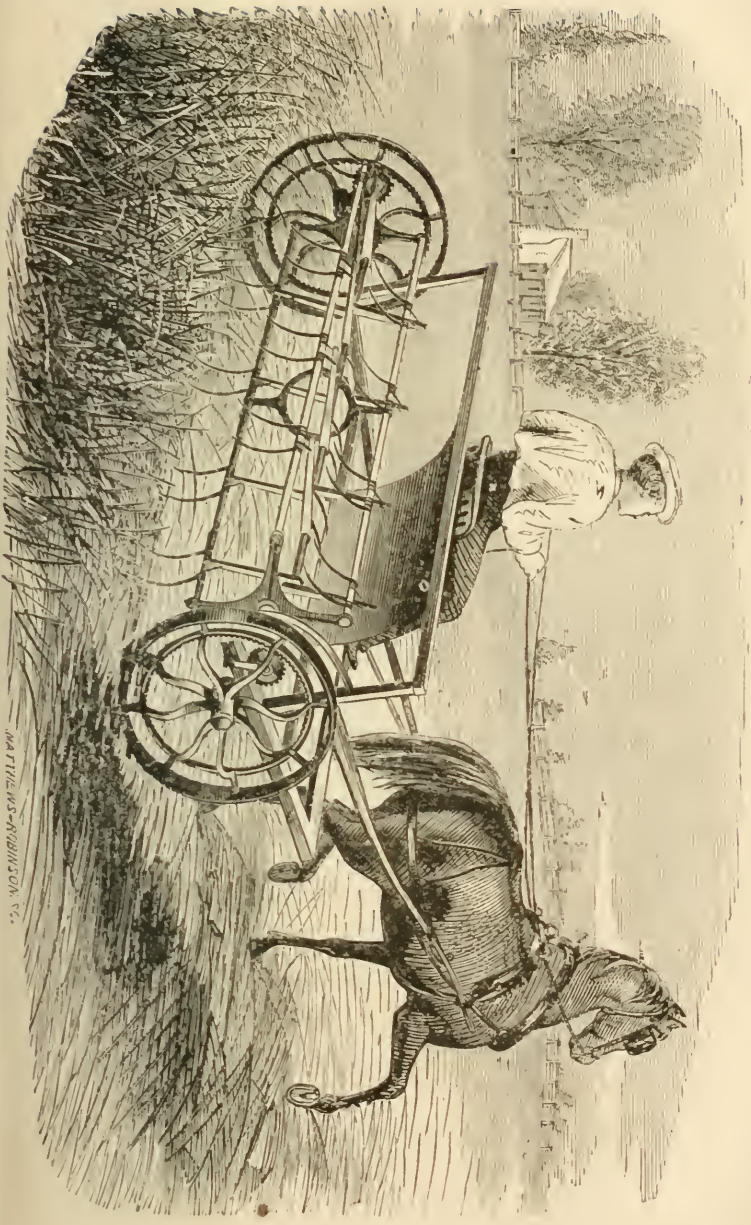
Several different patterns have been introduced and worked with success.

The Harpoon fork was originally invented by E. L. Walker, of Jenner Crossroads, Somerset county, Pennsylvania. It was simply a straight spear, and, as such, it entered the hay when a bolt was drawn at the handle, which threw out at the side one

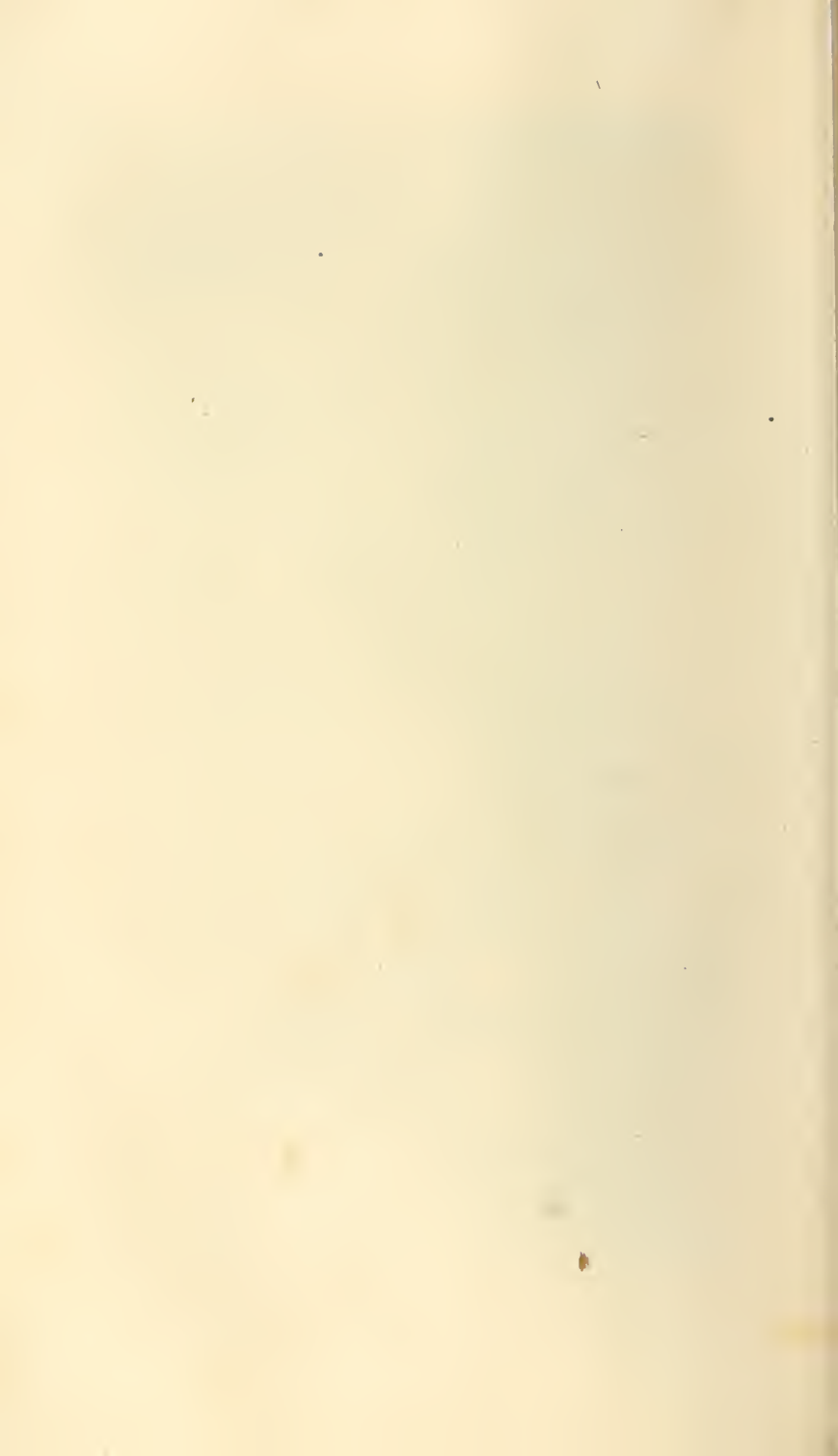
or more lateral hooks, which seized upon the hay, and thus lifted it in large quantities from the load. There is no doubt that a larger amount of hay can be removed from the load by this arrangement than by any other style of fork. But Mr. Walker became satisfied that he could improve upon it, and now his fork has assumed the simple form as illustrated in *fig. 52*, and in this form it has been very largely sold and very widely distributed over the country. It is made entirely of iron, which gives it durability, while its weight is only ten pounds. The construction, as appears by the cut, is extremely simple, and there seems to be but little liability to get out of order, having no tines to bend or to break. It takes up but little room as compared with some of the other forks, and it is worked so easily that a boy can operate it. Its strength and its grappling power are so great, that it will take and hold enough for two horses to raise over the barn beams. At a trial before the Pennsylvania State Fair, in competition with others, the committee report that they found it the best implement for unloading hay.

This Fork is manufactured by Wheeler, Melick & Co., of Albany, New York, who send out with it the best style of anti-friction roller pulleys, which are admirably designed to facilitate the practical working of the machine.

THE REAPERS. The progress made in the improvement, and the extent of the manufacture of reapers, is scarcely less important than that of mowers. For the boundless West it is, perhaps, of even great importance. The last official census reported an aggregate production of 173,104,924 bushels of wheat, and it is hardly too much to say that the product at the present time exceeds two hundred million bushels. The application of machinery has given us the power of an almost unlimited expansion of this product.



MADE BY JAMES ROBINSON, SC.



At the public trial of reapers at Geneva, fifteen years ago, all the machines were very defective in the execution of their work. The draught was very heavy, and the side draught even in the best of them was described as killing for the horses. There was not, at that time, a self-raker in the country that was capable of doing satisfactory work. Five years later, at Syracuse, some progress had been made in this direction, but scarcely more than to make it certain that a self-raking reaper was destined eventually to succeed.

At the Auburn trial, in 1866, the self-rakers did better work than the hand rakers, and they will very soon drive the hand raking machines completely from the field. They had improved in other respects to such an extent that they could readily cut lodged and tangled grain, and leave it in a good condition for binding. The side draught, which, in previous trials, had been severe, was reduced to a very low point, some machines showing none at all.

The next demand on the mechanical ingenuity of the country is for a self-binding, as well as a self-raking, reaper, and there is strong reason to believe that this important object will soon be attained. Attempts have been made to accomplish this, but they have not as yet given general satisfaction. Perhaps exception should be made in favor of Carpenter's automatic Grain Binder, patented by S. D. Carpenter, of Madison, Wisconsin, who is thought by many good judges to have discovered the principle on which an automatic binder, to be attached to the reaper, is possible. This is a contrivance which binds with a wire in bundles to be regulated by the character of the crops. It does not materially add to the draught of the reaper.

The automatic rake and the automatic binder, both attachments to the reaper, must be regarded as the most important recent inventions in agricultural machinery. Neither of them

can be said to be perfected, but the success so far attained seems to leave no doubt that the time will soon come when the hand raking machines will be as much behind the times as the sickle and the scythe.

One of the most popular self-rake reapers at the West is that of Walter A. Wood. This machine was first brought out in 1860, with a novel mode of discharging the grain. The motion given to the rake resembles somewhat the action of the human arm, and it leaves the grain in gavels the size of which is regulated by the will of the driver. The rake is driven by a chain which passes around the edge of the platform, working with great precision, and delivering the grain in compact bundles ready for binding. The reaper cuts a swath five and a half feet in width, and will do from fifteen to twenty acres a day, in the most satisfactory manner. (*Fig. 57.*)

USE AND CARE OF MOWERS AND REAPERS. With regard to the higher cost machines upon the farm it would be natural to expect the exercise of at least ordinary care, not only in their selection but in their management, both while in use and after the season is past. But farmers are notoriously negligent. A valuable mowing machine is not uncommonly left, after its work for the season is done, under the lee side of a fence, uncleaned and unoiled, or perhaps under the barn, or in an open shed, where it is liable to rust and be injured by neglect far more than by the wear and tear of a whole season's usage.

The following suggestions apply to both mowers and reapers:

1. Buy the best. It will be the cheapest in the end.
2. Buy it early, so as to be sure you have the one you wish, and not find, just as you are ready to begin, that you cannot get the one you intended to buy.
3. When attaching the horses see that the knives are in a

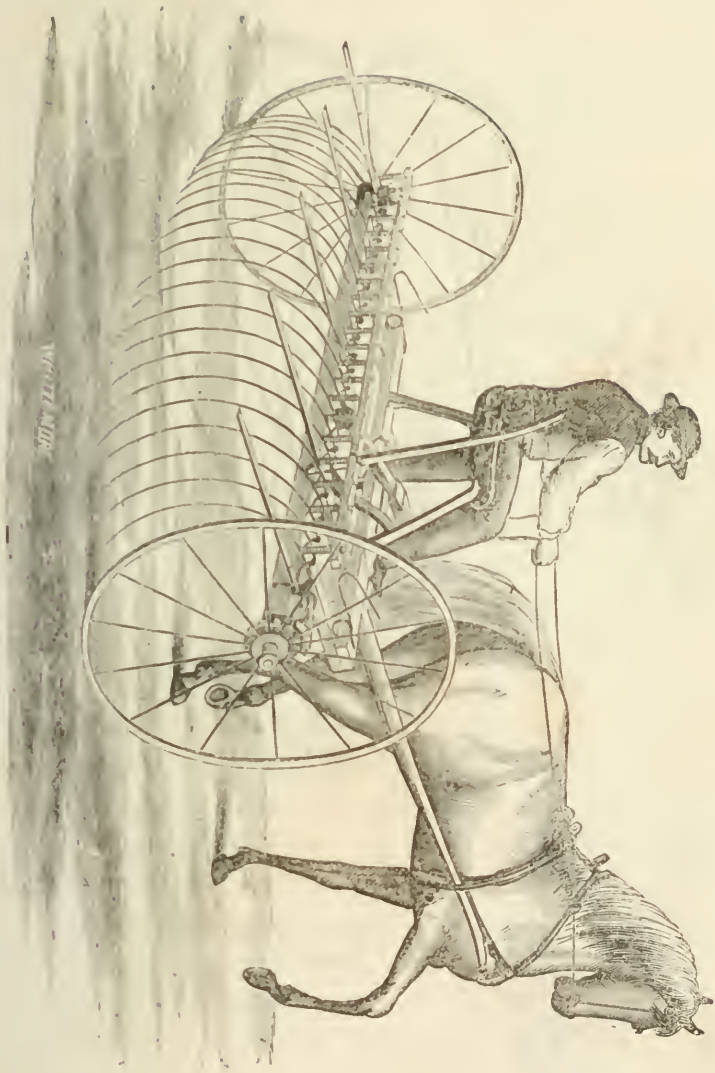


Fig. 56. BAY STATE RAKE.

horizontal position, neither pointed up or down. This secures a smooth, even stubble.

4. See that all the nuts are turned tight. The manufacturers are often obliged to finish a part of their machines some months before the time for using them, and all wood is liable to shrink a little.

5. Buy the very best sperm oil, if possible. Poor oil will be sure to gum up. If you cannot get sperm oil, kerosene and castor oil mixed, one third of the former and two thirds of the latter, will answer a good purpose.

6. Keep the bearings well oiled, also the buttons which hold the knives down to the plates in the fingers.

7. Keep the knives sharp all the time. Take both scythes into the field sharp, and once an hour or so rub the edges with a sharp gritted whetstone; this saves sweating your horses, and the wear upon the machine, and leaves the field looking as if you understood your business. Use the scythes about equally, as they fit and work the better for it.

8. Keep the buttons down as close to the cutter as possible, and have the scythes play easily. They are made of malleable iron, and will bear pounding, but in long use they are apt to wear loose. Examine them frequently, and as they wear, rap them down with a hammer so as to keep the edge of the cutters in close contact with the edge of the steel plates in the fingers. You might as well expect to cut wet paper with a dull, loose jointed pair of scissors, as to cut grass with dull scythes, not in their proper position.

9. When the cutters become worn to a point, and begin to grow shorter, have new ones put on; it is the poorest economy to use them so; like using a worn out plough point.

10. Examine your machine carefully as soon as haying or reaping is over, and if it needs any repairs, send it at once to

the manufacturer, unless you can replace the parts wanted yourself. He has time in the fall, before beginning to turn out machines for the next season, to attend to it faithfully, and you save much vexation, and perhaps loss, which might occur if this is neglected till spring.

11. If the machine needs no repairing, take out the knives, wipe them clean, and then rub them over with an oily rag, to prevent rusting. Oil the fingers, and remove the pole and bar, put the bar and scythe in a dry place, clean your machine thoroughly, and keep it dry and clean through the winter.

If these suggestions are not heeded do not blame the manufacturer if your machine soon wears out.

THRESHING MACHINES. The improvement in machines for separating grain, has been constantly progressive, until they may be said to have reached a truly wonderful degree of perfection. The older portion of the present generation can remember, when the old fashioned flail resounded on nearly every threshing floor in the country. Here and there the grain was trodden out by the tramping of cattle. The writer often adopted this method of separating both wheat and oats, many years ago, not merely by way of experiment, to see if the thing could be done, but in real earnest, as if it were one of the best and most approved ways in the world. But what a waste of time and labor!

Wheeler's patent is a well known and efficient thresher, which saves labor and time, and separates and cleans wheat or rye, with great rapidity. The machine is manufactured by Wheeler, Melick & Co., of Albany, New York. Two horses will work the machine, while a three horse power will drive it with such velocity, as to keep a smart man hard at work to feed it up to its capacity. (*Fig. 58.*)

The horse power thresher is of English origin. Its introduc-

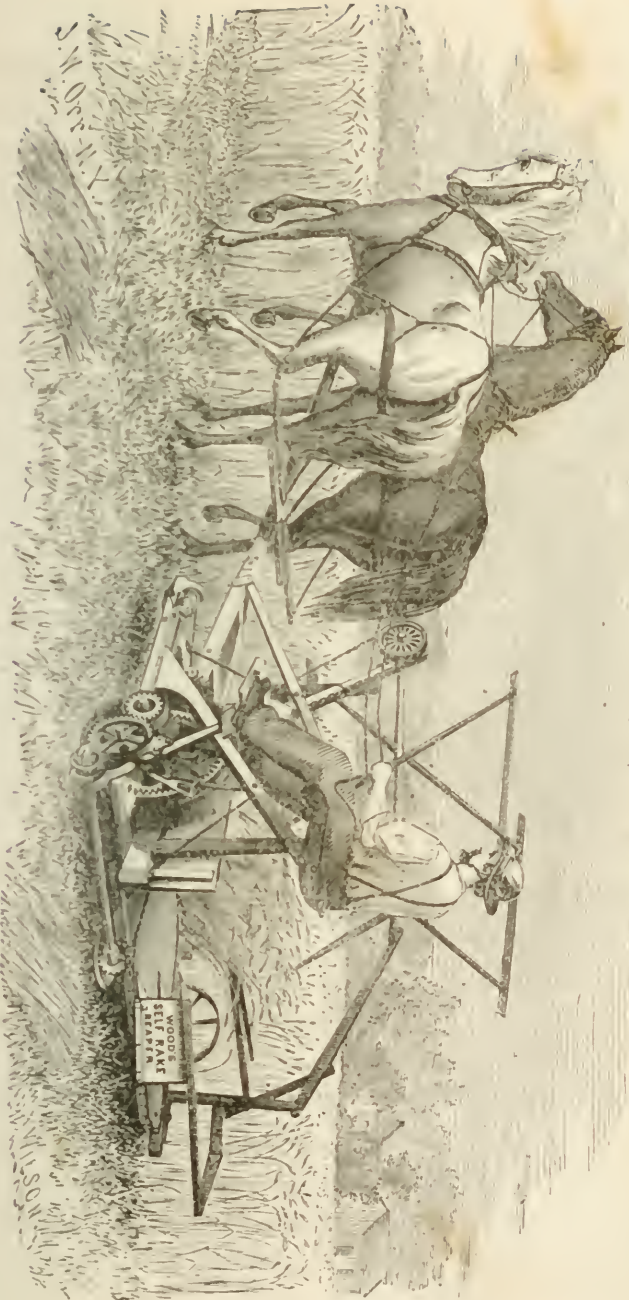


Fig. 57. WOOD SELF-RAKE REAPER.



tion was strenuously opposed by the laboring classes there, as an attempt to infringe upon their rights. Separators and winnowers were attached to the thresher at a much more recent date, but they have been found so important, that now few machines are made without one or the other. Straw carriers followed soon after, by means of which the straw is stacked away. A bagging apparatus is now often added, so that the grain is threshed, winnowed, measured, and bagged, ready for market, at one operation, and the straw taken care of with very little labor. Most of the labor is done by the team, while the rapidity of work is quite wonderful.

At the trial of Threshing Machines, at the Paris exhibition, in 1855, the victory was won by an American machine, and during the operation, to ascertain the comparative rapidity and economy of threshing, six men were engaged in threshing with flails, who, in one hour, threshed sixty litres of wheat. In the same time

Pitt's American machine	threshed	740	litres
Clayton's English	" "	410	" "
Duvoir's French	" "	250	" "
Pinet's	" "	150	" "

A French journal, speaking of this trial, said: "This American machine literally devoured the sheaves of wheat. The eye cannot follow the work which is effected between the entrance of the sheaves, and the end of the operation. It is one of the greatest results which it is possible to obtain. The impression which the spectacle produced on the Arab chiefs, was profound." And yet, since that exhibition, still farther improvements have been effected in this country. (*Fig. 59.*)

Pitt's machine itself has been somewhat improved, and as now manufactured by J. T. Case & Co., of Racine, Wisconsin, is one of the very best machines in the world. These makers

turn off from three hundred to five hundred machines in a year, each one including an admirable thresher, separator, and carrier. Most of our approved American machines, in fact, now in use, separate the grain from the chaff and the straw and carry the latter back to the stack. Many of them measure and bag the wheat, ready for market. Wherever our complete machines have come into competition with those of English, French, or other European manufacture, they have invariably proved themselves superior in point of simplicity, rapidity, and perfection of work.

CORN SHELLERS. On farms where a considerable amount of corn is raised, a Corn Sheller is quite indispensable. It shells with great rapidity, and on many a farm would pay for itself in a single year.

There are several patents, some of them adapted more especially to hand, others to both hand and horse power. Some of them are adapted more especially to the small-sized ears usually grown in the Eastern and Middle States, others to the large ears of the Southern and Western States. (*Fig. 60.*)

The Southern Corn Sheller is made expressly for the large farms and plantations of the West and South, where the corn is large. It is made both single and double, to shell one or two ears at the same time.

NATIONAL HAY CUTTER. The advantage of cutting food for stock, though it has at various times been a subject of discussion among practical men, is now very generally conceded. Wherever a large stock of cattle, or a large number of horses are kept, it is often good economy to feed out more or less of the coarse substances of the farm, like straw, corn, clover, second-quality hay, etc., mixing them either with the better qualities of hay, or with some form of meal or concentrated food.

The form in which food is given to cattle is by no means a

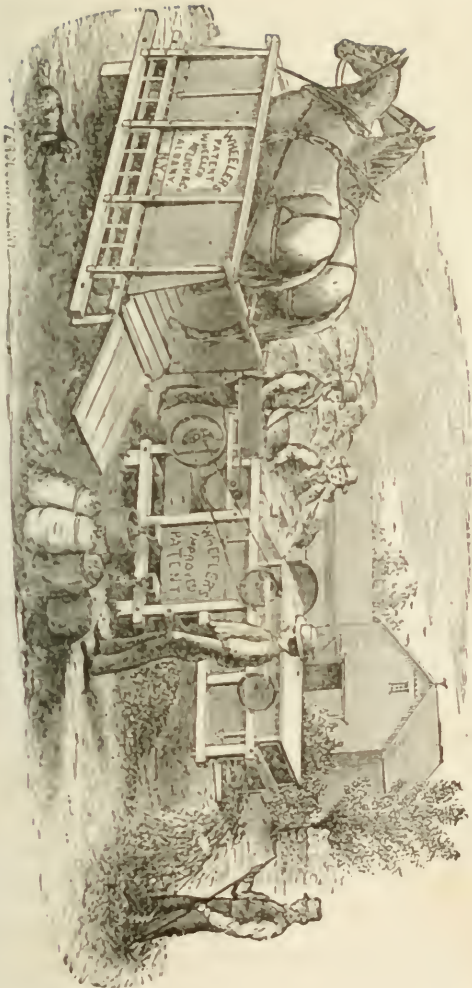


Fig. 23. WHEELER'S TYPE-SETTER.

matter of indifference. Hay or straw, when cut short, or chaffed, is taken up in a condition to prevent any unnecessary expenditure of muscular force. As less mastication is requisite, if cut fine, less of the tissues of the body are expended in grinding down the food.

Hay or Fodder Cutters are made to cut the feed of different lengths, according to the stock for which it is designed. For the ruminating animals, it may be less finely divided than for others. If for an ox, a cow, or a sheep, it is cut from one to two inches long; for a horse it would be better economy to cut it from a quarter to half an inch. It is of the first importance that a machine should cut short, and with perfect regularity; and to this end the hay or straw must be delivered to the knives with the same regularity, or the work will be imperfect.

Here is the great defect of the machines fed by hand. Next to a short and regular cut, strength, simplicity, and durability are to be considered.

But besides the great economy of feeding cut fodder, which amounts to a gain of at least twenty-five per cent., under ordinary circumstances, in the food and the increased thrift secured, there is a positive advantage to be derived in the manure. Long stalks of coarse straw are often quite inconvenient to handle, and are liable to be troublesome in plowing. The use of some form of hay and straw cutter has, therefore, become almost universal, and must be regarded as quite indispensable on every well-conducted farm.

The National Fodder Cutter possesses many points of decided superiority, and is very properly regarded as one of the best. It is manufactured by J. D. Burdick & Co., of New Haven, Connecticut, of several sizes, to suit the requirements of large as well as small farms, the former to be worked by horse or steam power, and capable of reducing a ton and a half

per hour, the latter easily worked by hand, and cutting or chaffing from three hundred to one thousand pounds per hour. This Cutter unites the important elements of strength, ease of working, and safety, the knives being covered to protect the operator from accident. I know of no better machine in the market. (*Fig. 61.*)

EXCELSIOR ROOT CUTTER. No farmer who keeps a flock of sheep or a stock of cattle, should neglect to cultivate a wide breadth of root crops; and to feed them out judiciously requires the use of a good vegetable cutter. Neat cattle and sheep, when attempting to eat turnips, mangolds, carrots, potatoes, or pumpkins, in pieces so large that they cannot readily take them between the teeth, are extremely liable to get choked. Many a valuable animal, whose life might have been saved, has been sacrificed by a neglect to cut the roots. (*Fig. 62.*)

The Excelsior Cutter is the best adapted to this work of any that I have any knowledge of. At the New York State Fair at Buffalo, it cut a bushel of potatoes fine enough for sheep in twenty-six seconds. It cuts pumpkins, turnips, and other roots, into strips of a size best suited to sheep and cows, and it does it with such remarkable ease and uniformity that a small boy or girl can cut a bushel of roots in a minute. The cylinder is hollow, made of hard iron, and the little gouge-shaped cutters are fastened to the surface, and slice off the pieces of the size of a man's thumb, or larger, the cutters being easily adjusted to cut the size desired. This simple and effective root-cutter is manufactured by J. R. Robertson, of Syracuse, New York. It has taken the first premiums at the Pennsylvania, the New Jersey, the New York, and other State Fairs, and, so far as known, it has given universal satisfaction in practical use on the farm.

CIDER MILLS. Many a small farm has a supply of apples

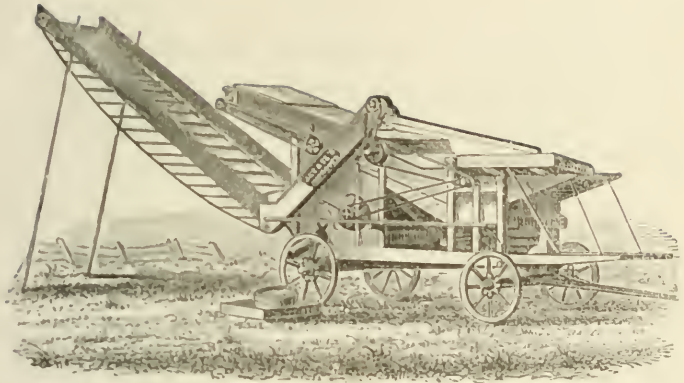


Fig. 59. PITT'S THRESHER.



Fig. 60. CORN SHELLER.

and other fruits, which, for want of adequate means of economising them, are of less value than they might otherwise be made. A hand cider mill is, therefore, a great convenience to the small farmer. With it he can crush, and grind, and press his apples, his currants, his grapes, etc., and make them into cider or wine, at a trifling expense of time and trouble. (*Fig 63.*)

HUTCHINSON'S CIDER AND WINE MILL. The best mill which I have examined, is Hutchinson's patent—a simple and convenient machine, of various sizes, that has often been exhibited, and taken premiums. This mill enables the farmer to produce sweet cider and wine at any time, and thus to save many fruits that would otherwise be lost. The juice comes out clear and sweet, and if from sound apples, will keep good a long time. The fruit is first crushed, and then ground into a fine pomace, without breaking the seeds, and discharged into the press beneath, to be pressed out at convenience. The pressing is a simple and easy process.

All the iron work, with which the juice would be liable to come in contact, is covered with a durable preparation that prevents all rust, and keeps clear and free from any thing disagreeable. The screws are made of wrought iron, with a fine thread. The teeth of the grinder are not liable to clog. From eight to ten bushels of apples, grapes, currants, etc., can be ground by hand power in an hour. For simplicity, neatness, and compactness, I know of nothing of the kind superior to this; and as it is always ready to make a quart, or a barrel, of cider or wine, at any time, it is an article of great convenience. It is manufactured by the Peekskill Plow Works, at Peekskill, New York.

If any farmer is desirous of knowing the extent and variety of agricultural implements, let him send one dollar to Messrs.

R. H. Allen & Co., 189 Water street, New York city, for their large illustrated catalogue, containing upwards of three hundred and eighty illustrations; including plows, harrows, cultivators, seed sowers, harvesting implements of all sorts—wind, water, steam, horse, and dog powers—fans, shellers, and separators—corn, cob, and grain mills (which should be in more general use among large farmers)—hay, straw, vegetable, and stalk cutters—hay presses, churns, barrows, wagons, and trucks; besides hundreds of little things of value and interest to the farmer. A careful perusal of this work will well repay the farmer for the time and cost. Messrs. Allen & Co. have long devoted themselves to the interests of the farmer, and we are indebted to them for valuable assistance in the preparation and illustration of this chapter.

CARE OF FARM IMPLEMENTS. Nothing is more common than to hear the farmer charged with neglecting the implements of the farm, by unnecessary exposure to the weather and careless usage generally. There is, no doubt, some ground for this charge; and yet there is often a good cause for an apparent neglect.

The proper care and management of mowers and reapers have been alluded to on a previous page, and we have only a few general suggestions to add, in this connection, with regard to other implements. These are of two kinds—such as are used within doors mainly, and such as are used without. The former are not usually subject to exposure and injury to such an extent as the latter. Implements used in the field might be again divided into such as are required more or less at every season, and such as come into occasional use only. Those that are liable to be required at any season, must necessarily be more exposed than others; but they are, fortunately, of simple construction, and less costly, when they are to be renewed,

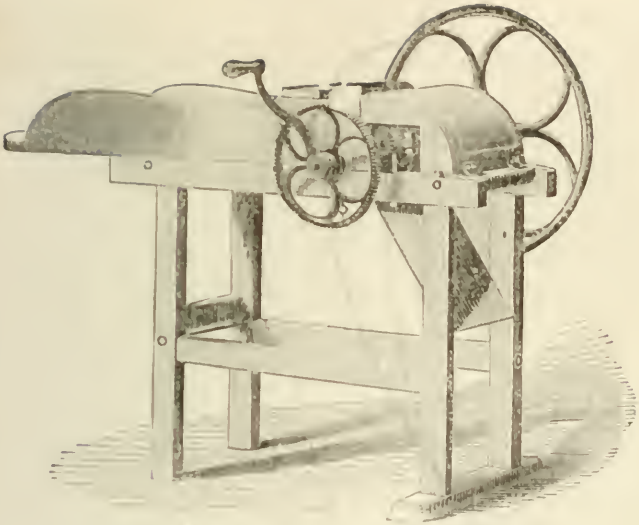


Fig. 61. NATIONAL FODDER CUTTER.

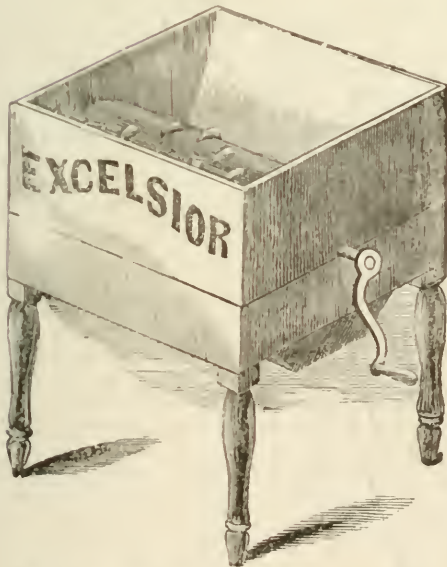


Fig. 62. EXCELSIOR ROOT CUTTER.

than many of those that are used for a short time at certain seasons.

The plow is, perhaps, more frequently used than most other implements, and it is subject to great exposure. When it was made of wood, it was liable to rapid decay. It is still often injured by neglect, and want of housing after use. All plows should be cleaned before storing them away, and if pains were taken to brush over the iron work with a cloth moistened with oil, it would prevent rust, and prolong the period of usefulness.

A tool-house is an obvious necessity on every well-regulated farm, and all those tools that are but rarely required, should be kept there, and immediately returned after use. In fitting up this tool-house for the reception of miscellaneous implements, care should be taken to keep the floor as little encumbered as possible, in order to allow free access to every implement when it is wanted. A large class of small implements—scythes, wheels, saws, etc., are best hung against the wall, on nails. Small articles, not readily suspended, should have a place on shelves. Hoes and weeders, and similar tools, are more accessible in framed stands. Plows, grubbers, etc., may be kept along the side walls. Have a specified place for everything.

As often, at least, as once a year, there should be a regular muster and examination of all tools. It may be the work of rainy weather. Collect into the tool-house every thing that belongs there. Scrub and polish with sand and water, if needed; oil such tools as will not be needed for some time; mend any that show the need of repairs, and take to the blacksmith shop or carpenter such as cannot be done at home; and, when in good condition, return each to its place. Plow points get worn and broken, nuts and bolts are loosened perhaps, or lost, and a thousand little things require to be mended or replaced, which,

in the hurry of the working season, have to be tolerated. It is economy to keep them, as they should be, in order; and a day or two, at the close of the season, in a general picking up, mending, painting, oiling, and scrubbing, will save many a dollar, which will be required to buy new implements in place of those ruined by neglect.

We have alluded to the wonderful development which mechanical ingenuity has wrought in our agriculture. The mower, the reaper, and the thresher, are fit types of the ever restless and progressive spirit of the present age. A few, wedded to old prejudices and to early customs, may resist them as innovations, for a time, but their language is too powerful and persuasive to be long unheeded. They promise for us a glorious future, in which they will accomplish, for us and for our country, triumphs no less grand than the triumph of arms, for they develop the means of supporting the millions of human beings, which the implements of war can only destroy.

In the early ages of the world, men dug the earth, and sowed the seed, and reaped the grain; but while the myriads toiled, without aspiration or hope, civilization was confined to the few, the mechanic arts languished, and the gigantic forces of nature waited the hand of a master to call them into beneficent activity. The river rolled on its resistless current for more than a hundred years after the Christian era without turning a wheel. The winds swept over the hills of Europe till the eleventh century, without giving motion to a single mill. The mighty power of steam lay hidden.

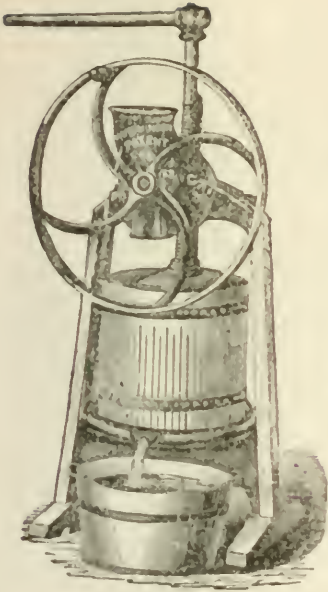


Fig. 63.

HUTCHINSON'S CIDER MILL.

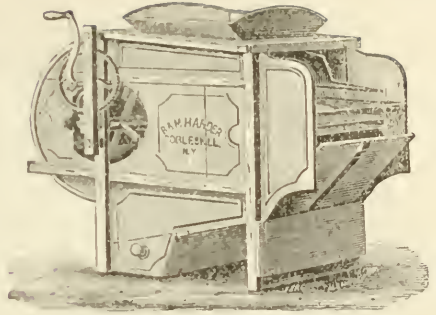


Fig. 64. FANNING MILL.



Fig. 65. COTTON MARKER.

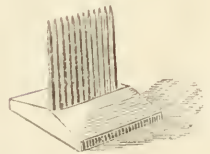


Fig. 66.
FLAX COMB.

CHAPTER V.

GRAINS.

WHEAT CULTURE is the most important of all agricultural operations, and has more influence upon the world than any other.

Wheat is brain food, and the progress of civilization and intellectual culture can be traced by the extent of its growth and consumption. Two hundred million bushels of wheat are annually raised in this country, and we have the soil and the machinery for an almost unlimited expansion of the product. Such an important branch of our industry is worthy of the most attentive and pains-taking consideration.

THE CORNER STONE OF WHEAT CULTURE, as of all improved farming, is drainage; it is here that the largest amount of capital is required, and it is here that it *pays*. And as drainage is the corner stone, fattening stock, rich manure, and clover fallows, are the foundation stones. Each of these will be treated of in this chapter.

SOILS FOR WHEAT. The best are the clays; clay and lime, clay and sand, clay and loam. There must be clay for a succession of good crops, there must be sand for bright stiff straw. A sandy soil is too porous for wheat, although a single good crop of spring wheat is sometimes produced even on the sands of New Jersey. Muck is not adapted to wheat culture. Wheat will succeed on a greater variety of soils than is commonly supposed, if care is taken to enrich and fatten the land.

There is no State but what can and ought to raise enough wheat for its home consumption, and there are no obstacles in the way greater than the tradition that wheat will not pay.

The New England States produce only one fifteenth of their consumption, and pay from eight dollars to sixteen dollars per barrel for wheat flour. We do not propose to the farmers of that section to raise wheat for exportation; leave that to the Western farmers; but they can, by an improved system of farming for wheat, produce the wheat for home consumption at a great ultimate saving. It will require the investment of considerable capital in drainage, in improving soils, (see *Chapter III.*,) in the purchase of stock, etc.; but the object is a worthy one, and ultimate success and profit are, we believe, certain. THE IMPROVEMENT OF SOILS for Grain is discussed in *Chapter III.*, but we would say here that there are many soils that can be made to produce good crops of corn, oats, rye and barley, that will only yield small crops of wheat, because wheat requires some elements not required by the other grains. Some soils, with only a small admixture of clay, will only give a fair wheat crop in a six years' rotation. Where clay and sand, or clay and gravel, are commingled in just the proportion which will insure drainage without drought, wheat can be profitably raised every three years. If your soil is not of this character, the first thing to be done is to drain. Clay contains the food for the wheat plant, but it is also the most retentive of water, and an excess of water is death to winter wheat. After drainage of a heavy clay soil a few hundred bushels per acre of sand completes the work of improvement, and you have a soil which can be made to yield remunerative crops. A pure sand *cannot be made* a remunerative wheat soil. Clay can always be made so by the application of SAND, LIME, SALT, AND RICH BARN-YARD MANURE. The new soils of the prairies will, for a few

years, bear good crops of wheat without manures, or additions of any sort, but to crop lands in this way is ruinous in the end, and the prairie farmers have often found it out to their cost. Nor does it help the matter much to put back the straw or to feed it out and return the manure to the land. Something richer must be added. Either a portion of the grain must be fed with the straw to the stock or some substitute must be found. Ashes, lime, plaster, etc., applied to green crops and plowed under, form the substitutes. The relative value of these fertilizers is given in *Chapter III*. Ashes and lime should be composted with straw, leaves, stalks, and muck. Gypsum, lime, etc., should be sown on clover or buckwheat, and the crop plowed in green. An acre of wheat requires one thousand four hundred and eighty-seven pounds carbon, one thousand two hundred and sixty-two pounds oxygen, one hundred and seventy-one pounds hydrogen, and thirty-two pounds nitrogen; an acre of clover, well set and plowed under in blossom, yields one thousand seven hundred and fifty pounds carbon, one thousand three hundred and ninety-six pounds oxygen, one hundred and eighty-five pounds hydrogen, and seventy-eight pounds of nitrogen. It will be seen by the above that there can be no better preparation for the wheat crop than a clover lay turned under. Wheat will not perfect without nitrogen, and one gallon of the urine of a cow, or one quart of the urine of a horse, when they are fed on grain, contains nitrogen enough for sixty pounds of wheat. One pint of human urine contains the same amount. Read *Chapter III*., and learn how to economise this product more precious than gold. Pulverized charcoal will retain a large amount of urine, and is a most valuable fertilizer for wheat, especially on a worn soil. Other applications for renovating such lands are, first, ten cords well rotted stable manure, twenty bushels leached ashes, five bushels bone

dust, one bushel plaster, and one bushel of salt per acre. Second, five two-horse loads of wood mould or swamp muck, two hundred pounds superphosphate; one hundred pounds Peruvian guano, one peck plaster, and one bushel salt per acre. Third, three hundred pounds superphosphate, twenty bushels leached ashes, one peck plaster and one bushel salt per acre. Salt in some form we believe to be necessary on all wheat lands for permanent cultivation; refuse salt can be obtained from fish, beef, and pork dealers, at a nominal price. A correspondent of the American Farmer writes that "he mixes five bushels of salt with ten of air-slacked lime, lets it stand three months, turns it three times during that period, and sows three bushels of the mixture per acre before the last harrowing." This is an excellent method of using it.

John Johnston, the veteran farmer of Geneva, New York, says that he has sowed five bushels of salt per acre, and believes that for every bushel of salt, he got an extra bushel of wheat, besides hastening the ripening several days, by which means his crop escaped the ravages of the midge. Let every wheat-grower test the value of salt on his own lands, by using it on one portion of his field, and carefully noting the results. Clover, as we have before stated, is the most efficacious of all green crops to plow under for wheat. It is also economical. Calculate the cost. One peck seed, \$2.50; one hundred pounds plaster, 70 cents; labor, hauling, sowing, etc., \$1.00; or \$4.20 per acre. But, after all, we must still depend largely on rich barnyard manure, and fatten the land through a regular rotation of crops; especially with a view to the wheat crop.

Says S. Edwards Todd, agricultural editor of the New York Times, for many years a careful wheat culturist, and always a close observer: "After a wet soil has been thoroughly underdrained, so that there are no apprehensions that the young

plants will be lifted out of the ground by freezing and thawing; after the surface soil has been renovated with clover and kept in an excellent state of fertility, by a judicious system of rotation of crops for several successive seasons; after the ground has been plowed, replowed, and plowed again, and again, and again, and then harrowed, scarified, teased with the cultivator, and fretted with the roller, and vexed with the clod crusher; and after every noxious weed has been exterminated, root and branch, and their leaves, stems, and radicles have been changed into a fertile mould, the hopes of the ambitious husbandman will not be realized in beholding a bountiful crop of the full wheat in the ear, unless he has *fattened* the soil. In this lies the grand secret of raising wheat. Yet very few, even of our best farmers, understand that this is the chief requirement of the soil, after every thing else, to appearance, has been done which is really essential."

How to fatten the soil, then, is a question of greatest importance. It is by the application of wheat-producing material to the soil in the previous rotation of crops. The base of clay soils is *alumina*, the great requisite for large heads and full kernels of wheat. The phosphatic materials contained in lime, plaster, gypsum, bones, ashes, etc., are essential to the production of the milk of which the kernel is formed. Silicia must also be present to assist in making a healthy, bright, stiff straw, that will maintain an erect position until the grain is harvested. And all these elements must be in such a state that the roots can appropriate them at once. The food must be prepared for them. This can only be accomplished by applying them to previous crops; and no crop so well prepares food for wheat as clover. Clover, then, either plowed under or fed to fattening stock, and the manure returned to the soil, is a prerequisite of successful wheat culture. Lime or plaster should be sown with

the clover, and after it is well started in the spring, it may be pastured; this is much better than the old system of SUMMER FALLOWS. That was an exhausting system; the naked land was baked and burned under the direct rays of the summer sun. The clover fallow does not take as much from the soil as it returns when plowed under or plastered. The clover draws many valuable elements from the atmosphere, which it yields up to the soil; it shades, protects, and mulches the ground, and improves its condition. (See *Chapter III.*) But even this rotation of clover and plaster is not enough to maintain the fertility of the soil and produce renumerative crops of wheat. The further fattening of the soil is accomplished by keeping stock. Sheep are the best stock for this purpose, if the best breeds are selected. (See *Sheep.*) Sheep require more care in summer than neat cattle, but in winter they can be housed, and fed with much less expense; they do not require their grain to be ground, as that for cattle always should be, and they will bring quicker returns in wool and mutton, than any other kind of stock, and will add as much valuable manure to the compost as any kind of stock. But whatever kind of stock is kept, whether horses, cattle, sheep, or hogs, they should be kept fat, should be fed with grain or oil cake, and never be allowed to grow poor. Give them all they can eat, and a little to spare, for the manure from one fat animal is worth certainly twice as much as the manure from a lean one. For this purpose we recommend the raising of a wide breadth of root crops, their careful preservation and liberal feeding. (See *Roots.*) Keep not one more animal than you can keep fat; carefully preserve all their manure, both solid and liquid, apply it to the rotation preceding your wheat, let a clover fallow bring it into condition for wheat food, and you have the basis of successful wheat culture.

PREPARING THE SOIL. We have elsewhere (*Chapter II.*) given

our views, in regard to the benefits of deep cultivation, and the crop under consideration is no exception. Although at the time of putting in the seed, the plowing should be shallow, the land should have been previously subsoiled. Cultivate the soil to the depth of from sixteen to twenty inches, for the crops preceding wheat, whether they be corn, roots, or clover, not by turning ten inches of the subsoil to the surface, but mellowing it by means of the subsoil plow, and bringing only an inch or two at a time to the surface. All your crops will be better, for this mellowing of the subsoil; each will return you a large proportion of the expense, and you can expect nothing but failure of your wheat crop without it. If it is thus subsoiled for the crops that intervene between the wheat crops, it will be in just the condition required by this most fastidious plant. But when it comes to preparing directly for seeding the wheat, plow shallow. If you plow deep *now*, the wheat will at once take deep root, and by the lifting of the frosts, the roots will be broken off. Plow shallow, or even harrow the surface thoroughly, and the roots will spread out horizontally, and mat together, and though raised by the frost, will settle back into their proper place again, when the frost is gone. Skinner's Gang Plow, and Ides' Wheel Cultivator, are preferable to the ordinary plow, in preparing the soil for wheat. For similar reasons, the manure, applied directly to the wheat crop, should be merely covered two inches below the surface, or harrowed in. For this purpose, only thoroughly decomposed manures should be applied at the time of seeding. This manure, being immediately available and near the surface, will promote the growth of the roots in the manner desired. We have suggested that the seed bed should be shallow; it should also be mellow. The harrow and the clod crusher should be used, until

the whole surface is as fine as the garden bed, if you would get the largest crops.

SOWING THE SEED. *Early and late sowing.* If there were no Hessian fly in the land, the last of August would undoubtedly be the best time to sow wheat in the Northern States, but early sown wheat is liable to be destroyed by this pest. We think, then, that in the northernmost tier of wheat-growing States, sowing should rather be delayed, until the last week of September, unless there occurs a sharp frost previous to that time. Let the intervening time be spent in thoroughly preparing the soil, so that the seed, when sown, may find no difficulties in the way of an immediate and thrifty growth. If you must sow in soil not fattened, and enriched, and deeply mellowed, you *must* plant early, so that the grain will get a fair growth before the winter sets in. **THE DEPTH TO COVER** seeds, must be determined by all the circumstances of the case. If there were no frosts, undoubtedly six inches would be as good depth as any to cover wheat, but when we take into consideration the certainty of frosts, and the injury they do by breaking off the roots of the plants, we conclude that shallow planting is more desirable. Two inches in an ordinary wheat soil is sufficient, of course a very light sandy soil requires greater depth. **THE AMOUNT OF SEED TO THE ACRE**, depends upon the quality and condition of the soil. In a poor and imperfectly prepared soil, a large proportion of the seed does not germinate, and what does get a start, *tillers* but little, and two and a half or three bushels of seed per acre, is often required to produce a crop of from eight to fifteen bushels per acre. This is *poor* farming, because it keeps both the land and the owner *poor*. A much better system is that which so fattens and prepares the land, that from one to one and a half bushels of seed will suffice for a crop of from twenty-five to forty-five bushels. One bushel

of wheat, selected as described on page 168, and well drilled in, is sufficient for soil in the very best condition. But we think it safer to add one peck to this quantity; and, when sowed, one and a half to two bushels will be required.

DRILLING IN WHEAT has many advantages over sowing broadcast. Less seed is required, as it is all put in and covered at a uniform depth. Less time and labor are required, as the whole is completed at one operation, while, when sowed broadcast, it must be harrowed twice. Drilled wheat comes up much more uniformly, the stalks are more nearly uniform in height, and the heads are consequently more uniform. Another advantage of the drill is, that an acre or two may be plowed, harrowed, and the seed drilled in, all in one day, while the soil is in the best condition for it. The Star Drill and Cultivator, described in *Chapter IV.*, is well worthy the attention of grain growers. We hope the drill will ere long supplant hand sowing, as the reaper and mower are supplanting the cradle and the scythe; but meantime we must give directions for sowing and covering wheat. In hand-sowing, always cast the grain all one way, and that away from the margin of the field; calculate the width of one throw, and make it as even as possible; let the seed slip off the fingers, never through them. There are several hand sowing machines, which will do the work a little better than it can be done by hand. It is very difficult to harrow in grain evenly. The feet of the teams will tread much of it in too deep, and much will be left on the surface uncovered. We believe the Rotary Harrow, manufactured by the American Agricultural Works, is the best for this purpose, although not equal to some other harrows for ordinary farm operations. Mulching winter wheat, when it gets but a feeble start in the fall, will sometimes save it from being winter-killed. If the

first heavy fall of snow is rolled, it will have a good effect. Never pasture grain in the fall, however well it may be started.

HARROWING WHEAT in the spring may be very beneficial if the wheat has been drilled in two inches deep. Instead of the ordinary coarse harrow, use a harrow with a large number of fine teeth; the crust is then thoroughly broken up, and a mellow soil prepared for the secondary roots, which make their appearance 'as soon as growth commences. Where the seed has been sowed broadcast, and harrowed in, a large proportion of it will be covered very shallow, and will be torn up in the process of harrowing. Spring harrowing offers opportunity also for seeding to grass where this is desired. Aside from this very early harrowing, no attempt should be made to hoe or cultivate the wheat crop. If the soil is drained, mellowed, and thoroughly prepared as directed in these pages, it will not cake and harden so as to need the cultivator. If drilled in, the rows offer an opportunity to pass through the crop and pull the weeds and grass by hand, but they should not be hoed up, as the roots of the wheat will be injured by the hoe. Pull up every plant that appears among your wheat, and lay them in the rows for a mulch. The wheat is particularly sensitive in regard to weeds. Chess and quack grass are its inveterate enemies, and should be destroyed without mercy.

THE TIME TO HARVEST WHEAT is just after the kernels have passed from a milky to a doughy state, which is about two weeks before it is fully ripe. There are various signs by which this is determined. One is by opening various kernels from different heads, and if the interior is thick or doughy, it is time to cut it. On the contrary, if it is still thin or milky, it will shrink after being cut, and will not give as much or as good flour.

Another sign of the proper state for harvesting is when the

straw turns yellow, either from the head downwards, or from the root upwards, say about two joints. If the straw between the two lower or upper joints has turned yellow on a majority of the stalks all over the field, cut at once. When the grain has been drilled in, this ripening will be very uniform. If the grain is allowed to stand after this period, it will lose a proportion of gluten, which goes to the shell; and will be more difficult to handle without shaking out a large proportion of the grain; and the straw will lose much of its nutritious qualities. The straw would be better for fodder if cut a week or two earlier; it is therefore important that the harvesting be not delayed a day after the proper period has arrived: have every thing in readiness to harvest the grain immediately. This can be done with modern improvements at the rate of ten to fifteen acres per day, with a single pair of horses, and a self-raking reaper. By all means have a machine that will harvest all kinds of grass and grain. (See in *Chapter IV.*, description and directions in regard to mowers and reapers.) If you only raise a small amount of grain or grass, secure an interest in some neighbor's machine; but if you cut ten acres, of either grass or grain, buy a machine.

A southern farmer, who raised seven hundred acres of wheat, had it cradled by hand, commencing about ten days too soon, and finishing ten days too late. That first cut, shrank; and that last cut, shelled badly, and gave a large proportion of bran. His loss on the crop was not far from twelve hundred dollars. A great deal of grain will still be cradled. The cradle scythe is better less than four feet in length than over; the fingers should be a little shorter than the scythe. Do not grind the scythe too thin. Many scythes are spoiled by too much grinding. Stack the grain as fast as it is cut; do not let it lie in the swath. Whether cut by a self-raking reaper, and left in gavels,

or raked by hand, it should be bound as soon as possible, and stacked. The size of the gavels is an important consideration; they should be as large as can be conveniently bound, and of uniform size. If one thousand sheaves are made where only seven hundred and fifty were needed, just the time used to bind two hundred and fifty sheaves is lost. In raking gavels, great care should be taken that the butts be kept even, else it will not stack properly. A great convenience to the grain raiser is a band maker. We give a description, and as it is not patent any blacksmith can make one. Take a piece of half-inch round iron twenty inches in length; make three inches at one end into a hook, and nine inches at the other into a crank. Before bending the hook, run the iron lengthwise through a six-inch stick of hickory, or other hard wood, for a handle.

The bands are made as follows. Wet a quantity of straw, fasten some of it to the hook and walk backward, turning the crank. A person should sit on the floor, and let out the straw as it is wanted. Several hundred feet of good bands can be made in an hour in this way.

SHOCKING WHEAT is one of the most important operations of the harvest. The main cause of so much poor flour is bad shocking and stacking. Wheat can be shocked in such a manner as to receive no injury from ordinary rains, but it is seldom done.

The loss to the wheat crop from faulty shocking, can be reckoned only by millions. In forming a shock, either set one sheaf in the centre, and lean others against it, or set two sheaves leaning against each other. Upon these centre sheaves depends the stability of the shock, and great care should be taken that they securely brace each other.

And here we would stop to recommend, in the strongest language we are capable of using, the employment, by every grass

er grain grower, of hay and grain caps. Says S. E. Todd: "As there is so much uncertainty about having fair weather during the days of harvest, they seem to be an almost indispensable requisite to successful agriculture. Indeed, I think that grain caps are far more important than a mowing machine or a reaper. If I could have but one of the two, I should consider it more economical to purchase one hundred dollars' worth of hay caps, than a mower or reaper. Few farmers really understand and appreciate the eminent advantage of such appendages. I think that if a farmer who has been accustomed to secure his crops without grain caps, will employ them during a wet season, he would be ever after unwilling to dispense with their use. In localities where long and heavy storms of rain are apt to prevail during the haying and harvesting season, every farmer ought to prepare a good supply of hay caps, not only for protecting his hay while it is in cock, but for protecting his cereal grain and Indian corn-stalks, when they are in the shock. Such caps will oftén pay for themselves in a single season in protecting hay only, but after the hay has been gathered, they will be found quite as serviceable for protecting barley, wheat, and oats."

These caps should be made of common ticking or sheeting, six feet square, with the rough edges hemmed. Turn up the corners about three inches and sew them down tightly, work holes in each corner for wooden pins to go through; these pins may be made of any hard wood, and should be twelve to eighteen inches long, with a knob at one end, and sharp-pointed at the other. They should be dipped in boiled oil to render them impervious to water. The writer just quoted says: "Make a paint of three parts of coal tar and one part of benzine, and apply to the cloth in hot weather, and you will have caps that will last as long as any one man will need them."

Wheat, if properly stacked, can be kept nearly as well out of doors as in; but not in the way it is usually done. Says Mr. Todd: "A farmer should never attempt to stack his own grain until he is sure he knows how, and he can never be sure of that until he has a vivid recollection of the time when he did not know how. In Great Britain it has long been the custom to secure grain in stacks, and they have brought the art to a great deal of perfection, and every farmer who has not learned the art himself, should secure the services of some English, Welsh, or Scotch farmer to do that job for him, until he has thoroughly acquired the art himself."

SPRING WHEAT. There are some special directions necessary in regard to spring wheat, or wheat sown in the spring, instead of the fall, for this is the only difference between the two. Some varieties are better adapted to spring sowing; but winter wheat can be made spring wheat and *vice versa*. After the crops are off in the fall, the ground can be thoroughly mellowed, the frosts will still more completely pulverize it; and, in the spring, this winter fallowed ground will be in splendid condition for the seed. If you sow wheat in the spring, prepare the soil in the previous autumn, and then you will be able to take advantage of the first opportunity. Light soils are better adapted to spring wheat than heavy soils, yet very light soils should not be winter fallowed.

Sow spring wheat as early as the ground will admit. If you defer plowing until spring, your seeding will be too late, especially if the spring is wet. Sow your wheat in the mud if your soil was *thoroughly* prepared in the autumn; but do not sow until the hard frosts are passed. With a hardy variety of spring wheat, retaining the character of the winter wheat from which it sprung, it may be sown as soon as it can be got two inches into the ground; but such are not most of our spring

wheats. Spring wheat *can be raised wherever winter wheat can*, and there are many advantages in raising spring wheat. Let every farmer prepare his land as we have directed, and sow one crop of spring wheat, and few, we think, will ever choose to depend again entirely on winter wheat.

THE SELECTION OF WHEAT FOR SEED, is a matter in which most cultivators are culpably ignorant or careless. The points to be aimed at in the first selection of a variety for cultivation, are, *abundant yield; early ripening*; (a few days makes a vast difference in this respect;) *hardiness in winter; regularity of growth; a close chaff*, rendering it proof against the midge; *a thin skin*, and *stiffness of straw*, without which the grain lodges, and the kernels never fill full and plump. If the land is fattened, prepared, and kept in the best state of cultivation, the SOULES, DIEHL, and BOUGHTON, or OREGON wheat, are probably the best of the white wheats. The SOULES is productive, hardy, regular, with close chaff, thin skin and stiff straw, but is not quite early enough for the slipshod farmer. The DIEHL is earlier and perhaps the very best of all the white wheats, for a rich soil. The PEDIGREE WHEAT is a good wheat with a bad defect, a loose chaff that permits it to shell out badly in harvesting.

The WEEKS WHEAT is a much esteemed variety in some sections, and worthy of general cultivation. The WHITE MEDITERRANEAN is the standard variety for farmers who are not willing to give their fields the best cultivation. It is early, hardy, with a close chaff, but is not as productive, nor of as good quality as the other wheats named, nor is the straw as stiff. It will bear slack cultivation better than any of the other varieties. We still lack a wheat which shall be as early and as hardy as the MEDITERRANEAN, and at the same time as productive and as fine as the others named. The RED

WHEATS bring a less price than the white, but are still much cultivated.

RED BLUE STEM WHEAT. We give this the preference among the red wheats. It is a little later than the Mediterranean, but hardy, regular, with close chaff, gives as good quality of flour as any other of the red wheats, and is very productive under good cultivation.

The RED ANDRIOLA is objectionable, on account of its long, rough arms.

The GOLDEN STRAW is an amber wheat, that promises well under the best cultivation; it is said to succeed best on a rich, sandy loam, which we are inclined to doubt; if so, it will be a very convenient variety, as it will be profitable where other wheats will not.

The RED CHAFF AMBER, and the WITTER, are good varieties for the best cultivation; but, as with the white wheats, the MEDITERRANEAN red wheat is the surest of moderate success under moderate cultivation. For spring wheats, the BLACK SEA, when pure, the CANADA CLUB, the RIO GRANDE, the FIFE, and the CHINA TEA WHEAT, all have good qualities to recommend them. There are many other excellent varieties of wheat, and each farmer must decide for himself, by experiments on his own soil, which is the best for him to cultivate. We do not believe in universal varieties of any plant. What is best adapted for one section may not, and probably is not, equally valuable in another. But when a variety has been selected it should be kept pure, the seed carefully selected from year to year, and the quality kept up, and if possible improved by the best cultivation, or it will soon degenerate. The great inexcusable sin of American wheat growers has been, and is, their carelessness in this respect. THE SELECTION OF SEED for wheat is as important as the selection of stock for breeding. Seed wheat

should be grown separately, harvested separately, threshed separately, cleaned separately, and kept separately, for this special purpose.

The crop of wheat in this country can be increased fifty, and we honestly believe one hundred per cent., by attention to this matter. If you sow ten acres of wheat, select one acre of the best of the land, give it special attention, sow ashes and plaster more freely on it, add a few extra loads of rich compost, give it extra cultivation, go through it often while growing, and pull all weeds, grass, etc. It should be allowed to ripen a little longer than the main crop, (it will naturally mature a few days earlier,) and be carefully harvested to prevent shelling. It should not be threshed in a machine, (as this often breaks the skin and destroys the germ,) but very *moderately* with the flail. You only want the plumpest, fullest, kernels. Every farmer should have a fanning mill that will separate the large from the small grain. (*Fig. 64.*)

The cut represents a fanning mill which will not only do this, but will separate barley, chess, grass seed, etc. For cleaning grass seed nothing equals it. Clover and timothy are separated as if by magic, and the seeds of weeds are separated from the whole. It separates grain into three grades, according to the size and weight of the kernel, and the best bushel in ten, twenty, or fifty, is easily secured for seed.

But until you get this or some other separator you can still further improve your seed by the following process. Clean your barn floor, open the doors at both ends, when there is a good current of air, throw the grain towards the wind, and at the further end of your floor you will have the largest and heaviest kernels. Sowing without selecting the seed is such a shiftless piece of business that we should think any farmer would be ashamed to confess it. Two kinds of wheat should

never be sown in the same field, or so near as to hybridize or mix. Keep your variety pure, save the best seed with care, and cultivate well, and your wheat crop will increase both in quantity and quality.

SMUT is a great enemy of the wheat crop, and the only help for it is brining the seed. The most convenient method is the following. Cut a cider barrel or oil tierce in two, in the middle, or use two large wash tubs; make a strong brine, strong enough to bear an egg, and if used hot all the better; put the brine into one of the tubs and turn the wheat into it; stir it up two or three times and skim off the chaff, and light wheat which will come to the surface; then shovel it out into a basket, and let it drain over the other tub; turn it on to the floor and sift slackened lime into it slowly, stirring it in with a rake until it will not stick together; sow as soon as possible. RUST is another foe the wheat grower is obliged to encounter; the remedy for this disease is to supply the soil at once with ashes and sand, in addition to the careful selection and preservation of seed as before described. If the farmer continues to sow his seed without this care in raising and preserving it he will continue to have smutty and rusty wheat. The only remedies for the insect enemies, the midge, the fly, the worm, and the chinch bug, are careful selection and thorough tillage. "Make the wheat grow so luxuriantly that the little which the insects consume will not be missed," nor the growth checked.

RYE. Much that has been said in regard to wheat is applicable to this crop as well. Rye will grow on poorer soils and with less cultivation than wheat; it will flourish on quite sandy soils, and on soils nearly destitute of clay, if given a moderate dressing of compost, guano, or plaster. Still we affirm that the more liberally it is supplied with fertilizers the more profitable will be the crop.

All that we have said in regard to the preparation of the soil, careful selection of seed, drilling in the seed, and harvesting the crop, in the preceding pages, is applicable equally to rye as to wheat.

Rich barnyard manure, composted as described in *Chapter III.*, and applied at the rate of ten cords to the acre, will prove abundantly remunerative. Farmer Slack, who allows the most valuable part of his manure to go to waste, has little or none left to apply to his rye, and has poor crops.

When rye straw is as valuable as at present, a heavy crop of rye is an object worth trying for. Subsoil, harrow and cross harrow, manure as directed, not forgetting the salt, lime, or bones, and sow early, the last of August or first of September. We have known over eighty bushels of grain, and over nine thousand pounds of straw, secured from two acres by the above method of cultivation. If the seed is carefully selected the grains will be larger than the average and not as many, of course, to the bushel; we therefore advise *sowing* from one and a half to two bushels of selected seed, or *drilling* one to one and a half bushels. Every sheep raiser would do well to sow a patch of rye for late pasturage, as it brings the stock to the winter in the best condition, and will also afford early pasture in the spring.

BARLEY is usually and best grown, between a root or corn crop that has been heavily manured and well cultivated, and a wheat crop. No barnyard manure should be applied directly to the barley, but liberally to the crop that precedes it. When the crop of corn or roots is off, plow the land. There will not be time in the spring, as the crop must go in as soon as the danger of severe frosts is over. If drilled in, use two bushels of seed; if sowed broadcast, two and a half bushels. When the head assumes a reddish cast and lops down, is the time to cut

it, and it should be done at once, as both straw and grain lose by every day's delay. It can be mown, cradled, or cut with a reaper. When the straw is short, it can be raked and housed without binding. Barley is excellent food for stock, but it is mostly used for making beer. Some is exported for that purpose. The straw is worth more for fodder than wheat straw.

BUCKWHEAT will grow upon a very poor soil, with very poor cultivation; but should have a little more manure and a little more cultivation than it usually gets. It makes an excellent green fodder for milch cows; for which purpose, three pecks should be sown in June, which will be fit for cutting in August. If plowed under green, it makes an excellent fertilizer for wheat. It can be sown as late as August 15th, and if it does not ripen before frost, can be turned under, so that nothing is lost. In sowing for a grain crop, two pecks is an average quantity of seed. The straw, if not touched by the frost, is good fodder, and the grain is very nutritious. We could never do without our "*buckwheat cakes*." The grain should be stacked as soon as harvested, as it will cure better than in the swath.

OATS, being the best known feed for the horse, form a very important crop, and we are quite sure they can be made a very profitable crop in all our thickly settled districts. We allow that twenty-five bushels per acre, weighing twenty-five pounds to the bushel, may not be very profitable—but thirty-five bushels, weighing thirty-five pounds to the bushel, on the same land, with only one extra plowing (subsoil) and one extra harrowing, is profitable. The first great necessity of this crop is the selection of a new variety for seed. The common oat may be improved, but there are already in the market several most excellent varieties, which it will pay for the farmer to procure, *provided he will thereafter keep them pure*. We recommend every farmer to make a *trial* of some of these oats. We have no

doubt that over one hundred bushels to the acre have been raised of the "SURPRISE OATS," the "NORWAY OATS," and the "NEW BRUNSWICK OATS." Not having grown these oats ourselves, we depend upon the following statements from the *American Stock Journal*, to sustain our remarks:

"THE SURPRISE OATS. The producing classes are interested in knowing more about these oats. The writer has a wholesome distrust of new seeds, wonderful roots, and remarkable fruits. He looks a man in the eye steadily a long time before he receives his statements of the wonderful character and newness of any thing. And even then, like Thomas, he doubts. Accordingly, to satisfy himself concerning the statement made of these oats, he has to-day visited Sandwick, talked with Mr. Van Olinda's neighbors, looked upon and walked over the fields where the oats grew, examined the straw, explored the granary where the oats are stored, seen and felt of them as they came from the thresher, handled them as they came from the fanning mill, thrust his hands into the bins from which the public are supplied. And we are entirely satisfied, that if we can believe our own senses, there is no sort of humbug about them. They are of wonderful size, weight, and beauty—will weigh nearly or quite as much per bushel as barley."

"NEW BRUNSWICK OATS. Having purchased, in the spring of 1866, two bushels of the above-named variety of oats, and grown it with such astonishing success, for two successive seasons, without the slightest deterioration, I will briefly state my experience relative to its qualities. The two bushels above mentioned were sown in drill, on three quarters of an acre, the tenth day of April, 1866. The yield was forty-one bushels—weighing forty pounds by measure—equal to seventy-three bushels standard measure per acre. Last spring I drilled broadcast twelve acres, and harvested four hundred and eighty

bushels, weighing forty-one pounds by measure—equal to six hundred and fifty-six bushels standard weight.

“The average crop, this season, of our common degenerated variety, varies from twenty to thirty bushels per acre, weighing twenty to twenty-eight pounds the bushel, quality very inferior.

“In addition to the vast superiority of the New Brunswick oats, it ripens about one week earlier than our common varieties, has heavy, stiff straw, which is not so liable to fall.”

“NORWAY OATS. It has been grown in this country for the past two years with great success, and promises to supersede all the best varieties of oats heretofore grown. The grain is *very large and plump, handsome, and of a beautiful color*, has a remarkably *thin husk*, and is nearly *double the weight* of our common degenerate varieties of oats.

“This oats ripens *earlier* than the common varieties, and will yield from fifty to one hundred per cent. *more grain* per acre, on the *same soil*, and with the same culture.

“The straw is a bright clear yellow, *stout*, and not liable to lodge, and is perfectly *clear of rust*, and grows from four to five feet high.

“This oats has been grown on every variety of soil, and in every State of the Union, with the most perfect success.”

It will be useless, however, to pay five dollars per bushel for these oats for seed, unless you are determined to use some care in preserving the seed; for these, or any other seeds, will degenerate under poor management. Oats can be grown two or three seasons on the same land, by the following treatment. After the crop is cut, harrow in the gleanings and scattered seed; it will be a foot high before winter. Just before the ground freezes, plow it under, running the subsoiler in each furrow after the plow. Early in the spring, prepare the surface with the harrow or cultivator, and drill in two bushels of seed,

or sow three bushels. This should in no case be continued more than three seasons, as it tends to degenerate both the soil and the seed if continued longer. Sow grass seed, or clover, as desired, with the last crop. Oats will pay as well, for good composted barnyard manure, as almost any crop. If ten cords of compost, per acre, be applied in the rotation we recommend, we believe an *average* of seventy-five bushels per acre of heavy oats can be secured, besides a much larger crop of the best oat straw for fodder. The seed should be raised and saved, and separated just as described, for growing and saving seed wheat.

It will pay.

INDIAN CORN is the great staple crop of America, greater than wheat, hay, or cotton. It is a prime necessity in our agriculture. More bushels of corn are raised in the United States, than of all other cereals together. It makes our beef, pork, mutton, and poultry. It is a necessary accompaniment of all good farming at the East; in its culture is the progress and wealth of the Northwest; it is at present the life of the South. Cotton is no longer king. Corn must occupy the attention of southern farmers, if they would arise from their desolations. They must adopt new methods of culture, and new implements, and it will be our aim, in this chapter, to show how it can be made to pay.

PREPARATION OF THE SOIL. The necessary preparation for wet lands will be found described in the first chapter of this book. When corn ground is rather heavy, or when corn is to be planted on sod ground, by far the best plan is to plow and subsoil in the autumn. The frost pulverizes the soil, and it will be ready for the seed several days earlier in the spring. If barnyard manure or compost is to be used, spread it on after plowing in the fall, or haul it on while the ground is frozen, during the winter, unless the land is sloping, and liable to be

washed in the spring, but never apply undecayed barnyard manure directly to the corn crop at the time of planting. If your land was plowed and subsoiled to a depth of eighteen inches in the autumn, you can plow in the spring, as soon as four to six inches of the surface soil is in condition, which will often be two weeks earlier than it could be plowed, if it had not been subsoiled in the autumn. Reduce the surface soil to the finest tilth by means of the plow, cultivator, roller, clod crusher, and harrow. This will save much after cultivation. Each harrowing now is better than once hoeing during the growing season. Farmers of the South, it is in your power, by this deep and thorough cultivation, even without the aid of expensive fertilizers, to raise four bushels of corn on ground where only one could be raised by the old shovel plow system. It will pay. If need be, cultivate fifty acres instead of one hundred, and cultivate it thoroughly. You will soon be able to purchase a few fertilizers. In the mean time fatten a little stock, a few hogs, a few sheep, or other stock. Keep them fat the year round, and carefully saving the manure, put it back on your corn land.

MANURES FOR CORN. On the new soil of the prairies, a few crops of corn may well be grown without any application of *manures*; they are already in the soil; the decaying vegetation of centuries; the ashes of a thousand prairie fires have put them there. But some of the elements of the corn crop will ere long be exhausted. In the East any attempt to raise corn, without manures of some kind, is sheer folly. And in the South, the use of some of the modern fertilizers will in time so increase the productiveness of the soil, that the corn crop will exceed in value that of both corn and cotton previous to 1862. Lime, in some form, is one of the elements that is to accomplish this result. Apply fifty bushels of lime per acre, to as many acres

as possible this year, and you will find it returning to you in the harvest time. Apply five to ten bushels of salt per acre, to all corn land. Next year, or this if you can get it, apply two hundred or three hundred pounds per acre, of Peruvian guano, in the hill. Or sow two hundred pounds guano broadcast, and put one hundred pounds plaster in the hills. Or, if you keep poultry, sow three hundred pounds superphosphate of lime, and apply a handful of poultry droppings to each hill. We have reliable reports of one hundred and sixteen bushels per acre, and of two hundred bushels upon one acre, in South Carolina, by underdraining, subsoiling, and the application of two hundred pounds of guano and three hundred pounds of plaster to the acre. We have also reports, from nine farmers in Kentucky, of from ninety to one hundred and eighty-nine bushels per acre, by the same process. Geo. C. Gilmer, of Charlottesville, Virginia, raised last year, on twenty-five acres, two hundred and fifty barrels of corn, by means of this thorough cultivation, and one ton superphosphate of lime, one ton old dominion fertilizer, and one ton of plaster mixed. This is at the rate of about two hundred and fifty pounds per acre, of the mixture. Fifty acres of the same farm, cultivated shallow, and without fertilizers, produced one hundred barrels. The above remarks apply equally to eastern and western farmers, save that the former must depend mainly upon the manure of grain-fattened stock; use more ashes, bones, etc. The droppings of poultry, composted with peat or charcoal, can hardly be esteemed too highly, as a dressing for the hill at planting time. The pou-drette described on page 52, is still richer for the same purpose.

The following experiment shows the economy of liberal culture.

A twenty-acre corn plot was divided into two plots, which

we call A and B. Both received thorough culture, including subsoiling. A received two tons unleached ashes, half a ton of plaster, and two and a half tons of Peruvian guano. B received no manure. Plot A yielded twelve hundred and fifty bushels. Plot B, six hundred and seventy bushels. The following year the application was reversed, A receiving no manure, and B receiving the above-mentioned application. Plot A this year yielded nine hundred and twenty bushels, and plot B, ten hundred and seventy-six bushels. This showed, in two years, an increase of twelve hundred and thirty-six bushels of corn, to pay for the fertilizers, and leaving much of their value still in the soil.

SOAKING THE SEED is practiced by a great many farmers, and we think is, as a rule, beneficial. If tar is used it should be tar water, very thin. We think a better mixture is one pound of copperas and one pound of chloride of lime, dissolved in a hogshead of soft water, or in that proportion. Put the seed in over night and commence planting the next morning, taking out the seed as fast as it is wanted, and roll it in lime, plaster, bone dust, or ashes. This prevents the ravages of birds and insects.

THE TIME TO PLANT CORN varies so widely in different parts of the country, that no date can be set; but as soon as the apple trees are in blossom, it should be planted, if the soil is ready for it.

HOW TO PLANT CORN. We say with a drill or corn planter, by all means. A good corn planter opens the furrow, drops the corn, sows whatever fertilizer you wish to put in the hill, covers and rolls it all at one operation, and the evenness and regularity with which it is done is as great a recommendation as the time and labor saved by it. The Star Drill, recommended elsewhere, will not only sow all kinds of grain, corn, and grass

seed, but plows the ground and plants the seed at the same time. Plant closely if your land is in good condition, three feet apart is better than five. Three and a half to four feet is the average distance at which to plant. Where the seed is dropped by hand, care should be taken that the kernels are dropped near together. In drilling, with the rows forty-two inches apart, and corn six inches apart in the rows, there will be about six thousand more stalks than by the ordinary hill planting. Of course the land must be better fertilized, but the increased yield, both of corn and fodder, will pay for the manure.

CULTIVATION after planting, is very much simplified by the thorough preparation of the soil. In fact, as we have intimated, an extra harrowing, before planting, is as good as one hoeing after the corn is up. But if you have not mellowed your soil as thoroughly as you wished, you can do so before the corn gets started; fasten a harrow behind your roller, and go over the field with them. As soon as the rows show plainly, start the cultivator, and keep it going until the corn gets two feet high, when it is best to leave it alone, except to go through and pull the weeds once more. But if you do not cultivate thoroughly at first, you will be obliged to continue cultivation until the ears set, when it must be left absolutely alone. At the second cultivation, pull all but three stalks in a hill, and if ashes or plaster was not put in at planting, give each hill a handful now. Cultivate level. Do not hill up around the stalks, but keep the ground level, and the whole surface mellow. Hilled corn will not stand the droughth as well as if the surface is level.

FOR FODDER. If corn is sown for fodder, it should be sown only on well prepared and liberally manured land, and then sown so thickly that no ears will be likely to set. Some drill

in the seed with a wheat drill two and a half feet between the rows. Others sow broadcast and cover with a cultivator. We know of no choice in methods, but know that there can be nothing better for summer fodder for milch cows, when the grass is short and the pastures burned. One square rod per day will feed a cow to the full. An acre will then feed four cows one month. The feed should be cut only the day before it is used, and wilted slightly. If wanted for winter fodder, bind in small bundles, and it will cure perfectly in stocks. Cut, and steamed, and fed with ground grain through the winter, no feed can excel it for milch cows.

HARVESTING. Never top corn, but let it stand until glazed, and then cut up and shock. You will thus have both corn and fodder. If cut before frost both corn and fodder are better. In making shocks, either leave one hill uncut to form the centre, or bind a stout bundle for the purpose. Several contrivances are in use, but a good, sharp, heavy corn cutter, in the hands of a strong man, is the most common. We do not see why some method may not be contrived of doing this work by horse power. The man who contrives some simple and economical method of doing this hard work, will be a public benefactor. Where it is desirable to husk corn in the field, the ears should never be thrown upon wet or frozen ground. Where corn can be hauled under cover, it can be husked rainy days or evenings. Many of us have pleasant recollections of husking parties, where all the neighbors were invited in, young and old, and the barn floor was covered, and stories, cider, apples, pumpkin pies, and good cheer generally, made the evening hours fly swiftly, while huge piles of golden ears came out from their husky coverings. We should like to see these old social gatherings revived, for they tend to create kindly feeling and make the farm more attractive to the young folks. Corn

husks are in many localities well worth careful saving, as they bring a good price for making mattresses.

RAISING, SELECTING, AND PRESERVING SEED CORN. As with the other grains, if we would raise the best corn, we must carefully attend to the seed. Select the best ear from all stalks bearing two ears, and plant an acre by itself, giving it extra cultivation and manure; continue this process from year to year and you will get two ears on nearly every stalk. We would say here that two-eared crops require more manure, and if you cannot give this, you had better continue to plant the one-eared variety, selecting always the finest ears. These should be secured before freezing, and hung up in a protected room where they will not freeze. Three, four, and even six ears to the stalk can be raised on the same principle as above described.

The King Philip, Dutton, Tuscarora, Baden, and Flint, are the common varieties of the East; the South and West have their own peculiar varieties, known as the southern and western corn. Any of the common varieties can be improved by careful cultivation and selection of seed.

BROOM CORN does not properly belong here, but will be more likely to be seen in this connection. It requires the best of soil and cultivation, and is not considered profitable except on a large scale, and for a succession of years. It is drilled in rows three feet apart and from six to ten inches apart in the rows, and from six to ten seeds in a place; cultivate until it is five or six feet high throwing a little dirt to the rows every time. The heads are bent down, and the brush cut before it is fully ripe, and the crop cured under cover. The seed is of some value as fodder, and the stalks for litter, while the brush brings from \$200 to \$300 per ton. One ton to three acres is a fine crop.

LEGAL WEIGHT. The legal weight, per bushel, of the dif-

ferent grains, varies very largely, shelled corn ranging from fifty-two to fifty-eight pounds; corn in the ear, from seventy to seventy-two; rye, fifty-two to fifty-six; barley, thirty-two to fifty-two; buckwheat, forty to fifty-two; oats, thirty-two to thirty-six. The legal weight of wheat is sixty pounds in all the States. The following table, from the *Agricultural Annual*, shows the number of seeds in a pound, of the different grains and grasses.

Wheat.....	10,500	Mangel Wurzel.....	24,600
Barley.....	15,400	Parsnip.....	97,000
Oats.....	20,000	Carrot.....	257,000
Rye.....	23,000	Lucern.....	205,000
Beans.....	600 to 1,300	Red Clover.....	249,600
Peas.....	1,800 to 2,000	White Clover.....	686,400
Flax.....	108,000	Rye Grass.....	334,000
Turnip.....	155,000	Sweet Vernal Grass....	923,000
Cabbage.....	128 000		

CHAPTER VI.

GRASSES.

THE Grass Crop is one of the three great crops of the country; and yet the means by which it may be improved and increased, are very little known. Some sort of grass will grow upon almost any soil; but the most nutritive grasses, and the largest crops, can only be produced upon good, well-cultivated lands.

This crop has two main purposes—hay and pasture. The great point is, to select such seeds, and sow them in such proportions, as will best answer the purpose for which they are intended. We will here speak of some of the more valuable grasses, and their respective qualities. There are upwards of three thousand species of grasses known to botanists; but those of agricultural value can be reduced within thirty species.

RICE GRASS, of value in the South only, grows in wet ground, and can be cut several times during the season.

MEADOW FOXTAIL—an early grass—productive, nutritious, with a luxuriant aftermath, which springs up immediately after cutting or cropping, and is a favorite with sheep and cattle. It does not take full possession of the soil for three or four years, and is therefore not suited to a rotation. It loses seventy per cent. of its weight in drying, and is injured by being cut in the blossom, and is therefore not in the first class for a field crop; but, as a grass for permanent pastures, it is superior. It thrives

on almost all soils except the dryest sands and gravels, though best on rich, moist, strong soils.

TIMOTHY, OR HERDS GRASS, we consider, in the northern half of this country, to be unsurpassed by any other grass as a hay crop. It is later than clover, and therefore we think should not be sown with it. It is very productive; as high as five and a half tons of dry hay having been cut to the acre. It is very nutritious, giving, by analysis, a larger proportion of nutriment than any other grass. It gives but little aftermath; and if cropped closely, springs up slowly. It is therefore not suited for pastures. It is inclined to run out in three or four years, and cannot be relied upon for a permanent meadow. It thrives best in moist, peaty, or loamy soils, and is not suited to light, sandy, or gravelly soils. If cut in the blossom, or immediately after, it is relished better by stock, although the yield is greater in weight when the crop is ripe, owing to the seeds, of which it yields from four hundred to twelve hundred pounds per acre.

RED TOP, FINE TOP, BURDENS GRASS, DEW GRASS, are common names for the *Agrostis Vulgaris*—called in England FINE BENT, and in Pennsylvania and the Southern States, HERDS GRASS—a second quality meadow grass, or permanent pasture grass, suited to moist soils, though growing in all. Cattle do not relish it when ripe. It should therefore be cropped closely in the pasture, and cut in the blossom for hay.

WHITE TOP, OR WHITE BENT, is a variety of the same genus as the RED TOP, and is especially adapted to overflowed meadows. BLUE JOINT GRASS is common to low grounds, is nutritious, and relished by stock in winter. ORCHARD GRASS, OR COCKSFOOT, is one of the most valuable grasses. It is as early as red clover, and is therefore the grass best adapted to sow with it. It is productive, yielding from three to five tons per acre. It is very nutritious, and very palatable to all kinds of

stock. It gives a bite earlier than almost any other grass, is permanent, will bear close and constant cropping, stands severe drought, and, when cut, will in a week give a good bite to stock. It is therefore admirable as a permanent pasture grass. It blossoms with clover, gives a very large proportion of hay, grows a speedy and luxuriant aftermath, and is well adapted for permanent meadow with clover. It is inclined to grow in tufts, to prevent which it should be harrowed and rolled in the spring, and some other grasses should always be sown with it.

MEADOW SPEAR GRASS is recommended as a mixture with other pasture grasses in moist pastures.

KENTUCKY BLUE GRASS—scientific name, *Poa-pratensis*; common names, GREEN MEADOW GRASS, JUNE GRASS, COMMON SPEAR GRASS, etc. Early, productive, nutritious, and palatable. This is one of our valuable pasture grasses, on soils containing limestone. It endures the cold, but is liable to be parched in droughts. It requires two or three years to arrive at perfection, and is therefore adapted only for permanent growth. It makes a very choice hay, but the crop is never large. It should be cut just before the seeds ripen. It should not be closely cropped, as it starts slowly. BLUE, or WIRE GRASS (*Poa Compressa*) is a more valuable variety of the same genus as the above, so hardy as to flourish on sandy, hard, or rocky soils; not very productive, but yielding a very large per cent. of nutritive matter in proportion to its bulk. It is greatly relished by all grazing animals, and is especially valuable in producing an abundant flow of milk. It should always form one in any mixture of pasture grasses on dry rocky knolls. ANNUAL SPEAR GRASS is a very common pasture grass, flowering through the whole season, and furnishing an early bite, and continual feed, except in very dry seasons, when it becomes parched. ROUGH-STALK MEADOW GRASS. Productive, permanent, not as nutri-

tive as some of the other grasses, but very much relished by stock. Adapted only to moist soils, in connection with other grasses. WOOD MEADOW GRASS is a fine, succulent, nutritive grass, losing only fifty-five per cent. in curing, and is worthy of more general cultivation in connection with other grasses.

FOWL MEADOW GRASS, (*Poa Serolina*,) one of the earliest and best of the cultivated grasses. It is both productive and nutritive, but its chief recommendation above other grasses is that it may be cut at any time from July to October. It makes a sweet and tender hay, the aftermath containing more nutriment than orchard or oat grass. It should always be mixed with other grasses in rich moist soils. MEADOW FESCUE is a pasture grass natural to moist pastures, ripens its seeds early, and scatters them itself. If ever sown it should be with several other grasses. ITALIAN RYE GRASS gives an early and constant growth of nutritive foliage, but not as good as many other grasses. TALL OR MEADOW OAT GRASS is well calculated for a permanent pasture grass, growing spontaneously on deep sandy soils when once introduced, and also succeeding on tenacious clover soils.

SWEET SCENTED VERNAL GRASS is not very valuable for hay, giving but twenty per cent. of hay; and its chief value as a pasture grass is its early and constant growth, and its peculiar pleasant flavor, which it imparts to the butter made from it. It should be sown with a large mixture of other grasses. BLACK GRASS is the best product of salt marshes; SEA SPEAR GRASS or GOOSE GRASS, being next in importance, the hay made from the mixture of the two making a valuable fodder when fully cured. Many barren tracts of salt marsh might be made to yield valuable crops of the grasses, if properly ditched, while the peaty matter taken out would repay a large portion of the ex-

pense. RED CLOVER. Although the clovers are not properly grasses they are practically treated as such, and form the basis of much of the best husbandry of the country. It is cultivated for four distinct purposes; for hay, for pasture, for seed, and for manure. When for hay, sow on winter wheat in the spring, either on the snow, or, as soon as the snow is off, harrow the surface and sow to the acre eight pounds clover seed, eight of orchard grass, four of timothy and two of red top.

Clover is distinctly a lime plant, and the soils in which it thrives the best, are stiff loams containing lime. Lime should also be sown either with the seed or as soon as it is up. One or two bushels of plaster or gypsum will be sufficient where the soil already contains considerable lime. If the plaster is not sown in the spring sow on the stubble as soon as the grain is off.

Do not pasture the young clover in the fall; and the next spring sow plaster again as before. Cut when the heads *begin* to ripen, and sow plaster again. If a crop for seed is desired cut the first crop early, before a seed ripens, and sow no plaster after the first cutting. The seed crop should stand until two thirds of the heads are ripe.

Clover and timothy are often seeded with the wheat in the fall, but, as we have stated elsewhere, clover and timothy are not so well adapted for each other as clover and orchard grass, and, as we shall attempt to show further on, no two grasses should be sown by themselves. Clover is apt to be winter-killed unless the land is top dressed, of which we shall speak in another place.

CUTTING AND CURING for hay should be ordinarily done just as the earliest heads begin to ripen. Cut no more than you can cock at once. As soon as it is fairly wilted, cock it, and let it cure in the cock. Handle as little as possible. Mow or stack

it the day after it is cut unless it gets wet. If only a small quantity is cut it may often be housed the same day, but it is better to put the whole crop of clover in at the same time, that it may settle evenly. A peck of salt or lime to the ton is always an improvement. Cover the top of the stack or mow with straw, or, what is better, salt marsh hay.

In cutting for seed, the best plan we have ever tried is to cut with the reaper, attaching a board at the back edge of the grain platform. When the platform is full, pitch it off in heaps. In cutting with the scythe lay two swaths together. Secure as soon as dry, as a hard rain will wash out much of the seed. The grain caps recommended in *Chapter V.*, are often invaluable at this time. A crop of clover ought to average three bushels to the acre, and the straw and chaff are worth enough to pay for harvesting. Another practice is to get the largest possible crop at the first cutting for hay, and then when the new growth gets well started, pasture it. We consider this advantageous, as it saves hauling the clover and hauling back the manure.

CLOVER AS A MANURE. Valuable as clover may be, both for hay and pasture, we consider its greatest value to be as an improver of the soil. We have spoken at length of this elsewhere, and would only add that gypsum or plaster should always be sown with the seed, or on the young clover, for whatever purpose it may be intended. When the first crop has been cut for hay, the second can be turned under when in blossom. The next year this crop will pasture a cow to the acre until August, when, if plowed eight inches deep, the soil will be in admirable condition for winter wheat. Clover must be seeded every two years. If a permanent meadow or pasture is desired, enough other grasses must be sown with it to take complete possession of the soil at the end of two years.

WHITE CLOVER is a pasture grass very much prized in the best dairy regions, and should be sown in all mixtures for permanent pastures. Nothing gives a better flow of milk than the clovers.

TIME TO SOW GRASS SEED. We advise early spring as the best time to sow clover and orchard grass, which should always be sown together, either on the late snows or as soon as it can be harrowed in. If timothy is to be grown with clover, (a practice we cannot commend,) the timothy should be sown in the fall, and the clover brushed in in the spring. We consider it well to sow a mixture of grass seed with all the small grains. The growth between harvesting and fall plowing makes a great deal of manure for the next crop, besides shading the land. We conclude that with all the other grasses that we have recommended for cultivation the best time to sow is in the fall as soon as the ground begins to be moistened by the fall rains, the ground being prepared before the rainy season commences. If sown before this time, much of the seed is likely to be burned, or dried up and lost. Grass seed may be sown with corn. The ground must be thoroughly worked at the last hoeing, and the seed sown and harrowed with a fine toothed harrow. Six pounds clover, one peck each of orchard grass, red top and timothy; is a good mixture for this purpose; we prefer, however, making the quantity of these a little smaller, and adding small quantities of other grasses.

HOW MUCH SEED PER ACRE, is a very important question. Opinion and practice are very much divided, but it is clear that we do not sow a sufficient variety of seeds, to take the fullest possession of the soil. We sow two or three varieties together, while in a natural pasture or meadow, twenty to thirty varieties may be found growing in a single square rod. Twelve pounds of clover seed per acre, with ten of orchard

grass, is a safe and economical average; but better than this, we think, will be found the following mixtures. FOR PERMANENT PASTURE, meadow foxtail, two pounds, orchard grass, six pounds; white clover, five pounds; red clover, four pounds; rye grass, four pounds; timothy, four pounds; Kentucky blue grass, four pounds; meadow fescue, four pounds; red top, four pounds; and rough stalked meadow grass, four pounds. If the above is to be reduced at all, leave out the clover. FOR MOWING IN THE ROTATION. Orchard grass, six pounds; red clover, ten pounds; rye grass, five pounds; red top, four pounds; timothy, six pounds. FOR HAY AND PASTURE. Timothy, six pounds; June grass, four pounds; orchard grass, four pounds; rye grass, four pounds; wood meadow grass, four pounds; white clover, four pounds; perennial clover, two pounds; rough stalked meadow grass, two pounds; vernal grass, two pounds. If any of the grasses in either of the above lists are to be left out, the amount of timothy should be increased; but we believe that the number of varieties usually sown, is far too few to produce the best results. We present five additional tables, copied mostly from the report of the secretary of the Massachusetts State Board of Agriculture.

MIXTURE FOR SOWING ON LIGHT SANDS.

	Pounds.		Pounds.
Tall meadow oat grass.....	3	Timothy	3
Meadow soft grass.....	3	Orchard grass.....	4
Italian rye grass.....	4	Hard fescue	6
Perennial rye grass.....	1	White clover.....	4
Perennial red clover.....	3		

MIXTURE FOR DRY GRAVELS.

	Pounds.		Pounds.
Perennial rye grass.....	5	Red top.....	3
Tall oat grass.....	8	Red fescue.....	4
Meadow soft grass.....	4	June grass.....	4
Soft broom grass.....	4	White clover.....	4

MIXTURE FOR ROCKY HILLS.

Pounds.	Pounds.
Perennial rye grass.....6	Timothy .....6
Wood meadow grass.....3	Red fescue.....4
Crested dog's tail.....3	Fall oat.....2
Meadow soft grass.....2	Red top.....2
Rough stalked meadow.....2	White clover .....8
Common spear grass.....2	Orchard grass.....3

MIXTURE FOR MARSHY OR OVERFLOWED GROUNDS.

Pounds.	Pounds.
Rough stalked meadow grass....3	Fiorin.....3
Reed canary grass.....4	Timothy.....4
Fowl meadow grass.....5	Tall fescue.....4
Manna grass.....5	White clover.....4

MIXTURE FOR PEATY LANDS; (reclaimed).

Pounds.	Pounds.
White top.....2	Meadow Foxtail.....2
Red top.....2	Italian rye grass.....4
Timothy.....10	Perennial rye grass.....5
White clover.....4	Red canary grass.....3
Fowl meadow.....4	Rough stalked meadow.....3

We earnestly recommend the above mixtures to the consideration of farmers. Of course they can be varied indefinitely, as circumstances may demand, but the principle on which they are based should never be forgotten. Sow such a mixture of seeds, and in such quantities, that they will take complete possession of the land, leaving no room for the inferior grasses and noxious weeds, which will otherwise surely occupy their place, and reduce the value of the crops.

The following shows the number of pounds to the peck, of the previously mentioned seeds. Timothy, eleven; clover, sixteen; orchard grass, three; red top, three. The fescues, three and a half; meadow foxtail, one and a quarter; vernal grass, one and a half; fall oat grass, one and three quarters; meadow soft grass, one and three quarters; Italian rye grass, three and

three quarters; perennial rye grass, five to seven; wood meadow grass, three and three quarters; June or spear grass, three and a quarter; rough stalked meadow grass, three and three quarters.

TOP DRESSING GRASS LANDS, is an approved, but not sufficiently appreciated practice. A top dressing of wood mould in the autumn, serves both as a mulch and a manure, and increases the yield of hay. A very interesting series of experiments have been made at the Michigan State Agricultural College, by which it was ascertained that,

2 bushels of plaster	per acre	gave an increase of	4153 lbs of hay.
5 " of wood ashes	" " " " " "	" " " "	3942 " " "
3 " of salt	" " " " " "	" " " "	4184 " " "
20 loads of muck	" " " " " "	" " " "	3683 " " "
20 " " and 3 bushels salt	" " " " " "	" " " "	5318 " " "
20 " Horse manure	" " " " " "	" " " "	5023 " " "
20 " Cow manure	" " " " " "	" " " "	4874 " " "

The soil was a light sandy loam. Estimating hay at fifteen dollars a ton, twenty loads of muck are worth something over twenty-five dollars, and three bushels of salt applied with it as much more. Five bushels of ashes bring nearly thirty dollars. We advise farmers to invest a few days' labor in the muck swamp in the fall; draw the muck on to the fields, and let the frost crumble it; spread in the spring, and add the salt. The great object to be kept in view in

CUTTING AND CURING hay is to have it as much like grass as possible. This will depend both upon the time of cutting and the method of curing. The safest time to cut is just when in full blossom. A small per centage in weight will be lost by this early cutting, but it is gained in the aftermath. Timothy should be cut about four inches high, or it will be killed out. The various machines and tools for harvesting hay are fully described in *Chapter IV*. Most hay is cured too much. We

have said it should be as much like grass as possible, and, therefore, should not lie out until the juices are all dried out of it.

Do not mow when the grass is very wet, either with dew or rain. If cut with the scythe, turn twice, if with a machine, once will be sufficient after the top has wilted; after two hours' hot sun on the other side, cock it, haul it before the dew begins to fall, or after the dew is dried off in the morning, and store it in well ventilated mows. This is the great trouble with hay barns, no ventilation. See *Chapter XIX*. If properly ventilated, hay may be put in quite green, and be relished like grass all winter. A peck of salt to the ton is always an improvement, and green hay is safer from heating when salt or lime is sprinkled in at the time of mowing away.

Hay that has been wet, and, therefore, cured twice, should always be kept by itself.

SEEDING WET PRAIRIE. Either harrow as soon as the frost is out two inches deep, sow the seed and cross harrow; or pasture until it is dry enough to plow. Plow across, the way you wish the surface drainage, and harrow the same way; sow the seed, cover with a brush, harrow and roll it.

As we have intimated, we believe in frequent seeding, and in a much larger variety of seeds than is usually sown. An Iowa farmer advises the seeding of prairie sloughs to red top. "Sow as soon as the ground thaws, and harrow well. Mow it before harvest for two years, and you can be pretty sure of an unfailing crop after. For pasture it is worth three to one of slough grass."

IMPROVEMENT OF PASTURES, as recommended by that veteran writer, S. E. Todd, is to plow them, and cultivate the soil for a few years, applying liberal dressings of barnyard manure, or turning under red clover. After turning under a crop of clover, sow three or four bushels of Indian corn per

acre, turn the crop under before frost, and sow winter rye just before it freezes up; sow with the rye, or early in the spring, before vegetation commences, one of the mixtures recommended for pastures, not less than six or eight varieties of grass seed. When it is desirable to improve pastures without plowing, apply a liberal dressing of either good barnyard compost, bone-dust, wood-ashes, or gypsum, and harrow with a heavy harrow, with long and sharp teeth. Then sow a liberal mixture of grass seeds and harrow in. Pastures treated thus should never be fed early. The middle of summer or early autumn is soon enough to turn stock on to it. The fertility of pastures should be kept up by the application of compost, ashes, lime, bone-dust, etc. If farmers will save and compost their solid and liquid manures, as recommended in *Chapter III.*, they will soon have some to spare for their pastures. Where brush and briars have taken possession of the pasture, cut the brush, sow a few bushels of plaster, and turn on a flock of sheep; continue this two or three seasons, and you will get a fair pasture. A moderate application of muck, compost, lime, or ashes, every year, would undoubtedly keep up our pastures and be profitable in every respect. Making a pasture of mowing lands; that is, turning stock on after the hay has been cut, is an injurious and exhaustive practice. It sometimes seems absolutely necessary when pastures fail, but the less of it that is done, the better. Rather sow an acre or two of corn to supply fodder in case of drought.

THE SELECTION OF GRASS SEED, whether for meadow or pasture, is an important consideration. Old seeds are mixed with new, and not more than half a crop is the consequence. The safest way is to raise your own seeds, or buy of some neighbor in whom you have confidence.

You can certainly raise your own clover, timothy, orchard

grasses, and other more common seeds. And when it is necessary to buy, samples can be bought and germinated in a few days, and the farmer thus be enabled to tell how large a proportion is likely to grow, and regulate his sowing accordingly.

CHAPTER VII.

ROOT CROPS.

THERE can be no "best farming" without a liberal culture of roots. Good farming implies plenty of manure; manure implies stock; stock implies feeding; and the best feeding is that which combines hay, grain, and roots. It is also very much better for the health of stock to feed them partly with roots through the winter. The farmer should not deprive his *stock* of vegetables any sooner than his *family*.

As to the *relative* value of roots and corn, there is a great difference of opinion. One farmer says, "I have formerly raised roots and put a thousand bushels or more of them into my cellar; and when I have had to bring them up myself and feed them out in winter, I have asked myself the question whether I could not get along more easily by raising corn and feeding it to my stock. It is a very easy thing to get a thousand bushels of roots into your cellar, but it is some work in a cold morning to bring them up, chop them, and feed them out. Then another thing we have to guard against, is excessive cold; roots, after they have been frozen, are unhealthy for any animal. I know of cows that have been made sick by eating carrots that had been frozen. There is no such trouble with Indian corn. That is the crop adapted to us. My experience is that I can raise one hundred bushels of corn where I can raise one thousand bushels of roots." Another says: "The

most expeditious way of raising corn, after all, is to raise roots. A thousand bushels of roots, which can be raised as easily as a hundred bushels of corn, will buy three or four hundred bushels of corn. That is the reason I do not raise any grain. I cannot afford it. I raised none this year of any kind; but a little less than a third of an acre of mangolds sold for enough to buy one hundred bushels of corn; and I had enough French turnips, from five eighths of an acre, to buy two hundred and fifty bushels of corn. Those French turnips cost ten cents a bushel, and, as I said before, that is the most economical way of raising corn, that I know of." Another says: "The comparative value of the crops you can raise upon an acre of ground properly prepared for mangolds, is hardly the question. Nor is it the question whether fifteen hundred bushels of mangolds would not be better than one hundred bushels of corn, because you would not be likely to get, on such land, any thing like one hundred bushels of corn. But fifteen hundred bushels of mangolds are worth more to any man, for his cattle and sheep, than any one hundred bushels of corn that ever grew. There is no doubt about that at all. Turnips for growing cattle; they are as natural to them as oats to a growing horse. A bushel of turnips for fifty sheep; there is no better food in the world. I have tried it over and over again. I would rather have it than a pint of corn for each sheep. You can easily figure which would cost the most."

We believe roots to be necessary to the best estate of man and beast alike, and were the difficulties of raising them twice as great, we should still say, to the farmer who desires the best (and the most profitable because the best) mode, feed roots with your hay, grain, stalks, or straw. A larger amount of manure is required; but the crop will return it or pay for it. A dry, warm cellar is requisite; every farmer should have such a

cellar. They must be cut; but root cutters are at hand and will cut all kinds of roots, pumpkins, squashes, etc. Of course, we must have corn and grain for our stock, but on expensive lands near large cities, or on the lines of railroad, convenient to market, roots will be more profitable. Every farmer should raise roots enough to give his stock a taste every day they are stall fed. Dry hay and grain sustain life, but will not give the best results. Five tons of turnips are certainly equal to one of hay for feeding purposes; and, as certainly, ten tons of turnips can be raised to one of hay upon the same land. Eight tons of turnips are about equal to one of corn, and twenty tons of turnips to one and a half of shelled corn, is about the average of the crop. Enough has been said to show the value of root crops; we now proceed to the method of culture.

TURNIPS. Robinson says, "The best soil for turnips is newly-cleared forest, or reversed sod, not too clayey; but they will grow well on pretty stiff clay, if finely pulverized." Our experience is, that the common English turnip (which is the easiest of all root crops to grow) wants a light mineral soil, but, with careful preparation of the soil, will grow well upon any but heavy rich clay lands. Green manure should never be applied to any root crops. Well rotted compost is the thing. Or, green manure may be hauled on in the fall, five to eight cords to the acre, and covered in ridges, and plowed in in the spring. Plow late for turnips, and sow not earlier than July. Early sowing causes them to get their growth before it is time to harvest them, and the consequence is rot. October is the great month for root growth. Turnips may be sown to advantage as late as the last of July, after some early crop that has been very heavily manured, like the early potato, or strawberry crop. The turnip is not fitted for long keeping, and is only valuable for early winter feeding. The Swedes, White Globe, Yellow

Globe, Purple-top, and Cow Horn, are all good varieties for field culture.

RUTA BAGAS are more valuable for stock than turnips, and are raised with more difficulty. They require a stronger soil, but substantially the same culture as turnips. They should be sown earlier, say about the middle of June, or first of July, at the latest. There are some twelve or fifteen different varieties in cultivation, but there appears to be no satisfactory decision as to which are the best.

THE MANGOLD is adapted to a wide range of cultivation, and a great variety of soils. The seed should be sown in May; in other respects the cultivation is the same as with the other root crops. The Long Red and Long Yellow are the best for deep soils, and the Globes for shallow soils.

CARROTS, we judge, all things considered, to be the best of all the root crops for the soil and for feeding, but the assertion that they are worth as much, bushel for bushel, as oats, is a simple absurdity. No farmer can afford to let his stock be without roots, but they can never take the place of grain. They are to be used in connection with grain. They are best suited with a warm light soil, well cultivated, as all soils for root crops should be. The land for carrots and for mangolds should be plowed as early as possible. Only thoroughly decomposed manure will do for carrots. The seed should be sown the last of May, or first of June. Plow, cross-plow, and harrow at intervals, before sowing. It does the weeding in advance. A field thus worked before sowing, will not only grow more and better roots, but with one third the labor of weeding. Carrots can be raised by almost any farmer for six cents a bushel, after he learns the most economical ways of doing it. We shall speak of these things under the head of General Cultivation of Root Crops. The tops of carrots, if cut while they

are still green, are very palatable food for stock. Every particle is greedily eaten by cows, horses, and sheep. This is a strong argument in favor of late planting. The Long Orange we deem the best variety for field culture.

GENERAL CULTIVATION OF ROOT CROPS. Nothing but deep plowing will do for root crops. Fifteen inches deep is the shallowest plowing we can commend for them. Give the roots a chance to run down straight and smooth. Repeated plowings, and harrowings, dragging and rolling until the ground is mellow and free from clods, is the proper preparation of the soil, in connection with heavy manuring. Roots cannot be made profitable without heavy manuring. Put on five to ten cords of good compost to the acre. The compost of muck and liquid manure which we have previously recommended, is especially valuable here. The selection of seed is of vital importance with this crop. The only sure mode of procuring good seed is to raise it yourself. Select good sized smooth roots, and as soon as the ground is settled in the spring, plant them out in rows. The seed stalks will grow with numerous branches, and the heads will ripen at different seasons. They should be cut off as they mature. The husks should be rubbed or threshed off, some clear, dry, cold day in winter. The seed is cleaned by sinking. Put it all in a tub, fill with water, stir the seed slightly, skim off the chaff and light seed, and turn off the water; repeat this operation two or three times, and you will only have full plump seeds, nearly every one of which will germinate and give a good root. Here is the first and great secret of raising large crops of fine roots. It can never be done without this careful selection of the seed. After washing, spread them out on a cloth. Let it dry three or four days, (unless it is to be sown at once,) turning it every day. Do not dry by a fire. We approve of drilling in all root crops. It is much

more certain. With seeds selected and cleaned as we have described, you can sow just the number of seeds you want on an acre. If it is desired to have the roots one inch apart, twelve seeds to the foot can be dropped with great regularity. Many of these seed sowers also have an attachment by which guano, phosphate, or any fertilizer, can be sown with the seed. If the droppings of the privy have been saved and composted, as directed in *Chapter III.*, you have just the thing to sow with your seed. Some application of the sort is desirable. Four or five bushels of salt to the acre should never be omitted unless you have kelp or other sea mosses in abundance. Refuse salt is as good as any; when sown with the drill, less seed is required, and thinning is unnecessary. When good turnip seed is drilled in, on well prepared ground, one half pound per acre is enough. Too thick seeding is injurious. One pound to the acre is often sown broadcast, but that is too large a quantity. Mr. Ware, a successful cultivator in Massachusetts, drills three and a quarter pounds of carrot seed per acre. They germinate sooner if soaked, for twenty-four hours before planting, in warm water. The drills should be far enough apart to allow a horse cultivator between them. Constant weeding is necessary in growing root crops, although a large proportion of the weeding may be saved by previous thorough breaking up the soil. When sown broadcast, they may be thinned by harrowing after they come up. This also tends to leave them in rows, kills many weeds, and loosens the crust. As soon as the weeds get started, go through with a horse hoe between the rows, and follow with the hoe or "weed killer." Never let the weeds get the start of the crop. Ruta bagas should be thinned; this may be done by cutting up the plants with the hoe. With rows three feet apart, and plants on an average two inches apart, if the soil is plowed deeply so that the roots can find pasture, from twelve to fifteen

hundred bushels of turnips, ruta bagas, and even carrots, may be secured. Roots, as a rule, should be left in the ground as late as may be without danger of freezing. They may be topped in the field before the tops decay, by means of either the hoe or shovel. The tops are relished by stock. One great objection to this crop is the labor of handling. Much of this can be economized.

Run a subsoil plow beside the rows, and it will lift them so that they can be very easily pulled. Indeed, the ground should be so mellow that they can be pulled without difficulty. Gather them on a dry day in dry weather. Throw them between the rows and let the dirt dry on them. An hour or two will dry the dirt so that most of it will shake off while loading them. Have a scuttle to your cellar, so that you can slide them in by the cart load. After they are in the cellar, don't forget them. On cold nights (not freezing) open the windows and scuttle door; in warm or wet weather shut them up as tightly as possible. A very successful farmer says, "If I am fattening hogs and want to give them meal and grain, I cook the roots and mix the meal in so that it is all cooked and steamed. I think, for fattening hogs, cooked meal is better than raw. But I will state that I have kept successfully, for years, store hogs and breeding sows, from November to March, with nothing at all but raw mangold wurzels. I don't approve of feeding raw roots to small pigs; but store hogs, weighing from one hundred and twenty-five pounds upwards, will thrive well on them."

It is undoubtedly more desirable to steam roots for hogs than cattle. Cutting them up with a root cutter, or in small quantities, chopping them with a hatchet, is usually sufficient preparation for cattle. One half bushel of roots is a liberal allowance for each animal, allowing six pounds of grain, and twenty pounds of cut corn-stalks and straw. Where hay and grain are

very cheap, as in some parts of the West, large crops of roots are not profitable, but small crops, to give the stock an occasional bite, should, we judge, be raised even by western farmers.

POTATOES. There is no need of urging the cultivation of potatoes, for the farmer wants these *himself*, and will have them even if they cost him one dollar a bushel. In this country they are more generally used than any other article of food. The soils best suited to the potato, are the dryer and lighter soils. New land, or pastures newly cultivated, give the most certain and most abundant crops. In wet, undrained soils, or in those of stiff clay, they are not of as good quality, and are more liable to disease. Land that has been long cultivated, seldom produces good crops. No green or unfermented manure should be used on land intended for potatoes, within one year of planting. No stable manure should be used, until thoroughly rotted and composted with peat, muck, or sods. The safest applications are ashes, or plaster. Guano, or superphosphate, if sown broadcast and plowed in lightly, will prove beneficial. No application of strong manures should ever be made directly to the *sets*. We advise always planting in drills or ridges. Hill planting is only fit for gardening. The ground should be subsoiled at least to the depth of twelve or fifteen inches. The manure should be plowed in at this first plowing. The seed may be either put in with a drill, which makes the furrow, drops the *sets* at the required distances, and covers them; or a light plow run through, making a furrow four to six inches deep, the *sets* dropped, and the plow run through again, to cover them. This is an expeditious and excellent method of planting potatoes. For the smaller early sorts, the drills may be from twenty to thirty inches apart, and the *sets* from six to ten inches apart in the drills and covered three or four inches deep. For large

and later sorts, make the drills thirty to thirty-six inches apart, *sets* ten inches apart in the drills, and cover four to six inches deep, according to soil. If the soil is inclined to be heavy or wet, four inches is sufficient.

There is a great variety of practice in selecting seed for planting. Large or small, whole or cut, the discussion has been going on for years. Our own experience, as well as our judgment, from all reading and observation, is that large fair specimens of any grain, fruit, or vegetable, are the best for seed. But if large potatoes are selected and planted whole, there are too many sprouts, and the crop will be small; but if cut into pieces, having two or three eyes, there will be enough to give food to the young plant, without crowding too many roots together. The great objection to planting cut *sets* can be obviated by cutting a week or two before planting, and allowing the cuts to heal over. As soon as the sprouts make their appearance above ground, harrow the field across the drills. This breaks up the surface, kills the weeds, and gives a good chance for the young plants to grow. A light fine toothed harrow is best for the purpose. Such a one we recommend every farmer to have for harrowing his meadows, grain fields, corn fields, and potato fields, after the crops are up. This early harrowing saves much after cultivation. Cultivate with an ordinary cultivator, until the blossoms appear, then hill up with the plow. It is injurious to work the ground in wet weather, or when the tops are wet.

In harvesting potatoes, a plow can be run on each side of the drill, and then the potatoes are readily forked out. Many farmers plow out their potatoes, with the common plow, and others use a plow made for the purpose. Pick up and store, as fast as uncovered, and while the potatoes are still cool, as drying and heating cause them to rot. Any method of storing

potatoes, that keeps them from the light and cold, is sufficient. The great difficulty in raising the potato, is the rot, for which there is no remedy. Care in the selection of varieties, and in planting none but the best specimens of those varieties, may be of some value; care in the application of manures, and in the cultivation of the soil and crops, may mitigate the severity of the disease; care in the harvesting and storing of the crop, may lessen its ravages, but there it remains, a most serious obstacle. The following varieties are especially recommended for cultivation. **BUCKEYE**, early and productive. **DYKEMAN**, early and productive. Grows better in strong clayey soil, than any other we know. **MERCER**, early and of the finest quality, but not as productive or hardy as others. **STATE OF MAINE**, quite early, of good quality, and moderately productive. **EARLY GOODRICH**, productive, hardy, and a good keeper. **THE EARLY ROSE** we consider, in some respects, the best of all the early potatoes. It is ten days earlier than the Early Goodrich, very productive, of finest quality, and so far free from disease. **CARTER**, once esteemed the finest of all the late varieties.

DAVIS SEEDLING. "As a winter potato, or for extensive cultivation for market, is one of the best of all varieties." Hardy and productive. **JACKSON WHITE**; earlier than Davis seedling, commands a high price in its season, free from disease, and a good keeper; one of the best for general cultivation. **JENNY LIND**, very large, productive, free from disease, and keeps well. **PEACH BLOW**, handsome, hardy, productive, keeps well, brings a good price in market; but is really not of as good quality as any of the other late potatoes recommended.

COLEBROOK'S SEEDLING, **PINKEYE**, and **GLEASON**, have each desirable qualities for general cultivation. There are many other excellent varieties, but none we believe better than those recommended above. As to feeding potatoes to stock, we be-

lieve other roots are more profitable to raise for that purpose, but all the small potatoes will come in play, in feeding; and if the farmer finds them difficult to dispose of, at paying prices, in the market, they are worth twenty-five cents a bushel to feed to stock, with hay at sixteen dollars a ton. Stock should always have some roots, during the winter, and potatoes will answer the purpose.

SWEET POTATOES are raised from sprouts or slips. Almost any corn land below 41°, will give a good crop. The slips are raised in beds, and transplanted, when three or four inches high, or any time before they commence running. The slips are pulled, and the tubers left in the bed. Two or three crops of sprouts can be obtained in one season, from the same tubers. The soil should be deeply plowed, subsoiled, harrowed, rolled, or dragged, and put in the most mellow condition. Only well rotted stable manure should be used. Make ridges three feet apart, by turning two heavy furrows together. Set the slips in these ridges, burying them nearly one half their length. The after cultivation consists in keeping down the weeds. They can be plowed out the same as potatoes. They should be dug before frost. For keeping at the North they must have a dry atmosphere of even temperature. At ordinary prices a large crop of sweet potatoes is very profitable. Other root crops will be treated of under the head of Market Gardening.

CHAPTER VIII.

SPECIAL CROPS AND ROTATION OF CROPS.

COTTON, though no longer King, is a most important crop. As corn furnishes cheap food, so cotton furnishes cheap clothing. It is a child of the sun and flourishes only where it can have seven or eight months secure from frost, and be nearly free from rains for three or four months. Three classes of soils are suited to cotton. Soft or rotten limestone soils; the black soils of the Texas prairies, and the Alabama canebrakes; and, best of all, the river bottoms or alluvions. The cotton region proper in this country is within the limits of South Carolina, Georgia, Alabama, the northern part of Florida, Mississippi, the northern half of Louisiana, the southern half of Arkansas, and the eastern half of Texas; but within these limits, with improved modes of culture, might be raised the cotton of the world.

There are other small portions of the South where cotton can be grown, but not in profitable quantities, except at a high price—twelve to sixteen cents per pound. Not more than one half the cultivatable land of a plantation should in any case be planted in cotton. The remainder should be devoted to corn, roots, pasture and woodland. Perhaps a still better division is one third in cotton, one third in some green crop to be plowed under, and one third in grain, grass, and roots. Every cultivated acre will thus have a chance to recuperate itself once in

three years; and as cotton is not an exhaustive crop, with a few fertilizers, this might be made sufficient.

A satisfactory rule is one mule and one hand for every ten acres of cotton. The best mules for the purpose are fast walking mules, and quickness of movement is more desirable than great strength. The same is true of hands—a rather small but active hand is the best on the cotton plantation.

The best mode of preparing for planting and cultivating a cotton crop is briefly as follows:

Plow early; the last of February, if the soil will admit. Mark off the rows. Give the soil a month to settle. Run a light harrow along the ridges. Follow with a marker, soak the seeds in some fertilizer, drop evenly two or three inches apart if by hand, four to six inches if by a drill; cover one inch deep. As soon as the third leaf appears, with a shanghai plow, or a cultivator that can be run astride the rows, clean away the grass and weeds from both sides at once. Follow with the hoes, "chopping out" weeds and superfluous plants. Cultivate once in two weeks with plows and hoes till the plants interlock across the middles.

PLOWING. The planter of one hundred acres of cotton, with the necessary grain and roots, requires four or five large plows for preparing his grain land, and for making the ridges for his cotton. Cotton requires a deep soft bed for its long tap root; but deep cultivation between the rows has been proved injurious. At least ten small plows of different patterns are desirable. The scooter or bull tongue, for marking the rows where a drill is not used; the scraper or sweep, for cultivating the middles; the shanghai, for clearing the rows at the first cultivation where a cultivator is not used; the shovel plow and the mould plow. In *Chapter IV.* will be found a description of the *best* large plows, and Messrs. R. H. Allen &

Co., of New York, or Messrs. Sinclair & Co., of Baltimore, will furnish, on application, special price lists of all plows, especially adapted to southern crops. We advise also the purchase of subsoil plows for grain and root crops. Buy one, and make an experiment, and we feel assured it will prove profitable.

We would allude here to what is known as circle plowing. What we mean by this is best illustrated by turning a tub, measure, or round basket, bottom side up, tying a string to each handle, and so winding them around the basket or tub that they shall reach the top, each over the opposite handle from which they started. Thus we have a gradual ascent to the top in a half circle. On the light uplands where the soil is mellow as an ash heap, it has been for years washing down the slopes until much of it is ruined. Circle plowing is the only remedy. First make ditches in the form we have described, so that they will take the water that comes pouring down the hill, and they will bear it away down a slope so gradual that no washing will take place.

After a heavy rain send through the ditches and have the gulches filled up, and the earth thrown out. They will soon harden and protect the soil from washing. Conform the plowing to the slope of the ditches. Care and practice will render the marker very expert, and the rows will be nearly as uniform as on level ground.

The plows should be started early in the spring, or rather the latter part of February, whenever the ground will admit. If the previous growth was cotton let what was a middle last year be a row this, and *vice versa*. On stubble or corn land, mark off the rows with a light plow, or scooter, follow in the same furrow and enlarge it with the shovel plow, drag the litter into this furrow and cover by turning two furrows over it. The custom

of lapping two furrows together, leaving the soil beneath them unbroken, is shiftless, and unprofitable, as well as unworthy any enlightened cultivator. Leaving these ridges for a month or more to be settled by the spring rains, planting commences from the fifteenth of March to the tenth of April. Every day's delay in planting shortens the season by so much, and lessens the crop. Mark off your rows for planting with a light plow or a marker. The great object is to have the rows perfectly straight. A perfectly straight row is easily cultivated; and when it is remembered that for three months cultivation must be constant, you will see the utmost care here will be well repaid. The following contrivance is simple but effectual for the purpose. It consists of a stick of timber with V shaped blocks fastened on one side, and a hoop-shaped handle on the other with which to guide it. It is drawn by one mule; easily managed, and as the blocks are just the distance apart required for the rows, uniformity is readily attained. (*Fig. 65.*)

The one represented in the cut is sixteen feet long, and marks four rows five feet apart. Of course the size can be varied to suit the convenience. On light lands, or under poor cultivation, from four to four and a half feet apart is the average distance required between the rows, while under the best cultivation, or on very strong lands, the plant grows so luxuriantly that six and even seven feet are desirable.

Apply no manure directly to the plants, but sow broadcast, and plow in at the first plowing. The system recommended by Dr. Cloud, of Alabama, as condensed by J. B. Lyman, of Louisiana is so near perfection that we give it nearly entire. "First, by circle plowing let the planter prepare his lands so as to prevent washing, and retain in the soil all the salts, and all the fertilizers he may add. Now let him arrange for a rotation of crops, as follows: In his mind's eye divide the plowed land into

three parts or tracts, one third cotton, one third grains and roots, and one third fallow, assigning to each farm laborer an equal amount of cotton and corn land.*

“Calculate to have on the farm stock enough to consume all the food that grows on it; mules, horses, cows, sheep, poultry; and lay it down as a first principle that no manure is to be wasted. Provide stock pens, hollowed towards the centre, and also sheds for the stock. Let every animal on the place be confined at night in these enclosures, with an abundance of litter; leaves and pine straw are better even, than wheat or oat straw.

“Cotton requires potash and lime, wood ashes, plaster, slaked lime, or bones, will easily supply this demand. The necessity for phosphoric acid is imperative, in order to produce a healthy plant, and in all soils that are not alluvial, that is, where there is not a great abundance of fine vegetable mould, the demand for phosphorus is probably the reason why diseases of various sorts, such as the rust and the rot, attack the plant. In addition to lime and ashes some fertilizers containing the phosphates must be used. *Compost*, or barnyard manure and bone manure, weeds, muck, and peat abounding in vegetable matter, will supply them. (See *Chapter III.*)

“Moisture is needed to rot any litter you may use. Scrape your yard on wet days, piling the compost under the sheds; sprinkle over the compost a little lime, ashes, poultry manure, etc. Guano and crushed bones are the most valuable of the condensed fertilizers. Obtain a few pounds of sulphuric acid, and after it has absorbed all the bones, sprinkle it on the compost heap.”

Cotton seed is one of the best fertilizers of cotton, but it

* We recommend, instead of the fallow, some green crop, not only to shade the soil from the hot summer sun, but to help in enriching it. Plow under lightly while still green.

should be applied to the preceding crop, and not to the cotton itself. By the above system of Dr. Cloud, on many plantations, five hundred bushels of compost manure to the acre may well be made before March comes. Look at it. Straw, leaves, weeds, muck, peat, the droppings solid and liquid of your well fed stock, your poultry, and your family, what an inexhaustible mine of treasures; and then the value of all these can be doubled by the addition of a few dollars' worth of lime, or by saving your ashes, and by putting sulphuric acid on your bones.

Supposing then there are five hundred bushels for each acre of cotton. "Mark off the field with a scooter plow, (unless the old lines are visible,) the first line fifteen feet from the boundary, and the others thirty feet apart. On these lines or rows deposit the manure in heaps of ten bushels each. This is easily done by having the capacity of the cart twenty bushels and dropping half for the first heap, and dumping the balance for the second. In this way the manure is distributed at the rate of five hundred bushels to the acre. This will produce very thrifty plants, and the rows should be at least five feet wide." Cover the manure lightly at the first plowing.

PLANTING. The seed should be soaked in a weak solution of stable manure, water and salt, and then rolled in lime, ashes, and guano—or in plaster, which is preferable, as the seeds then show more plainly in the drill. Thirty pounds to the acre is recommended; but with perfect seed, prepared as above, and evenly sowed by drill or by hand, one half this amount is abundantly sufficient. We have known twice this amount, or sixty pounds to the acre, sown, without producing plants enough for a stand. The seed to be used for planting should be the best, cleaned of fibre as much as possible, and carefully housed. The great piles of cotton seed lying about the gin houses through the winter, furnish very uncertain seed. "Im

prove the cotton seed, and your staple is directly augmented in value. One advantage of this system of generous manuring, is the improvement of the seed, and consequently an increase in the length and fineness of the staple; for an excellent quality and an abundant yield of cotton wool can no more be expected from *seeds* that are dwarfish, than large clips of wool from *sheep* that are dwarfed."

Having then good seed, in good condition, and prepared for planting, put it in with a drill, or cotton seed planter, if you can (beg, borrow, steal, or) buy one. These implements are now made to combine a small harrow, which goes in front of the ridge and breaks the crust; a drill that makes a furrow for the seed; a wheel that distributes the seed evenly at any required distances; and a scraper that follows, and covers them evenly, levelling the surface on either side. Fifteen to twenty acres of cotton per day can be planted with it. It can also be used to sow any kind of seeds. A common corn planter can be arranged to put in cotton seed much faster and better than it can be done by hand. If you can by no contrivance get a drill or planter, mark out the rows with the implement we have described on page 212; let the hands follow close behind it and drop the seed, three or four in a place, at distances of thirty to thirty-six inches apart, (under our system of manuring; under the ordinary system, twenty to twenty-four inches apart,) in the drills. Cover with a drag made of a piece of plank, and drawn along the ridge. Here are four operations, requiring the whole field to be gone over four times; when, with a cotton seed planter, costing only from thirty to forty dollars, the whole can be done at one operation. This, where *time* is so valuable, and every day's delay indicates the loss of a day's picking at the other end of the season, is a small item indeed. Ingersoll's is the best cotton planter we have seen, but it can be

improved, and will be, if the demand for machines is such as to promise remuneration for the improvements. The planter can now for a fortnight leave his cotton field, and hurry up his other work; about which time, under favorable circumstances, his cotton will need

CULTIVATION, which consists in keeping down all grass and weeds, and keeping the surface stirred. As soon as the third leaf appears, *bar off*, that is, run a light plow on each side of the row, close to the plants, cutting up the grass and throwing away the dirt from the row. A double plow is the best for this purpose—that is, two light plows on one beam, that will run astride the rows and do both sides at once. A cultivator, with the forward hoes taken out, will answer the same end. The poorest implement for the purpose is the single plow, which must be run on each side of the row. Here the advantage of perfectly straight rows is seen, as the plow can be run, by an expert plowman, close to the rows, without disturbing a plant. The hoe gang should follow immediately after the plow, and chop out the grass and superfluous plants from the rows, leaving the plants in clumps of three or four, at distances of from twelve to thirty-six feet, according to the condition of the soil.

This work should be done very rapidly. With one mule and one hand to each five acres of cotton, a week should suffice for this first operation. In about a week, or not more than two weeks from the day you commenced to "*bar off*," start in your small plows and "*mould*" the cotton; "that is, let the plows throw the dirt up to the rows, the hoes to follow, thinning the plants to a '*stand*,' and leaving every thing clean and smooth." This working should be very thorough and careful, the most so of any. The plants can all be cut away except the two most thrifty ones in each clump, and this is called a "*stand*." All the grass and weeds should be destroyed, and fresh earth drawn

around the stand. Keep the plows running until the middles are all broken out. Manage now to get over your ground once in two weeks with the scraper. This is light work, and the teams should be urged to a brisk pace. Rapid movements are now required.

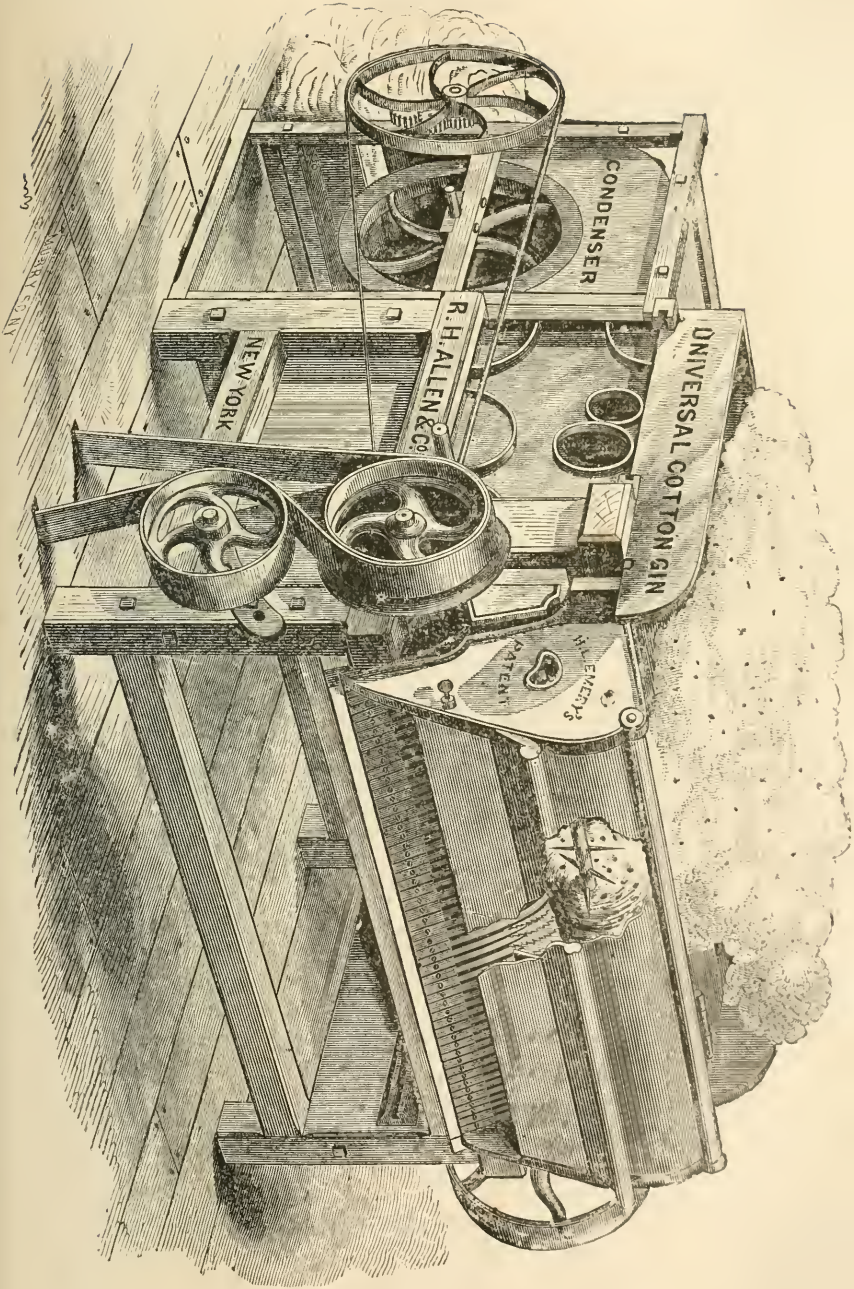
The common corn cultivator will answer the purpose on light lands, where it is not necessary to ridge high; but the "cotton sweep" is better. Any thing that kills the weeds, and tends to throw the earth up to the ridges, if kept moving rapidly, will answer the purpose. During the very hot weather of July and August, the teams should be in the field at the earliest dawn, and rest from eleven until two or three o'clock, the mules having shade and dry fodder. Or, better, if the planter has an extra mule or two, to let them work only half the day. At this season, buttermilk should be provided for the laborers. Nothing is more nourishing and cooling. One cow to every three or four persons, should be a part of the stock on every cotton plantation. When the plants begin to interlock across the rows, haul off the cultivators and let it alone until the time for PICKING. This commences from the first of August to the middle of September, according to the soil, the season, and the cultivation. For at least four months, the chief business, to which every thing else must yield, is picking. Every available hand should be employed—for the hands required to cultivate the cotton will not suffice in picking time.

We give below the gist of the directions recorded by Joseph B. Lyman, of Louisiana, the author of a most excellent statistical and practical work on cotton. "Start the pickers as soon as you can see a half dozen open balls down the row. Each hand should have a bag and a basket, the bag fastened about the neck and adapted to the height and strength of the picker. Activity is now required, and women, with their quick fingers,

usually make the fastest pickers. The basket should be so arranged by the planter that the bags can be conveniently emptied when they attain a weight of twenty-five pounds. Every arrangement that tends to facilitate the work, or relieve the laborer, is to the credit and profit of the planter. Humanity, as well as interest, demands that every thing that can be done to lighten this monotonous task, shall be done. By many overseers, there has seemed to be an entire disregard of the welfare of the laborers. Let there be refreshments at the baskets. Kindle a fire and have coffee boiling before sunrise, and when the gang come out of the rows give each a half pint with corn bread. It will give them strength for their work and is a preventive of miasmatic disease, to which cotton pickers are particularly liable from working from the cool morning air into the fierce heat of midday. In the heat of midday, provide a tub of buttermilk, or sweetened water, and give them a few minutes rest before they set in again; the time will not be lost, for they will strike in with more spirit, and the expectation of another drink will quicken their movements on the way back. The month of October is the height of the picking season, and the planter must urge his hands to their best exertions. But let him not, in his pushing, encroach upon the hours of relaxation and rest. His rule should be gather no cotton after nightfall, and pay high for fast picking, rather than for night work.

“Sometimes it is well to divide the force into ‘fast pickers’ and the ‘trash gang,’ the former pressing rapidly through and gathering all the fair, clean cotton, that is hanging open on the upper branches, the others gleaning the ‘trash cotton,’ as all inferior or dirty cotton is called. There is no time so favorable for sorting this trash cotton as when it is first picked. The ‘first picking’ should never be allowed to become wet with

Fig. 67.



dew, but should all be picked before nightfall, and taken, while still warm and dry, to the sheds, to be stored for a month or two before it is ginned. This increases the weight and gives it a better color."

GINNING, BALING, AND MARKETING, hardly come within the scope of this book; but, as we believe the past and the present systems to be wasteful and faulty in the extreme, we embody some suggestions in regard to this part of the subject. In many parts of the cotton States, a community living within a compass of five miles, produce, in favorable seasons, five thousand bales. The number of persons in such communities averages about fifteen hundred. The average number of bales ginned, at each gin house, is not over two hundred. The average cost of the gin houses and equipments is five thousand dollars, or one hundred and twenty-five thousand dollars laid out in gin houses and equipments. Now, instead of this arrangement, let the planters combine to put up a factory that will gin out this whole crop, bale it in the best manner for market, and, at the same time, manufacture eighty thousand yards of cloth for home use, which could readily be done in the four months that the gins are idle. The advantages of such a system are numerous.

The planters would be saved so large an investment in machinery. Better machinery, better operators, and consequently better work would be secured, and at much less expense. It could be packed in the best manner by the best power presses, and baled with iron hoops, thus saving to the planter the old charges of one dollar and a half or two dollars per bale for repacking.

After the principal part of the crop has been thus perfectly prepared for market and shipped, the power can be thrown upon the spindles, and the remainder of the crop made first

into light cloths, for summer wear, and afterwards linseys for winter wear; and the worst of the cotton into bagging." We consider these suggestions well worthy the consideration of the cotton planters whose gins have been destroyed, whose capital is limited, and who desire not only to build up their own broken fortunes, but to bring the best and most lasting prosperity to the South.

INSECTS AND DISEASES. The cotton louse is the first enemy of the young plants. Proper fertilizing and thorough culture are a preventive; but, where the louse appears, dry ashes and plaster should be dusted over the plants. It will destroy most of the insects and be always beneficial to the plants.

THE CUT WORM should be treated to a mixture of ashes and lime in equal parts, and applied around the stem of the plant. **THE COTTON MOTH** is the great enemy of the cotton and should be fought with all conceivable weapons. Just at the time the first balls open a gray moth may be seen in small numbers flying about the field in the morning and early evening. This moth, an inch or more in length, is of a rusty gold color on the back, and a dull silvery white on the breast. There are two black spots on the wings, and two little horns projecting from the head. As we have said, there are but few of them, but unless they and their eggs are immediately destroyed an army of worms will soon destroy every green leaf of the cotton plants. The following methods should all be used without delay. Put the laborers into the field early every morning for a week, with paddles, and as the moths fly up from the leaves strike them down and kill them. Make a mixture of molasses, vinegar, and cobalt, and expose it on plates elevated in different parts of the field, one plate to the acre. Just at dusk build bonfires in different parts of your field, and many of them, attracted by the blaze, will fall into it and perish. What

few escape these three methods of destruction will deposit their eggs on the leaves. They cut the mid-rib or main fibre of the leaf, and bend it over, fastening it down with a slender thread, and within the shelter thus formed, deposit their eggs. After the moths disappear, which will be in about ten days after their first appearance, put your whole force into the field and let every leaf thus curled up be gathered and burned. These leaves are readily distinguished after examining one sample. The planter may now feel at ease, for his enemy is destroyed. If not destroyed at this time, there will appear in about a month an innumerable host of them, and in a few days a more innumerable host of worms. THE ARMY WORM is a formidable foe. He eats every green thing in his track. An army of these worms marches in regular order, and the planter has time to prepare for them. When you hear of their advance towards you, bring out your force and plow a trench about your place, beginning on the south and west. Let it be deepened with the hoe and spade to eighteen inches, with a smooth perpendicular wall on the inside up which they cannot climb. As soon as they make their appearance at this trench, put a patrol with plows and spades along the line, to plow under the pests, if they find any weak spots and make their way through. Straw and dry sedge grass laid in the ditch and burned will destroy many of them. THE BALL WORM belongs to the corn field, but migrates to the cotton fields when the corn gets hard. There are three methods of lessening their ravages. The first is to build fires about the corn fields at dusk, during the first two weeks of July, when the *moths* are flying, and before they deposit their eggs. Millions will be thus destroyed, and as every pair destroyed would breed some five hundred or more ball worms, it is readily seen that this proceeding is very effective. The second method is included in

the system of rotation recommended. Never follow corn with cotton or *vice versa*, but let a year intervene between these crops, in which either put in grain or roots, or sow some green crop to be plowed under. The Ball Worm must have either corn or cotton, and if he has neither he dies. The third method is to plant a few rows of very late corn among the cotton. All three of these methods should be used, as no one of them is sufficient.

"Rust," "Sore Shin," "Rot," "Blue Cotton," and all other diseases, so far as we know, are in nine cases out of every ten the direct result of defective cultivation, and the only remedy is to return in the shape of lime, plaster, ashes, etc., some of the elements withdrawn from the soil by the crop.

COTTON SEED. The principal value of cotton seed is as a manure, to return to the soil from which the cotton is taken. This is the only use to which it can be put in the interior, and should be carefully husbanded for this purpose. As we have before stated, it should not be applied directly to the cotton but to the previous crop. A small but constantly increasing portion of the cotton seed, will be used for making oil. It is in the process of making the oil, that the cotton seed cake is produced. This cake is very nutritious to stock. Less than one-fiftieth of the cotton fields of the United States are under cultivation, and enterprise and capital turned in that direction, must ultimately bring a large reward.

From the "Southern Farmer."—"RICE—PREPARATION AND CULTIVATION. New land is preferred, free from grass seed, and the richer the more profitable, of course; if not rich, old or new, it is good economy to make it rich.

"First, prepare by good plowing, if old land, deep and thorough, harrow as fine as can be, then open furrows two to three feet apart, owing to quality of land; drill the seed, one to

two pecks per acre, depending on number of rows, two or three feet distant being a guide; cover with a wooden tooth harrow, cotton coverer or roller, but about one half to one inch deep—best about one inch. When the plant is about two to three inches high, the two to four first blades ‘bar off,’ or run a cotton scraper as for scraping cotton, not deep, merely to shave off the surface; then, with a sharp hoe, scrape the entire surface, leaving it clean—cut off all weeds, grass and rice. In a few days the rice will be up, and as the season has become warmer, the rice grows faster; a bull tongue plow can be used near the plant so as to turn enough earth to it on each side as to cover the earth and mould the plant. When some six inches high, pass the hoe through the row, leaving trenches about one foot distant. Keep clean with cultivator, sweep or shovel plow, stir from time to time to keep plant growing. To be harvested by the sickle and left for two days to cure, by shocking up; opening out and shocking as good hay or fodder is made. Thresh by flail, by machinery, by the old plan of horse tramping on it, or by striking the heads over some pieces of wood.”

TOBACCO CULTURE is, for the time being, a paying crop, but it exhausts the soil more rapidly than any other crop. Any methods of culture that leave this fact out of view are faulty; as they enrich the land owner at the expense of all the fertility of his land. And when land is once exhausted of its fertility by the cultivation of tobacco, no process can make it profitable to cultivate them again for any crop whatever. For proof of this look at the exhausted and abandoned lands of Virginia and Maryland. So far as the system of cultivation, urged in the following pages, is different from others, it is because this idea is prominent, viz: *any method of culture that steadily exhausts the land, is faulty and ruinous.* Tobacco will grow on almost any soil

and in any climate that will produce corn, but a warm, mellow soil, is its chosen home.

The northern cultivator must secure warmth, by selecting an alluvial, sandy soil, or a light warm loam, and increase it by abundant manuring. The southerner may depend more for warmth upon his sunny climate, and insist more upon depth and richness of soil. A heavy loam, or a soft clay, will do him good service. There are two exceptions to these rules, and they are rank soils which produce a "strong" tobacco, and exposures subject to strong winds, where the plants will be broken and bruised. The preparation of the soil should be most thorough, as it not only increases the quantity, but improves the quality. We have seen two crops of tobacco, grown on adjoining farms, sell, the one for eight and the other for twenty-two cents a pound, the difference being wholly in cultivation and handling. The one crop cost about fifty per cent. more to cultivate than the other, but it brought one hundred and seventy-five per cent. more. If the land has not been subsoiled for the previous crop, plow in the fall, and subsoil to the depth of at least fourteen inches, and the deeper the better. As early in the spring as the ground will do to plow, the manure should be plowed in. The oftener it is plowed, harrowed, rolled, plowed, crushed, and harrowed, the better condition it will be in for the growth of the plant. It is difficult to tell just where this working of the soil ceases to be profitable, but our experience is that six workings (including plowing and subsoiling in the fall) is the least to be recommended. This only provides for two plowings, one rolling, and one harrowing in the spring. Manures are the life of this crop, and it is only by the most abundant manuring, that the fertility of the soil can be maintained in Tobacco. On newly cleared land, where the soil is filled with vegetable matter, and the brush has been burned

on the land, three crops may be raised without manure, but no more tobacco should be raised on it, for at least three years, and it should be liberally manured for the intervening crops.

Well rotted barnyard manure, ashes, and salt, are the three specifics for tobacco. Lime it *must* have, either in the shape of ashes, gas lime, or superphosphate of lime. Salt at the rate of from three to six bushels to the acre, furnishes the soda required by the plant. As for other manures, the cultivator must use what he can get. Twenty-five loads per acre of compost, of muck with solid and liquid manure, with twenty bushels of ashes and four of salt, is the plainest prescription we can make. Twelve loads (by loads we mean *loads*) of compost as above, with two hundred weight of guano, (salt and ashes added, as before,) is a good proportion. If the ashes are not at hand, two to three hundred weight of phosphate can take their place. Guano, on all crops, should be covered deeply, while superphosphate should be left near the surface. Manure from the hog pen, where peat and muck have been supplied liberally, is a most excellent dressing. In fact any substances that will promote the growth of other crops, will benefit this. Green and strawy manure should never be applied directly to the crop, but first rotted and composted. No ashes, lime, or other fertilizer, should ever be sprinkled on the leaves of the plants.

PREPARING THE SEED BED should be attended to as early in the season as the ground gets dry. One tablespoonful of seed, if each seed produce a plant, would suffice for an acre. But, as a precaution against all accidents, sow three tablespoonfuls of seed for each acre to be set in tobacco. Each spoonful of seed should have a square rod of land, so that a seed bed of three square rods is required for each acre in plants. The most approved method of treating the seed bed is as follows. Select a protected, sunny spot, the south side of a wood, or a southern slope, if possible,

near a brook, for convenience in watering. Cut off all weeds, grass, etc., close to the turf; pile up dry, well-seasoned wood, and burn the surface thoroughly; clear off the coals, and spade in a quantity of manure about four inches deep. Rake in bone manure if handy. Stir up the seed in three times its bulk of plaster, and sow in a still, *damp* day, or water as sown. Rake the bed lightly, not to exceed half an inch in depth, then roll, or tread down hard and even. Water the young plants constantly, if dry weather succeeds, always with tepid water, and never while the hot sun is shining on them, which rule applies to the plant in all stages of its growth. Cover the bed with brush until the plants are well out of the ground.

The time for sowing tobacco seed, in the extreme South, is from the first of February to the first of March. In the extreme North it is two months later.

Transplanting should be done, if possible, when the ground is damp, otherwise it will be necessary to water while transplanting. Three feet apart, both ways, is a safe rule in setting the plants, and the earth should be pressed firmly about the roots. Great attention is necessary to the newly-set plants. Some cover them during the heat of mid-day, others water them morning and evening until they get established. Many will fail, and should be at once replaced. If the ground is very dry, a little hole should be made for the plant, and a pint of water turned in. As soon as it has disappeared, set the plant. In a week or ten days after setting, cultivate and hoe. Repeat the operation as often as once in ten days, and keep the ground loose and clean till the crop is too large to be worked among.

Soon after the plant is set, the cut worm makes his appearance, cutting off the stems of the young plants. Go through the field every morning, and where a plant has been cut off,

dig open the hill and destroy the worm. This is the only method we know of as being effectual. A few bushels of salt per acre will keep away many of them. These cut worms have no sooner been destroyed, than a greater enemy appears, in the tobacco worm, or "*horn worm*," a large green worm, which, if left to itself, would destroy every leaf. The first preventive of their ravages is to destroy the moths, by fires and torches, during the last of May, as directed in Cotton Culture. The second is, to examine the under side of the leaves for the eggs, and destroy them. They are small, of a light transparent green. As soon as the worms begin to appear, get over the field every week and pick off and kill every worm, large and small. "Topping," consists in breaking off the stalk about the time the blossoms appear. One third of the leaves should usually be topped off. After topping, break off all the suckers. Repeat this last operation three times, at intervals of a week.

Good practice differs so widely in regard to harvesting this crop, that it is useless to give more than the main points to be kept in view. When the leaves bend over to the ground, and are dotted with yellow spots, lose their fur, and look glossy, they are supposed to be ripe enough to harvest. The crop is greatly improved in quality by letting it stand two weeks longer; but the risks are so great, that most think it wise to begin harvesting as soon as it *will do*. Hail, winds, frosts, worms, and suckers, are only to be insured against by early harvesting. To cut so as to save handling is a great object. To cut two rows and lay them over together, is good practice. A hatchet or a cleaver which will sever the stem at one stroke is desirable. If handled before it is wilted, the leaves get broken and bruised, if left to wilt in the hot sun, they get sunburnt. On this account, cutting is often delayed until the middle of the afternoon, and left over night. Great care should be

taken, in handling and hanging tobacco, not to bruise, break, or tear a leaf. There are still great risks before the tobacco is finally cured. Where the crop is large, we believe fully in the utility and economy of curing by furnace heat. From five days to a week is all that is required to cure it, and the best quality and greatest weight is thus secured.

Dr. Dorsey, an intelligent and experienced cultivator, in Calvert county, Maryland, writes to the *Maryland Farmer* :

“Owing to the great uncertainty which always attends the curing, in the natural way, I adopted, several years ago, Bibb & Co.’s Tobacco Curing Apparatus, with which I have been entirely successful, not only saving my whole crop from injury, but greatly enhancing if not doubling its value. The ‘Furnace’ is so arranged, in a barn, as to take up but little room, the pipes running so near the floor the hands walk over them without difficulty, enabling the planter to fill every part of the building except a small space near the apparatus. The heat is distributed very uniformly throughout the barn by means of two distinct sets of pipes—one set conveying the smoke to the chimney or smoke stack, and the other distributing hot air, drawn off from under a jacket thrown over the ‘furnace.’ This jacket answers the double purpose of protecting the tobacco from scorching overhead, and holding for distribution the surplus heat at the furnace end of the building. Either wood or coal may be used in firing with this arrangement. My plan is to use wood (of any kind well seasoned) during the day, and up to bed time, when two or three bushels of coal are thrown in, which insures ample heat for the night. The door of the barn may then be locked, and the fireman retire.”

The peculiar color of the leaf is obtained by sweating. Three or four hundred pounds are packed in a case and pressed. If quite dry, it should be moistened before packing.

Hops form quite an important crop in some parts of the country, and might in other parts; we therefore give a few directions by which any farmer may start a hop yard. The soil best adapted to hop growing is a loamy elay, underlaid with limestone, but they can be raised on any land that will produce a crop of corn. It should be thoroughly underdrained if at all inclined to be wet, as standing water is fatal to the plants.

The position should not be exposed to the fiercest winds, neither should it be so sheltered that it will not get a constant supply of air and sunshine. Thorough preparation of the ground at first is good economy, as the plants are permanent.

It should be plowed twelve inches, and subsoiled twelve more, or if it is old sward, the turf should be turned under and covered, and then followed by the subsoiler. In the spring, manure heavily, plow, cross plow, harrow, and cross harrow until the soil is mellow, and the manure thoroughly mixed with it. Decomposed vegetable matter is preferable to barnyard manure. If the soil is destitute of lime sow a few bushels every year, as the plant *must* have lime. *Planting.*—The vines are not propagated by seeds, but by runners or sprouts from old vines. They are called “sets,” and can be obtained in any quantity from old hop yards, and sent by express. The “sets” should be taken up as soon as the frost is out, by loosening the earth about them, cutting them off near the main plant, and lifting them out so as to break or bruise them as little as possible. These should be cut into small pieces, with two or three eyes each. Mark off your field both ways, and make the hills eight to ten feet apart each way. Let these distances be carefully measured, as perfectly straight and uniform rows are a very great advantage in after cultivation. When places for hills are determined, put two or three sets in a hill, eyes up.

Cover from two to four inches deep, press the earth firmly about them, and mark the place with a stake.

The male plants should be set at regular distances of eight hills and eight rows apart, making from eight to twelve male plants to the acre. They should be distinctly marked so that they can be known at a glance. Keep all weeds and grass out by means of plow, cultivator, and hoe. Any hoed crop can be cultivated between the rows the first year. Corn or potatoes are commonly planted. The old system of training to stakes sixteen to twenty feet high was clumsy and expensive. A much better and cheaper system is as follows: When your plants are three or four inches high, set a stake at each hill, eight feet out of the ground. The best and cheapest stakes are sawed one and one quarter inches square, and coated with tar. The tar preserves the stakes, and is offensive to the hop louse. The first year the vines are trained to these stakes alone. The second year the tops of the stakes are connected by twine and the vines run all over the top of the yard.

At the *male* hills, put a stout high pole, eighteen or twenty feet long, and let the male vine run up, so that its pollen may be distributed on the others. The cost of this method is one third that of the old method, and has great advantages in gathering the crop.

The hop louse is the only insect that injures the plant to any great extent.

They can be destroyed by thoroughly dusting fine plaster among the leaves and stems. If done early, say the first week in July, one application will generally rid the vines wholly of them, but if they appear again give them another.

Burn the vines that are cut up in the fall. The work in succeeding years consists in keeping out grass, weeds, and worms. In spring, the yard, as soon as dry enough to work, must be

grubbed. Hoe the dirt from the hill without injuring the crown of the root. With a knife cut off all the old vines smooth, and any runners that are seen. Never tear them off nor cut them with the hoe. At the same time examine whether there are any grubs in the hill, and kill all found.

“There are two kinds of grub, both which must be killed wherever found. Tie the vines as often as any stray from the poles, with soft yarn, but it should not be done on a cold day, or in the morning, as then they will break.

“When the smallest vines have got a good start, three feet or more, select four vines, and bury the refuse vines at the foot of the stake with two inches of dirt, and never pull or cut them off, as is usually done. In a few days the leaves will rot, making manure, and the vines will make cheaper food for the grubs than those running up the stake. These vines throw out small roots, and help make the crop for the year, besides they are the best kind of ‘sets’ for a new yard next year. Mix air-slacked lime and unleached ashes, and put on about a pint to each hill.”
(*Prize essay of H. C. Collins.*)

When the vines get above the top of the stakes train them out on the twines, one in each direction, and keep them going as long, as fast, and as far as they will.

After the frosts have destroyed the vines, cut them off close to the ground and throw two or three shovels full of compost on the hill. Where the vines are trained on high poles the vines must be cut down right in the growing season, in order to pick the hops, but by the horizontal system of training the crop can be reached from the ground.

Picking *begins* as soon as the earliest seeds ripen. The crop is not in as good condition as it would be if it could have a little more time, but it is better to pick it two days too soon, than one day too late. When ripe, the seeds become hard, and are

of a purple color. Some portions of the yard will ripen earlier than others, and here the work should commence. Do not hurry the picking too fast at first, but after a few days, when fully ripe, put on all your force and secure the crop. The cleaner the hops are picked the better price they will bring. A man who has the reputation of picking his hops clean and putting them up nicely, will find sale for them, even if the market is dull.

Get the best pickers; pay the best prices; feed the pickers well, and treat them well, and you will have clean hops.

The most expensive part of the hop culture is kiln drying; but large cultivators can afford it; and if three or four smaller cultivators, owning contiguous lands, would combine to erect a kiln for their common benefit, they could readily compete with the larger growers. The kiln has usually four apartments, the stove room, dry room, store room, and press room. The kiln should have a good draft; it is directly over the stove room, and separated from it by a slat floor, and a moveable wire or hemp carpet. The hops are spread on this carpet, twenty to twenty-four inches deep, (except those first picked, which are green, and should not be more than twelve inches deep,) and fires immediately built in the stoves, of large seasoned wood, and kept up until the hops are all dry, usually eight to twelve hours. Next to the dry room is the store room, which should be kept perfectly dark while the hops are in it. The press room is underneath the store room. The pressing and baling can be done on rainy days, from four to six weeks after drying. The Harris press is the best we know of for pressing and baling, but any screw press can be made to do the work.

HEMP AND FLAX. Hemp can be grown on any good corn land with profit, and as the supply never equals the demand we consider it a sure and profitable crop. It has a long tap root and the soil should be plowed deep and subsoiled. The surface

should also be made very mellow and even, to receive the minute seeds. As soon as the ground is warm re-plow with a light plow, sow one and one quarter bushels per acre of carefully selected and preserved seed, harrow it in and brush the surface smooth. Cut when the stalks turn yellow and the leaves begin to fall.

Cutting hemp with a hemp-hook or grain cradle is very hard work, but there is no reason why a reaper cannot be made strong enough to do the work. Hemp is not a rapid exhauster of the soil, the leaves and stubble affording a good supply of manure. An application of compost, one third barnyard to two thirds muck, peat, or leaf mould, would keep the land in good condition for years. A rotation, however, with corn, wheat, or clover, is beneficial.

FLAX can be raised to advantage in all parts of the country. There is always a good demand and a fair profit. It likes a fertile loam, deep and mellow, but will not flourish on wet lands. Underdraining is the first step on such lands, whatever crops you propose to raise. The most important point in the *cultivation* of flax, is the preparation of the soil. It should be deep, mellow, but compact, smooth, and clean. No farm crop requires more thorough preparation of the soil than this. Our remarks on the preparation of soil for wheat, apply to this crop as well and should be read here. As far as possible every weed should be eradicated in cultivating the previous crops. Potatoes, corn, or oats, are the crops recommended to precede flax; a good five years' rotation is grass, corn, potatoes, flax, oats; for seven years, grass, corn, oats, potatoes, flax, clover, wheat. A third is corn, oats, potatoes, flax, clover, wheat. Once in five years is as often as flax should be grown on the same soil. Thoroughly rotted manure, rich compost and vegetable matter, applied to the previous crops, is the rule in flax culture. Prepare the

soil as early in the spring as it will work without being sticky, leaving it as mellow and fine as the harrow, roller, and brush, can make it. Let it lie until the grass and weeds spring up all over it, and the leaves on the trees begin to unfold, then give it a thorough harrowing to destroy these weeds, and while the ground is still fresh sow the seed as speedily as possible. Mark off your ground both ways, in "lands" eighteen feet wide, by dragging a chain after you from stake to stake, across the field. This is a more important matter than you may think it, and should never be neglected. Soak the seed in warm water an hour or two, and then roll in gypsum. This is of great advantage in sowing these slippery seeds. Now sow around your "land," giving the seed an even, uniform cast. Only a small portion of seed should be taken at a time. A great difference of opinion exists as to the amount proper to be sown to the acre, from one peck to seven bushels being recommended. If sown *only* for seed, one bushel, or even three pecks, may be sufficient; and if sown *only* for the fibre, two and one half, or even three bushels, may not be too much; but where both seed and fibre are taken into consideration, which we strongly recommend, one and one fourth to one and three fourth bushels is the proper quantity. After sowing, brush in with a hand brush. Do not allow any team on the field. A brush harrow, drawn by two men, will brush the seed in evenly and none will be trodden down three or four inches deep, which is exceedingly injurious. If the ground has been worked as recommended, and the weeds conquered beforehand, the crop will need but little weeding; but if, unfortunately, weeds should appear before the plants are a foot high, a careful hand, without boots, should go in and cut them up just beneath the surface, and bring them off the field. It is far better to destroy the weeds before the flax is sowed. If the seed has been evenly

covered and the teams kept off, it will have grown very evenly and will ripen very evenly, which is a great advantage. It will be ready to harvest, when the stems turn yellow, and the balls brown, and the lower leaves are dead. If raised for the fibre, begin at once; but if the seed is the *only* purpose, let it stand until dead ripe. In harvesting, when the best fibre is desired, pulling is resorted to. "Each laborer takes a strip about four feet wide, and either spreads it in a swath behind him or throws it down in gavels. The flax is grasped just below the ball with both hands, and pulled with a quick jerk." Cradling and mowing are often resorted to, and if the ground is so level that the mower can cut it evenly one inch from the ground, nearly the whole of the fibre will be secured.

Mowing is better than cradling. One great point is to keep the butts even.

"Rippling" is the process of separating the seed from the flax. It is done by means of a rippling comb, as shown in the cut *fig. 66*, consisting of twelve rods of round iron, set in a block. Two riplers, each with a boy to hand them the flax, can hatchel out seed very fast by this contrivance, which we consider much better than any kind of threshing. As the preparation of the ground is the most important item in the *cultivation* of flax, "Retting," or as it is sometimes called, *rotting*, is the most important in its *preparation*. It consists in keeping it under water until fermentation softens the fibre. For this purpose a pool is formed, either by a dam, or by digging a pit and turning the water of a stream into it. In either case it should be but little deeper than the length of the flax, should be as tight as possible, to prevent leakage, and should be so arranged that all leakage can be replaced. Rain water is the best for the purpose. River water, that has been warmed in the sun, next; and cold spring water, the least desirable; the

latter should always stand in the pool several days before the flax is harvested. The pool, if accessible on both sides, may be sixteen to twenty feet wide, if accessible only on one side, eight to ten feet will be more convenient; the size and arrangement of the pool being wholly a matter of convenience. The flax should be kept from the bottom by a layer of rails or boards. Where soft water is to be had, the flax could be set into the pool before it is turned on. The water should cover the flax about six inches. Put boards over the whole and hold them down by means of flat stones. After the water has been on the flax seven days examine it by getting into the centre of the pool and putting the hand down into the heart of the bundle; if it feels hard and wiry, leave it another day and until it begins to feel soft, then repeat the examination thrice a-day, until it feels quite soft, when a bundle should be taken out and a lock of it bent several times across the forefinger; when the woody part of the stem breaks, and the loose fibre detaches from the stem, it is on the point of decay and should not be left in the water longer. Take out carefully by hand and not with a fork. *Never use the same water twice.* It should now be spread out very thin on the grass, for a week, to dry, then bound in large bundles and housed. It is now ready for market, and will bring a good price. There are other methods of retting, but the above is the simplest and best. Any method that accomplishes the same result is just as good, as far as the flax itself is concerned, but the above is a safe, sure, convenient, and economical mode, wherever a stream of water is at hand.

A proper selection of seed is as necessary for the best success in raising flax as in raising wheat. Riga seed has been often pronounced the best, and we recommend with this crop, as we have for others, that the farmer raise his own seed. He can do it

cheaper and will be sure of fresh seed. Only the large, plump, bright seeds, should be used. These can be separated from the others by means of the fanning mill. The seeds should be dried, immediately after threshing them out; by spreading them out and turning them often, giving them a free circulation of air, they will soon be dry enough to store away. Twenty-five bushels of seed are raised per acre, and it is worth from three to five dollars per bushel for linseed oil. The cake made from it is a most valuable food for stock and makes better manure than any other food. It should be fed in connection with grain.

SORGHUM will grow successfully on any soil that will produce a good crop of corn. The ground should be prepared in the same manner as for corn. It can be sown a little earlier than corn, and at intervals of two or three days, or a week. The seed should be soaked to the point of sprouting. Plant in rows three to four feet apart, and the hills twelve to eighteen inches apart in the rows. Each seed will send up several stalks; when six inches high, thin out to four or five stalks. Cultivate the same as Indian corn, and hill up well around the stalks. If sown in drills, three feet apart, leave one plant to the foot. In drilling in seed, cover one and a half inches. After the plant has blossomed, and before the seeds ripen, strip off the leaves. They make excellent fodder. In ten days or a fortnight from the stripping, the cane will be in condition to make syrup, and will remain so for some time. Freezing will not injure it, unless it thaws afterwards. As soon as convenient, commence cutting up, and continue it, just as fast as you can possibly press the cane and boil the juice. Take from the field at once to the rollers, or mill, and press the juice the same day it is cut, and commence boiling at once. All who know how to manage maple sap, in making syrup, know how to manage this. Those who have the patent pans for boiling sap, are

fortunate. Those who have not, had better get them. Until they do, however, the juice can be boiled in the ordinary sap kettle. The question here arises, if it is profitable to raise sorghum for sugar. We do not think it is, or ever can be made so, except on a large scale. But we do believe it profitable for the farmer to raise it for making syrup, and for fodder for his stock. It is a very simple process to make syrup from it, and the farmer may make a barrel or two, from a small strip of ground. Three hundred gallons per acre, has been pronounced an average crop, but even at two hundred gallons per acre, or two barrels from half an acre, it will prove profitable. It has been raised and made at a cost of sixteen cents per gallon, and we think that it may be done by almost any farmer, at a cost of not over twenty-five cents a gallon.

As a fodder for stock, sorghum hardly has its equal. For this purpose it should be sown in drills, two or three quarts of seed to the acre, and cut just before blossoming. It will immediately spring up again, and three crops may be cut during the season. It is very nutritious for cattle, who eat every particle of the stalk with avidity.

MAPLE SUGAR and MAPLE SYRUP are such delicious, and withal such marketable articles, that we consider it worth while to know how to get the most and best. Never destroy a sugar maple, as long as you can get sugar from it. If you are clearing up, and cannot leave the young trees where they are, plant them out somewhere else. Plant them out in your orchard, or along your fences, or on some hillside. "Its form and foliage are beautiful; its shade delightful; its sap delicious and healthful in all its stages; and its products profitable. *Plant Maple Trees.*" We indorse the above quotation, and shall endeavor to give the most economical methods of making syrup and sugar. At some leisure time during the winter, get your

augers, spouts, buckets, barrels, pans, etc., ready, have your wood cut and hauled to the "sugar camp."

At the first sign of freezing nights, and thawing days, tap your trees on the sunny side, two feet or more above the ground, and if liable to be disturbed by animals, four feet above the ground. Make a hole with a three quarter or one inch auger, slanting upward, and not more than one half or three quarters of an inch into the wood at first. After a few days, it may be bored a little larger and deeper. "Boxing," or tapping, with an axe, is unmitigated folly. Use wood spouts, which are very easily made of soft wood or elder. Select, every year, a spot removed from the last year's wound. Use large buckets. You will be much more likely to save all the sap. Four gallon tin pails, if taken care of, are the best and most economical, but common wooden pails answer a good purpose. Never use large and small pans, tins, etc., for you will be likely to lose a great deal of sap. The nails on which the buckets are hung, should be pulled out at the close of the season. Keep every thing clean. Collect the sap in tight barrels, and have a molasses hogshead for a reservoir. This should, for convenience, be set a little higher than the kettle or pans, so that the sap can be drawn into them steadily, by means of a faucet. If you have used kettles in boiling sap, use them no more. Get sheet iron or copper pans. You can make them yourself, out of stove pipe iron. They save time and wood.

A New Hampshire farmer says: "I have a brick furnace, and sheet iron pans, the whole costing twenty dollars. My son has done all the labor this season, at a cost of eight dollars. He used one and a half cords of wood, and made twenty-nine gallons of syrup, for eight days' labor." The sap, when boiling, must be carefully watched, and not allowed to overdo. When boiled in pans, it evaporates very rapidly, and if not attended

to, will catch you napping. When done it will be brittle if cooled suddenly on snow or ice. To clarify syrup, strain it through a cloth while hot, into a kettle, and when cool, add an egg and a half pint of milk well beaten together, for every five gallons of syrup; mix it, and put it on the fire, heat gradually to boiling, when all impurities will rise to the surface, and should be at once skimmed off. This makes a beautiful syrup, and, when further evaporated, a very pure sugar. Thirty maples would supply almost any farmer with syrup and sugar, at much less expense than to purchase them at present prices.

BET ROOT SUGAR. We use in the United States, yearly, four hundred thousand tons of sugar, three hundred and fifty thousand tons of which is imported. Instead of this, we should not only produce all we use, but become large exporters. This end can be accomplished, if we will turn our attention to the sugar beet.

The production of beet sugar, throughout the world, is now about six hundred and fifty thousand tons, or one fourth of the whole production of sugar. We have millions of acres adapted to the cultivation of the sugar beet. We have the best labor saving machinery of any country on the globe, and there is no good reason why we should not produce a million tons of sugar annually, within ten years. We shall endeavor to show that it is to our pecuniary, and especially to our agricultural interests, to do so.

The cost of raising the beet cannot, under judicious cultivation, exceed three dollars per ton, and we think that they can be raised for two dollars per ton. But taking the highest estimate, of three dollars per ton, there is left a large margin for profit, as one ton of beets will yield from one hundred and forty to one hundred and eighty pounds of refined sugar; about fifty pounds of molasses suitable for distillation; five hundred

pounds of leaves, an excellent green fodder; and five hundred pounds of pulp, worth one third as much as good hay. But this is not all; the beet crop cleans and prepares the soil; and, in a rotation, is one of the best preceders of any grain crop. The yield of beets, per acre, varies from seventeen to forty-two tons. We think that, with our improved methods, an average yield of thirty tons per acre can readily be secured, but taking the low average yield of twenty tons per acre, at five dollars per ton, is one hundred dollars, deducting the highest estimate of the cost of production, three dollars per ton, leaves forty dollars per acre clear profit to the farmer. Considering the probability of a yield of thirty tons per acre, costing two dollars per ton, we have the possibility of a profit of ninety dollars per acre.

There are, at present, but few manufactories of beet sugar in this country, but they would spring up on every side, if the farmers once determined to raise the crops, and made that determination known. Communities settling on the rich soils of the West, have this matter in their own hands. Let a dozen farmers, in any section of the country, agree with some capitalist to supply him with beets, and a market will be at once created. It is for farmers to agitate this matter, in their daily conversation, in their visits to the city markets, in farmers' clubs, and through the columns of their chosen agricultural journals. The manufacture must be exceedingly profitable. It is carried on from September to March, a period when labor is easily commanded. It will employ the extra farm laborers, at a season when their services are not required on the farm; thus incidentally conferring a permanent benefit upon every community, where such an industry is established. The estimated cost of working one thousand tons of beets is.

1000 tons of beets @ \$5.00.....	\$5,000
Labor.....	2,000
Other expenses.....	1,200
	<hr/>
Total.....	\$8,500

Receipts.

160,000 lbs. sugar @ 10 cents.....	\$16,000
7200 gallons molasses @ 25 cents.....	1,800
200 tons pulp @ \$4.....	800
	<hr/>
Total.....	\$18,600

leaving a profit of over one hundred per cent. on the manufacture, reckoning the sugar to be worth only ten cents per pound. But supposing such a quantity could be raised as to bring the price of raw sugar down to eight cents per pound, there would still be a profit of over fifty per cent. on the investment of the manufacturer. Certainly this branch of industry cannot remain long unoccupied.

We copy the remarks of Mr. E. B. Grant, upon the influence of the beet sugar culture, and then proceed to describe its cultivation.

“The effects produced upon agriculture in Europe, by the cultivation of beets, for sugar and alcohol, have been astounding, and the importance of the interest is now everywhere acknowledged. In the cane sugar countries, upon the territory surrounding a sugar establishment, no crop is to be seen but the cane, while the cattle and sheep are few. In the beet sugar districts, on the contrary, the fields are covered with the greatest diversity of crops, among which are, wheat, oats, rye, corn, barley, rape, flax, tobacco, and all the cultivated grasses. Every field is cultivated, close up to the roadside, and the stables are filled with fine cattle, sheep, horses, and swine. No farmer needs to be told which system is the best and most enduring.

“The amount of beets raised in France in 1865, could not

have been less than two million tons, producing at least one million tons of pulp—an amount sufficient to feed ninety thousand cattle, or nearly one million sheep, for one year; or to fatten, in the winter months, nearly three times that number. It also furnished more than one million five hundred thousand tons of manure.

“In an agricultural point of view, the effect produced by the culture of so much land in beets, and the application of the manure of so many cattle, with the consequent increase in the amount and value of subsequent crops, is perfectly apparent. The quality of wheat raised after beets, is better than that usually produced; the ears are larger and heavier, the straw stronger, and not so liable to lodge; the berry is larger and brighter; its specific gravity is also greater, weighing from two to three pounds per bushel more than ordinary wheat.

“The effect of its introduction into the United States would be to produce results correspondingly greater than have attended it in Europe, for here the consumption of sugar, per capita, is nearly four times greater, and the value of lands is not a quarter of those in Continental Europe, while they are by nature far richer and more easily cultivated. The supply of coal is unlimited. The vast distances over which many farmers are obliged to transport their produce, render it difficult or impossible to dispose of their more bulky crops at a profit. The introduction of sugar-making would give them another and most profitable crop, for which they would have a home market. It would enlarge the local demand for other farm produce, by interspersing a manufacturing with an agricultural population, to the great advantage of both. It would go far to change the present wasteful, and necessarily unending system of agriculture, and to substitute for it another, founded upon more correct principles.”

SOIL AND CLIMATE. The cultivation of the sugar beet is not, like cane sugar, confined to any small section of country, but flourishes in all the varieties of climate to be found in the United States. Deep, rich soils, especially those abounding in vegetable mould, produce large crops of beets. The black soils of the West are well adapted to beet culture. Sandy ground, if rich, gives an excellent quality of beets rich in sugar. Any soil that is dry, deep, and mellow, is suitable. A clayey, tenacious soil, stony land, and mineral soils, should be avoided. Alluvial or bottom lands, overflowed yearly, are desirable, as they require no artificial manure. All grain lands are not only suitable, but are improved by the cultivation of the sugar beet.

MANURES should be applied to the preceding crops, rather than directly.

The virgin soils of the West do not at first require manure, but the soils should be turned under, and one season's cultivation, at least, precede the beet. Human ordure is perhaps the most effective fertilizer of this crop. There is an objection to the ordure of sheep and hogs, on the ground that the salts contained in them are injurious. We are inclined, from all experiments in that direction, to conclude that the ordure of cattle should be preferred. Strawy manure, well rotted, is preferable to unfermented manure, or manure without straw. Stable manure, composted with muck, ashes, etc., as we have recommended for wheat and root crops, is as efficacious here. The only difference in the manures for this crop and any other root crop is, that salt must be omitted, as it renders the sugar more difficult of extraction. Guano should not be used alone, but composted with bone dust and superphosphate of lime.

Bone dust, wood ashes, and lime, form a most excellent compost. Some fertilizers we deem to be absolutely necessary to the perfection of this crop for a series of years, for stable ma-

nure will not supply all the elements taken from the soil. Fieret Brothers, the model farmers of France, where the cultivation of the beet has attained its greatest perfection, have cultivated a farm of five hundred and fifty acres for thirteen years, growing oats, rye, hay, beets, and wheat, in rotation. They are sugar manufacturers, and fatten eight hundred head of cattle and three thousand sheep every year. They attribute their success to the immense amount of fodder and manure their "pulp" enables them to make, and to the improvement of the soil consequent upon beet culture. Their average crop of oats has increased, in this time, from forty-five and a half bushels to ninety-two and a half bushels, and the straw in proportion.

The average crop of rye has increased from seventeen to thirty-four and a half bushels, and straw in proportion. Their average crops of wheat, for the time, have been thirty-six and a half bushels, of hay over three tons, and of beets twenty tons.

They state that the cultivation of beets reduces the cost of cultivating the succeeding crops enormously. They use lime and manures liberally, plow deep, and cultivate thoroughly the beet crop, and a single light plowing is sufficient to prepare the land for the succeeding grain crop, which is drilled in.

THE PREPARATION OF THE SOIL, by deep plowing and thorough pulverization, is one of the main elements of success. The beet requires a *deep*, mellow bed, that its long tap root may grow straight and smooth. If the soil is not mellowed to a sufficient depth, a part of the beet will grow above ground. This top, which grows above the surface, is not only worthless for sugar, but is injurious to the balance, and is cut off before the beets are ground. If the ground selected has been in previous cultivation, manure in the fall, and cover the manure about six inches deep. Follow this with a second plowing, as deep as possible, with a double Michigan plow; or, what

is better, one deep plowing, from eight to twelve inches, and a subsoil plow six to eight more.

If a crop of weeds make their appearance before winter, harrow, and cross-harrow, or dig them up with the cultivator.

As soon as the ground is dry and warm in the spring, cross-plow it, and cross-harrow it. Grant advises that the last harrowing be followed with a drag, or the harrow turned upside down, to smooth and level the soil. We think this operation must answer the purpose admirably.

SOWING commences the latter part of April, or as soon thereafter as the ground is warm and dry. The seed should be steeped for five or six hours in the following solution: Nine ounces sulphate of potash, and an equal quantity of sulphate of lime, in one gallon of warm water. Add to this five or six gallons of water, and cover the seed. After the liquid is turned off, roll the seed in wood ashes, or slaked lime, or plaster of paris, or guano, until each seed is coated. Sow with a drill or seed sower, in rows, sixteen to eighteen inches apart, and six to eight inches apart in the rows. Cover not more than two inches deep. If there is any doubt about the vitality of the seed, sow bountifully, and thin out all superfluous plants. The object is to have the plants stand one foot apart after the final thinning. Their culture and gathering is not materially different from that of other roots. The former consists in cutting or pulling all weeds, keeping the ground mellow between the rows, thinning to twelve inches, and transplanting superfluous roots to fill vacant places. The gathering can be done with a plow. The plow used in Europe, called an "awachem," is thus described by Grant: "A sort of plow with a share shaped like a cone, the section of which is an oval, somewhat flattened on the lower side, about three feet in length, seven or eight inches in diameter, and tapering to a blunted point. It is drawn by two horses, and will dig from

one and a half to one and three quarter acres per day." Some improved implement of this kind for digging roots is needed, and will probably soon be supplied.

The beet ripens, in the latitude of Illinois, about the first of September. The leaves turn yellow, wither, and begin to drop off. The longer the beet stays in the ground without freezing, or being soaked by the fall rains, the better. But if there are indications of rain or frost, secure your crop. If the rains take you unawares, as soon as they are over, and the weather is dry, harvest the crop as speedily as possible. Beets, once frozen, should be left a few days before being dug. Great care should be taken not to bruise, cut, or otherwise injure the beets, especially when they are to be kept any length of time before using. If some are to be used at once, and others preserved in the pits, select the ripest for preservation, and let those least ripe, and those grown in the richest soil, be always used first. The best way to preserve the beet is to *keep it frozen*. Let them once freeze, and then protect them from the rays of the sun, and they will remain frozen throughout our northern winter; but as soon as they thaw, they must be used at once. The French pile them in huge piles, of a uniform depth of from five to eight feet, covered with straw in such a way as to shed the rain, ventilated by various contrivances—sometimes not ventilated at all. The outside beets are placed in perfectly systematic layers, one by one, with the roots in and the tops out; the rest are thrown promiscuously into the interior of the pile.

Another method, is placing them in pits dug in dry soil, two feet deep and twelve wide, and of any required length. If the bottom of the pit is inclined to be damp, a coating of dry sand is put on the bottom, and sometimes a ditch is dug all around the pit, outside the roots, and a little deeper than the pit. The roots are then thrown into the pit, and a wall of beets built

around them as before described. This pile narrows gradually till it reaches a height of six to eight feet. A wall of earth is now built around the pile, and its thickness increased as the weather demands. The upper three feet of the pile can be covered with six or eight inches of straw, until the earth is actually needed to prevent freezing. The sooner the beets are put in piles or pits after being dug, the better, as they lose weight by exposure to the light.

BET PULP is the residue of the beet after the sugar has been extracted, and is worth at least one third as much per ton as hay for feeding stock. It will keep for two years or more in good condition, and be always relished by cattle. It is preserved by the Messrs. Fieret, to whom we have alluded, in the following manner: A ditch is dug in dry, hard soil, and the pulp trodden firmly into it, filling it two feet above the surface. The whole is covered with two feet of earth. They fatten yearly eight hundred head of cattle and three thousand sheep. They will fatten in one hundred days. They allow cattle eighty pounds of pulp, five pounds chopped straw, and five pounds oil cake, daily. The sheep are each allowed six pounds pulp, half pound chopped straw, half pound oil cake, and one pound chaff. Chopped corn stalks, and Indian meal, can be fed with the pulp to advantage in this country. The beet leaves are also an excellent fodder, and can be preserved in layers, with salt sprinkled between the layers; and fed to milch cows with the pulp, they increase the flow of milk.

SEED. A most important consideration is the selection of seed, both as to quality and variety. At present the seed must be imported. We recommend Messrs. B. K. Bliss & Son, of New York, as reliable dealers in seeds, and they will gladly answer all inquiries in regard to their cost, etc. But it should be the aim of the cultivator to raise his own seed. The White

Silesian seems to unite the necessary qualities for the best sugar beet, which are a pear-shaped root, growing wholly beneath the surface of the soil when it has room to extend itself; a smooth surface, free from lateral roots; a firm flesh, and medium size. The beets for seed should be chosen before they are piled or put in the pits. The most perfect specimens should be selected. Those grown in very rich soil are not as good for seed as those grown in a medium soil. No beets should be selected any portion of which has grown above ground, nor any with a double or imperfect crown. Cut off the leaves within about an inch of the crown, and also the extreme end of the tap root. Dig a trench, as before described, and lay the beets in carefully in layers, covering each layer with just sufficient earth to separate the beets. Form a conical pile three feet above the surface, and cover with a few inches of earth, increasing the covering as cold weather advances, to prevent freezing. All other roots require ventilation; and although it is claimed by Grant and others that the sugar beet does not, we consider it safer to ventilate all piles or pits. This can be done by setting tiles on the top of the beets, at convenient distances, and stuffing them with straw, as is recommended for all roots. As early in the spring as the ground can be worked, set out the beets in a dry soil that has been deeply plowed and heavily manured the previous year. Set them in rows three feet apart, and two feet apart in the rows, mixing a couple of handfuls of bone dust with the soil when the beet is set. Set the crowns just below the surface, and press the earth closely about them. An inch of earth, and another handful of bone dust on the crown of the plant, completes the setting. The French cut three or four longitudinal slits in the beet, commencing about an inch below the crown. We have no doubt that these cuts assist the plant, enabling it to throw out more and stronger roots, and consequently pro-

ducing more and better seed. As soon as the beets sprout, weeding and cultivation must begin, and be kept up until the seed ripens. Cut away weak flower stems, and when the seeds begin to form, pinch off the tips of the stalks. Just before the seed stalks turn brown, cut them off near the ground, and dry them in some airy and sunny place. Thresh out the seeds in hot weather, blow out all the chaff you can, and spread them out until they are thoroughly dry, occasionally stirring them. Put into small sacks, and hang in a dry, airy, secure place, until they are two years old. Never sow one year old seed. Before sowing, the coarsest of the seed should be rubbed between two boards and partially crushed, or they will clog the sower, and the seed will not be evenly distributed.

ROTATION OF CROPS AND MANURES, THE ADAPTATION OF STOCK TO THE SOIL, AND GENERAL MANAGEMENT OF CROPS. The theory of rotation is that the soil contains in a greater or less degree all the elements of plant food; and that each crop extracts its own peculiar elements and no others. This is undoubtedly true. Agricultural chemistry shows, by analyses, what elements are extracted by each crop. For instance,

The results of various chemical analyses has shown that red clover is composed principally of potash, lime, and carbonic acid, and that the grain of wheat consists, for the most part, of phosphoric acid and potash, and the straw of silica. Potatoes are composed principally of potash, carbonic acid, and phosphoric acid; turnips, of potash, lime, carbonic and sulphuric acids; peas consist principally of potash, and phosphate of lime; the grain of rye of phosphate of lime and potash; the straw of rye of potash and silica. M. Sprengel found potash, soda, and silica, to be the principal ingredients in the grain of maize, and the stalks to consist principally of silica and lime. The ashes of the grape vine consists principally of potash, lime, and phosphoric acid.

Analyses also show the composition of soils, and are, in some measure, a guide in adapting crops to the soil, but the expectation cherished, a few years ago, that chemistry would solve all the difficulties of agriculture, has not been realized. There are so many considerations besides the elements in the soil and crops, that chemistry can only *suggest* what the farmer must *prove* by practice. It is true that *the intelligent farmer will always be AIDED*, by a knowledge of the principal elements of the crops he cultivates, of the soils on which he cultivates them, and of the manures applied, but the rain and the dew, the air and the sunshine, which he cannot regulate, will often change his best planned results.

All soils contain mineral matter and phosphate of lime sufficient for a crop of any kind; but it is readily seen that if the same crop is removed, year after year, and no equivalent returned, certain elements will become entirely exhausted. But if the elements removed can be replaced by manures, or such a succession of crops raised that each element will be taken in its turn, allowing the soil an interval of several years to recuperate, the soil will retain its fertility. It is in this connection that the analyses of manures are valuable, and here that chemistry has done and is doing useful work for agriculture. We give below the principal elements of various manures and fertilizers.

A cord of leached ashes contains about

147 pounds phosphoric acid,	184 pounds silex.
41 " oxide of magnesia.	21 " oxide of iron.
196 " magnesia,	50 " potash,
1.657 " carbonic acid,	2.227 " lime.

Average dung of a cow, for one year, contains

4,800 pounds genie,	37 pounds chalk.
677 " carbonate of ammonia,	24 " common salt,
71 " bone dust,	15 " sulphate of potash.
37 " plaster.	

A family of six persons will ordinarily produce per day about eighteen pounds of excrement, liquid and solid; or, in one year, six thousand five hundred and seventy pounds, containing twelve pounds of chlorine, fifty pounds of salts, two hundred and twelve pounds of dry, organic matter. In the latter there will be forty-five pounds nitrogen. This is equal to fifty-five pounds of *pure ammonia*, or one hundred and forty-two pounds of the *carbonate of ammonia of commerce*. See, in *Chapter III.*, directions for saving and utilizing this valuable manure.

The manure of *fattening* hogs approaches nearly to night soil. Sheep dung comes next in order. Horse manure contains, in one hundred parts, about

10. carbon,	3.28 carbonate of ammonia,
1.30 hydrogen,	.96 other salts,
9.50 oxygen,	Balance water.
.60 nitrogen,	

But horse dung rapidly loses these valuable qualities, unless composted as directed in *Chapter III.*

Guano should contain from thirty-four to thirty-eight parts phosphates, thirty-three to thirty-five parts organic matter and salts of ammonia, and sixteen to twenty-four parts water. One hundred pounds cow's urine contains forty pounds of ammonia, and eighty pounds of the most powerful salts ever used by the farmer; its actual value, therefore, is nearly double that of the dung. One cord of loam saturated with urine, is fully as valuable as a cord of solid dung. See directions, *Chapter III.*, for saving the liquid manure. The urine of the hog is still more valuable, containing one fourth more ammonia, and also phosphates of which the urine of other animals is destitute. We wish we could awaken, in the mind of the farmer, an alarm at the waste of these valuable products which is constantly

going on around him. Two hundred pounds of bones, yielding one hundred pounds of bone ash, contain,

Phosphate of lime, 88.00 pounds.	Soda 3.25 pounds.
Carbonate of lime.. 6.00 "	Alkaline sulphates
Magnesia 1.25 "	and chlorides.... 1.50 "

This will require about eighty-eight pounds of oil of vitriol to reduce to super phosphate.

The above analyses show, in a measure, the constituents of the various crops and manures, and may suggest the proper application of the one to the other. It must be remembered, in this connection, that the crops can take up nothing but liquids; and the most powerful manures, unless readily soluble in the soil, are of no value to the crops.

No application of manures, however, can preclude the necessity of a rotation of crops in order to the *best* results. There are elements, both in the soil and in the air, that the nicest analyses cannot detect, and nothing but time can replace. A rotation of manures is also a necessity. The farmer who applies the same manure, whatever crop he may take from the soil, has yet to learn the first principles of rotation; which are to replace, as nearly as may be, the constituents removed by the crop. There is also an adaptation of manures to the soil as well as to the crop. A soil already full of lime is not benefitted by more.

Stock raising and mixed husbandry are essential requisites of a system of rotation of crops. Farmers must keep more and better stock if they would make farming pay. Says S. E. Todd: "When the agriculture of our country is characterized by that system of judicious management which will eventually prevail—when our soils shall have been underdrained as they ought to be—when they shall be improved in fertility by manuring and more complete pulverization—when our farmers

have learned how to save, to make, and to apply manure in the most profitable manner—and when they have learned to turn their grain into meat which will be worth as much as the grain, while the manure of the animals fed will increase the amount of the next crop nearly two fold—then we may not only reckon our agriculture as being *progressive*, but as a system of farming that ‘will pay,’ and be worthy of universal adoption.” “What then is paying farming? We answer, it is that system of management in which our old worn out farms are renovated from their greatly impoverished condition, the poor land rendered good and productive, and the good land rendered better, paying the cost of cultivation and the interest on the capital invested; and leaving a profit to the proprietor, *all from the resources of the farm.*” “We want to sell the products, and, at the same time, make such a disposition of them that the soil will not be impoverished by removing crops from it. We want to keep our cake and eat it too, in a certain sense. For example: if a farmer raises one hundred bushels of Indian corn, his aim should be to use it up in such a manner that his soil will not be impoverished. The same is true of his other crops of cereal grain and grass. By feeding out one hundred bushels of corn in the most economical manner, and to the best kind of swine, cattle, or sheep, and by saving *all* their manure and applying it to the soil where the corn grew, and by cultivating that soil in a most thorough manner, its fertility may be improved.”

“If a farmer desires to raise bountiful crops, of any kind of grain or grass, he cannot expect to be able to do it on a soil that has been exhausted of most of those substances which are required to produce that kind of grain. But by raising stock in connection with growing grain, by feeding out a large portion of coarse grain to animals; by husbanding all the resources for saving and preparing fertilizing materials for the soil; and

by adopting a judicious system of rotation of crops which are adapted to the soil and to the locality, the grain producing material which is especially adapted to promoting the growth of each kind of grain, will have time to accumulate in the soil, so that, whenever a given crop of grain or grass is to be grown, there will be such an abundance of it that not only the stalks, but the grain, will be large in quantity and superior in quality.

“In case a farmer keeps sheep, in connection with grain raising, he will want one or more cows, to furnish milk and butter. Then, lard will be very essential for culinary purposes, to say nothing of the value of pork for food. Then a span or two of good horses will be indispensable, and a yoke of good oxen. All these animals are absolutely necessary, even on a grain farm. Therefore, where such animals are kept, we have all the elements of a good system of mixed husbandry to begin with. And now, if every thing is arranged harmoniously, in connection with a judicious system of rotation of crops, providing *all* the manure is made and saved, and properly applied, that can be; and if the soil is thoroughly drained, where it is too wet, and properly cultivated, and every operation performed in good time, and in a farmer-like manner, we may rest assured, that success will attend the effort of the husbandman.”

“In order to come fully up to the standard and practice of a thrifty and successful cultivator of the soil, every farmer should calculate to keep some kind of stock, neat cattle or sheep, to consume, and to work into manure the corn stalks, straw, and coarse grain. It is, and always has been, and always will be, ‘penny wise, and pound foolish’ policy, to keep *poor animals*, or to keep *animals poor*. It has ever been a mystery, that I could not unravel, why multitudes of farmers could be so regardless of their own interests, as to allow their animals, which

come into the barnyard in a thrifty, fleshy condition, in late autumn, to return to the pasture poor, in the spring. It is the worst policy on the whole farm, to allow animals of any kind to grow poor. A farmer should not attempt to keep one more animal than he can keep in a growing and thrifty condition. To keep too many half-starved animals, is a practice which deserves the severest condemnation. I have always acted on the policy, that it is better to *save* a pound of fat or flesh, than to attempt to produce it. The kind of soil that a man cultivates in connection with the crops he raises, should determine, in a great degree, what kind of stock he should keep on his farm. If a man's soil will produce abundant crops of wheat, oats, corn, and grass; then we may conclude that it will support thoroughbred animals of the largest size, whether they be neat cattle or sheep. If neat cattle, those that have a large infusion of Durham blood will be found quite as profitable, and doubtless more so, than any other breed."

On a hilly, barren, and rather unproductive soil, Mr. Todd recommends the Devon cattle, and South Down sheep, or a cross between the Merino and South Down. (We have quoted thus at length from Mr. Todd, as expressing, better than we could do it, our idea of the principles of rotation and mixed husbandry, and we can give no better advice just here, than to advise every reader to procure Mr. Todd's book, "*The Young Farmers' Manual*", notwithstanding its exorbitant price, and we can assure you that it will well repay a careful perusal.) This system requires improved stock. A good cow, ox, or sheep, got by a thoroughbred male, is preferable in every respect to two poor ones, by grade males. They give more milk, more beef, more wool, and more mutton, in proportion to the food furnished them, and the manure voided is more valuable.

Our advice to farmers is: Never, when avoidable, put any animal to a grade male, but always to a thoroughbred.

Sheep will often be more valuable than neat cattle on the farm. A farmer can take care of sheep with less labor and expense, and will get annual returns for wool and mutton, whereas neat cattle must be kept three or four years. Sheep will eat coarse grain and fodder, which for cattle should be ground. Neat cattle and sheep should not be pastured together, as the sheep will take advantage of them and get most of the fine, tender grass. Pigs should always form a part of this system of mixed husbandry, as they work over and make into valuable manure a great deal that would otherwise be lost.

Consuming the productions of the soil on the farm is the key note of our system of agriculture, and the only system to be recommended for universal adoption. Neglect of this principle is one of the reasons why farming pays no better. "A mixed husbandry is a system of farm management, in which raising grain constitutes only a portion of a farmer's employment, while raising stock of some kind is a chief part of his business. In other words, raising stock and growing grain on the same farm possesses decided advantages over that system of husbandry in which nothing but grain is grown or stock reared. A system of mixed husbandry includes all the good practices to which we have made allusion in this chapter. Every farmer must judge for himself what stock to keep, what crops to raise, and what system of rotation to pursue, we shall therefore only indicate briefly some of the systems of rotation, and the proper place of the principal crops in the same.

The farm is divided into pasture, meadow, and tillage land, the latter into four, five, six, or seven fields, according to the number of crops to be raised. As a rule, none but the pastures should be fenced off. (See "*Fences.*") The seven field system

does not make permanent grass lands, but gives several years to grass of each of the divisions of land, and gives one to corn, one to oats, and one or two to wheat.

Supposing the rotation to begin with corn, a cleansing crop; it is followed by oats, which has the same effect in that respect as the corn crop, though not hoed. It makes a shade at midsummer, calculated to check the growth of weeds, and the stubble being shortly after plowed, it has the effect of a hoed crop, and, with the previous corn crop, combines to leave the ground in condition for grass seeds. The oat stubble is manured at midsummer, with the contents of the farmyard, and a good foundation is laid for a crop of wheat, and of grass following.

Whether clover seed alone, or timothy or other grass seeds, be now sown, depends upon whether one or two crops of wheat are to be taken from the course. If two crops, then clover seed only will be sown the following spring. From this sowing, a crop of clover hay will be taken the next year, and a fallow prepared for wheat the coming fall. Upon this wheat is sown timothy, or other grass seeds. The crops should nearly all be consumed on the farm, and the refuse returned to the soil. This is a system to be recommended. It makes variety in the crops; gives the soil the benefit of the preserving effects of a long standing sod; devotes half of the period of rotation to ameliorating treatment, and returns not only the coarser products to the soil, but feeds at home a large proportion of the grain.

The following is a good six course rotation. First year roots heavily manured. Second, clover limed, and second growth plowed under. Third, wheat. Fourth and fifth, grass, two years. Sixth, corn, rye or oats. A five year course rotation First, green crop. Second, wheat. Third, grass. Fourth, roots Fifth, corn or oats.

By this plan two grain crops are never raised off the same field in succession. The following is a four course rotation, which, in some localities, will do very well: First year, corn, potatoes, or fallow, manured. Second, oats. Third, clover. Fourth, wheat.

The only objection to this course is that one grain crop, corn, is followed by another grain crop, oats; but in the culture of maize the soil is, or should be, kept perfectly free from weeds, and being a dull crop, the land is generally in good heart for cereals.

Of course the farmer must form his system to suit his own peculiar circumstances, but will do well to adhere to the principle laid down. It will be noticed that we advocate wheat after clover, or more literally clover before wheat. We consider it good practice, as will be seen by reading the chapter on wheat culture. In many wheat growing districts the rotation is limited to wheat and clover, two seasons in clover and one in wheat, sheep and horses consuming the clover on the farm. This can only be good practice, however, in districts covered with limestone and plaster beds. Another plan is to raise wheat after potatoes, commencing the rotation with corn, heavily manured and thoroughly cultivated, following this with potatoes and barnyard manure, the third year wheat, and then two years in grass. We have heretofore spoken of turnips and wheat in *Chapter V*. A crop of peas is one of the best to precede winter wheat; they take but a small proportion of the wheat producing material, mature rapidly, and when fed out to growing stock return full value to the soil. They leave the ground mellow and friable, but a dressing of well composted manure should be plowed in after the peas are removed. Wheat was formerly sown after Indian corn, but as it takes, in large measure, the same plant food, it cannot be called good practice.

The sugar beet is excellent to precede all grain crops. (*See Chapter on Beets for sugar.*) Corn on sod ground is the common practice, and we do not know that it can be improved upon. We are aware that corn is often raised on the same ground for successively five, ten, and even twenty years, but such a practice is simple folly. We should not follow roots with corn as a general rule, although we have met with good success on heavily manured land. The grasses are usually sown with and therefore follow grain in almost any system of rotation.

The rule to be observed in all rotations is: If any crop takes up a large proportion of any given element from the soil, do not follow it with another crop requiring the same element. The rotation on prairie soils is often confined to grass, corn, and wheat, the grain being all removed, and the straw burned. This is an exhaustive process; and there should be substituted for it, at once, a more extended rotation, or at least a system of mixed husbandry, which shall consume a portion of the grain, with the hay, stalks, and straw, on the farm, and return them to the soil. The systems of rotation for cotton and other crops are given in connection with the culture of those crops.

In conclusion, we would say, raise such crops, and in such quantities, that you can give each a full share of attention, remembering that to get the best crops requires the best care, and make it your ruling principle that the best market for your crops is in the manger, the stall, and the piggery.

Fig. 68. OLD BLACK HAWK.



PART SECOND—STOCK RAISING.

CHAPTER IX.

HORSES AND MULES.

IN BREEDING HORSES for farm use, quickness of working, power to pull loads, and ability to endure constant daily labor, are the prime qualifications to be aimed at.

Speed, draught, and endurance. We say *speed*, for a horse that can harrow, or rake two acres while another is doing one, or that can go to mill, or market, in one hour, when it takes another two, is worth to his owner, other things being equal, twice as much as the other. In the choice of a stallion, then, for breeding good horses, the more blood compatible with the size required the better; the "pure blooded," high-bred horse, having greater quickness, strength, bottom, health, and vigor of constitution, as well as greater courage.

Black Hawk, whose portrait forms the frontispiece to this chapter, is a good specimen of the roadster. (*Fig. 68.*)

The blood should be on the side of the stallion; breed up, not down. Never put a mare to a stallion of inferior blood.

The stallion should be free from vices of temper and disposition, as he will surely transmit these to his progeny. He will also transmit diseases and malformations, therefore these should be avoided. The general description for a stallion for the pur

pose of the farmer is—sixteen hands high; fore legs above the knee, and hind legs above the hock, long and muscular; below these joints, short and bony; joints round and well set, short backed, well ribbed up, short in the saddle place, and long below it; high withers, broad loins, broad chest, straight rump, a high muscular crest, a lean well set head, broad nostrils, small ears, and a small clear eye. (See *fig.* 69.) A dark bay is the best color, an iron grey next, then black, and other dark shades. The mane and tail should always be darker than the hair of the body. The prevailing method of using stallions cannot be too strongly condemned. The unscrupulous owners of stallions tax them to a degree ruinous to them and their progeny. No stallion should be used regularly as a breeder, until he is four years old. When three, he may be put to a half dozen mares, and his qualities tested, but too much must not be expected of his stock, at this age. If it is passable, keep him for a stallion; with moderate usage his colts will be good until he is twelve or sixteen. But the present monstrous practice of allowing stallions to serve from sixty to eighty mares in a single season of three months, rapidly deteriorates the stock. Twenty mares, or at most two a week, for the season, is all that any stallion can be taxed, without serious loss in the quality of his colts. And instead of being confined all the time in the stable, eating heating food, and only seeing the mare when led out for copulation, they should be allowed to run together for a day or two, in the pasture; both the horse and the mare will enjoy this season, and the superiority of the foal will abundantly repay such an allowance. You will raise horses with much less disposition to be vicious.

Our breed of horses will continue to degenerate as long as the present exhaustive practice is continued. The only practical remedy, that we now see, is for farmers to club together and

purchase a stallion, or raise one among themselves, keeping him for their own breeding. This course has been largely practiced in some communities, and a marked and most profitable improvement in the stock has been the result.

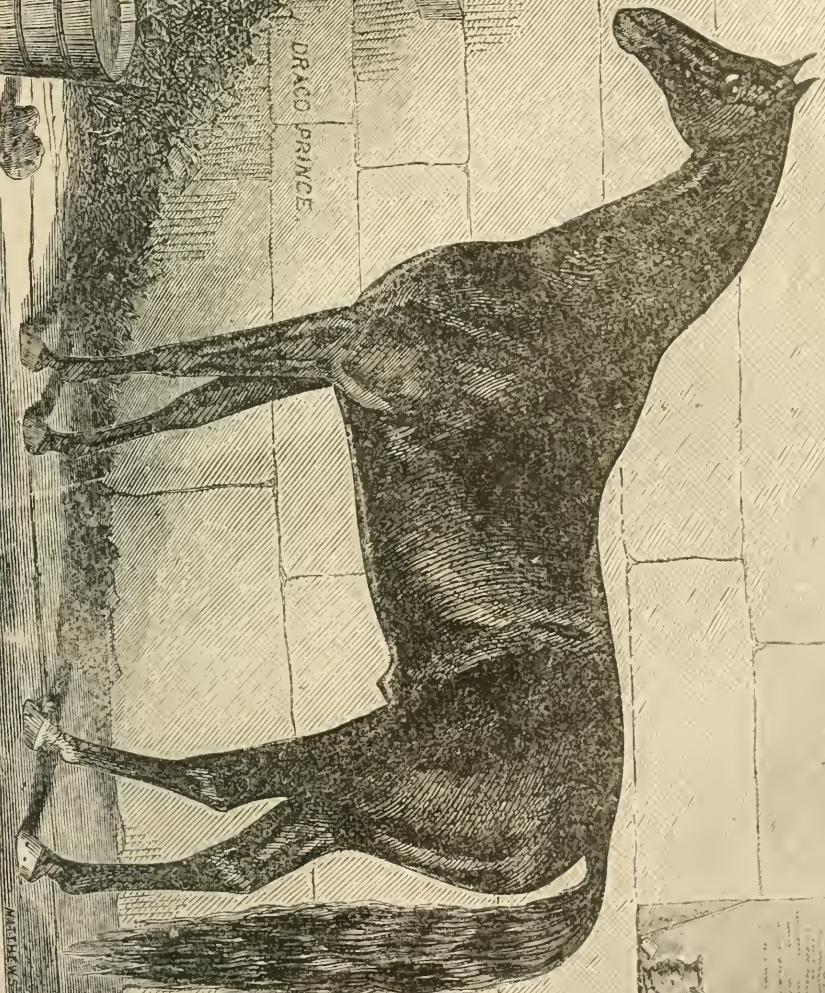
IN THE CHOICE OF THE MARE, size, symmetry, and soundness, are to be regarded as essentials. ("Beauty from the dam; temper and disposition, from the sire.") She should have a roomy frame, a little more than the average length from hip to shoulder, sloping hips, wide chest, deep girth, strong quarters, and particularly a wide deep pelvis; permitting the passage of the foal into the world uninjured. She should be gentle, free from all vicious habits, and from all constitutional diseases or deformities, such as diseases of the lungs, eyes, or spavins, bad feet, or any bony enlargements, as she will almost surely transmit these ill shapes, even if she herself is excellent. Never breed from a sulky, baulky, savage, or vicious mare, unless you wish to perpetuate the breed. It is true, these are often overcome by the sire, but the risk is too great to be advisable. Before putting her to the stallion, by careful usage and feeding, get her into the most perfect state of health, not over loaded with fat, but in a first rate condition. Her state at the time of coition, will have a lasting effect upon the foal. Gestation should commence under the most favorable circumstances. There should be MUTUAL ADAPTATION, between the sire and the dam, in both form, size, and all other important characteristics. The mare should be a little larger than the horse, unless the mare be too low, when she may be bred to a horse a trifle taller, but not of the leggy kind. A low mare to a leggy horse, to produce height, is a mistake. Any great difference in size will usually produce distortions. If either is defective in any point, be sure the other is perfect in that point. If the colt is

desired for the farm, put the mare to a farm-horse, if for the carriage, to a stallion adapted for a roadster. If the design is to improve the breed, without special reference to either, a pure blooded horse will certainly, under our limitations, accomplish the purpose. If your stock is good, you may breed in and in, for two generations, but never more, that is with near blood relations, and if your stock is degenerated, cross it at once, with some distinct strain of pure blood, to reinvigorate and strengthen the stock. Where stock has already been long inbred, breed up, by stinting the mares to the best thoroughbred stallion that can be found, broad chested, and strong loined, about the height of the mare, but stouter. The fillies from this cross will be larger and stouter than their dams, and from them may be bred again, still larger and stouter horses, by the same process.

The Canadian horse, we think, all things considered, the best breed for the farmer, and if special care were taken to breed only from the largest and most perfect specimens, or to breed the mares to thoroughbreds of the Norman stock, the breed might be greatly improved. It possesses endurance, but needs a little increase in size, and decrease in weight, and increase in speed. Judicious breeding, with this object in view, will abundantly repay the breeder. We cannot close this subject without entering our strongest protest, against the abuse of the mare often practiced. She should never be put to the stud before she is three years old, and it is usually much better to wait still another year, that she may perfectly mature. Again; let her have more of the companionship of the horse; a single connection does not satisfy her; let them run together two or three days, in a retired pasture, the disposition of your colt will be enough better to warrant it. Thirdly, do not make her bring a colt every year. it is too great a tax upon her, and the

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colts will not be worth any more. Two inferior colts are no better than one first class. Again, don't try to get colts from a poor old, worn out mare, that after years of hard labor, has earned the right to rest. It is a cruelty to her, and the foal will be nothing but an abortion and a disgrace.

THE MARE INTENDED FOR BREEDING, should be subjected only to light labor, and this should be continued through the first months of gestation, taking care that she be not subjected to any strains, or great fatigue. When not required to work, if the weather is good, permit her to run in the pasture. When the weather is inclement, she should have shelter. Her food should be liberal and nutritious. Clover, lucerne, green corn, ruta bagas, and carrots, a few *old* and thoroughly dried oats, and steamed bran mashes, are the best food during gestation and suckling. She has two lives to support, and her food should be moist, easily digested, and nutritious.

She should be carefully groomed, and most kindly treated, all through the period of gestation, if you expect from her a good dispositioned foal. During the last six or eight weeks she should be subjected to no labor, removed from all other animals, allowed to roam at will, or taken out and gently exercised. As she comes nearer the time of foaling, keep her where she can be watched, and assistance rendered if any should be needed. When the period arrives, the time occupied by the mare in foaling is short, and her pain severe. We cannot approve of foaling in the field. Lead her in on to the barn floor, or under a shed well littered. Let all your actions and words be gentle and kind—a harsh tone is unnecessary, and may be injurious. Even the voice of a stranger, or of one of whom she is afraid, adds to the sufferings of the mare at this time. The hour of labor being near at hand, fasten a pair of light hobbles to the fetlocks of both hind legs, and ropes from them run between

the fore legs. This should be done by some one in whom she recognizes a friend. They should be held firmly, to prevent her striking out at the attendant who assists the birth.

After the birth, bring a pail of warm milk gruel, and leave the mare and foal to themselves. Entire quiet for two or three hours is the best medicine. After this, give her a meal of prepared food. Do not resort to purgations if she does not immediately expel the after-birth. Some writers recommend a quart of ale once in three hours; if, after the third dose, it is not expelled, inject cold water until it is.

The colt is now the object of care. If the dam is in good condition, she will need no medicine. After a month or six weeks, the labor of the mare should be gradually resumed, and the colt allowed to run with her; but not yet on the roads. If the colt is strong, he may be weaned in six months—except that fall colts should not be weaned until the spring grass appears. The future animal is now in your hands, and will be about what you make him. Half the diseases, and *all the vices* of the horse, are the result of man's treatment of him. Unvarying kindness and attention now, are a thousand times better than the whip or the horse-breaker by and by. He should be coaxed to take morsels from the hand, petted and fondled. The lesson is soon learned, and he learns to regard men as friends, and to do their bidding. It is surprising how universally men repel the instinct of confidence and affection in the horse, and think it is more manly to assert their authority in harsh and threatening tones, which only awaken dread and fear. The colt should be warmly housed and sheltered during the winter. Thousands of good colts are injured for life by being compelled to stand out without shelter, and with scant food. Chopped feed moistened, bran mashes, etc., are even more necessary for the colt than for the mature animal.

If the colt is to be castrated, it should be done when he is from four to six months old. We would repeat here, that the supply of stallions is altogether too small, and urge upon farmers the desirableness of preserving entire their best male colts. Castrating, if done early, is a safe operation, and may be done by the farmer himself. Find the orifice through the lining of the belly; trace it back to the testicle, a distance at this age of only two or three inches; bring down the testicle with the two forefingers. The vessels will bleed but little. Apply a little fine salt and turpentine, and the evil effects will be soon removed. The longer castration is delayed, the more difficult and dangerous it becomes.

We have been, in all this chapter, considering the method of breeding good horses. Those who are satisfied with the poor, scrubby, inferior horses so common all over the country, which cost just as much to get, and just as much to keep, as a good horse, will probably continue the old method of breeding, haphazard, from broken down, half-starved mares—and when they get a colt, will ruin all his good qualities by neglect and unkindness.

BREAKING AND TRAINING THE COLT, on the present system, engenders nearly all the so called vices of the horse. The horse is not by nature vicious. Judicious training of the colt will break up any vices that may have been inherited. Within a week from his birth the training should commence. When you take a mash to the mare, seat yourself, and let her eat out of your dish, at the same time offering some tempting morsel to the colt, take advantage of his acquaintance to handle him a little pat his neck and 'gradually to handle him all over until you can lift his feet, handle his ears, and look in his mouth, without his showing any signs of fear. If you always act and speak kindly he will know no cause for fear. A few moments

each day will suffice to accomplish all this, and much more, before he is weaned. A bit made of a green stick may be held in his mouth by strings, until he will open his mouth readily to take it, when the colt bit and bridle may be put in its place; after this has been tried a few times he may be led about a little with it beside the dam, he may then be tied by it a few minutes at a time until he will stand easy. All this while it should be done gradually, and, without a harsh word or a blow, should be done firmly. If the colt is inclined to resist any of the operations, gently but firmly insist and persist until he learns that whatever you want of him he must do, and that instead of being hurt, he is rewarded when he does what is wanted. He will soon learn that man is his master as well as his friend, and will never forget it; no more will he ever forget abuse, or unkindness.

He should now be walked around with a bag over his back, first loose and then strapped on, then the stirrups attached and allowed to dangle, until the fear of any thing of the sort is removed. When he is a year old he may be reined up occasionally to the surcingle and allowed to mouth the bits, and if designed for a saddle horse the semblance of a man put on his back, or for a farm horse, the different portions of the harness put on, and taken off occasionally.

During his second year he may be tied beside some steady horse, and taught to walk and trot, to be guided by the lines without the shafts, to be backed into the shafts, and finally to draw the buggy himself, all by slow, easy stages, and all the danger and difficulty of breaking a wild colt when he is wanted is avoided. If he is turned out to pasture, the person who carries him salt should, as often as once a week, give a few moments to some portion of the above training.

The common method of letting the colt run wild until he is

two or three years old, and then beginning his training, is unnatural, cruel, harmful in every way. A colt gentled in the way we have described is worth at the age of three years double the value of the unbroken colt. Neglected till he is three years old the colt *can never be properly broken*. He may be subdued to sullen obedience, but by the above method he may be made the willing servant of man, whom he has learned to regard as his friend, as well as master. Nothing but the most stupid disregard of the law of kindness can make this patient, docile and naturally obedient animal, vicious.

But as there are some who will still persist in destroying this most valuable trait of character in their most valuable property, we shall give directions for breaking these already half spoiled animals.

The more high spirited and the more valuable the colt is, the more likely is he to be spoiled, by trying to do at three years old the work that should have been done before he was one.

He should be brought into the stable, and visited, and handled often, until he is somewhat used to it, then portions of the harness tried on; if he can be accustomed to it without showing fear, lead him out into the yard, and make him turn to the right or left at the word or the reins. If he refuses to obey, which is quite likely, we know of no way but to whip him into subjection. When he does obey caress and reward him. If you succeed in making him obey here, fasten him beside a steady horse with a light wagon, and make him go, peaceably if he will, forcibly if you must. If after all these operations he shies from the harness, tries to run from the wagon, or refuses to draw, do not give it up, but use every exertion to bring him to submission, and, finally, to the process known as taming. No horse properly gentled and trained according to the above directions will need taming, but as the majority of colts are

never trained a great many horses will have to be tamed, for which

RAREY'S METHOD is the best. It consists in fastening up the left fore leg, by a strap, buckled tight over the ankle, and the arm near the body, and the second strap attached to the right foot, run through the surcingle to the right hand of the tamer, while the left holds the bridle. See *fig. 70*. The horse is now harmless, and should be made to hop, when a vigorous pull with the right, will throw him on to his knees, where he can be held until he is ready to turn on his side, which he should be encouraged to do. These operations will take from fifteen minutes to three hours, according to the strength and spirit of the horse. When once fairly down, he should be caressed, handled, and a saddle or portions of the harness put on to him until he finds that none of them will do him any harm. This throwing should be repeated several times, until the horse readily submits, and allows his master to do whatever he pleases. By this method Mr. Rarey has tamed the most vicious of horses.

HOW TO STABLE, FEED, AND GROOM A HORSE. No man has any right to torture a dumb animal. It is poor economy to breed disease and death, in so valuable an animal as the horse. Yet both these things are done in most stables. They are abodes of torture and death. Each horse should be allowed, at least, six by nine feet of stall room, that he may have room to turn about, change his position, lie down, or stand up, as he pleases, during the long weary hours that he is a prisoner. The partition between these stalls should be solid, only the height of the horse's chest; the balance should be open work. In this stall he should not be tied by the head, as this prevents the change of position, of which we speak. He should be allowed the *freedom* of at least a six by nine feet cell. The present method of tying a horse in a narrow stall, with the floor slant-

Fig. 70. RABBY'S METHOD OF HORSE TAMING.



ing backwards, is the cause of the diseases of the feet and joints, so common and so disastrous. It is desirable to have the floor slant backward to save the urine, but the horse should never be forced to sleep, or stand long, in that position; if he has the freedom of the stall, he will choose his own position. We allow the horse nine feet, and there should be at least six more to the stable doors. No matter how many horses there are, no horse should have less than this space, and twelve feet in height. It is a thousand times better to have no loft at all over the horses, to give them the clear space to the roof, and light and air their stables from the roof; but as it will be impossible to persuade most farmers to do this much for the health and comfort of the animal that serves him so faithfully, we will say that no stable for a horse should be one inch less than twelve feet high, well lighted, and well ventilated. We do not mean by this that there should be cracks in the floor, and doors, and sides, by which cold currents of air are let in upon the poor shivering creature, but that there should be some regular outlet for the *impure*, and inlet for the *pure* air.

If you still persist in having a loft over your stable, there should be left at least a space of three feet, between the loft and the back of the stable, and this space opening into the back of the stable and extending to a ventilator at the roof, will carry off one half the diseases that now affect your horses. The impure air that most horses breathe, is a most flagrant violation of all the principles of health. Shut yourself up in a contracted room for months, eat, drink, sleep, urinate, etc., in the close quarters, and how long before you would wish an end to your existence? But the lungs of the horse are as sensitive as yours, his smell is keener, his eye is as tender. This brings us to the matter of light; blindness in horses is in three cases out of four the result of dark stables.

The horse can see in the dark, but not in total darkness. Nothing thrives without light. The stables should have the sunlight by day, and whatever light there is at night. If the best plan is adopted and the stables run to the roof, they can well be lighted by windows in the roof. But, however this may be, the light should come from above and behind the horse. A twelve feet stable will allow of a window over the door, for there should be a door, six feet wide and eight feet high, behind each horse; this door should be cut in halves, both ways, making four quarters, either one or all of which can be opened or closed at pleasure. They should be wide and high, in order that there might be no danger of the horse hitting either his head, or his hips, in going out and in; it should be divided in order that in the summer the upper half can be kept opened, and a draft of cool air supplied.

The stable should be cleaned out and aired every morning, and, if the horse stands in it at all during the day, at night also. The manure should not only be shovelled entirely out of the stable, but the floor should be thoroughly washed down with water, as recommended in the chapter on manures, not only to save the manure, but to save the eyes, nose, and lungs of the horse from the ammonia generated by the fermenting urine. This ammonia is the fruitful cause of many of the diseases of the horse. Not only should the impure air be as far as possible excluded, but the horse absolutely requires fresh air if you would keep him in a state of health. This can be secured by a very cheap and simple contrivance. An air-box, eight inches square, should be run through the whole length of the building, each end being open to the air, but protected by a screen of slats or wire. This box may be about even with the nostrils, and openings, an inch square, made in it in each stall. In most stables the mangers are too high. The horse naturally eats off

the ground. This brings us to the subject of FOOD. The pasture is the natural feeding-ground of the horse. Tender, juicy grass and twigs are his natural food. His teeth are soft, his throat, stomach, and intestines are sensitive. In feeding the horse, these plain facts are generally overlooked or ignored. No positive rule for feeding all horses can be given; but the food should be soft, juicy, easily digested. It should be clean and sweet. Clean, fresh water should be always within his reach. The farmer's horse can and should have more or less pasturage. When the grass is green and tender, in the spring, the horse delights in it. In the warm summer nights, if possible, he should be permitted to roam at his pleasure in the pasture, rather than be confined in the heated stable, tormented by flies and other insects. The cool, dewy grass will be very beneficial to him. When confined in the stable in warm weather, the upper half of the stable door should be open, and he be free to thrust his head out into the night air if he choose, which he certainly will. We have, in the chapter on breeding, referred to the food necessary for the mare and foal, and will only speak here of the FOOD OF WORKING HORSES.

Too much hay and too little grain is the mistake in feeding working horses. For ordinary work, from eight to ten pounds of hay, (by which we mean the best of hay, properly prepared,) and twelve quarts of good heavy oats is amply sufficient for regular feed. They should be fed with a lock of hay and a half-pail of water on opening the stable; and when the stables have been cleaned and aired, and the horse groomed, he should have the other half-pail of water, and, if going out, six quarts of oats, if not, four quarts, and, after these are eaten, four or five pounds of hay. Horses should be watered, if convenient, during the forenoon, and certainly at noon, when they should have four quarts more of oats, and when they return at night, should be

cleaned, watered, and have their oats and hay without fail. Two or three pecks of clean carrots, turnips, beets, or potatoes, a few at a time, will be grateful to them, and invaluable in regulating the bowels and cooling the blood. A mash of stewed bran and oats once a week is not too much to ask for such a faithful slave, and will tend to his health and usefulness. If he is to be put to severe work, the amount of grain must be increased and of hay diminished.

The condition in which the hay and grain is given is another important consideration. The natural food of the horse is soft and juicy; hay, oats and corn are hard, harsh, and dry. *One third less fodder is necessary* where it is moistened and softened. All hay for the horse ought to be chopped and moistened an hour before feeding. Oats should be ground and mixed with the hay in the form of provender. Corn should never be given whole, unless steamed or soaked, and the same with oats. We repeat that this is economy, as two thirds of the amount will give the horse as much or more sustenance than before, *and the teeth and digestive organs will last much longer*. The best of the grasses for the horse is timothy, then herds grass and clover. The only grain suitable is the oat. Corn should always be used sparingly, as it works many disorders in the system, as do also rye, barley, wheat, and bran. If any of these are used, it should be ground, with oats for chopped feed. Some attention should be paid to the tastes of the horse. If, after long feeding with one continual round of the same food, he loses his appetite, make a change. Do not allow your horse to run down during the cold weather, it is then that he needs the best of food and shelter. If he works hard for you through the spring, summer, and fall, you owe him a good winter's keep, and you lessen his vigor, and shorten his term of usefulness, if you deny it to him. The natural age of the horse is forty years, and at twenty a horse

should be in his prime. Steady and severe labor need not wear out the horse before this time, if he be properly cared for from the hour of his conception, through all the stages of his existence. This sounds strangely, because the carelessness and cruelty, the meanness and ignorance of man, has shortened by more than one half the natural term of his existence.

The horse delights to be the faithful servant, slave, and friend of man. He will tax his strength and powers of endurance to the utmost, at the bidding of his master. Such faithfulness should be returned by kindness and attention. Harsh words, kicks and blows for every supposed offence of the unreasoning creature, are marks of a most contemptible character.

In addition to stabling and feeding, GROOMING THE HORSE is of more importance than is usually allowed among farmers. Grooming is hard, tedious, disagreeable business, and is, therefore, very much neglected. Daily grooming is absolutely essential to the health of the horse in his imprisoned state. The dust of the stable, and the mud of the street, will soon stop up the pores of the skin without grooming. Except in cold and stormy weather, the horse should be groomed out of doors between his feeds in the morning.

Every portion of the body should be combed, and rubbed, and brushed, and in warm weather sponged. And here we would protest against the universal use of the curry comb. Some horses do not mind it, even like it, but to some horses with tender skins it is an implement of torture, and instead of being glad to be groomed they shrink and shy, and perhaps kick and bite, and are severely punished as vicious. Try the same implement on your own skin and see how you like it. When a horse is thus sensitive to the curry comb it should only be used to comb the mane and tail, and to scratch the legs, and a hair cloth and brush used for grooming. Says Herbert, "In ordinary

cleaning in the morning the head should be first dressed. The hair should be lifted and deranged lightly, not stretched or torn with the curry comb; and then rubbed well, in all directions, both against and across the grain of the hair as well as with it, until it is entirely clean from dust and dandruff. The ears should be gently stripped and pulled with the hand from the roots to the points; and the whole head should then be washed smoothly and evenly as the hair ought to lie. The neck, back, shoulders, loins, croup, and quarters follow, the same plan being used, except that in dressing these parts, while the comb is used lightly and dexterously with one hand, the brush is employed in removing the scurf with the other. The flexures of the skin at the insertion of the limbs are parts that require especial care, as the dust is most apt to collect in these places.

“This done the horse must be thoroughly wisped all over with bunches of dry straw till his coat is quite clean and glossy, when it may be gone over for the last time with a fine soft brush or a light duster.” When he is brought in from his daily toil and stabled for the night, the process should be carefully repeated; all mud, sand, and dirt must be removed from the legs and belly, and the legs rubbed by hand until they are warm.

The horse should have a good bed of clean litter, straw, or sawdust, not deep, but with room for him to lie in any position that suits him. Most horses should be blanketed in cold weather, but to some horses a blanket is an annoyance and prevents rest. As rest is what the horse needs after his day's labor, he should be accommodated by allowing him to go without his blanket.

The practice of singeing and clipping horses in the fall is abominable and dangerous. Just as his master is about to put on

his flannels and great coat his horse is deprived of the warm hair that has been growing for his protection against the winter chills, and disease is almost surely the consequence.

The practice of clipping the fetlocks is undoubtedly bad, as the heel of the horse is tender, and when exposed is subject to many diseases. Nature has provided the fetlock as a protection, and as such let it remain. Never in grooming dash cold water upon the legs of the horse. Use water with a sponge; or after washing with soap and warm water, cold water may be turned on the back from a watering-pot to rinse off the suds and shut the pores.

This should never be done in the stable where the horse has to sleep, unless there be a chance to air it and dry it before night.

HOW TO BUY, USE, AND SELL A HORSE. It is useless to try to buy a very good horse at a very low price. People do not exchange gold dollars for dimes. A perfect horse, thanks to bad breeding, bad training, and bad care, is a rare thing, and is not parted with except for a fair equivalent. If the horse is well and sound, and is offered low, be sure he has been spoiled in training, and will fail you when you need him most. Men will prevaricate and deceive in regard to a horse, who would not in other things—for such is the common custom—so the buyer must always judge for himself. The eye should be examined from the front, with the head a little shaded. If there are any white, filmy spots, or streaks, on the eye, it denotes inflammation, which is likely to return, and detracts from the value of the animal. Next to the eyes, or rather before them in importance, is the condition of the lungs. Owing to our miserable stables, a large proportion of our horses are more or less diseased in the lungs.

BROKEN WIND will be detected by galloping a horse up hill

a hundred yards, and then jumping out; apply the ear to the chest, and a double expiration will be heard. THICK WIND, roaring, and whistling, are only the earlier stages of broken wind, and can be detected by the above process. Another method of detecting these defects, is to grasp the throat from the front, and compress it until he is forced to cough. A sound horse will cough once, and recover his wind with a clear, sonorous inhalation and exhalation. The diseased horse will utter a broken, rattling cough, and recover his breath with a long, whooping, laborious rattle.

DEFECTS IN THE LEGS AND FEET cannot always be discovered, but there are certain marks that surely indicate them. White spots on the knees show that the horse has broken his knees at some time or other, and as it is usually by falling, which is likely to occur again, the chances are that a broken knee horse is a stumbler. Says Herbert, "In examining the legs of a horse, the purchaser should first stand with his face to the broad side of the horse as he stands on flat ground, and observe whether he rests perpendicularly on all his legs, having the natural proportion of his weight on each leg straightly, squarely, and directly; or whether he stands with all his legs straddled outside of their true aplomb; or with all drawn together under the centre of his belly, as if he were trying to stack them all into a hat; or lastly, whether he favors one or more of his legs, either by pointing it forward, or by placing it in any position in which no weight at all, or a very small stress of weight, is thrown upon it. A horse may apparently favor one foot accidentally from a casual impatience or restlessness. He is not therefore to be rejected because he points a toe, once or twice. But if he seem to do so he should be constantly brought back to his original position, in which he must bear equally on each foot, when, if he be found constantly to favor

the same foot in the same manner, something serious must be suspected which gives the horse uneasiness and pain, though not perhaps sufficient in degree to produce present lameness.

If the toe of a fore foot be pointed forward it indicates disease of the coffin bone, almost incurable. If both fore feet are thrown forward and both hind feet thrown back it indicates founder. If with all his feet drawn together under him he is used up. If his knees bend forward and his legs tremble he has been knocked up with hard work or hard driving.

CURBY HOCKS, or a protuberance at the commencement of the shank bone are objectionable in young horses. After the side view take a front view, and see that the horse is not bow legged or knock kneed. SPLENTS are small pieces of bone extending from the shanks, and if so near the knee as to interfere with the action of the joint, or so far back as to interfere with the sinews, will produce lameness. THE BACK SINEWS sometimes give way, and although healed are never as good as new. Run the hand downward from the knee to the fetlock with the nails of the thumb and middle finger in the groove between the bone and sinew. If the sheath be round, hard, straight, and even, well; but if there are knots, or soft places, something is wrong; if pinched at these places the horse will wince.

RINGBONE is a bony excrescence around the foot, just above the hoof. It is one of the worst of defects. Sidebone is the same, only it extends but part way around the hoof. Bone spavin is a bony excrescence on the inside of the hock-joint, and can be discovered by the hand. Bog spavin occurs a little inside and below the bone spavin; it is a collection of the fluid that lubricates the joint, and gives under the pressure of the hand. Blood spavin is of the same nature, and detected in the same way. These are sufficient reasons for refusing to purchase a horse.

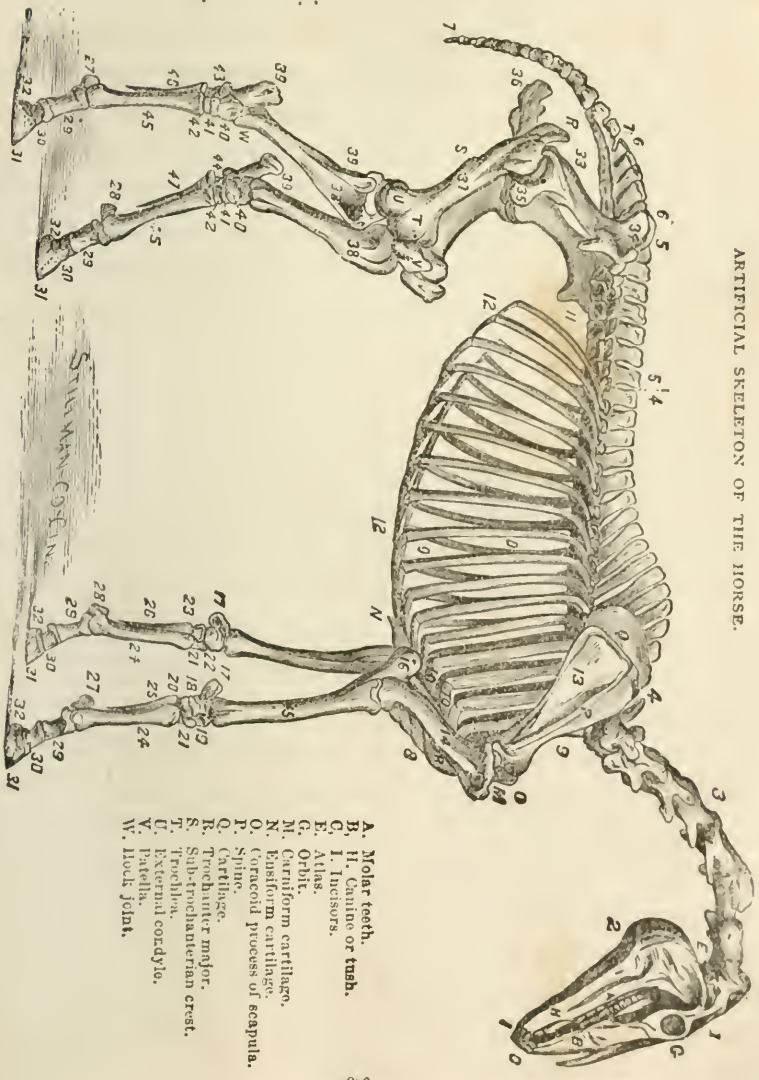
THE AGE OF A HORSE cannot be told by his teeth, if he be

properly fed. The cruelty which makes the soft-toothed horse eat hard hay, grain, and corn, causes his teeth to wear down, and in proportion as they are worn down, his age is calculated. A horse, properly fed, at twenty years, should have as good teeth as most horses now do at ten years.

HOW TO USE A HORSE; as not abusing it. Overworking is a common method of abuse. Do not overwork the mare with a foal; neither work the colt too early; for every year that you delay putting the colt to hard work, you will gain two years in his longer usefulness. Other things being equal, a colt that is not put to hard work, till six years old, will be as good at fifteen, as another will at ten, if put to work at three years old. Never pair a strong horse with a feeble horse. Make your loads suitable to the roads you have to go on, and do not strain your horse through a quag or plowed field with the same load you consider sufficient for level ground. Beating a horse is usually worse than useless. Never allow a hired man to strike a horse a blow. Absolutely forbid it, and discharge a man for it as you would for picking your pocket. The cruelty of men to these poor dumb beasts is not only barbarous and sickening, but is also ruinous. Millions of dollars worth of horse flesh is ruined by these brutal punishments. The horse kindly treated delights to serve his master, and will strain every nerve to accomplish his commands. Brutality only causes fear and stubbornness. Striking a horse with a hoe, shovel, or other tool, kicking in the abdomen, striking with a club, and such punishments, are acts of which any decent man will never be guilty. Kicking a mare with foal is so perfectly abhorrent that it seems as if no man would ever do it; but it is done, always to the injury, and often to the death of the foal. Slitting and cropping the ears, nicking and docking the tail, are cruelties that ought to be wholly abandoned. The horse is not absolutely your property

ARTIFICIAL SKELETON OF THE HORSE.

1. Cranium.
2. Lower jaw.
3. Cervical vertebra.
- 4, 4. Dorsal vertebra.
- 5, 5. Lumbar vertebra.
- 6, 6. Sacrum.
- 7, 7. Coccygeal vertebra.
8. Sternum.
- 9, 9. True ribs.
- 10, 10. Cartilages of true ribs.
- 11, 11. False ribs.
- 12, 12. Cartilages of false ribs.
13. Scapula.
14. Humerus.
15. Radius.
16. Elbow.
17. Os distiforme.
- 18, 19. } Carpals bones.
- 20, 21. } Carpals bones.
- 22, 23. } Carpals bones.
24. Large metacarpal bone.
25. Outer small metacarpal bone.
26. Inner small metacarpal bone.
- 27, 28. Sesamoid bones.
29. Os sutraginuis.
30. Os coronal.
31. Os pedis.
32. Wing of pedal bone.
- 33, 34, 35, 36. Os innominatum.
37. Femur.
38. Tibia.
39. Os culeti.
40. Astragalus.
- 41, 42, 43, 44. Tarsal bones.
45. Large metatarsal bones.
46. Outer small do.
47. Inner small do.



- A. Molar teeth.
- B. H. Canine or tush.
- C. I. Incisors.
- E. Atlas.
- G. Orbit.
- M. Cartiform cartilage.
- N. Eustiform cartilage.
- O. Corneoid process of scapula.
- P. Spine.
- Q. Cartilage.
- R. Trochanter major.
- S. Sub-trochanterian crest.
- T. Trochlea.
- U. External condylo.
- V. Patella.
- W. Hoof joint.

like a board, which you may saw, cut, burn, or nail at your pleasure. Nor have you a right to sell a horse to one whom you know to be a hard, cruel master. When you sell never cover up or hide any defects; state fairly the good and bad qualities of your horse, and set your price; if bought on your terms, no warranty is necessary, and no lawsuits will follow. To sell an unsound horse for sound is a transaction of the same nature as passing a counterfeit note, and no upright man, if he looks at the subject rightly, will do it. The good points of a draught horse are: large feet and legs; square shoulders; a broad, muscular neck, strong and thick at the junction with the shoulders; a round, wide breast; short legs; short upright pastern; a short back; large, broad hindquarters; a short thigh, with strong muscles; (if the muscles here are weak and thin, the horse is defective.) Such a horse as we have described is only fit for draught. As most farm operations require a steady, slow movement, a heavy team is better than a light one. A horse weighing seven hundred might be just as strong as one weighing fourteen hundred, and yet he will not be able to haul a load with the same ease, and would need a stronger harness, and stronger whiffletree. A light horse, drawing a heavy load, must move quick and expend great muscular force; while the heavy horse, hauling the same load, does it largely by the momentum of his body. The momentum of a heavy team tends to keep a load in motion; whereas a light team must do it with their muscles, which is very exhausting. As to mares or geldings for teams, a recent writer states, that when he had only a few acres of land to plow, he found a team of good mares the most profitable. He had them drop their foal before they were needed for spring labor, or else after their spring labor had been done, and thus got two good colts annually, which in good part paid the expense of keeping the team. We should say that such a

team should only be in the hands of a most careful and reliable workman. In case a farmer keeps two teams, one of mares and one of geldings, he can give the latter the heavy work and the mares the light work, usually to good advantage. Says S. E. Todd, "Horses can turn the grindstone, do the churning, pitch our hay, hoe our corn, dig our potatoes, and do almost any thing else, and do it with ease, and keep fat, too, if we will only think for them, and give them the word to go ahead and to stop. Our business is to think, and it is theirs to do the work. When I see a little man lifting and tugging, hour after hour, to load a few tons of hay, and get it on the mow, while he has two fat horses standing idle, which could do it in a few minutes, I always think, what a dunce you are, to make such a beast of burden of yourself, when the Creator has given you such strong animals to perform your hard labor."

It is undoubtedly true, that with a little exercise of ingenuity, and a small outlay for tackle, nearly all of this hard labor can be done by the horses. Every thing that can lessen the hard labor of the farm, is worthy of consideration, and especially every thing that will save *time*, during the busy season of harvest.

ANATOMY OF THE HORSE. The preceding cut, (*Fig. 71 A.*) gives a correct representation of the frame of the horse, and the position of the different parts, of which we shall have occasion to speak, in treating of the diseases of the horse. The skeleton is composed of two hundred and forty-seven separate bones, thirty-one of which are in the spine, thirty-seven in the thorax, three in the pelvis, seventeen in the tail, the fore extremities forty, the hind extremities thirty-eight, the cranium ten, face and jaws eighteen, teeth forty, ears eight, tongue five.

The hoofs are the foundation, and hold the coffin bone (31), resting on this is the lower pastern bone (30), with an opening

in the back, holding the navicular bone (32). Next is the upper pastern bone (29), upon which rests the shank bone (24), with the sessamoid bone (27, 28). The knee joint has seven, sometimes eight bones. Back of, and just below the knee, is a small thin bone, extending down the front shank, nearly its whole length, called the splint bone of the foreleg (25, 26). Above the knee is the main bone of the leg, called the radius or the arm (15), above the arm the elbow (16), and still higher the humerus or shoulder bone (14). In the hind leg, the bones are the same until we reach the hock joint, which has six bones. The shank has two splint bones. Above the hock joint is the tibia, the largest of all the bones (38). The stifle joint is formed by the tibia, and the femur or thigh bone, which is next above (37). It is covered in front by the knee pan or *patella* (v). The six bones of the hips complete the bones of the legs. The bones of the head and neck are easily comprehended, by an examination of the skeleton. The bones of the skull, are thin plates locked or dovetailed together, to prevent displacement. The head and neck are joined at (e), by the ligament, known as whit-leather, and it is here, that Poll Evil and Fistula have their origin. The bones of the spine are linked together by lock-joints. The scapula or shoulder blade unites the foreleg to the frame (13). Some of the above bones are solid, others hollow, while the ends or heads of all the bones that form the joints, and all the small bones of which the joints are composed, are spongy, as are also the ribs, shoulder blades, and back portions of the jaw bones. It is in these spongy bones that diseases make their appearance.

The movements of all these bones are governed by the muscles and tendons, the muscles all ending in tendons, and being joined to the bones by cartilages. The strength of the horse is in the muscles, and they should be full and hard. They are

composed of fibrine and albumen, the latter sheathing each muscle, preventing friction, loosens and lubricates the fibres, assists their growth, and renders them elastic and flexible; and the food should be such as to give the largest amount of muscle.

The horse is lined with membranes. They form a fine coating over the bones, the brains, bowels, kidneys, heart, lungs, and line all the cavities of the body.

The construction of the skin, and the purposes it serves, are the same as in other domestic animals, and will be treated of, as will other portions of the system, in the specific chapters relating to diseases.

DISEASES OF THE BONES. Big head and big jaw, are the result mainly of bad food and bad treatment, although water and climate favor its development. It is mostly confined to Tennessee, Arkansas, Mississippi, Louisiana, and Alabama, where the horse is fed through many months, often on corn and corn stalks, dirty, rotten, and mouldy, from standing too long in the field. Says Stewart, in the "*American Farmer's Horse Book*," (the best authority on the horse in this country,) "On such food, two thirds of the horses at the South are compelled to live, and as a consequence, more than one half of them suffer continually from fever. No wonder they have Big head, and every other disease that horse flesh is heir to; the only marvel is, that they are ever well, or indeed that they live at all. To feed them corn exclusively is bad enough, but when that corn is rotten, and eked out by mouldy fodder, the condition of the poor animals is deplorable."

To Dr. Stewart belongs the credit of discovering the causes and applying the remedies to this disease. In its first stages, it may be detected by running the thumb up under the lip, beside the under jaw bone. *The symptoms* are, an enlargement of nasal bone, the skin and muscles of the head harden, and pulling the

lips fails to move them; there is a constant sleepiness while standing, a drawing up of the feet, running eyes, stiff joints, hard, dry skin, and great difficulty in voiding the dung, which is hard, black, and dry. The appetite continues good. The treatment should commence as soon as the symptoms are discovered. It consists, first, in *bleeding*. Where the disease is in its early stages, take three pints of blood at intervals of two weeks, in bad cases two or three quarts at intervals of a week. After bleeding, apply corrosive liniment, with a small mop, to the parts affected. The liniment should then be dried in with a hot iron held near the skin, but in no case allowed to touch. In mild cases apply for two weeks every other day. In severe cases, use it every other day of every other week, until digestion becomes improved, which is the sign of success. To relieve the other portions of the body, give the horse a tablespoonful of stramonium three times a week, every other week, as long as it may seem necessary. Stramonium is the seed of the thorn apple or jimson weed; it is the best known horse medicine. The horse should be allowed rest, quiet, and good housing until fully recovered.

Former methods of treating this disease by extracting teeth, burning, etc., were barbarous, and are now worse than useless.

SWINNEY, or inflammation of the shoulder or hip, is caused by a strain, and aggravated by diseases of the feet. The symptoms, at first, appear only in the feet and legs, but may be distinguished from founder by the animal's unwillingness to lie down and his evident suffering when compelled to do so by exhaustion. There is great fever at the shoulder, the flesh becomes hard, and the skin adheres. At this stage apply the corrosive liniment three or four times a week, for a month or so, or until the symptoms disappear. The second stage of swinney is called big shoulder; the flesh and tendons of the breast shrink

and the bone at the shoulder joint grows larger. The feet are nearly always diseased, and no cure can be effected until the feet are restored to a more healthy condition, for which, (see *Diseases of the Feet*,) at the same time, apply the corrosive liniment to the shoulder, and loosen the skin by rubbing and pulling it daily.

BONE SPAVIN is an enlargement on the inside of the hock, below the joint, and is usually ruinous to the horse unless promptly treated. It is caused either by a blow or a sprain, and is transmitted by breeding. Undoubtedly, hard usage, improperly constructed stables, and other abuses, aggravate the disease.

Never breed from a sprained stud or mare, and do not let the colt run too soon, or too much, on the roads. The symptoms of spavin are so plain that the man who takes care of the horse, and does not discover it in its earliest stages, must be a very careless observer. The lameness is irregular; the horse will step lame in the morning, or after standing for some time; sometimes a bunch appears, but often not for many weeks; the difficulty will gradually increase and the joint become stiff. On observing any symptoms of it, make an examination, and the enlargement may be felt by the hand. Give the horse rest at once, and apply the corrosive liniment four times a week every other week, as long as necessary. The blister and the application of mercurial salve is often beneficial, but all cutting, firing, or other barbarous uses are to be condemned. If not attended to, in its early stages, it readily becomes incurable.

LAMENESS OF THE HOCK should be treated with the corrosive liniment, and, in case it is broken, perfect rest is the only cure. RING BONE occurs at the coffin-joint, and admits of cure in its early stages, but not afterwards. It is often bred, and often caused by a bad formation of the legs. Rest and treatment,

the same as for spavin, should be given upon its first appearance. Club foot is simply the worst stage of ring bone. STIFLE or lameness of the stifle joint, as well as all bruises and injuries in the vicinity of the stifle joint or patella, induces heat and tenderness, which increase, if the horse continue to be used, to terrible suffering and permanent injury. Give immediate rest and an application of corrosive liniment every other day for a week or ten days. SPLINT is an enlargement on the splint bone, and usually interferes but little with the usefulness or comfort of the horse, except a little inflammation at first. Apply a lotion (*see Remedies*) to a pad, fastening it over the spot, and moisten often until inflammation subsides. When a splint interferes with a tendon or appears to be troubling a horse, give a few applications of the corrosive liniment.

Stumbling is the effect of a bad formation of the joints and limbs and not a vice. Sway back is a deformity caused by riding a colt before it is strong enough to bear such a weight.

There are various other bone diseases which require the skill of an educated veterinarian, and if a serious lameness cannot be traced to any part a veterinary surgeon had best be consulted. Most of these lamenesses are the result of misuse; great care should be taken to prevent them. Loads should be moderated to the strength of the animal. The horse is not matured until eight years of age, and should never be taxed to his full strength previous to this time. The appointments of the stable should be such as to preclude accidents to the limbs.

DISEASES OF THE FEET are among the most injurious, as well as the most painful, to which the horse is subject; and when it is discovered that there is any trouble with the feet, its cause should be at once discovered, and prompt measures taken for relief. Most diseases of the feet, if taken in their earliest

stages, can be so far subdued, as to preserve the usefulness of the horse. This is not only economy, but mercy likewise. NAVICULAR DISEASE, so called, is a disease of the small bone, forming the projection of the heel, and resting upon the frog. Severe bruises upon the frog, by stones, frozen earth, and the like, extend to this bone, and disease sets in. A horse apparently sound, suddenly becomes lame in one of the fore feet. No cause is discernible; he points the toe out several inches, whether standing or travelling; in travelling the toe is made to touch the ground before the heel; the horse favors that foot, at all times; no enlargement, or inflammation, are discovered. This is the first stage, and a cure is now wholly within your power, if you act at once. In the course of a week or two, the lameness, which was slight, disappears, and is forgotten, but ere long it appears again, with renewed violence. There is now an ulcer on the navicular bone, and, like an ulcerated tooth, is a most painful affliction; the horse is in agony; every *step* is concentrated agony. The navicular bone begins to decay, the hoof shrinks, and fracture of the bone, or rupture of the hoof, end the usefulness of the animal. It often leads to *ringbone*, *foot evil*, *narrow heel*, *thrush*, *greasy heel*, *hoof rot*, *sand crack*, and other afflictions of the feet. As a prevention, the frog should be kept from the ground by paring the frog, and by refraining to pare down the hoof behind; or, when necessary, putting leather under the shoe at the back, as is recommended by English farriers.

The treatment, in the first stage of the disease, is simple enough. Put the horse in the stable yard, or in the stable, if it gives room for him to choose his own position at his pleasure. Feed liberally of grain, to keep up the vigor of the body, soak the foot an hour, in hot or warm water, every other night for a fortnight, and apply the corrosive liniment the intervening

nights. After another fortnight's rest, the work may be resumed. But if the disease is neglected at first, and ulcers allowed to form, treatment becomes much more difficult and uncertain. The object now is to form an abscess, and thus an outlet for the ulcerated matter. Apply the liniment to the frog, the bottom and back part of the foot, and also to the heel. Cut out any decayed matter from the bottom of the foot and apply the liniment freely. Continue this course until the foot recovers, whether it be two months or six. If you can produce a discharge of the ulcerated matter a cure is sure. Keep his condition good. Give him a dose of sulphur (*see Remedies*) every other day for a week. If the treatment does not produce an abscess or subdue the lameness, after two or three months, Neurotomy is the last resort. The hoofs of the horse, like the nails of man, are a secretion, and are naturally hard and strong; but when disease is present, in any part of the leg or foot, the secretion becomes imperfect, and soft hoof, or brittle hoof, is the result. *Any disease of the foot leads to others.* This shows the necessity of instant attention, even to the slightest lameness.

CRACKED HOOF is one of the ailments from a feverish condition of the feet induced by other diseases. Narrow he causes the front of the hoof to crack. When the hoof is not properly pared in shoeing, the hoof will crack in the quarters. Founder produces brittleness, brittleness produces contraction, and contraction is one cause of cracks. Cracks often extend to the sensitive part of the foot, the flesh grows into them and the pain of stepping on the foot must be intense. We advise, first, that the disease which causes faulty hoof be removed, and the crack will heal. In the meantime, if the crack does not extend to the flesh, carefully clean out all sand, dirt, etc., pare down the edges of the crack, and cover it with a bandage. smeared with pitch; so as to prevent any dirt from

getting in. Keep this on until the hoof grows over. The hoof will grow an inch in about ten weeks. The horse should not be put to hard labor. When the crack extends *down* the whole hoof, and into the sensitive part of the foot, wash it out with the chloride of zinc lotion, (*see Remedies*), until bleeding ceases, then bind the parts together by wires, as in sewing up a wound. Give the horse perfect rest until the union is complete, and then remove the wires. Dr. Dadd claims to have done the same thing successfully with waxed threads. The crack had better be covered with pitch, and a bar shoe worn. To prevent a partial crack from extending the whole length of the hoof, draw lines with a red hot iron in the shape of a V, from the coronet to the crack. These lines should only be through the outer crust of the hoof.

HOOF ROT is a very common and annoying complaint. English writers call it punice foot; and some American writers, tender foot, but no horse's foot is tender unless diseased or injured. It often causes various other diseases of the foot and joints, and is as often caused by them. Its symptoms are a dry rot of the bottom of the feet, which appears chalky, and may be dug out with the knife. The frog sinks away, and the ankle joints are swollen at times, after long standing. If caused by some other disease, that must be first treated. The direct treatment for the hoof rot is, after cleaning out all the decayed matter from the bottom of the foot, pare down the frog and sides of the hoof and apply the corrosive liniment four times a week, for two weeks. Moisten the horn twice a day, with glycerine ointment. (*See Remedies*). Now shoe the horse with a dish shoe; that is, a bar shoe having the web hollowed out like the sides of a dish; the only part which touches the ground being the rim of the inner circle, or else with a light shoe, *thick* in the web, but narrow. A stopping, of leather or gutta percha, forming a

cushion for the yet tender sole, will enable the horse now to resume work.

CORNS, so called, are an accompaniment of hoof rot, or some other disease, which should be first treated. They are not properly corns, but consist of patches of blood or matter forced into the horn from above. When the hoof is cut away, a red spot is discovered, which will grow brighter the more the hoof is cut away. If not attended to promptly, ulcers are formed, and the confined matter finds an opening either at the heel, or the coronet, sometimes continuing around the foot and causing the hoof to drop off entirely. Cure the hoof rot, and as a general thing the corns will disappear.

STONE BRUISE, NAIL PRICKS, and bruises of the feet, should all be treated with a few applications of the corrosive liniment. The bar and shoe, and tow filling, to ease the pressure upon the injured part, are to be recommended. The best immediate remedy, when the liniment is not at hand, is water on a flannel bandage, and fastened around the fetlock. It should be kept wet.

NARROW HEEL, or contraction of the hoof, as we have seen, is a resultant from navicular disease, and always denotes a diseased condition of some other portion of the foot; for so long as the foot is sound, it will secrete healthy horn; and if there is no fever to dry it up, it will not contract. With the disappearance of the disease, the foot will again secrete healthy horn. When this is assured, the horn should be frequently rubbed with the glycerine ointment. The common practice of filling the foot with cow dung, is based on the idea that the foot should be kept moist, which is correct. But it can be much better accomplished by stuffing with wet rags, which also tend to keep the foot clean. The cow dung tends to produce other disorders of the feet. A soft pasture is nature's remedy for all ailments

of the horse's foot. In cold, stormy weather, however, the horse, whatever may be his condition, should have a dry stable, plenty of room, and good bedding.

FOUNDER, acute or sub-acute inflammation of the feet, (*Laminitis*;) is, with one or two exceptions, the most common of all horse complaints. It is caused by bad usage. On examination of the feet, it is found that there is some other disease, generally hoof rot, and we have *never* seen feet, otherwise sound, attacked with founder—or, more properly, inflammation—which leaves the horse foundered. Keep the feet sound and healthy, and you need not fear founder. The immediate causes of inflammation in unsound feet, are various. Overheating, and sudden cooling; a change from the cold and wet to the stable, where he stands in hot dung; long standing in some mud hole; a long journey on a hard dry road; over-feeding after great exhaustion; or over-drinking when hot;—will produce inflammation which is likely to terminate in the feet. Inflammation of the lungs is sometimes suddenly transferred to the feet. The symptoms are restlessness and frequent changing of the fore feet. There is an inclination to lie down, but a fear of doing so, and three or four fints will often be made before he succeeds. He will lie quietly for awhile, and seem to be relieved. When he attempts to rise, the pain is so great that he falls back again upon his side. The nose is often laid upon the fore feet, as if to indicate the seat of the pain and ask relief. This is the first, or sub-acute stage.

Remove the shoes as carefully as possible, cleanse the feet with soap and water, fasten a sponge to the sole, and bandage the feet with thick bandages. Keep these bandages wet with the arnica mixture (*see Remedies*) for several days. Give the patient gruel, scalded mashes, and boiled roots. Give daily a dose of sulphur and cream of tartar. Dilute the drink with cream of tartar. This is the ordinary form of inflammation, taken in its first

stages, and usually yields to the above treatment; but sometimes it progresses so far that the flesh quivers, the eyes glare, the nostrils are distended, the breath is jerking, the flanks are tucked up, the back is roached, the head is erect, the mouth firmly closed, the fore legs are pushed far forward, and the hind legs advanced to take the weight of the body, and the feet are constantly on the move. This is the acute stage.

Remove the shoes, bleed from the jugular vein from two to four quarts, according to the condition of the animal, and insert a pint of warm water into the veins by a large syringe. Purgation and perspiration will ensue, and the horse will be relieved. We do not often advocate bleeding, but believe this to be a case where it will always be beneficial. Now, drench the horse with hot salt and water, bathing his feet and legs with it, and rubbing them dry with a rough cloth or brush. Repeat the bathing and rubbing three or four times in the course of an hour; and after this apply turpentine, or the corrosive liniment, to the foot, just at the edge of the hair. Do not work the animal until well over the attack; and then proceed to cure the hoof rot, or other disease, which may have caused it. It often affords relief to split open the little knob, in the long hair, at the back of the fetlock. For an established founder, the following prescription is given by Dr. Stewart: "Flour of sulphur, one pound; cream of tartar, quarter of a pound; saltpetre, quarter of a pound; pulverized 'jimson' seed or stramonium, one pint. Mix, and make seven doses, giving one every day for a week." At the same time, use the corrosive liniment on the feet.

QUITTOR is caused by wounds, bruises, pricks, neglected corns, etc. Pus, or matter, collects, and moves upward through the tissues for an outlet. It causes severe pain, but makes no sign until it reaches the coronet, when swelling begins. When this is discovered, remove the shoe, pare the sole, soak the hoof

in warm water for several hours, make an opening in the hoof below the *sinus*, or swelling, and apply a poultice—the object being to get a discharge downward. If this does not succeed, slit up the *sinuses* or swellings, and inject tincture of blood root. If you secure a discharge from the opening in the sole, inject blood root, and the cure is soon complete.

Canker, and Cracked Heels, or Grease, are only continuations or developments of a disease known as THRUSH, which is usually caused by filthy stables. A horse who stands in filth all the time, will probably have, sooner or later, Thrush—and then, Greasy or Cracked Heel. As we have said before, the stable should not only be cleaned out and washed down in the morning, but, if the animal has been in the stable during the day, all filth should be removed, and a bed made of clean litter. Thrush and Grease are usually the signs of filth, and they are a disgrace to the owner, which should make him hang his head with shame. Thrush is sometimes caused by other diseases, but in such cases it appears in the fore foot; while, in the hind foot, it is always, we believe, the result of inexcusable negligence. It is a foul discharge, which has the power of decomposing the horn. It is known by its disgusting smell. It appears in the cleft of the frog. It should be treated by soaking pieces of cloth in the corrosive liniment and pressing them into the cleft of the frog and heel at night, removing them in the morning. Do this about five nights a week, until all smell is removed. CANKER, as before stated, is a second stage of Thrush, the horn not only being decomposed, but fungoid or spongy horn being secreted. For treatment, cut away all the poor horn, and apply the chloride of zinc lotion, adding enough flour to thicken it. Fasten on a pad. Re-dress daily, or every other day, and at each dressing cut away all faulty horn. Any contrivance which will press the pad to the foot will answer

the purpose. Mayhew recommends putting on the shoe and putting in wedges.

CRACKED HEELS, called by English farriers Grease, is a disease which follows thrush, and can often be said to be only a continuation of it. It is the oozing out of the ulcerated matter attending disease within. Either the coffin or the navicular joint is affected. The skin of the heel becomes dry and feverish, cracks open, and foul matter exudes. If not checked, the whole heel becomes a mass of putrefaction, filthy and offensive. Grease never occurs when there is a decent attention to the care of the animal. To let it go on after it is once discovered is shameless brutality, and should be a State Prison offence. A growth of *fungus*, or proud flesh, will commence from the sores, which will soon harden and become horny. During all this time the poor creature suffers untold agony. As a preventive of Cracked Heels we recommend clean stables, good bedding, rubbing the legs when the horse comes in from the wet, and a warm dry stable in cold and wet weather. The practice of dashing water on the heels and leaving them to dry as best they will, is a fruitful cause of diseased feet. When the legs are wet they should always be rubbed dry with a cloth, or a wisp of straw.

As soon as cracked heels are discovered, or the heel becomes dry, hot and scurfy, wash with soap and water, and rub dry; then apply the corrosive liniment for three or four days. After this, apply the glycerine ointment for the same length of time. If the disease is not discovered until the grease begins to exude and hang on the hair about the fetlock, cut off all the long hair, and pursue the same course as above. In either case, give the horse almost entire rest while operating on him, or a cure will be doubtful. An hour's moderate exercise daily will be beneficial. We will not give directions for treating the worse stages

of the disease, for we cannot believe that any man intelligent enough to read this book, will allow it to go on after it is once discovered.

DISEASES OF THE GLANDS AND NASAL MEMBRANES. GLANDERS is a fearful disorder, bred by filth, and spread by contagion. It is found mostly in the close, filthy, ill ventilated stables of the city, where impure air, water, and food, are more common. From these it is transferred to the farmer's stables by various means. Horses purchased in the city and transferred to the country, carry the infection with them. The farmer's horse, put up at the city stable when he goes to market, or to court, contracts the affection. Eating, or drinking, after glandered horses, is often sufficient to transmit it. The snort of one horse to another will sometimes carry the infection even at a distance of several yards. The symptoms are running of one nostril, in nine cases out of ten the left; the fluid thin and transparent; it increases, grows thicker, and more sticky; its color changes towards yellow; it becomes clotted with mucus, and long sticky white threads of mucus hang to the nostrils. This soon changes to a stream of filthy pus, thicker, darker, and sometimes bloody. These are the first two and curable stages of the disorder. It is readily distinguished from other secretions running from the nose by its glueness or stickiness, and in the second stage by its sickening smell. During these early stages of glanders, the horse loses flesh, the air passages are affected, the breathing becomes difficult, the glands swell, ulcers form in the nostrils, and the discharge, which was only from one nostril, extends to both, and sometimes to the eye. A gland adheres to the inside of the jaw; the nostril changes color and becomes pallid. As a consequence of this state of things the horse loses his spirits, appetite fails, the coat stares and is easily rubbed off, and the horse rapidly goes down. Unless taken now a cure is

impossible, for every bad symptom rapidly increases; tumors form in the head, and Farcy, which is only another name for the last stage of glanders, ends the miserable existence. The discovery of a cure for glanders by Dr. Stewart, entitles him to the gratitude of all owners of horses. Preventive measures should be taken against this disease. The ill ventilated and foul stable should be aired and cleaned, the manger washed out every day, and the drinking pail kept as clean and sweet as if for your own use. When the farmer puts his horse in a strange stable he should insist that the manger be washed out before his horse eats from it; when leaving a strange stable the nostrils should be sponged out. When the manure is thrown into a basement under or near the horse, powdered charcoal thrown upon it will not only save the ammonia and nearly double its value as manure, but will prevent this ammonia from entering the nose and lungs of the horse. A half peck for the dung of each animal will be sufficient.

We give Dr. Stewart's treatment for Glanders. "Bleed in the neck vein, removing about three quarts of blood.* Have ready a strong decoction of tobacco, of which put one gill in a pint of warm water and turn this down the horse. It will make him very sick, but it will affect him much less than when in health, and thus used is not really dangerous. Wash out his nostrils with the tobacco decoction, weakened with water, as directed in the next section for staggers. Be at pains to reach as high up the nostrils with the mop as you can. The mixture must be as hot as he can bear it. Continue this treatment from two to four weeks, or until a favorable change is apparent. Use the mop

* We do not think Dr. Stewart means to advise bleeding in the first stage of the disease, but only when there is considerable inflammation, ulceration, and enlargement of the glands. At any rate two or three quarts of blood is a small loss to an animal having sixty to eighty quarts.

at the nose for eight or ten days; drench with the tobacco mixture two or three times at intervals of three days. Give the horse as much sulphur and resin as you can get him to eat, for the space of ten days. A full dose will be four ounces of sulphur, and two of resin, both pulverized. Let the food be light and relaxing, grass if it is in season; if not, boiled roots thickened with shorts, and salted. A quantity of salt should be placed where the animal can help himself. "Attend promptly to disinfecting your stable. Fumigate it with tobacco-smoke while the horse is in it. Make him and all his companions inhale as much of the smoke as you can. Fill the stable with the smoke until you can no longer remain in it yourself. Wash every part of it, and especially the mangers, with a strong decoction of tobacco, and keep pounded tobacco leaves in every feeding place used by any horse that has been exposed to the disease." An occasional fumigation of the stable when any infectious disease is suspected, will act as a preventive.

BLIND STAGGERS is a disease known only on the newly cleared plantations of the Southern States, and is caused by eating worm-eaten corn. The worm leaves a peculiar and poisonous dust on the corn, which the horse inhales, the passages from the eyes to the nose are closed, inflammation ensues, the poison is carried to the brain, and the horse goes deaf, blind, and raving mad. Cure is doubtful if not discovered before the mad stage. Bleed freely, give the tobacco decoction recommended for glanders, and, if possible, add a half pound of eye-salts. While still under the effects of this medicine give two ounces of laudanum in a little warm water. Your object is to get the horse quiet, and to prevent spasms. Make a soft swab or mop on the end of a stick, and swab out the nostrils with the decoction of tobacco and warm water. This is to open the passages to the eye, and as soon as a discharge can be

effected, the horse is out of danger; repeat the swabbing out every day until the cure is complete. As soon as a discharge is effected from the head, draw a blister immediately over the brain.

If any one must feed worm-eaten corn, let it be swept and brushed to scatter the poison. Tobacco dust in the manger will act as a preventive. Watch the horse under such circumstances, examine the nostrils often, and if these little passages are closed, the nostrils inflamed, and the head hot, not a moment is to be lost. Prompt action is the only hope. DISTEMPER, or STRANGLES, is another contagious disease, altogether too common. It is often designated as *horse-ail*. It appears in all horses, but usually in the colt, when taken either from his mother's milk, or the tender grass and fresh air of the pasture; confined in a narrow, dark, dirty cell, standing and sleeping in its own filth, and fed on dry food. Such a change is sufficient to induce distemper. We believe that it is always caused by some such violent change, and is spread by infection. It seems to be an effort of the system to adapt itself to the change. The symptoms are, in the first stage, a general derangement, some fever, quick pulse, a dry, hacking cough, sore throat, and running at the nose.

This discharge can be distinguished from glanders by always being white; the neck soon becomes stiff, the throat becomes swollen, an abscess forms, the swelling is hard and hot, the fever becomes high, the breathing is oppressed, food and drink are refused, the swelling comes to a head, and, being opened, the animal speedily recovers. The above symptoms are exceedingly suggestive; *first*, of care in making the change from the pasture to the stable, from green food to dry, from the mother's milk to fodder, or any other great change in the habits. All change should be gradual. *Second*, it suggests what we have

Before urged, air, light, ventilation, and cleanliness in the stable. As a preventive, when one horse has the disease separate him from the rest, where they cannot possibly take his breath, and fumigate and wash with tobacco water as recommended after glanders. *Treatment.*—Wash the neck and throat with a strong decoction of tobacco, as hot as the horse can bear it, two or three times a day. Give sulphur and resin, two pounds of the former to one of the latter. Contrive to make the horse eat a quarter of a pound of this every day, for several days. Give mash, boiled oats, or green feed, but no corn. If the swelling continues, but does not soften, poultice with steaming mash; when it softens open it at once.

Dr. Stewart recommends bleeding three pints, “then take and thoroughly mix together one tablespoonful of gunpowder, one of lard, one of soft soap, one of gum myrrh, and two of tar; put a spoonful of this down the horse’s throat, as far as you can, with a paddle or spoon, twice a day.” NASAL GLEET is usually a continuation of distemper, or, rather of the discharge accompanying distemper. We confess that we do not know its cause. The symptoms are an irregular discharge, often mixed with blood. It will sometimes cease for a few days, and then recur. The discharge changes color with the food. Leave the horse to himself, in an ordinary, dark, ill ventilated, filthy stable, and you will soon have an incurable case of glanders. If this is not desired, treat the same as for distemper, washing out the nose daily with the tobacco water, until the discharge ceases. Good pasture, if in mild weather, and good stabling, if cold or wet, are requisite. If stabled give some green food and roots, with daily out-door exercise.

DISEASES OF THE EYE are almost, if not wholly, unknown in the wild horse, being the result of the carelessness or cruelty of man. They are very seldom hereditary, as a blind mare will

produce colts with the best of sight. They are in no way connected with the teeth, as is often supposed. The term, "NATURALLY WEAK EYES," so often used, is folly, as there is no such thing as naturally weak eyes. The Creator has provided every horse with perfect vision, and it is the ignorance or recklessness of man that destroys it. Other diseases of the head will sometimes affect the eye; when the disease is cured, the eye will recover. There are three causes which account for nearly all cases of disease of the eye. The first is ammonia. The dung and urine constantly give out ammonia; it is often so strong as to make you sneeze and your eyes to water, even when in the stable for a few minutes; what then must be the effect upon the sensitive, tender eye of the horse, who stands in it hour after hour. It is the cause of three-fourths the cases of weak and diseased eyes. It can only be lessened by having the urine drained off as it falls, by removing the dung, by daily washing down the stable, and by admitting fresh air at the head, and having ventilation at the back of the stable, for all which full directions have been given. The second cause which renders the first much worse is the want of light. Nothing thrives without light, and the frequent change from the dark stable to the glare of day, and *vice versa*, produces a very injurious effect. (*See Construction of Stables.*) The third cause is from injuries to the eye, from hay seed dropping into the eye, from cuts of the lash, and blows about the head. The former is prevented by having no lofts over the stable, and by putting the hay where the horse can reach it without stretching up his head. The latter is prevented by kindness instead of cruelty. The general treatment for WEAK EYES, SIMPLE OPHTHALMIA, or INFLAMMATION OF THE EYES; SORE EYELIDS; and simple injuries of the eye, causing soreness or inflammation, is easy, and should never be neglected, as these simple affections readily become serious dis-

orders. When the eyelid is closed, and tears drop from it, attend to the case at once. Remove all the causes of the disease. Examine the eye and remove any hay seed or other substance that may have caused it. Bind a cloth over the eyes, and wet it with arnica and water, one pint of water to an ounce of arnica. Repeat this for several nights, sponging the eye several times a day with cold water. If inflammation is excessive, and white spots are seen on the eye, indicating sores or abscess, bleed three pints, and use the eye-wash invented and prescribed by Dr. Stewart. (*See Remedies.*) The blood should now be attended to. Give two or three ounces of sulphur, every other day for a week, and every other week for six weeks. If inflammation does not decrease, bleed the inner surface of the eyelid, or the eye vein. Give no corn, but green food or roots. SPECIFIC OPHTHALMIA, or Moon Eyes, is a terrible disease, without cure. It is caused by the fumes of impure stables. *Symptoms*:—Swollen eyelids, tears; the circumference of the ball is inflamed; the horse cannot bear the lid to be lifted in the light, but will submit in the shade, the iris loses its bright color, and grows lighter; the whole eye is disorganized. Soon these symptoms disappear only to break out again with renewed violence. Sometimes it attacks one eye, sometimes both; it changes from one eye to the other, disappears and returns, but continually grows worse, and finally produces total blindness in one or both eyes. To check the disease, and save one eye, should be attempted. The horse should have a roomy, well-ventilated stall, perfectly dark in front, but well lighted from behind or above. Open the eye vein, and puncture the interior of the lid. Put a cloth saturated with cold water over both eyes, at night, and if the eyelids are very much inflamed add one ounce of arnica to a pint of water, and keep the cloths wet with this during the forenoon. Give green food, or roots, but no corn, and but little hay. Give the

following preparation: Powdered sassafras, three ounces; skunk cabbage, three ounces; gentian, three ounces; sulphur, two ounces; elm bark, eight ounces; ginger, two ounces; salt, three ounces. Mix, and divide into twelve powders, giving one every night with the food. Let every farmer who has a horse attacked with this disease, raise or remove his loft, give ventilation, light, etc. This will cost money, but the price of one good horse will pay for a good deal of carpenter work. The little washer, cosily stowed away in the inner corner of the eye, called the haw, which serves to wash the eye and clean it of specks, dust, and grit, sometimes becomes inflamed and protrudes over the eye, in the form of a white hook, and is therefore called a HOOK, and is sometimes removed by persons who should know better. This deprives the horse of his only resource to keep his eye clean. When much inflamed, prick it slightly; pull the lids apart, and apply the eye wash two or three times a day, and the inflammation will disappear.

The various affections of the eyes are the cause often of shying, fright, wheeling, sudden starts, running, backing, turning out of the road, and all eccentric movements of the horse. He sees imperfectly, and, being timid, acts accordingly. Whipping in such cases is barbarous, mean, and cowardly, besides being worse than useless. Instead of further fear, confidence should be restored by kind words. If the *owner* always speaks kindly to the beast, he will soon learn confidence, and the sound of his voice, during fright, will do more good than the whip or the rein. When frightened, speak kindly before you draw the rein, then draw it gently, talking all the time, not in loud, harsh tones, but mildly.

DISEASES OF THE MUSCLES AND TENDONS.

POLL EVIL, and FISTULA, are the same disease appearing in different places—Fistula on the top of the shoulder, just under

the upper portion of the shoulder blade, in the cartilage marked Q in the skeleton. Poll Evil occurs in the neck, just back of the ears, near the point marked E in the skeleton. Both are caused by bruises against the top of a low stable, or the sides of a narrow stall—against the top of a low doorway, or against the sides of a narrow one. It is strange, that to save a few dollars, or a little space, men will thus allow their valuable property to be injured. These diseases are sometimes caused by blows; by the saddle; and, rarely, by rolling on a stone or stick. The tendon becomes swollen and painful; the horse tries to rub the place against the sides of his stall, which only aggravates the evil. A small swelling appears. Any person who watches his horses with any care, will discover the evil before it goes farther. When the above symptoms are discovered, put the hand to the places mentioned. There will be heat and tenderness, even if the swelling has not appeared. At this stage, apply the corrosive liniment every morning for a week or ten days. If, however, there is a considerable swelling before it is discovered, or if, after applying the corrosive liniment as above, the swelling should continue, an abscess has formed, and prompt measures are required. The following is Dr. Stewart's valuable prescription: "Spread a thin coating of May Apple liniment (*see Remedies*) over the whole tumor every morning, washing it off at night, and then greasing the surface of the tumor. Continue this three or four days, until pus begins to ooze out; increase the liniment, apply every other day, and let it be on a day and a night, but *never* longer. Always wash it off thoroughly with warm soapsuds, and grease with any kind of grease." If the tumor is not made to discharge, cut it with a sharp knife, at its junction with the body. If the May Apple liniment is not to be had, apply a linseed poultice, or a poultice of equal parts of sugar, soap, and powdered bloodroot.

BOG AND BLOOD SPAVINS, so called, are not spavins, and bear no resemblance to spavin. They are of the same nature as WIND GALLS and THOROUGH PIN; but where, and why, these diseases got their odd names, it is difficult to conceive. The spavins appear at the hock; wind galls at the ankles; thorough pin on the back part of the hock joint. Because they do not often cause immediate lameness, they are said to be harmless. But how would a man like to have *his* injuries and sores judged in the same way? They are caused by severe strain, and by blows and kicks on the legs, such as brutal men often give. They should never be opened, as they cause a permanent running sore.

Apply the corrosive liniment three or four times a week for three or four weeks, and if no improvement occurs, let them alone. When, however, they produce stiffness of the joints, or inflammation, apply the liniment until it disappears. CURB is an enlargement on the back of the leg below the hock. Give rest, and corrosive liniment. It is a dangerous injury, and will often render the horse useless unless a long rest and treatment are given.

TETANUS, or LOCK JAW, though not very common, is an exceedingly painful and dangerous disease. It is usually caused by wounds, bruising *either* nerves or tendons, such as prick in shoeing, nicking, docking, broken knees, galls, etc., etc. It is also caused by such abuse as hard driving and standing in the cold or wet. The horse first grows fidgety, the ears are set, the muzzle protruded, the head elevated, the nostrils remain dilated, the muscles grow rigid; upon lifting the head, the "haw" projects over the eye; the tail is raised, the belly contracts, the legs are straddled and stiff, the eye is sunken, the whole body becomes hard and contracted, the jaws are locked, and agony and starvation make short work of the sufferer. If the symp-

toms are discovered before the jaws become locked, make a mash by boiling a peck of bran in a gallon of water. The bran should be in a loose bag; and after boiling twenty minutes, bind this bag to the throat as hot as it can be borne; at the same time fasten a quilt, or a couple of large blankets, over him. Just before binding on the bag, give a quart of corn meal gruel. If you can thus produce perspiration, you will be likely to save locked jaw.

If, however, the jaw should be locked before action is taken, or become locked in spite of the means taken, resort must be had to bleeding and opiates. Bleed two quarts from the neck vein, then stop the flow for half an hour; then bleed three quarts again; stop the flow, and again bleed three or four quarts. Never bleed continuously in any case.

Now have ready the bran mash and quilt, adding a little tobacco juice and camphor to the water. Dissolve a quarter of a pound of salts in a half pint of warm water, and add one ounce of laudanum. Turn this slowly down the horse's throat, by means of a tunnel or open horn inserted between the front and back teeth. After three hours, give the corn meal gruel; and in three more, two ounces of salts. Give the gruel every six hours. In the mean time, let a pail of gruel stand where he can stick his nose into it with ease, and he will suck it up himself as soon as his sufferings abate. If all these measures should fail of relief, cut the scab from his fore leg, grate it fine on a coarse file, put a teaspoonful in each ear, and dust a little up his nose.

CRAMPS, or spasms of the muscles, are caused by over-exertion during the day, and cramped confinement during the night. The horse loses control of his limbs; one moment they may be stiff and rigid, the next they may jerk and twitch with more or

less violence. Rub the legs with salt and water, and, when dry, with the corrosive liniment.

RHEUMATISM is a common complaint. It mostly affects the joints, shoulders, and hips, but often the chest also. It follows colds and chest affections. Driving a horse into a pond when heated, exposure to cold wind or rain, excessive exertion, and sudden changes, are all causes of rheumatism. It is more likely to attack a high conditioned horse than a lean horse. The symptoms are the same in cramps, but more marked; the limbs swell, it flies from one part to another, and sometimes to the heart, where it proves fatal. Sometimes it settles in the feet and becomes *founder*, again, it settles in the chest, and the horse is said to be chest foundered. Rub the legs with salt and water as for cramps, and give a quart of salt and water, as hot as the horse will take it. The bowels can be relieved by an injection of the same. Give two or three doses of "jimson seed."

For spasms of the muscles, or twitching of the muscles in any part of the body, rub with salt and water, and when dry, apply the corrosive liniment. In cases of STRING HALT apply the liniment to the hip, at the junction of the spine, and to the back part of the foot, daily, for a month. Give two doses of "jimson seed" the first week, and one dose a week for the next three weeks. If the string halt is confirmed there is not much use of touching it. When it first appears the above treatment often removes it or makes it less.

DISEASES OF THE SKIN AND EARS. As all hardships first fall upon the skin, it is no wonder that it is often diseased. SCRATCHES. This troublesome affection is caused by stable filth, helped by a bad state of the system, the blood, and the digestion. It makes its appearance on the back side of the foot, in the form of dry, scabby patches, which are very itchy, and the horse, scratching them with the other foot, extends

them upward to the fetlock, until they form a solid mass, often raw and bleeding. It is readily discovered from the continual scratching of the horse, whence it is called scratches. Use the corrosive liniment, four times a week, until cured. Feed green food or roots, mashes, etc. For swelled legs or ankles, from whatever cause, apply the liniment as directed above. **SURFEIT** is a general disease of the skin, indicating a thick and impure state of the blood. Little pustules appear upon the skin, and the oily secretion whose work it is to moisten and lubricate the surface exudes from them. Bleed the horse from two to four quarts, according to size and condition, give two doses of sulphur and resin, rub the skin where the pustules have appeared, with an ointment of sulphur and lard in equal parts. Do this two or three nights, turn him to pasture, or let him have a week's rest, and he will be as good as new. **MANGE** is a disease into which neglected surfeit will run. It is also caused by negligence, filth, lack of grooming, starvation, bad digestion, and bad condition generally. It is exceedingly contagious; any thing it touches will carry contagion; it is accompanied by a little insect, but whether the insect is the cause or the effect is not fully ascertained. The first symptoms are a scurf, or scabby eruption of the skin, usually about the mane, accompanied by excessive itchiness. The skin becomes scaly, peeling off and leaving raw, red spots, often bleeding. The horse rubs himself as if he would tear the skin from his body, everywhere he rubs he leaves dandruff, scurf, or scabs to infect other animals, unless prevented.

If the horse is in good condition, he has probably been infected. Wash the whole body in lime water. Make an ointment of one pint each corrosive liniment, sulphur, and lard and anoint the whole body, from the nose to the hoof; spread thin as possible, but see that every part is touched. If fair weather, let the horse out during the day, but keep him in, in

cold or wet weather, or at night; in two days wash again with lime water. If the horse is in low, poor condition, give a dose of sulphur and resin every third day, for two weeks, and feed well with green feed, steamed oats, boiled roots, etc. The former treatment will be of little avail unless you now bring him into good flesh and condition.

HIDE BOUND. This very peculiar disease is caused by the drying up of the secretions which make the skin soft and pliable, and the hair sleek and glossy. Any complaint attended with much fever, will do this. It is also caused by exposure, and by poor ventilation. The skin becomes dry and hard, adhering to the flesh; the hair is rusty and staring, the digestion is usually very much impaired, and the excrement is dry, hard, and black. The blood is corrupt, thick, dark and feverish. Bleed; taking two to three quarts, give a tablespoonful of "jimson seed" three times on every third day. Let the horse have sulphur and resin in his food, as previously directed. Green food, or roots, good stabling, fresh air, and rest will do the remainder. *Stiff Complaint* is only an aggravated case of Hide Bound.

WARTS. Seed warts are not of much account, unless they appear where they will be likely to become chafed. Blood warts should be removed as soon as they appear. In either case grease the skin for three inches about the wart with tallow. Make a strong solution of potash, one and a half pounds to one pint of water. Touch the end of the wart with this, morning and evening, *always* applying the grease before doing so. Apply the potash every other day, always scraping off the dead matter before doing so. Do not let the potash touch any thing but the wart. After the wart is reduced apply corrosive liniment a few times at intervals of two days. Keep them greased, but wash off the grease before putting on the liniment. **HARNESS GALLS, SADDLE GALLS, WARBLER, and SIT FASTS,** are all

different developments of the same thing, namely galling by harness, saddle, shafts, etc. When such a gall is observed, wash clean with cool water, and when dry cover with an adhesive plaster of common salve. If swollen and matterated, leave a slit in the plaster for the escape of the matter.

In bad cases use the corrosive liniment until healing begins, then put on the plaster. When they harden like corns, leaving the edges sore, remove the hard portion with a knife and apply the chloride of zinc lotion until they begin to heal, then apply plaster as before. Scabby eruptions of the ears are to be washed with strong soapsuds, and anointed daily with the sulphur ointment. Tumors appearing on different portions of the body should be treated at once with the corrosive liniment.

DEAFNESS, and most diseases of the ear, are the results of violence, beating over the head, pinching and pulling the ears, etc. If tumors or swellings appear within reach of the little mop, apply the corrosive liniment. If within the ear inject small quantities of the eye-wash. (*See Remedies.*)

DISEASES OF THE BRAIN AND NERVOUS SYSTEM are usually fatal. Water on the brain; hydrophobia; epileptic fits; phrenitis or inflammation of the brain, and insanity are, so far as we know, wholly incurable. Dr. Stewart thus writes of APOPLEXY: Apoplexy is caused by a pressure of blood upon the brain. It is hardly recognized by the farmer, and he would probably be surprised to know how many horses die of it yearly. The animal's death is usually attributed to some other disease, and the treatment pursued aids in hastening the result. Perhaps nearly one-fourth of those severe attacks of disease which go among the masses by the name of bots are really apoplexy."

It is often mistaken for staggers or some other disease of the stomach. High feeding and little exercise are often the immediate cause, but these are not sufficient to account for it without

other and predisposing causes. Apoplexy is always characterized by giddiness and wildness of motion, and nearly always by a staggering gait. Hence the reason why it is so frequently mistaken for "the staggers."

Its severe symptoms in the next stage are profuse sweating, a trembling of the whole frame and especially of the knees; a wild, wistful look and a twitching of the skin, and jerking of the ears. Youatt's description is perfect. "The actual illness is perhaps first recognized by the horse standing with his head depressed. It bears upon or is forced against the manger or the wall, and a considerable part of the weight of the animal is evidently supported by this pressure of the head. As he thus stands he is balancing himself from one side to the other as if he were ready to fall; and it is often dangerous to stand near him or to move him, for he falls without warning. If he can get his muzzle into a corner he will sometimes continue there motionless for a considerable time, and then drop, as if he were shot; but, the next moment he is up again with his feet almost in the rack (*we think the last is a rare exhibition. C. W. D.*). He sleeps or seems to do so, as he stands, or at least he is nearly or quite unconscious of surrounding objects. When he is roused, he looks vacantly around him. Perhaps he will take a lock of hay if it is offered to him, but ere it is half masticated the eye closes, and he sleeps again with the food in his mouth, soon afterwards he is perhaps roused once more. The eye opens, but it has an unmeaning glare. The hand is moved before him, but the eye closes not; he is spoken to, but he hears not. The last act of voluntary motion which he will attempt is usually to drink; but he has little power over the muscles of deglutition, and the fluid returns through the nostrils." These are the first stages; foaming, gnashing of teeth, twitching, wildness and convulsions follow. As there is a pressure of blood

which is fearfully congested, bleeding must be resorted to. Take first a couple of quarts. In ten to twenty minutes as much more. Between these bleedings give a pint of hot salt and water, with a teaspoonful of cayenne pepper, and half an ounce of laudanum in it. If the horse is not weak from the bleeding, in ten or twenty minutes bleed again, until he shows signs of weakness. Mix one-half ounce each of gentian and ginger, and four ounces epsom salts; make two doses. Give one four hours after the laudanum, the other twelve hours later. Give a warm meal gruel after this until the bowels are free.

If the horse recovers, take pains to prevent his getting in high condition again, as he will almost surely have another attack.

PALSY, or partial paralysis, is a rare disease, is not well understood, and no treatment is sure. Nervous spasms, in which the horse becomes frightened, agitated, and trembling, without apparent cause, are usually treated with the whip, which can only aggravate them. Give the horse a little quiet, pat his head, talk soothingly to him, and a few minutes will restore his tranquillity. Relax the system by giving only soft food.

DISEASES OF THE TEETH AND MOUTH.—Few people compare animals with themselves, when called upon to care for their wants, but in most respects, physically, they are alike, and the same causes produce the same effects in each. As the child suffers in teething, and the adult from toothache, so do the colt and the horse, under like circumstances. During suckling, the mother's milk prevents the evil effects of teething, but after weaning, the colt is liable to various diseases from this cause. The process by which the first teeth are removed, and replaced by the permanent set, is wonderful and curious, but we have not space to describe it. During all this period, or into the third year, there is always more or less soreness and inflamma-

tion. A tooth striving to push through the gums at one end, and to fasten its fangs at the other, is a serious matter, and it should be aided in its upward course by cutting the gums. The mouth should be often examined, and wherever a tooth is trying to push its way through, with a sharp knife, cut from the base of the tooth to the point. If this is not done, inflammation will often extend to the throat, the head, and the eyes. The inflamed condition of the mouth, constantly tends to sour stomach. The practice of putting out the colt to pasture, and leaving him for weeks to take care of himself, is to be severely condemned. In this time, he may lay the foundation, and we know that thousands of colts do thus lay the foundation of serious diseases of after life. The colt should be often visited, examined, and handled, if you desire a sound or reliable horse. Pasture is best for him in summer, but will not excuse neglect. In winter keep him warmly and comfortably housed, give provender, cut feed, a few oats, roots, and other light diet, but no solid, heating food. Keep a little salt where he can easily get at it, and occasionally put half a dose of sulphur in his feed. Good wood ashes, put often in the bottom of the manger, will neutralize the sour stomach. Toothache we believe to be very common among horses, not alone from decayed teeth, but from biting pebbles, grit, etc., in the food, and from hard substances getting between the teeth. The head is often carried on one side, or pressed against the wall, saliva dribbles from the lips, the food is allowed to fall from the mouth. One day the horse eats little, and is low spirited; the next day he makes up for both, showing the same condition as in men. If the symptoms continually grow worse, the teeth should be examined, and the *decayed* one removed. If the breath is hot and offensive, the saliva thick and stringy, give sulphur, four ounces; if possible, an ounce of "jimson seed." Put ashes in the manger, as directed for colts.

Green limbs of the poplar are most excellent in these cases, and will be eaten greedily. Scurvy of the teeth is only a form of decay, the decayed portion being left on the surface. Treat as above, and when the stomach recovers its healthy tone, the crust can be removed with a coarse file. The tooth should be sandpapered after filing. Before closing the subject of the teeth, we would say that the practice of feeding unground grain to young colts, before the permanent teeth are set, is injurious, not only at the time, but in after years.

There are many abuses of the horse's mouth by bit and bridle; and mouth and tongue are often chafed and wounded by those who profess to have feeling for brutes. Severe pulling and "*sawing*" on the bits, pulling up hard and suddenly, and all like practices, except when absolutely necessary for personal safety, are to be condemned. Always say whoa, before you begin to pull on the bit, and then pull up steadily.

LAMPAS as a disease, is only imaginary, it is an inflammation of the muscles in the roof of the mouth. The old resorts to burning, and caustics, are horrible. If the inflammation is severe, make a slight cut in the muscles, *close to the teeth*, wash the mouth and gums with some cooling lotion, weak arnica and water, or weak chlorate of potash.

DISEASES OF THE THROAT AND LUNGS are common in our climate, as well to horses as to man. But climate is not all. The horse has huge lungs, and absorbs large quantities of air at each breath; to breathe this air over again is injurious. When we take into our account, that in ninety-nine stables out of one hundred, the air is not fit for the horse to breathe at all, and that this air has to be breathed over and over many times for lack of ventilation, it is a wonder that any horse has sound lungs. COLDS, *influnza*, ("pink-eye," "horse-ail," so-called by many horse jockeys,) are produced in the horse in *just the same manner*

as in men. Heating and exposure afterwards; a hard, wet drive without being properly dried, rubbed down, warmly housed, well bedded, etc. Such are the causes. SWELLED THROAT. In this term we include, sore throat, enlarged glands, and laryngitis, or inflammation of the larynx. In all these developments of cold, there is more or less soreness, swelling, redness of the eye, an increase of mucus from the nose, dullness, stiffness, failure to eat, slobbering of saliva, etc. To discover laryngitis, apply the ear to the windpipe from the chest to the head; as you proceed, carefully listening, up the neck you will hear a little gurgle, which increases to a wheeze or whistling sound. All these affections lead to bronchitis, consumption, and death. The place to stop them is here at the outset, the time is now, when first discovered. If a mild case, dissolve half an ounce of extract of belladonna in two quarts of water. Put half a pint in a bottle, hold up the horse's head, and turn it into the mouth; let him retain it thirty seconds, drop the head, and it will run from his lips. Repeat this at least three or four times a day. Give no hay or whole grain; only green food, roots, boiled grain, mash, gruel, and such soft food should be given during any soreness or inflammation of the throat. If the attack is severe, or increases in spite of the above treatment, open the neck vein, and bleed two or three quarts. Prepare chloride of zinc, three drachms; extract of belladonna, half an ounce; tincture of capsicum, two drachms; water, one gallon, and use as directed for the belladonna and water. Apply the corrosive liniment on the outside of the throat, not more than two mornings in succession. COUGH is an accompaniment to almost every disease of the throat and lungs. The first cough should be noticed, and its cause ascertained. The disease which causes it should be attacked. Dr. Stewart recommends the gunpowder mixture, (*See Remedies*,) and if he

stands in stable, as much sulphur and resin as he will eat. Undoubtedly a piece of rock salt in the manger is beneficial in all throat and lung complaints. Grass in its season, and soft food as above, are nature's remedies. BROKEN WIND, HEAVES, roaring, wheezing, and various other difficulties in breathing, are all of one nature, and ought to be all classed as one. They are incurable in the present state of science. Such horses should never be driven hard, far, fast, or heavily loaded. Feed and water before starting, and never put them to work when the stomach is distended with food.

DISEASES OF THE CHEST AND LUNGS. CHEST FOUNDER. Symptoms, stiffness of shoulders during action, pain in the breast when touched. Give hot salt and water, and wash the breast in the same. If on the second day the symptoms grow no better, apply the corrosive liniment, and give a pint of hot salt and water, in which mix half an ounce of ginger, and a drachm of tartar emetic. BRONCHITIS is one in the list of maladies that follow each other from cold to consumption. First cold, then enlarged glands, swelled throat, bronchitis, pneumonia, congestion, and last, consumption. When will men learn that care for their animals which shall prevent this train of maladies. Dr. Dadd thus gives the symptoms of Bronchitis. "Veterinarians recognize this disease under three aspects, viz.:—

1. "Acute, as when the horse is suddenly attacked with an irritable cough and sore throat, with the usual febrile symptoms, such as quick, wiry pulse; membranes of the nose and mouth redder than usual, accelerated respiration; great anxiety of countenance, etc., etc.

2. "Chronic bronchitis, which sets in after the acute has subsided. This stage is marked by a discharge of watery and some-

times mucous fluid from the nose; and the act of respiration is performed with a wheezing noise.

3. "The third variety has been named the epidemic." Give two ounces of Epsom salts, in a pint of salt and water, pretty warm; while this dose is being prepared, wash the whole neck and chest with a decoction of tobacco, weak, but hot. Now put one ounce each of gentian and ginger in a quart of water, and boil until one half evaporates. Divide this into four doses, and give night and morning. Continue these until improvement in the patient is perceptible. We also wish to cover the mucous membranes. Slippery elm is the best possible article; into two quarts of boiling water, stir just enough to thicken it, not quite as thick as cream; make four doses of it, and give twice daily. Keep the bowels loose by means of warm gruels and mashes. Dadd says: "*Fine feed*, scalded and set before the animal warm, answers two purposes, viz., that of relaxing the engorged surfaces of the nose and throat, and also has a relaxing effect on the bowels. If the bowels should remain closed, inject warm soapsuds. PNEUMONIA, or inflammation of the lungs, is the next stage of the disease; it is usually ushered in with a chill, (the horse shivering all over), succeeded by unnatural warmth of the body and coldness of the extremities; the pulse is quick, breathing short, quick, and hard; a sure symptom is the icy coldness of the extremities. If you do not conclude to end these sufferings with the bullet, treat vigorously as recommended for bronchitis. Congestion is the last stage of pneumonia, and unless death follows immediately, the horse is spared for the finishing stroke of CONSUMPTION, for which we prescribe no cure, as there is none.

DISEASES OF THE STOMACH AND BOWELS.

The BOT is a natural inhabitant of the stomach of the horse. His history is as follows: The gadfly, that torment of the horse.

Attaches her eggs to his hair, they hatch, and the little grub is licked off by the horse and swallowed. Sometimes several hundred will thus be deposited in the stomach. They attach themselves to the upper part of the stomach, where they spend the winter and pass off in the following season to make room for another company. They seldom do any harm. In rare instances they obstruct the entrance of food. It was formerly supposed that they injured, and sometimes killed the horse, and there are still those ignorant enough to give powerful doses of medicine "to kill the bots," or, "to drive out the bots."

Now, if it were worth while to attempt to kill them, or drive them out, it cannot be done. No medicine can be given strong enough to kill them. They will live for months corked up in spirits or poison. But supposing the dose given would kill, it can only reach a very small proportion of them. They are securely fastened where the dose goes over them like a shower bath, and has no effect, except on a few stray ones who may be wandering about off their guard. When examined under the microscope, they are seen to have a little mouth no larger than the point of a needle, which they can close at their pleasure and refuse *all doses* you may send them. It is said that they eat through the stomach of the horse, and cause death; this is not so. They have no power to eat the stomach *until it becomes so diseased that death must surely follow*. The stomach of a horse apparently sound, killed by accident will often be found eat through. It is probable that they attack some weak or partially diseased spot. Any one who will examine them under the microscope will see that they have no means of penetrating the healthy, sound stomach. When bots are voided in the excrement or are found clinging to the anus, give the following prescription: powdered fern, two ounces; powdered poplar bark, four ounces; mustard seed, two ounces; common salt, six

ounces; sulphur, three ounces; aloes, one ounce. Mix and divide into eighteen powders; give one, night and morning, in the feed. This will bring away any not firmly attached, and will promote digestion. The awful doses sometimes given for bots, we condemn. SOUR STOMACH is liable to trouble the horse at almost any time; it is caused by fermentation of the food; grass after eating hay; too much food after fasting, and other like causes. Fermentation produces gas, the gas distends the intestines, and the horse has COLIC, inflammation of the bowels, ENTERITIS, (fret, gripes,) or SPASMODIC COLIC which though called by the above differing names, is substantially the same, and has three stages. The symptoms are, *first stage*, uneasiness, eating stopped, pawing with fore foot, hind foot raised to the belly, the nose points to the flank. *Second stage*, spasms, they grow more frequent and more violent: the sufferer sweats and trembles; he assumes various positions to obtain relief. *Third stage*, he suddenly lies down, rolls, kicks, and as suddenly comes to his feet again. He is now in terrible pain, and in danger every moment of a rupture of the bowels, and instant death. The treatment for the colic is so simple that a child can understand it, and yet many persist in turning all kinds of nostrums into the already terribly inflamed stomach. During the first stage, give a tablespoonful of chloroform in a gill of whisky, and a pint of warm water. In case the chloroform is not right at hand, dissolve in a pint of hot water all the salt it will dissolve, and give as hot as the horse will take it. Now inject a pint of warm soapsuds. If you have no syringe, put it in a long necked bottle and turn it into the rectum, or turn it through a tunnel. Secure a discharging tube from the bowels and the horse is saved. If the disease has reached the second, and especially the third stage, the horse must be bled before any other treatment.

FLATULENT COLIC is much like the former, but occurs in the large intestines, and is caused by a stricture or stoppage of the rectum. Hard masses of excrement are held fast in the passages, and the gases cannot escape. A rumbling is heard in the abdomen, which distinguishes this from the ordinary colic. The bowels must be moved, but not by physic. Give the injection of warm soapsuds two or three times, at short intervals; and if these fail, strip your arm, grease it to the elbow, force it up the rectum until the obstruction is reached, and crush it with the fingers—or, if that cannot be done, roll it backward until it can be removed. After the bowels are freed, in any colic, give a dose of sulphur and resin, daily, for three or four days, with soft food, and a little daily exercise. While waiting for a movement of the bowels, the work can be hastened by bathing the flanks in hot tobacco water. Inflammation and soreness of the rectum, sometimes accompanied by bleeding, often follow these severe attacks of colic. Bathe the rectum with salt and water, cold. Grease the anus with lard and salt whenever it appears to itch or be sore.

DISEASES OF THE LIVER, URINARY ORGANS, ETC. JAUNDICE, or YELLOWS, is distinguished by yellowness of the eyes, mouth, and skin. The dung hardens, the urine is highly colored, and the appetite fails. Give four doses of "jimson seed," two days apart; omit for a week; and if the symptoms do not begin to yield, repeat the doses. If jimson seed is not to be had, give daily a half dose of sulphur and resin. The bark of yellow poplar is beneficial in all these diseases.

NEPHRITIS, or INFLAMMATION OF THE KIDNEYS, is a very troublesome complaint, caused by any one of the thousand abuses to which the horse is subjected. Bad fodder is one, and strong *diuretics*, such as copperas, saltpetre and mineral poisons, are the frequent agents. In this, and all other diseases of the

urinary organs, the horse stands with his hind legs wide apart; he frequently tries to urinate, but the amount is small, and grows more scanty; it is high colored, and sometimes bloody; he refuses to turn the body, and shrinks when the loins are pressed. In the first stages, apply a cold water bandage to the loins. Into one pint of boiling water stir enough powdered slippery elm to make it creamy, and add one half pint of linseed oil, for a dose. In severe cases, bleed once; apply the corrosive liniment to the loins; increase the linseed oil to one pint. Give for drink, oat meal water, made by stirring a quart of oat meal into a gallon of boiling water.

DIABETES, or PROFUSE STALLING, may become nephritis, and should be taken in time. Dr. Stewart recommends whortleberry leaves, two ounces to one quart of boiling water, for two doses, on alternate days. Bloody discharges with the urine he treats in the same manner. Sometimes the urine is thick and reddish, and again white and milky. These states precede GRAVEL, or STONE IN THE BLADDER, which is indicated by partial suppression of the urine and great suffering. The symptoms are otherwise very much of the nature of spasmodic colic. The cure of gravel is doubtful, but Dr. Stewart says he has cured five cases out of six in his extensive practice by the following means: A table spoonful of "jimson seed" every other day, in the feed, until six doses have been given. Also four doses, or a dose morning and night, for two days, of the spirits of nitre four ounces, oil of juniper half an ounce, oil of sassafras one ounce, made into four doses. Suppression of urine may be present without any of the diseases we have named, caused by any injury to the urethra. Give the dose last named in a pint of warm water, three times a day, on alternate days.

FOUL SHEATH is not a disease, but leads to it. The sheath should be bathed and washed quite frequently. When this is

not done, dirt will collect inside it, forming into lumps, which irritate it, and cause inflammation. Foul, putrid, offensive matter runs from the sheath, a disgusting advertisement of either the ignorance or carelessness of his keeper. The penis is not protruded at all to urinate, but the water is allowed to run out of the sheath. The first thing to be done is to remove the lumps, wash the sheath with soap and water, and grease it with lard and salt. This washing and greasing should be repeated two or three times a week, until the sheath is perfectly well and the foul odor gone.

DISEASES OF THE HEART AND BLOOD are not common, unless we name all fever a disease of the blood, which it really is. Disease of the heart cannot be ascertained except by the most experienced eye and ear, and when discovered we know of no remedy. Fevers accompany nearly all diseases of the horse, and require no separate treatment. Bleeding is treated of under the head of Remedies. POISONS of snakes and insects, should be treated at once with a half pint of whisky and a teaspoonful of hart-horn, internally, and a wash of the same externally. For the sting of insects, mosquitos, gadflies, etc., we would recommend, as a preventive, the use of the cresylic soap, sold by Orange, Judd & Co., publishers of the *American Agriculturist*, New York. An animal washed with this is insect proof, and the endless torment and irritation are at an end. A box of ten pounds costs four dollars, and will prove well worth the money. We would once more caution farmers against the use of poisons in treating their stock. *Nux vomica*, *cantharides* or *Spanish flies*, *copperas*, or *sulphate of iron*, and *corrosive sublimate*, are all poisons. *Sumach* will sometimes poison the nose, causing sores. These should be greased with glycerine or lard.

FRACTURES of the skull, of the nasal bones, and of the ribs, are sometimes caused by blows or kicks. No person should

ever strike a horse with any hard or heavy instrument, and to kick a horse in the abdomen is brutal.

FRACTURES OF THE LIMBS are simple when broken only in one place, and compound, when broken in two or more places; in which case they will protrude. A simple fracture if taken at once can be made to heal. Pads of cotton should be laid upon the leg and bound tightly to it with strips of cloth. These should be soaked with arnica tincture and water, half and half; keep them wet for several hours at a time every day.

The next thing is to sling the horse to prevent his lying down. Get six or more yards of bagging, according to the width of the stall. Fasten one end to one side of the stall, run it under the horse's belly, and draw it up on the other side till it takes him nearly off his feet. Any contrivance that will answer this purpose is all that is required. He must be fastened in front, so that he cannot pull himself out of the sling. When the fracture is a compound one, and the bones are displaced, the setting should take place before he is raised to his feet. The leg should be wet for sometime previous in hot soapy water. Cloths may be wrapped around, and hot water poured on for twenty minutes. A rope must be fastened to his foot and carried around a post or some fast body and the leg gradually pulled until the bones come in place again. This can be told by a gentle pressure of the hand. The wet cloths should now be removed, and if the bones are all right the leg may be rubbed with the hand until it is dry. This may be done by one while others prepare the bandages, three inches wide, and dipped in a warm mixture of equal parts of pitch, beeswax, and tallow. Begin to wind below the fracture, place cotton padding over the fracture, and wind the bandage tightly over this. Wind as far above the fracture as below it. Two pieces of green wood may be hollowed out so as not to press upon the wound, and the ends

shaved down thin, and then bound on with more of the adhesive strips. All this should be done as quickly as possible, and the leg relieved from the ropes." A horse in good condition will usually by this treatment recover the use of the limb. The leg should be bathed for a few days with arnica, to prevent inflammation. We have known a simple fracture heal in one month, and have heard of a compound fracture taking seven months. A fracture below the knee will heal sooner than one above. Let the horse decide when it is healed by giving him a chance to use it after one or two months. Feed him well, and keep up his strength.

SHOEING requires little to be said, as the smiths take that in their own hands. No horse should be shod before he is three years old.

The shoes on young horses should be cleaned as often as once in two months. The farmer should stand by and watch the operation, and see that the heel is not pared down too much. One-third less should be pared off at the heel than the toe.

An account of the remedies for diseases of the horse.

DR. STEWART'S CORROSIVE LINIMENT. Turpentine, one pint; corrosive sublimate, one ounce; gum camphor, one ounce; shake well, and let it stand twenty-four hours. It should be kept constantly on hand by every owner of a horse. The corrosive sublimate should be powdered as fine as it is possible for any druggist to do it. Tell the druggist so when you go for it. Never turn this liniment on to your flesh or clothing, or on to any tin or metal. Always turn it into some glass or earthen vessel. Shake the bottle well before opening. Apply with a little mop, and for bone diseases dry it in with a hot iron, held near the flesh.

GLYCERINE OINTMENT. Animal glycerine, half a pint; chloride of zinc, half an ounce.

CHLORIDE OF ZINC LOTION. One grain chloride of zinc to one ounce of water.

SPLINT LOTION. Acetic acid, two ounces; water, eight ounces; chloric ether, one ounce; apply to a pad of two or three thickness of cotton cloth bound on.

GUNPOWDER MIXTURE. One tablespoonful each of gunpowder, lard, soft soap, gum myrrh, and two of tar. Divide into six doses.

SULPHUR AND RESIN. A dose of sulphur is two ounces. A dose of resin two tablespoonfuls. Two ounces of sulphur and one ounce resin form a dose for every other day.

JIMSON SEED. This well known plant (*Datura Stramonium*) possesses great virtues as a horse medicine. It grows in waste places among rubbish, and is sometimes called thorn apple. Gather the seeds in October. A dose is a tablespoonful.

The remaining five prescriptions we copy from Dr. Stewart's invaluable book, *The American Farmer's Horse Book*.

MAY APPLE LINIMENT. Boil May apple roots until you obtain a thick syrup; while still boiling add one-fourth as much lard as you have syrup. Great care will be necessary to keep this stirring and prevent it from burning.

MAGIC NERVE LINIMENT. Spirits of hartshorn, one and a half ounces; sulphuric ether, one and a half ounces; spirits turpentine, half an ounce; sweet oil, three fourths of an ounce; oil of cloves, half an ounce; chloroform, one ounce. Keep tightly closed, and excluded from the light. Do the bottle up in a cloth.

MERCURIAL SALVE. Quicksilver, the size of a pea. Iodine, the size of a pea. Corrosive sublimate, one ounce. Mix with two tablespoonfuls of lard. Rub it in with a rag, on the end of a stick.

SULPHUR OINTMENT. Red precipitate, half an ounce; sul-

phur one ounce; lard, four ounces. Mix well and preserve for use.

EYE WASH. Take three hen's eggs and break them into a quart of clear cold rain-water. Stir until thoroughly mixed. Boil over a slow fire, stirring often. Add half an ounce of sulphate of zinc, (white vitriol,) continue the boiling a few minutes, and it is ready to set off. The curd that settles in the bottom, applied to the eye at night, will draw out all fever and soreness. The liquid on top is the best eye wash ever made for man or beast.

BLEEDING is recommended by Youatt, Percival, Mayhew, and Stewart, the leading Veterinarians of this country and Europe. It is to be done judiciously, however, as wholesale blood-letting for every disease is bad practice. Bleed always from the large neck vein, the jugular vein, from six to ten inches down the neck, from the back of the jaw. Draw a small hard cord tightly about the neck, about six inches below the place where you intend to bleed.

As soon as the neck fills out, moisten the finger, and smooth the hair straight with the vein. Cover the eye on that side. Lay the fleam lengthwise of the vein, holding it in the left hand and strike it a smart blow with a stick, taking care not to cut through on the opposite side of the vein. When you wish to stop the bleeding cut the cord from the neck.

Bring the edges of the cut together, and pin the skin with a small pin. Tie some of the tail hairs tightly under the pin.

In twenty-four hours the pin can be removed, and the scar wet occasionally with spittle or, better, diluted arnica. To find the pulse of a horse press the finger along the artery on the underside of the lower jaw bone. A proper pulse is thirty to forty per minute. Fifty beats to the minute is evidence of disease.

MULES The usefulness of the mule as a farm laborer has

been fully appreciated, in some of the middle and border States, but there seems to be an unaccountable prejudice against them in the eastern and western States. We regard them as more desirable than horses or oxen on the farm. They are much quicker in their movements than the ox, and are as tractable when rightly trained.

Mules, on an average, are more valuable than horses, are easier raised, are not as subject to disease and accident, are not likely to run, and are longer lived; but to make them thus valuable, just as much care must be taken in breeding them, for "any kind of a jack," "or any kind of a mare," is *not* "good enough," to breed a mule from. The same points in breeding must be observed as in breeding horses.

The following comparison instituted by a writer in the Agricultural Annual is, in the main, true :

"Cost of getting horse colt or mule colt, the same. Cost of raising the first two years, a little against the mule. The third year the mule will do light work enough about the farm to pay for his keep, and after he is three years old will do any ordinary farm work. But the horse colt must be kept until he is four years old before he is worked at all, and when he is four must be a first-rate colt to bring as much as the mule will at two years old.

"But assume the animals are both required for the farm work, see what a difference there is in favor of the mule. The *working life* of the mule can be as safely estimated at thirty years, as that for a horse at ten years, so while a mule is working its life out, three horses will be required to do equal service. But these are not the only items; the saving of feed is at least one-fourth, or not less than five hundred and forty-seven bushels of corn, and twenty-seven and a half tons of hay. These amounts added to the original saving in purchase of

animals show an advantage in favor of the use of the mule, over the horse, of over one thousand dollars, during the ordinary life of the animal. There are still other advantages, the mule seldom runs away, breaking wagons, harnesses, etc., and when one does run he is not likely to run again. He is healthier, and less dainty about food, unground grain and dry feed being just the thing for him."

The so-called vices of the mule, are jumping, kicking, and obstinacy; "as obstinate as a mule" has become a proverb, and like many other proverbs conveys only half a truth. These faults are all in training. The mule will not jump if when a colt he is kept where he can not get over the fences. Most people will let down one or two of the top bars and let the mule colt jump over the lower ones. He then learns to jump. It would be much better to leave the top bar and make him go under. Kicking comes a little more naturally to the mule than the horse, but the habit can be broken up in colthood, and they will not kick thereafter. We have the word of Mr. Riley, superintendent of government mules, who has had over five thousand under his care at one time, that by kind treatment to the colt he is readily broken of this vice. The mule colt should be handled and gentled, just as directed for the horse colt, and taught not to fear the presence and handling of man. It is fear that makes him kick. Most trainers, fully believing in the natural "devilishness" of the mule, leave them alone just as long as they can and then go at them with club and lash, harsh words and harsher actions, and soon break the mule into an inveterate kicker. As to obstinacy; train a mule colt as we have directed for training colts, and we venture that there will be no more obstinate mules than there are baulky horses. The good points of a mule, are short stout limbs, rather than long slim ones; a compact body,

rather than a large frame. The best color seems to be the black, and dark colors. As we have said, the diseases of the mule are fewer than those of the horse, but otherwise are the same, and the treatment is the same also. The mule was introduced into this country by Washington, and is a universal favorite wherever he has had a fair trial.

CHAPTER X.

CATTLE.

BREEDING. It should be the object of every breeder to raise as good cattle as his circumstances will permit. This requires great care in breeding. No one breed has all the good qualities, and therefore there should be a careful and judicious selection of those individual animals, of different breeds, having the points desired, and a cross made to produce an animal adapted to each separate purpose of the farm.

This theory, with all its limitations, we now propose to set before our readers.

OUR DAIRY STOCK.*

The characteristics of the domestic Cow are dependent upon a great variety of circumstances. They are partly hereditary, and partly acquired, or implanted in the system, by the treatment and management adopted in raising the young animal. What are called dairy qualities, are not strictly inherent in any particular race, breed, or family of stock, but may be found more or less developed in individual animals, not only among all the well established breeds, but also among those not recognized as belonging to any particular breed, as the common or "native" stock of the country.

* By the author of *Milch Cows and Dairy Farming.*

Fig. 71. Head of "Auroora, 2d," Boston, owned by H. G. Wilson, and J. C. Ingham, Mass.



If a farmer wished to collect a dairy stock for any special purpose, as, for instance, the production of butter or of cheese, or the manufacture of large quantities of milk, for sale as such, he could find animals not only among our common stock, but also among all the well-known breeds, that would be well adapted to his objects. Still, there would be a decided difference in these animals. With those selected from any of the well established breeds, especially cows that have been bred with reference to the dairy, he would find a remarkable degree of uniformity. He would soon discover that they transmitted their good qualities to their offspring with certainty, and that he could rely upon them to produce their kind, when bred to a male of their own class or breed—while in those selected from the common stock of the country, he would see no uniformity, either in size, color, or milking capabilities, and that they could not be relied upon to produce a progeny like themselves. And here is the great and most striking defect of the “native” stock, so called. While much of it possesses high qualities, there is no reliance upon the quality of its progeny, as there is among the well established breeds, and hence the advantage of a resort to the latter.

Dairy stock may be divided into three classes: Cows that are adapted to the BUTTER dairy, or where the making of butter is the leading object; cows that are adapted to the CHEESE OR MILK DAIRY; and cows more especially adapted to the FAMILY DAIRY. Animals best adapted to either one of these purposes might be unfit for the others.

THE BUTTER DAIRY. For the butter dairy, we want a cow that gives a rich quality of milk, or a milk in which the oily or butter particles readily separate from the water, and rise in a thick, rich, golden coating upon the surface. Quality, here, is more important than quantity. The milk of some cows is

more than double the value of that of others, in the butter dairy, simply on account of this property of separating readily into its component parts. It may be no richer, intrinsically, and no more nutritive, than milk that has a better emulsion, as the chemists say, that separates more slowly, with greater difficulty, and less completely. Milkmen know very well that milk of the latter quality will bear transportation and hauling far better than what is commonly called richer milk, and that it is less injured by such transportation.

The milk of the Jersey cow, for example, is quite celebrated for its butter-making qualities. It sends up rapidly, under favorable circumstances, a large proportion of rich, thick, yellow cream, that makes a delicious butter. The milk of the Ayrshire, on the other hand, does not so quickly or so completely part with its cream. Set a pan of Jersey milk alongside a pan of Ayrshire milk, under equally favorable conditions, and let them remain for twelve or eighteen hours, and then skim the two, and the difference will be immediately perceptible. The skimmed milk of the Jersey is blue and watery, poor in quality, while that of the Ayrshire is still white and rich. The Ayrshire milk is more nutritious, probably, than the Jersey; it has parted with less of its cream; it is rich in casein, or cheesy properties, in which the nutritive qualities of the milk are found.

Now, for the purposes of the butter dairy, it is easy to see which of the two is most desirable, which is worth the most. The one will make a larger proportion of rich butter than the other, quart for quart, but the latter is undoubtedly the more nutritive of the two, to say nothing of the larger quantity. It is also easy to see which is the most valuable animal for the production of milk, to be sold and consumed as milk. And this illustrates the difference between the products of the two

breeds, and also the importance of studying the specific object of the dairy, or of breeding and feeding animals that are especially adapted to secure that object.

The Jersey cow was introduced into this country about thirty years ago. She came from the Channel Islands, off the coast of France, but belonging to Great Britain. The Island of Jersey has been noted, for many years, for the great care with which it has bred its cows with special reference to the production of butter. Taken first to England from the little island of Alderney, to which the animal was transplanted from Jersey just a century ago, it acquired, as a *breed*, the name of Alderney--a, name to which it is now little entitled, since that island is but a speck in proportion to Jersey, and it is now nearly covered with residences, and not devoted to the raising of stock of any kind. When first imported, the Jersey cow was ill-shaped, lean, and described as resembling "two boards nailed together, as thin as a lath." But within the last twenty years she has been quite transformed into a comely-shaped creature, with a fine deer-like head and neck, delicate limbs, soft skin, and all the points of a good dairy cow—with good hind quarters, less thin and angular than formerly, the whole form giving promise of the highest dairy qualities.

The Jersey is by no means remarkable for the quantity of milk she gives, but she holds out better than most other classes of dairy cows, so that if she does not fill the pail in the height of the season, she makes up for it by yielding a good supply of milk the year round, it being often no easy matter to dry her off previous to parturition.

"*Lady Milton*," (*Fig. 72*,) is a capital model, not only of a good Jersey, but of a good dairy cow; she gave her owner, Mr. James C. Converse, of Arlington, Massachusetts, a yield of butter which is worthy of special record. In the first week of

June 1867, she gave one hundred and twenty quarts of milk, which made fifteen pounds of butter. In the first week of July, the yield of milk was one hundred and fourteen quarts, and of butter, eighteen pounds. In the first week of August, she gave of milk, one hundred and fifteen quarts, and of butter, sixteen pounds. In the first week of September her yield of milk was one hundred and seven quarts, and of butter, fifteen pounds. In July her aggregate yield of butter was seventy-nine pounds, and from the 1st of June to the 7th of October, on green food without grain, her butter amounted to two hundred and ninety-three and a half pounds, or an average of fifteen pounds and ninety-two one-hundredths a week, for eighteen weeks and three days. And this was no exception to her ordinary yield, nor was there any special effort made to feed her up to her utmost capacity. Pasture grass constituted her food in June and July, with pasture and a little green fodder corn at night in August and September.

This cow is, perhaps, better than the average of animals of her breed; but the same general characteristics are to be found in them all; a rich and high quality of butter, and an abundance of it. She was drawn from life, and the engraving gives a very good idea of the form of the Jersey cow, and of her color, which is usually fawn and white, sometimes shading into a bluish gray, or mouse color, and darker.

"*Abraham*," (*Fig. 73.*) of which we also give an engraving, shows the color and the form of a good Jersey bull. He is owned by the city of Boston, and kept at the public institutions at Deer Island, in Boston harbor. He is represented as in rather high flesh, but otherwise is correctly drawn from life for this volume, and a capital likeness of one of the best breeders in this country.

For the butter dairy, the Jersey cow must hold the first place among the well established breeds of this country. But she is

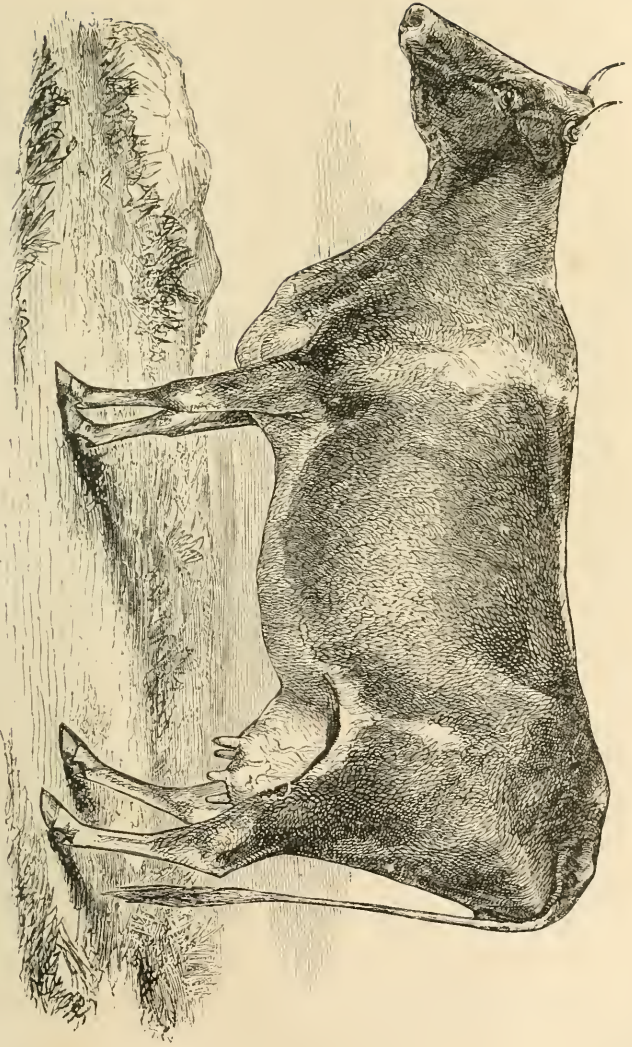


Fig. 72. "LADY MILTON"—Jersey—owned by J. C. Converse, of Arlington, Mass



rather a large eater, and she does not fatten to a good quality of beef when she is ready to be laid aside. That the breed does not make the best of working oxen, can hardly be regarded as any objection, when it is considered that human labor must be at rather a low ebb wherever it can be profitably associated with so slow an animal as the ox.

The estimation in which the Jersey is held as a dairy cow, is sufficiently shown in the high prices which she commands, and the readiness with which she sells. She has grown in popularity every year wherever her merits have become known, and this not merely among amateur farmers, or on the grounds of the suburban gentleman who wants a pet family cow to ornament his lawn and supply the small family with milk, but in the hands of the dairy farmer who seeks profit rather than the gratification of taste or fancy. One or two pure bred Jerseys in a herd of ten "native" cows, will improve the butter qualities of the milk to an extraordinary extent. The same object may be attained at less cost, by an infusion of Jersey blood, secured by a cross of a pure Jersey bull and the common cow.

It should be stated that the butter of the pure bred Jersey is rather too rich to keep well, and that to have it in perfection it should be consumed fresh. This is a fact too often overlooked, but which is perfectly well established and admitted by many who have had the largest experience with the pure bred Jersey. It may well be doubted whether any herd of "native" cows could be selected which would give such uniformly rich milk, and so highly colored and delicious butter.

The Brittany cow has characteristics very similar to the Jersey. She is not remarkable for the quantity of milk she yields so much as for the quality of the butter made from it. In this respect she stands first in reputation among the breeds of France, Brittany butter being eagerly sought not merely for its superior

richness and beautiful color, but for a peculiarly sweet and "nutty" flavor which it possesses to a greater extent than any other butter. This peculiarity is preserved in animals crossed with the Brittany, even to the third and fourth generation, an evidence of the antiquity and established qualities of the race. The agent who visited the district of Morbihan to select two herds recently imported, saw cows of this race at Vannes, whose milk yielded four pounds of butter a day for some days in succession.

The Breton cow is small in stature, the average height being only about thirty-six to forty inches. She is a perfect dairy cow in miniature, with a remarkable symmetry of form, a short, fine, clean head, with sharp outline, a small muzzle, a bright eye, small ear, and slender horn. Her neck is thin, long and slender, with a free crest and little dewlap. She has a straight back and prominent and well developed hind quarters. The ribs are well arched, the chest wide and deep, showing abundant room for the internal organs. The limbs are remarkably beautiful, the legs short, the joints small and well defined, the hoof small, dry and generally black. The skin is fine, soft, and yellow, the hair fine and curly, the color black and white. A few are all black, and now and then a red and white one appears.

This is the poor man's cow, the pet of small farms and scant pastures, hardy, docile, living and yielding a good product longer than most other races of domestic cattle, satisfied with little and with that little coarse, willing to shirk for itself around the house, or wherever she can find a morsel of food. She continues often till twelve or fifteen years of age to yield well, losing only about a quarter of her greatest flow of milk at the age of sixteen or eighteen years. The Brittany cow is worthy of a high place in the butter dairy, either as a pure breed, especially in regions of short pasture and limited fertility, or as a

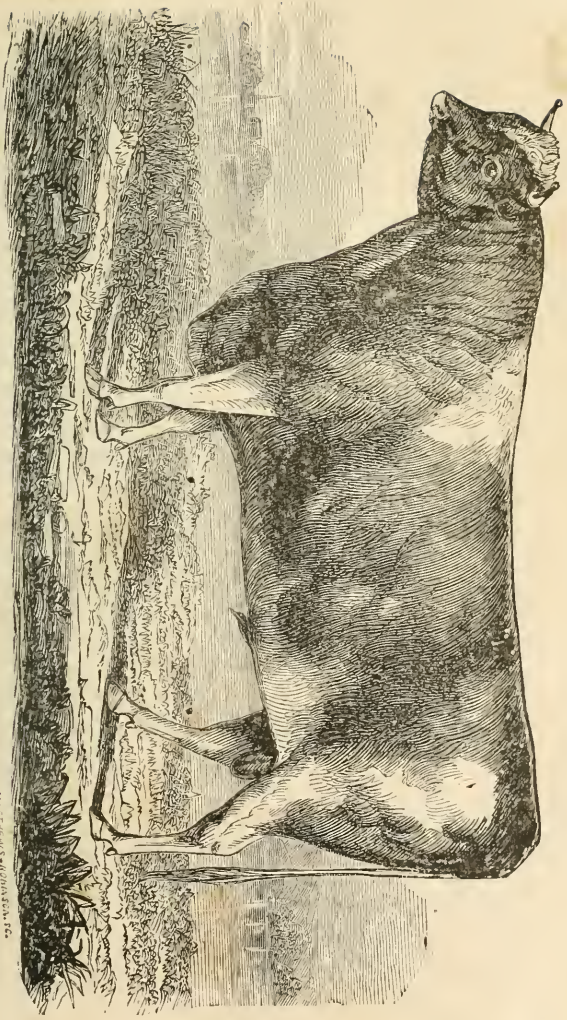


Fig. 73. "ABRAHAM"—owned by the city of Boston.

grade with our common stock, or with any of the well marked breeds. The butter will command the highest price in the market, while, from the small size and gentle disposition, the animal will be sought as a family pet.

THE MILK DAIRY. In the milk dairy, or where cows are kept for the production of milk to be sold in its natural condition, the object is usually to obtain the largest quantity with less reference to the quality. And here not only the class of stock, but the whole system of feeding and management should be quite different from that adopted in the butter dairy. We want an animal that yields largely in proportion to the food consumed, and that holds out well. In regions of great fertility where the pastures are naturally luxuriant, a few families of the Shorthorns and Shorthorn grades or crosses of the improved Shorthorn male, with well selected common cows of the country, meet this essential feature to a very high degree.

The improved Shorthorns, as a breed, originated towards the close of the last century, the basis of it being a class of cows at that time to be found in the counties in the North of England, especially in Durham, Yorkshire, and Lincolnshire. They were noted as milkers, and remarkable for large size, which was due to the striking fertility of the region. So susceptible were these animals, in the hands of the skilful breeder, that they rapidly gained a high reputation, and to this day they have maintained their position, though, as a breed, they have lost, to some extent, the strongly developed milking qualities of the old stock. This was, perhaps, the fault of the breeder rather than of the breed. The abundance of nutritious food furnished to the young animal induced an early maturity, which led to the general practice of breeding for beef, rather than for milk, and to the consequent neglect of the dairy qualities.

Some families of improved Shorthorns have retained the

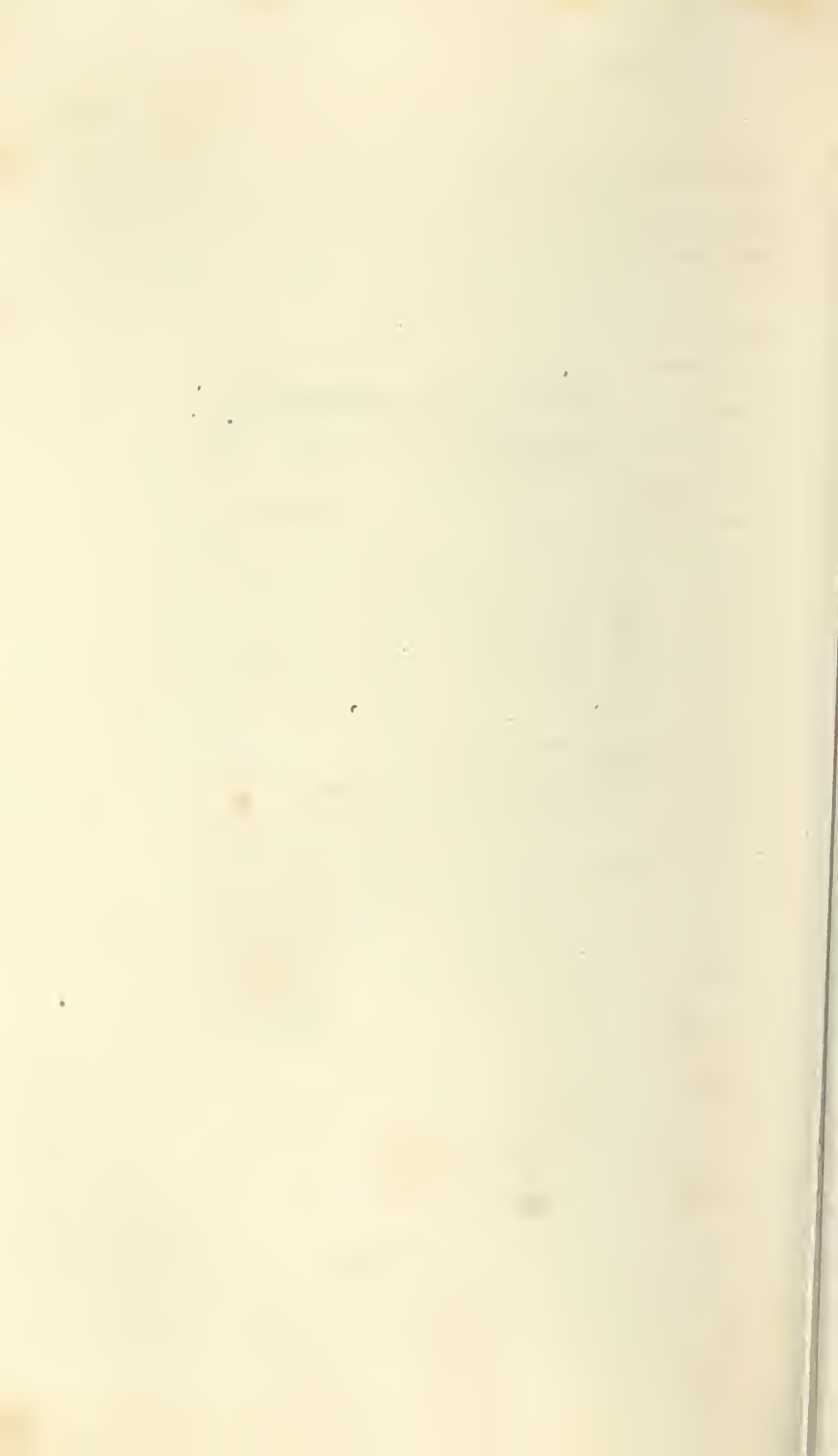
milking qualities, however, to a much greater extent than others, and a few breeders have taken special pains to keep the dairy qualities in view. The "*Sixth Duke of Thorndale*," (Fig. 74,) one of the most perfect animals of this breed in the country, owned by George T. Plunkett, Esq., of Hinsdale, Massachusetts, traces his pedigree through a long line of rich milkers. The milking strain is concentrated in him to a remarkable degree. And so it is in "*Aurora Second*," a superior cow belonging to H. G. White, Esq., of South Farmingham, Massachusetts, the head of which forms the frontispiece to this chapter. For dairies where the production of milk for sale or for the manufacture of cheese, constitutes the leading object, some strains of the Shorthorn or Shorthorn grades are very useful in regions of abundant pasturage, or where the soiling system is adopted and practised.

It is for the town dairy, or where cows are kept for the supply of milk to the cities, that the grade Shorthorn is chiefly sought. In such cases the space the animals occupy becomes a matter of some importance, and the object is to make the most of it. And hence, in the London dairies, we find the old Yorkshire cow, essentially a Shorthorn, and the modern improved Shorthorn crosses are kept as the most profitable, though, in proportion to the amount of food consumed, they may not yield any more than animals of some other breed.

The Ayrshire is another fixed and well established breed which has been frequently imported into this country, and has exerted a marked influence upon the stock on our dairy farms. Ayrshire, to which the breed owes its name, lies on the coast of the Firth of Clyde, in the southwestern part of Scotland. The climate is milder and softer than that of most other parts of the country, and well calculated for a dairy district. Here, about a century ago, originated a series of improvements in



Fig. 74. "6TH DUKE OF THORNDALE." Bred by Mr. Samuel
Thorne, Washington Hollow, N. Y., the property of
G. T. Plunkett, Hinsdale, Mass.



dairy stock, which, though not remarkably promising at first, have made the name of Ayr as widely famous for its dairy cattle as for the sweet songs of its poet, Burns.

It was not alone by the careful selection from the old native stock that these improvements were effected, but it is probable that more or less crosses were taken with breeds already established. A native race may be improved by careful, choice, and systematic breeding and selection, but the process is slow and uncertain, and offers less advantage to the enterprising breeder, than the more promising one of using stock already improved to obtain first crosses. Just what the crosses were that led to the early modifications of the old Ayrshire cattle, it matters little. They were, no doubt, desultory efforts made without any clear idea of building up a famous breed on the basis of the old stock, which was small, ill-fed and ill-treated, supposed to have been derived originally from the western coast of France, the country of the Bretons. A better course of treatment, which prevailed after these early attempts, did much, no doubt, to change the general character of the stock of Ayrshire, as it will any other.

The Ayrshire cattle, now a well-established and well-defined breed, have long been distinguished for their remarkable dairy qualities, and for the quantity of milk they give in proportion to the size of the animal and the amount of food consumed. The form and structure of the cow, from the muzzle to the tail, indicates that she possesses qualities which adapt her, in an eminent degree, to the purposes of the dairy. Her head is small, with a long and narrow muzzle; her eyes, sparkling and lively; her horns usually small, clear, and crooked, and set well apart at the roots. Her neck is long and slender, small towards the head and free, from the dewlap. Her shoulders are thin, her fore quarters light, and her hind quarters large and

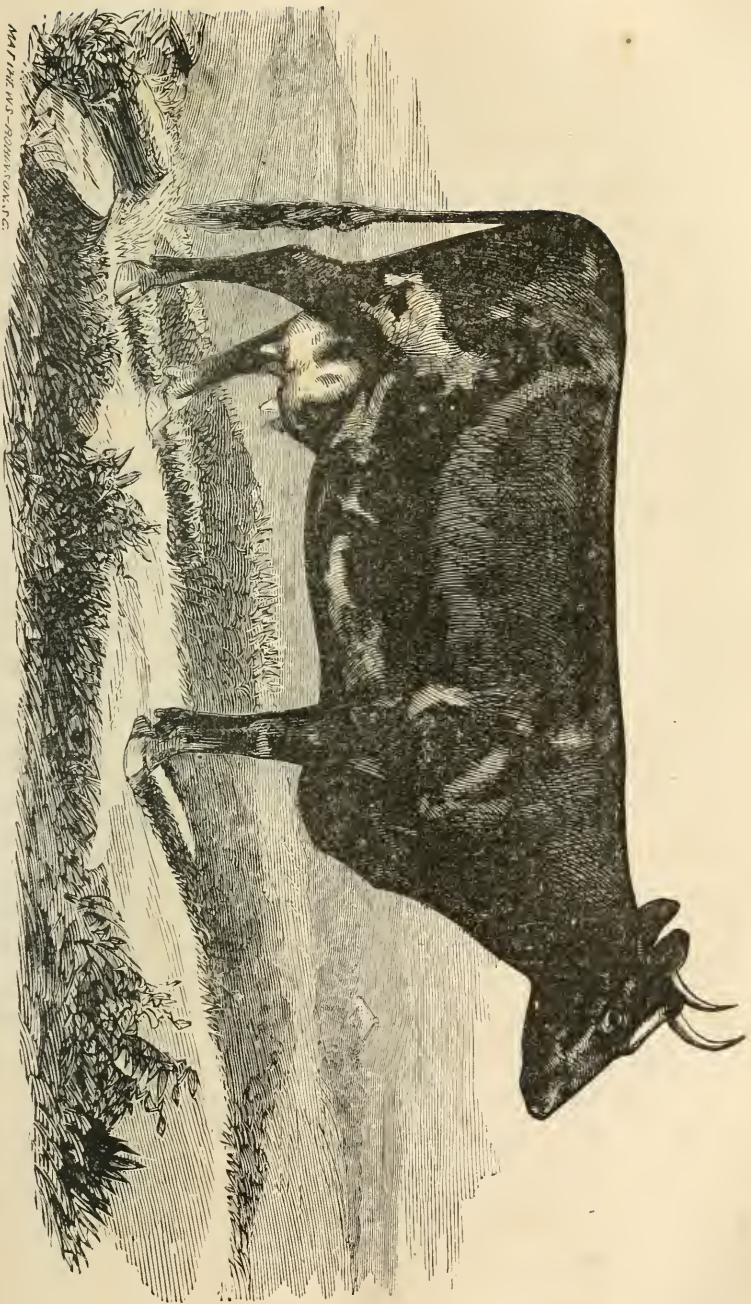
well developed, giving her often a sort of wedge-shaped appearance, which, though it may not add materially to her beauty of form, is universally regarded, among dairymen, as a sign of a great milker.

The engraving of "*Flora*," (Fig. 75,) a prize Ayrshire cow, belonging to William Birnie, Esq., of Springfield, Massachusetts, gives a very correct idea of this wedge shape, and the full development of the hind quarters, by which it is produced. It is the form of a cow of great capacity at the pail. The back is straight and broad behind, the dorsal joints loose and open, the carcass deep, the pelvis full and wide over the hips. The tail is usually long, small, and slender, and the legs short with firm joints. The udder is large, square, broad, extending well forward, not over fleshy, too low hung, nor too loose. The milk veins are large and prominent, the teats sometimes too small, pointing outwards, and set well apart. The Ayrshire is generally a good handler, her skin thin, her hair soft, her whole figure compact and well proportioned, having no objectionable amount of ossal.

"*Honest John*," (Fig. 76,) drawn by the same artist, and belonging to the same owner, shows the form and figure of an Ayrshire bull. He is represented in too high flesh, a weakness of the artist, but otherwise the likeness is correct. He is dark red and white; the color of the breed, generally, is variegated, either dark or light red and white, often beautifully contrasted. Occasionally the color is all red.

There is a tendency to nervousness in some of the Ayrshires, particularly in young heifers, but it seldom extends to viciousness. With mild and gentle treatment, frequent handling, and freedom from excitement, it is easily overcome. The cow is docile and managed without difficulty.

It is now nearly forty years since the importation of Ayr



MATTHEWS - BOSTON, U.S.A.

Fig. 75. "FLORA?"—Ayrshire—owned by William Birnie, Springfield, Mass.



shires into this country began. During that time the breed has considerably changed and greatly improved in appearance. The black muzzle, always objected to by the Ayrshire breeder, was then quite common. The color was darker, usually deep red or brown, flecked with white. More recently there has been a tendency to lighter colors, the red becoming of a lighter shade and less in extent, and the white forming the prevailing color in many good specimens. The form, too, is more symmetrical, and more attractive to the eye. These changes have not interfered with the tendency to milk, and the animal is hardy, active, full of life and spirit, and remarkably well adapted to our climate and short pastures. She is a good milker, and seldom fails to yield a large quantity and a good quality of milk.

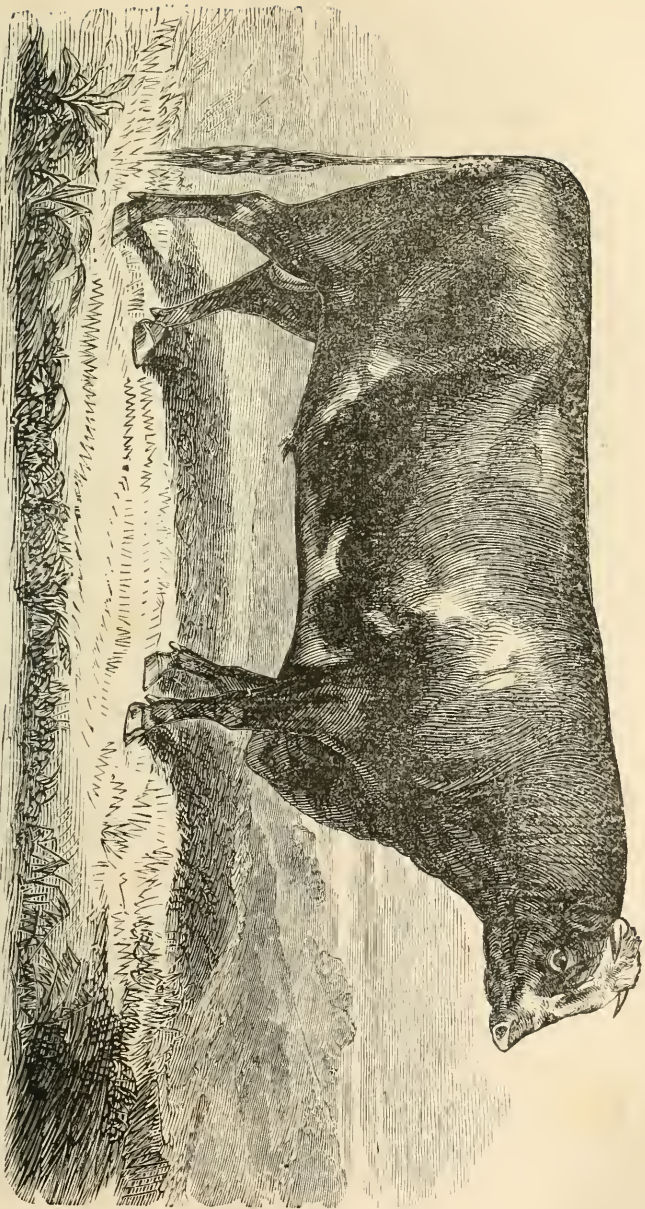
It should be borne in mind that no dairy cow could be expected to do as well here as in the moist and mild climate of Scotland. Our climate is dry. A drizzling rain or mist in Ayrshire, keeps the grass green, succulent, milk producing. A dry, hot, sultry summer is seldom known there. Here it is the rule. No cow, in such a climate, and on such food as we can offer her, in most part of the older States, will do as well at the pail as in such a climate as that of Scotland, and we have no right to expect it.

But a cow belonging to Mr. Birnie, the owner of "*Flora*," with the milk carefully and accurately weighed, gave in April, after calving on the 25th of March, one thousand one hundred and twenty-seven pounds of milk; in May, nine hundred and thirty-four pounds; in June, one thousand and twenty-five pounds; in July, nine hundred and seventy-two pounds; in August, nine hundred and twelve pounds; a total in five months of four thousand seven hundred and fifty-three pounds, on pasture feed or green hay and cornstalks. This was *her own*

weight of milk every month for the five months of the trial, and four hundred pounds over. Larger yields than this are recorded.

One of the four Ayrshires originally imported into this country by the late John P. Cushing, Esquire, of Massachusetts, gave in one year three thousand eight hundred and sixty-four quarts, beer measure, or about nine hundred and sixty-six gallons, at ten pounds to the gallon, being an average of over ten and a half beer quarts per day for the whole year. And the first Ayrshire cow imported by the Massachusetts Society for Promoting Agriculture, in 1837, yielded milk from which was made sixteen pounds of butter a week for several weeks in succession, on grass feed alone.

The cow "*Jean Armour*," imported in 1838 by Mr. H. H. Peters, of Massachusetts, gave in June, having calved on the 20th of May, one thousand five hundred and twenty-four and a half pounds of milk, an average of fifty and five-sixths pounds per day. In July she gave one thousand six hundred and six pounds, or an average of fifty-one and five-sixths pounds a day. In August, one thousand four hundred and forty-one pounds, an average of forty-six and a half pounds per day. In September, one thousand and forty-one pounds, or forty-seven and one-third pounds per day. The total product from June 1st to September 23d, a period of one hundred and fourteen days, was five thousand six hundred and twelve and one-half pounds, or an average of forty-nine and three-sixteenths pounds a day. During the second ten days of June she gave five hundred and twenty-one and one-half pounds of milk, or fifty-two pounds a day. During the second ten days of September she gave four hundred and sixty-two pounds, or forty-six pounds per day. Her milk was set for three days in July, and six pounds and three ounces of butter made from it. Her weight, in good



MARSDEN, DEL.

THE FRANKS-ROBERTSONS, N.Y.

Fig. 76. "HONEST JOHN,"—Ayrshire—owned by William Birnie, Springfield, Mass.

order, was nine hundred and seventy-six pounds. She was in good pasture all the season and after June 12th had three pints of corn and cob meal and three pints of bran, and, late in the season, in September, green cornstalks once a day.

These yields of Ayrshire cows, which might be multiplied, show the general characteristics of the breed. In her native country the Ayrshire is generally bred for the dairy and for no other object, and hence the cow has attained a just and world-wide reputation for this quality. Still she fats readily when her usefulness is over. She is hardy and does well on short and thin pastures, and so has proved herself very useful on a great proportion of the farms in the Eastern States, where a larger cow would not thrive.

The Ayrshire makes a good cross with the common stock of the country and with the Shorthorn. The cross with the Jersey is not to be recommended. With the Shorthorn her form becomes a little more symmetrical, while there is no risk of lessening the milking qualities of the offspring, if sufficient regard is paid to the selection of individual animals to breed from. As a breed, it probably unites, to a greater extent than any other except the Brittany, the supposed incompatible qualities of yielding a great deal of milk and beef in proportion to the food consumed, or cost of keeping.

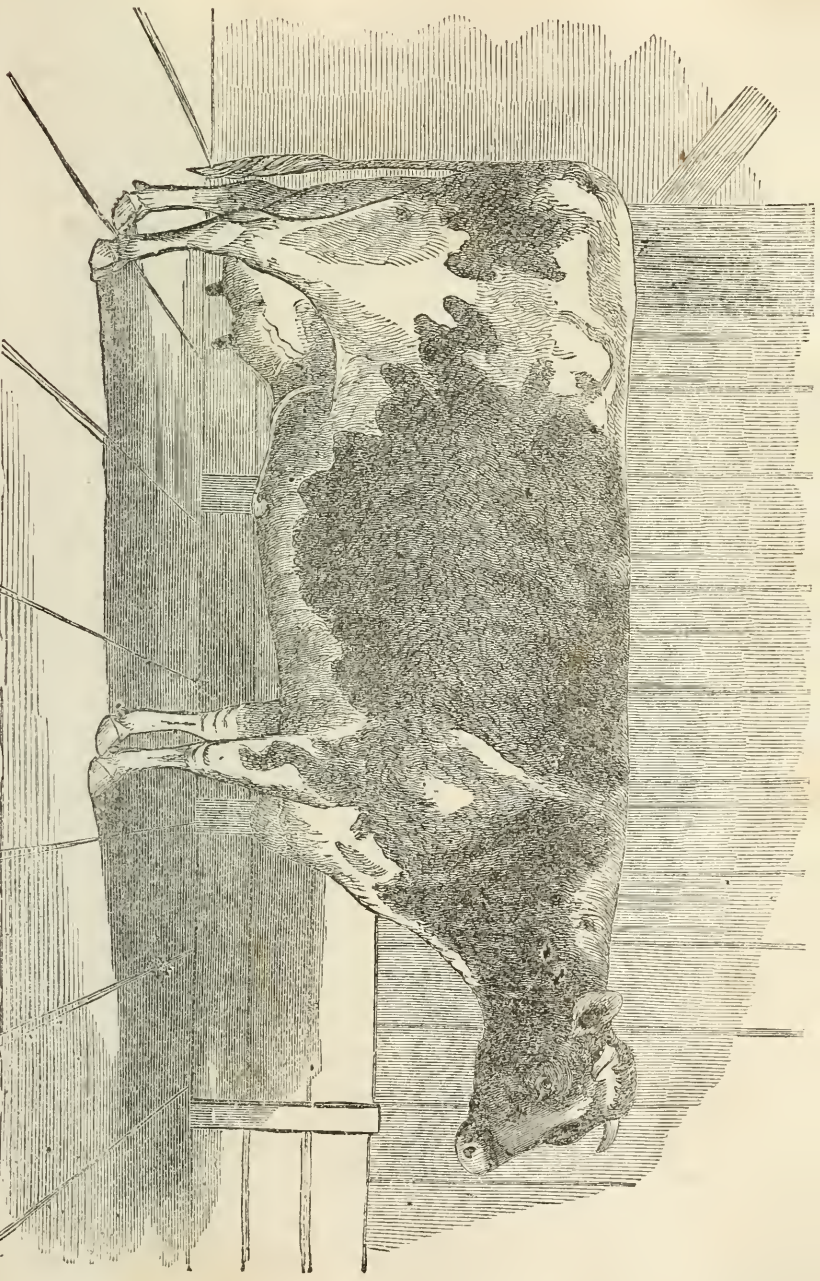
The Dutch cow was early imported into the colonies first established at New York and in New Jersey. It is probable that, even at that early day, the milking qualities of the race were fully developed. The climate of Holland, and the low, rich, and luxuriant pasturage, so moist, succulent, and milk-producing, naturally induced the milk-yielding capacities of the stock and a large growth of the animal frame. Transplanted to our dry and warm summer climate, and to the exposure of our long and severe winters, the animal could hardly

be expected to maintain her extraordinary power of secreting milk in so large quantities, and hence, though the Dutch race laid the foundation of the stock of the Middle States, its superiority as a milker does not seem to have been fully sustained.

Nature has done more for the race of cattle along the marsh districts of Northern Europe, extending from the confines of Holstein around to the borders of France, a distance of some hundreds of miles, than art or the skill of man. The soil is all of a low and swaly character, formed by the accumulated deposits of successive ages. The whole country is intersected by sluggish streams and still more sluggish canals, the banks raised so as to prevent the rush of the tide over the green and smiling farms. The land, of course, is extremely rich and fertile, a magnificent stretch of lowlands, much of it diked in with incredible labor from the treacherous sea, and covered here and there with low and comfortable farm-houses and a thrifty, honest, and hard-working class of farmers. The soil and the moisture of the climate are exceedingly well calculated to lead to an extraordinary development of the cultivated grasses and other forage plants so important in nourishing a large race of cattle. On such a soil and in such a climate we should expect to find the grass-feeding animals of all kinds attaining a size not generally found in other circumstances.

There are some general characteristics to be found in all the cattle of this long and fertile stretch of marsh region, though they are divided into many distinct races, all due to local influences, rather than to any systematic effort at improvement. The Dutch may be regarded as a type of them all. It belongs among the larger races of cattle, though its bony structure is said to be only a little above the average in weight. The head is usually small and fine, the horns of medium length, stout and inclined forwards, the neck long and sunken or curved, with

HOLSTEIN (OR DUTCH) COW, "TEXELAAR." Imported and owned by Winthrop W. Cheney, Belmont, Mass.





rather a large dewlap, the shoulders strong and thin, the rump large and broad, and the hind quarters generally well developed. The legs are long and the general form of the animal is rather thin than fleshy, sharp, and angular, and not generally well rounded. The color is almost invariably black and white, though red and white Dutch cows are often seen.

The most striking economic character of this race is its milking capacity, the product being more remarkable for quantity than richness, the milk being thin and watery, the characteristic of all the marsh races as compared with the highland or mountain races of continental Europe. The cows bring heavy calves, and the young stock on abundant food grows rapidly to great weights; but it requires very rich food to effect it, and without this, the race does not justify its otherwise distinguishing qualities.

For a milk dairy, in regions of rich and succulent food, the Dutch may be a profitable animal for the mere production of milk or cheese, but she is a large eater and a slow feeder, that is, she requires great expense to fatten in proportion to many other races and breeds. It is not an improved breed in the sense in which the term is applied to the Shorthorn, the Ayrshire, or any other class of animals built up by selection and great care. It is the common stock of a country and a climate where a small milker must be the exception, the whole course of feeding from the birth of the calf being naturally such as to induce an abundant secretion of milk. The term "Holstein," often used in connection with "Dutch," as applied to this race is wholly inappropriate, the Holstein races, of which there are several, being entirely different in many essential particulars. Dutch cattle have recently been imported, and efforts are being made to establish them as a dairy stock upon our soil.

Other well established breeds or races of cattle might be

mentioned as having claims to the attention of the dairyman, and among them the Kerry, a small, hardy race of cattle from the mountainous districts of Ireland. It has been imported recently to a limited extent. Some families of the Devons have been bred in this country with special reference to the dairy, but, as a breed, it is not to be thought of for the purposes of the milk dairy. The milk, however, is of excellent quality. In its own country it has been bred more for beef than for milk. There are many well known races on the continent, in France, Switzerland, and Germany, whose dairy qualities have been celebrated for many years, but none of them have been imported to a sufficient extent to have influenced, in any perceptible degree, the general character of our stock.

The common stock of the country owes its origin to a great variety of sources, which date back to the early importations for the colonies, before any systematic efforts had been made, even in the respective countries from which they came, to improve the breeds of domestic animals. From the West Indies, from Wales, from the southern coast of England, from Holland, and Denmark, and Spain, from every country which furnished its quota to establish a new colony in the new country, came the cattle for the early supply of the settlers, and an infinite mixture of races and breeds followed, just as chance or convenience dictated. Hard and scanty fare, exposure to cold and danger, and starvation, left little to be expected in the way of improvement, and it is a matter of surprise that our "native" cattle came down to us as good as they were at the time when our importations of improved stock began, and more system prevailed in selection and management.

As it is, many individual animals might be selected from our common stock, which would possess more than ordinary qualities as dairy cows; but they are the result of chance

rather than breeding. They do not constitute a race, breed, or family, the qualities of which are inherent, uniform, well established, and capable of being transmitted to their progeny.

Many peculiarities, when once established in the animal system, become hereditary or readily transmissible from the parent to the offspring, and hence the natural foundation of races and breeds, or families. The term *race*, in domesticated and other animals, applies only to those of the same species, possessing, besides the general characteristics of that species other peculiarities, which they owe to local circumstances to which they have long been subjected, and which they transmit with certainty to their progeny; and it is essential to the idea of a *race* that it shall have possessed these characteristics from a time "whereof the memory of man runneth not to the contrary," that is, beyond the limits of authentic records.

The term *breed*, on the other hand, applies to a family of animals built up by a long course of careful selection till certain desired qualities became fixed, capable, and sure of being transmitted. The peculiarities of races are more inherent, fixed, and strongly marked than those of families built up or made artificially, or, in the language of the farm, the "blood" is stronger in the one than in the other.

Our common stock may form a good basis of improvement, but good as it is, in many respects, it has defects which it is desirable to remedy. Two modes of improvement naturally suggest themselves to the mind of the enterprising farmer, either of which seems to promise good results. The first is that of selection from among our "native," or common cattle, of the best and most perfect specimens not known or suspected to be related to any of the well established breeds, and to use them as breeders, and so to build up a new and artificial breed after

the manner adopted by the early founders of the improved breeds in England.

This mode of improvement is simple enough when applied to any of the long established breeds. Indeed it is the only mode which preserves the purity of blood in such cases ; but to do it successfully with our common cattle would require great experience, a quick eye for stock, a mind free from prejudice, and a patience, and perseverance quite indefatigable. It would be necessary to pay great attention to the calves thus produced, to furnish them at all times, during their early growth, with an abundant supply of nutritious food, and to regulate it carefully according to their growth. And when it is considered that this mode would require a long series of years to arrive at any fixed and satisfactory results, owing to the fact that our "native" cattle, made up as they are of so infinite a variety of incongruous elements, do not produce their like, that the defects of an ill-bred ancestry will be continually "cropping out" for several generations, constantly thwarting the expectations of the experimenter, it is not surprising that so few efforts of the kind have been made, or that those that have been made have attracted so little public attention. To be sure the objection of time, and expense, and repeated disappointment should have little weight, if there were no more sure and speedy method of accomplishing the object.

The second method is more feasible, and it is the one that has generally been adopted, and constitutes the basis of enlightened and systematic efforts to improve our stock at the present day. It is to select animals from races or breeds already improved and brought to a high degree of perfection, and to use them in obtaining crosses or grades with our "native" cattle. A good selection of pure bred males, from breeds distinguished for their dairy qualities, and the use of

cows remarkable for these qualities, will secure the desired results more surely than any other course. But a stop should generally be made at the first cross, that is we should go back to the pure bred sire of the same breed, to be used with the progeny of the first cross, and so on. Any other course will lead to confusion and degeneration, and is never advisable if it can be avoided.

Dairy qualities do not, it is true, belong to any one breed in particular, but as they are dependent largely upon structure and temperament, which are hereditary, they are themselves transmissible through the male parent. Endless disappointment has followed the raising of the offspring of cows remarkable as milkers, simply because the qualities in them were accidental, the males not coming from cows of similar long established, high dairy qualities. Three or four years of labor and expense have been incurred, only to find that the offspring of such animals will not justify the outlay, unless equal care is taken in selecting the male, to which they are bred, with special reference to the same qualities, or qualities which we seek to obtain and perpetuate.

The offspring of crosses, taken in this way, with a pure bred male and the common cow, will be grades, but grade cows are often better for the practical purposes of the dairy farmer than pure bred ones. Both parents undoubtedly have a great influence in transmitting the milking qualities of the stock, and the skill of the breeder is displayed in the selection of individual animals from which to obtain crosses.

This latter mode of improvement requires less skill, however, and less exact and critical knowledge of stock than the first. It is easier to appreciate the good points of an animal already greatly improved than to discover them lying latent in the animal which we propose to use as the basis of improvement. This

method also has an immense advantage in the fact that results are more rapidly obtained, and the various steps of improvement more directly perceptible, from year to year.

By the first method, that of building up a breed or family from judicious selection of both sire and dam from our common stock, the final attainment of success could hardly be expected in the ordinary life of man. By the second, every successive step may be one of progress and improvement, provided the selection of the male is judicious. And this selection should be made wholly with reference to the specific object we desire to attain. If it is a class of cows for the butter dairy, take the male from the breed distinguished for its rich milk, and its butter making properties, and adhere to such a breed through each successive stage of the effort. If it is cows for the milk or the cheese dairy, select the male from a breed remarkable for its large yield, and adhere to males of this character. This course, when the selection has been made with proper care, has seldom failed, and it offers advantages at the present time superior to any other.

The special reason for a resort to the pure bred male, in crossing, is not so much that the particular individual animal selected has the desired properties united and developed in himself, as that they are hereditary in the breed to which he belongs. The moment the line is crossed, and the pedigrees or ancestry of the sire lost, uncertainty commences. The form of a grade or cross-bred bull may be even better, in individual cases, than that of the pure-bred one, but there is less hope of his transmitting the qualities for which the breed to which he is allied is most noted. As already stated, we have the basis in our common cattle of the most excellent dairy stock in the world. Their defects are want of uniformity and uncertainty in breeding, to a uniform high standard of quality. They are

hardy, thoroughly acclimated, capable of great endurance, and by the methods already indicated may become the most useful, the most profitable, and the most satisfactory cows on the dairy farm.

THE FAMILY DAIRY. For the family cow, where usually only a single one is kept for the limited supply which she affords, we need not resort to any established breed, to the exclusion of others. "Utile au riche, providence au pauvre,"—useful to the rich, a blessing to the poor,—is the characteristic description of the Brittany cow, and it includes the essential requisites in a cow for family use. The man of wealth wants an animal to ornament his lawn, and he will select her for beauty, or because she is rare, and unlike the common cattle of the neighborhood. He wants a docile, gentle creature, that will become the pet of the family. A limited quantity of milk, of a rich and creamy quality, will meet his requirements, so far as product is concerned, and in these, or other respects, the Brittany or Jersey cow, or a high grade of either breed, will be unsurpassed. The man of more limited means wants a cow that will yield a quantity of good milk, large in proportion to the food consumed, docile, thrifty and hardy. A well selected grade Ayrshire or a "native," of medium size, will be as useful as any cow to be had. As no calves are to be raised in such circumstances, as a general rule, little regard will be paid to the selection of breed, but even here it is not to be overlooked, that the better the breed, the better price will the calf bring, when it comes to be sold, either to the butcher, or to be raised.

THE RAISING OF CALVES. The mode of raising the calf has an important influence upon its qualities, and its usefulness, as a dairy cow. Here the object is not to force the animal, as in raising for beef, to early maturity. The quality of food, as

well as the quantity and mode of feeding, are to be considered with reference to their effect, upon the animal structure.

In most sections, where animals are bred for the dairy at all, the value of the milk, whether to be manufactured into butter or cheese, or to be sold in its natural state, is such as to make it necessary to adopt some system of economy. It is a comparatively easy matter to feed the calf, designed for breeding purposes, or for beef, by letting it run with the dam, taking all the milk it requires, and this method, with high priced stock, or in raising for beef, is the best economy, no doubt, but it is found to be too expensive where the dairy is an object of attention. Various modes have been adopted to lessen the expense of raising stock for the dairy, and the effect which different kinds of food will produce on the animal economy, has been carefully studied. Strict care is necessary, not to feed the young so as to develop a tendency to great size, either of bone or of adipose tissue, or fat cells, and so we must avoid feeding too highly upon articles of a very stimulating nature.

Most dairymen, therefore, have adopted the plan of taking the calf from the cow at an early period, and feeding it from the dish by hand, up to the time of bringing it, to solid food. By this method the food can be easily modified, and the growth is not liable to be checked, as it often is when the calf is allowed to run with the cow to a certain age and finally taken away. As soon as the calf is dropped, the cow is allowed to lick it dry, and the young creature to suck once or twice, which it will do as soon as it is able to stand—when the cow is milked clean, given some warm bran mash or gruel, and left for a day or two with the calf. After that, if the udder is all right, not inflamed or caked, the calf is taken away, and taught to feed by putting the fingers into its mouth and gently bringing its muzzle down to the milk in a dish. In the dairy districts of Holland, the

calf is generally removed at once to a shed by itself, and rubbed dry, without allowing the cow even to see it; and if the udder is right, this is, perhaps, the better way. As soon as it is able to stand, it is supplied with the warm milk drawn directly from the cow. This it should have, in all cases, as its first food, since it contains certain medicinal properties admirably calculated to free the bowels and intestines from mucus and excrementitious matter. It should have the milk of the cow, in this way, three or four times a day, for a week or ten days at the least, whatever course it is designed to adopt after that. The milk during this period of time possesses, as we have said, certain qualities which are necessary to the calf, and which cannot be effectually supplied by any other food.

In the third or fourth week, the milk for the calf may be skimmed, but warmed to the degree of fresh-drawn milk; though, after that, less care is required to warm it and to give it the milk of its own mother, that of other cows now answering equally well.

If in spring, the calf at the age of six to eight weeks may be tethered out upon the green grass, or put into a small enclosure near the house, and still fed twice or, better, three times a day, upon skimmed milk, with a mixture of half hay tea or gruel. If in winter, a wisp of clover, or other sweet hay, should be hung up over its pen within easy reach. This will soon lead the young animal to begin to eat solid food. The careful Dutch dairy-men prefer not to turn their calves into grass till the age of ten or twelve weeks, and then even continue the skim milk or buttermilk several times a day. If the weather is chilly, they take care to warm the milk.

The most important thing to be borne in mind, in the raising of calves, is neither to starve nor to overfeed. A calf should never be surfeited, nor fed so highly that it cannot be fed more

highly as it advances. It should be kept growing thriftily, without getting too fat. Both extremes are to be avoided. At the same time the utmost gentleness should be observed at all times. Persevering kindness will overcome the most obstinate natures. The disposition of the cow is greatly modified, if not indeed wholly formed, by her treatment while young. Calves, therefore, should be handled frequently, led by a halter, caressed, and made into pets. They will almost invariably become docile, and suffer themselves to be approached and handled in the pasture and the barn; and it is the quiet temperament and confidence acquired by this course of treatment that constitutes one of the most important characteristics of the good dairy cow.

With respect to hay tea, often used in this country as a partial substitute for milk after the calf is several days old, it is prepared by making an infusion from the best and sweetest hay, cut by a chaff or straw cutter into pieces about two inches long and put into a kettle and boiling water poured over it, when it is allowed to stand two hours, carefully covered. After the first week of the creature's life, the proportions of the pure milk of its dam and hay tea may be equal. After the third or fourth week, two thirds of hay tea and one third of milk; and a few days after, three quarters hay tea and one quarter milk. It should be given at least three or four times a day, at the rate of about three quarts at each meal, to be gradually increased to four quarts as the calf grows older. This diet should be continued till the age of ten or twelve weeks, when each meal may be reduced to less than a quart of milk with hay water—or skimmed milk or buttermilk may be substituted. At this age the animal will soon be able to take care of itself. It is important that the hay tea should be made fresh at least every two days, as it will lose its nutritious quality if kept too long. This course is adopted not as being better than milk, but simply as a

matter of economy in providing the most suitable and cheap substitutes.

In Ayrshire, calves that are to be raised as dairy cows are usually fed on whole milk for the first four, five, or six weeks, when they are allowed from three to five quarts at each meal, twice a day. Some never give any other food, while so young, except milk, and lessen the quantity as they begin to eat grass or other food, which they do at five or six weeks old; and at the age of seven or eight the milk is wholly withdrawn. If in winter, the milk has to be continued longer. A calf will not learn so soon to eat hay as grass, nor will it thrive upon it so well when it does eat it. Hay tea is also used then, and linseed boiled to a jelly and mixed in the milk. Treacle, and other substitutes, are sometimes used, but milk, when it can be spared, is regarded as the best and most natural food.

A method by which the expense of raising calves could be reduced in the proportion of two-thirds, as compared with feeding it all milk, was suggested by the Duke of Northumberland, in the following manner: Half an ounce of common treacle, or molasses, is well mixed with a pint of skimmed milk, when an ounce of finely-powdered linseed oil cake is gradually added, stirring it until thoroughly mixed, when it is to be added to the remainder of a gallon of milk; the whole to be brought to the temperature of new milk, and fed to the animal. After a short time the proportion of pulverized oil cake may be considerably increased.

Hay tea, oil cake, and oat meal will form the basis of substitutes for pure milk; but the first few days the milk fresh from the cow must be given, and the gruel added gradually afterwards, till water is substituted for milk. Mixing oil cake with gruel is the secret of the success of this method, and the oil cake must be the best to be had. It may be prepared by taking

a large six-gallon bucket and putting into it two gallons of scalding water; then add seven pounds of the fine oil meal Stir the oil cake and water together, and add two gallons of hay tea into which middlings, barley, or oat meal have been mixed.

It requires but little calculation to estimate the comparative economy of these different methods. If we suppose the calf to run with the cow for six months, and to take eight quarts a day, which an ordinary cow ought to give for the first six months after calving, we have the cost as follows:

8 quarts, at 2 cents a quart, for six months, . . .	\$26.88
8 " " 3 " " " " " . . .	40.32
8 " " 4 " " " " " . . .	53.76

There are few locations where milk will not command one of these prices, either to sell or to convert into butter or cheese. If we take the first estimate, and add to it the cost of keeping during the first winter, we have the following as the cost at one year old:

Amount of milk consumed	\$26 88
Hay the first winter	5 00
Roots, at the rate of half peck per day for 4 months,	3.05
Cost at one year old . . .	<u>\$34 93</u>

Take now the method of bringing up by hand as indicated, and say,

50 quarts of milk at 2 cents per quart	\$1.00
700 quarts of milk at 1 cent per quart	7.00
Pasture for five months	2 00
Hay during first winter	5.00
Roots for four months of first winter, half peck per day, at 20 cents a bushel	3.05
Cost of one year old raised by hand . . .	<u>\$18.05</u>

Calling the second season's pasturing \$5, and the second season's wintering \$10, we have the cost, at two years, when the heifer ought to come in as a dairy cow, \$33.00.

This is, of course, only a general estimate. The price of food, labor, and other incidental expenses vary so much in different localities, that practical results in one section would not apply to others; but it must be evident, that the feeding of the first year is not only the most expensive, but requires greater care and judgment.

So far as it can be controlled, the period of dropping the first calf should be arranged to take place in the month of May or June, just before the greatest luxuriance of pasture feed. This will induce the largest possible flow of milk when the milk glands are in a condition of growth to be readily influenced by food. A greater development of the mammary or glandular system takes place now than if the animal came in on dry food, and it creates the capacity for large secretions of milk through the life of the cow. The capacity of the udder for holding milk will depend largely upon the character and abundance of the food during the first year; and a cow coming in for the first time in May, or early in June, will be worth more, as a milker, than she would be to come in at any other season. Feed, therefore, so as to induce the largest possible flow of milk the first year.

FEEDING AND MANAGEMENT OF DAIRY STOCK. No branch of the dairy can exceed in importance the feeding and management of stock. It will be found in practice that nothing comes out of the bag that is not first put into the mouth. The breed of animals may be the best in the world, and yet success in the dairy will depend very largely upon feeding, regularity, and general treatment.

The feeding, or nutritive value of all the various articles of

food, has been fully investigated, so that we know what constituents produce fat, what are heat, and what are flesh producing, what goes to build up the bony structure, and what enters into the muscular tissues; but while there is much of practical interest in these investigations, we are not to overlook the fact that, in actual practice, we have to deal with living organizations, and that the most conflicting variety of circumstances often comes in to modify the results which theory would lead us to expect. Instead of the test-tubes and retorts of the laboratory, in which a certain number of materials, under certain circumstances, will invariably combine and form a certain substance, we now have the living animal, with its fine adjustment of nervous and muscular organizations, and we find that our results depend upon physiological peculiarities, upon likes and dislikes, upon circumstances over which we have not always a full control. Food relished one day will be rejected another. That which gives satisfactory results at one time will utterly fail at another. Under precisely the same conditions of shelter, food, and management, so far as we can tell, the yield of milk will vary in the same cow; and while one cow thrives on one kind of food, another will not. Let the system of management remain the same, and the quality of milk of the same cow will often vary, be rich and buttery at one time, and watery or cheesy at another.

Many of those changes and variations, which introduce an element of uncertainty into our calculations are due to hidden causes, but there are others which we know more about, and which have an important influence over the nutritive value of food. Bad air, or want of ventilation in the stall, will reduce not only the quantity, but the value of milk. Fright or worrying by dogs, or fast driving, the irritation caused by flies in the pasture, any thing in fact, which disturbs the quiet of the ani-

mal, will have its injurious effect. And so the condition in which food is given will exert nearly as perceptible an influence as the kind of food itself.

The most natural and the most commonly adopted method of feeding dairy cows, in the latter part of spring, through the summer, and the early autumn, is to let them run at pasture. This period will extend from four to six months, according to the locality and the season. Here the cows rely almost wholly upon grass. But it often happens, owing to droughts or overstocked pastures, that an additional amount of food has to be provided to supplement the supply obtained in the pasture. This will consist, generally, of green food, cut from day to day, in the shape of green corn-fodder, or other cultivated crops, as root tops, rye, green oats, or other forage crops. On many dairy farms, carried on for the supply of milk, the cows are supplied daily with a small amount of cotton-seed oil meal, which yields a large quantity of milk. When it is judiciously fed, not exceeding two to four pounds a day for each animal, it is attended with good results.

The greatest judgment will be required in the winter or stall feeding of stock, and with respect to the different modes pursued, the greatest diversity of opinion and practice prevails. While some feed exclusively upon hay, and often an inferior quality and quantity of hay, others feed roots, brewers' grains, and some variety of meal, and take the trouble to steam and cook the food, so as to increase its nutritive qualities and render it more palatable. Good hay will undoubtedly form the basis of feeding on a vast majority of dairy farms, and, if furnished in sufficient quantity, it is generally adequate to the supply of dry cows, or cows not giving milk at the time.

For cows in milk, during the winter months, the root crop in some form, as that of turnips, Swedes, mangolds, or carrots, is a

most important addition, as they keep the system open and healthy, and promote the secretion of milk. And if the cows are not in milk, but are to calve in spring, the difference should be rather in the quantity than the quality of the feed.

In feeding roots, the common English turnips, a sort of make-shift crop, to be sown after some early crop has left the land, is to be used first, and it helps to break the otherwise sudden change from green food to dry hay in November and December. The Swede will naturally follow, at the rate of half a bushel to a bushel a day, according to the size of the animal. The mangold, which keeps admirably till late in the spring, and improves in quality, should follow the Swedes, and will carry the stock along to grass in good condition.

All coarse fodder, cornstalks, swale hay and straw, should be cut in the straw cutter and mixed together. The roots, after being cut into slices, may also be mixed into this mass of cut food, when the whole may advantageously be put into a large close box, and a few quarts of shorts, middlings, or bran scattered over it. If now hot water is poured upon this mass, it will, after standing covered up a few hours, constitute a highly relished and nutritious feeding. This is a simple and cheap method of securing some of the advantages of steaming.

Regularity in the hours of feeding, and all the operations in the cow-house, is of the utmost importance, and second only to a full and liberal supply of food. Indeed, regularity, cleanliness, and gentle treatment may be considered as the cardinal points of successful dairy management. These, in conjunction with judicious feeding, will insure the highest rewards to be derived from dairy stock.—*C. L. Flint.*

OXEN. We know they are somewhat out of fashion, but we are convinced that where a farmer keeps more than one team, one of them had best be an ox team. You want horses to take you

to mill and to market, but for plowing and hauling on the farm a properly broken ox team is to be preferred. If the young oxen are trained to a quick step, in a light cart they will do their work as quickly as a horse team.

They will stand more continuous hard work with less liability to disease, or accident. It is not hard work that worries the ox, but the continual whipping and bawling to which many "hands" treat them. An ox can be trained to go by the word just as well, and better than by the whip. Let us compare the advantages of the two teams. In the first place, the horses cost twice as much as the oxen; their harness costs more; they are more liable to disease and accident, to run away and smash wagon, harness, and their own necks. And when the horse is lamed and his service at an end, he is good for nothing but his hide, while the oxen, after two or three years' service, can be put in the stall for a few weeks, and then sold for enough to buy a young and vigorous pair to replace them.

Some writers also claim that the ox costs less to keep, but we think he ought to cost just as much, and have just as much and as good feed as the horse. Give him grain and he will give you work, manure, and finally beef.

In this way oxen can be made to pay a profit, while the horses are wearing out. From six to ten years of age the oxen steadily increase in value, and when too old for service will bring a profit for beef. Lest we be misunderstood here, we repeat that where time is an object, as in going distances, the horses are to be preferred, and if a farmer keeps but one team it must be horses.

THE DEVONS make, all things considered, the best cattle for the farmer. They are not large enough for the heaviest work, but no ox of his size equals him in strength, activity, perseverance, or willingness. A cross between the Devons and some

of the larger breeds, which retains all the excellencies of the Devons, with an increase of size, weight, and power, is what we think should be aimed at by breeders.

The Devon is naturally *medium* as a dairy cow, giving a fair quantity of very rich milk, but when they are bred with a view to increase their size, strength, and beef qualities, as they should be, the milking qualities decrease.

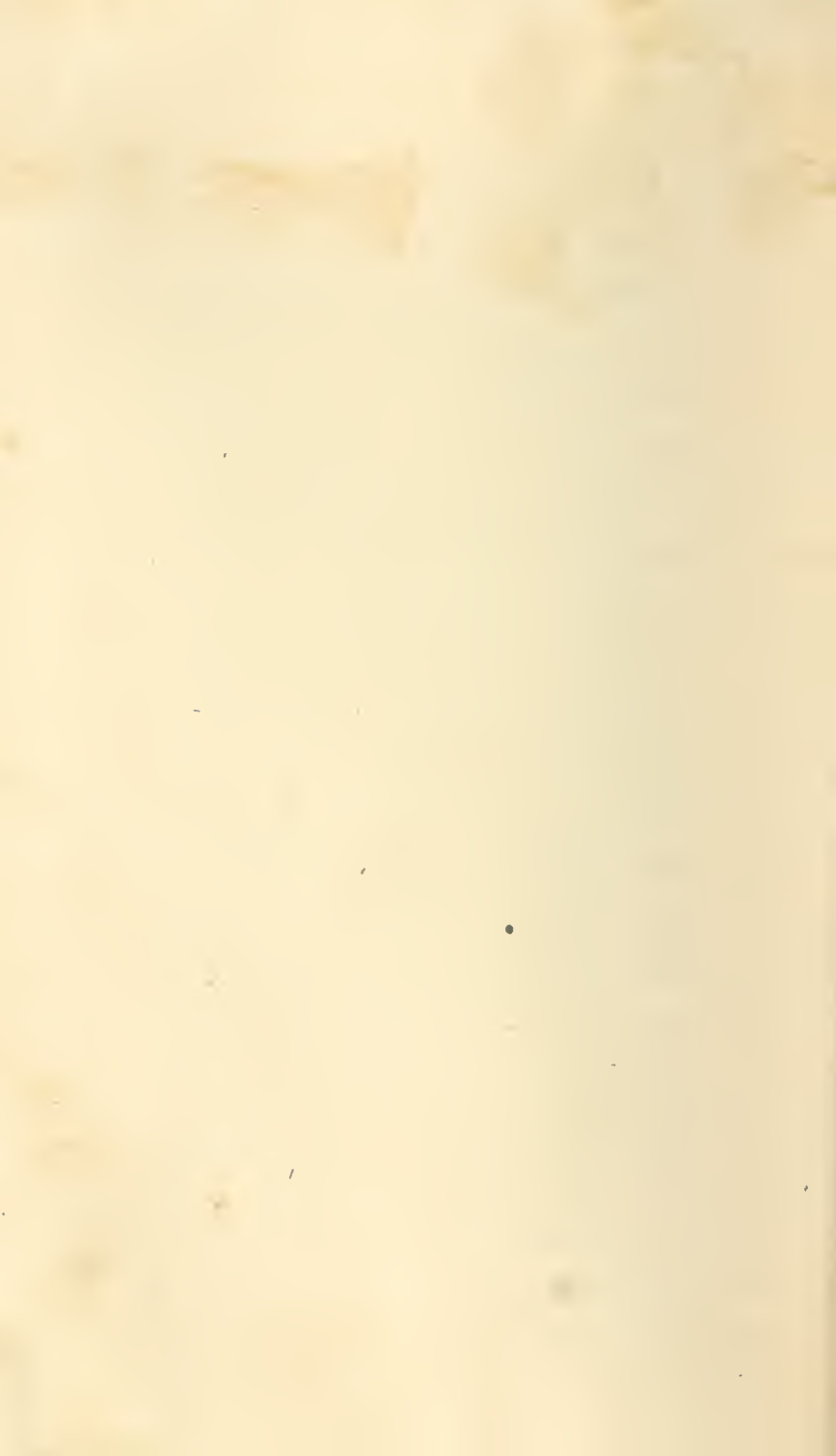
As a beef animal the Devon is in the first class. He fats readily, has compact bones, and therefore a small amount of waste, and the flesh is of the finest quality, and well laid on. We recommend the Devons for workers, and for beef, but not for the dairy.

THE HEREFORDS are the perfection of strength for a working ox, but of no account as a dairy breed. They have, therefore, never been very popular in this country, and are perhaps larger than is absolutely required for ordinary farm labor; but this is not to their disadvantage, for they take on flesh readily, mature early, and turn out splendidly on the butcher's block. As a cross with the Devons, or selected native cows, to produce working oxen, we think the Herefords will yet prove their superior qualities. THE AYRSHIRES have been already spoken of as a dairy breed. They have not the characteristics of working cattle and do not put on flesh as fast as the Herefords, or the Durhams, neither do they consume as much feed.

THE HOLSTEINS have not been fairly tried as working oxen, or as beef cattle, but we think grades with lighter and more active breeds will give good results. That they will take a leading place as dairy stock, we have no doubt. THE SHORTHORNS, whose value as milkers has been discussed, are also superior as beef animals, putting on flesh with astonishing rapidity, and maturing at four years old. At that age they give one quarter less waste than any ordinary cattle of the same weight.



Fig. 78. HEREFORD BULL.



Crossed with good native cows or Devons, they make excellent working oxen. IMPROVED STOCK is the aim of every enterprising farmer. It costs no more to raise and keep a pure "Short-horn" or "Jersey" than a common scrub, but for any conceivable purpose they are superior. They will give more milk, more valuable calves, and when past service more beef, on the same amount of feed. It is not, however, within the means of many farmers to buy a herd of pure breeds at three hundred or four hundred dollars each, nor is it necessary. Get one bull and one cow of the breed best adapted to your wants, or else arrange with a neighbor to purchase the one and you the other. Breed your best grade cows to the bull and you will soon find a great improvement in your stock. Now dispose of those animals that do not come up to your standard of excellence; cows that do not conceive readily, or that are liable to abortion, no matter how good milkers they may be; breed from none of the grade bulls, but keep the bulls from the two pure animals first purchased for breeding purposes. It is perfectly safe to breed in and in, unless you discover some defect in the stock, when a cross can be made with some other pure bred stock. None but pure bred animals are *certain* of reproducing their characteristics in their progeny. A grade bull will sometimes do it, but it is mere chance work, and cannot be relied upon. It will not do however, in these crosses, to breed the small cow to the large bull, but the small Devon or Alderney bull to the Shorthorn cow, or the large native or grade cow usually produces good results. BREEDING COWS, that is those kept for breeding choice stock, when they are discovered to be in heat should be immediately put by themselves until they can be introduced to the bull. This should be done in some quiet place with no other animals about, and above all, no crowd of men and boys, as is often the case. There should be no attempt

to force an acquaintance, no bustle or worrying them. After a once repeated service confine the cow in the stall until her heat fully passes off.

Nine and one-half months is the average time of the cow, and after about seven months' pregnancy, milking should cease, and she should have good care, shelter, and warm beds, good food and a plenty of it. She now has two lives to support, and the quality of the calf will be greatly affected by the care now given. The cow should not be allowed to lay on fat, but kept up to a good condition. Mr. L. F. Allen in his recent publication says: "A breeding and milk cow, in all her bodily condition, should be gently and kindly treated.

"She should never be driven at a pace beyond a walk.

"She should never be jumped over fences or bars.

"She should never be shouted at or worried in driving.

"If they meet with objects occasioning fright or fear, let them leisurely survey the obstacles until fear is removed.

"Never suffer the cow or the herd to be worried by dogs.

"Be gentle with them always."

BULLS intended for stock raising should be well fed from their birth; never fattened, but kept constantly and steadily growing. Oat meal, barley meal, and peas are better than corn meal, (in fact we recommend that no bull ever be fed on corn at all;) these, with milk and grass until he is eight months, will insure great seminal and muscular vigor. Teach him to lead as early as possible, and when he is nine months old put a copper ring in his nose. Handle him often and gently, and in ninety-nine cases out of one hundred he will be gentle in return. Most of the viciousness of bulls is the result of either improper handling, or no handling at all. When once they become vicious there is little dependence to be placed on them, and their keeper must be on his guard. Never use a yearling bull

unless it be on a *single* cow as an experiment. At two years old he may be used sparingly on twenty to thirty cows, and when three years old he will be vigorous, and ought to be good for at least five years' service of one hundred cows a season. When in service his feed must be the best, and he should be groomed and washed often. This is necessary to his best health, as is also daily exercise.

The following from the "*Country Gentleman*" is so admirable, that we copy it and indorse it entire. WORKING BULLS. "I have one of Emery's endless chain powers to drive my hay-cutter. My bull is an Alderney two year old, weighing a little over nine hundred pounds. I put on the brake and had him led into the power, where he had a small feed of oats given him. While he ate these he was groomed and caressed. This was repeated two or three days in succession. Then, while he was eating, the brake was slacked a little, and as the floor moved down (slowly, so as not to alarm him) he stepped up to keep his muzzle at the oats. At the fourth lesson he worked an hour, and cut hay enough to last my stock—some eighteen head in all—two or three days.

"We have not had the slightest trouble, and so much does he appear to like the exercise and the pleasant remembrances of the reward of good behavior, that I shall not be surprised if, when he happens to find the door open, he should go in and run the machine' on his own account. I intend to put up a circular saw and let him cut my fire-wood.

"Now for the advantages. The pampering and confinement which makes a horse run away will, in time, make a bull devilish. The work I give him requires no harnessing; it is only an hour's walk up a hill of thirteen degrees elevation. It gives him an outlet for his superfluous spirits. It keeps him 'in hand' and gentle; it wears away the growth of his hoofs,

develops his muscle, and improves his health. Have I not a right to expect my herd to be benefited by such management?"

REARING CALVES has been spoken of in connection with dairy stock, but we have a few words further to say. They should always have enough food to satisfy their hunger, enough pure water always at hand to satisfy their thirst, a comfortable, warm, dry, and well bedded shelter, to which they can help themselves whenever the weather is bad. For whatever purpose the calf is to be raised, for beef, for work, or for the dairy, these things will pay. If for veal, calves should have their mothers' milk for four weeks, with meal added if they will take it. We do not mean by this, that the calves should be allowed to run with the cows and look out for themselves. The teats are not evenly milked by the calf, and one or more of them are likely to become worthless. The constant sucking also lessens the future flow of milk. Males, not intended for breeding, should be castrated young. Heifers intended for beef should be spayed. Steers should be early accustomed to be fastened together. Any time after six months a little gentle training may be commenced. It is less labor to train them now, and they will be more tractable and docile than if left to be two or three years old.

When they are first put into the cart, they should be driven around the inside of some lot, next to the fence, which prevents them from turning out in that direction, while you stand on the inside to keep them to their track. Never put steers to a great heavy cart, unless your object is to make them slow. Put them to a light cart and teach them to step quick, to walk fast.

FEEDING STOCK is the most important operation, in *improved* farming; for the farmer feeding all his crops to his stock depends upon them to turn it into manure and beef. He calcu-

lates to see his returns come in from the sale of his beef, mutton, and pork, and desires to know how his hay and grain must be fed to make the most meat. Of course, we take it for granted that he has breeds that will fat, for some breeds will not, no matter what you feed them, and others will only fat on such enormous quantities as tend to ruin the producer. We have seen a great, big headed, paunchy ox, fed for three months beside a grade Devon, eating full one-third more, and gaining less than one-half as much in the three months.

Get a breed that will fat, and then *keep them growing*, summer and winter. It is wretched policy, east, west, north or south, to let any animal lose a pound of flesh. That pound of flesh has cost you money, and it will cost you money to replace it.

A man who for any reason is obliged to pay twice for a piece of property, is reckoned unfortunate, but many a farmer voluntarily pays six or eight times over for the same fifty pounds of flesh, and wonders why farming does not pay any better. My friend, when you get a pound of flesh, keep it. It won't cost one-half as much as it will to replace it.

If pasture get scant in the fall, so that animals have to trave all day to satisfy their hunger, they will soon fall off in flesh. The farmer should piece out the pasture by feeding cornstalks, root tops, pumpkins, etc. Winter feeding, and care, is where many farmers fail. Feeding stock of any kind from stacks is miserable policy. Hay thus fed will not go more than one half as far as when fed under shelter. The cold and wet cause the cattle to eat more, and yet they do not thrive on it. Much is trampled under foot and wasted. Says Mr. Allen: "The consequence of all this is, that, through irregularity of feeding and carelessness of distributing their food, and want of shelter, the cattle lose flesh every day, and be their condition what it may, on coming into winter quarters they go out 'spring

poor.' Better keep ten head only, and keep them well sheltered and well fed, than one hundred in this shiftless, cruel way. It will be profitable, while on every ill-kept animal you will lose money, and the manure of the animals thus fed will be worth but little more than so much clay."

STALL FEEDING. For milk cows and fattening stock, stall feeding the year around is certainly advisable. The experience of every stock raiser who has ever given it a trial testifies that the profit is *at least double*. There is no doubt of it. If we could persuade every stock owner to adopt this soiling system, we should feel that we had done as much for our country as Fulton, Eli Whitney, or Elias Howe. It would increase the agricultural wealth of the country in a tenfold ratio. It would in five years pay the whole national debt. It is the only true economy in stock raising. In our soiling system we include stall feeding, cutting and steaming food, and the husbanding of manures. Its advantages are first, A SAVING IN FENCES. All the fences required (and all there ever ought to be on any farm) will be a good-sized yard to exercise them in. Now a man having one hundred and fifty acres of pasture often divides it into six lots. To fence these lots costs not less than one thousand dollars; the interest and repairs on which every year will be sufficient to pay a man for doing all the extra work of soiling fifty head of cattle. Can't you invest your one thousand to better advantage. Again, each of these fences takes up land. Your one thousand dollars worth of fence takes up from three to four acres of land. A second consideration is the saving of land. Four acres each, or twelve head to fifty acres of land, are required by the pasturing system, and often six acres each, or only eight head to fifty acres. Put this fifty acres under cultivation, and it will keep twenty-four head as well, yes, better than it now keeps eight or twelve. We have already seen that

the saving in fences will pay all the extra expenses of soiling, leaving one thousand dollars to be invested in the additional stock that can be fed under the new system. We venture to say that one and a quarter acres in hay and grain for winter soiling, and three quarters of an acre in green crops for summer soiling, will be sufficient for any stock. We have statements from a large number of reliable men who practice soiling and *no one of them* allows over two acres per head. It will thus be seen that the same number of acres can be made to feed twice or three times as many head of cattle by the soiling system. Third, is the saving in manure, and this is the most important consideration of all. Manure is valuable even on the virgin soil of the prairies. No amount of manure is wasted when applied even to these. As we have already seen, the soiling system enables the farmer to keep double the number of animals on the same amount of land; it will also double the value of the manure of each animal, thus making four times the amount of manure to return to the fields.

No land will ever become "exhausted" under such a system, but will constantly increase in fertility. A fourth consideration is that there will be a large extra product of milk, butter, or beef; enough to pay for the labor of soiling.

DIRECTIONS FOR SOILING. For summer feeding an open shed may be used, connected with a yard or lane. The sheds should be divided into stalls, and every creature should have its own place, and never be allowed to feed anywhere else. They will soon learn to take their own places without crowding or hunching each other. Their feeding hours should be regular and often, at least four times a day.

The sheds should, of course, be provided with mangers, and the stalls with stanchions, as it is desirable to have the animals stand in them all but two or three hours in the day, when they are out for exercise.

The crops for summer soiling are winter rye, which comes first, and can be cut in May, and is excellent to let them down from dry to green food; next clover and other grasses in succession; then rye again, for rye will furnish several cuttings during the season; then early sowed corn, oats, sorghum, and other crops. Corn should be sown every fifteen days, until the first of August, or even later. For fifty head of cattle, we would advise the following summer crops: Five acres winter rye, twenty acres of corn, sowed at five different sowings fifteen days apart; seven acres of red clover, and five acres of Timothy, or oats. Each animal should have enough, but no more than they will eat up clean at each meal. As each animal always eats at the same place, the feeder can easily manage this.

Plenty of pure water is indispensable to the best results, especially with milk cows. Free access to pure water will increase the flow of milk. The best arrangement we have ever seen for this purpose was a double manger, or rather a pretty wide manger, (lower down than is customary,) and a partition through the middle, from end to end. Either half of this manger could be filled with water, at any time, from a pump outside the building. This having water always at hand is a most important matter, and adds to the profits of the dairy. If open sheds are used for summer soiling, they should be so arranged that the team can be driven along in front of them, and the fodder passed from it to the stalls. If feeding is done in the stable, which is best for milk cows, at least, the team can be driven in on the floor. In winter all feeding should be done in the stables, and here much will depend on cleanliness, air, pure water, and constant care.

Remember that you are saving enough to pay for a great deal of labor and attention. Summer is the best time to fatten beef,

but you must keep up your stock in the winter also. In coming down from green food to dry, care must be exercised that the change is not too sudden, especially with milk cows. As the green food grows insufficient, cut some early cured hay, and mix a little meal with it. Keep up not only the amount, but the quality of the milk.

CUTTING AND COOKING FOOD FOR STOCK now engages our attention. There are six cogent reasons why this should be done. It saves the labor of mastication, which is severe work for cattle, as their teeth are only calculated for eating grass. The finer fodder is cut the better. However fine you may cut it, it will still require more mastication than green grass. While cutting renders it fine, wetting it renders it more succulent, and cooking it softens the fibre; it therefore is all available as food, and the same amount cut and steamed will go twice as far as in the natural state. There are thousands of reliable statements to prove this, and yet, either from indifference, indolence, or unbelief, the multitude of farmers still go on feeding uncut hay and stalks, unground grain and whole roots to their stock. A third great advantage of cutting and steaming is, that every thing can be made palatable and used. The profit in this direction is equal to the cost. Half hay and half straw are by this means made fully as good as clear hay uncut. Coarse hay, badly cured hay, straw and cornstalks are eagerly devoured by the most dainty stock when cut and steamed. This shows that even poor fodder cut and steamed is more palatable to the stock than the best uncooked: this is the cow's argument in its favor. Twenty pounds of good hay cut and steamed will keep a cow in *better* condition than thirty pounds uncut and uncooked.

Says Mr. Allen, on this point: "If the food goes into the animal at blood heat, so much of the animal heat as has to be

expended in warming that otherwise cold food after entering the stomach, would be saved to go into flesh; for the animal heat has to be created by this food, and is therefore expended in producing it, and cannot to that extent, of course, make fat or flesh. So also would be saved the amount of food expended in producing the muscular strength and work of the jaws in grinding; for this power has to be furnished from some source, and we hold that the power so produced in the internal system of the animal itself is the dearest possible way of making it. Cooking or warming the food is, therefore, a great economy, much more, we consider, than its additional expense." The trouble with Mr. Allen, and a dozen other writers on this subject whom we might name, is that they follow with long and elaborate descriptions of cooking apparatus, boilers, pipes, etc., which frighten away those who would like to try the experiment. After a man has once tried it and found what an immense improvement it is, he does not hesitate to invest any reasonable amount of time, labor, and money in perfecting it. A CHEAP PROCESS is what is wanted at first. The following is simple: Line your feed-box with tin or sheet iron, cut your feed, turn on a gallon of boiling hot water for every two bushels of feed: shut on the cover *tight*, and leave it from two to five hours; it will keep warm over night. Where more than five animals are to be fed it will pay to have a power cutter. A horse power is a convenient thing to have for a great many purposes on the farm. By it hay, straw, stalks, and roots can be cut with very little trouble. A set-kettle just outside the door will heat the water. This can be covered tightly, and a pipe run from it to the feed-box; this will keep the feed cooking as long as the water is hot. When roots are to be fed, they should be cut up and put into the box with the feed. It is good practice to mix a little bran, meal, or mid-

dlings with the feed; it seasons the whole and saves hay. George A. Moore, of Buffalo, New York, says: "I think cutting and steaming combined insure a gain to the feeder of at least thirty-three per cent. The manure resulting from feeding steamed food is worth double that from feeding in the ordinary way." This man feeds eighty head and cooks their feed. Hundreds of dairymen and stock-raisers are trying it, and pronounce it at least one-third more profitable than the ordinary method. We now proceed to the DISEASES OF CATTLE, and their treatment.

INFLAMMATORY DISEASES. Inflammation of the stomach causes numerous symptoms of restlessness and evident pain. The animal lies down, points its head towards the belly, and often strikes the belly with the foot. Give a slippery elm drink every two hours; inject warm soapsuds. Keep up these remedies for several days. Feed on gruel and other light feeds. *Inflammation of the bowels* is not readily distinguished from inflammation of the stomach, except by a greater rigidity, and evidences of more severe pain. Wring out a horse blanket in hot water and apply to the bowels, and inject clysters of soap and water, as in inflammation of the stomach.

INFLAMMATION OF THE LUNGS is indicated by cough, dullness, and cold extremities. The mouth is hot, and the animal is reluctant to move. Apply flannels saturated in hot vinegar to the legs and feet. Give half a pint of thoroughwort tea every hour. Inject warm soap and water. Inflammation of the bladder, kidneys, womb, or urinating organs is indicated by a frequent desire to urinate, and also to void the excrement; but small quantities are dropped, and the animal is in increased pain; the loins shrink from the touch. The slippery elm drink and soapsuds injection should be used, and a wet blanket kept

on the abdomen. It should be kept warm by frequent wringing in hot water.

INFLAMMATION OF THE BRAIN. The symptoms and treatment are the same as described for the horse.

INFLAMMATION OF THE EYES. Use the eye wash directed for the horse. **DYSENTERY, DIARRHŒA, GRIPES, and COLIC,** are inflammatory in their character and results. They are caused by sudden changes either in temperature or in food. In calves, flour milk gruel, with a little chalk, is usually all that is required. A gill of castor oil should be given if the former does not give relief; and if still obstinate, inject the warm soap and water. Give grown animals a pint of castor oil, or, if not to be had, substitute sweet oil or melted lard. Gruel and slippery elm drink, in all these complaints, is a most excellent laxative. Diarrhœa may often be checked by the following dose: one gill of finely pulverized charcoal, one ditto fine salt, diluted with melted lard. If this does not check it, double the dose.

BLOODY MURRAIN is caused by leeches, which the animal sucks up from muddy water. Cattle should always have pure and, if convenient, running spring water.

MANGE is a contagious disease of the skin, caused by filthiness, in connection with improper feeding. We never knew it to generate on a cleanly, well-kept beast, but if once generated in a herd it will soon spread. The diseased cattle should at once be put by themselves. The symptoms are a dry scurf about the roots of the hair near the tail, and spreading from that part all over the body, causing severe itching and violent rubbing. Give sulphur one ounce, slippery elm two ounces, charcoal one gill, lard sufficient to mix. Make into six doses, and give two a day in the feed. Prepare an ointment of spirits of turpentine one pint; sulphur three quarters of a pound; and oil sufficient to reduce it to an ointment. Rub in gently. This

ointment will keep for months, if new butter, without salt, is used instead of oil; and for all diseases of the skin in cattle, sheep, or hogs it is the best thing we know of.

PLEURA PNEUMONIA, RINDERPEST, CONTAGIOUS TYPHUS, and other modifications of the same contagious diseases have from time to time swept off thousands of cattle and are likely to do so again. The symptoms are fetid breath, hot mouth, unnatural heat and redness in the vagina and rectum. Soon the lower lip, on the inside, will be covered with pin-head blisters, and a thick fluid will begin to run from the mouth. The animal will hold its head to one side and have a pitiful look. When discovered, kill every infected animal without a moment's delay, bury all their excrement, and every thing that has been in their stalls. Isolate the rest of the herd, and kill them as fast as a sign of the disease appears. Put a box of chloride of lime where every animal will have to step in it some time in the day, and see that every one that comes into the yard steps in a box of the same when they go out.

HOOVEN is caused by eating too greedily of green food, which, clogging in the stomach, ferments and generates gas, which distends the stomach and often causes death. Give two ounces of ammonia (hartshorn) in a quart of soft water every fifteen minutes. A flexible tube passed down the gullet will often allow some portion of the gas to escape. Cloths wrung out in hot water and applied to the body, and vigorous rubbing with the hand, often assist the work. An injection of warm soap and water, at short intervals, is also to be recommended. Prompt, vigorous, and persevering measures are to be kept up until the animal is relieved or dies. But do not add to the load already in the stomach any physic or nauseating doses.

LICE or FLY BITES should be treated by rubbing grease and Scotch snuff into the skin.

CHOKING often occurs where farmers do not cut up their roots, or where cattle get to the apples or potatoes unbidden. The best practice we know of, is to strap up one fore foot and make the animal hop. The obstruction will soon be thrown up. Another plan is, to have a rod about three feet long, with a greased swab on one end, and, one man pulling out the tongue, another forces the swab quickly down to the obstruction.

THE DISEASES OF DAIRY STOCK are few, where properly cared for; but garget, milk-fever, and slinking, are by far too common. GARGET is an inflammation of the udder. One or more teats become swollen and tender; the milk cakes in the bag, and in time the flow will cease. When first discovered, put the calf to the mother several times a day. The udder should also be washed frequently. Give a physic of Epsom salts and molasses. Dissolve one-half to a pound of salts in a quart of boiling water, add a teacup of molasses, and give before it gets cold.

SLINKING THE CALF (*abortion*) is quite common among high fed cows, but the causes are not yet known. It usually occurs from the fourth to the sixth month of pregnancy. If the cow is uneasy and feverish, excited and timid, remove her from the rest, give her a dose of salts and molasses in gruel or a mash. A cow that has once slunk her calf is not reliable to breed from again, but with a valuable cow we should always make a second trial, but never more; dispose of such cows and get others. We think something can be done in the way of prevention. In the first place, when near calving time, and for some weeks after calving, the cow should not be exposed to cold rains or drink very cold water. Ice cold water given to a cow, just before or just after calving, has often caused the loss of the animal as a breeder. Again, we are of the opinion that hard water

has something to do with it, although it is by no means sufficient alone to cause it. Keeping the bull with the cows is, we are satisfied, a frequent cause of abortion; it should never be allowed. Eating frosted grass must be very bad for the cows, whether it aids in procuring abortion or not. When there is frost on the grass, keep the cows in the yard until the sun dissolves it.

If one cow suffers abortion, the whole herd often follow from sympathy. The smell and symptoms are known to them by instinct, and has an injurious effect upon them. They will smell of the sick cow and her droppings, and then run bellowing about, and soon follow her. Therefore, on the first symptoms, the diseased cow should be removed from sight, smell, or sound of all others, and kept until all is over. And if the cow drops her calf in the field, the fetus should be removed far away and buried, and the cow removed from the herd. Any putrid or offensive matter, fright, or sudden change of feed will in some cows produce abortion.

PUERPERAL OR MILK FEVER. All cows are subject to more or less fever at calving, which in a day or two, or perhaps in three or four days, increases; the cow loses her appetite, becomes dull, rolls the eyes, and looks wildly at her flanks; she loses the use of her hind legs, and if down cannot rise. If the cows are watched, as they should be, the first symptoms will be discovered. If so, give the dose of Epsom salts and molasses. If the fever is high, and the hind legs are already stiff, add half an ounce of red pepper, or ginger, or caraway, or quarter of an ounce of each to the salts and molasses. If the disease has gone so far that this dose does not give relief, give another, doubling the quantity of ginger, pepper, etc. At the same time that the first symptoms are discovered, the soapsuds injections, wet cloths, etc., must be also attended to. These are of as much

importance, and often more, than the internal remedies. After recovery has commenced, good gruel, mashes, etc., should be furnished, always warm. Cows and cattle are subject to fevers of greater or less intensity, but all requiring prompt treatment.

SYMPTOMS OF SIMPLE FEVER. Nose dry and hot; rumination dull; breathing quickened; horns hot; feet and limbs often cold; bowels usually constipated. Salts and molasses, with a continued use of wet blankets, will usually relieve fever at this stage; but if symptomatic fever ensues, and the above symptoms become aggravated, the eyes red and staring, the animal uneasy, and in such distress as to moan frequently, one quarter of a pound of sulphur and half an ounce of ginger must be added to the above dose. In both cases soap-suds injections will assist in relieving the bowels. Typhoid fever is usually accompanied with some diarrhoea. No salts or other physic should be given in this case, but the water treatment must be used rigorously, and red pepper or ginger given in gruel; one quarter of an ounce of each, or half an ounce of one in oatmeal gruel is the proper method of administering it.

These fevers cause heat in the horns, called by some "horn-ail," "horn distemper," etc., and such resort to boring the horns. Now this is all folly. There can be no disease of the horns; it is only the result of fever and inflammation elsewhere. When the cause is removed, the "horn-ail" will also disappear, and not till then.

Loss of the cud is a symptom of indigestion. Give a slight dose of salts and molasses with a little ginger and sulphur.

OPERATIONS. CASTRATING. We quote from "Allen on Cattle." "First grasp the scrotum in the left hand, and bring the testicles down to the foot of the bag; then with the other hand and a *sharp small knife* cut a perpendicular slit in the rear of each testicle, *close to the bottom*, and long enough for the

released testicle to pass through; then cut through the skin and the inner case enclosing it; push out the testicle, and gently draw the cord attached to it out one or two inches, and cut or scrape it off, and the work is done. Then put in a little *salted* soft grease, and push it upwards towards the belly." In hot weather apply a little turpentine to the cut edges to keep off the flies. In cold or stormy weather house the calf. If the scrotum becomes inflamed, open again and press the matter out. From three to six months old is the proper time for the operation.

SPAYING is the same process performed on the heifer, and where the stock is to be fattened it is a profitable operation, as they make better beef and fatten more readily. Another object of spaying is to secure a uniform flow of milk the year round. For this purpose it is done from four to six weeks after the calving, when the milk is at its fullest flow. Where a regular quantity of milk is desired all the year, and the raising of stock is no object, spaying becomes desirable. A veterinary surgeon will spay a herd of cows in a very short time, at a small expense, and with little danger. Only about one per cent. are lost in the operation.

DISEASES OF THE FEET AND LIMBS should be treated as described for the same diseases in the horse.

CHAPTER XI.

SHEEP, SWINE, AND OTHER DOMESTIC ANIMALS.

WE have searched a number of volumes for all possible information upon sheep husbandry, and have found most of that contained in this chapter included in two large volumes by the Hon. Henry S. Randall, LL.D., to whom we here acknowledge our indebtedness. We advise all flock masters, and especially any who are just entering the business, to purchase Mr. Randall's volumes.

We have before alluded to the profits of keeping sheep on grain farms, and we are fully of the opinion that many more might be kept to advantage in the Middle, Northern, and Eastern States. A farmer can turn his money quicker in sheep than in cattle. They pasture better, and there are thousands of acres of worthless, briery, bushy pastures, that can be made fertile by turning in a flock of sheep. The common breeds of poor blood, long legs, large heads, and slab sides *will not pay*; they consume more food than the improved breeds, do not get fat, and neither the carcasses nor the wool will bring as good price, often not more than one-fourth as much.

The market for mutton is increasing, and near large cities, or convenient to the railroads connecting with cities, the mutton may be made the main point. But in the interior, and especially in the West and South, wool must be the chief object. When wool is the main object the Merinoes have no competitor.



Fig. 79. MERINOS.

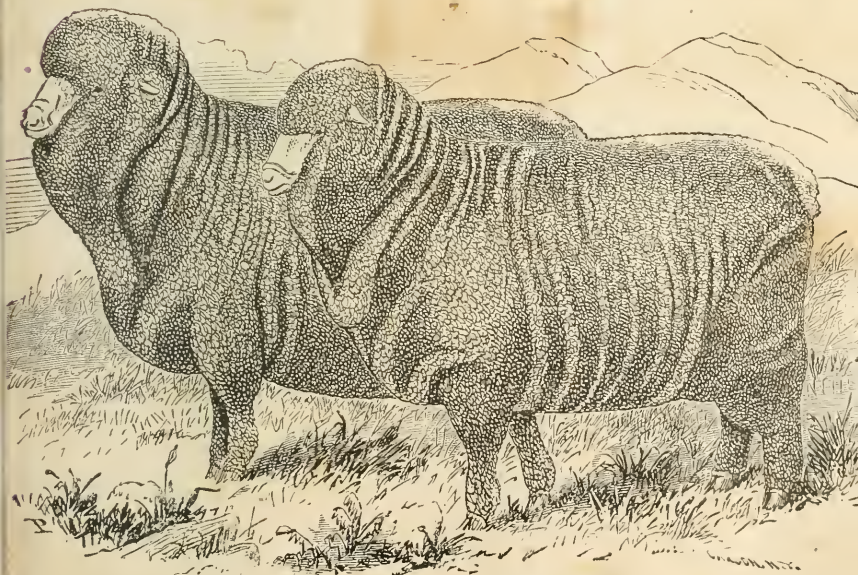
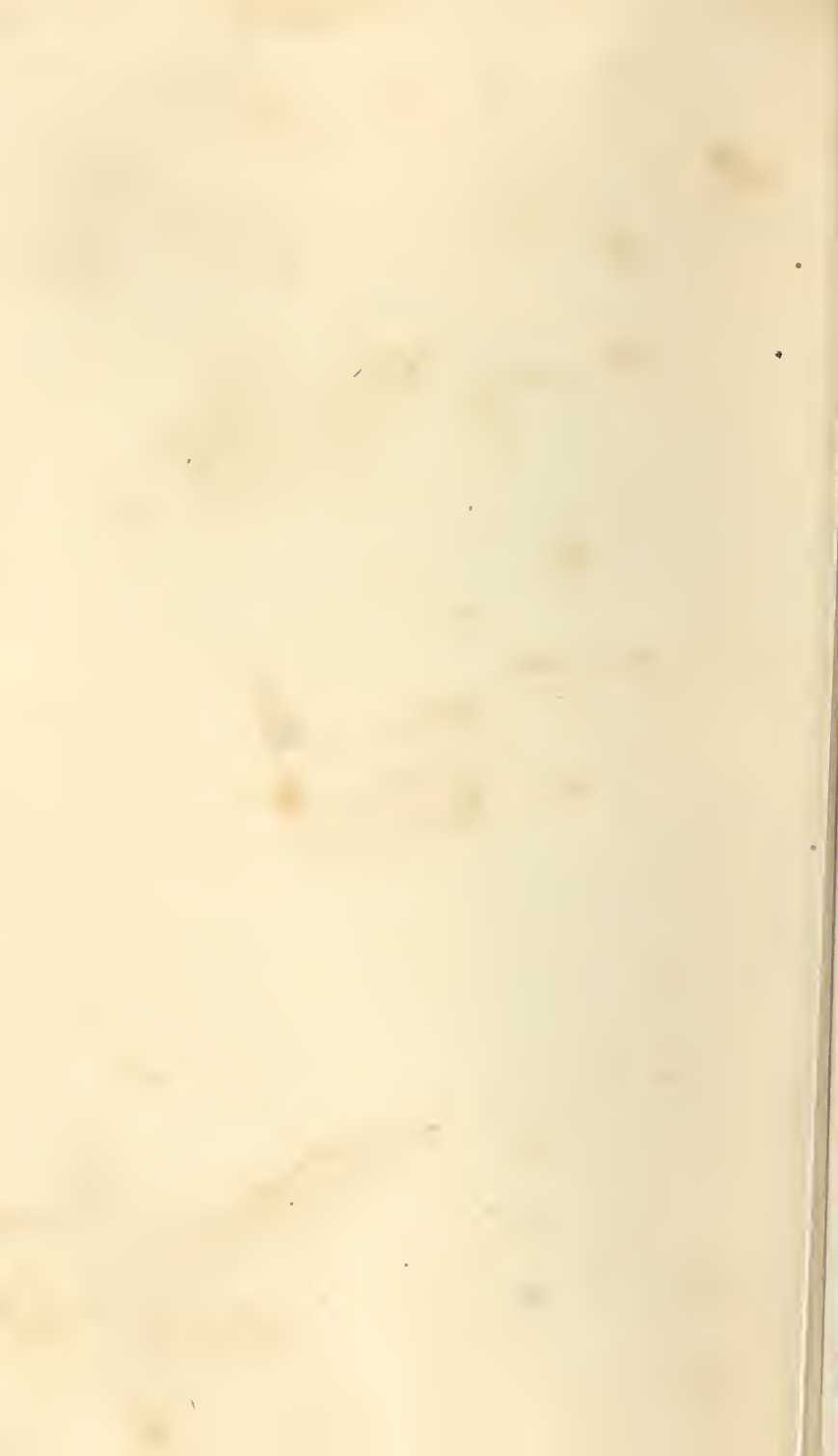


Fig. 80. MERINO EWES.



Common breeds, put to a pure bred Merino ram, produce a grade averaging at the lowest calculation one pound heavier fleeces. And if these and their progeny are continually bred to a pure blood Merino, the same increase will continue. In fact no ewe should ever be bred to any but a pure blooded ram, when the services of such a one can be obtained.

The Cotswold is a large, fine mutton sheep, and will shear from ten to sixteen pounds of wool. The carcass often weighs over two hundred pounds at two years old, and will be worth several cents more per pound than the common breeds. When near a good market the Cotswolds are as profitable as any breed we know. The South Down, for both mutton and fleece, are fully equal to any other breed. They do not shear quite as heavy a fleece, nor market so heavy a carcass as the Cotswolds, but both fleece and carcass are worth more per pound than the Cotswolds. This breed is ready for the butcher at any time from three months to five years old, giving as much weight for their feed as any other. The buck can be profitably introduced into any flock where it is not especially desirable to keep up pure blood for breeding purposes.

The LEICESTERS are only mutton sheep, but near large markets they can be raised with great profit, as they put on flesh very fast. They shear six to eight pounds of fleece. The introduction of the Cotswold ram to this breed greatly improves the animal for breeding purposes.

We will briefly state the points of a good fine woolled sheep. A stout, vigorous body of medium size for the breed; a thin, loose, elastic skin of a rosy color; a regular skin, except folds about the neck, (the folds once so much in fashion, all over the body, were of no use, and interfered with the shears); fleece of even length and thickness all over the body; a thick, shortish coat on the hind legs and over the top of the head, and

also covering the scrotum of the ram. Exceeding fineness of wool is not desirable in the American market. The wool should be "true," that is the same size from root to point. The cuts of the different breeds in this chapter give a good idea of their points.

BREEDING should always be accompanied by a purpose to improve the flock, and all ewes of inferior form or fleece, having any serious defect in constitution or habit, should be "culled" and sent to the butcher. The owner should keep a constant watch of his flock, and if large, select the ewes with reference to the rams to which they are to be bred. We surmise that no breeder will allow the ram to run indiscriminately with the flock at or near coupling time. If there is a difference in the size of the rams, select the ewes with reference to the size, not breeding a small ewe to a large ram. When you get a good ram, a sure lamb-getter, who stamps his good qualities on his stock, keep him and breed in and in, until you have a whole flock with his good qualities. There is no danger from breeding in and in, if the ram is perfectly sound, but if any defects begin to appear in his get, change him at once, and stamp out the defect by disposing of all that have it, no matter how good they may otherwise be. "*Keep none but the best.*" That motto is the sheet anchor of sheep husbandry. It costs something to be served by a full blooded ram, but the profits are sure. A flock of a hundred common ewes worth four hundred dollars, served by a common ram worth, perhaps, ten dollars, will bring an equal flock, but worth no more than their dams. But serve this same flock with a full blooded ram worth one hundred dollars, and every lamb at six months old will be worth at least one dollar more, and at every shearing their fleece will be worth more; every lamb they drop will be worth

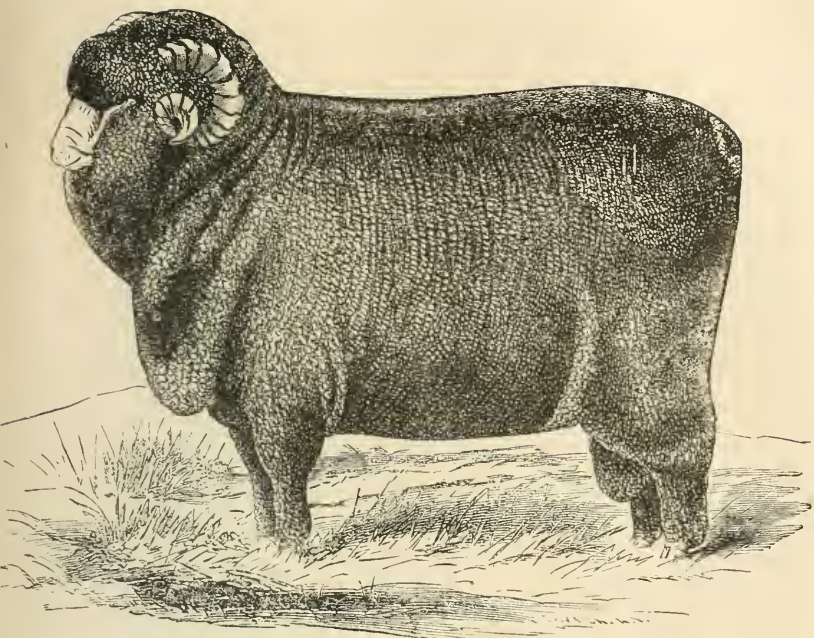
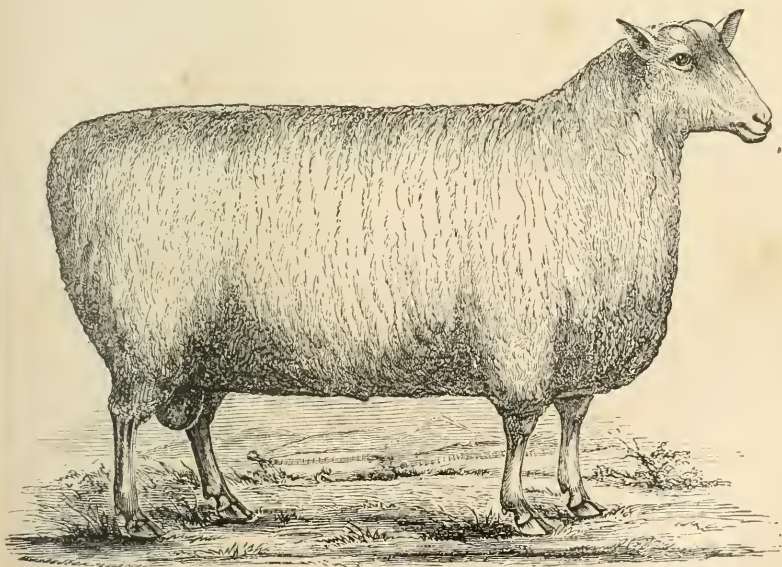


Fig. 81. MERINO RAM.



LEICESTER RAM. Owned by Jurian Winne, of Albany Co., N. Y.

still more and so on, the profits of the transaction increasing every year.

RAMS at eight to ten months old, if very strong and healthy, may serve five or six ewes; in the second year thirty or forty, in the third year, one hundred. After this, if properly managed, every strong, healthy, well-cared for ram may serve one hundred and fifty to two hundred and fifty ewes in the coupling season of six weeks. This is on the supposition that he serves each ewe but once. When the foolish practice is adopted of allowing the ram to run with the ewes, forty to fifty are enough for a ram, and two rams should never be put into a flock together. Rams properly used, and never overtasked, are good until their seventh or eight year. When in service the ram should have oats with his hay, and a few roots, oil cake, and extra care.

SPRING MANAGEMENT OF SHEEP. When changing the flock from dry feed to grass, let them out only a few hours each day for several days, keeping up in part their dry feed. TAGGING, is cutting off the wool about the vent, from the roots of the tail, down the inside of the thigh. It should *always* be done before the flock is turned out in the spring. Ewes with lamb should be held on their side by a helper, and always handled very carefully. If the pastures contain burdock, thistles, beggar ticks, etc., they should be cut, gathered, and burned before the sheep are turned out. LAMBING TIME varies widely with different flock-masters. The aim should be to have the lambing season from about the middle of April to the middle of May. The ewe averages about five months in pregnancy. The flock-master should make himself very familiar with the ewes for some time before lambing, so that he can handle them without difficulty. Never a harsh word or action among sheep. Lambing requires a well littered, clean, well ventilated room, whether stable or shed. If the days are warm and pleasant

the sheep should run in the yard, but at night should be sheltered. More harm than good usually results from going around in the night. If their accommodations are such as they should be, all lambs dropped will be found right side up in the morning. No assistance should be given in lambing, until the ewe shows signs of exhaustion in her efforts to expel the foetus, when a little gentle assistance may be rendered by taking hold of the feet of the lamb and giving a gentle pull when the ewe makes an effort to cast it. The lamb should come with a fore foot each side of the nose. If it comes in any other shape, it should be pushed back into the womb and the attempt made to get it in position. If NEW BORN LAMBS are acknowledged and licked by the dam, do not interfere. If the lamb appears weak, or for any reason does not suck, put him to the teat, milk a little onto his nose, and rub his back about the roots of the tail. Be very gentle, never get out of patience, even if the little brat is stupid; persevere, and you will succeed. Do not feed with a bottle or spoon until you are sure he will not suck. If the difficulty is with the teats of the ewe, put the lamb to another ewe that has plenty of milk, until you can get the teats right. In cold weather the lamb will sometimes be found chilled; it can neither move nor swallow. Wrap it up in a blanket and put it either into an oven or into water as hot as is comfortable for the hand; rub it dry at once, and, if still too weak to suck, as soon as it can swallow, give a teaspoonful of spirits in warm milk. Strong tea will sometimes do, if you have not the spirits at hand. If any lambs have to be brought up on cow's milk, let it be new milch cows. Such lambs are apt to become costive; the evacuations are difficult or cease, and the lamb becomes dull and sleepy. An injection of milk and molasses at blood heat should be given, two ounces at a time, until the bowels are moved. Give six teaspoonfuls of thoroughwort or



Fig. 83. SOUTH DOWNS.

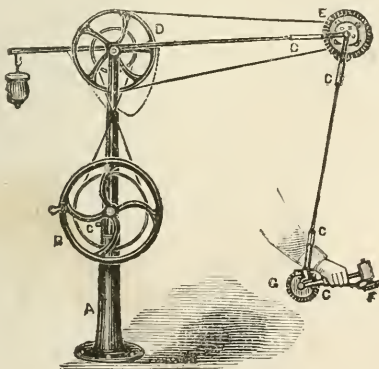
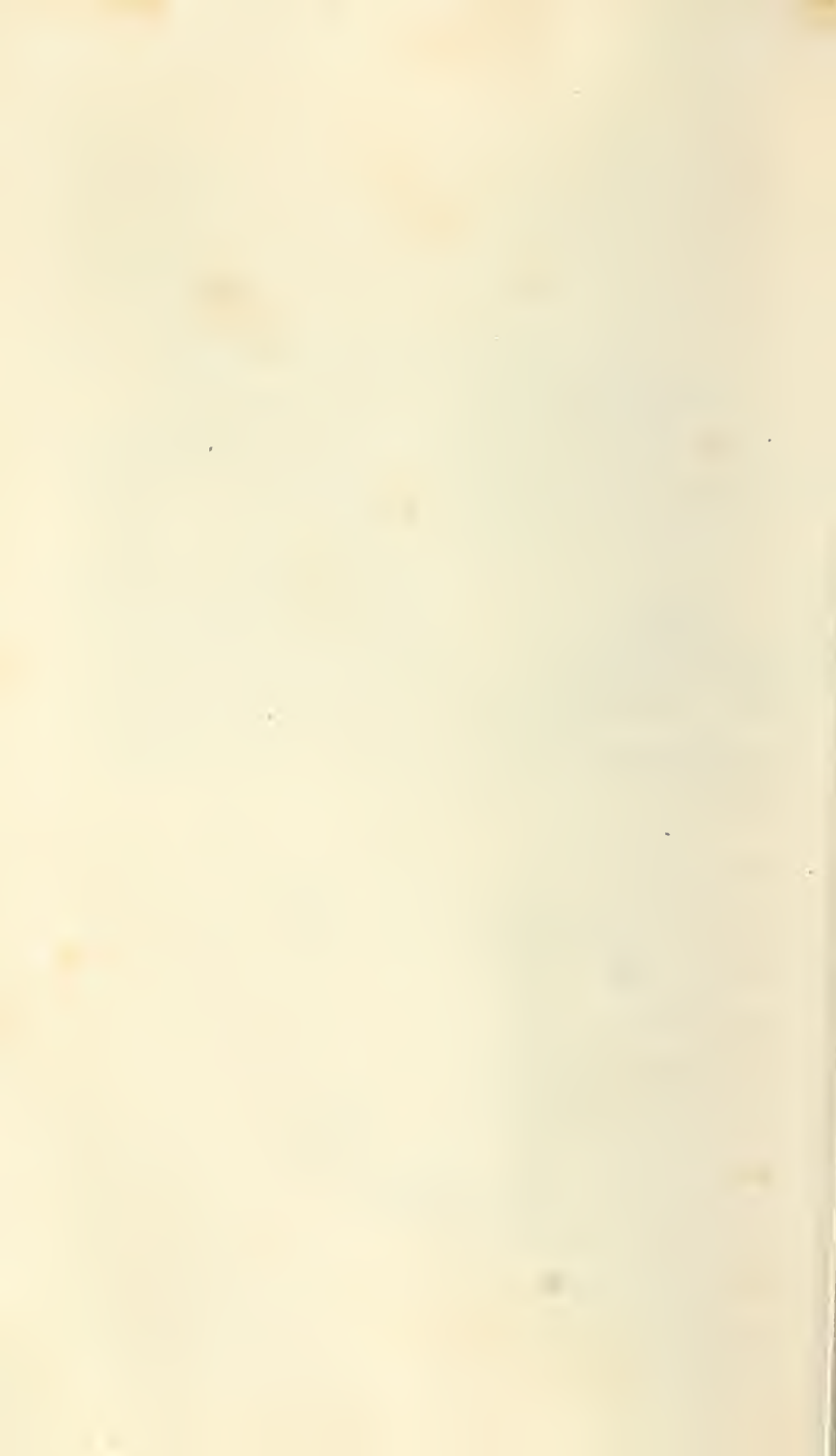


Fig. 84.
SHEEP SHEARING MACHINE.



boneset tea. We shall often recommend injections, and would say that no flock-master should ever be without a syringe. The lamb is to be held up perpendicularly by the hind legs, the fore feet just touching the floor, for a moment during and after the injection. If a healthy looking lamb does not suck well, examine his teeth, and cut the gums where any are pressing through. Watch the lamb and see that his dung does not pin down his tail over the vent. If so, remove the dung and rub the vent with chalk, or dry clay. If a lamb purges too freely, give a teaspoonful of chalk in milk. When the lambs are born with swelled neck, bind a woollen cloth around the neck and soak it in camphor. If the lambs are otherwise imperfect, cull them and get them out of the flock.

EWES AFTER LAMBING should be allowed rest, quiet, and the best of feed. If any of the ewes do not seem to give milk enough for their lambs, separate them from the rest and give them oatmeal gruel, roots, bran slop, etc.

When the teats have been cut off by the shearer, open them with a knitting needle, following with a hot needle; insert only far enough to secure an opening. A young ewe will sometimes refuse to let the lamb suck, she should be held until the lamb has once drawn his rations. If the udder is inflamed or caked, wash in hot water until a flow is secured; in the mean time putting the lamb to a ewe that has lost hers, or has milk to spare. A ewe with a good supply of milk, who loses her lamb, should have another, if there are twins or extra lambs, but if she is to be dried off, she should be fed on dry feed, and milked once a day for a week, and two or three times the next week. Every flock should have a dozen or two of pens for a hundred or more sheep. These should be three or four feet square, and high enough so that a sheep cannot jump out. Whenever a ewe disowns a lamb, or is wanted to adopt a lamb,

the ewe and lamb should be enclosed in one of these pens. If in the dark and away from the others, all the better. If a lamb dies, take off the skin from the body and wrap it around another lamb and the mother will adopt it. For some time after birth the dam recognizes its own lamb only by the smell.

DOCKING LAMBS is best done when two weeks old. The lamb is held on a block, the skin of the tail is shoved towards the body, and the tail is cut with a chisel. It only needs to be left long enough to cover the anus and vagina. If the lamb bleeds too much, tie a cord tightly around the tail for ten or twelve hours. If the weather is warm and the flies are about, rub a mixture of tar, butter, and turpentine on the parts. When docking, is a good time to count the sexes and put a little mark on the males. CASTRATION should be done between the second and sixth week. The operation should be done carefully, the spermatic cord cut, not jerked out, and tar, butter, and turpentine applied to the parts. WASHING SHEEP is under many circumstances dangerous and inconvenient. Wherever it is so, we advise shearing without washing. Washing is not wholly safe before the middle of June, in the latitude of Pennsylvania, and as it is often desirable to shear long before that time, the sheep must either go without or be washed in chilling cold water. When washed, the object usually is to see how little of the dirt can be got out and yet have the fleece sell for washed. The unwashed wool of a clean, careful breeder is worth more, often, than the half washed wool of careless ones. Any man who buys wool ought to be able to judge pretty accurately as regards shrinkage. In washing wool the wool should be wet and left to soak for a little while, then the sheep are dipped and the wool squeezed, then dipped once more, or put under a fall of water. When the sheep are brought to the washing the hoofs will be

found to have grown out of shape, curled under, etc. Washing softens the hoof and frees it from dirt. Have a strong sharp knife and pare off all these irregularities and also a part of the sole, if very thick. The long toes are usually clipped with nippers. SHEARING may be done from one to two weeks after washing, or as soon as the fleece is so far filled again with oil or yolk as to be silky and glossy; seven *warm* days will accomplish this better than fourteen *cold* ones, and three *hot* days better than either. Says Mr. Randall: "Shearing should always be done on smooth, clean floors or platforms, with the sheep penned close at hand. If the weather is fair, it is best to drive only enough sheep into the pen at once to employ the shearer three hours, the rest remaining in the pasture to keep themselves filled with feed. A hungry, empty sheep is more impatient, and the shears run around its collapsed belly and sides with more difficulty. The bottom of the pen should be kept clean with straw, stalks, or corncobs; corncobs are the best. If there are any sheep in the pen dirty from purging they should be the first taken out. They should be carried a little aside from the shearing floor and the dungy locks cut away. When the catcher catches a sheep in the pen he should lift it in his arms clear of the floor, instead of dragging it to the door, and thus filling its feet with straw, manure, etc. At the door of the pen he should hold it up with its back resting against his own body and its feet projecting toward the shearer, who should be there to clear its feet of filth, and with a small broom to free its belly from all dirt, before carrying it to the platform."

Shearing is a nice operation and not well done by a novice. R. M. Smith, of Manchester, has invented and patented a machine for shearing sheep, and good authority pronounces it successful in doing the work rapidly and well. Messrs. R. H. Allen & Co., the great implement manufacturers of New York

city, are preparing to manufacture them on a large scale. **SELECTING AND MARKING** can be done at shearing time. The breeder should have a box of type, or large letters cut in the ends of blocks of soft wood. The following brands are convenient. The initials of the owner's name, and in addition a B for those that are to go to the butcher, C for very choice ewes, and the initials of each of your rams for marking the sheep after they are topped. At shearing time the owner should stand by and examine each sheep and decide what mark should be put upon it. At no other time can the decision be made so well; the shape, size, and weight of fleece are now seen. Breeding qualities are also to be taken into account. All imperfect sheep should be drafted out of the flock, if perfection is desired. Where all are to be sold, only the initials of the owner need be branded, but choice sheep may well be marked, and perhaps an extra price can be obtained. The branding is done with a mixture of lampblack, turpentine, and oil. Oil and turpentine boiled, and lampblack stirred in while boiling, is another mixture, to be applied warm. Some have a series of figures and stamp the age at every shearing. Those who make breeding their business have an elaborate system of marking and registering. A little copper plate, fastened to a ring in the ear, is a neat and simple contrivance. The plate contains the initials and a number; opposite that number in the owner's book a description of the sheep is placed. After shearing, the sheep should have shelter at hand until they are able to endure the cold rain storms which often occur in June. **TICKS** can be killed by dipping the sheep in tobacco water. Make enough to cover a good sized lamb and strong enough to kill any ticks you pull off and throw into it. One man holds the fore legs and nose and another the hind legs, and then dip the sheep into the tub or box. Set it into another tub or box, squeeze out the

wool, and you will not be troubled with ticks. After sheep are sheared the ticks go to the lambs, and there is no excuse for not exterminating them. If you do not, they will exterminate your sheep. At shearing time the horns will often be found growing towards the eye or cheek; they should be cut back with a small fine saw. MAGGOTS penetrate into sores on sheep and cause death. The tar, turpentine, and butter, applied to all cuts made at shearing or to any wounds made afterwards, will prevent this. Dung about the vent generates maggots and should be removed, and the above application made.

EDUCATING RAMS should be begun early. They should be visited and handled until they are perfectly docile. Two grown rams should never be allowed to run together. A choice ram can be mated with a couple of wethers in a good inclosure, from which there is no possibility of escape. They should be taught to lead before they are six months old. A ring put through the horn is by far the best method of securing rams. FENCES around sheep pastures should be sound but need not be high, until the sheep learn to jump, when no ordinary fence will keep them. If the fence is sound and tight, and they are always taught to go under the bars instead of going over them, there will be no trouble. But only teach one sheep that it can jump over or crawl through, and you soon have a flock of jumping sheep.

SALT, TAR, SULPHUR, ALUM, ETC., are often given sheep in their summer pastures, but none of these except salt can be necessary for a healthy sheep. Salt they must have; once a week is often enough to give them a taste. If lumps of rock salt are kept in their troughs they will lick them whenever they feel the need. If salt is thrown upon weeds, thistles, clumps of coarse grass and bushes the sheep will eat them to get the salt. Water and shade are both beneficial in the

sheep pasture. Sheep that have been feeding in a pasture where there is water should not be turned into a pasture without water. It is a good plan to have temporary sheds even in summer pastures; if an unusually inclement storm comes on they will take refuge and save enough in strength, heat, and fat to pay for the sheds.

WEANING AND FALL FEEDING. Weaning should seldom be delayed after the lambs are four months old, and if sweet, tender pasturage is ready for them a month earlier it is advisable to take them off then. The great point to be aimed at is to keep them growing rapidly until winter. In no case should they be allowed to go backward, or even remain stationary.

“WELL SUMMERED IS HALF WINTERED” with any kind of stock. The ewes should be removed to a dry pasture; if possible, out of hearing of the lambs, who should be in care of wethers or old crones that have no lambs. As soon as pasture begins to fail or frost nip the grass, begin to feed oats, shorts, bran, and roots in small quantities. A tablespoonful of oats to begin on is enough for each lamb. Before winter sets in increase to a gill, or its equivalent in bran, and have a little hay in the rack under their sheds. The crones they are with will teach them to eat it. Shelter should be provided for all sheep pastures. Sheds opening to the south and west answer the best purpose.

FALL FEED AND SHELTER FOR EWES intended for breeding is one of the most important items of sheep husbandry. For various reasons they should come into winter in good condition. Unless they do, it is difficult to keep them up through pregnancy, if they take the ram at all, and when lambing time comes their poor condition is shown in the number of poor and dead lambs. As soon as the pasture grows at all scant, or the frost

injures the grass, feed them pumpkins, turnip tops, cornstalks, and turnips.

If any ewes still remain thin, separate them, and feed still better, giving a little grain. Shelter should be convenient of access in all storms, and there should be hay in the racks for them to nibble.

But does all this pay, says farmer "Behindhand." Yes, and it is the only way to make large profits out of sheep. A poor flock brings a small percentage of profit, but a first rate flock brings a large percentage.

A flock brought to the winter in good condition will take the ram readily, few will miss, and it will take but about one-half the time to serve them. They go through the winter much better, especially if it is severe, and drop their lambs within a few days of each other, being in uniform condition, and the lambs partake of the good condition of the ewes. **COUPLING** The ewes selected for the service of a particular ram should be kept by themselves, and the ram let loose among them; when a ewe is served she should be drawn out of the flock and the initials of the ram stamped on her. As soon as the ram has served six or eight he should be returned, and the ewes sent to the field. The served ewes should be kept apart for thirteen days, when they can be turned in again to the ram. The old method of allowing one or more rams to run with the flock will never be revived again among breeders of any intelligence.

Teasers have also been discarded. The ram requires extra care and feed for a month before and during the coupling season. No corn should be given, but oats, peas, beans, a little wheat, and the choicest of hay. No excess of food should be given, but just what he will eat up clean at each meal. Rams, we repeat, should *at all times* be kept separate from each other and from the rest of the flock. Preparing for winter. the flocks

should be divided after coupling, into lots, not to exceed one hundred Merinos, or fifty South Downs, or twenty-five of the larger mutton breeds. The sheep in each flock should be nearly uniform in size and strength. Feeble sheep and lambs should be put in a hospital by themselves, or disposed of at any price they will bring.

WINTER MANAGEMENT OF SHEEP. Sheep should have winter shelter in whatever portion of the country they may be kept. It saves the lives of some, it saves loss of fat from exposure in all. There is also a saving in food; for sheep sheltered during cold storms will not consume as much food, and will consume it more economically. Wet and dried, hay loses not only much of its palatableness but some nutrition. In the South these shelters need only be of poles or slabs covered with turf or straw. Set up crotched poles, ten feet apart and four feet high; lay long poles in these crotches, and set up slabs slanting against this frame. In all States south of forty degrees, open sheds are sufficient, and the sheep will flock to them on the approach of a storm. But north of that sheep barns with open yards are much to be desired. The plan (*Fig. 85*) will give an idea of an economical structure for a good sized flock. It consists of three two-story buildings, the one across the end eighty by twenty, the other two one hundred and twenty by twenty feet. These are divided on the first story into eight stables, *a, a, a*, each twenty by forty feet, which will accommodate sixty Merinos, though fifty each is the largest number that has been wintered in them. The stables are all connected by doors, *e, e, e*, and a door, *d, d, d*, opens from each into a common yard, *C*; each stable has also its separate yard, extending for two hundred feet on each side of the buildings, and entered by the doors, *b, b, b*. The lower end of the common yard is fenced off by a movable fence, indicated by the dotted line.

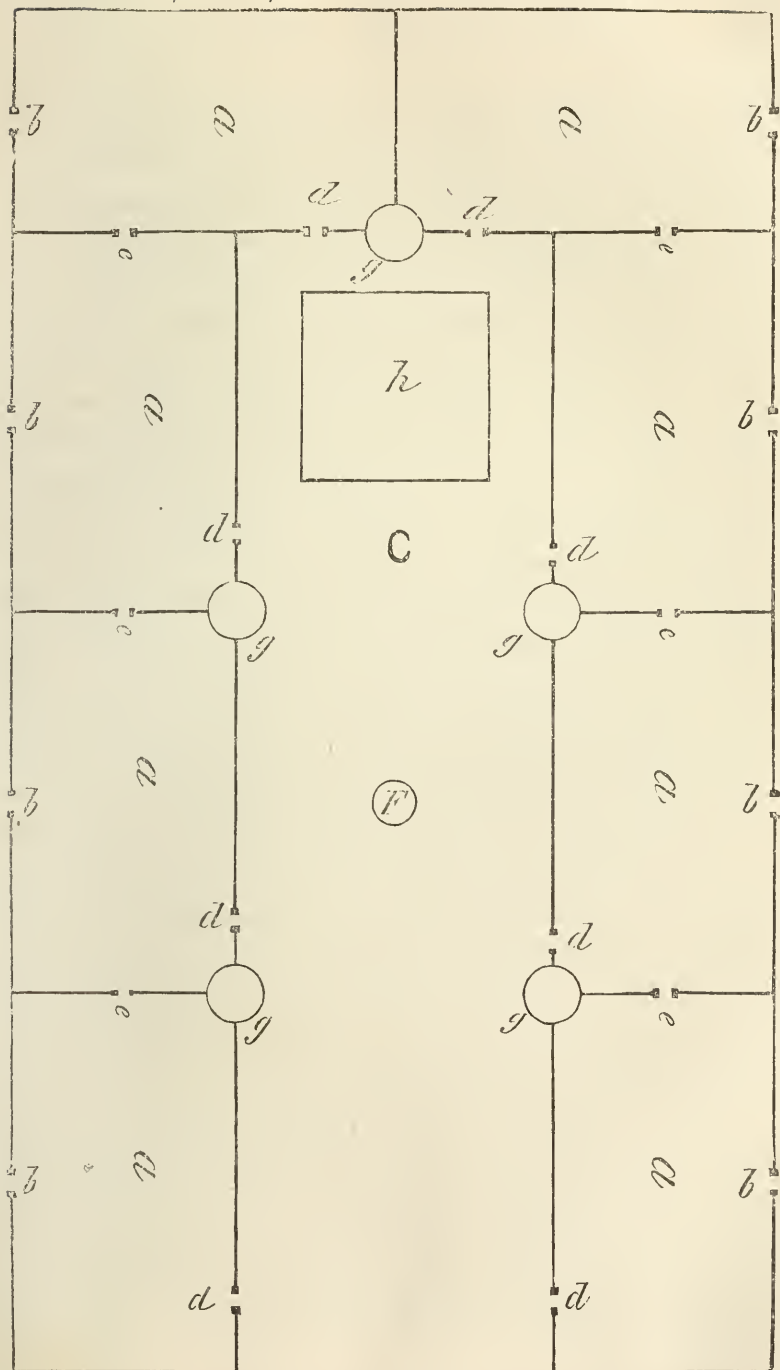


Fig. 85. PLAN OF SHEEP-BARN AND YARDS.

This yard is a hospital yard, shearing yard, coupling yard; docking, castrating, tagging, and many other operations are performed here. It is always kept clean, and deeply lined with good litter. The second story of the end building has one room used for storing hay. The second stories of the two long buildings are divided into two rooms each, one each for grain, hay, and straw, and one is used for storing any fodder. There is a good root cellar underneath one half, of one of the long buildings. At *g, g, g*, are half hogsheads, sunk to within one foot of the sill bottoms, and supplied with water by troughs, connecting with the pump, *F*. This arrangement is not quite satisfactory, as it is liable to freezing in extreme cold weather. At *h* is a ram pen. We consider the best features of this plan to be the common yard, and the separate yards connecting with each stable. These buildings can be made of light stuff, at a small expense compared with the value of the stock which can be stored in them from year to year. These barns abundantly accommodate a flock of from four hundred to five hundred Merinos and their winter food. A farmer, who commences with a flock of fifty, can put up the end building first, and add the others as his flock increases, but we think that, substantially, this plan should be kept in view. Each stable has one small window and one sliding window, (not glass,) so that they can be ventilated at any time without opening the doors. The sheep barn, whatever its construction, should be on dry ground, and have yard room and ventilation.

Pure air is beneficial to all animals, and the practice of leaving the dung in the stables all winter is a bad one, though very common. Three times, at least, the stables should be well cleaned out. The time of a thaw is, on several accounts, desirable for this purpose. Gypsum should always be sown on the manure before covering it with fresh litter, both to disinfect the

manure and preserve its good qualities for the soil. A few cords of seasoned peat, filled in each autumn, and hauled out in the spring, collect the urine, and make a more valuable manure, cord for cord, than ordinary barnyard manure. Sheep should not be closely confined all winter. A run on the snow in the middle of a mild day is exceedingly beneficial. And if the snow is off a couple of hours' nibble at the grass will do more to keep the system in good condition than any nostrums, such as tar, alum, etc. Especially on the ewes with lambs this short hour of relaxation, whenever the weather will admit, is of incalculable benefit. Says Randall, "I urge letting out breeding ewes on the fields for this limited time each day, (when the weather admits,) because no animal more intensely craves a portion of green food in winter, and I consider nature or instinct a first-rate judge of its own wants; because the small portion of green food obtained from the fields can exert no injurious effects in any direction whatever, while it prevents the costiveness peculiarly incidental to pregnancy, and, by keeping the bowels in an open and regular state, has a strong tendency to avert all unhealthy action or agencies; because the travelling about and digging for green feed affords a most necessary and healthful exercise; and, finally, because a neglect 'of these ordinances which *nature* has inculcated,' for the guidance of the pregnant ewe, has been followed by wide-spread disaster."

For those who feed turnips, as every sheep owner ought, once a week for exercise is all the escape required. A sled load of hay can be drawn off a half a mile or so, and the sheep allowed to follow it out and back.

WINTER FEED. Sheep require about three per cent. per day of their weight in hay or its equivalent, that is, two pounds for a sheep weighing sixty-five to seventy-five pounds; three pounds for one in the vicinity of one hundred pounds, etc.

Early cut clover, cured bright, is undoubtedly the best feed for sheep, but economy requires that they should also consume the straw and stalks of the farm. We would say here, that every sheep owner, who has any land adapted to turnips, should raise them for his sheep. We should as soon think of going without potatoes in the family, as raising sheep without turnips, or some other roots. Turnips, as far as they can be fed, are far cheaper than hay.

The following amounts are equal to one hundred pounds of meadow hay, composed of clover, timothy, June grass, etc.

Amounts nearly equivalent to 100 lbs. of meadow hay in feeding value.	{	90 lbs. early cut red clover.	|	40 lbs. to 50 lbs. wheat.
		150 " pea vines.		360 " rye straw.
		300 " turnips.		250 " oat straw.
		40 " peas or beans.		200 " barley straw.
		60 " corn, buckwheat, barley, or oats.		300 " wheat straw.

It is not economy to feed any one of the above alone, not even the best hay, but as in our own food a variety is both more palatable and more healthful. Regularity in the hours of feeding and in the amount given are also very essential. It is usually desirable to feed a large proportion of straw during the first two or three months of winter. Two and a half or three pounds of straw is equivalent to one pound of hay, but that amount of straw could not be digested properly, so a portion of the food must be in more concentrated form. This is accomplished by feeding three pounds of straw, equal to one pound of hay, and one pound of grain, bran, meal, or oil cake, equal to two pounds of hay. One pound of roots added to the above makes a most excellent feed. John Johnston writes: "I generally buy my sheep in October. Then I have good pasture to put them on, and they gain a good deal before winter sets in. For the last twenty-three years, I have fed straw for the first two or two

and a half months, with a pound of oil cake, meal, or grain to each sheep. When I commence feeding hay, if it is good early cut clover, I generally reduce the quantity of meal or grain one half; but that depends on the condition of the sheep. If they are not pretty fat, I continue the full feed of meal or grain with their clover, and on both they fatten wonderfully fast. I have fed buckwheat, a pound to each per day, half in the morning and half at four in the afternoon, with wheat and barley straw."

As the breeder wishes to avoid fat, the grain can be wholly dropped, when the clover is substituted; but if the sheep begin to fall off, it should be resumed in small quantities. The oats and waste hay left in the racks by the sheep, if put into a separate rack and sprinkled with brine, will be eaten by the sheep for the sake of the salt.

PRAIRIE MANAGEMENT of sheep is essentially different from that heretofore described. In the newer States land can be purchased at one dollar and twenty-five cents the acre, and vast pastures without claimants can be pastured, rent free. The following letter will show how the thing is done.

"TO HON. H. S. RANDALL. About the 29th of last July I started from Calhoun County, Michigan, with two droves of sheep, about seventeen hundred in each drove. My sheep stood driving remarkably well, and arrived in northern Iowa about the 10th of September. I found good feed, and about the time winter set in my sheep were in fine order. I sold three hundred, and prepared winter quarters for the remaining three thousand. I erected my sheds two miles apart, where water was convenient. I succeeded in getting a grove at each place, and built my sheds fronting the grove and parallel with each other, about five hundred feet long. I built them of poles and posts from the groves, and covered them with straw. The front posts were about six feet above ground, and the back

ones about four. I employed Irishmen who were in the habit of using the spade, and covered the back side with dirt, and then with sod, which made them very warm; being open in front, this was very important. The sheds were thirteen feet wide, and I cut them up twenty-two feet apart, with board fences which ran out in front of the sheds about fifty feet, making yards and shelter for fifty sheep."

Here are sheds with only the cost of putting them together, and three months of feeding free. The writer goes on to state that he bought the best hay he could get, bought corn in the field, cut it and shocked it while the fodder was green, and hauled it after the ground froze. He also got some oats and some shorts. He fed the sheep what hay and corn fodder they would eat, and fed a bushel of grain (one quarter oats, one quarter corn, and one half shorts) to each fifty sheep daily. There are a vast number of acres in the West and Southwest where such a system on a large or small scale can be carried on. And on many improved farms in the interior of any of the Western States, where it takes one bushel of grain to haul another to market, it will prove much more profitable to feed the grain to sheep and raise wool, which costs only four to six per cent. to take to market.

SUMMER FEEDING on the prairies south of forty degrees commences in April. The sheep are not coupled until December, and lambs do not begin coming until May, when pasture is good and the cold storms over. Lambing "on the range" is a laborious operation, for all the lambs dropped during the day are to be got into the fold before night without separating them from their dams. Mr. Randall recommends strong pens to hold a half dozen sheep each, strong enough to keep out the wolves, so constructed that they can be hauled to any part of the range. Any lambs dropped late in the day might be put

into these for the night. If covered with brush they will be a protection from the storm. We can see how a half dozen such pens would be convenient in numberless cases, paying their cost every season. The lack of water is the great objection to prairie husbandry, and there is no use of locating a range unless water is to be had the year around. Turnips sown broadcast on the inverted sod will give green food in abundance. Indian corn is the chief feed in addition to hay, and often almost wholly substituted for it. Its cultivation on the prairie soils is easy and cheap. One man with a pair of horses, planters, and cultivators can take care of fifty acres of corn, which will often yield eighty bushels per acre, and nearly double the fodder we get in the Eastern States. It should be cut and shocked before frost, and drawn to the sheep as wanted: two men with a team will feed three thousand sheep. One acre of corn with the fodder will feed twenty sheep through the winter. Wheat straw brined will be eaten for the salt. This is the cheapest way to furnish salt, and the best way to dispose of wheat straw, much of which is now wastefully burned. Washing, and shearing, and most of the operations of sheep husbandry are the same under all circumstances. Care and culling are desirable everywhere.

Says Hon. Samuel P. Boardman, in regard to sheep husbandry "on the range," as prairie husbandry is called:—"A man should spot long legged and bad shaped sheep, broken mouthed and old sheep, light shearing sheep, bare bellied and thin fleeced sheep; ewes with spoilt or partially spoilt bags; ewes which are known to be poor nurses, and whose lambs, for a year or two, are known to have been given to other ewes to raise; wethers which are three years old, and which shear so light that the butcher had better have them; and, if trying to breed common, coarse sheep into fine wool, all the coarse, hairy hipped sheep. No man will ever get a *first rate*, even

profitable flock of sheep, who does not make a practice of *yearly* culling.

Before turning bucks off the floor, daub them well behind, and under the horns with pine tar. This will prevent the flies blowing them, which they frequently do in hot, damp, weather, being attracted by the stench. If fly-blown, and not attended to, the maggots will kill them. In case maggots, from any cause, get a lodgment, scrape them all out, and rub the parts with turpentine.

The DISEASES OF SHEEP are few compared with those of other animals, and where sheep are well kept, according to the rules we have laid down, foot rot and scab are the only diseases to be feared. The face sometimes gets sore, or the lips swell and crack, but if the lips are rubbed with lard or common pot grease, (both without salt,) the soreness will disappear. Sore or inflamed eyes should be treated with the eye wash prescribed for the horse.

GRUB IN THE HEAD is a troublesome and perhaps, occasionally, fatal disorder, but not to such an extent as is generally supposed. In mid-summer a gadfly attacks the sheep and lays her eggs in the nostrils; these soon hatch into grubs, and burrow into the head to spend the winter. Prevention is better than cure in this case. Plow occasional furrows through the sheep pasture, about the first of July, and the sheep when attacked will run their noses into the fresh earth to escape the fly. About the same time smear the bottom of the salt trough with tar to the depth of two inches and sprinkle the salt over it. The tar they get on their noses repels the fly.

COLIC in sheep is shown by twisting the head, stretching, frequent lying down and rising again, and other symptoms of pain and uneasiness. An ounce of Epsom salts dissolved in warm water with a teaspoonful of essence of peppermint should

be given to a grown animal, and half that dose to a lamb. Thoroughwort or boneset tea are the next best remedies.

MALIGNANT CATARRH has been often mistaken for grub in the head. It will never attack sheep kept in a well ventilated stable, and as we have recommended. We know of no satisfactory treatment for sheep whose whole internal structure has been debilitated by lack of fresh air, impure odors, etc., and it is only such that are subjects of this disease.

ABORTION among sheep is not common, and is usually caused by some injury, crowding, kicks, a butt from a ram, fright, etc. It sometimes results from internal causes, however. We consider moderate exercise and a limited supply of green food, or turnips, an almost certain preventive, except in case of accidents and injuries. Two abortions in succession is sufficient excuse for sending the finest ewe in the flock to the butcher. The ewe that aborts, with the lamb, after-birth, etc., should be at once removed from the sight and smell of the other ewes. GARGET, or inflammation of the udder, is treated the same as in cows. Fomentation in hot water, and a purgative of Epsom salts two ounces and ginger one drachm, are the simple remedies.

The SCAB is a contagious skin disease, like mange in other animals. The sheep becomes very restless, rubbing itself against whatever comes in its way, often pulling out its wool with its teeth in its distress. All affected animals should be separated from the flock as soon as the disease is discovered. Every one should be examined for the little red spots on the skin which denote the scab. If the disease appears when the wool is short, scrub the bodies with a stiff brush, and dip them into the tobacco decoction described for ticks. If they are in long wool, as is usually the case, mix lard, tar, and sulphur, in the proportion of one pound of lard, a half pound of sul-

plur, and one-quarter pound of melted tar. Rub a little into the head; then make a part in the wool from head to tail, and rub a little in with the finger wherever there is any redness. Continue this all over the back and sides. We also recommend for this and all other skin diseases, insects, etc., the cresylic soaps and cresylic sheep dip before mentioned.

DISEASES OF THE FEET, such as are produced by sand, gravel, frozen mud, hard travelling and the like, require first the cleaning of the hoof from all substances which cause disease, the cutting away of the outer portion of the horn, and the application of a coat of tar and turpentine.

HOOF ROT is the most common and most dangerous of all the diseases of sheep in this country; we shall therefore give Mr. Randall's description and treatment in full:—

“The horny covering of the sheep's foot extends up, gradually thinning out, some way between the toes, or divisions of the hoof, and above these horny walls the cleft is lined with skin. Where the points of the toes are spread apart, this skin is shown in front, covered with soft, short hair. The heels can be separated only to a little distance, and the skin that is in the cleft above them is naked. In a healthy foot it is as firm, sound, smooth, and dry as the skin between a man's fingers, which, indeed, it not a little resembles, on a mere superficial inspection. It is equally destitute of any appearance of redness or of feverish heat.

“The first symptom of hoof rot, uniformly, in my experience, is a disappearance of this smooth, dry, colorless condition of the naked skin at the top of the cleft over the heels, and of its coolness. It is a little moist, a little red, and the skin has a slightly chafed or eroded appearance, sometimes being a very little corrugated as if the parts had been subjected to the action of moisture. And on placing the fingers over the heels it will

be found that the natural coolness of the parts has given place to a degree of heat. The inflammation thenceforth increases pretty rapidly. The part first attacked becomes sore. The moisture—the ichorous discharge—is increased. A raw ulcer of some extent is soon established. It is extended down to the upper portion of the inner walls of the hoof, giving them a whitened and ulcerous appearance. Those thin walls become disorganized, and the ulceration penetrates between the fleshy sole and the bottom of the hoof. On applying some force, or on shaving away the horn, it will be found that the connection between the horny and fleshy sole is severed, perhaps half way from the heel to the toe, and half way from the inner to the outer wall of the hoof. The hoof is thickened with great rapidity at the heel by an unnatural deposition of horn. The crack or cavity between it and the fleshy sole very soon exudes a highly fetid matter, which begins to have a purulent appearance. The extent of the separation increases by the disorganization of the surrounding structures; the ulceration penetrates throughout the entire extent of the sole; it begins to form sinuses in the body of the fleshy sole; the purulent discharge becomes more profuse; the horny sole is gradually disorganized, and finally the outer walls and points of the toes alone remain. The fleshy sole is now a black, swollen mass of corruption, of the texture of a sponge saturated with bloody pus, and every cavity is filled with crawling, squirming maggots. The horny toe disappears; the thin, shortened side walls merely adhere at the coronet; they yield to the disorganization; and nothing is left but a shapeless mass of spongy ulcer and maggots. Attempts to cure the disease, the state of the weather, and other incidental circumstances cause some variations from the above line of symptoms. When the first attack occurs in hot weather, the progress of the malady is much more rapid and violent.

The fly sometimes deposits its egg in the ulcer, and maggots appear almost before—sometimes actually before—there are any cavities formed into which they can penetrate. The early appearance of maggots greatly accelerates the progress of disorganization in the structures.

“The fore feet are usually first attacked, sometimes both of them simultaneously, but more generally only one of them. The animal at first manifests but little constitutional disturbance. It eats as is its wont. When the disease has partly run its course in one foot, the other fore foot is likely to be attacked, and presently the hind ones. When a foot becomes considerably disorganized, it is held up by the animal. When another one reaches the same state, the miserable sufferer seeks its food on its knees; and, if forced to rise and walk, its strange, hobbling gait betrays the intense agony it endures on bringing its ulcerated feet in contact with the ground. There is a bare spot on the under side of the brisket of the size of the palm of a man's hand, but perhaps a little longer, which looks red and inflamed. There is a degree of general fever, and the appetite is dull. The animal rapidly loses condition, but retains considerable strength. Nowhere else do sheep seem to me to exhibit such tenacity of life. After the disappearance of the bottom of the hoof, the maggot speedily closes the scene. Where the rotten foot is brought in contact with the side in lying down, the filthy, ulcerous matter adheres to and saturates the short wool of the shorn sheep; and maggots also are either carried there by the foot, or they are speedily generated by the fly. A black crust soon forms, and raises a little higher round the spot: it is the decomposition of the surrounding structures,—wool, skin, and muscle,—and innumerable maggots are at work below, burrowing into the living tissues and eating up the miserable animal alive. The black, festering mass rapidly extends,

and the cavities of the body will soon be penetrated, if the poor sufferer is not sooner relieved of its tortures by death.

“The offensive odor of the ulcerated feet, almost from the beginning of the disease, is so peculiar that it is strictly pathognomonic. I have always believed that I could by the sense of smell alone, in the most absolute darkness, decide on the presence of hoof rot with unerring certainty. And I had about as lief trust my fingers as my eyes to establish the same point, from the hour of the first attack, if no other disease of the foot is present. But the heat, which invariably marks the earliest presence of hoof rot, might arise from any other cause which produced a local inflammation of the same parts.

“When the malady has been well kept under during the first summer of its attack, but not entirely eradicated, it will almost or entirely disappear as cold weather approaches, and not manifest itself again until the warm weather of the succeeding summer. It then assumes a mitigated form; the sheep are not rapidly and simultaneously attacked; there seems to be less inflammatory action in the diseased parts, and less constitutional disturbance, and the course of the disease is less malignant, more tardy, and it more readily yields to treatment. If well kept under the second summer, it is still milder the third. A sheep will occasionally be seen to limp, but its condition will scarcely be affected, and dangerous symptoms will rarely supervene. One or two applications of remedies made during the summer will now suffice to keep the disease under, and a little vigor in the treatment will entirely extinguish it.

“With all its fearful array of symptoms, can the hoof rot be cured in its first attack on a flock? The worst case can be promptly cured, as I know by repeated experiments. Take a single sheep, put it by itself, and administer the remedies daily, after the English fashion, or as I shall presently prescribe, and

there is not an ovine disease which more surely yields to treatment. But, as already remarked, in this country, where sheep are so cheap and labor in the summer months so dear, it would be out of the question for an extensive flock-master to attempt to keep each sheep by itself, or to make a daily application of remedies. There is not a flock-master within my knowledge who has ever pretended to apply his remedies oftener than once a week, or regularly as often as that; and not one in ten makes any separation between the diseased and healthy sheep of a flock into which the malady has been once introduced. The consequence necessarily is that though a cure is effected of the sheep then diseased, it has infected or inoculated others, and these in turn scatter the contagion before they are cured. There is not a particle of doubt, nay, I know, by repeated observation, that a sheep once entirely cured may again contract the disease, and thus the malady performs a perpetual circuit in the flock. Fortunately, however, the susceptibility to contract the disease diminishes, according to my observation, with every succeeding attack; and fortunately also, as already stated, succeeding attacks, other things being equal, become less and less virulent.

“What course, then, shall be pursued? Shall the flock-master sacrifice his sheep; shall he take the ordinary half way course, or shall he expend more on the sheep than they are worth in attempting to cure them? Neither. The course I would advise him to pursue will appear as I detail the experiments I have made.

“*Treatment.* The preparation of the foot is a subject of no dispute, but the labor can be prodigiously economized by attention to a few not very commonly observed particulars. Sheep should be yarded for the operation immediately after a rain, if practicable, as then the hoofs can be readily cut. In a dry time,

and after a night which has left no dew on the grass, their hoofs are almost as tough as horn. They must be driven through no mud, or soft dung, on their way to the yard, which doubles the labor of cleaning their feet. The yard must be small, so they can be easily caught, and it must be kept well littered down, so they shall not fill their feet with their own manure. If the straw is wetted, their hoofs will not of course dry and harden as rapidly as in dry straw. Could the yard be built over a shallow, gravelly bottomed brook,* it would be an admirable arrangement; the hoofs would be kept so soft that the greatest and most unpleasant part of the labor, as ordinarily performed, would in a great measure be saved; and they would be kept free from that dung which, by any other arrangement, will more or less get into their feet.

“The principal operator or foreman seats himself in a chair; a couple of good sharp knives, (one at least a thin and narrow one,) a whetstone, the powerful toe-nippers, a bucket of water with a couple of linen rags in it, and such medicines as he chooses to employ, within his reach. The assistant catches a sheep and lays it partly on its back and rump, between the legs of the foreman, the head coming up about to his middle. The assistant then kneels on some straw, or seats himself on a low stool at the hinder extremity of the sheep. If the hoofs are long, and especially if they are dry and tough, the assistant presents each foot to the foreman, who shortens the hoof with the toe-nippers. If there is any filth between the toes, each man, after first using a stick, takes his rag from the bucket of water, draws it between the toes and rinses it, until the filth is removed. Each then seizes his knife, and the process of paring

* A place might be prepared in any little brook by gravelling or by laying a floor of boards on the bottom.

away the horn commences. *And on the effectual performance of this all depends.*

“If the disease is in the first stage, *i. e.*, if there is merely an erosion and ulceration of the cuticle and flesh in the cleft above the walls of the hoof, no paring is necessary. But if ulceration has established itself between the hoof and the fleshy sole, the ulcerated parts, be they more or less extensive, *must be entirely denuded of their horny covering, cost what it may of time and care.* It is better not to wound the sole so as to cause it to bleed freely, as the running blood will wash off the subsequent applications; but no fear of wounding the sole must prevent a full compliance with the rule above laid down. At worst, the blood can soon be staunched, however freely it flows, by a few touches of a caustic, say butter of antimony.

“If the foot is in the third stage—a mass of rottenness and filled with maggots—the maggots should first be killed by spirits of turpentine, or a solution of corrosive sublimate or other equally efficient application. It can be most conveniently used from a bottle having a quill through the cork. By continuing to remove the dead maggots with a stick, and to expose and kill the deeper lodged ones, all can be extirpated. Every particle of loose horn should then be removed, though it take the entire hoof; and it frequently does take the entire hoof at an advanced stage of the disease. The foot should be cleansed, if necessary, with a solution of chloride of lime, in the proportion of a pound of chloride to a gallon of water.* If this is

* Mr. Youatt recommends this, and says it “will remove the fetor and tendency to sloughing and mortification which are the too frequent attendants on foot rot.” I never yet saw mortification (gangrene) of the foot result from this disease. Mr. Youatt’s directions as to treatment are far more satisfactory than are his statements of the causes and symptoms of this malady.

not at hand, plunging the foot repeatedly into water, just short of scalding hot, will answer the purpose. And now comes the important question, what constitutes the best remedy? •

“The most common and popular remedy now used in Central New York is: One pound blue vitriol; one-quarter pound (with some one-half pound) verdigris; one pint of linseed oil; one quart of tar. The vitriol and verdigris are pulverized very fine, and many persons, before adding the tar, grind the mixture through a paint mill. Some use a decoction of tobacco boiled until thick, in the place of oil.

“The remedy recommended by Mr. James Hogg, of Scotland, is turpentine two ounces, sulphuric acid two drachms; to be well mixed before it is used and applied freely to the diseased part.

“Any of these remedies, and fifty more that might be compounded, simply by combining caustics, stimulants, etc., in different forms and proportions, will prove sufficient for the extirpation of hoof root, *with proper preparatory and subsequent treatment*. On these last, beyond all question, principally depends the comparative success of the applications.

“First. No external remedy can succeed in this malady unless it comes in contact with all the diseased parts of the foot; for if such part, however small, is unreachèd, the unhealthy and ulcerous action is perpetuated in it, and it gradually spreads over and again involves the surrounding tissues. Therefore every portion of the diseased flesh must be denuded of horn, filth, dead tissue, pus, and every other substance which can prevent the application from actually *touching* it and producing its characteristic effects on it.

“Second. The application must be kept in contact with the diseased surfaces long enough to exert its proper remedial influ-

ence. If removed, by any means, before this is accomplished, it must necessarily proportionably fail in its effects.

The preparation of the foot, then, requires no mean skill. The tools must be sharp, the movements of the operator careful and deliberate. As he shaves down nearer the quick, he must cut thinner and thinner, and with more and more care, or else he will either fail to remove the horn exactly far enough, or he will cut into the fleshy sole and cause a rapid flow of blood. I have already remarked that the blood can be staunched by caustics; but they coagulate it on the surface in a mass which requires removal before the application of remedies, and in the process of its removal the blood is very frequently set flowing again, and this sometimes several times follows the application of the caustic.* Cutting down to the crack between the horny and fleshy sole is not enough. The operator must ascertain whether there is any ulceration between the outside horny walls and the fleshy part of the foot, or at the toe, or whether there is even a rudiment of an unreachd sinus or cavity in any part of the foot where the ulceration has penetrated or is beginning to penetrate. The practised eye decides these questions rapidly from the characteristic appearances, without the removal of unnecessary horn; but the new beginner must feel his way along cautiously removing more horn where there is doubt, but so removing it that he will not unnecessarily cause an effusion of blood, or uncover the *healthy* quick, or disarrange the proper bearing of the foot. If the foot is in the third state, the removal of the maggots, the cleaning of the ulcers, the proper excision of the dead tissues, etc., require much time, sometimes more than half an hour to each foot. The most ex-

* The toe vein bleeds very freely, and it often requires some time and trouble to staunch it.

perienced operator cannot perform such processes in a hurry—the inexperienced one must perform them slowly, or all the time saved will be lost, twenty times over, in having to repeat them for an indefinite number of times.

“I had a flock of sheep a few years since that were in the second season of the disease. They had been but little looked to during the summer, and as cold weather was setting in many of them were considerably lame—some of them quite so. The snow fell and they were brought into the yards, limping, and hobbling about deplorably. This sight, so disgraceful to me as a farmer, roused me into activity. I bought a quantity of blue vitriol, made the necessary arrangements, and once more took the chair as principal operator. Never were the feet of a flock more thoroughly pared. Into a large washing tub, in which two sheep could stand conveniently, I poured a saturated solution of blue vitriol and water, *as hot as could be endured by the hand even for a moment*. The liquid was about four inches deep on the bottom of the tub, and was kept at about that depth by frequent additions of the *hot* solution. As soon as a sheep's feet were pared, it was placed in the tub and held there by the neck, by an assistant. A second one was prepared and placed beside it. When the third one was ready, the first was taken out, and so on. Two sheep were thus constantly in the tub, and each remained in it about ten* minutes. The cure was perfect. There was not a lame sheep in the flock during the winter or the next summer. The hot liquid penetrated to every cavity of the foot, and had doubtless a far more decisive effect even on the uncovered ulcers than would have been produced by merely wetting them. Perhaps the lateness of the season was also favor-

* This, by a misprint, was published five, in Sheep Husbandry in the South.

able, as in cold weather the ulcers of ordinary virulence discharge no matter to inoculate the healthy feet; and thus at the time of applying the remedy there are no cases where there has been inoculation not yet followed by the actual disease. I think that the vitriol required for the above one hundred sheep was about twelve pounds, and that it cost me fifteen cents per pound. The account then would stand thus:—Twelve pounds of vitriol at fifteen cents, one dollar and eighty cents; labor of three men one day each, two dollars and twenty-five cents: total four dollars and five cents—or about *four cents* per sheep.

“Many years after the above took place, I treated a flock of diseased lambs in the same way—except that they were put into a larger tub which would hold five of them, so that each stood in the hot fluid from twenty to twenty-five minutes: and again the cure was perfect. They too were handled just as winter was setting in; were wintered alone; and were turned early in the spring into a flock of about one hundred and fifty which had never had hoof rot.”

As Mr. Randall has himself treated upwards of five thousand sheep with this disease, we need no better authority.

Broken legs are treated with cold water and simple splints bandaged to the legs. From four to six weeks is required to firmly heal a simple fracture below the knee. Fractures above the knee make a case for the butcher. Dog bites and other wounds should be fomented with warm water until clean; the wound, if possible, sewed up, and a poultice applied. Flaxseed, slippery elm, or bran make a good poultice. The poultice

NOTE. We are indebted to Messrs. N. P. Boyer & Co., Parkesburg, Chester County, Pennsylvania, for the cuts of Merino Sheep, Figs. 80 and 81.

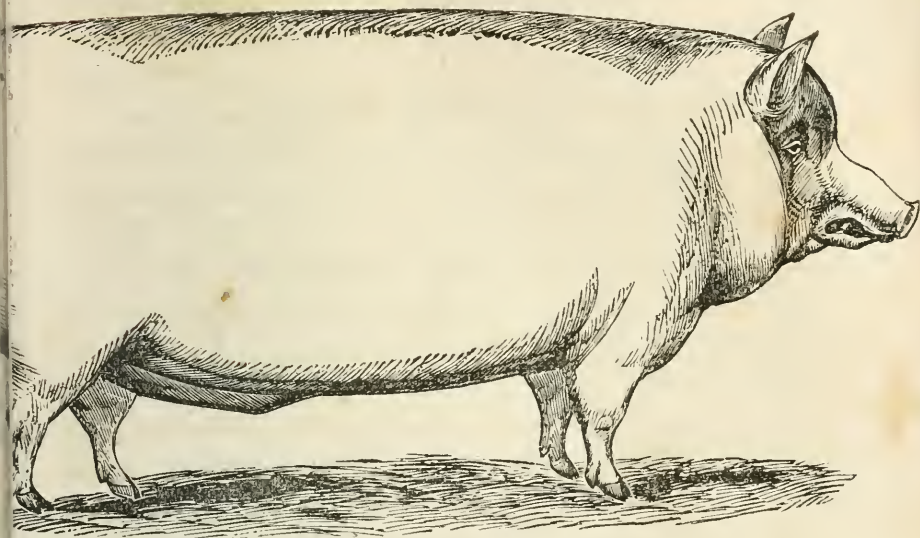


Fig. 86. SUFFOLK BOAR.

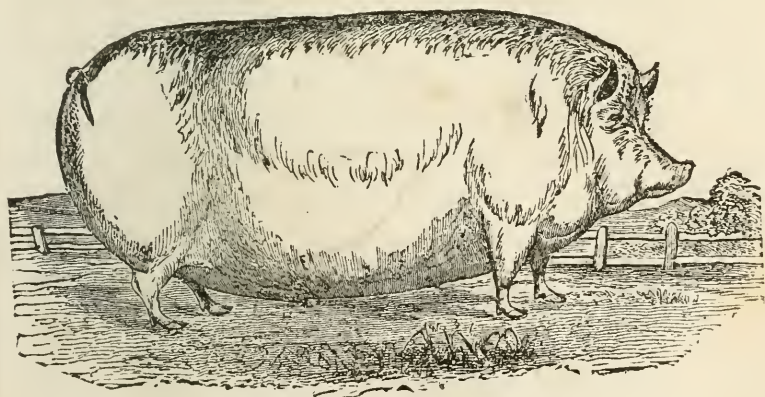


Fig. 87. IMPROVED PRINCE ALBERT.

should be changed twice daily until inflammation is over. An oiled or greased cloth over the place will be all that is required after this.

HOGS fill an important place in our plan of mixed husbandry, because they will convert into manure and pork much that would otherwise be unconsumed. But few farmers at the East raise as much* pork as they might with profit, and the markets are supplied with Western pork. The reason why they do not make it pay is, that they do not manage right with their hogs. In the first place, there is no use in feeding a long, thin, slab-sided breed of pigs, even if they are given to you. Get a good sow of some first rate breed, or else breed the best common sow you can find to a thoroughbred boar and raise a good breeding sow. Manage so as to have two litters, one early in the season, and the other long enough before winter to have them get well agoing. Good pigs are always in demand, and it is just as easy to get six to ten *good* pigs as the same number of poor runts that will never fat. And the same amount of food fed to a good pig will make twice as much meat as to the other. The only difference in expense is the first cost of the boar or sow, and one litter of pigs will pay all the difference in expense between a pure bred Chester, Suffolk, or Berkshire, and the lank specimens ordinarily used for breeding.

WHAT IS THE BEST BREED? is a question often asked; but there are several so good that it is difficult to answer. Where the "Chester White" is known, no other breed can compete with it. It is, according to our notion, nearer perfection as a *hog* than has ever before been arrived at. Its outline is beautiful, its disposition gentle, its habits quiet and contented—not disposed to roam and fret, so that the food it consumes goes to the formation of flesh, and is not spent in running after mischief. It is not a gross feeder, but, like all other animals, requires its

food at regular intervals. This care and attention is never lost on it. There is no other breed that enjoys better health. If kept and properly cared for until twelve or fifteen months old, it will yield from five to seven hundred pounds of pork. What other animal will yield so much in so short a time, from so small a beginning, with such a small outlay of capital?

The BERKSHIRES are a larger breed, fatten well in proportion to their food, and are excellent breeders. No one can go amiss in purchasing a Berkshire. The SUFFOLKS, and the improved Prince Albert Suffolks especially, are good. The Essex, Cheshire, Leicester, and Polands are much better than the "no breed." The China is fit only for crossing with some of the large coarse breeds. Such a cross improves the China in size and the larger breeds in quality.

But in buying a sow or a boar for breeding, do not be satisfied with its being *called* a Chester, or Suffolk, or Berkshire, (unless you buy of some responsible breeder,) but see for yourself that the animal has the good points of the breed. These points can be seen by close examination of the cuts we give in this chapter from photographs of hogs owned and bred by Messrs. N. P. Boyer & Co., Parkesburg, Chester County, Pennsylvania.

BREEDING. The sow goes from fifteen to seventeen weeks with pigs. At the end of the fourteenth week she should be watched considerably, and if she appears to be suffering, restless, wandering about collecting straw, etc., coax her into a sty by herself, where you can take care of her and the pigs. This sty should have cleats nailed on the sides a foot from the floor, under which the pigs can escape, or else the sow may lie on them. It is not best to interfere to take away the pigs unless she seems likely to crush them, but it is well to be where you can watch her without being seen yourself. When the farrowing is over and

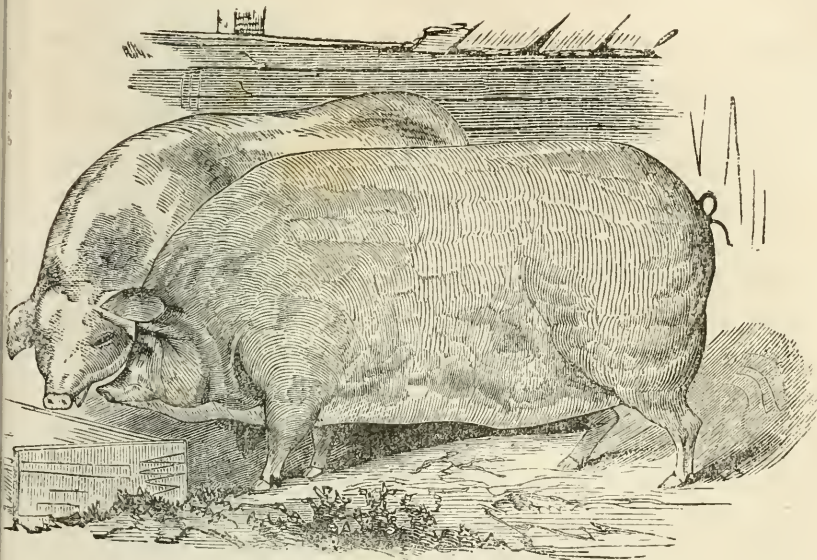


Fig. 88. CHESTER WHITES.

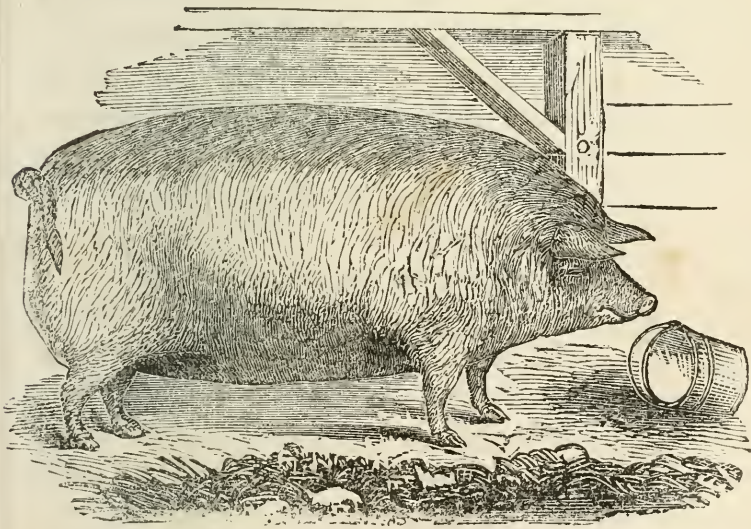


Fig. 89. CHESTER WHITE BOAR

the after-birth is dropped, remove it at once, for if she eats it she will be likely to eat her pigs also. If she should commence to eat her pigs, give her a half pint of spirits and make her drunk. If she is not too fat she will manage without lying on her pigs. For a week or two before farrowing she should be fed on cooked meal and milk, and this should be continued for some time after. If roots are given, they should be cooked also. If convenient, turn her out an hour or two every day into grass. If a farmer has a few lengths of adjustable fence always about his premises he will find it handy on many occasions. He can fence in a few rods of grass for pigs, calves, or lambs, as required. After ten or twelve days the pigs can be let out with the sow. Frequent feeding is better for the sow than large feeds. If she is weakly, or seems to have too many pigs for her milk, make a mash of whey and bran, or skim milk, meal and bran, and teach the pigs to eat as soon as possible.

Messrs. N. P. Boyer & Co., large breeders of improved swine, say, in their "Stock Journal."

It sometimes happens that sows, especially with a first litter, refuse to acknowledge the maternal relation; and, like some of our own species, endeavor to discard their offspring.

When a case of this kind shall occur, after the sow has ceased labor enter the pen quietly and catch the sow, placing her upon her side, and whilst one person at her back, with his knees gently pressing upon her to keep her down, and a hand over her to each set of feet to keep her from struggling, another one places the pigs in position at the teats, which they sometimes refuse until the nipple be wet with new milk, when they readily take hold and require little invitation afterward. After the pigs have sucked they must be removed before letting go of the sow, if she still remains belligerent, or she may injure them in her haste to rise and get away; but if she utters that short and con-

tinuous lively grunt that sows are known to do when their pigs are sucking, it shows that she is becoming reconciled, and little danger may be apprehended. But sometimes it will be necessary to repeat the coercive process, which must be done as gently as possible, and a second trial rarely fails to induce the sow to take to and become reconciled to her young brood. Whilst I have known them to become reconciled and passive upon the first trial, so as to continue quietly permitting the pigs to suck, after the attendants have retired, I have, in a few cases, had to apply compulsion a third time before the sow would succumb; but this is rare, as a second trial scarcely ever fails to succeed."

In any case, begin when they are two weeks old to give them warm milk, and gradually thicken it with boiled vegetables or bran. They should have a little trough of their own, under their railing, where the sow cannot get at it. If another litter is wanted in the fall from this sow turn the boar in to her, when she is out in the yard away from her pigs, a week or ten days after farrowing. She should not suckle her pigs more than six weeks after taking the boar. When you get pigs, whether you raise them or buy them, keep them growing all the time. This is the secret of success in making pork. If a pig is allowed to stop growing it takes twice the time and twice the food to get him started again. There is nothing equal to milk to give pigs growth. Let them have oat meal, corn meal, and wheat bran in equal quantities, always cooked. Scalded food will fatten them all one-third more than raw. Never feed any grain whole. Mow the pigs grass and clover. Many farmers just keep their pigs on slops, grass, and whole grain until autumn, just enough to "keep them along," and then crowd them in fattening. This is the reason they do not make it pay. With a good breed that will fat, nothing they eat is lost upon them, it all

comes back in pork. So grain should always be ground and steamed for hogs. They will make full one-third more fat on the same quantity. A box like that described on page 398, will answer the purpose. See our remarks on cooking food for cattle. The same remarks apply here. J. V. Mapes, of Elmira, says:

“Instead of whole grain it is much more economical to grind and cook it either by boiling or steaming. In winter, boiling is much better than steaming, for the reason that it takes considerably less fuel to boil a small quantity than to steam it; and farther, that you can boil merely what is wanted for a feed at a time, and give it moderately warm, which renders it very grateful to the animal in extreme cold weather. I am wintering thirteen hogs, weighing from one hundred and forty pounds to five hundred pounds, by feeding the lot on twelve quarts of cat meal, boiled thoroughly with cut hay or cornstalks, and diluted to thirteen pailfuls for a mess three times a day, which makes a very fine porridge, adding about a pint of salt to each mess, making for the whole thirty-six quarts of ground oats per day. If the same hogs were kept on whole corn or any other grain it would, probably, cost five times as much, and they would be in no better condition, while they would be much more liable to disease.

“This kind of feed is very fine for sows suckling pigs, because it keeps them in good heart and gives a large flow of milk. It is also very fine for pigs just weaned, as they will leave butter or skimmed milk to eat this. It is, probably, more nutritious than buttermilk.

“In the summer season hogs and pigs should most certainly have access to a good field of clover, both as a matter of economy and of health, as they will keep in good condition and grow rapidly thereon with but little or no other feed. Thus by a rigid economy, both in winter and summer, hogs may be kept as a matter of profit as well as any other class of stock.”

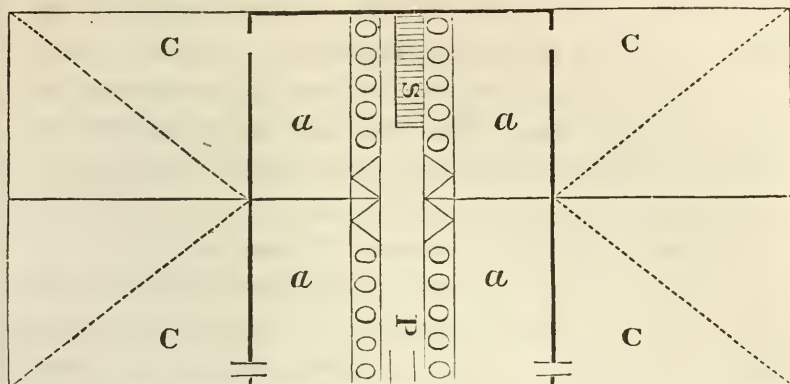
Hogs turned into the orchards, as recommended in the chapter on Fruit Culture, will not only be of benefit to the orchard, but will pick up considerable forage. They are very fond of acorns, beech nuts, etc., and will fat on them faster than on any other food. It is not good economy, however, anywhere to let hogs run in the woods much, for they will run off their fat. A very large hog raiser in Kentucky says:—

“First, we bought the best, thinking the only true economy was in having the hog that made most meat and grease in the shortest time, from the food we provided. And we never permitted them to get poor; finding it cheapest to feed a fat hog and keep it so than to save by stinting, and then bringing up.

“Secondly, we never permitted our hogs to roam, keeping them under fence; believing it cheaper to provide food than to run them upon Uncle Sam’s property, or any other body’s, and pilfer for a living. We provided pastures, water, small grain, peas, pumpkins, squashes, potatoes, pindars, corn, etc. Of course, we say not that we had all at once, or all of the time, but we have had six acres of squashes, six acres of pindars, hauled in ninety ox loads of pumpkins, etc. We never relied on corn alone, it was too expensive. We had pastures of divers sizes and of the various clovers and grasses.”

The western farmer depends largely upon corn of course, after the pasturing is over, but we think the suggestion of pumpkins is a good one. The piggery is an important consideration, and in the following plan and explanation will be found our ideas upon this matter. (*Fig. 90.*)

The heavy lines represent a building fifteen by thirty feet and two stories high. The upper story is divided into two rooms; in one is stored the meal, bran, etc., required for feeding. In the other is a set kettle for cooking the food. A pump runs from this room to the barn well, and water is therefore handy.



(Fig. 90.)

Having a fire here, this is used for a work room in winter, and all sorts of little odd jobs of mending, etc., are done in cold weather. This heater is also very handy at butchering time. P is the passage way, and S the stairs leading to the second story. A, a, a, a, are for feeding pens, each having an entrance to yards, C, C, C, C. These feeding pens have solid floors, of matched boards and slant so that all the urine runs into the yards. Each pen has two slide windows made of boards, one opening into the yard, C, and the other at the end.

The troughs which run along next the passage way are square boxes of solid, seasoned, oak plank, with oblong holes in the top for the pigs to eat through. This keeps each pig in his place and prevents them getting their feet in the trough. The feeding places at the corners are represented in the cut. The side of the trough towards the passage way opens on hinges for the purpose of cleaning.

The yards outside the pen, represented by the light lines, were dug out two feet, and a stout board fence built. Three feet of peat were then filled in, and this is taken out each year and replaced by fresh. It is almost the best manure made on the

farm, soaking up all the urine from the animals. Over the parts inside the dotted lines, and marked C is a roof of rough boards, matched so as to shed all the rain and keep a dry sleeping place for the hogs. The whole yard is kept well littered with straw, leaves, etc., and never gets muddy. There is a gate in each yard, not represented in the cut.

DISEASES OF SWINE. DIARRHŒA. Change the food and mix in the morning's mess a teacupful of powdered chalk for a full grown animal. **HOG CHOLERA.** The principal symptom is almost constant evacuations of a dark color, of a fetid odor, and containing much bile; the extremities are cold. If one hog has these symptoms give each of the others three times a day, in their feed, a tablespoonful of the following mixture. Sulphate of iron, one part; cinchona, two parts; charcoal, two parts; flour of sulphur, twelve parts. (One pound of sulphur two ounces each charcoal and cinchona, and one ounce sulphate of iron, will make six days' doses for one hog.) Continue to give for six days.

FEVER. Symptoms. Eyes red; skin, lips, nostrils hot and dry; great thirst and poor appetite. Bleed a large hog a quart, and smaller ones in proportion. Bleed from one of the veins in the ear, or in the fore leg, just above the knee. Feed nourishing food often. If the bowels are closed inject warm soap and water. Cracking of the skin, mange, and other cutaneous diseases are to be treated with a mixture of lard and tar.* In cases of mange keep the hog without food for half a day, and then give from one to three ounces of epsom salts in a warm bran mash. After this give a tablespoonful of sulphur in each meal, until the sores heal.

MEASLES. Symptoms. Red eyes and pustules about the

* Also Cresylic soap, before recommended for cows, sheep, etc.

throat. Give no food for one day, then give sulphur with each meal. *Cases of Colic* are best treated with doses of warm water, and injections of warm soap and water if possible. RHEUMATISM, stiffness of the limbs, and unwillingness to move. Keep the animal on boiled diet given warm. Wash the limbs and shoulders in *hot* water, put him in a warm clean place and give sulphur and cinnamon half and half, at each meal. Sometimes the fore legs will be stiff from the stopping up of the little openings on the inside of the fore legs. Scrub with soapsuds and a corncob, until all scurf is removed, then soak in hot water, and finish by rubbing in a little lard. CLEANLINESS. It may sound strange to some when we say that cleanliness is necessary to the health of the hog. No animal will keep cleaner if you will give him a chance. He wallows in mud, but would prefer clean water, he roots in filth, but prefers fresh earth, turf, and leaves. He eats, sleeps and evacuates in the same room, only when you oblige him to. Give him a place to eat, a place to sleep, and a place for rooting, etc., and he will keep his sleeping apartment cleaner than any other domestic animal under the same circumstances. The hog should have a clean, dry, well floored, well littered place to sleep. When in a closed room it should be cleaned out every morning, just as much as the horse stable; it should have a slide at each end, so that it can be ventilated all day. All the diseases of the hog are bred of the dirt, wet, filth and bad air to which he is forced. The trough should be washed down daily. Our plan for the piggery shows how these things can be done. CASTRATING should be done at six or seven weeks old, before the pigs are weaned. The operation is the same as described for calves. Spaying is also done about the same age, when the sow pigs are not required for breeders. It is also done when sows are to be fatted. When sows abort, or protrude the womb after farrowing, or eat their pigs, they

should be spayed and fatted. The animal is laid on the left side and firmly held by the assistants. An incision is then made, and the fore finger inserted until it finds the ovaries; these are drawn out of the opening and both cut off at once. The womb is returned and the wound sewed up, and rubbed over with a little lard. Care should be taken for a few days after spaying that they get neither wet nor cold.

GOATS. The goat is destined before many years to be an important member of our family of domestic animals, and a source of wealth both to farmers and manufacturers. Already preparations are on foot for manufacturing the durable and brilliant fabrics so long imported from Cashmere; already rich worsted stuffs and richer dress goods have been made in this country, and we are promising ourselves, our daughter shall have a Cashmere shawl from an American loom on her wedding day. And it will be well for enterprising, far seeing men to make an investment in this direction.

The CASHMERE or ANGORA GOATS, from whose silky hair such lustrous articles are manufactured, are hardy, healthy, and prolific. There are already some three or four thousand of them in various parts of the country, and they have proved their adaptation to the various climates of the United States. They will thrive in bleak, cold, mountainous regions or in the tropics. Says the "*Wisconsin Farmer*," "The goat, generally, is as cosmopolitan as the dog, or the sheep. He is found amidst the snows of Norway and Siberia, on the burning sands of Africa, and in the flowery and poetic vales of Turkey and Cashmere. The finest varieties of the wool bearing goat live in different countries and latitudes, from Persia on the thirtieth to Silesia on the sixtieth parallel north latitude; from China in the east to Asia Minor in the west; even the most valuable and delicate varieties, in the bleak, cold, mountainous

climate of the Himalayas, Thibet and Russia, feeding on shrubs and the scanty vegetation of those sterile regions; also in the warmer climates of Persia, Turkey and Cashmere. Therefore, since this natural habitat embraces all the degrees of latitude, including the United States, and has a similar variety of climate, mountains, etc., reason and common sense teach, that every variety of the wool bearing goat will thrive in most parts of the United States, particularly in the mountainous and more barren portions, as well as in any region on the globe, while abundant experience has established the fact, that wherever this goat has been introduced, he has flourished as well as the sheep."

All the evidence at hand shows without doubt that the goat thrives with less care and on more scanty herbage than the sheep, and is especially adapted to the mountainous grazing regions of the Northern States. In New England, where the wool would be at the door of the mills of Massachusetts and Connecticut, we can imagine no addition to the farm stock which would be productive of more wealth than the goat. Their flesh makes the nicest of meat, their milk is worth twice that of cow's milk, and often gives twice as much cream as the richest cow's milk. Goat's milk is often ordered for children and the sick by our best physicians, and its peculiarly nutritious and healthful qualities have long been known and acknowledged by the medical fraternity. For many years to come their wool will be much more valuable than that of the sheep, while they can be kept at less expense, and will pay a large proportion of their keep in milk.

An extensive breeder in Ohio writes to the *Ruralist*: "For a number of years I have been somewhat extensively engaged in breeding these Cashmere and other breeds of goats. I have found the Cashmere especially healthy and hardy, and have de-

rived the greatest satisfaction from the attention I have bestowed upon them. They are very prolific, well adapted to our climate, and are profitable, not only for their wool, but for their skins, which makes the most beautiful furs for the use of ladies and children. Their flesh is superior in flavor to that of mutton.

"I have now on my farm upwards of one hundred and fifty head, and I can state with certainty that it costs no more to raise and keep two good goats than one sheep.

"Dogs are not inclined to molest them. They are not partial in their choice of food, and will live on any kind of herbage. They are very domestic in their habits, and readily seek their proper shelter at night, and evince a ready instinct to seek shelter from a coming storm."

These are great advantages, not the least of which is that they will defend themselves against the dogs, whose ravages are so destructive among the sheep.

The fleece of the Cashmere goat weighs from four to nine pounds. They seem to improve in this country both in size and weight of fleece. Says the authority before quoted:

"The skins of the mature animals are dressed for robes, which sell for from fifteen dollars to twenty-five dollars. The skins of the young are dressed for furs, colored or not, and command often fifty dollars each, for such has been the progress of the worsted manufacture within the last ten years, that machinery already exists in this country and Europe upon which this fleece can be made into every fabric to which it has been applied in the East, with equal success and far greater dispatch. At present the main effort should be directed towards importing perfect specimens of the wool bearing animals, and crossing them upon the common goats already in the country. By this means the latter are so much improved as to be in the third or

fourth generation scarcely distinguishable from pure breeds. Says the *American Agriculturist*: "Rocks that goats will not climb, foliage that they will not eat, bark that they will not gnaw, are things hard to find. Still, these propensities to overstep bounds, and do what we would rather they would not, may all be controlled, and their silky fleeces made available to the comfort and pleasure of man. We have been much interested in examining samples of the fleece of different pure blooded and grade animals of this breed, if so it may be called, as well as the animals themselves, and are convinced from the diversity of form in the animals, and of fineness of the wool or hair, that there is in the stock great capacity for improvement. These goats impress their characteristics with great certainty and power upon their offspring, when crossed with common goats. The fleece consists of the long, often very fine, silky hair, and beneath it, very close, fine wool, which coats the animal in the winter season, and affords a most efficient protection from the cold. By careful breeding, doubtless either of these kinds of fleece may be increased in quantity. The fine Cashmere shawls are made from the soft, fine wool; and, though experiments in introducing the fine haired goats of Cashmere and Thibet into Southern India, to produce this fine fleece, have failed, yet the Cashmere introduced into this country, and their descendants, are said not to deteriorate in this respect."

A still further recommendation of these animals is that they are not subject to rot, grub, and other diseases, to which sheep are liable. The cut we give is from a goat owned by Messrs. N. P. Boyer & Co., of Parkesburg, Pa. (*Fig. 91.*)

THE DOG. The late H. W. Herbert published a work, of six hundred and sixty-three pages devoted to the breeding, breaking, training, and diseases of dogs, yet the number of worthless curs has continually increased. There is nothing so worthless

as a worthless dog, and yet they are counted by millions. The Commissioner of Agriculture estimates the yearly cost of the dogs in this country at FIFTY MILLIONS OF DOLLARS, for a set of good for nothing, thieving, sheep killing, mongrel curs. It is a shame to our civilization. And not only a shame and a loss, but a great disadvantage to the sheep interests. These dogs annually destroy two million dollars worth of sheep. It is often a great drawback to sheep raising, especially mutton sheep, near large places. At least nine out of every ten dogs should be at once killed by process of law, and the remainder put under bonds of at least five hundred dollars each to keep the peace. Then every dog owner will be responsible for the damage done by his dog, and no one can keep a dog, that is not responsible; the trouble now is that the owners of the half starved pack that destroy the sheep usually have no property but the dogs, and no damages can be recovered. This is one of the hindrances in the way of raising pure bred sheep, for the dogs might destroy the work of years in a single hour. Thus one department of greatest importance is kept back by these mongrels. We call upon farmers to see, each for himself, every representative to the legislature or assembly from his section, and urge the passage of more stringent laws, in regard to dogs. Let a ten dollar tax be instituted and collected. Let any one be permitted to kill any dog on which the tax is not paid and soon there will be a thinning of these hated ranks. We do not advocate the killing of good dogs, of good breeds, with good qualities. No one admires such a dog more than the author, who would like to see the ranks of good dogs increased. But such dogs are the rare exceptions. The so-called watch dog, if of any service in that capacity, is usually an ugly, vicious brute, and is no protection against a regular burglar or thief, for such will give him chloroform even through barred and bolted



Fig. 91. CASHMERE DOE.



Fig. 92. SHEPHERD DOG.



doors. And the bulldogs and other watch dogs are among the most destructive when they once get into the sheep pasture. The full blooded Newfoundland and St. Bernard, or a cross between the two, may be made of great service to the farmer, and seldom of themselves attack sheep, but as soon as you begin to cross them with any thing else, unless it be the shepherd dog, you spoil them entirely. We would not have a cross from a Newfoundland, St. Bernard, or shepherd dog and a bulldog, about our premises much more than we would a rattlesnake. The SHEPHERD dog is the most valuable of the whole family of dogs. A writer in the *Western Rural* thus describes them :

“The Spanish shepherd dog is said to belong to the same family as the St. Bernard spaniel. Like the dogs of this breed, he possesses great intelligence and sagacity, combined with courage and endurance, properties that are invaluable in a country infested by thieves and wolves.

“The Hungarian, French, and Mexican shepherd dogs are evidently of Spanish origin. In Mexico the pups are suckled by ewes, and become so much attached to the flock that they never leave them, except when compelled by hunger to visit the ranche. In the sheep districts of New Mexico the shepherd's dog not only defends the flocks from the attacks of wolves and other beasts of prey, but contends to the death with the Indian marauders who endeavor to take the sheep by stealth or force.

“The Scotch shepherd dog or colley is a light, active animal, of great sagacity and of incalculable use to the shepherds in the Highlands of Scotland and other mountainous pastures. Mr. James Hogg, the ‘Ettrick Shepherd,’ says that a single shepherd and his dog will accomplish more in gathering a flock of sheep from a Highland farm than twenty shepherds could do

without dogs; in fact, without this docile animal, the pastoral life would be a mere blank. It would require more hands to manage a flock of sheep, gather them from the hills, force them into houses and folds, and drive them to market than the profit of the whole flocks would be capable of maintaining.

"Although the sheep husbandry of the United States differs materially in many particulars from that of the Highlands of Scotland, the colley is pretty extensively diffused in this country, and is valued very highly by the farmer, shepherd, or drover. In a communication to the American Agriculturist, Mr. T. C. Peters, of Darien, New York, says:—'I think the shepherd dog the most valuable of his species, especially for the farmer. Our dog Jack, a thoroughbred Scotch colley, has been worth one hundred dollars a year in managing our small flock of sheep, usually about seven hundred in number. He has saved us more than that in time in running after them. After sheep have been once broken in by and become used to the dog, it is but little trouble to manage them; one man and the dog will do more than five men in driving, yarding, etc. Let any man once possess a good dog, he will never do without one again. The sagacity of the shepherd's dog is wonderful, and if I had not seen so much myself, I could scarcely credit all I read about them.'

"The English sheep dog, or drover's dog, is a *tailless* animal, larger, coarser, and stronger than the colley. It is very easily trained, and seems especially adapted for working among cattle, keeping the herd from straggling when on the prairie or the road to market, and acting as an aid to the farmer in the management of his flocks and herds."

We consider it always well to allow the ewe to suckle the pups.

In training these dogs for service they should be taught to

follow behind the flock, running to this side and that, to start up lagging sheep, to run over the fence and head off runaways, to stand in front and hold them at bay, but never to worry them, bite them, or in any way frighten them. These dogs thus brought up with the sheep, are the best drovers that can be found. The sheep learn to obey them without fear, and they drive the sheep without harming them. We have known a slut of this breed to nurse and raise a lamb whose dam had died. Such a race of dogs, well trained, which only requires practice, for they take naturally to the business, would be of great advantage in herding large flocks "on the range," and we call the attention of flock-masters to their merits.

The DISEASES OF DOGS are numerous, but are not at all necessary. The present style of promiscuous breeding is the source of most of them. Keep your breeds pure, and at once kill a diseased slut and castrate a diseased dog, and diseases will lessen. DISTEMPER is the more common of these diseases. The first symptoms are dulness and loss of appetite, purging or vomiting, running from the eyes and nose, and a short cough. The animal becomes very sensitive to cold, seeks warmth, and is constantly shivering. The bowels generally become constipated. All these and other symptoms increase, the eyes and nose are obstructed by the discharge from them, and the dog fast wastes away. But there is often a lapse of two or three weeks between the first symptoms and the last, in which time it is often supposed that the dog is recovering. When the distemper is mastered the dog will at once begin to fatten; if he does not the disease is only dormant. As soon as the symptoms are discovered all flesh must be forbidden, and skim milk and bread given. When the bowels are constipated inject warm soap and water. For the very largest dog make the following into twenty-four pills, and give three daily: Bella-

donna, twenty-four grains; nitre, four scruples; gentian, four drachms; ginger to mix. One eighth of the above is sufficient for a lapdog. If diarrhœa sets in, give a teaspoonful of chalk three times a day. If fits set in, kill the dog at once. Distemper is not contagious, but epidemic.

MANGE is another common ailment of the dog, the result either of poor condition, filth, or contagion. Rub with lard and sulphur. If in poor condition, give beef tea strong, and good gruels; the object being to get him in flesh as soon as possible, without overloading his stomach. If the dog is in very high condition, very fat, reduce him to a diet of gruel, and get off his surplus flesh.

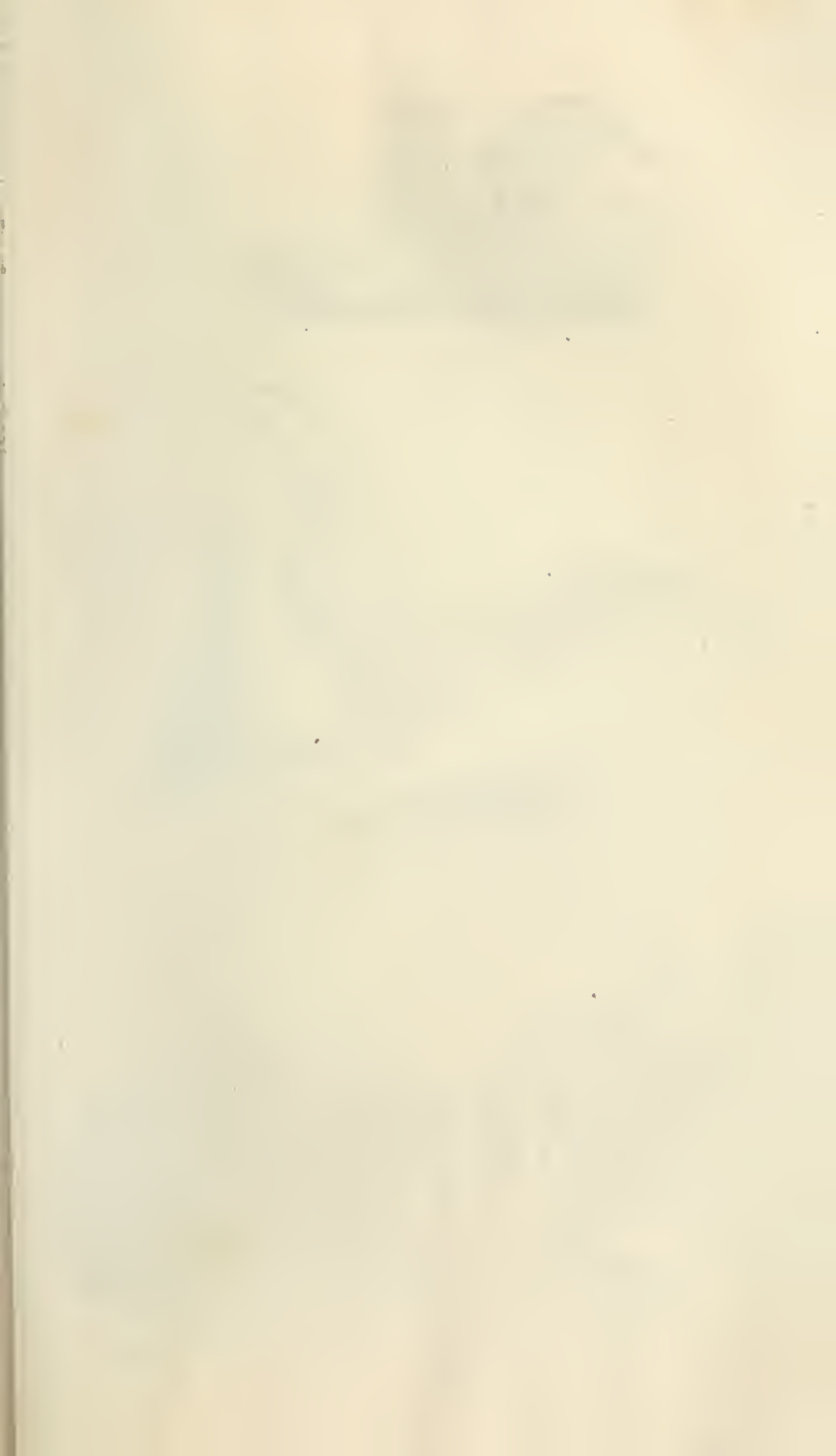




Fig. 93.

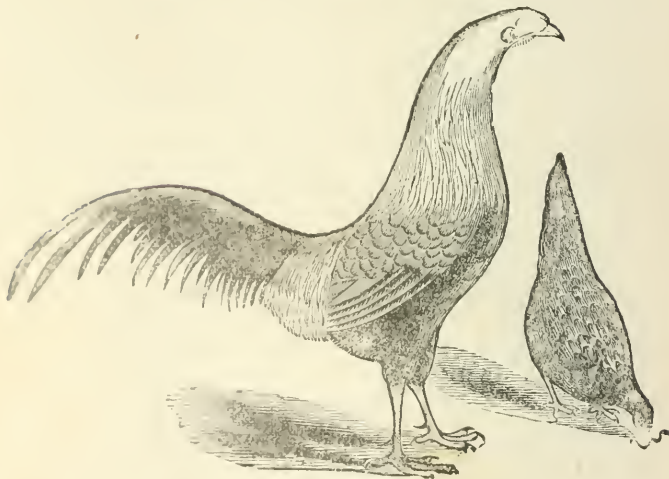


Fig. 94. SUMATRA GAMES.



Fig. 95. GAME COCK.



Fig. 96. CLIPPER GAME.

CHAPTER XII.

POULTRY AND BEES.

FARMERS usually keep a little Poultry, and yet but few are aware that they are the most profitable stock on the farm. The farmer can well keep a liberal supply of fowls by feeding them three or four months in the year; the remainder of the time they will forage for themselves. They will, if given the range of the barnyard, the orchard, the stubble field, or the tobacco plantation, secure worms, grubs, bugs, and scattered seeds from April to November, sufficient to keep them in good flesh and return their owners from three to six dozen eggs each, to pay for the privilege. We consider that a flock of hens or turkeys turned into the orchard or tobacco field will pay for their winter's keep in destroying worms and insects. If the hen only lays fourteen weeks out of the fifty-two, (which is less than the average for two, three, or four year old fowls,) say one hundred eggs at three cents a piece, you have three dollars for her keep, and a little pile of the strongest manure, besides her services among your insect enemies. But what will it cost to keep her through the winter. A peck of grain will feed a large hen about three weeks; so if you feed four months, you will feed six pecks of grain. Will any other animal return you so much for so small an outlay? But this is not all; you still have the hen either to put in the pot, send to market, raise you

a brood of chicks or give you another three dollars worth of eggs.

The raising of poultry on a large scale can be made profitable anywhere within a day's reach of any of our large cities. We are tempted here to condense a little account of poultry raising on the farm belonging to the Metropolitan Hotel, of New York. The farm is located in West Chester County, and about twenty acres of rough land, worth little for tillage, all devoted to poultry. The undergrowth is allowed to grow; the turkeys have the woods to range in, and there is a pond for the ducks and geese. During the summer they are all allowed to range at will; but fowls once accustomed to a roosting and laying place will usually return to it. For winter quarters, there are two houses. Lime and plaster are used very freely to absorb the ammonia, and compost the droppings. The sloping shelves under the roosts are swept every week and newly sprinkled with lime. All this valuable manure is barrelled and applied to corn, producing the biggest corn in the country, and sixty tons of hay from twenty acres.

We quote from the *New York World*:—"The eggs pay for food and attendance, leaving the sales of poultry clean profit. Mr. L. says he can produce a thousand pounds of poultry cheaper than he can the same weight of mutton, beef, or pork. He finds as much profit from turkeys, and often greater than from hens. They often require more attention, but some years he has fifty to sell, for which he gets five dollars each, besides a great many more, for which he gets from one to three dollars. Just now he has three thousand young chickens, several hundred young turkeys, two hundred hens laying every day or hatching broods, and handsome platoons of ducks and goslings, probably about four thousand in all, of domestic fowls, each of which, on an average, is, or will

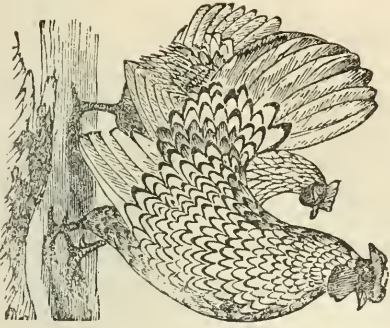


Fig. 99.

SILVER LACE BANTAMS.

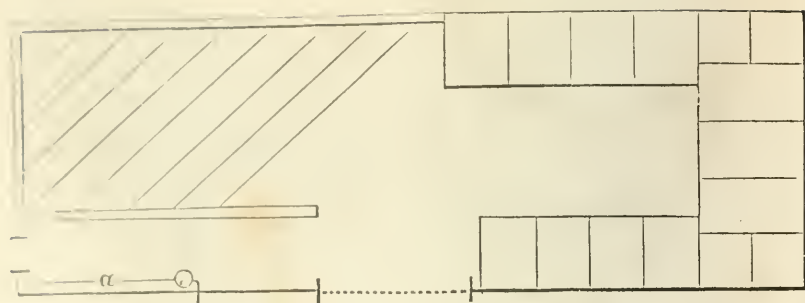


Fig. 98. COCHIN CHINA FOWLS.

be by Thanksgiving, worth a dollar. Deduct from this the cost of two hundred bushels of grain, and the hire of an attendant, to whom he may pay two hundred and fifty dollars a year and board, perhaps more. They eat up the grasshoppers, grubs, worms, eggs of insects, larvæ, beetles, snails, katydids, and June bugs, so clean that his farm is less beset with pests than most others about him. He has apples when others are ruined by the borer, the caterpillar, the tent worm, the canker worm, or the curculio."

This looks like a hazardous business, but it is not, and there are hundreds of rough farms in the vicinity of cities where a flock of five hundred fowls, to begin with, would soon become a vast army of producers. Since writing the above we have read a somewhat elaborate article in a western paper to prove that one hundred a year is all that can profitably be raised together, yet the above poultry farm has been carried on for years with unbroken success. The best points in Mr. L.'s system are, free range in summer, cleanliness at all times, liberal feeding and warmth in winter, and a change of cocks every spring: and these things can be secured by every farmer. We will try to give a few plain directions for farmers.

First, get a cock of some good breed for every twelve hens. Secondly, build a poultry house for the winter protection of the fowls, for nests, for a roosting place, and for the sake of the rich ammoniacal manure they will drop. The droppings will soon pay for a good poultry house. We recommend the following plan. (*Fig. 97.*) This is ten by thirty feet, and eight feet above ground, with a roof sloping one way. It can be built up against a shed or other building, the shed answering for the backside of the poultry house. In the first place a cellar is dug six feet deep, and the bottom filled one foot with cobble stones, rammed down hard; a foot of the earth thrown out is



(Fig. 97.)

then rammed down upon the stones, and a foot of good gravel, fine, on top, as a floor. This secures permanent drainage, cleanliness, and the gravel is indispensable to the health of the fowls. The floor is three feet below the surface, which secures warmth in the coldest weather. The house may now be built as directed. Castaway boards are just as good as any thing, for it is not the looks you are after, but the profits. Ten or fifteen dollars will build such a house on many farms, and twenty-five dollars will pay for it anywhere. The slant lines near the entrance represent the roosts, which are five feet from the floor and two feet above the level of the ground. Underneath these roosts is a slanting shelf, which is swept every week and covered with lime. Don't omit this, whatever shape you put your poultry house in. The squares at the opposite ends represent the nests, which are ranged in tiers, commencing on the bottom. There are three tiers, allowing three feet for each tier; forty-five nests in all. After the hens come off with their broods, the nests are scalded out with boiling water and lime. The hens should be set as nearly as possible about the same time, and when they come off twenty to thirty chicks given to one hen to take care of, and the other hens treated to a cold bath, and shut up for a few days, when they will commence laying again. Cracked corn is the best and most economical feed for fowls, but they



Fig. 100. BRAHMA POOTRAS.

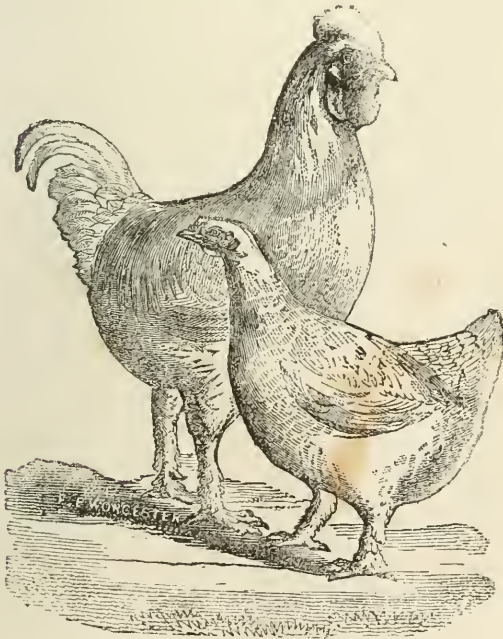
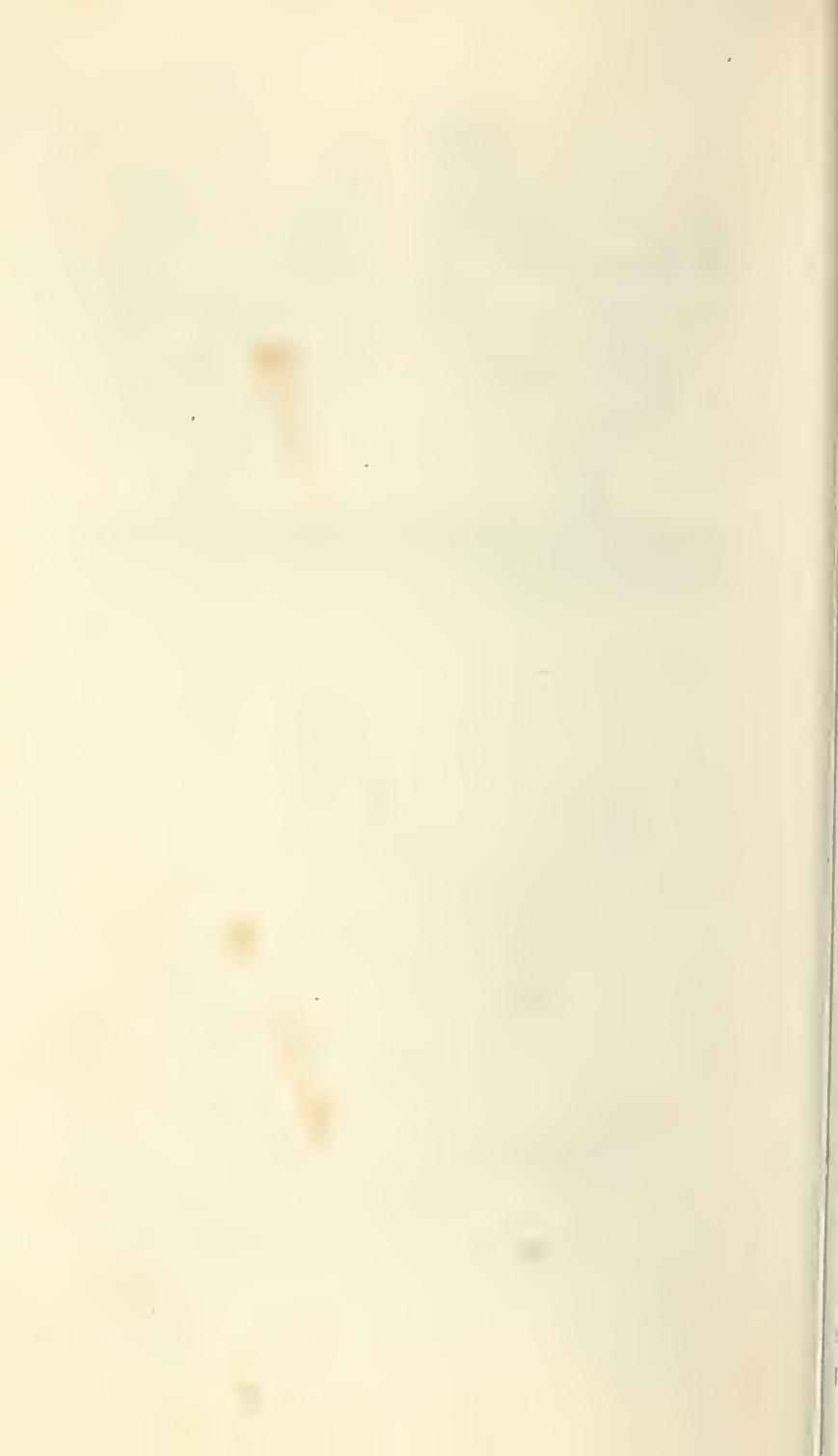


Fig. 101. WHITE BRAHMAS.



should never be kept on any one kind of food; oats, kitchen scraps, buckwheat, bonny ciabber, sunflower seeds, and other changes should be made. Never feed all they will eat, but stop when they cease to be greedy for the food. Lime, burned oyster shells, and the shells of their own eggs will assist them in forming new shells. Give chickens plenty of room and plowed ground to scratch in. If you do not want the hens in the plowed land, fasten the coop near it and let the chickens run. But it is better, after the first week or two, to let them all run, calling them to the house at least once a day to make them feel at home there.

WHAT ARE THE BEST BREEDS? We have already advised the purchase of cocks of some good breed, and we will now give the characteristics of the best breeds. Says a poultry raiser writing to the *Prairie Farmer*: "Our common barnyard fowl, with good care, will lay one hundred and forty eggs each year, and give them time to rear each a brood of chickens. A Black Spanish will lay one hundred and twenty eggs, but does not set at all. A Leghorn fowl will lay two hundred eggs in a year; this breed does not set till three years old. Hamburgs (Golden Pencilled) will lay from two hundred to two hundred and forty eggs each year, but does not set till three years old, and sometimes not even then. Bramah fowls will lay one hundred and forty eggs, and bring up two broods of chickens each year.

"The average cost of keeping fowls, of all kinds, with corn, at one dollar per bushel, and small grain in that proportion, will be not far from one dollar and twenty-five cents each per year."

We indorse the above estimate of the Hamburgs, their refusal to set being no objection to them if you have Cochins to set their eggs under. The game cock put upon common fowls of good size is one of the best investments we ever made in poultry. Their chicks make great layers, are hardy, always

keep in good flesh. There is nothing like the game cock, for keeping order in the flock and for keeping hawks, cats, skunks, and all other enemies at bay. The black Spanish fowls are good layers, but do not make good meat, and are not to be recommended. The Dorkings are good, and no one can be amiss in purchasing a few eggs and raising a cock of this breed. The Cochin crossed on the common fowl improves the latter, but we should prefer investing our money in something else. The Bramahs are much better. The Polands are also good layers but, like the Hamburgs, do not set. The Leghorns also come in the same class, but are of smaller size. We hope that no one of our readers will ever have the "hen fever." We recommend no one to buy a stock of any of the above fowls. But what we do recommend to every man that cultivates an acre of ground is, improve your stock by an admixture of some one or more of the above breeds. Make it a rule to get a new cock every year. If your fowls are too small, get a large breed. If poor layers, get a Hamburg or a game cock. If they are not hardy, and none of them make good mothers, get a game or a Bramah. It will pay; having been surrounded by poultry more than ten years, we insist that it will pay.

The DISEASES OF POULTRY are caused by breeding, filth, impure water, lack of gravel, and close confinement. Pure water is absolutely essential to the health of fowls. When ranging in the summer they will go to running streams or the barnyard trough, but in the winter they suffer for lack of fresh water. In the plan of a poultry house, given in a preceding page, A is a pipe on the bottom of the coop three feet below the level of the ground, running into a keg set in the ground, with an outlet on the other side. This pipe comes from the barnyard trough, and as long as there is water in it the hens are supplied. As this poultry house is built against one of the

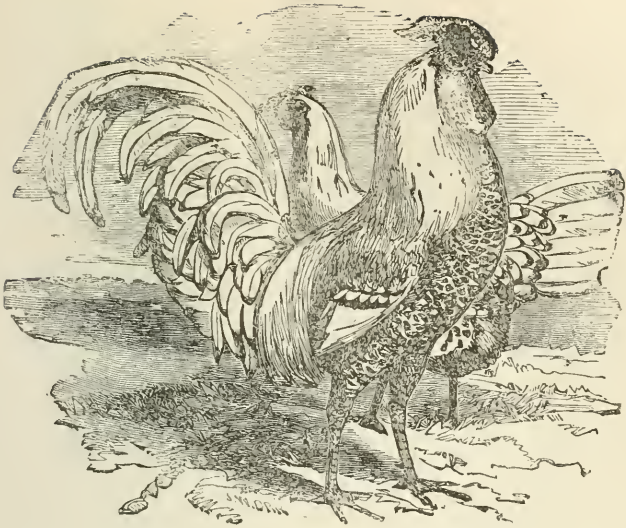


Fig. 102. SILVER HAMBURGS.

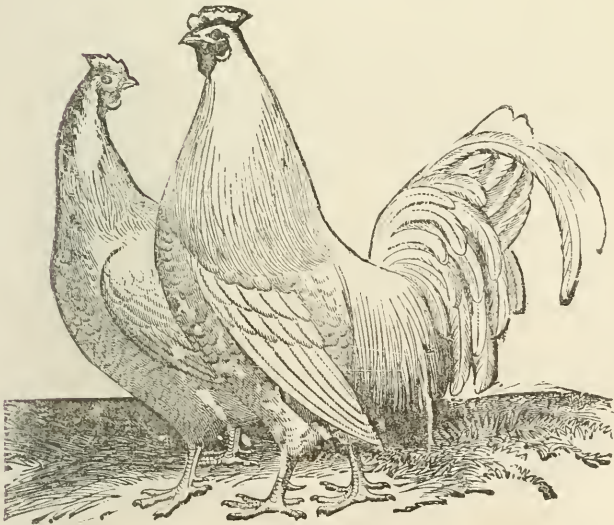
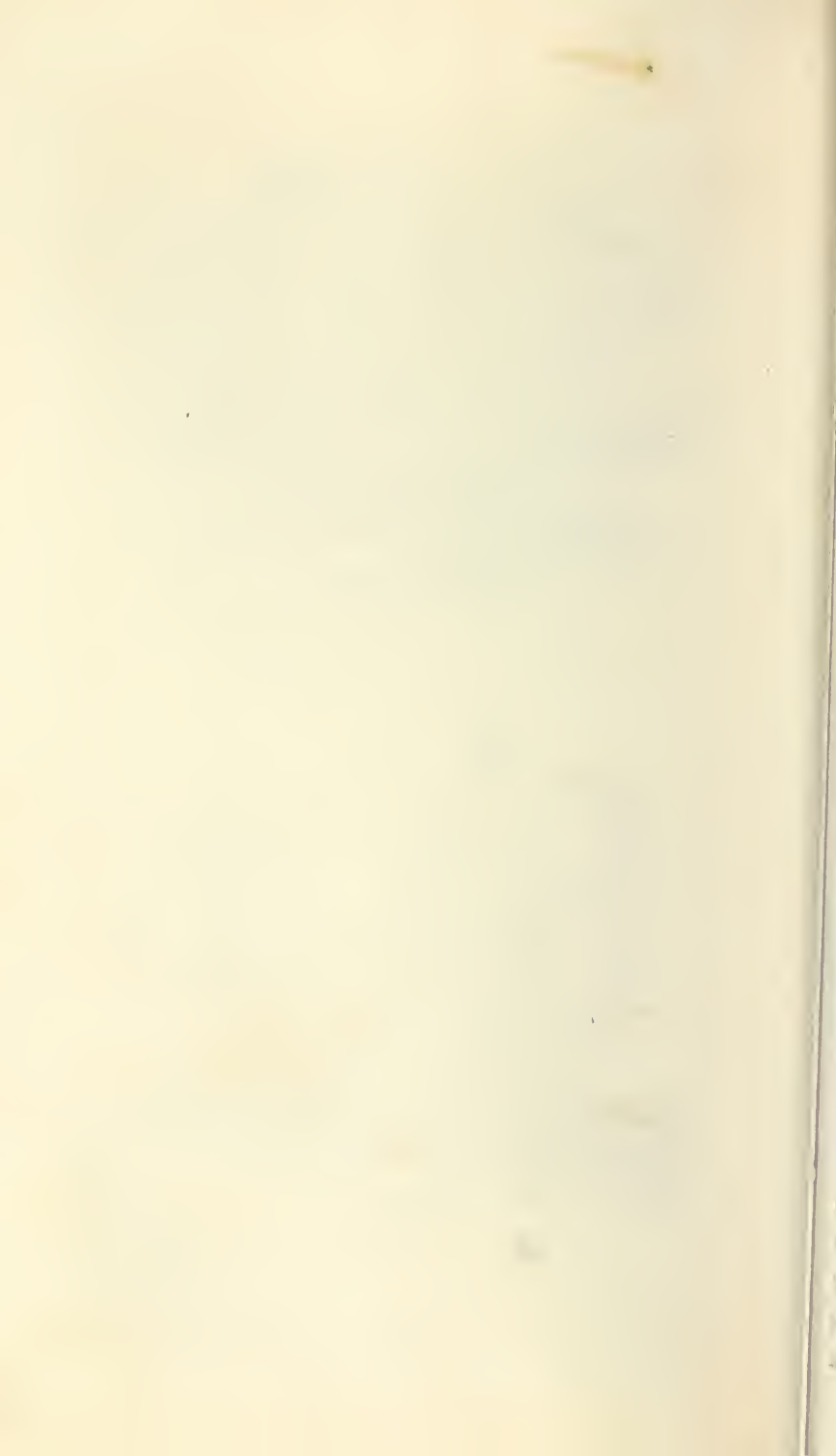


Fig. 103. WHITE DORKINGS.



barnyard sheds only twenty feet from the pump, the operation was easy.

A box of wood ashes set in the coop and changed every week or two will keep the fowls pretty free from lice. Gravel and sand on the floor keep their digestion good. Camphor in the water or mixed with meal dough will cure gapes in chickens. Rubbing the heads of chicks with lard and sulphur before they are a week old will prevent gapes, killing the worms that cause it. Roup is the most dangerous disease attacking fowls. The breathing becomes hard and distressed; through the mouth instead of the nostrils. The fowls affected with it should be removed from the rest and, if of no special value, killed. If it is desired to save them, feed with stale bread soaked in spirits, boiled and mashed potatoes, and hard boiled eggs chopped fine, and give them a clear, airy but warm place. As they begin to improve, chop fresh meat fine and give them every day. The great cause of disease is yet to be considered; it is the continual use of the same cock or his descendants. A new cock should be introduced every year, or there can be no just expectation of health or large returns of eggs.

TURKEYS are also a source of profit near all large places. The bronze turkey is the most desirable, and it would be well if a cock or a pair could be introduced into every farm in our more thickly settled States. Many farmers object to them in the meadows, but if they can get at plowed ground, orchards, tobacco fields, or stubble, they will not tangle your grass. The hen turkey is a wanderer and will naturally seek to hide her nest. This can be prevented. Says Saunders, a poultry breeder: "About the middle of March, generally speaking, the female commences laying; she indicates the coming event by a peculiar cry, by strutting about with an air of self satisfaction, and often prying into out of the way places, evidently in quest of

a secret spot for incubation. She should now be closely watched, and some management is required to induce her to lay in the nest assigned to her. The nest should be prepared with straw and dry leaves; it should be secluded, and to incite her to adopt it a nest egg should be placed in it. When her uneasiness to lay is evident, she should be shut into the barn or shed where her nest is prepared, and let out as soon as the egg is laid."

The turkey is a persistent setter and often persists in staying on her nest when she is suffering for food and water. She should be removed occasionally, and during the last ten days the eggs should be lightly sprinkled with water while she is off. This sprinkling applies to the eggs of all fowls. After hatching, the chicks should be sheltered for a few days, when they will look out for themselves. Water is their great enemy, for a thorough ducking often kills them. After the hatching appears to be all over, chop up some hard boiled eggs and feed the brood. Bread crumbs wet up with milk or curd, or oatmeal dough, will answer after this. Water should be put in a very shallow dish for fear of ducking the chicks. Turkeys nor any other fowl should ever be allowed on the hay, or in the stables, when the horses are there.

FATTENING POULTRY for market is a very simple operation. Not more than two weeks before they are wanted shut them up in coops with just room to stand comfortably. Mix a dough of meal and milk, just thick enough so that you can make it into rolls. Roll it into crams about the size of your little finger, (smaller for small pullets,) put it into the bill and help it down. If the cram is dipped in milk it will go down easy. We would say here that all fowls should be fed as soon after light in the morning as possible, for they worry for their food and lose their fat if they have to wait. At midday put a little

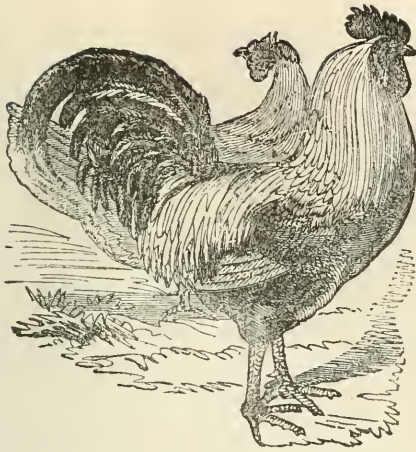


Fig. 104. GREY DORKINGS.

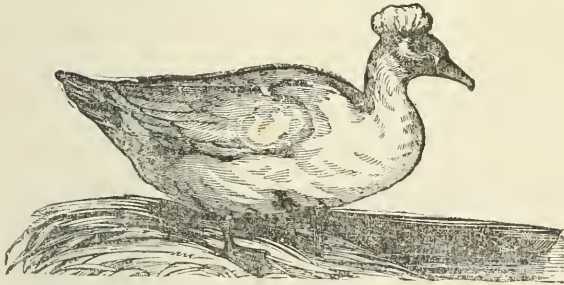


Fig. 105. CRESTED DUCK.

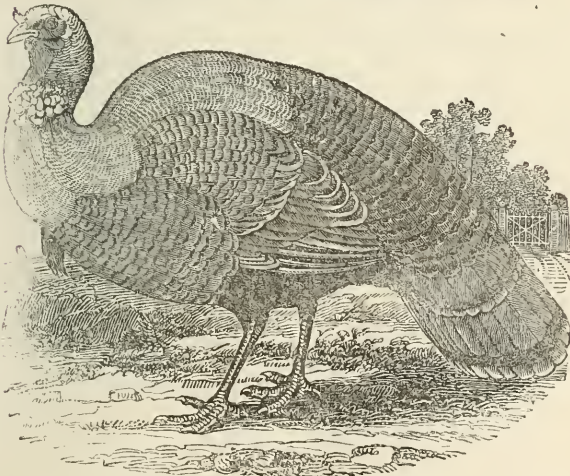


Fig. 106. WILD TURKEY.

cracked corn or oats where the cooped fowls can reach it; also keep water and sand within their reach. At night cram again, unless the crop is still partly filled, in which case the bill must be held up, some warm water turned, in and the bill closed. In this way inside of two weeks the largest fowls can be made very fat at a trifling expense. This feeding should never be continued more than two weeks. For twelve hours before poultry is killed neither food, or water should be allowed.

DUCKS can be raised by any one who has an acre of waste land, with a stream or a pond at hand, but it is useless to attempt to keep them in close quarters or without plenty of water. They are good layers, and drop a large egg with very rich meat; their eggs are very heavy, and when eggs come to be sold by the pound, as they ought always to be, ducks' eggs will bring a high price. The Rouen and Aylesbury are the finest breeds for eggs and poultry, and a pair of either of them will soon raise a flock, as the eggs are set under the hen. One drake should be allowed to every six layers.

GEESE also require water and pasture, but will not pick up all their living, as the duck will when it has a good range. Geese must be fed morning and night with grain. When setting, the female should have food and water convenient. Like the duck and the turkey, the eggs require about four weeks to hatch, and should be sprinkled several times in the last ten days. The Bremen or Embeden geese are large, (weighing often forty-five pounds per pair,) quiet, fat readily, not as likely to stray as others, and the most profitable for market.

THE HABITS AND MANAGEMENT OF BEES present the most interesting study we have ever attempted. Upwards of twenty

NOTE. The cuts of fowls in this Chapter are from poultry owned by N. P. Boyer & Co., stock breeders, Parkesburg, Chester County, Pa.

volumes have been written and published in this country alone concerning them, and the half has not yet been told. We shall aim simply to give plain, practical directions, which all can understand, for taking care of bees so as to make them profitable.

Certain well established facts must be well understood before undertaking Bee keeping.

1. There are three kinds of bees in every prosperous hive, *viz.*, the queen, the drones, and the workers.

2. The *Queen Bee* is the only perfect female in the hive. She is the mother of all the others. No swarm can prosper without a queen. She is readily distinguished from all the others by her long body, short wings, and yellow abdomen. (*See No. 6, Fig. 111.**) There are never two in a hive, as the reigning queen destroys all others before they come out of their cells. If the queen is lost, the industry of the hive is stopped until preparations are completed for hatching another. The queen leaves the hive when about seven days old to meet the male bee, is impregnated, and never leaves the hive again, except with a swarm. Queens are the only bees that live more than one season: they sometimes live three years. They are capable of laying one hundred thousand or more eggs in a season, if supplied with brood cells. They have an effective sting, but never use it, except against each other. A queen goes out with every swarm: if by any accident she is lost in swarming, the bees return to the hive.

3. The *Drone* is the male bee. A large number are usually

* *Note. Description of Fig. 111.* 1. Egg. 2. Position of egg and larva in the cells. 3. Full grown worker larva. 4. Worker nymph or pupa. 5. DRONE. 6. QUEEN. 7. WORKER. c. QUEEN CELL. 9. Proboscis or tongue of worker. 10. Sting of worker. 11. Ovaries of Queen. 12. Honey sac, intestines, and stomach of worker. It is exceedingly difficult to make a good representation of comb on paper.

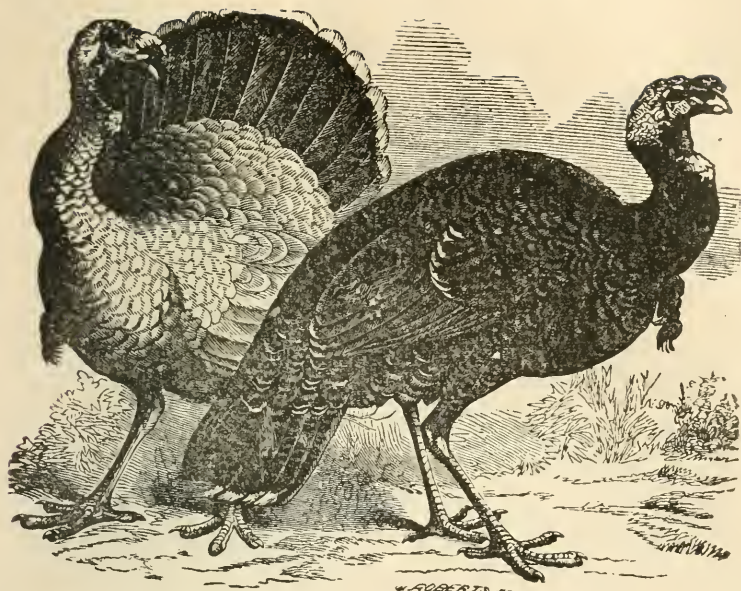


Fig. 107. BRONZE TURKEYS.

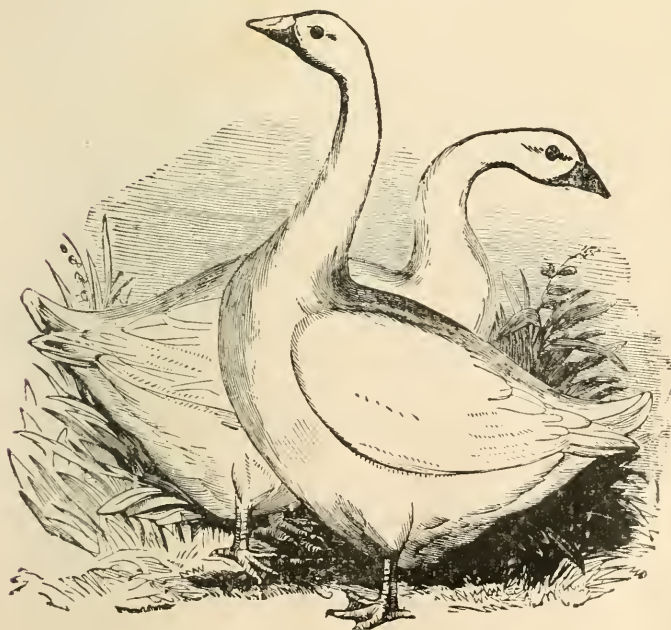
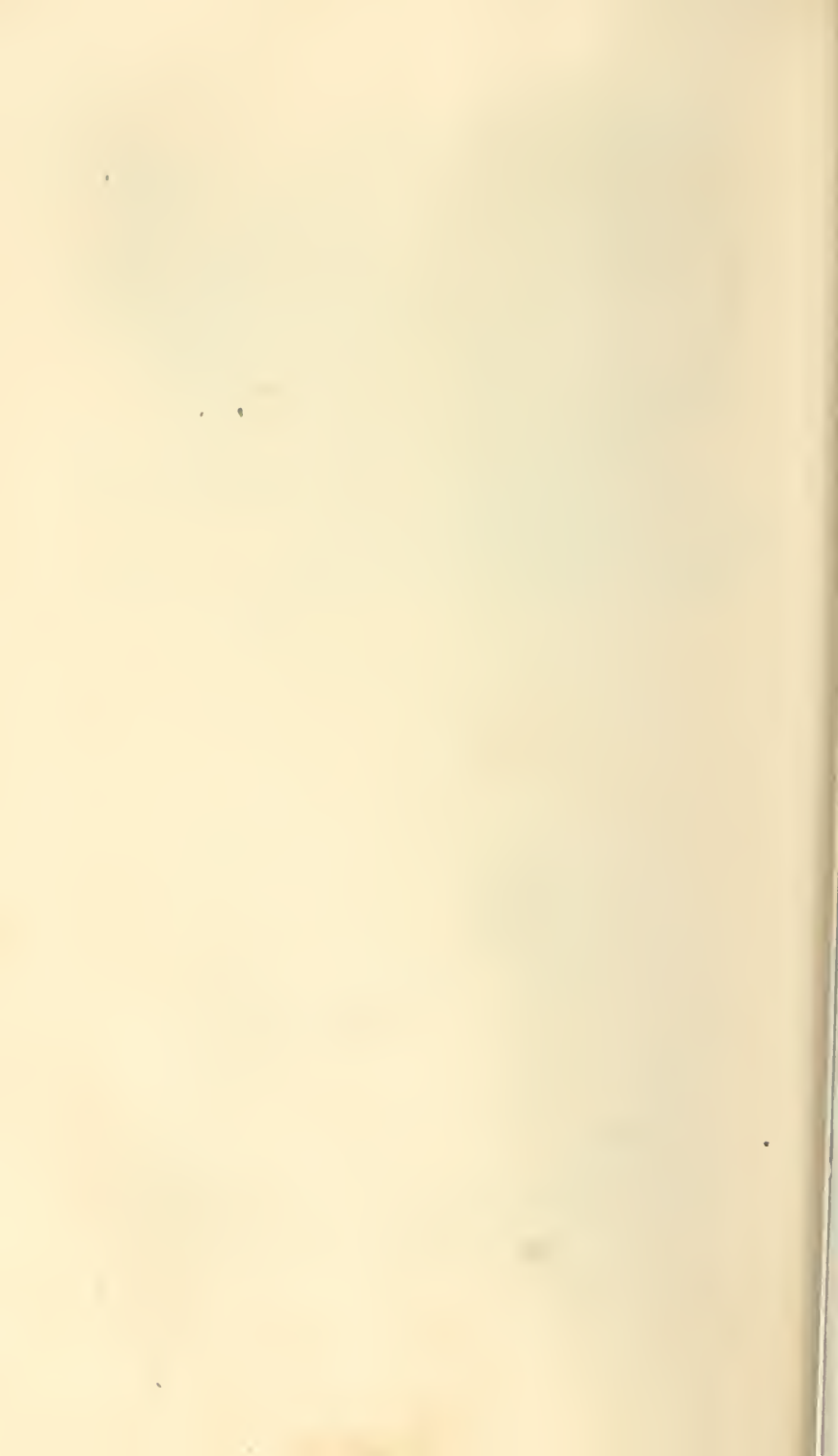


Fig. 108. BREMEN GEESE.



reared in each hive, only to be destroyed after the honey season is over and the young queens have been impregnated. They are not producers, but constant consumers. They do no labor whatever. In short, they are *drones*. They are larger and more clumsy than the workers. (*No. 5, Fig. 111.*) There are sometimes several thousand in a hive, but they are soon killed. As they are never allowed to live out their term of life, it cannot be said how long they will live.

4. The *Workers* constitute the main body of the colony; they do all the labor of the hive. For the first two weeks after they are hatched they work inside the hive, after which they go out to gather honey. During the working season a worker seldom lives more than two months, so that the colony is wholly changed (except the queen) several times during the season. A good swarm ought to contain from twenty thousand to thirty thousand bees, and previous to swarming they often contain double the above number. The workers have a poisonous sting, which they use for defence, but when carefully handled they will seldom sting. When away from their hives they will never sting, if they can escape without it. When swarming they may be handled, shaken, or brushed, and, unless likely to be crushed, will not attempt to sting. *When filled with honey, at any time, they will not attack*, even in defence of their hive and its treasures. They are smaller than the queen or the drone, have a little sac for storing honey and little baskets on their legs for pollen. In *Fig. 111* are seen the proboscis or tongue, the honey sac, the sting, etc.

5. There are four substances secreted or gathered by the bee, and found in every prosperous hive, viz., pollen or bee bread, propolis, wax, and honey.

6. Pollen is gathered from the blossoms, and is essential in rearing the brood. Unless pollen, or a substitute, is furnished

the colony will soon run out. Rye flour is a good substitute for pollen.

7. Propolis is a substance gathered from trees, with which the bee stops the cracks, fills the corners, and varnishes the interior surface of the hive. It is also used with wax in fastening up the comb, and sometimes in varnishing the comb.

8. Wax is a secretion from which the bees make their comb. It is more valuable than honey, for it requires at least twelve pounds of honey to produce one of wax. Good bee comb should therefore never be destroyed when it can be avoided. Just the amount of time and honey required to build the comb is saved by furnishing each swarm with comb.

9. There are two kinds of comb, brood comb and honey comb; and the brood comb is also divided into worker comb and drone comb, the drone comb having the largest cells. The size of brood cells, as built by the bees, never varies a hair; that is, worker cells are all one size and brood cells one size; while honey cells are of all sizes and depths. It is very important to be able, from the first, to distinguish the different kinds of comb. The difference in the size of the cells determines the future of the bee, for all the eggs are the same. Three or four worker cells are made into one long cell for a queen, (c, *Fig. 111*,) and drone cells never hatch workers, nor workers drones, although the eggs in both are just alike. Comb building is carried on at night and in stormy weather. When comb must be provided for the honey as fast as it is gathered, much time is lost; but if the bees have plenty of empty comb on hand, or it is furnished to them as fast as filled, they will fill it with astonishing rapidity in the honey season. We have known a strong colony add six pounds to their store in a single day.

10. HONEY, the great object of our labors in bee keeping, is

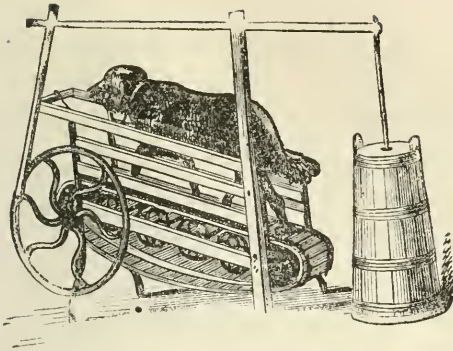


Fig. 109. DOG CHURN.

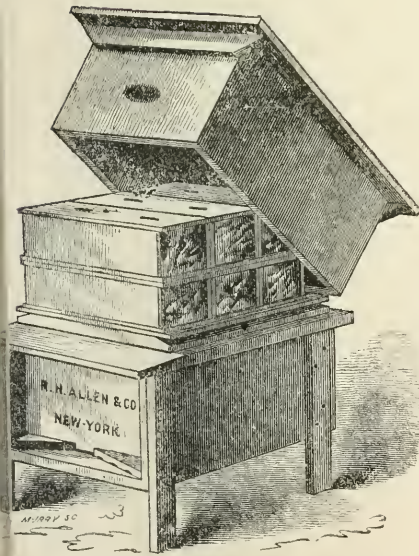


Fig. 110.

LANGSTROTH'S MOVABLE COMB HIVE.

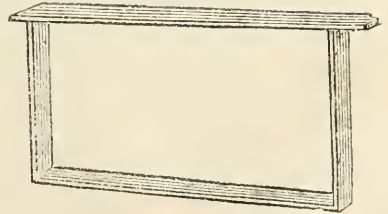


Fig. 110. b.

the nectar of the blossoms. The number of plants that supply honey on a large scale is limited. As the honey undergoes no change at the hands of the bee, but is the same when deposited in the combs as when sipped from the blossom, there is necessarily a great difference in the quality. It is especially desirable that there should be a succession of honey producing plants; for the yield of surplus honey depends upon the length of the honey season, and not upon a large quantity at any one time. The main stay of the bees is clover; but its season is so short that it cannot be depended upon for a supply. The following is a succession of honey producing trees and plants; any one within a mile or two of such a succession is in a most favorable position for bee keeping. The willows are the first to give their supplies in the spring; then follow the sugar maples, fruit trees, the dandelion, the tulip or poplar tree, the linden or bass wood, the locust, seed onion, red, white and Alsike clovers, buckwheat, berries, thistles, etc.

The first four, with the buckwheat, clover, and berries, form the main supply. We venture to say that there is no farm in the country but what will readily yield sufficient supplies for a few colonies of bees. Under the head of miscellaneous items will be found an article in regard to Alsike clover, which, while it is better for general cultivation than red clover, is the best possible pasturage for bees.

11. HIVES. It is safe to say that one half in bee keeping depends upon the hive and the other half upon careful, intelligent management. The bees will do their part if they have a chance. In the old fashioned management the bees were hived in square box hives, and kept there through the season. At the end of the season the old colony was murdered and robbed. A small amount of poor honey mixed with brood was obtained, and but little pure, clean, unmixed honey could be had. Each swarm

had to begin anew to build comb, and as some forty to sixty pounds of honey was required for comb, the honey season was nearly over before the bees could begin to store surplus honey. There was no way to examine the comb; all was in the dark and at hap-bazard, and bee keeping was unprofitable. This is all changed. The Rev. L. L. Langstroth has invented a hive, the intelligent use of which renders success certain. Bee keeping is now a safe and profitable business. The main principle in the Langstroth hive is the movable frame, as shown at *Fig. 110*. Suppose the top which is turned up in the figure to be taken off, and also the six honey boxes and the board under them; you have now the whole interior of the hive open to you. The frames, *b*, are hung inside the hive from front to rear, and instead of attaching their combs to the hive, they will build them in these frames. As each one of these frames can be removed and replaced at pleasure, all the operations of the bees are under observation and control, which is *the secret* of success in rearing bees. The second advantage of this hive is the honey board, or the board between the top of the hive and the honey boxes. (*See Fig. 110.*) This board has several holes, which are kept covered until the lower hive is pretty well supplied with comb, brood, and honey. They are then removed, and the bees are allowed to fill these upper boxes with their surplus honey. Any one of these boxes can at any time be removed and an empty one put in its place. We advise every farmer in this country to buy a Langstroth hive with the right to make and use them, and bee keeping will become both a pleasure and a profit. There are many other advantages in using the Langstroth hive, which may be hinted at as we proceed.

SPRING MANAGEMENT. *March.* Bees which have been removed from their stands for the winter may, some calm, sunny day, this month be replaced for the summer. It should be

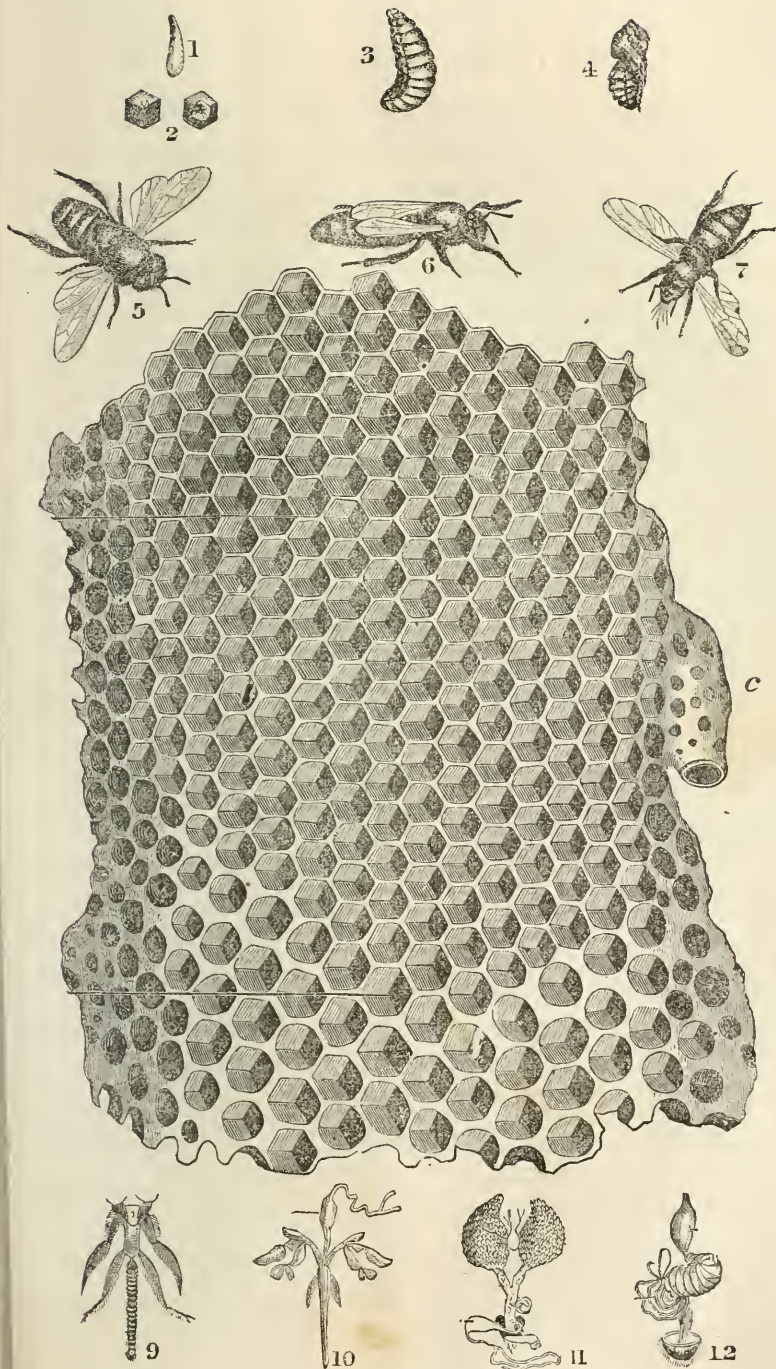
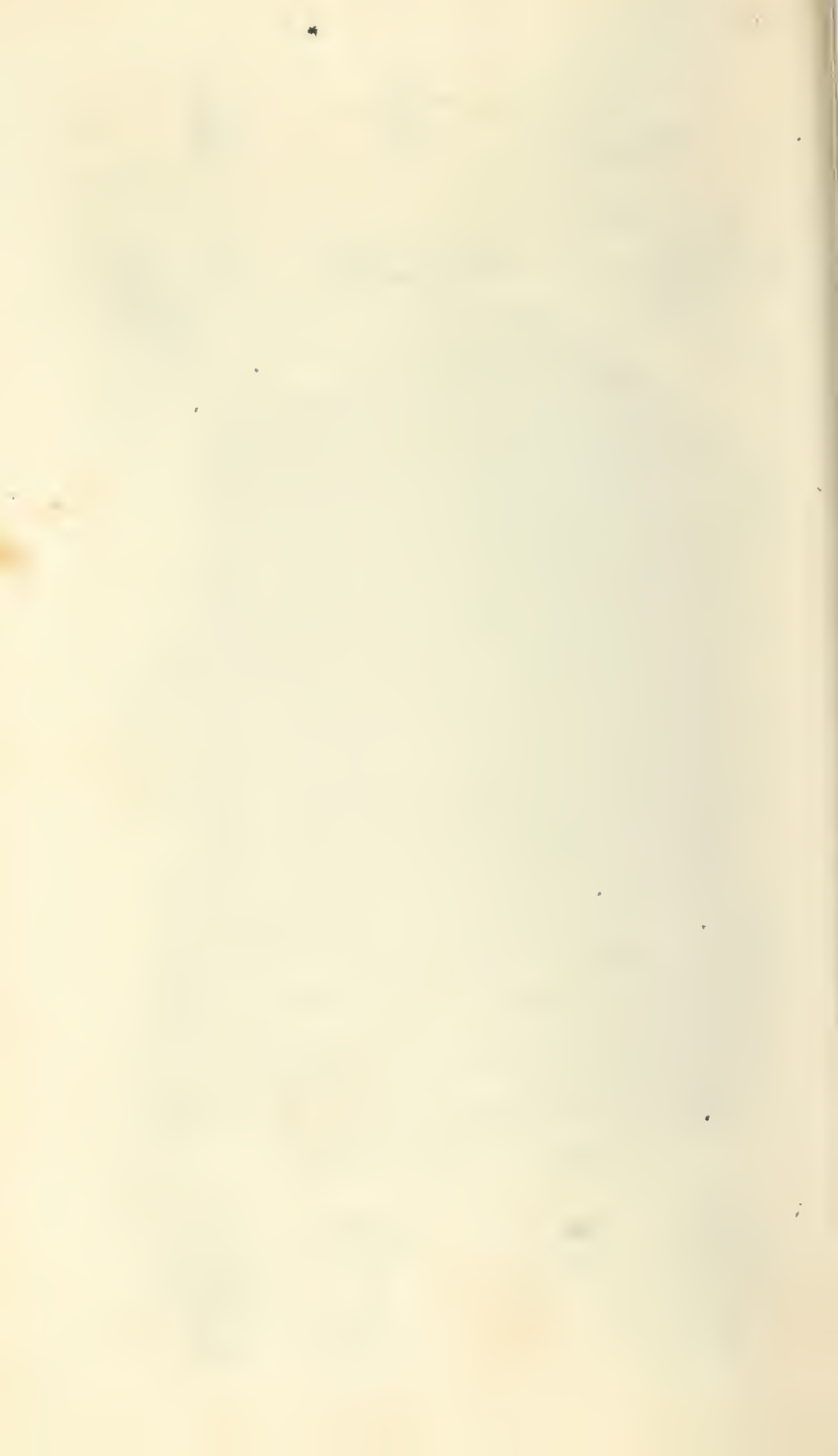


Fig. 111. BEES AND COMB.



done in the middle of the day, and the top of the hive at once removed, allowing the sun to shine directly on the bees. Clean hives, dry and warm, should be at hand, and the combs with all the adhering bees put into one of them. With the Langstroth hive this is so easily done that there is no excuse for neglect. The hive in which the bees were wintered can now be washed, scalded, and made ready for another colony, or for a swarm by-and-by. In making this change from one hive to another, the condition of the bees can be ascertained. If they have lost their queen, there will be no young brood hatching; and they must either be united with another colony, or brood, or queen cells furnished them from some other colony who have them to spare. If they have brood, they should be supplied with water and rye flour. They cannot raise brood without water, and by feeding rye flour you may gain from ten days to three weeks in the hatching of the brood. A sponge saturated in sweetened water, and put over one of the holes in the honey board, is the best plan for supplying water. The following most interesting communication from Messrs. Langstroth and Son explains the feeding process.

“As soon as the weather permits the bees to fly and discharge their accumulated fæces they are ready to commence breeding with vigor; and experience demonstrates the advantage of now beginning stimulative feeding, to encourage the spread of brood. It is not the abundance of old stores of honey or pollen that tempts to early breeding, (though their scarcity will prevent it, unless the deficiency is supplied,) but it is the sense of *something coming in* that encourages the bees to hasten matters. Therefore we supply them with this encouragement; and where the hives have plenty of honey, it is an open question with us whether in pleasant weather the *flour alone* is not *all the stimulus* required. Let us tell you, readers, how we feed it.

As soon as the bees begin to fly freely in the spring we prepare one or two boxes, sixteen by twenty inches, and six inches deep. Put a good layer of *clean* straw in the bottom, spread the flour on the straw, and set the boxes in some quiet, sunny place, in or near the apiary. To *start* the bees to work, we put a few drops of honey or sugar syrup on a comb in each box; once started, they will keep at it until the blossoms appear. The bees quickly "get the hang of the operation," and it is amusing to see them collecting the flour—the boxes being nearly black with bees, and the whole air resounding with their joyous hum. They moisten the flour with honey from their stomachs and take it up with their jaws and front legs; then, hovering in the air over the box, transfer it to the baskets on their hind legs, then away to the hive. We had them thus at work (Italians) one bright, still day this month, when the thermometer was at twenty-six degrees! To-day (March 12th) was constantly showery, yet, with the covers over the boxes propped open to admit them, they have carried in fully ten pounds of flour, working until it was dark. This suggests putting the boxes in a shed opening to the south, if such a one is at hand, where they can *work under cover*. Our only fear has sometimes been that they might carry in too much flour, but the combs show no especial accumulation of it, and it is evident that they use it almost as fast as gathered.

"Wheat flour and oat meal will do, if rye is not to be had. See that your bees have enough honey left over to last them until blossoming time. A little feeding will bring forward ten thousand workers to assist in the honey harvest, as soon as the first blossoms open. The hives should be protected from the high winds as much as possible, and yet be open on two sides at least to the direct rays of the sun. We should recommend that the bees be placed where they are to stand for the summer,

as soon as they are set out in the spring. We prefer that no two hives should have an entrance less than one rod apart. If it is desirable to place hives nearer than this, turn the entrances in different directions, and do not change their positions after the bees have marked it. Thousands of bees are lost from getting into the wrong hives when the hives are too near together. While the hives should all be of exactly the same size, the fronts may be painted different colors, or set in irregular order so that each bee may readily distinguish his own."

April will usually bring some sunny days and a few blossoms, but if your stocks are strong and you have fed as directed, your increased and increasing brood are consuming a large amount of honey. As you went through the hives last month you saw the state of each colony. If any had more brood comb than honey they will now require feeding. A little judicious feeding is desirable, even in well supplied hives. It encourages the workers, both to early swarming and to storing surplus honey. A mixture of equal parts of honey and sugar is the best for feeding. Southern honey will answer. Boil and remove the scum; when it cools turn into an empty comb, or into saucers, and put them in the place of the honey boxes. With a Langstroth hive you can take out a frame and comb, and insert another containing the feeding mixture. If you feed in saucers, chop up straw and sprinkle on the surface of the mixture, or your bees will be drowned in it. As soon as the blossoms are abundant remove the feed. (*See Winter Management for further remarks on feeding.*) Every bee that you keep alive now will bring you in golden treasures bye and bye. The supply of water should be continued, as the bees are still maturing large numbers of brood.

May. Have hives *ready* for swarming. As the weather becomes warmer the increase of bees in the hives is amazing.

Drones begin to come out, and if any swarms were without a queen, and you gave them brood comb from other hives, you will have young queens. If they are not impregnated within fourteen days, take them out and destroy them, and give another brood comb from some other full hive. You can tell readily whether the queen is fertile, for she will then begin laying eggs in one of the central combs. If the bees now begin to gather much honey, put on a honey box and give them access to it, and thus let them use the lower hive mostly for brood. If, after commencing to gather honey, they are shut off by a long cold spell their numbers are so immense and so active that they will soon consume all their store, and feeding will again be necessary. But if the weather is good, and the fruit blossoms abundant, colonies treated as we have advocated will often swarm, or be ready to swarm. (We shall treat of both natural and artificial swarms under the head of *June Management*.) Bees will only swarm when honey is abundant in the fields, no matter how large and crowded the colony, or how large the stores. As fast as they fill the surplus honey boxes and seal over the cells, remove the boxes, and put empty ones in their place. For making artificial swarms, queen bees should be raised. It is well to commence this about the first of May in this latitude, (Pennsylvania.) Late in the afternoon of some warm day, take a comb with worker eggs, and young bees just gnawing out of their cells, and put it with all the bees that are on it into an empty hive. A pint of bees are enough to take with it. If you do not secure this number on the comb, shake them off from another comb into the empty hive. These bees will at once begin to raise a queen. They should be fed with honey and water. In about three weeks this little colony will have a fertile queen for use in artificial swarming.

SUMMER MANAGEMENT. *June* is the great swarming month,

and with the Langstroth hives the farmer, who has a dozen colonies, may take a swarm from each almost any day, and thus have swarming over. But we will speak first of natural swarms. The common idea that the young bees go off leaving the old bees in the hive is a mistaken one. As we have before stated, the average life of the bee at this season is not over two months, and the oldest of the bees in the hive must be the ones to swarm, for the very young bees are not yet ready to leave the hive. The natural, swarming instinct, is so strong that great care and many precautions are often necessary to prevent overswarming. The indications of a *first* swarm from a hive are not very distinct. The swarm is to be led off by the old queen, and young queens are reared to supply her place. An old queen will seldom venture out with a swarm except about the middle of a fair still day. If, on such a day, when the other colonies are busy gathering stores, one colony seems to be idle, but few bees leaving for honey, there is probability of a swarm. If the inside is now examined, and queen cells are found sealed over, the bees intend to swarm at once. We say intend, for they often delay after all their preparations are made. A sudden failure in the supply of honey blossoms, or a sudden change in the weather will often delay them. Before leaving, each of the departing bees fills the honey sac with honey, a large swarm sometimes taking six or eight pounds. As soon as they get well out of the hive they will usually cluster on some limb, and it is a good plan to have the bee hives in plain sight of some low trees. A still better plan is to have three or four pieces of board hung up in sight of the hives, with a large black cluster painted on each of them in imitation of a swarm, with a new clean hive set under each. Take a board twelve inches long and six wide, make a circle or an oblong on it, and drive in a dozen small wooden pegs inside this circle, leaving their heads

out half an inch. Now paint the circle black, drive a hook into one end of the board, hang it on a low limb in plain sight from the hives, and you will catch a good proportion of your swarms on them. Have one in each of four directions. Every swarm clustering on one of these can be hived without difficulty, by unhooking the board, putting it down on a sheet, setting the hive over it, and taking the hive, inclosed in the sheet, to the stand. On no account ring bells, drum on pans, shout, shoot, or make any such disturbance. Its only effect can be to drive off the swarm. If they rise high in the air, and make a bee-line away, throw the rays of a looking glass upon them. When they cluster on a limb, jar them off into a basket, and tip them down on a sheet before the hive, which should be propped up to receive them. If they alight on the body of a tree, they can be dipped off with a tin cup and turned on the sheet before the hive. If they do not all go in readily, take a spoon and scoop them in. If a little piece of comb is fastened with wax on the frames, they will usually take to their new home more readily, and often begin work within an hour. As soon as they are all in, remove to their permanent position. Do not leave them long where they are hived, for some will leave for honey when they discover comb, and will be lost when they return and find the hive gone. We speak of dipping, scooping, jarring, and snaking bees as if they had no stings. Well, bee-keepers perform all these operations, with no protection, without being stung. The bees are filled with honey, and will not make an attack. The only danger of attack is from some improvident bee who failed to fill his sac, and is, therefore, ill natured. We advise all who are timid and those who suffer severely from a sting to wear a bee hat and rubber gloves when handling bees. The bee hat is made by sewing a strip of cloth to the edges of a common stiff brim hat, long enough to button under the

coat. Over the face sew into the cloth wire gauze; if just coarse enough to prevent the entrance of a bee it will not obstruct the sight. A little sugar and water sprinkled on the bees at any time will make them docile. Have a sprinkler with a fine rose spout, put in sweetened water, lift off the cover of the hive, and, before they recover from their astonishment, give them a sprinkling, and their animosity is all gone; you can take out their combs, brush them off, cut out pieces of comb, and do just as you please with them, so that you do not squeeze them, which indignity they will resent. Many men open their hives and examine their bees without even this precaution. In every case great care should be taken to make no sudden, quick motions about the hives; not to jar the combs, but lift each one slowly and carefully; not to breathe on the bees, which will instantly rouse their anger, when not dosed with sweetening; and lastly, not to crush any, by either inserting frames, adjusting honey board, honey boxes, or cover, or in any of the operations of hiving.

SECOND SWARMS are more clearly indicated than first swarms. The second swarm comes out from six to ten days after the first. If you listen at the hive in the morning you will hear the piping of the queen. It is different from any other sound ever heard in the hive; it sounds like *peet, peet*, several times repeated. When this is heard a swarm may be expected within two days, and usually the next day, if the weather is good and honey abundant. The third swarm will come off within four days after the second. These swarms, after the first, grow smaller, and are likely to come out at any time of day; they are also more likely to go a distance before clustering. We should lay it down as a safe rule that third swarms should be returned. Hive them in the usual way, and the next day return them to their old quarters. Where there are large crops of

buckwheat, second swarms form large colonies, and will often make very strong stocks. One swarm from each stock, however, is usually the better plan for any except experienced apiarians. If any of the swarms do not prosper, they can be united before winter. Keep your stocks strong, even if you allow no swarming. Two weak stocks will perish, when, if they were united, they would make good stocks. In the Langstroth hive the swarming can be controlled, and one, two, or three swarms allowed, as desired.

ARTIFICIAL SWARMING. The advantages of being able to control swarming are numerous. The three principal ones are, that it obviates the necessity of watching the bees all through the swarming season, prevents the loss of swarms, and secures just the number of divisions desired, and no more. If it is not desired to increase the number of hives at all, the queen is prevented from leaving the hive, and the colony kept in the same hive for several successive years. This makes very strong stocks, and, if plenty of room is given for storing surplus honey, usually nearly two-thirds as much will be secured from this one hive as if it had been made into two. It will be seen by referring to *Fig. 110*, that plenty of surplus room can be given to the bees in the movable comb hive. A second hive, with the bottom off, can be set over the main hive, instead of the honey boxes, if desired. At the entrance of the hive are seen two little blocks; these can be arranged so as to prevent the exit of the queen, while giving free access to the workers; and by this means swarming is controlled. When drones begin to appear, and queen cells have been constructed, is the proper time for artificial swarming. Have ready as many hives as you intend to make swarms. In arranging the frames (see *frame b, Fig. 110*) in these (which we shall call *new hives*, to designate them from the occupied hives, which we shall call *old hives*)

leave space for two frames, vacant. If you have plenty of good worker comb fasten it in the frames with wax. The bees are delighted to find such treasures in their new quarters; they serve also as guides in building new comb. *Never put drone comb in the frames*, but if good, save it to put into the surplus honey boxes. Having your *new* hives all ready, you wish to open a hive and take out a part of its bees. If there are any clustered about the entrance give them a puff of smoke. A tin tube in the shape of a cigar, but longer, is needed in these operations; in it put a burning chip, or piece of dry, decayed wood, or a burning puff ball, or any thing that will make smoke. Now take off the top of the hive, uncover a hole in the honey board, and puff in two or three whiffs of smoke. Carefully loosen and lift off the honey board, give the bees a gentle sprinkling of honey water or sweetened water, and you can do what you will in the hive. Experienced bee keepers omit the smoke and only sprinkle the bees. Now with a knife carefully loosen each frame from the side of the hive. Gently move those in the center nearer together, so as to give plenty of room to lift out the end frame first. If it should be fastened to the side cut it off with a sharp knife. Slowly and steadily lift out each frame and shake the bees from the comb on to the sheet in front of the *new* hive. Get the bees once started into it and all will follow. If you see the queen, which you will be likely to do, be sure that she goes into the *new* hive, and all will be well. Put about three-fourths of the bees and one or two combs, with both brood and honey, into the *new* hive. See that you leave queen cells in the *old* hive. As you have put two frames from the *old* hive into the *new* hive, you will make their places good either with empty frames or frames with worker comb in them. This whole operation is readily accomplished inside of ten minutes, after a little experience. Now close up the entrance to the

old hive and remove it to the most distant stand from its former position, facing its entrance in a different direction. Keep it closed (except the ventilating holes) until the evening of the next day. Put the *new* hive where the *old* one stood before. *The old hive must always be removed to another and different position, and the new hive placed where the old one stood.*

A variation of the above mode for those who are afraid of the bees is to puff the hive full of smoke, remove the top and honey board from the *old* hive, and the bottom from the *new* hive. Set the *new* hive on top of the *old* hive. Drum with two light sticks on the sides of the *old* hive, at the same time puffing an occasional whiff of smoke into the entrance. The bees will, after filling themselves with honey, ascend into the upper hive, when they may be treated as before. This is a more uncertain method, and should not be practised by any one who can muster up courage enough to handle these harmless little insects. In a week or two after making the swarms, examine all the colonies and see that each has a fertile queen. This may be ascertained by examining the combs for fresh laid eggs. If immature bees are at any time found on the bottom or about the entrance to the hive it is a sure sign of a fertile queen. If colonies that have queens are raising others, it is a sign that they intend swarming, and the queen cells should be cut out.

July is often a swarming month in bad seasons, and swarms sometimes fill their hives and make some surplus honey. Shade is very necessary during the heat of summer, and also free ventilation. Give plenty of room to old colonies for surplus honey, and also to new colonies as soon as they get the hive nearly filled with comb. If there is a surplus of drone comb remove it, for drones are great consumers. After your young queens begin to lay, shut out the drones by means of the entrance blocks. This can be done about one o'clock on some fine day,

when a large number of these idle gentlemen are out airing. As long as there are plenty of supplies the workers will allow these worthless fellows to live and eat their hard earned stores.

August is usually the season of the second honey harvest. The second clover crop and the buckwheat now furnish supplies. Bees will sometimes so prosper on buckwheat as to swarm again while it is in blossom. In other cases the supplies will fail in this month, and bees will be tempted to robbing other hives. This is disastrous, as bees once succeeding in robbing another hive will seldom return to honest labor. Robbing often occurs when the hives are first put out in the spring.

If feeding is commenced and stopped before honey is abundant, the weak colonies are likely to be robbed. In opening hives and sprinkling bees with sweetened water or honey water, a temptation is given to neighboring colonies, and an attempt will often be made to rob the favored hive. A strong colony with a queen will never be robbed. If hives are a suitable distance apart, as we have recommended, the chances that robbing will be attempted are decreased. A strong colony with a queen will defend itself so vigorously against the robbers that the attempt will be speedily abandoned. Thousands of bees are however killed in these encounters, and it is best to keep all hives well apart, all stocks strong, all colonies supplied with a queen, all that are destitute of stores in the spring well fed, to prevent their making any attempt at robbing; and keep any colonies that may be weak closed up when the honey harvest suddenly fails. The blocks will enable you to so arrange the entrance that but one bee can pass at a time. If you discover that a swarm is being robbed in spite of this precaution close up the entrance entirely. The robbers will soon cluster in large numbers on the outside of the hive. Now sprinkle them with clear cold water and they will leave. The weak colony

should now either be joined with another, or supplied with a fertile queen. Some directions for supplying a queen will be in place here.

Three weeks are gained by supplying colonies with a queen when lost. The queen is most frequently lost when going out for impregnation, and as she has destroyed all the unhatched queens and there is no worker brood, the loss must be repaired by the keeper. The indications of loss are plain, and when young queens are a week old the hives should be glanced at morning and evening. The bees run about on the hive, fly away a short distance and return, and all is confusion within and without the hive. This swarm should now be given some worker brood from another hive, or better still a fertile queen. (See our direction for rearing extra queens.)

The bees will receive her if she is covered with honey water. When queens survive their second year it is best to remove them to give place to a younger and more vigorous one. In using the Langstroth hives brood comb can be obtained at almost any time. The bee keeper who allows his stocks to remain without queens is too careless to succeed.

FALL MANAGEMENT. *September.* The fall flowers which are in blossom this month afford often large quantities of honey, but some colonies now seem averse to storing it in the surplus honey boxes, but will crowd the hive full of honey, and leave but little room for brood. When such a state of things occurs remove some of the full combs and insert empty ones. If the caps of the cells are sliced off with a sharp knife and the combs laid over a pan and kept *warm* a little while a large share of the honey will drain out, and the same combs can be returned again and again to be refilled.

October. Any stocks now found without a queen should be joined to a weak colony. Weak colonies should be joined

until all are strong. Put two or three of the fullest honey combs in the centre of the hive. If any stocks have not a large supply of honey feed them, the last of this month, or the first of next. Cut a hole through the centre of each comb near the top for winter passage.

November. "Last season I had three swarms of bees. In November two of them died, leaving no honey in either hive. On examination, I found the third swarm alive, but their honey was nearly gone. Being anxious to preserve my stock, I determined upon an experiment in feeding. I obtained twenty-three pounds of Southern honey for this purpose, costing seventeen cents per pound. My hive was of the Langstroth pattern. In place of the surplus box, I put a box containing a part of the Southern honey. As the bees emptied the box, it was refilled, until in three days they had disposed of the twenty-three pounds. The swarm wintered well, and from the fifteenth to the thirtieth of last June the bees swarmed three times. During the summer and autumn, I took from the old swarm two boxes of honey, weighing eighteen pounds, and from the first new swarm six boxes of honey, weighing fifty-eight pounds. The four hives are large and are now filled with comb and honey—fifty pounds or more in each hive—making in all two hundred and seventy-six pounds of comb and honey. Last season, one of the most disastrous to the bee keeper of any I have ever known, my neighbors' bees all died, one of them losing twenty-two swarms. Forty-four swarms died in our neighborhood last autumn and winter, most or all of which, in my opinion, might have been saved by feeding."—*Cor. N. E. Farmer.*

Mrs. Ellen S. Tupper, of Brighton, Iowa, one of the best apiarians in the country, says: "In the fall in every apiary some weak stands will be found. Some will have too few

bees, others too little honey. I unite these and never have any difficulty.

"I alarm the bees in both hives which I wish to unite, then leave them a few moments to fill themselves with honey. I then put one of them over an empty hive, (my hives have movable bottoms,) take each frame out, and shake or brush the bees into the hive below. When all are out, set the other in its place and proceed in the same way. The bees, all brushed together thus into an empty hive, are too much frightened to quarrel. I then arrange all my frames containing honey in one hive, and set it over the one in which the bees are. They all go up rapidly and take possession of the frames like one colony."

WINTER MANAGEMENT. *December.* The later in the season the bees are able to fly out, the better; the bee keeper must therefore be governed by the weather and the climate. If the bees are to be housed it is best to leave them out until winter is fairly settled. A cold snap or even a heavy snow storm will not injure them, but continuous freezing weather will. The best place to winter bees is undoubtedly a *dry* cellar. Next to this is a building with double walls, the spaces being filled with sawdust, tanbark or charcoal dust. An even temperature is the main object. Darkness and steady cool air tend to keep the bees quiet. When removed to winter quarters the lower entrance should be left open and wire cloth placed over the holes in the honey board. This gives upward ventilation. After the bees are removed to their winter quarters, let them alone; all light and disturbance are now harmful. It is sometimes well to bury bees for the winter, if you have a dry, sandy soil: the trench should be made larger every way than the hives and the spaces filled with straw. With a little care, bees can be wintered out of doors. If there is a winter entrance

near the top of the hive the lower entrance can be nearly closed. The honey board should be removed and a straw top put in its place, over which put the regular top. Drive stakes around the hives and pack in straw. All but the front of the hive should be thickly covered with straw. The entrance should face the southeast. We have seen colonies thus packed buried in a snow bank half the winter and come out in good shape in the spring. In *January*, breeding is again commenced. In *November* and *December* there is no breeding, and but little activity in the hive, but now active preparations are commenced. Supposing the bees to have been closed up on the first of December, about the middle of January the bottom of the hives should be cleaned of all dead bees and the bees that are housed supplied with water. Remove the wire cloth from one of the centre holes in the honey board and put in its place a sponge filled with sweetened water. Cover the sponge with a tumbler. Again in about a month the hive should be cleaned, and if any of the stocks have exhausted their stores they must be fed.

We have thus far spoken only of management in the movable comb hives, and have recommended only Langstroth's. It is the only one with which we are personally familiar, but we are assured on good authority that the "*American Hive*" is equally meritorious.

BOX HIVES will still be largely used, at least until the great superiority of the movable comb hives is felt, and we will give a few directions for managing them. The shape of the hive should be long from front to rear, fifteen inches deep, twelve inches wide, and twelve inches high. About these proportions will be found to be the best. Inch boards unplaned are better than planed. The timber should be thoroughly seasoned and very carefully put together. The hive should set into a

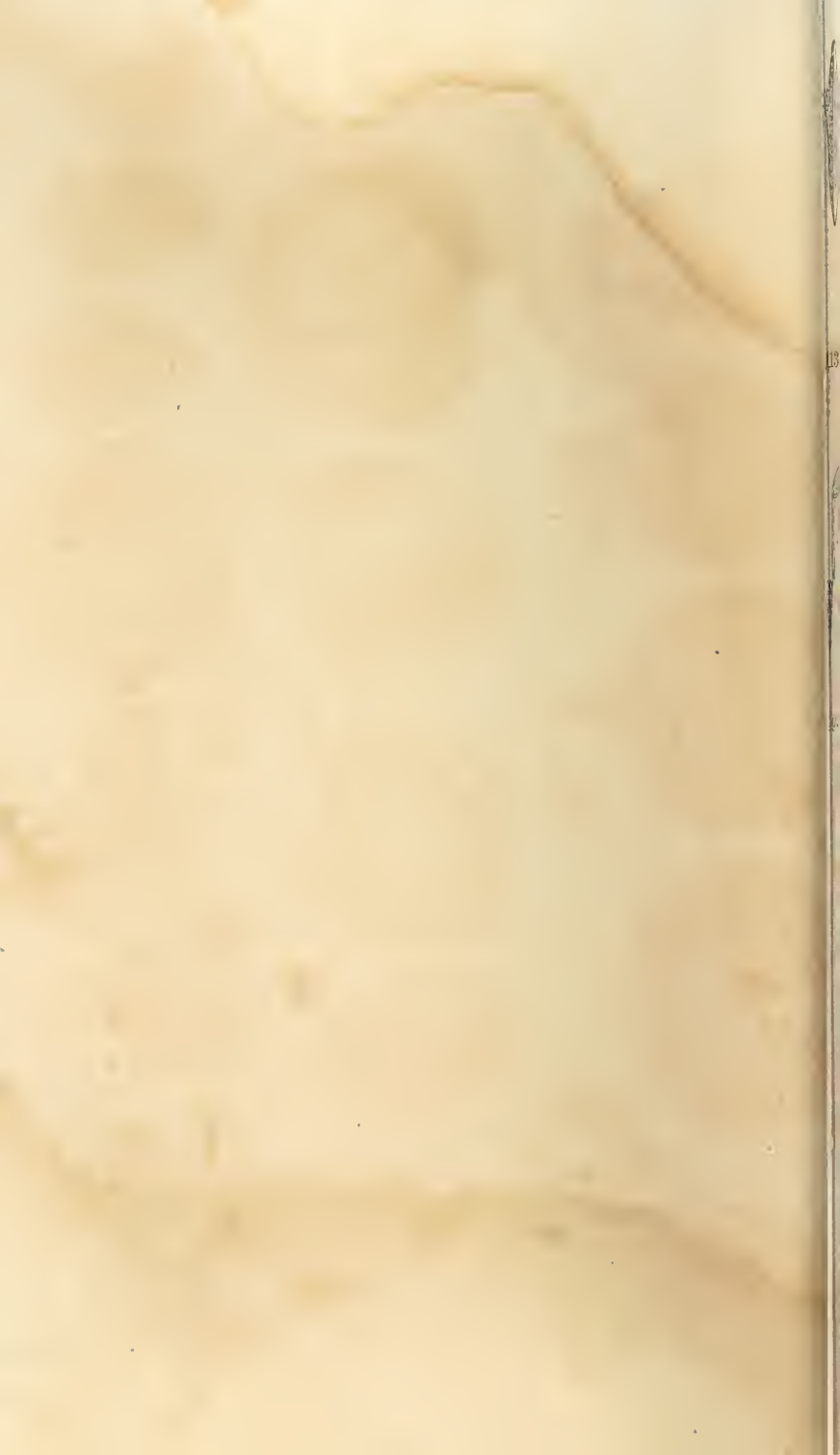
groove in the bottom board and not be fastened to it. Two or three half inch sticks crossing each way in the centre of the hive help to support the combs. One-quarter inch from the top of the hive fasten slats four to six inches wide, of one-half inch stuff leaving cracks one-quarter of an inch wide between them. Over the top put a cover projecting on all sides and fastened to the hive by small hooks. You have then both a movable top and bottom board, and a honey board, which is as near a Langstroth's hive as you can come in a box hive. If you already have box hives, bore holes in the top and put on a cover like the one turned back in *Fig. 110*. It is seldom well to take honey from the brood chamber; with holes in the top of the hive you can set on surplus honey boxes and get your honey clean and clear as in the movable comb hive.

Nearly all the directions for feeding, watering, natural swarming, and wintering, which were given for the Langstroth hive are applicable to the box hive thus constructed. Artificial swarming is much more difficult and uncertain. The box hive must be turned bottom upward. This is accomplished by smoking the bees. When it is ascertained what colonies are in condition to part with a swarm, the new hive is prepared as before directed, also a square box just the size of the hive.

Turn the hive bottom upwards after smoking the bees; set the box over it and rap steadily on the sides of the hive, giving them also an occasional whiff of smoke. In ten or fifteen minutes turn the bees that have gone up into the box out before their new hive, remove the old hive to a new place, and set the new one on its stand as previously directed.

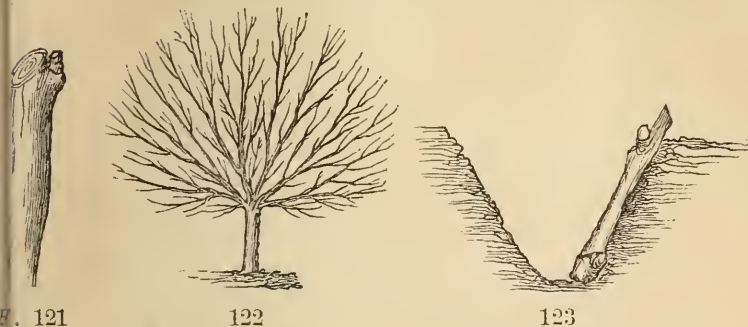
ITALIAN BEES are, on many accounts, much better than our common bees. Italian queens are sent in little wire cages to all parts of the country. The common queen is removed and the next day the Italian queen, cage and all, inserted in a hole,

cut into one of the combs. The next day she can be released from her confinement and the bees will usually receive her. The hive will soon be filled with Italian bees. We have often given directions in this chapter without giving reasons, and made statements without bringing proof. For full explanation and proofs which will satisfy the most sceptical, we refer the reader to the large works of Langstroth and Quinby upon bee culture. In the mean time follow our directions if you desire the best success.





BUDDING AND GRAFTING,



PRUNING.

SETTING THE CUTTING.

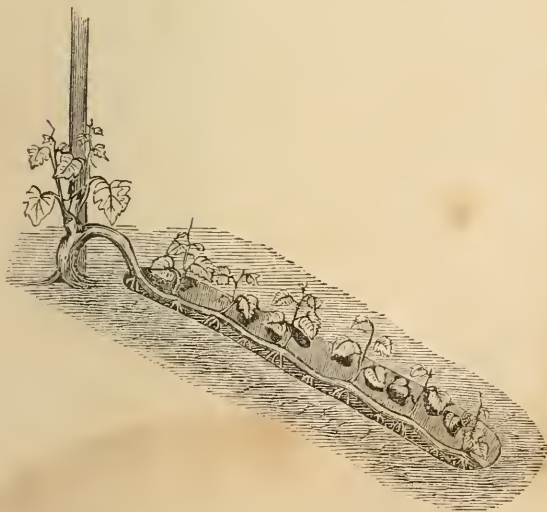


Fig. 124. THE LAYER.







PART THIRD—FRUIT CULTURE.

CHAPTER XIII.

ORCHARD CULTURE.

ATHRIFTY, PROFITABLE ORCHARD is within the reach of every farmer, by as plain and simple means as a crop of potatoes or any other farm crop, and we shall try to rob this exceedingly plain subject of some of the mystery that has been thrown about it, and give practical directions for accomplishing so desirable an object; beginning with the NURSERY, for every farmer may as well be his own nursery man. Select for the nursery a warm, dry spot, *perfectly dry*, plow it eight or ten inches, subsoil it ten or twelve inches more, spread on three inches of compost of muck and manure thoroughly rotted, (*see Manures*,) harrow and cross harrow it in, then cross plow it under. If to be planted in the fall, the pomace from the cider press may be planted for apple stocks. Break it up fine by raking with an iron rake. If planting be deferred till spring, the seed must be separated from the pomace by a coarse sieve, and the sifted pomace repeatedly washed until clean seeds alone are left. Spread the seeds thickly on boards, and stir until perfectly dry. These seeds should be packed in slightly moistened sand, in tight boxes, and kept through the winter in a dry, cool place, and planted at the earliest moment in the spring. Pear seeds will have to be

collected more carefully, or bought of the seedsman, but we recommend the purchase of a few bushels of pears. They can be cut and dried, and when cutting them to dry the seeds can readily be saved.

Cherries should remain on the tree until perfectly ripe, then put into tubs and the pulp washed off. All other things being equal the autumn is the best time for planting all seeds. If they are to be preserved until spring, they must be packed in moist sand. They should be sown in drills three feet apart. Cover one inch deep with earth, and another inch with leaf mould from the woods.

These few precautions will secure you a vigorous growth of shoots.

For peaches, apricots, and nectarines, the stones should be kept in layers of sand. Put a layer of sand in a box, then a layer of stones, and expose them to the action of the frost through the winter. They should be examined a fortnight before planting time, and if they have not begun to crack, give them a wetting; if they do not open by planting time, crack them on a wooden block with a wooden mallet. Fruit stones should be planted deeper than seeds, say three inches, and the rows three feet apart as before, and covered with leaf mould. This prevents evaporation, retains heat and moisture, and does not exclude the air; and heat, moisture, and air are the three requisites of germination. These preparations are simple and easily made, and will insure good stocks.

Plum stocks must be gotten from horse plums, or some other native species that reproduces itself from seed. Otherwise it is to be treated the same as the other stone fruits. In all these operations it should never be forgotten that one good vigorous stock is worth five poor ones; and the temptation to drop the seed too closely, and thus crowd and stunt the plants, should be

resisted; and as soon as they appear above the surface, if too thick, they should be thinned out, and when four or five inches high, all the feeble plants should be thinned out, and only those left which are vigorous. The weeds must not be allowed to grow in the nursery, but the cultivator must be kept running between the rows, which have been left three feet apart for this purpose; and the hoe must supplement the cultivator.

These seedlings will often make a growth of from four to six feet before the winter. Three feet is enough, so that they thicken and are vigorous. If the seeds are planted in the fall and all the above conditions complied with, the seedlings will be ready for transplanting one year from the seed. If not planted until spring, or if not thoroughly cultivated and unsparingly thinned, they will have to be carefully covered for the winter, and left over for another year. There is only one proper time for taking up all seedlings, and that is the autumn. Begin at one end of the row, run your spade slanting under the roots, pry them up a little, and then pull them out with the hand. These seedlings can be packed away in the cellar, covering the roots and half the stalks with sand or mellow earth, or they can be heeled in, in some dry place protected from the frost, and taken into the house to be dressed when outdoor work, is over.

Another method of obtaining stocks is by CUTTINGS, (*Fig. 123,*) or shoots of one year's growth, cut in the autumn, or spring before growth commences, and planted in the soil. Under the ordinary circumstances of the farmer, this method can be applied only to such species as throw out roots readily, such as the grape, quince, currant, and gooseberry. In making cuttings it will be better if a small portion of the older wood can be taken off with the shoot. If cut in the autumn or early winter, they should be kept in damp mould in the cellar until the frost is

out of the ground in the spring. Three-fourths of the shoot should be under ground, with one or more buds above ground, they may be laid in a slanting position, which will bring them nearer to the heat and air. The soil should be pressed closely about the cutting. A third method of obtaining stock is by LAYERING, (see *Fig.* 124,) or bending down the branches of the plant and covering a portion with earth. The advantage of this method over the preceding, is that the new plant is nourished by the mother plant until it has taken root. Layering should be done in the spring, and the new plant cut from the parent in the autumn. Make a slight excavation in the soil near the plant, bend the branch down into the place, make a small cut on the underside, and fasten it in its place. Sprinkle a very little earth over it at first, and more as it sprouts. The end of the branch, shoot, or twig thus layered should be fastened up straight. A fourth method is often successfully adopted with the quince, called MOUND LAYERING. The plant is cut down early in the spring, nearly to the ground, leaving only a few buds at the base. During the summer, shoots will grow from each of these buds. In the autumn, the earth is drawn up around the base of the plant, so as to entirely cover the old stump; another season, each of the shoots takes root, and in the autumn, strong stocks are ready for the knife.

We repeat that all stocks, whether from seed, cuttings, or layers, should be taken up in the fall and protected, and the DRESSING done in the house during the winter. This consists in trimming the roots and cutting back the stem. If the tap root is long and there are but few branching roots, the tap root must be cut back to within a few inches of the stem; if there are branching roots, they should be trimmed; if but few and short roots, the ends should only be smoothed off; in the case of layers and cuttings, only those roots that have been mutilated

will need to be removed. All injured roots should be cut off. All these operations, and all cutting of trees, should be done with a very sharp knife, in order that the cuts may be perfectly smooth. As this cutting of the roots lessens the power of the plant, the stem must also be cut back to keep the balance. It is always safe to cut it back one-third, and if it has grown tall and thin with but few buds or branches, it will often need to be cut back two-thirds of its length. If the tops are not cut back the plant will not grow the first season, and thus a whole season will be lost. At the time of dressing, the stocks should be divided into two classes, to be planted separately in the nursery rows; the most vigorous, both in root and stem, will be ready to *bud* the first season, while the feebler ones will have to wait over until another. Here will be seen the advantage of that thorough preparation of the soil, cultivation, and thinning which produces strong stocks. The work of dressing and selection having been done in the winter, the stocks will be ready for replanting as soon as spring opens. The soil of the nursery should be thoroughly prepared as directed for the nursery. If the soil is pretty *clayey* it will answer for the apple, pear, quince, and plum stocks; but for the stone fruits, considerable sand must be worked into the clay.

The rows should be three and a half feet apart, and eighteen inches apart in the rows. The plot being ready, and the distances measured, a trench should be made deep enough and wide enough to hold the roots without crowding. The roots of each plant should be dipped in a tub of mud and set in the rows, and perfectly pulverized earth pressed tightly about them. But few plants should be taken out of their winter bed at a time, and the roots should be exposed as little as possible. Plants with a single straight tap root may be set with a dibble, or sharp stick two or three inches in diameter; but care

must be taken that the earth is pressed compactly about the stem. All the CULTIVATION necessary in the nursery is that every weed shall be kept out and the ground between the rows be kept mellow by the cultivator. This should be furnished with a short whiffletree and long traces, so that cultivation may go close to the rows without injuring the stems. The most vigorous of these stocks will be ready for BUDDING the same season, twenty-one months after planting the seed or putting down the layer.

BUDDING, is inserting the bud of one tree under the bark of another. It is done most successfully from July to September, when the trees are in their most vigorous growth. The buds should be fully developed and the bud on the end of the shoot, called the terminal bud, perfected. In budding the peach the terminal bud is the best. The buds are cut smoothly off, a very little of the wood being taken with them. (*See Figs. 113 and 116.*) A cut is then made in the stock in the shape of a **T**, the bark lifted, and the bud slipped under it. (*See Figs. 114, 115, and 116.*) The tree should then be tied, leaving only the bud exposed. Bass-wood bark makes the best bandage, but husks, or even cloth, will answer the purpose. If in two weeks the bud begins to swell, it has taken, and the bandage may be removed; if it has not taken, the operation may be tried again the same season, or the stock left over to be grafted in the spring. It is usually best to bud near the ground. When a number of buds are cut at once, they should be stripped of their leaves and packed in damp cloths, moss, matting, or sawdust, and in a cool cellar, several days. If ordered from a distance, they should be used as soon as received. All *suckers*, or *robbers*, as they are termed, being shoots that appear on the stem below the bud, should be removed. The following spring after budding the stock may be cut back, as shown in *Fig. 117.*

The second method of propagation is by GRAFTING. This differs only from budding, in that it is the insertion of a stem with several buds, called a scion, into the wood of the stock. Scions should be cut in the autumn or winter, after the fall of the leaf, from healthy, vigorous trees, and buried in dry sand, on the north side of a wall or building, and a mound made over them to shed the rain. The three common methods of grafting are shown in *Figs. 118, 119, and 120*. The main points in either are, that the cuts be perfectly smooth, that the inner bark of the scion and the stock fit perfectly on *one* side, that they be pressed tightly together, and that the whole be covered water tight. The latter is accomplished by the use of grafting clay or wax. Grafting clay is made by mixing one-third clear, fresh horse dung with two-thirds clay and a little hair, thoroughly beaten together. Grafting wax is made of tallow, beeswax, and resin, in equal parts. A larger proportion of tallow makes it more pliable; a larger proportion of resin and less tallow makes a composition in which rags can be soaked and tied around the graft. It is sometimes put on warm with a brush, or, if too stiff for that, worked in with the hands; any way to make it water tight. Grafting can be performed on quite large limbs; and if the farmer has vigorous trees bearing worthless fruit, a few dollars spent in grafting, and a little time in pruning, will prove abundantly profitable.

ROOT GRAFTING is extensively practised by nurserymen upon apple and quince stocks, as it can be done in the house in the winter. The seedlings, or cuttings that are to be root grafted, are taken from their winter bed, a few at a time, grafted, and at once returned. The stem is cut off at the collar, or the point where it emerges from the ground, and the graft inserted in the same manner as upon the stock. (*See Figs. 118 and 120.*) When

set in the nursery rows only the graft should be left above ground.

These trees in the nursery, now require but little time or attention; it is only important that the ground be kept mellow by frequent cultivation, that the weeds be kept down, that shoots that appear on the old stump be rubbed off, and that the tree be kept upright. If exposed to high winds, or inclined to a crooked growth, the new shoot should be trained to a stake.

Let us now take a note of time. The *first year* was devoted to the growth of the stock from the seed, layer, or cutting; the *second year* to the transplanting of the yearlings and the budding of the most vigorous growers. The *third year*, early in the spring, those trees budded the second year should be relieved of the stocks, (*see Fig. 117*;) those that failed to take the bud should be grafted. The second quality stocks, not vigorous enough to be budded last year, should be headed down to within three or four inches of the ground. In the autumn of this year the second quality stocks are to be budded. The *fourth year* we commence a systematic PRUNING, which is to be continued during the life of the tree. Pruning is resorted to for various purposes. 1st. Pruning to direct the growth from one part of the tree to another, as from the top to the base. This is accomplished by pruning the more vigorously growing parts, and thus directing the sap to the other parts. 2d. To renew the growth of stunted or feeble trees, by pruning them back to a few buds and throwing the whole vigor of the tree into these few. 3d. To promote fruitfulness, by pruning after the foliage appears in the spring, thus checking the growth of the wood, which promotes the formation of fruit. 4th. To regulate the growth and shape of the tree. 5th. Root pruning, to lessen the dimensions of trees and promote fruitfulness. We shall give directions for pruning each variety of fruit in future

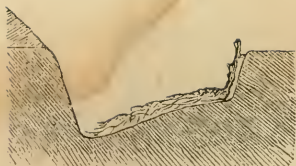


Fig. 125.
PLANTING THE VINE.

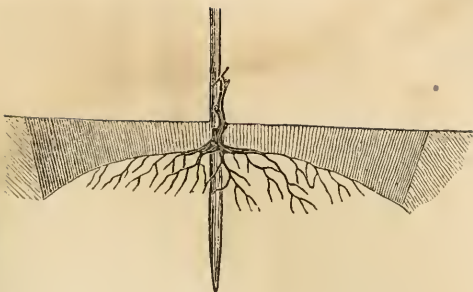


Fig. 126. SETTING OUT THE VINE.



Fig. 127. PRUNING SHEARS.



Fig. 128. GRAFTING CHISEL.

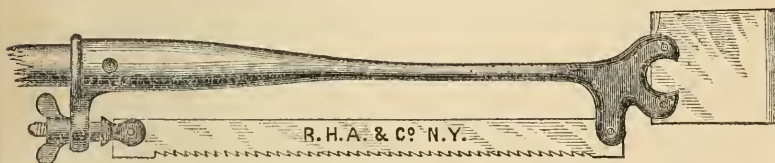


Fig. 129. PRUNING SAW AND CHISEL.

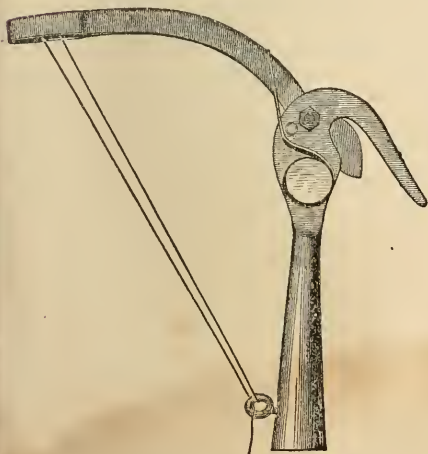


Fig. 130. POLE PRUNING SHEARS.



Fig. 131. FRUIT LADDER.



pages, but will here give the GENERAL PRINCIPLES AND PRACTICE OF PRUNING.

The time for pruning varies with the climate, variety of fruit, and the object to be attained. Perfectly hardy trees may be pruned at any time between the fall of the leaf in autumn and its reappearance in spring. This may always safely be done in the South and Southwest. More tender trees, north of the forty-third degree of latitude, should be pruned in the spring, before growth has commenced. Trees that throw out shoots rapidly, like the peach, may be pruned just before midsummer; but if limbs of any size are cut, the wound should be covered with a preparation of shellac and alcohol,* or with grafting wax, thinned and applied with a brush. The exceptions to the above general rules in regard to the time of pruning are, that trees which grow wood and leaves vigorously, without fruit, are pruned back after the leaves are grown; and the pruning of young trees during the summer by PINCHING, of which we shall speak hereafter.

The amount to be pruned also varies with circumstances; but we are sure that one thousand trees are pruned too little, for every one that is pruned too much. As a general rule, one-half of each year's growth should be cut away before another season's growth commences. This increases the strength and vigor of the tree, induces earlier fruitfulness, and promotes longevity. A well pruned fruit tree will bear sooner, more freely, better fruit, and for a much longer period than an unpruned one. These are objects worth accomplishing, when fruit is in such great demand and at such remunerative prices. The cut should be made with a very sharp knife. Haggling defeats the objects

* Mix enough shellac in alcohol to make a preparation of the consistency of paint, and apply with a brush.

of pruning. If the limbs are so large as to need a saw, the cut should afterwards be pared perfectly smooth and covered with the preparation of shellac. The cut surface should be as small as possible, and always in single shoots just beyond a bud. (*Fig. 121*) The peach and grape should have a little more wood above the bud than represented in this cut. By elaborate systems of pruning and training, a tree may be made to grow in an form desired, and the curious specimens in the gardens of many horticulturists of France and England, and a few in this country, are the admiration of all beholders. We speak of this here only to show that the unsightly and ill shaped trees commonly seen in farmers' orchards are advertisements of either the ignorance or indifference of their owners, as the shape of the tree is entirely in the hand of the cultivator. This shaping should commence in the nursery, according to our plan, the second season after budding, or the fourth year from the seed. The trees have had a whole season of growth and will show very marked differences. All will be too tall and spindling, and the tops must be cut back one-third to one-half, and the other branches trimmed so as to give the desired shape to the tree. The best shapes for each fruit are given in connection with the treatment of that fruit. The shape of the tree during this its last season in the nursery is governed by pinching off the ends of the shoots: a few minutes each week spent among a thousand young trees in the nursery will suffice for correcting any bad habits of growth. If the top shoots up, at the expense of the side branches, pinch off the terminal bud, if shoots form too low, pinch them: if shoots appear in wrong places, pinch them off; keeping in mind always the shape desired. This is usually done with the thumb nail, but a pair of nippers may be used to advantage. The main point in this process is not to let the trees spindle nor develop on one side at the expense of the

other. In the autumn of the fourth year, or two years from the bud, the trees should be transplanted to the orchard. This is sometimes done one year from the bud, but the safer and better way is to wait till the second year.

Orchards should be underdrained, unless very dry. A fruit tree will never be productive with stagnant water about its roots. It should be thoroughly prepared to the depth of twenty inches by subsoiling, manuring, harrowing, and cross plowing, as described in the directions for preparing the nursery. In addition to the compost of muck, manure, leaves, night soil, etc., an application of fifty bushels of ashes or lime to the acre will be advantageous and, if the soil be destitute of lime, necessary. Does this preparation look like too much cost and labor? Rest assured it is the very cheapest way of producing fine crops of fruit, which will surely return the outlay many fold. Never set trees in *holes* without thoroughly preparing the whole soil. If you cannot spare the time and labor to prepare an acre in this thorough manner, prepare one-half or one-quarter of an acre, and leave the rest until you can prepare it. The scarcity of fruit is due to the *hole system*. If the young trees have been properly pinched back, they will not need much pruning when transplanted. Cut back only enough of the head to balance the loss the roots have sustained. When raised in the farmer's own nursery this loss of roots should be small; when they are transported to him from a distant nursery the roots will be nearly all cut off for convenience in transportation. This is one of the reasons why we advocate the home nursery. The roots of the tree extend as far in each direction as the height of the tree, and where the ground has been kept mellow by cultivation, there will be but little difficulty in getting them up nearly entire. Every wound should be pared smooth with a sharp knife; the roots searched for borers, and dipped in mud

before replanting. A trench should be dug in the already prepared ground, of such width and depth as to accommodate all the roots in their natural position. The tap root if long may be considerably shortened, say one-half its length, taking care that enough shall be cut from the top to balance the loss. If transplanting is done while in leaf, the leaves should all be removed. The tree should be set at the same depth as before its removal. One person should hold the tree in the required position, while another throws in the finely pulverized earth about the roots and turns in water to settle the earth. It is essential that the earth should be closely packed about each root, and puddling is the surest way to accomplish it. If transplanted in the autumn, a mound of earth should be drawn around the stem, both to stiffen it against the wind and to protect it from being girdled by mice. Otherwise it should be fastened to an upright stake in such a way as not to chafe the bark. *Watering* young trees after transplanting, as usually conducted, is injurious.

Watering the tops with a sprinkler or hose at evening, during severe droughts is the most effectual; but keeping the ground mellow about the roots and **MULCHING** is usually sufficient. Spread a thin coating of hay, straw, or coarse litter about the trees, and it prevents evaporation and the drying of the surface soil. It is also a protection to the roots in winter, and therefore is to be recommended for all trees at all seasons of transplanting, and for tender trees, like the cherry, peach, and apricot, is almost indispensable.

If the roots become frozen and thawed again in contact with the air they are spoiled, but if well buried, filling all the cavities before thawing, they will be uninjured. In transplanting, carefully prepared labels stating the variety should be kept on the trees, and a record made in some book of what

trees are in each row. The following table shows the number of trees or plants required to the acre at given distances apart:

40 feet apart.....	28	12 feet apart.....	302
33 " "	40	10 " "	436
25 " "	70	8 " "	680
20 " "	108	6 " "	1208
15 " "	194	4 " "	2720

The rule for guidance should be to allow space enough at least on two sides of the tree freely to admit the sun and air.

NOTE. The pruning saw and chisel and pole pruning shears (*Figs.* 129 and 130) will be found exceedingly useful in cutting high limbs, removing the webs of worms, cutting off fruit in the tops and on the outermost branches of large apple trees, etc. They can be had of any dealer in implements.

CHAPTER XIV.

APPLES, PEARS, AND QUINCES.

THE apple will grow upon almost any soil, but, as a properly planted and cultivated apple tree will bear for one hundred years, the selection of soil and situation is worthy of careful attention. The soils best suited to the apple are limestone soils, strong clayey loams, and sandy loams. A too sandy loam may be modified by a dressing of clay. And both clayey and sandy loams, if destitute of limestone, should be liberally dressed with lime, before planting the trees, and occasionally afterwards. Never plant an orchard in wet land, until it is *underdrained*.

The northern slope of a hillside is the best position for the apple in the Northern States, and the bottom of a valley is the worst for any fruit in any section. If it is the intention to cultivate grain on the same ground with the apple orchard, the trees should be planted forty feet apart. We believe the better way to be to plant them twenty to thirty feet apart, according to the natural size of the tree, and cultivate nothing but hoed crops between the rows. Rye should never under any circumstances be grown among fruit trees; and clover only to be plowed under, or fed on the ground. The ground should always be kept mellow, and for three reasons we recommend high manuring and root crops in the orchard. The cultivation of root crops keeps the ground mellow; the manure which es-

capable the crop, will be caught by the roots of the trees and thus saved. The crops can be kept from growing near the trunks of the trees. The pinching and pruning process must be kept up to maintain the proper shape of the tree. For the standard apple tree in the farmer's orchard the lowest limbs must be six feet from the ground, and all buds below this should be rubbed off or cut off after they get started.

The lower limbs should be the largest and longest on the tree. The tendency of growth is towards the top. If any of the upper limbs outstrip the lower they must be cut back. The better shape for the standard apple is the vase shape, leaving the inside of the tree quite open. A few hours each season will suffice to regulate the growth of quite a large orchard, and this care makes all the difference between a moss covered, scraggy tree, and small, mealy, crabbed fruit; and fine trees with large, fair, and well ripened fruit. The heads of most apple trees are allowed to become so full of limbs that the foliage shades all the inside of the tree, and no fruit ripens except upon the outer branches, while if the surplus branches are kept cut out the whole tree will produce fruit. Root pruning in connection with manuring is of great importance when there is too vigorous growth of the wood without fruit. Dig a trench around the tree as far from the trunk as the extension of the branches, cutting off the roots with a very sharp spade or a knife, and fill the trench with thoroughly rotted compost.

We have seen most wonderful effects following this treatment of trees. If repeated every other year, we believe most apple trees can be made to bear every year. We have certainly seen a small orchard treated in this manner bearing one hundred bushels, when every other orchard in the vicinity was nearly barren. To rejuvenate an old apple orchard, prune and graft one-third of the top each year, and apply manure to the roots.

Scrape off all the coarse bark from the roots to the branches, and wash the trunk in strong soapsuds.

Says R. L. Pell, Esq., of Esopus, New York, a very successful culturist: "For several years past I have been experimenting on the apple, having an orchard of two thousand bearing Newtown Pippin trees. Three years ago, in April, I scraped all the rough bark from the stems, washed all the trunks and limbs within reach with soft soap, and trimmed out all the branches that crossed each other." In the latter part of June "I slit the bark by running a sharp pointed knife from the ground to the first set of limbs. In July I placed one peck of oyster shell lime under each tree, leaving it piled about the trunk until November, when it was dug in thoroughly. The following year I collected from these trees seventeen hundred barrels of fruit for market, besides the cider apples. The trees were then manured with stable manure, composted, and the succeeding autumn they were again loaded with fruit, while the trees not so treated were quite barren." This is the experience of many others who have tried this process in a less thorough manner.

Pigs and fowls may be turned into the orchard before the fruit ripens, and after the crop is gathered; they will eat the windfalls, and destroy thousands of worms by their rooting and picking.

Sheep are less valuable in the orchard, as they only eat what is on the surface. If the orchard is plowed very early and clover sown, when the clover is pretty well grown, a litter of pigs may be turned in, and with a little additional feed will grow fat on the feed and the windfalls while they grub about the roots, destroy the worms, and leave their valuable droppings to enrich the soil.

We say to every farmer plant an apple orchard; it will be a source both of pleasure and of profit. Six years from the planting of the seed you may begin to gather enough for your

own consumption, and in ten years a full supply. If properly cared for, for ten years, you may safely calculate on fifty years of productiveness, and we have seen twenty bushels of apples gathered from a tree one hundred and thirty years old.

To aid you in the selection of varieties we give a list of the best and most successfully cultivated, as collated from the reports of the various Pomological Societies of the country. The month named after each variety shows the average time of ripening. Best varieties for the whole country: Red Astrachan, August; American Summer Pearmain, September; Early Harvest, July, August; Gravenstein, October, November; Baldwin, late fall; Rhode Island Greening, late fall. (*Fig.* 135.)

Select varieties for the North Eastern States in addition to above. Golden Sweet, August; William's Favorite, August; Sops of Wine, August; Early Joe, August, September; Porter, September; Fall Pippin, November; Hubbardston Nonesuch, December; Ribston Pippin, Roxbury Russet, late; Fameuse, November; Tallman's Sweet, November; Northern Spy, about November; Rambo, late; Westfield Seek No Farther, November, December. Select varieties of the Middle States: Early Harvest, Red Astrachan, Early Joe, Primate, August; Sweet Bough, August; Jersey Sweet, September, October; Porter, Fall Pippin, Gravenstein, Belmont, November; Twenty Ounce Pippin, (for market,) November; Rhode Island Greening, King of Tompkins County, November; Fameuse, Mother, November; Tallman's Sweet, Ladies' Sweet, Baldwin, Northern Spy, Roxbury Russet, late fall.

Select varieties of apples for Northern Indiana, Illinois, Northern and Central Ohio, etc. **SUMMER APPLES;** Early Harvest, Carolina Red June, Benoni, Early Pennock, High Top Sweet, Red Astrachan, Keswick Codlin, Hocking. **AUTUMN APPLES:** Autumn Strawberry, Bailey's Sweet, Dyer, Haskell

Sweet, Duchess of Oldenburg, Lowell, Maiden's Blush, Ramsdell's Sweet, Fameuse, Fall Pippin, Fulton, Mother, Rambo. WINTER APPLES: Winesap, Rawles Jannett, Dominic, Jonathan, Carthouse, Westfield Seek No Farther, White Winter Pearmain, Minkler, Tallman Sweet, Northern Spy, Swaar, Bullock's Pippin, Ramsdell's Sweet.

Select varieties for Southern Ohio, Indiana, Illinois, Kentucky, and Missouri. SUMMER: Early Harvest, Red Astrachan, Carolina Red June, American Summer Pearmain, Large Yellow Bough. AUTUMN: Maiden's Blush, Buckingham, Rambo. WINTER: Rawles Janet, Ortly, Yellow Bellflower, Winesap, Rome Beauty, Newtown Pippin, Ben Davis, Pryor's Red, White Pippin, Jonathan, Bullock's Pippin.

Select list for Virginia and adjacent regions. Carolina Red June, Gravenstein, Belmont, Fall Pippin, Yellow Bellflower, Smokehouse, Rambo, Smith's Cider, Maiden's Blush, Loudon Pippin, Limber Twig, Fallwater, Pryor's Red.

Select list for Georgia and adjacent regions. Early Harvest, Red June, Horse, Bachelor, Meigs, Disharvon, Green Crank, Mangum, Kentucky Streak, Nickajack, Shockley, Stevenson's Winter. There are many valuable varieties left out from the above lists, the aim having been to give such list as should give a succession of marketable fruit, and productive and hardy trees.

This omits the Cogswell, highly prized in Maine; the Spitzenburgh, grown extensively on the line of Rhode Island, Connecticut, and Southern New York the Early Strawberry, moderately good in all localities; the Late Strawberry, a very productive early autumn apple of the West; the Broadwell, a fine winter sweet apple in Ohio; the Pomme Grise, a Canada apple; and a thousand others that are favorites in small localities. The above lists will however answer the practical purpose of the farmer.

It only remains to speak here of gathering and preserving the fruit. The more care that is expended upon these two operations the better the prices that will be obtained. The fruit that is picked by hand should be kept separate from that shaken from the trees. If the tree has been cut back and not allowed to

NOTE.—The subjoined table gives the leading varieties of apples, their season, the special use to which they are best adapted, the localities where their cultivation has been tried and proved successful, and the localities for which they have been especially recommended. While the list of profitable varieties is by no means complete, each of the varieties is, beyond question, safe in the localities for which it is designated.

NAME OF VARIETY.	Season.*	Use.	Conn.		Del.	Ind.	Georgia.		Illinois.	Ky.	Iowa.	Maine.	Mich.	Mo.	Miss.	N. Y.	Md.	Ohio.	Penn.	Mass.	Vt.	N. J.	R. I.	Va.
			Conn.	Del.			Georgia.	Illinois.																
Am. Summer Pearmain..	S.	T.			X	X			X															
Astrachan Red.....	E. S.	K. M.	X	X	X	X			X	X	X	X		X	X									
Baldwin.....	W.	M.	O	X											O	O						O	O	
Belmont.....	E. W.	M.			O	O																		
Bellefleur Yellow.....	W.	M.	X						X	X				X										
Benoni.....	S.	T.			X	X			X	X					O	O						X	X	
Bullock's Pippin.....	W.	T.			X	X			X	X												X	X	
Carolina Red June.....	E. S.	T.					X		O					O	X	X								
Dominic.....	W.	T.							X	X												X		
Duchess of Oldenburg....	E. A.	K. M.																						
Early Harvest.....	E. S.	M.	O	X	X	X			X	X	X			O								X	X	
Early Joe.....	S.	T.																						
Early Strawberry.....	S.	T.	X	X	X																			
Fallwater.....	W.	T.																						
Fall Pippin.....	L. A.	M.	X	X	X																			
Famense.....	E. W.	M.	X	X										X										
Golden Sweet.....	E. A.	K. M.																						
Gravenstein.....	E. A.	T.	X	X	X																			
Hubbardston Nonesuch..	E. W.	M.				X																		
Jersey Sweeting.....	E. A.	K.																						
Jonathan.....	W.	M.			O																			
King of Tompkins Co.....	E. W.	M.	X	X																				
Large Yellow Bough.....	S.	K. M.	O	X	X																			
Maiden's Blush.....	A.	K. M.	X	X	X				X	X														
Monmouth Pippin.....	L. W.	M.																						
New York Pippin.....	L. W.	M.			O				O	O														
Newtown Pippin.....	L. W.	T.			X				X															
Northern Spy.....	L. W.	M.	X	X	X																			
Peck's Pleasant.....	W.	T.	X	X	X																			
Porter.....	A.	M.	X	X																				
Rambo.....	W.	T.	X	X	X				X															
Rawles' Janot.....	L. W.	M.			O				O															
R. I. Greening.....	W.	M.	O																					
Ribston Pippin.....	E. W.	T.																						
Roxbury Russet.....	L. W.	M.	O		X																			
Smith's Cider.....	W.	K. M.			X				O															
Spitzenburg Esopus.....	W.	M.	X	X	X																			
Summer Rose.....	S.	T.	X	X	X																			
Tolman's Sweeting.....	W.	K. M.	X	X	X																			
Vandevere of New York.	W.	M.	X	X	X																			
Westfield.....	W.	M.	X	X	X																			
Wine Sap.....	L. W.	M.	X	X	X																			
Williams' Favorite.....	S.	T.	X	X	X				O	O														

* E. S.—Early Summer. S.—Summer. E. A.—Early Autumn. L. A.—Late Autumn. E. W.—Early Winter. W.—Winter. L. W.—Late Winter. T.—Table Variety. K.—Kitchen. M.—Market. X—Tried and proved successful. O—Especially recommended in the locality named.

throw out long, slender branches, the gathering will be much easier. Do not use the common ladder, placing it against the branches, but have a folding ladder, (*Fig. 131*;) also a long handled picker with a bag attached. (*See Fig. 130.*) Fruit carefully gathered, and packed without bruising, will keep in a dry place until spring, when it will bring the largest price. Whereas, if it is shaken from the tree and bruised, it must be sold at once when prices are usually at the lowest. We have known this very thing make a difference of twelve hundred dollars in the price obtained for the apples from an orchard of a little short of one acre.

PEARS AND QUINCES. Pears require nearly the same soils and situations as the apple, but more porous. Different varieties require different soils. All require lime, and if it is not naturally in the soil, it should be supplied. The following table shows the soils in which a few of the standard varieties do the best. In clayey soils:

ANDREWS,	HOWELL,
BARTLETT,	LOUISE BONNE DE JERSEY,
BEURRE D'ANJOU,	LAWRENCE,
BEURRE SUPERFIN,	MERRIAM,
BEURRE LANGELIER,	ONONDAGA,
BRANDYWINE,	ROSTIESER,
BELLE LUCRATIVE,	SECKEL,
BUFFUM,	VICAR OF WINKFIELD,
DOYNE BUSSOCK,	WINTER NELIS.

All the above varieties, except the latter, Winter Nelis, are benefited by a large admixture of sand in the soil. The following varieties grow best in a sandy soil without clay:

BEURRE D'AREMBURG,	DUCHESS D'ANGOULEME,
BEURRE BOSC,	FLEMISH BEAUTY,
BEURRE DIEL,	GLOUT MORCEU,
DEARBORN'S SEEDLING,	URBANISTE.

Whatever the soil, it should be thoroughly and well cultivated. The pear on its own roots will not well bear transplanting after three or four years of age, unless it is root-pruned every year, or at least the year before transplanting; but on the quince it may be transplanted at almost any age. But though in gardens and in market culture the pear is usually grown on the quince as a dwarf tree, for the purposes of the ordinary farmer, to whom we speak, we advise budding on pear stocks. At three years from the bud they should be removed to the orchard. The early autumn is the best time for this, and if done before the fall of the leaf, the leaves should be stripped off. When transplanted, great care should be taken to retain as many as possible of the small fibrous rootlets, as these furnish life to the tree. The same directions given for transplanting the apple apply to the pear, except that the trees should not be more than twelve feet apart, which will allow five hundred trees to an acre. Every farmer can find at least one-fourth of an acre to devote to the culture of the pear, which will allow for one hundred and twenty-five trees, and will be a source of enjoyment and profit. One need not now wait a lifetime to obtain the fruit, for six years from planting the seed is ample time for the first crops of this delicious fruit, and we know of thousands of pear trees that have borne for over fifty years. We once knew a tree three years from the bud to set over four hundred pears; all but about twenty-five were picked off, but this shows how quickly the fruit will mature, if treated properly. Pear trees set twelve feet apart and pruned to the pyramid form, will have plenty of room for a number of years, and as they become too thick the poorest trees can be thinned out. The pyramid form is very easily obtained if the trees are kept down, as the pear should be, to within twelve feet in height. In the pear orchard no calculation should be made for horse cultivation, and the

lowest branches should not be over three or four feet from the ground. Dwarf pears on quince stocks are cultivated much lower. All agree that the pyramid is the best shape for the pear, and each pruning should have reference to this shape. No grass or grain should ever be allowed in the pear orchard, but all root crops are beneficial as for the apple. A small strip can be plowed by the use of the short whiffletree, but most of the cultivation must be done with the spade, digging fork, and hoe. The pear must not be allowed to bear too early or too profusely. It requires a great deal of courage to pick off half the young fruit from a tree, but that which matures will be the larger and finer, and the exhaustion to the tree, not so great, even if the weight of fruit is the same. The tree is exhausted not by the amount in weight of fruit that it bears, but by the number of specimens in which it perfects the seeds. Fruit growers will do well to bear this in mind. For market or kitchen gardens the pear should usually be cultivated ON QUINCE STOCKS. The quince is a valuable tree of itself, but as a stock for the pear, it is of the greatest importance. It is usually propagated by layers when cultivated for its fruit. (See page 521.) The soil for the quince should be deep, and rich, and well cultivated. The common method of setting the bush and letting it take care of itself is *just as ridiculous* as for the farmer to leave his corn in the same way. They should be pruned annually, and never allowed to grow bushy. As they are usually near the house, they should be treated to frequent doses of soapsuds, and the soil about their roots kept mellow. Quince trees treated in this way will yield enormous crops in proportion to the size of the tree. The Orange Quince, of which we have a beautiful illustration in the colored plate, is the favorite for the garden. For stocks for the pear a different mode of propagation is practised, as described and illustrated on a previous page.

The stocks thus obtained are budded just above the collar. Pears on quince stocks will usually have to be obtained from the nursery, and we advise purchasing only of reliable nursery-men, and obtaining assurances that they are not on the common quince, which is worthless for stocks, but on the Angers Quince. Buy the best that are to be had; a few cents makes but little difference here, but will make a vast difference in the final results.

If, however, the attempt is made to grow your own stocks, select to bud on the quince only such as have proved successful when thus grown. Many pears will not grow on the quince. The standard varieties that are best adapted for the quince are:

BERGAMOTTE,	EASTER BEURRE,
BEURRE D'ANJOU,	FLEMISH BEAUTY,
BEURRE SUPERFIN,	GLOUT MORCEAU,
BEURRE DIEL,	LOUISE BONNE DE JERSEY,
BEURRE GIFFARD,	ROSTIEZER,
BRANDYWINE,	URBANISTE,
BELLE LUCRATIVE,	VICAR OF WINKFIELD.
DUCHESS D'ANGOULEME,	

In the Southern States the Madeleine, Julienne, White Doyne, Lawrence, Seckel, and Tyson can be added to the above list; and for the Western States, the Tyson, Seckel, Kirtland, Nouveau Poiteau, Doyne Ette, and Bloodgood.

The pear on the quince should be planted with the collar from two to four inches beneath the surface, for the quince serves as a root, *never as a stem*. Here has been the cause of the failure of tens of thousands of dwarf pears. If the quince stock is above the ground it is more liable to be attacked by insects; it is liable to be broken off by high winds, at the joint, and the pear, growing more vigorously, produces a deformity; while if placed from two to four inches below the surface, it is strong, healthy and free from borers, while the pear itself will

in time take root beneath the surface and grow upon its own roots. Under the proper treatment it comes into bearing on the quince in one-half the time needed on its own roots, can be more readily trained to a pyramid form, so desirable in the pear, and we think is just as long lived. We at least know of trees on quince stocks that have been in bearing over forty years. Twelve feet apart is ample space for planting these trees; and where ground is scarce, if it is sure to be thoroughly cultivated, annually manured, properly pruned, and the young trees thinned of their first crops, six feet apart in the rows, and rows twelve feet apart, will answer.

Summer pinching of the terminal buds is the best method of pruning these trees. If the leader shoots up too vigorously, pinch it off; if any of the upper shoots get as long as the lower ones, pinch them off; if buds appear where you do not want limbs to grow, pinch them. This is much better than to wait until the wood is matured and pruning must be done with a knife; but if you leave it until then, be sure your knife is like a razor. Cut just above a bud. Prune in the spring those branches you wish to have grow vigorously, and in the summer those whose growth you wish to check. Where trees are slow to come into bearing, prune in the spring, pinch through the summer, and root prune early in the autumn.

The pear, unlike other fruits, bears from a permanent spur; after the fruit has been picked, if this spur is cut back new fruit buds will start at its base. The germs of these buds can be seen at the time of gathering the fruit. The wood buds are readily distinguished from the fruit buds, as the latter are full and plump, while the former are usually pointed. Wood buds can be converted into fruit buds by bending down or breaking off the shoot just above the bud. This distinction between wood and fruit buds should be kept constantly in mind when pruning

the tree. Old pear trees are reinvigorated by the same process of grafting the tops, already described, for the apple.

Thinning the fruit, as we have hinted, is often necessary. Says Thomas W. Field, a successful cultivator of the pear: "Good soils, fine cultivation, healthy and vigorous trees, and all the other requisites of pear growing will often fail of producing fine fruit, if all that sets is allowed to remain on the tree. The fruit of the Bartlett, Dearborn's Seedling, Louise Bonne de Jersey, and many other varieties will set in such quantities that, if thinning is neglected, not one-half will reach the full size or acquire their best flavor. Besides, these varieties yield fruit so early that the trees would be ruined by this precocious fruitfulness. Two years after planting, these varieties will commence bearing, and not more than a dozen specimens should be allowed to ripen annually the first two years of bearing. The period for thinning is when the pears are from a half to three-quarters of an inch in diameter; for, as many fall soon after forming, it is not until then the healthy and perfect ones can be distinguished. Not more than one-half the thinning should be done at once, and the others may be allowed to remain until we can ascertain the imperfect fruit to be removed.

There are but few of the finer varieties that are not improved by gathering before they are fully ripe. Not a few have been discarded as unworthy of cultivation, which by early picking improve so as to rank among the first in excellence. Several varieties rot at the core when left upon the tree until fully ripe, which will keep for weeks if picked earlier. Among these are the Flemish Beauty, BeurreDiel, and Louise Bonne de Jersey. The true test of the proper condition for gathering is, the cleaving of the stem from the spur when slightly raised. Some varieties indeed should not be left even so long as this. The fruit should never be picked early in the morning while the

CHAPTER XV.

PEACHES, PLUMS, CHERRIES, AND APRICOTS.

ALL these fruits are within the reach of, and may be profitably cultivated by the farmer. Especially should farmers' boys, not yet fit for the heavy work of the farm, devote much time and attention to the cultivation of these delightful fruits. We will try to make the directions for their cultivation and care so plain that any bright boy can understand it.

The STOCKS for these fruits are easily raised from seeds. Plump, fair, and healthy fruit should be selected, and after the flesh has been used for the table the stones should be washed clean, spread out, and thoroughly dried. When dry, pack them in sand, in boxes, a layer of sand, then a layer of stones; this box should then be buried on the north or west side of a wall or building, just below the surface, and a mound made over the top that will shed the rain. Here they will be subjected to the frosts of winter and will germinate. Just before the ground is ready for planting in the spring take them up, and carefully cracking with a wooden mallet on a wooden block such as have not opened, put them back in the ground for a couple of weeks, but not so deep as before, and without the mound, as the warmth and moisture will now assist them to sprout. In two weeks, or as soon after as the ground will admit of planting, take

them up and plant in ground prepared according to the directions given for preparing the nursery.

The PEACH grows best on its own stocks, but hardy, late growing varieties, like the Gorgas, Crawford's Late, Late Rare-ripe, and other sorts of late varieties make the best stocks, and the stones (or seeds) should be selected from these late varieties.

When opened the second time, those that have sprouted should be immediately planted in drills from one to three inches deep; a light thin soil requiring greater depth. The balance unsprouted should be moistened, and put back for another two weeks.

As these trees are to remain where planted for two years they should be at least eighteen inches apart in the rows, and the rows three feet apart, to permit cultivation. If cultivated, that is the ground kept mellow, the weeds kept out, and an occasional top dressing of liquid manure given, sixteen months* from planting the seed you will have strong, healthy, vigorous young stocks on which you can bud whatever variety you choose of this most delicious fruit the world has ever seen.

The time for budding, if on some late growing stock, as recommended, is in September. The process of budding is described on a previous page.

In the spring succeeding the budding, the trees should be transplanted to the orchard or garden, the same directions given for transplanting the apple and pear applying to this and all fruits. From eighteen to twenty-four feet apart is the proper distance for peach trees. The same careful after culture, of the

* Some cultivators have recommended budding the same season the seed is planted, but the stocks are then so small that it is a more difficult operation for the inexperienced. We prefer to cut back the head of the tree the first season, and thus induce the growth of a vigorous stem before budding.

soil with root crops and top dressings is necessary to the perfection of *all fruits*, and to the fruitfulness, health, and longer life of *all fruit trees*.

The peach requires a light, sandy, warm soil. If too sandy an occasional top dressing of peat, clay, muck, or loam will amend it.

The pruning of the peach is, after the preparation of the soil, the most important part of its culture.

The sap tends more strongly to the extremities of the shoots than in any other fruit, so that left to itself the peach forms a long stem and long scraggy branches; while north of Virginia it should never be more than twelve feet high, (eight feet is still better,) with its lower limbs not more than three feet from the ground.

This height and shape is easily secured by what is termed, shortening in, pruning. For this purpose pruning shears are much better than the knife. The fruit is borne only on wood of the last year's growth, and consequently another great object always to be kept in view, in pruning the peach, is to keep each part of the tree furnished with an equally distributed number of bearing shoots. Take a yearling tree in the spring, and cut it back to within two or three feet of the ground. Below this cut a number of shoots will spring, of which three (or at the most four) are to be allowed to grow to form the main branches. *All other shoots* appearing during the season *must be rubbed off*. The next spring these three shoots should be cut back about half their length. From the shoots that will soon appear upon these shoots select two or three, and rub off all others from both stem and branches. This process is to be continued every year, by cutting off at least half the growth of the preceding year. Prune just beyond a bud as directed on page 532. The fourth year, and often the third, trees thus treated will

begin to bear. They should, however, be allowed to ripen only a few specimens the first year the fruit sets, and at least one-half the fruit should be thinned from even moderately bearing trees. If a tree will ripen two hundred peaches it will surely PERFECT one hundred. One hundred large perfect peaches will bring in the market double the price of two hundred small ones.

A cultivator of eight acres of peaches employs ten to fifteen men from eight to ten days picking off the fruit, when about the size of a filbert, and gets two dollars a bushel for his peaches, more readily than his neighbors get fifty cents for the same varieties.

Fig. 122 shows the proper shape for the peach; and it is astonishing what a hardy, thrifty, productive, and longlived fruit it becomes under this system of pruning, which is accomplished with great rapidity with sharp shears and a little fruit ladder on the principle of *Fig. 131*. We have thoroughly pruned a dozen large six years old trees in less than an hour, and are sure that we could prune a hundred average trees a day. Can any intelligent man hesitate to adopt such a system, when so much can be gained by so small yearly outlay.

Old trees whose vigor has been checked by borers at the roots should be searched in the spring, and the worms destroyed.

Says the author of "Ten Acres Enough:" "Ten well grown bearing trees which I found in the garden were harboring one hundred and ninety worms among them when I undertook the work of extermination. I bared the collar and roots of each tree as far as I could track a worm, and cut him out. I then scrubbed the whole exposed part with soapsuds and a regular scrubbing-brush; after which I let them remain exposed for a week. If any worms had been overlooked the chips thrown out by their operations would be plainly visible on the clean surface at the

week's end. Having tracked and cut them out also, I felt sure the enemy was exterminated, and covered up the roots, but first using a swab of common tar, applying it all around the collar, and some distance up."

These trees were also trimmed, and for years have produced generous crops of luscious fruit. The same operation on nursery trees, when transplanted, will deter the worms from taking possession of the tree. Swab the stem from where the roots branch out for about twelve inches up the stem.

Prevent the borers from getting in, and if they are already in, make all haste to get them out.

Varieties of Peaches adapted to the latitude of the Northern New England States, Northern New York, etc. : *

BERGEN'S YELLOW.....	F. Y. M.	GEORGE IV.....	F. W. E.
CAMBRIDGE BELLE.....	F. W. M.	GROSSE MIGNONNE.....	F. W. E.
COOLEIDGE'S FAVORITE..	F. W. E.	LARGE EARLY YORK....	F. W. E.
CRAWFORD'S EARLY.....	F. Y. E.	MORRIS WHITE.....	F. W. M.
CRAWFORD'S LATE.....	F. Y. L.	OLD MIXON FREE.....	F. W. L.
EARLY YORK.....	F. W. V. E.	OLD MIXON CLING.....	C. W. L.

Varieties of the Peach adapted to Southern New England States, Southern New York, New Jersey, etc. :

BARRINGTON.....	F. W. E.	DRUID HILL.....	F. W. L.
BELLEGRADE.....	F. W. M.	EARLY NEWINGTON.....	F. W. E.
COLE'S EARLY RED.....	F. W. E.	EARLY YORK.....	F. W. V. E.
COOLEIDGE'S FAVORITE..	F. W. E.	GEORGE IV.....	F. W. E.
CRAWFORD'S EARLY.....	F. Y. E.	GROSS MIGNONNE.....	F. W. E.
CRAWFORD'S LATE.....	F. Y. L.	HEATH CLING.....	C. W. L.

* ABBREVIATIONS. F. Freestone. C. Clingstone. V. E. Very early. E. Early, or previous to September. M. Medium, or previous to September 15th. L. Late. V. L. Very late. W. White flesh. Y. Yellow or yellowish.

LARGE EARLY YORK....F. W. E.	OLD MIXON FREE.....F. W. L.
MORRIS WHITE.....F. W. M.	RODMAN'S CLING....C. W. V. L.
NOBLESSE.....F. W. M.	ROYAL GEORGE.....F. W. E.

For Pennsylvania add:

TROTH'S EARLY RED....F. W. E.	WARD'S LATE FREE..F. W. V. L.
MOLDEN WHITE.....F. W. L.	RED RARERIPE.....F. W. M.

For Kentucky, Virginia, Maryland, Delaware, etc.:

COLE'S EARLY RED....F. W. E.	RODMAN'S CLING....C. W. V. L.
CRAWFORD'S EARLY.....F. Y. E.	SCOTT'S NONPAREIL.....F. Y. L.
DRUID HILL.....F. W. E.	TROTH'S EARLY.....F. Y. E.
COOLEGE'S FAVORITE...F. W. E.	GEORGE IV.....F. W. E.
CRAWFORD'S LATE.....F. Y. E.	GROSSE MIGNONNE.....F. W. E.
EARLY TILLOTTSON...F. W. V. E.	HALE'S EARLY.....F. W. E.
EARLY YORK.....F. W. V. E.	KENRICK'S HEATH...F. W. V. L.
GRAND ADMIRABLE.....C. W. L.	LARGE WHITE CLING...C. W. M.
HAINES' EARLY.....F. W. E.	MORRIS WHITE.....F. W. M.
HEATH CLING.....C. W. L.	OLD MIXON CLING.....C. W. L.
LARGE EARLY YORK....F. W. E.	ROYAL GEORGE.....F. W. E.
LATE RED RARERIPE...F. W. M.	SMOCK FREESTONE.....F. Y. L.
OLD MIXON FREE.....F. W. L.	YELLOW RARERIPE.....F. Y. M.

For Ohio, Indiana, Illinois, etc.:

BARNARD.....F. Y. M.	CRAWFORD'S EARLY.....F. Y. E.
COOLEGE'S FAVORITE...F. W. E.	EARLY TILLOTTSON...F. W. V. E.
CRAWFORD'S LATE.....F. Y. L.	GEORGE IV.....F. W. E.
EARLY YORK.....F. W. V. E.	GROSSE MIGNONNE.....E. W. E.
GRAND ADMIRABLE.....C. W. L.	LARGE EARLY YORK....F. W. E.
HEATH CLING.....C. W. L.	LEOPOLD CLINGSTONE...
LEMON CLINGSTONE.....C. Y. L.	MORRIS WHITE.....F. W. M.
MALTA.....F. W. M.	OLD MIXON FREE.....F. W. L.
COLE'S EARLY RED....F. W. E.	RODMAN'S CLING....C. W. V. L.

TROTH'S EARLY.....F. W. E.	SMOCK FREESTONE.....F. Y. L.
YELLOW RARERIPE.....F. Y. M.	WARD'S LATE FREE..F. M. V. L.
OLD MIXON CLING.....C. W. L..	

For the Southern States:

BEST EIGHT VARIETIES.

CHINESE CLING.....F. W. V. E.	BOUGH.....F. W. L.
EARLY TILLOTTSON...F. W. V. E.	HEATH CLING.....C. W. L.
LA GRANGE.....F. W. V. L.	LARGE EARLY YORK...F. W. E.
STUMP THE WORLD.....F. W. L.	SERRATE ISPAHAN.....

SECOND BEST.

EARLY CHELMSFORD....F. W. E.	CRAWFORD'S EARLY.....F. Y. E.
CRAWFORD'S LATE.....F. Y. L.	HARKER'S SEEDLING
ROYAL GEORGE.....F. W. E.	GEORGIA CLING.....
HORTON'S DELICIOUS....C. W. L.	LARGE WHITE CLING...C. W. M.
LATE ADMIRABLE.....F. W. L.	MONTGOMERY LATE....F. W. E.
FAY'S EARLY ANN...F. W. V. E.	

The American Pomological Society have approved the following varieties, in the order named:

- | | |
|-----------------------|--------------------|
| CRAWFORD'S EARLY, | SMOCK FREESTONE, |
| CRAWFORD'S LATE, | COLE'S EARLY RED, |
| OLD MIXON FREE, | HAINES' EARLY RED, |
| LARGE EARLY YORK, | LEMON CLING, |
| MORRIS WHITE, | BARNARD, |
| GEORGE IV., | JACQUES, |
| COOLEIDGE'S FAVORITE, | RODMAN'S CLING, |
| EARLY YORK, | STUMP THE WORLD, |
| HEATH CLING, | YELLOW RARERIPE, |
| GROSSE MIGNONNE, | BERGEN'S YELLOW, |
| OLD MIXON CLING, | COLUMBIA, |
| TROTH'S EARLY, | DRUID HILL, |
| STURTEVANT, | GRAND ADMIRABLE, |
| WARD'S LATE. | HALL'S EARLY, |

KENRICK'S HEATH,	BELLEGARDE,
LATE RED RARERIFE,	EARLY TILLOTTSON,
SCOTT'S NONPAREIL,	HILL'S MADEIRA,
TIPPECANOE CLING,	LARGE WHITE CLING,
YELLOW ALBERGE,	MALTA,
VAN ZANDT'S PERFECT,	ROYAL GEORGE.

(We give representations of Crawford's Early and Early York in our colored Fruit Plate.)

Surely, from such a list as the above, every mouth should be supplied with this delicious fruit.

The PLUM is propagated by budding the choice varieties on the common wild *Canada Plum* or the blue *Horse Plum*. Two French plums, the *St. Julien* and *Myrobolan*, are also used for stocks. A strong, rich, clayey loam is the best soil for the plum,—a porous or sandy soil harboring so many insect enemies. The same rules of careful planting and after cultivation apply to the plum as to the pear. The plum should be budded in August or September. It is a vigorous grower, and each year's shoots should be cut back one-half at the spring pruning, or else should be pinched back through the summer. It bears its fruit on spurs on wood two years old or more, which spurs should be cut back, after the fruit is gathered.

The best plums for general cultivation are: Washington, Coe's Golden Drop, Green Gage, Imperial Gage, Lombard, Smith's Orleans, Prince's Yellow Gage, Jefferson, Bradshaw, Lawrence Gage, and McLaughlin. Several other varieties are successfully grown in New York State, as the Columbia, Damsen, Duane's Purple, (also successful in New Jersey and Ohio,) Huling's Superb, Monroe, Peach Plum, and White Magnum Bonum or Egg Plum.

The Imperial Gage Plum is represented in our colored plate.

The CHERRY is budded on the Mazzard Cherry for a stock, for about two weeks after midsummer, and is a doubtful operation, if performed at any other time. The fruit grows on spurs, like the plum, and the tree requires no pruning, save to shape the head. The following is a select list of cherries, in the order of their ripening, the first being about the tenth of June, and the last about the first of August :

EARLY PURPLE GUIGNE,	EARLY RICHMOND,
BELLE D'ORLEANS,	ELTON,
GOVERNOR WOOD,	BLACK EAGLE,
COE'S TRANSPARENT,	YELLOW SPANISH,
BLACK TARTARIAN,	DORMER'S LATE,
MAYDUKE,	BELLE MAGNIFIQUE.
ROCKPORT.	

The APRICOT is budded on its own and on peach and plum stocks. The plum is preferred, and is best adapted to heavy soils. The soil should be deep and dry ; the situation should be on the north or west side of a wall fence or building. It is a delicious fruit, that ripens at least a month earlier than the best early peaches, and deserves to be much more generally cultivated. All directions given for planting and pruning the peach apply to this fruit. The best are, the Breda, Early Golden, Moore Park, Peach, Large Early, Red Masculine, (the latter valuable only for its earliness,) and the Golden Nectarine, represented in our colored fruit plate.

CHAPTER XVI.

DISEASES AND INSECTS INJURIOUS TO FRUIT.

THE DISEASES OF FRUIT TREES are mostly the result of either neglect in cultivation or the ravages of insects. A thrifty, strong, growing tree is but little liable to disease. Thorough drainage, deep cultivation, and such manuring as is given to other crops will prevent nine-tenths of the diseases of the fruit tree.

The BLIGHT of the pear, apple, and quince has not been traced to its cause; but the remedy is to cut off at once all diseased parts and burn them. This blight spreads rapidly, and it is economy even to cut off the whole head of several valuable trees, rather than incur the loss of the whole orchard. STAGNATION OF THE SAP is mostly caused by barrenness of the soil and water at the roots; the remedies are therefore underdraining and manuring. WINTER KILLING is the result of the exposure of the stem to the sun. A few warm days in the latter part of the winter starts the sap and the buds, and the succeeding cold weather freezes both. A northern exposure is therefore the best for such fruits. The shorter the stem the less liable is the tree to this mishap. WARTS on the plum and cherry should be cut off and burned as soon as they are discovered, and the wound covered with the preparation of shellac before recommended. The MILDEW will not appear on the peach in a deep dry soil, if they are well mulched, manured, and cultivated

as recommended. Stone fruits are liable to become gummed, which is a troublesome and destructive complaint. When any large limbs are pruned from these trees the wound should be covered with shellac. In the cherry it is often the result of tight bark, and a longitudinal cut in the smooth bark will remedy it. All the diseased parts should be scraped off and the place covered with shellac. The **YELLOW** IN THE PEACH is usually the result of neglect in cultivation. Trees affected with it should be immediately destroyed, and the balance manured and cultivated.

Nearly all other diseases of fruit trees are caused by insects, the study of whose characters and habits is one of the most interesting in which we have ever engaged. The limits of this book will only allow us to describe those most destructive, and give plain practical directions for their destruction. We do not give the hard scientific names, which, though of utmost importance to the naturalist, only confuse the practical farmer.

The **BORER** is common to most varieties of fruit. The eggs from which they are hatched are laid by a moth or beetle,* in the tender bark just above the surface of the ground, commencing about the last of June. The eggs speedily hatch, and the worm remains for a long time just under the surface of the bark, and then eats its way through and through the wood. The remedies are three in number, and should *all be used*, if complete success is desired. It is of the utmost consequence to destroy as many as possible of the original insect that lays the egg. This is done by building fires in the orchard in the early evenings in June. These insects, as also the caterpillar, moth, and many others injurious to vegetation, fly abroad at this time,

* The apple tree borer by a striped beetle and the peach borer by a wasp-like moth.

are attracted by the blaze, and fall easy victims. The old bark should be scraped off in the spring for twelve inches above the ground and two inches under, and if there are borers in the tree their holes will be discernible. Run a needle or a wire into these holes and destroy their occupant. Swab this portion of the stem with tar, or wash it thoroughly with strong soapsuds. Burn the old bark scraped off. Put a peck or two of lime or ashes around the stem of the tree in May, and keep it there until October, when it should be distributed under the tree.

The TENT CATERPILLAR is a terrible foe to our apple orchards. The eggs from which they are hatched are laid in rings around small branches, mostly in July, by a reddish brown moth. Each ring consists of three or four hundred eggs. They are hatched with the unfolding of the leaf the next spring. They immediately begin to form a web or tent (whence their name) and to forage on the young leaves. They do not leave their nests until about nine o'clock in the morning, again at noon, and just before night. They increase rapidly in size, and if neglected devour every green thing within their reach. The first thing to be done is to have every wild cherry tree cut down and burned; as this is the original chosen home and breeding place of this caterpillar. Then this little circle of eggs should be sought for at the time of fall or spring pruning, scraped off, and burned. If any escape this cleaning, as soon as their webs begin to show upon the tree, if where they can be reached, strip them off at once with the gloved hand, and crush them under foot or burn them. With a long handled mop soaked in strong soapsuds wet the nests that are out of reach of the hand.

The mop should be thrust into the nest, breaking it open the soapsuds will kill every worm it touches. This operation is best performed in the morning, before the caterpillars leave their nest, and should be repeated every few days until no more

appear. Lastly, thousands of the moths, and thus hundreds of thousands of eggs, can be destroyed by building fires in the orchards as before recommended. Not only use these preventive means yourself, but urge the same upon all your neighbors.

The CANKER WORM is by many confounded with the tent caterpillar, but is of a different habit, and requires different preventive measures. The female moth of this species is wingless. They begin to come out of the ground early in the spring, and crawling to the nearest tree deposit their eggs upon the branches, and then die. The eggs hatch about May first to fifteenth, and the worm immediately commences its ravages, which are often fearful. When they attain their full growth they are about an inch in length, from whence they are often called inch worms. They attain their growth in about four weeks, when they drop or crawl to the ground and descend into it until another season. To prevent these operations is more difficult than with the caterpillar, but an application of melted rubber around the trunk will prevent most of the females from ascending the tree. A band of grafting clay about the trunk and covered with tar will answer the same purpose. The orchard infested with canker worms should be plowed up in the fall, and the pigs and poultry turned into it. BARK LICE are often found on young trees in great quantities; they should be washed off with a strong solution of soapsuds. If found on old trees, the old dead bark should be all scraped off and soapsuds scrubbed into every crack and crevice with a brush, as high up as you can reach.

The APPLE WORM is hatched by a small gray-winged moth, which appears in great numbers the first warm evenings in June, and lays its eggs in the blossom end of the fruit, where soon hatches the little grub which eats its way into and spoils the apple, causing it to fall prematurely to the ground. Soon after

it falls the worm makes its escape, either into the ground or under the bark of the tree, until the following spring, when the young moth again emerges. It will be readily seen that the first thing to be done is to destroy as many as possible of these moths, by building fires in the orchard at the time of their appearance. When convenient, turn the pigs and poultry into the orchard as soon as the apples begin to fall, or pick up the fallen fruit every day, and feed it to the hogs, or burn it. Thus the worms are destroyed before they leave the fruit. An old cloth placed in the crotch of the tree when the fruit is falling will attract many of the worms, and they can be readily destroyed.

The old bark should be scraped off every spring, until you are rid of all worms at least. Pear trees are subject to several insects of the bark, which must be removed by scrubbing with a stiff brush and a solution of potash, one pound to two gallons of water, or whale-oil soap, one pound to three gallons of water; these washes should not be applied so strong when the tree is in full foliage, and may be made stronger after the fall of the leaf.

The SLUG is another enemy of both the pear and cherry. It resembles the snail, and eats the leaf. Soapsuds or strong tobacco water will destroy him.

The CURCULIO is the great enemy of the plum species, and often attacks other fruits. It is a small brown insect, which makes a crescent shaped incision in the fruit, and in it deposits its eggs. This is done mostly in May and June. The grub is soon hatched, and eats its way to the stone, when the fruit drops from the tree, and the grub escapes into the ground. These troublesome little insects appropriate to themselves whole orchards of fruit, first the apricot, plum and cherry, then the apple, pear, peach, and other fruits. The apricot and plum being first attacked, the work of destruction must commence here. When the Curculio first makes its appearance in

numbers, place a sheet on the ground under the tree, and strike the trunk with a wooden mallet, (cover the head with cloth so as not to bruise the bark,) and they will fall, all curled up, and apparently lifeless, when they can easily be collected and destroyed. Repeat this every morning for a week. When the fruit begins to fall gather it up every day and destroy it, or let the pigs do it for you.* On account of the curculio, the soil for the plum should be heavy clay, and never cultivated; the harder the ground under the tree the less chance is there for the burrowing and hatching of the grub. Paving under the trees or a coating of mortar prevents this.

In all this work of destroying our insect enemies we are aided by the numerous birds of the orchard and the garden. They should therefore be encouraged in every possible way to take up their abodes with us. The English Sparrows are to be especially recommended for this purpose. If every farmer would place one or more pairs of these little friends in his orchard, they and their rapidly increasing progeny would soon save many dollars worth of fruit from the insect destroyer. Their wanton destruction by thoughtless men or boys is not only cruel, but costly.

*A careful fruit grower informs us that he drives a spike into the tree just under the largest branch, and strikes the spike when he wishes to jar the tree.

CHAPTER XVII.

GRAPE CULTURE AND WINE MAKING.

THE CORNER STONES OF GRAPE CULTURE are underdraining, deep and thorough preparation of the soil, horizontal training, and renewal pruning. Underdraining has been already fully described. The subsequent operations are treated of in this Chapter.

VINEYARD CULTURE. The SOIL in which the grape will not grow is hardly to be found. Limestone soils are best, as they need the least preparation. A loose, friable soil, whether it be sand, gravel, or loam, is rather to be chosen, than clay or muck, although even these may be reclaimed. The SITUATION should be one protected from the north winds. This may be secured by planting on the southern, eastern, or southeastern slope of a hill; or, if this cannot be secured, a belt of woods at the north will answer the purpose; but where neither of these can be had, a belt of evergreens should be planted across the northern end of the vineyard, at least thirty feet from where the vines are to stand. The valley of a small stream is unfavorable, while the valley of a large stream, or the vicinity of a large body of water, is desirable. Whatever the situation, the soil must be made perfectly dry and open by underdraining.

The PREPARATION OF THE SOIL is a matter of the utmost importance, and it should be borne in mind that this is not an ordinary crop, and does not require an annual preparation, but

it is one that requires but one planting in a lifetime, while it will reward us with annual harvests. Many of the new soils in our Western States need no manures; but a soil not naturally adapted to the grape, or partially exhausted, will need various additions. If the soil is not surcharged with lime a liberal dressing of it will always be beneficial. When the soil is sandy or gravelly, it will require an abundant dressing of barnyard manure, muck, leaf mould, or the plowing under of green crops. Muck and leaf mould are especially valuable on such soils, and thousands of acres of almost barren, sandy soils, in the Eastern States, by the application of leaf mould from the adjoining forest or muck from the neighboring swamp, might be made to bear most luxuriant and profitable crops of the grape. Such soils, thus amended, are easily worked, are already underdrained, and produce the richest quality of fruit. Whatever the soil, it should be plowed and subsoiled to the depth of twenty inches, and manured with a compost of peat or muck and leaf mould, with old well rotted stable manure. This compost should be made several months before it is applied, and thoroughly forked over frequently before using. Ashes, lime, bones, or charcoal will always prove a valuable addition. A few soils will do without any application but a top dressing of lime, harrowed in; others will require a light dressing of fifty loads to the acre, and from this up to two or three hundred loads. Where the barnyard manure cannot be obtained, the compost may be made without it, adding lime ashes and a bushel of salt to every ten loads. This compost should stand at least six months, and be frequently forked over. Whichever compost is used, it should be applied after the plowing and subsoiling, and cross plowed in, then harrowed and cross harrowed, as complete pulverization is of the utmost importance to the young vines. "Will all this pay?" We

answer that there can be no doubt but that it will pay most abundantly. After the preparation of the soil and planting of the vine, the expense of culture is small, while the crops continue and increase.

PROPAGATION FROM SEEDS AND LAYERS, BUT PRINCIPALLY FROM CUTTINGS. The seeds are cleaned and sown exactly as described for the pear. This process is not common, but is both interesting and profitable. GRAPE VINES are usually bought of the nurseryman, but for several reasons we recommend the raising each man of his own. Of course, the first vines must be procured from some other source. Select two or three varieties which you wish to cultivate, and order two or three vines of each kind. Prepare a border three feet deep with leaf mould, etc. Set the vines as described elsewhere. (See *Fig. 123.*) Only one shoot should be allowed to grow the first season; all others must be rubbed off. Train this cane to an upright stake six or eight feet high. It is not best to let it grow higher than this; pinch off the top if it does. In the autumn cut it down to four buds, and in the extreme north protect the vine with straw through the winter. Two of the buds only should be allowed to grow in the spring. If any fruit clusters appear, pinch them off; also all laterals above the first leaf and all tendrils: the object is strong wood. Pinch the tops as before, if they grow above the stake. In the autumn one of these canes should be again cut down to two buds, and the other about one-third its length; if the cane is six feet this will leave four feet. If it is desirable to protect the vine, it can be bent down and covered with straw or earth. These four feet canes we intend for *layering*, and the wood cut off for *cuttings*. The length of wood cut from these ten vines, supposing the canes to have been only six feet long, will be forty feet, which will make from one hundred to one hundred and

twenty cuttings. Each cutting should have at least two buds. (*See Fig. 123.*) The cuttings will be from four to six inches in length. These cuttings should be packed in boxes in moist sand or damp moss, and buried out of reach of frost, or put in the cellar. In the South they may be set out in the fall, and we have set them out in Massachusetts in the fall, and protected them until spring with heavy coatings of manure and mulch; but the safest way, as far north as this, is to pack them away until spring. The cutting bed should be prepared early in the fall. Supposing we have one hundred cuttings, we want a bed two rods long and four feet wide. This should be trenched two feet deep and the compost worked in to the depth of eighteen inches. Six inches of the compost with two pecks of ashes will make a good bed. In all these applications leaf mould is especially valuable. The trenches for the cuttings should be a little deeper than the length of the cutting and nearly perpendicular on one side. (*See Fig. 123.*) The cuttings should be placed from three to four inches apart in the trench, and the trenches two feet apart. *Fig. 123* shows the position of the cutting when set. The top of the bud, however, should be about one inch below the level of the surface. The earth should be pressed carefully, but closely, about the cutting at the bottom, and more loosely about the upper bud, which should be just covered. This will leave the trench an inch lower than the surface. After the bud has made a shoot of two or three inches the trench may be filled, covering the bud one inch and mulching the ground on each side the rows. These cuttings will make a growth of from three to six feet, and should be kept tied to stakes to help the ripening of the wood. In the autumn they should be transplanted, but not yet to the vineyard. (*See Transplanting.*)

The third method of propagation is by layers. We left a cane

four feet long on each of our original ten vines, for LAYERING. This is the most certain method in use, although the number of plants obtained is not so large. We would say here that unless the vine makes a very vigorous growth, it is better to delay layering until the third season, cutting *both* canes back to two buds instead of one, as recommended above. When, however, it is decided to layer the vine, uncover it, if covered, as soon as the frosts are passed, and when the buds get well started dig a trench from the vine six inches wide, from four to six inches deep, and long enough to receive the cane, which should be bent down to the bottom of the trench, and fastened there by hooked pegs or flat stones. The vine should lie flat in the bottom of the trench. (*Fig. 124.*) Let it remain until the shoots have grown three or four inches, then rub off those not wanted. Four shoots for a four feet vine is a good rule to follow in this selection. Drive down a stake by the side of each and draw an inch of soil into the trench. In ten days or a fortnight a little more dirt can be drawn in, and so on, until the whole trench is filled. Never fill the trench when the vine is layered in the spring, as it will be likely to cause rot. Each of the shoots should be trained to a stake, and no one cane allowed to take too much of the sap. If one shoot gets the start of the others it must be pinched off. Hoe the ground frequently through the summer, or else mulch it to keep down the weeds, and absorb the moisture. The other cane that was cut down to two buds should be allowed to produce two or three shoots only, and all laterals, tendrils, and fruit clusters taken off, unless you wish to perfect a few bunches to test their quality, when only two shoots should be allowed to grow, and a single bunch of fruit allowed to mature on each one. It is not best to make layers and take fruit from the same plant.

Layers can be taken from the parent vine in the fall or the

following spring. Remember in taking up and cutting the layers that the roots should be towards the parent vine, so that the sap will not have to go backwards. The further treatment of these layers will be treated in remarks on transplanting. This same process of cutting down one cane and layering another can be carried on so long as vines are wanted, provided that every year the plant makes a vigorous growth of wood, but if it does not it should have a year of rest. It is now three years since we planted the original ten vines, and we have at least one hundred and fifty vines ready for transplanting. Not only will you have better plants, and at a less cost, than when procured from a nursery, but you will have practical experience of the habits of the vine that will be of value to you in future cultivation.

TRANSPLANTING should be done in the autumn, after the fall of the leaf, except with tender varieties and extreme northern latitudes.

The vines, whether layers or cuttings, should be taken up very carefully with a spading fork, preserving all the roots if possible. These roots can then be cut carefully and evenly. A small portion of the roots, if well covered with fine fibrous rootlets, will answer the purposes of the plant. If transplanted in the spring the stem cane should be cut down to two buds, if in the fall four should be left from which to select two in the spring. Whether to be planted in the fall or no, it is better to take up the plants, and cut back the head and roots in the fall, which is also much the best time to get plants from the nursery. These plants should be heeled in for the winter, which consists in covering the roots and most of the stem with mellow earth and straw to protect from frost. In transplanting, the roots should be left exposed to the air as little as possible.

The trench should be dug before the vines are taken up.

This trench should be eighteen inches wide, three deep on one side and five on the other, and the vines set in it, as in *Fig. 125*, three feet apart. The benefit of this transplanting to the nursery a year before the final transplanting to the vineyard will be great and lasting. The soil in the nursery should be prepared just as directed for the cutting bed. Well grown layers may sometimes be transplanted at once to the vineyard, but will be permanently benefited by a second transplanting. They should during this season in the nursery be trained to upright stakes, and all laterals and tendrils pinched off. And as we shall have occasion to speak often of laterals and tendrils we will explain what we mean. A lateral is a small branch which grows from the axel or arm pit of the leaf, close between the leaf and the stem of the vine. It will not do to take it out wholly, but when it has made two or three leaves pinch off all but one; if it starts again, pinch again, leaving one more leaf. A tendril is a curling stem which grows opposite a bud or leaf, without fruiting, and should be cut off.

After standing one season in the nursery comes their final transplanting to the vineyard. We speak of the cutting bed nursery and vineyard, as of three separate places, but the two former may well be in a corner of the latter. The holes for the plants should be dug before they are removed. The rows should run east and west six feet apart, and the plants four feet apart in the rows. If in after years these should be found too close, an arm can be cut off to give the desired room. If the roots upon the vines when taken from the nursery are circular, as is usually the case with cuttings, the holes should be circular, six inches deep at the edges, and two or three deep in the centre. If the roots are all on one side, as is often the case with layers, the square hole will accommodate them, the tips of the roots being placed lower than the base. (*Figs. 125 and 126.*)

The same rules for cutting back roots and cane apply here as before. The soil should be pressed closely about the roots and protected from the frost by straw. Unless the trellis is set before planting, a stout stake eight feet long should be driven firmly into each hole before the vines are set. The roots should be carefully spread out before covering them. In fall planting a little mound should be raised about the stem to protect the lower buds; in spring planting this is reversed, and a hollow left about the stem, to collect the rains, which should be filled, and the ground mulched as soon as the vine gets well started into growth.

Five years have now passed since the purchase of the first vines. Let us review them. The first year we grew a single cane on each vine, which when cut afforded us say thirty cuttings. The second we grew these thirty cuttings, also twenty canes on the ten vines, which made us say one hundred cuttings. The third year we transplanted the thirty cuttings to the nursery, grew one hundred more cuttings and forty plants by layering, and made, if we saved the wood cut from all the vines at transplanting, over six hundred cuttings; the fourth year we transplanted one hundred and forty plants to the nursery, and grew the six hundred cuttings. At the end of the fifth year we have eight hundred plants in the vineyard, (one hundred and seventy of them having been there a year, and borne a sample cluster of fruit each,) an indefinite number of plants in the nursery, and several thousands in the cutting bed, if we made all the pruned wood into cuttings. It may be well to do this, for grape growing is contagious, and some of your neighbors will by this time have the fever, and you can supply them with better plants at a less price than the nurseryman. Encourage all your neighbors to go into it and give them such advice as you can, for the business cannot be overdone, and the more

there are raised in a given locality the more readily will you find a market for them. Purchasers will come where the goods are.

PRUNING AND TRAINING. Pruning commences as soon as the vine begins to grow, for the pinching off of the laterals, tops, tendrils, buds, or shoots is pruning. But pruning for the purposes of *training*, only commences with the second year of the vine in the vineyard. We shall give three methods of pruning and training the vine, in the order in which we value them. The best system we have ever seen is the horizontal arm training. The *first year* in the vineyard the vine is only allowed to grow one upright cane, which is cut back in the fall to four buds, two of which are allowed to grow the second year. In both cases they should be kept tied to a stake and all laterals, tendrils, etc., pinched as before directed. A single cluster of fruit may be allowed to grow on each strong cane the second year, as a sample of what may be expected in abundance by and by. If the cane makes a strong, vigorous growth of from six to ten feet, cut each cane back to four feet, and bend the ends down to the ground on opposite sides of the stock and fasten them with hooked pegs. The **TRELLIS** should now be built, if not already done. If done before planting the vines, it obviates the use of the stake and is ready whenever wanted. The best form of trellis is that with upright instead of horizontal wires. A ten or twelve foot post is set in the ground between the vines, which for this purpose should be eight feet apart in the rows. Cross bars are nailed across, one twelve to fourteen inches from the ground and the other at the top, say six to eight feet from the ground. When the vine is taken up in the spring, stretch the arms along the lower bar and make a mark on the bar where each shoot is to grow; drive a nail into the bar at the mark and one into the upper bar directly above

it, and stretch number sixteen galvanized wire between the two points. This trellis is cheaper and better than the horizontal wire trellis commonly used. Cheaper, because number sixteen wire can be used instead of number ten, which gives one hundred feet to the pound, while number ten gives only twenty feet to the pound. Better, because the wires are just where you want them to train the shoots to. When the vine is taken up in the spring, fasten the two arms along the lower bar and select three or four buds on the upper side of each arm. If the vines have grown strong, the buds will be from four to six inches apart, in which case nearly all the buds on the upper side will be left; all others should be rubbed off. Where there is a bud missing on the upper side an under bud may be trained up to fill its place. As soon as these shoots get long enough they should be tied to the wires. Each one of these upright canes will usually set a few bunches of fruit. If the vine is very strong and vigorous, each may be allowed to bear three or four bunches. When these upright canes have grown about two feet, they should be stopped, by pinching off their ends, say from two to four leaves beyond the last bunch of fruit; they will soon start again, and after a few inches growth should be stopped again. All the laterals should be pinched the same as on young vines. At the winter pruning, these canes are to be cut down to three buds, two of which are to be allowed to grow the next season. This is the sixth year from the cutting, and the fourth year of the vine in the vineyard, and one of the canes from each spur may be allowed to ripen all the fruit it will. The principle of pruning now is to let one-half the vine bear one year and the other the next. From each spur on horizontal arms let two canes grow every year, and rub off all others as soon as they appear. The cane that bears this year should be cut clear away, and the other cut down to two buds.

Never let the same cane bear twice, nor let one cane grow taller than the others and rob them of their nourishment. (*Fig. 133 explained on page 604,*) represents this system of horizontal arm training and alternate renewal.

The OBJECTIONS urged against grape culture are, that the preparation of the ground is too expensive; the cost of the vines too great; the trellis too expensive; pruning too complicated; the life of the vines too uncertain; the time before the returns come in too long; and the market too uncertain. Every one of these objections arises from an entire misapprehension. The grape does not require large quantities of barnyard manure or fertilizers; if it did it would pay to give it all it required to the amount of one thousand dollars per acre; but its wants are very simple, being confined to a little lime, and plenty of leaf mould and muck, which can usually be had for the drawing. Can it possibly cost over one dollar per load? Allow one hundred loads to the acre, and you have a cost of one hundred dollars. Add to this the cost of plowing, subsoiling, cross-plowing after the manure is put on, harrowing and cross-harrowing, and you have an acre prepared for a crop that will bear for fifty years.

We say nothing about underdraining, because a soil that is too wet should be underdrained, whatever crop you put on it. Again, tens of thousands of acres in every Eastern State which are almost worthless for any other crop, if prepared in this way will at once increase in value tenfold, and will make returns in grapes that will astonish their owners.

The cost of plants is a heavy item when they are bought at the nursery, but, by the plan we have recommended, from ten vines you can in four years raise all the plants you will want for an acre, and sell cuttings enough to pay the whole expense. The demand for plants is immense and increasing, and must

increase for years to come. The grape fever is on the country, and nurserymen, to supply the demand, are using everything in the shape of grape wood to make plants from. They are no doubt doing the best they can under the circumstances, but even by their forcing they cannot begin to supply the demand, and we cannot blame them if they get their own prices. They *can* make better plants, and cheaper than you can, but they *will not do it* as long as they can get full prices for everything that has a root to it. You can manage to raise all the plants you need and make the cuttings pay the expense.

The trellis will be the next item of expense, but by the plan we have recommended you get a much better trellis for your money, than by the old plan of horizontal wires, which necessitated the use of number ten wire.

Six hundred posts to the acre will be the largest number you can possibly need, even for the moderate growing varieties, and ought to be had for sixty dollars. If the ends are tarred or charred before they are set, they will last a long time. Cedar posts are considered the best when they are to be obtained. This will necessitate twelve hundred cross bars an inch thick by two and a half or three inches wide, and eight feet long. In the Eastern States, where every farmer owns timber land, these can be got out with but little actual outlay. An acre trained and trellised as we have recommended will require three hundred pounds of wire, which at twenty cents per pound (the highest price we have ever paid) will cost sixty dollars. Use galvanized wire, as it lasts much longer than the common annealed wire.

Pruning is not complicated nor difficult, but as simple as the alphabet, and a boy may do the fall pruning of one hundred full grown vines in a day. Take, for example, a vine with two arms of five feet each, and five spurs on each arm, and two

canes to each spur, just twenty cuts with the pruning shears are required to prune this vine. We allow two minutes to each vine of this size, or thirty an hour. Cut away the cane that has borne the previous season, and cut the other down to three or four buds. The vines are free from leaves, and the place to cut is easily discerned. It is the summer pinching of the laterals, tendrils, and tops that requires the most trouble, but this is exceedingly simple, as we have already shown.

In a mild climate, pruning can be done at any time between the fall of the leaf and the starting of the sap; in the Middle States, either in the fall or spring, and only in the extreme Northern States must be delayed until February or March. Neither is the life of the vine uncertain, unless abused. There are many cases of vines on record that have borne for over one hundred years, and some that have borne for upwards of four hundred years. A selection of hardy varieties and winter protection, while young and tender, will secure fine crops of grapes, in our extreme Northern States, and nothing but the utmost negligence will produce the death of the vine, south of Pennsylvania, Michigan, and Iowa. Excessive bearing while young will so weaken the vine that it will be winter killed, north of these boundaries, and winter protection is a decided benefit south of them. A very simple method of protecting the vines, is to bend down the arms after the fall pruning, and shovel on earth enough to hold them down, then run the plow through and throw a furrow slice over them, going through again, and covering any that the plow has failed to cover. This is all work, but all crops require work, and this one will pay more abundantly for every care than almost any other. The time before the returns from actual sales of grapes come in, is longer than for ordinary crops, but the sales

of cuttings, if properly managed, will usually more than pay the expenses of cultivation, and the first full crop of grapes often pays the whole cost of preparation, trellises and all. We give below the yield of a vineyard within our knowledge, for ten years after planting.

1857. 2½ acres cuttings sold.....	\$240
1858. Cuttings planted for an additional 2½ acres, but valued at	400
1859. Cuttings planted to grow plants for sale. Grapes sold	468
1860. Plants sold.....	600
Grapes "	870
Wine "	344
1861. Plants "	500
Grapes "	1,120
1862. Plants "	660
Grapes "	704
Wine "	980
1863. Plants "	840
Grapes "	1,512
Wine "	730
1864. Plants "	300
Grapes "	412
1865. Plants " 5 acres in bearing.....	1,106
Grapes "	5,120
Wine "	3,500
1866. Plants "	1,100
Grapes "	600
Wine "	7,400
	<hr/>
For the ten years.....	\$29,506

or an average of nearly three thousand dollars per year, and fourteen thousand two hundred, or over seven thousand dollars per year, for the last two years, which yield may be safely calculated upon for years to come.

Mr. George Hussman, a large grape grower at Herman,

Missouri, has realized from two and a half acres the first five years after planting	\$23,305.80
The plants and trellis for the 2½ acres cost	1,277.00
Five years labor at \$500 per year	2,500.00
Interest on capital	500.00
	<hr/>
Leaving a clear profit of	\$19,028.80

for the first five years. This is a profit of over fifteen hundred dollars per year per acre. This is large, but we think, with the information we have given, any farmer can clear an average profit of one thousand dollars per acre from his grape crop.

The last objection, if a real one, would be fatal to the whole scheme. But it is the most absurd of the whole. There is market for one hundred pounds of grapes to every pound that is grown. Even the poorest varieties, picked before they are ripe, bring from fifteen to twenty-five cents per pound, and no one gets enough. As grapes are improved in quality, by the better systems of cultivation, and the introduction of better varieties, the old customers will increase their demands, and thousands of new ones will spring up on every side. Ten years ago, the acres of grapes in this country were not over four thousand, now they are as many million; but the demand has increased faster than the supply, and never was there such a pressure as now. At the same ratio of increase, ten years from to-day there will be four billion acres of grapes. If such an increase were possible or probable, we say that ten years from now the product of that number of acres would be as surely in demand as the present product; for if every citizen were glutted with fruit, we have still the wine to fall back upon, which we can make for home consumption, and even for export at immense profits. The amount paid for imported wines is enormous, and we can make a much better article at home

Our opinion is, that if pure grape wine could be made as plenty as whiskey, men would drink it instead, and thus the terrible evil of intemperance be very much lessened. We say to every one who has a square rod of ground, *plant a vine*.

A second system of training we will call the "Lakeview" system, as it is practised at "Lakeview," Ohio. The post is set before the vine is planted, and for the first two years the vine is trained to the post. Four canes are grown each year, after the first, only two being allowed to bear. The third year, slats are nailed from the top of each post to near the bottom of the next, say one foot from the ground, and the two canes not allowed to bear are trained on these, while the bearing canes are trained to the post. The cutting back is the same as in the other system; the two canes that have borne being cut out, and the two that are to be the bearing canes next year cut back to three or four buds. The advantages of this system are that vines are saved, and also the stakes on which in the other system the vines are trained the first two years. But we consider that it has too many disadvantages to come into common use, except as an expedient where capital is scarce. Still another, and the most slovenly and wasteful system that can well be contrived, is that of simply training each vine to a cedar stake. It involves the purchase or growing of three times as many vines, without a corresponding increase of fruit. The system of pruning is the same; two canes bearing each year. There may be an endless number of modifications of the first system, of some of which we shall speak in Garden Culture.

The cultivation of the grape in the vineyard consists in keeping the ground mellow and the weeds down. A cultivator should be run through the rows as often as once a fortnight, and the hoe used freely in stirring the earth and killing the weeds, where the cultivator will not reach. The soil should

not be worked when wet, nor so deeply near the vines as to cut the main roots. The best implement we have ever seen for killing the weeds is a hoe known as Allen's Weed Killer. (See cut elsewhere.) For stirring the soil about the stems, a pronged hoe is used. A good plan for plowing, and at the same time covering the vines, is to prune soon after the fall of the leaf, and then lay down the vines lengthwise of the trellis, and fasten them with a peg or stone. Pass down with the plow as near the vine as you can without cutting the roots, and throw a furrow slice over the vine, come back on the other side of the row, and cover the other vine; continue this until all the ground between the rows is plowed, leaving a trench in the middle. Go through and see that the vines were well covered. In the spring, begin at the trench, and turn the earth back and away from the vines. Manures should not be applied so long as the growth is vigorous, but as soon as it begins to decline apply more manure. A compost, such as we have previously described, should be on hand for use, and should be applied after the fall plowing. Ashes and lime in moderate quantities are always beneficial. If you once let your vines run down for lack of food, you can never recover your loss. The food they ask for is plenty and cheap, but they must have it. Bone dust, guano, etc., applied as a top dressing, will soonest reach the plant, but will not make good the lack of the compost. In an exceedingly poor soil, where it is not possible to secure at first, the requisite amount of compost at once, two quarts of bone dust and a shovel full of manure may be put at the root of each plant, and one cane allowed to grow; in the fall cut it back to two buds, and again allow only one cane to grow. If it makes a growth of ten feet, cut it back to four, and layer it as before described. When the young plants are a foot high, draw in an inch or two of soil, with a little more bone dust.

Four canes are allowed to grow from this four foot layer; they should be staked, and pinched as described for other plants, and no fruit allowed to grow the first year. Cut these canes back to three buds, and allow two canes to grow the next year, one of which may bear a few bunches of fruit; subsequent pruning is the same as described for horizontal arms. The reader will see that the object of this treatment is to get strong roots before allowing the plant to bear. More time, and double the number of plants are required to obtain the same amount of fruit, which will not be so good; it is only recommended therefore for very poor soils, where the compost cannot be secured to begin with.

GATHERING, packing, marketing, and keeping are important matters in grape culture. The grape will only ripen on the vine; and as the public taste becomes educated on this subject, they will insist on having ripe fruit. When ripe, the stem will shrivel, and soon the grape will begin to shrivel about the stem. The bloom on the grape is a token of its ripeness. In the descriptions of varieties we shall give the tokens of each variety. The grape will increase in weight, beauty, and flavor by being allowed to ripen perfectly on the vine, and, even if one or two weeks later in the market, will bring a higher price than the unripe grape. For wine, they should be left on as long as the frosts will permit. Nearly all the grapes now in cultivation color at least two weeks before they ripen.

When gathered it should be done as carefully as possible. They can be gathered quickest and best by means of scissors which hold them after they are cut. Cut the stems as long as possible and lay them in a shallow basket. They are packed for market in shallow boxes; the method being to cut out with small sharp scissors imperfect grapes, and spread the bunches out on a table. Turn the box bottom upwards, take off the

bottom, put in a sheet of thin white paper or a layer of grape leaves; pack in whole bunches of grapes, as closely as possible without jamming them or rubbing off the bloom; fill up the vacant places with parts of bunches, and, lastly, with single grapes, until the whole space is filled; then put on another layer of paper or leaves, and continue the layers until the box is filled.

The art of keeping grapes is just beginning to be understood in this country, and we are just learning what varieties will keep. For this purpose they must be thoroughly ripe, carefully gathered, all unripe, imperfect, or decayed berries picked out, spread out on a dry floor or shelves for a few days, and then packed in boxes, with paper between the layers. The bunches should not be allowed to touch each other. They should be put away in a cool room. The lids of the boxes may be left up a little, until it gets too cool. In this way some of our grapes may be kept until spring, when their greatly increased price will repay the trouble of preservation. A warm, damp atmosphere will spoil the grape, however carefully packed.

The GARDEN CULTURE of the grape requires some modifications of the foregoing rules, but in all its essential principles is the same. There are but few gardens in either city or country where there may not be found a sunny spot large enough to accommodate a few vines; and when the owner gets a grape that suits him, he can reproduce, modify, and cultivate to suit himself. The first requisite here, as before, is drainage. If it cannot be obtained by draining the garden or yard into a sewer, dig a trench with one end two feet deep and a gradual descent to the other end, into which should be thrown broken bricks, crockery, or stones, to facilitate the drainage. Fill this trench with a mixture of the original soil, old manure, leaves if pos-

sible, and charcoal. Often the only sunny spot is covered with a pavement; this is just the place for the vine. Dig your trench along the side of the walk, or even partly under it, plant your vines outside the walk, grow one good strong cane the first year, and in the fall carry it under the pavement to where it is wanted. The pavement will absorb quantities of heat, and also retain the moisture of the soil. A southern or eastern exposure is best here also; but a northern exposure, if at the side of a building which has the sun half the day, will answer well. Do not place the roots at any less distance than two feet from the building in any case; neither train the vine directly against the building, as it will injure both; there should be at least a foot of space between the trellis and the building, to allow a free circulation of air. The pruning is the same here as in the vineyard, one cane bearing this year and another next. The training may be done in a thousand forms, to suit the taste of the owner. The horizontal arms are to be preserved. In the vineyard we commence these arms at one foot from the ground; but they may be commenced at ten feet as well, only the process must be more gradual. The upright cane may be extended to ten feet in two years, and the two canes for arms grown the third year, the vine meanwhile being allowed to bear moderately, and all summer pinching to be faithfully attended to; or a single arm may be used, if the vine grows at a corner of the building or trellis, only observing that when the bearing canes are established the alternate pruning must be done, and no fruit allowed to grow below the arms. If fruit is wanted all the way from the ground to sixty feet high, it may be had, but a number of vines will be necessary. These can be planted, at least four feet apart, in different parts of the garden or yard, and the canes brought under ground, or under a pavement, to the point where they are wanted. Let the arms of one vine cover

the first three feet, another the second three, and so on until the space is covered. 41, *Fig.* 133 illustrates our meaning. These three vines are planted four feet apart. Two are not allowed to have any branches until they reach the second trellis; then they are trained with horizontal arms as before. For the third, fourth, and fifth trellis, if it is desirable to have vines so high up, they should be set four and eight feet from the trellis and brought underground to the point on the trellis where they are to run up. It is better to run them through tile pipe, to prevent their taking root all the way. If they should do so, the growth would be likely to be so vigorous as to defy all attempts at training. By this method four vines, covering a space twelve by sixteen feet, have borne an average of eight hundred bunches annually. The same method applies to arbor culture. Never attempt to cover the top and sides of a grape arbor from the same vine.

When there is room for neither trellis nor arbor, there may still be room to put down one or more stakes, to each of which a vine may be trained, and good results secured. Either the vine may be allowed to grow two canes the first year, and commence fruit bearing the second year, or the stem gradually heightened to eight or ten feet and side canes grown for fruit. In the former case, when the cane bears the second year, at the close of the first season one of the canes is cut to two buds for bearing next year, and the other cane cut entirely away, and vice versa the next year. In the other case, the single cane grown the first season is cut back to say three feet, (*Fig.* 132,) and the topmost bud allowed to grow the second season, all others being rubbed off; this cane is then cut back to within three feet of the former cut. We have now a cane six feet high: the two lowest buds, one on each side, are allowed to grow the third season, and one to bear fruit; these

FIG. 132

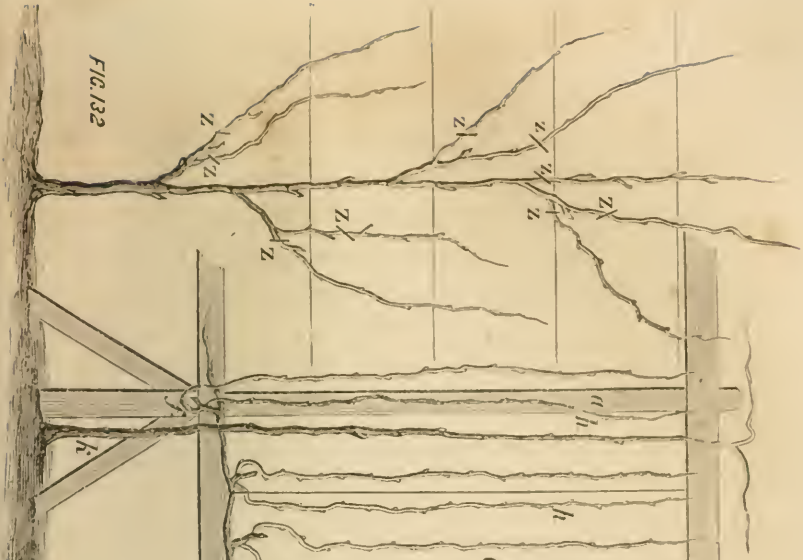


FIG. 133

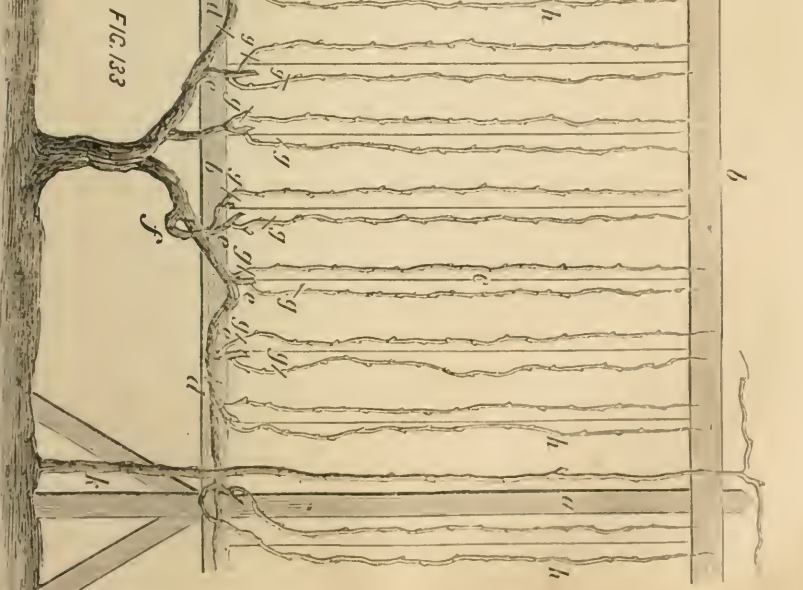
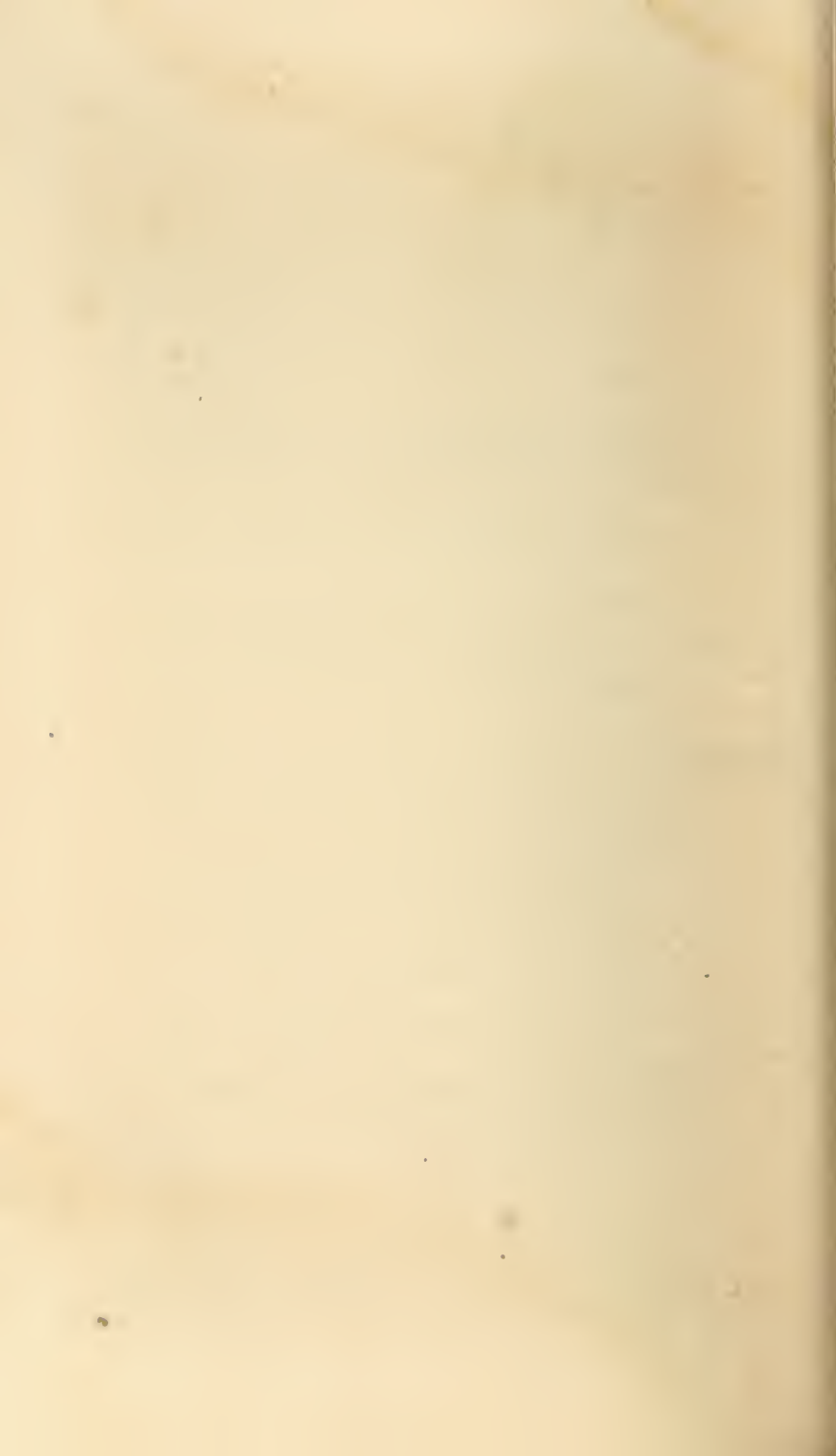


FIG. 134





are cut back according to the alternate system we have so fully described, and the main cane is only allowed to lengthen from twelve to eighteen inches. The top should be kept pinched off all summer. The fourth season two more side branches may be started about one foot above the others, and treated in the same way. *Fig. 132* shows this vine at the end of the fourth season, as it is to remain, and the cross marks (*z, z*) show where it is to be pruned. Another method of pruning and training is shown at *Fig. 134*. By some of these methods every one can have at least one vine, and most can have more. An occasional wash of strong soapsuds will be beneficial, if the soil is kept stirred and mellow.

FOURTEEN CAUTIONS. Before treating of varieties, diseases, etc., we wish to caution our readers: 1. Against using green manure, either in the preparation of the soil or after culture. 2. Against working the soil when wet, either in preparation or after culture. 3. Against planting vines too shallow in light or gravelly soils, or too deep in heavy ones. (Let the base of the roots be four inches beneath the heavy, clayey soil, and twice that depth in porous, gravelly soils. Allowance must be made for the settling of the earth, the natural spring of the earth, and the natural spring of the plant. If in a border, it should be higher than the surrounding level, to which it will sink.) 4. Against allowing secondary roots to grow from the stem above the original roots. (The earth should be drawn away from about the stem during the second season, and if any of these roots are discovered they must be cut off.) 5. Against cutting any of the main roots in any of the operations of culture. 6. Against covering vines in the winter wholly with straw or barnyard litter. (The vines should first be covered with earth, as the straw furnishes a shelter for mice.) 7. Against too late spring pruning after the sap has started. 8. Against putting down

too long horizontal arms where the plants are not vigorous. (Extend them gradually.) 9. Against allowing young vines to bear beyond their ability. 10. Against allowing laterals to grow too long before pinching. (Pinch when the first leaf on the lateral is about an inch in diameter.) 11. Against allowing the canes from the horizontal arms to grow too long, five or three feet is high enough, two being the better. When at this height, pinch out the top; it will soon start again, and when grown another six inches, pinch out the top of the new growth.) 12. Against allowing one cane to grow higher than another unless the growth of wood is too rank, when one or two canes may be allowed near the main stem as safety valves. 13. Against tying the vines too tightly. 14. Against applying manures, except in the fall. If applied in the spring or summer, it will produce a rank growth of wood which will not ripen before winter.

SELECTION OF VARIETIES. We have now much better varieties, and more numerous than ever before, but great caution must be exercised in selecting. We advise every *cultivator* to try every new variety that is *strongly* recommended, by the planting of one or two vines, but never invest any large amount of money in planting any new variety, no matter who recommends it. After a grape has been fruited for five or six years in different parts of the country, with nearly uniform success, and has also succeeded well on a small scale in your own hands, the investment will be safe. We hope and believe that the next ten years will give us double the number of excellent varieties.

LIST OF VARIETIES that are excellent in the localities named. *Abundant*, color dark purple, with a light bloom; flesh tender, juice sweet, skin thin. If held up to the light when ripe, the color will be uniformly deep; if tinged with red, they

are not ripe. Vine hardy and vigorous as far north as Lake Champlain, where it originated. Ripens very early. *Allen's Hybrid*; color amber green, with pearly bloom, and spots of claret when fully ripe; flesh tender; juice sweet, spirited and vinous; vine too tender for general cultivation, but worthy of much care as a garden and table variety. Ripens September. *Alvey*, color black, with a heavy blue bloom when ripe; flesh tender, without pulp; juice sweet and vinous; vine not hardy enough for open air culture at the North, but good at the South; ripens in September, and makes a delicious red wine.

CONCORD, black with heavy blue bloom. (*See Colored Fruit Plate.*) Flesh tender; acid at centre; flavor foxy; vine hardy and vigorous over a larger extent of territory than any other grape; ripens middle of September. Not a grape of the best quality, but its beautiful appearance, hardy growth, and productiveness render it the most popular and widely cultivated of all our grapes, and the most profitable market variety grown; better further West and South than in New England; "grown in Missouri; it makes a fine light red wine."* Cultivators should try to secure a better *grape*, with the same good qualities in the vine. *Clinton*, dark purple with pale blue bloom; flesh juicy, acid until after frost, it then has a spirited vinous flavor; a very strong grower, hardy and productive; makes dark red wine of fair quality. If kept late, makes a good table grape. Do not plant in a rich soil. *Cassady*, greenish white, with white bloom; skin thick; flesh pulpy; sweet, of fine flavor; vine hardy, but so late a ripener that it is not very valuable in the northeast; in the southwest very productive; makes a good white wine. *Creveling*, dark purple, with but little bloom; flesh tender; juice sweet, except at centre; vine hardy, healthy,

* *Hussman's "Grapes and Wines."*

and productive. A fair wine grape. Early. *Catawba*, deep red, fine bloom; flesh pulpy; juice sweet, vinous; vine vigorous and productive, but not hardy; late. This grape has been more extensively used for wine than any other American grape, and will still do well in favorable localities on the shores of Lake Erie, but in the interior is not to be recommended for cultivation. *Delaware*, beautiful dark red when fully ripe; skin thin; flesh tender; juicy, sweet, brisk, vinous; vine very hardy and moderately productive ripens first of September. Wherever the soil is light and warm, it is *the best grape* for extensive cultivation. It is delightful for the table, and makes a superior white wine, which sells for from five to eight dollars per gallon. *Diana*, pale red, with but little bloom; skin thick; flesh tender, treaty; juice, sweet, rich vinous; vine hardy and productive when properly cultivated; ripens last of September. This is one of our best grapes, and deserves careful cultivation for a table and market grape. It requires a deep, dry soil, not rich, but occasionally dressed with lime. It should not bear until the fourth year, and must be covered north of New York City, and protected somewhat in all the Northern States. It is the best keeper of all our grapes, and therefore is valuable; it will make a good raisin, and also a good wine. *Elsinburg*, black, black white bloom; flesh tender and melting; juice sweet and vinous; vine hardy and healthy; last of September. This is a very nice little grape, the only objection to it being its small size. *Hartford Prolific*, black or dark purple, with blue bloom; skin thick; flesh tough; juice sweet and somewhat sprightly and vinous; vine hardy, vigorous and productive; first of September. This is the best market grape of the early varieties on account of its earliness and large yield; makes a fair wine. Vines must be kept pinched back through the summer. *Herbert*, blue black, with light bloom; skin thin; flesh tender and

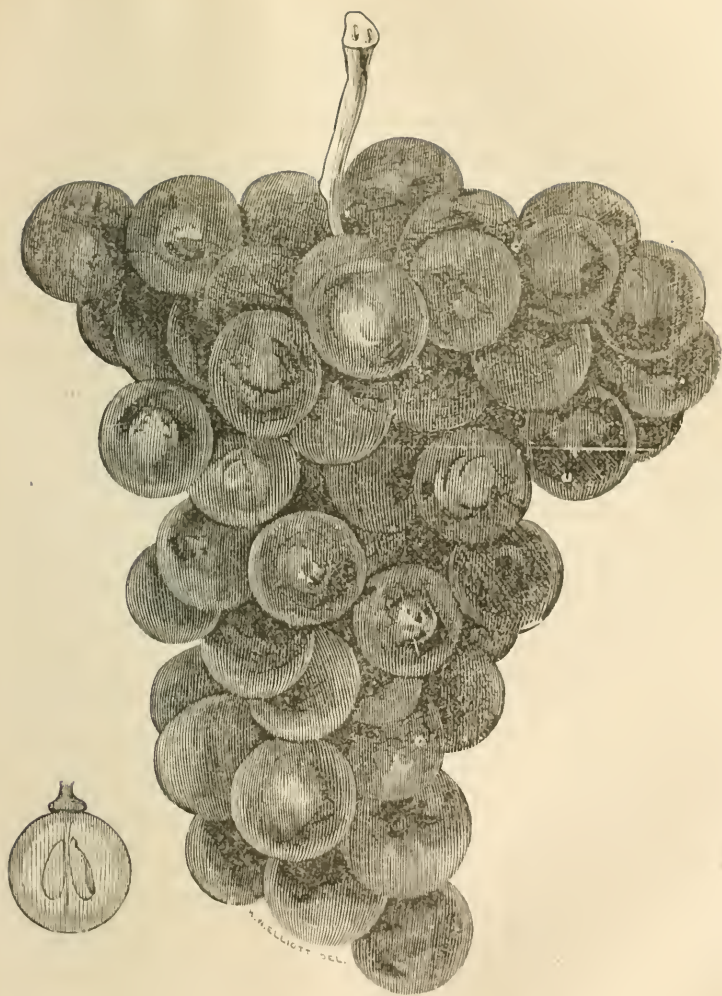
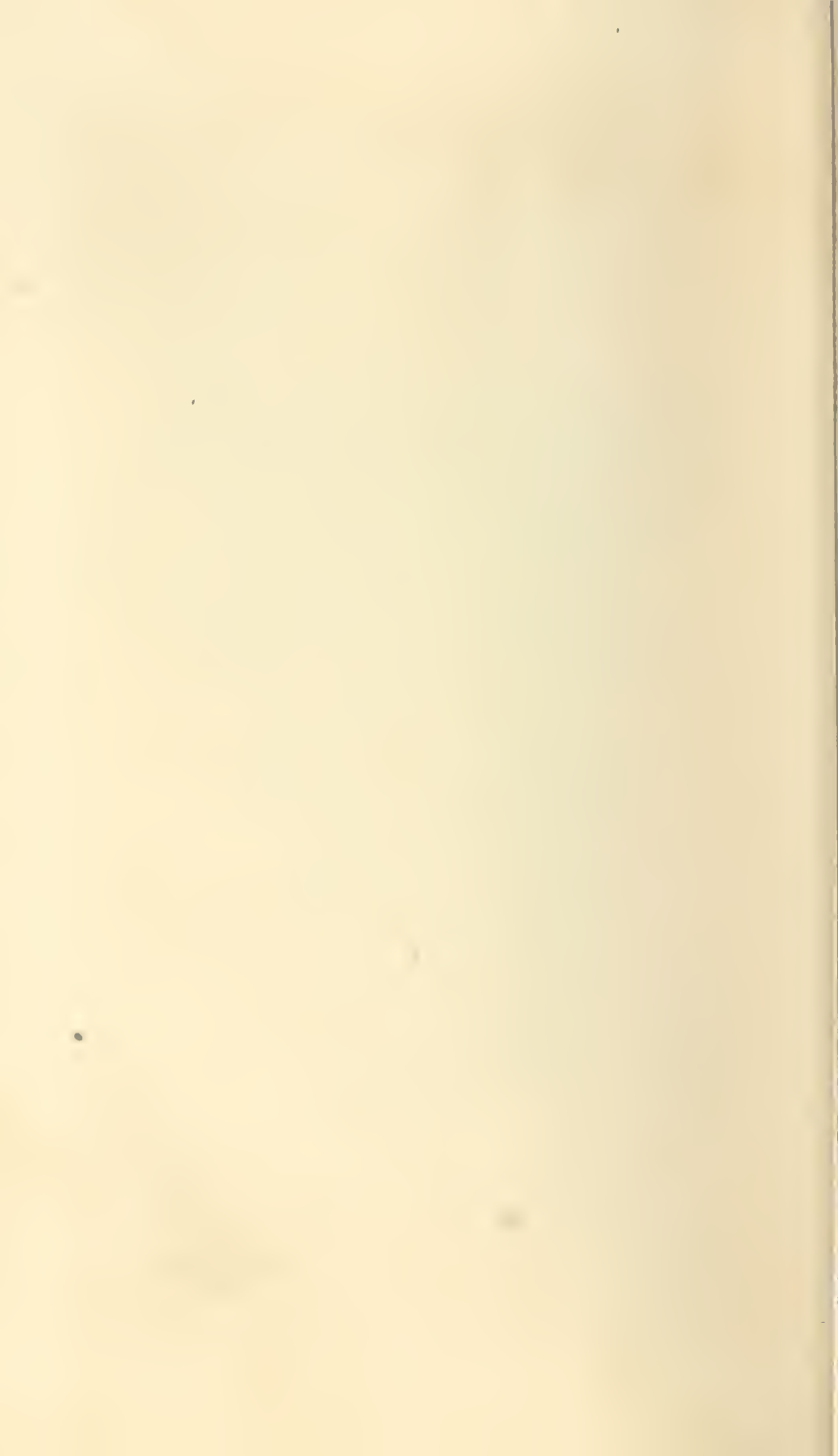


Fig 136.



melting; juice sweet, refined, sprightly, vinous; vine not hardy at the North, but does well in Southern Ohio and farther south, being healthy and productive; ripens late. One of the finest of Southern varieties, both for table, market, and wine. *Iona*, pale red, small, deep red veins at first, but growing dark red when fully ripe (see *Colored Fruit Plate*); skin thin; flesh tender, with but little pulp; juice and flavor all that could be asked for in a grape. Not fully tried, but promises well. This is a seedling by that indefatigable cultivator, Dr. C. W. Grant, who claims for it superior hardiness, productiveness, and earliness. It is a fine table grape, makes delightful wine, has the qualities of a long keeper and good raisin grape. We hope for the sake of its worthy cultivator and for the sake of American grape culture that it will prove all that is claimed for it; but we would caution cultivators against investing largely in it until they give it a trial. It has been condemned on short acquaintance by Missouri cultivators. *Israella*, dark purple, light bloom; skin thin; flesh tender; juice, sweet with pleasant flavor; vine hardy, vigorous, and productive; ripens early. We do not consider this grape quite as good in any particular as the Hartford Prolific. *Isabella*, dark purple, light bloom; skin thick; flesh tough, acid at the centre; juice sweet and sprightly what there is of it; vine uncertain. Not a good grape, but for a long time was almost the only market grape. Where they can be grown to advantage, it is a profitable market grape. We advise you neither to destroy or to plant a vineyard of Isabellas. *Martha*, pale yellow, white bloom; pulpy, but sweet; vine hardy, healthy, vigorous, and productive; early. The best of the white grapes for general cultivation. Makes a fine white wine. *Norton's Virginia*, black, thick light bloom; skin thin; flesh tender and melting to the centre; juice sweet, rich, spirited, vinous. Hardy, healthy, and very productive, south of Ohio, but not adapted to Northern

cultivation. Makes a fine, dark red wine. Will not grow readily from cuttings. Emphatically a wine grape. *Union* *Vitis*, dark purple, blue bloom; flesh pulpy, juicy, sweet, but not sprightly; vine tender when young, but grows hardy, vigorous, and productive; ripens October. Not a first quality grape, but very large and handsome, and, therefore, a very profitable market grape.

The following are Southern wine grapes:—*Taylor*, or *Bullitt*, *Lenoir*; *Lenoir*; *Bland*; *Wilmington*; *Scuppernong*; *Cunningham*, *Cynthiana*. None of them are suitable for Northern cultivation in the open air. The following are well worthy of further trial, and it is more than probable that several of them will yet prove excellent.

WALTER. *Ives' Seedling*, *Rebecca*, *York Madeira*, *To Kallon*, (liable to mildew and rot,) *Miles*, *Anna*, *Rogers Hybrids*, numbers one, four, fifteen, and nineteen; *Alexander*, *Diana* *Hamburgh*, *Eussian*, *Martauney*, *Rulander*, (makes a most delicate and valuable wine,) *Blood's Black*, (one of the most productive,) *Arnold's number one*, *Black Hawk*, *Dana*, *Detroit*, *Hyde's Eliza*, *Merr's Hybrids*. There are many new varieties constantly introduced, which should be purchased with great caution.

INSECTS injurious to the vine are not so numerous or destructive as those attacking some other fruits, but they are still, more than plenty, and on the increase. They consist of caterpillars, beetles, lice, etc. The first object to be kept in view is the destruction of the moths and other egg-laying insects, before they lay their eggs: by fires in the vineyard, orchard, or garden about twilight, at the time of their appearance, which is mostly from the middle of June to the middle of July. Vast numbers can thus be destroyed, and with every female are destroyed from fifty to two hundred eggs. The second main point is to carefully pick off at the early summer pruning, all nests, webs,

etc, and destroy them by scalding or fire. The third is the dusting with sulphur, lime, etc., throughout the season. For this purpose every one who has any considerable number of vines should have a pair of bellows. The rose bug, or "*rose-chaffer*," is the worst enemy of the vine, because it can be destroyed by neither of these three contrivances. They show themselves as soon as the blossoms, which they soon destroy, unless checked. The only way with these and several other beetles we shall name, is to have a large cloth stretched on a frame, set it under the vine, and shake it briskly; they will fall and can be scraped up and scalded or burned. Mead, in his work on the Grape, says: "They are too stupid to know when they *are* dead;" therefore the work must be done thoroughly. If repeated daily for a week, this operation will greatly mitigate the pest.

The MAY BEETLE, or COCKCHAFER, must be destroyed in the same way. Where they are very numerous, a flock of poultry should be permitted to follow the plow and cultivator, and they will devour numbers of the larvæ which are turned up from the ground. About daylight is the best time for rapping them from the vines. *The vinechaffer and steel blue beetle*; threaten to become very destructive to the vine, and a determined effort should then be made to exterminate them; this can be done, both by twilight fires and by rapping them off the vines into the sheet. The VINE HOPPER, or *thrips*, appear in June, and if numerous are very destructive, sucking the juice from the leaves and causing them to turn yellow; the remedy is to dust the leaves with a mixture of two parts of sulphur and one of caustic lime. If done early on a still morning it will nearly all adhere to the leaves and kill the insects. Two persons going through the vineyard at night, one with a torch and the other beating the vines, will destroy vast numbers. The RED SPIDER, which

appears on the under side of the leaf, and the APHIS, or *louse*, which appears on the ends of the young shoots and tender leaves, must be treated to frequent applications of sulphur and lime while the dew is on the vine.

The CATERPILLARS are the children of the moth, which can be destroyed by the twilight fires. The large queen caterpillars of the *sphinxes*, the *procris Americana*, which feeds in companies on the leaf, the *yellow bear*, and other large caterpillars are easily discovered, picked off, and destroyed by the careful cultivator, but the little *leaf rollers* are more difficult to find. We recommend the lime and sulphur for all these pests.

The birds are the fast friends of the vine grower, for they destroy much eggs, larvæ, and grubs. They war upon the insects at every stage, and the more of them you can encourage to take up their abode upon your premises, the lighter will be your own labor, and the heavier your crops. Every effort should be made to destroy insects, as their rapid increase would be destructive of all the interests of husbandry. *Diseases of the vine* are in a remarkable degree under the control of the cultivator, first, by selecting proper varieties; second, by selecting only dry soil and thirdly, by proper attention to summer pruning. At the lowest calculation three-fourths of the failures of the vine are owing to over-growth and over-bearing when young, and summer pinching and thinning are the remedies; but owing to sudden changes in the atmosphere, which lessen the vigor of the leaves, they are attacked by a *parasitic fungus*, which produces, or rather is, the disease known as mildew. Its first appearance is a single small white speck, which soon extends over the whole plant. When first discovered the vine should be thoroughly dusted with the lime and sulphur before recommended. The BLACK ROT is a much more dangerous disease, as it attacks the fruit, a small black or brown spot

appearing on the green berries. As soon as it is discovered, dust with lime, which will in some measure stay its progress.

WINE MAKING in this country, is yet in its infancy, but is destined to become an extensive and profitable branch of production: Grapes for wine should be fully ripe. Grapes that can well be gathered for market the middle or last of August should be left a month longer for wine. A little frost will not injure them. Those that are fully ripe the last of September can be gathered and made up then, and those bunches not ripe will ripen the sooner if the others are picked off. All unripe berries and all that have begun to decay should be cut out. The grape scissors before described, which both cut and hold the bunches, are the best for this purpose. The utmost cleanliness must be observed in gathering and assorting the grapes and in every operation connected with wine making, as the chief value of the wine is *flavor*, and a very little negligence will spoil the flavor of a batch. Before giving the process of making wine we will explain the terms used. BOTTLES should be of very tough glass, and thoroughly cleaned with coarse sand; cleaning with shot is very objectionable. CASKS for fermenting wine, should be large, say four hundred gallons, but the vintner must have all sizes. The large casks should be of well seasoned oak staves, about five feet long and one and a half or two inches thick, bound with iron bands, perfectly smooth inside, with a door on one end large enough to let in a boy to wash it out. When new they should first be washed in lime water. After the cask is emptied, let in a boy to scrub the side thoroughly before filling again.

CELLAR. Any good cellar, kept free from frost, will keep the wine the first winter, and if it clears well, it can be sold before warm weather; but a good cellar is a great convenience where any large quantity is to be made. Three considerations

are important in building a wine cellar: it should be in a dry spot, it should be sunk in the ground and the walls built hollow, to secure the utmost evenness of temperature; and it should be provided with means of thorough ventilation. A stair to it is sometimes desirable during fermentation. A side-hill is a desirable location, so that a team may be driven into the cellar.

CRUSHING may be done in any manner that will not break the seed. Where a quantity is to be crushed, two wooden rollers set in a square frame and turned with a crank and cog wheel, is the simplest contrivance. A very good mill with stone rollers, screws, etc., can be purchased for about fifty dollars, but not large enough for the largest vintners. The receiving and pressing room is usually built directly over the cellar, and holes left in the floors over each cask for drawing off the *must* to the cellar. This is a much more convenient arrangement than to carry it in buckets.

COVAGE, is fermentation on the skins.

FERMENTATION, *Vinous and Acetous*. Vinous fermentation is the first and natural fermentation which produces wine; acetal fermentation commences after vinous fermentation is ceased, and produces vinegar; it is sometimes caused by the introduction of foreign substances into the must; great care should therefore be exercised in picking and crushing the fruit.

FERMENTING VATS. These should be proportioned to the size of your casks. When the must is to ferment long on the husks, a false bottom should be provided to keep down the husks. It should be perforated with holes and fastened in its place. There should be an inch tube in the cover of the vat for the escape of gas.

FINING, or CLARIFYING. When the wines are not clear it

may be done by adding the whites of a half dozen eggs beaten to a foam with a little of the wine, to each forty gallons. Stir up well, and close tight for a week.

GALLIZING, so named from Doctor Gall, who first reduced it to a science, is adding the proper proportions of sugar and water to grapes that from any cause are too acid. See page 601 for a description of the process.

GRAPE MILL. (*See Crushing.*)

HUSKS; the skins.

LEES; the sediment after fermentation, adhering to the bottom and sides of the casks. The crust or salt that collects on the side of the cask is cream of tartar in a crude state, and is of value.

MUST; the juice of the grape before fermentation.

MARC; the mixture of crushed grapes, skins, seeds, and stems before pressing.

RACKING; the transferring of wine from one cask to another, leaving the lees. See description of process, on next page.

SACCHAROMETER; an instrument for determining the amount of sugar in the must.

STEMMING; the stems of the grape contain a large amount of acid, and it is often desirable to remove the larger portions of them before crushing. This is done by drawing the bunches through teeth attached to boards, with grooves for conveying the juice flowing during the operation.

To make light colored wine, the grapes gathered can be pressed and put into the casks the following evening.

Place the crusher above one of the fermenting vats, and crush them as fast as they come in from the vineyard. When not crushing, cover the vat with a stout crash cloth, and particularly as evening comes on, to exclude all insects. In the evening the free juice is drawn off into the cask, and the marc

immediately pressed and the juice added to it. The press should be large enough to accommodate the day's gathering. A good press, with grooves, hopper, etc., can be purchased for about fifty dollars. While pressing, the edges of the cheese should be cut and put on top, in order that the whole may be pressed fully dry.

The casks should be filled and refilled, as a portion evaporates during fermentation. The must from the press is usually allowed to run into a large funnel filled with oat straw and pass through a hose to the casks in the cellar.

To make dark wines the must is fermented on the husks. The crushed grapes are in this case put into the fermenting vat with false bottom. After the vat is three-fourths filled, the false bottom is put in, pressed down so as to be covered about eight inches, and the cover put on. Two or three days' fermentation at a temperature of about sixty degrees is usually sufficient. But here the judgment must be exercised. If a very dark wine is desired the grapes should be stemmed, and can then be allowed to ferment eight or ten days, when they are pressed and run into the casks as before. If the casks are kept filled during fermentation the yeasty part will flow out at the bung. In when it is casked, under fermentation, a vacant place is left, and a bag of sand put over the bung-hole, the husks sinking to the bottom when fermentation ceases. The wine is then racked. The empty cask being set lower than the full one, a siphon with a long and a short arm is inserted, the finger being held over the hole in the long arm until it is inserted in the cask. There are also various apparatus sold for the purpose, which large retailers will do well to purchase. The lees will, if distilled, make good brandy. The first racking is usually done, not later than January, and a second racking after the second fermentation, which often goes on all summer.

It sometimes occurs, owing to a short or wet season, that the grapes contain too large a proportion of acids, the saccharine matter not having been fully developed; this deficiency is remedied by Gallizing. When fully ripened and perfected on the vine, the must contains, in five hundred pounds: sugar, one hundred and twenty pounds; acids, three pounds; water, three hundred and seventy-seven pounds; in all, five hundred pounds. But in an inferior season five hundred pounds will contain: sugar, seventy-five pounds; acids, four and a half pounds; water, four hundred and twenty and a half pounds; in all five hundred pounds. To bring this inferior must up to the proper standard, there is to be added one hundred and five pounds of sugar and one hundred and forty-five pounds of water. The amount of sugar in the must is determined by the saccharometer, which is indispensable to the vintner, and can be obtained in any of our large cities. The amount of acids is determined by the acidmeter but as this is not yet common in this country, we here transcribe the process of Mr. George Hussman, of Herman, Missouri, one of the largest vintners of the country:—

“Last year was one of the most unfavorable seasons for the ripening of grapes we have ever had here, and especially the Catawba lost almost nine-tenths of its crop by mildew and rot; it also lost its leaves, and the result was that the grapes did not ripen well. When gathering my grapes, upon weighing the must I found that it ranged from fifty-two to seventy degrees, whereas, in good seasons, Catawba must weighs from eighty to ninety five degrees. I now calculated thus: if normal must of Catawba should weigh at least eighty degrees, and the must I have to deal with this season will weigh on an average only sixty degrees, I should add to this *must* about one half a pound of sugar (*to the gallon*) to bring it up to eighty degrees. But now I had the surplus acid to neutralize yet. To do this I calcu-

lated than: if even in a normal must of Catawba, or a must of the best seasons, there is yet an excess of acid, I can safely count on there being at least one-third too much acid in a must that weighs but sixty degrees. I therefore added to every one hundred gallons of must forty gallons of soft water, in which I had first dissolved eighty pounds of crushed sugar, (half pound to the gallon,) which brought the water, when weighed after dissolving the sugar in it, up to eighty degrees. Now I had yet to add twenty pounds, or one half pound to each gallon of the original *must*, to bring *this* up to eighty degrees. I thus pressed instead of one hundred gallons, one hundred and fifty gallons from the same quantity of grapes; and the result was a wine which every one who has tasted it declares it to be excellent Catawba.

“ Dr. Gall recommends grape sugar, but I have found crushed loaf sugar answers every purpose. I think this sugar has the advantage over grape sugar that it dissolves more readily, and in cold water. It will take about two pounds to the gallon of water to bring this up to eighty degrees, which will make a wine of sufficient body. The average price of sugar was about twenty-two cents per pound, and the cost of thus producing an additional gallon of wine, counting in labor, interest on capital, etc. will be about sixty cents. When the wine can be sold at from two to three dollars per gallon, the reader will easily perceive of what immense advantage this method is to the grape grower, if he can thereby not only improve the quality, but also increase the quantity of the yield. But this is only the first step; ‘after the most powerful pressure has been used, still remain all the ingredients of wine, except sugar and water, which being added, a good quality of wine is produced.’ Says Mr. Hassman: “I have also practised this method extensively the last season, and the result is that I have fully

doubled the amount of wine of the Norton's Virginia, and Concord. I have thus made twenty-five hundred gallons of Concord, where I had but one thousand and thirty gallons of original must; and twenty-six hundred gallons of Norton's Virginia, where I had but thirteen hundred gallons of must; and the result is that many of them are better, and none inferior to the original must. My method in making such wines was very simple. I generally took the same quantity of water, eighty gallons of water to husks that had produced one hundred gallons of juice, and added two pounds of sugar to the gallon. The husks after the first pressing were put at once into the vat and pulled apart and broken, and the water added. Fermentation commenced at once, and was allowed to go on for twenty-four hours, when they were pressed again as dry as possible. The must was then treated the same as the original. But let us glance a moment at the probable influence this discovery will have on American grape culture. It cannot be otherwise than in the highest degree beneficial, for when we simply look at grape culture as it was ten years ago, with the simple product of the Catawba as its basis, yielding an average of two hundred gallons to the acre, of inferior wine, and look at it to-day, with such varieties as the Concord, yielding an average of one thousand to fifteen hundred gallons to the acre, and, by gallizing, two thousand five hundred gallons of uniformly good wine, can we be surprised if every body thinks and talks of raising grapes." Mr. Hussman's experiments have proved very successful, and we hope the day is not far distant when good wines will take the place of bad brandy and whiskey, and the evils of intemperance be mitigated.

Gallized wines are treated in the same manner as other wines. After the second fermentation is fully over, it can be bottled, for which purpose is needed a small funnel, a small faucet, a

cork press, and a mallet. The corks should be scalded, and afterwards soaked in cold water, and one end compressed to fit the bottle. Fill the bottles so as to leave about an inch of space between the cork and the wine. Drive in the corks with the mallet, and lay the bottles so that the wine will cover the works. It is not necessary to bottle the wine; it will keep as well or better in the casks, if they are kept filled. All vacancies made by drawing off wine should be filled within a day or two, or a sulphur match burned in the space. If there is mould on the wine, run a tube through the mould, and when full remove the mould. The husks are often made into brandy or vinegar, the former by distillation, the latter by adding water and allowing it to ferment. Afterwards the husks should be returned to the soil of the vineyard. As we have said before, grape culture is contagious, and it is wise policy for the grape grower to encourage all about him to enter into the business. When a large press-house and cellar are established, small cultivators can there find a market for their crops. Each can learn of the other; all improvements will come to a grape colony, as well as purchasers.

NOTE.—EXPLANATION OF FIG. 133, PAGE 585.

aa. Posts eight feet apart, and eight feet high. *bb.* Cross-bars. *cc.* Wires. *dd.* Shows where the arms were pruned the second year after transplanting. *eecc.* Canes allowed to grow the third year. *ff.* Under buds, used in place of upper buds. *gg.* Shows where the ten canes grown the third year were pruned at the winter pruning. The left hand canes were cut wholly away, and the right hand canes cut back to two buds. *hh.* Canes grown the fourth year. *kk.* Vines grown to cover the higher part of the trellis. (*See Garden Training.*)

CHAPTER XVIII.

SMALL FRUIT CULTURE.

THE STRAWBERRY is the most delicious and widely cultivated of the small fruits, and is not only desirable in every garden, but can be profitably raised for market in the vicinity of every village, borough, or city. It flourishes naturally on a sandy loam, but any soil may be made suitable for it. Muck and peat mixed with a clay soil and enriched with manure, will make a good soil for most varieties. The soil, whatever it is, should be deeply trenched and manured liberally. The roots of the strawberry are fine, and the soil should be thoroughly pulverized and the manure mingled with the soil. The same manures and composts, recommended for other crops are required for this, and should be applied without stint.

North of New York, we think spring planting is to be preferred, but where fall planting will succeed, it is better. The time to plant is just after the crop is gathered. If the plants are to be immediately replanted, and a portion of the earth removed with them, the work can be done in the fall. When plants are taken up in the spring, the dead leaves should be removed. Where the roots are bared, it is well to clip off one-half their length with the shears before replanting. It is also well to puddle the roots in such cases. This is done by mixing earth and water, and dipping in the roots. When the earth is

taken up with the plants, of course a hole must be made large enough to receive earth and all; the roots are thus left in their natural position; but when the roots are bare, they can be forced into a very small hole, and will often grow in it. But a much more certain and profitable course is to make a hole large enough to spread out the roots. In either case the crown of the plant should never be set below the level of the surface. A cloudy day is the best for planting. The systems of cultivation and renewal are various. The first is the *shiftless system*, by which the plants are set out and allowed to grow until the ground is covered with vines, weeds, and grass, with no fruit.

The ALTERNATE STRIP SYSTEM is on some accounts the very best. Strike out rows three feet apart and set the plants about a foot apart in the row. Let all the runners on one side of the rows grow and take root, while all on the other side are cut off. Thus every alternate strip of three feet will be covered with vines which will give a crop of berries, while the bare strip will serve as an alley for the pickers. After the crop is over, dig up this alley, and the next season allow the runners to cover and take root in it. After this season's crop is gathered, dig in the old plants, and so on, digging up one side each year. At the time of setting the plants, and at each annual digging, a liberal coating of manure should be dug in.

The BIENNIAL SYSTEM has of late years been popular, and consists in planting in beds, three rows, eighteen inches apart each way, and paths two feet wide. Hoe the plants, weed faithfully, let the runners grow, and after the bed has produced two crops, dig or plow it up and plant in a new place.

The ANNUAL SYSTEM is the same, except that the plants are put a little nearer together, cultivated the first season, bear the second, and are then plowed or dug under. When pistillate

varieties* are planted, some other varieties must be planted in alternate rows, to fertilize them. One row of staminate to four of pistillate is sufficient. In most parts of the country north of New York city, winter protection is beneficial.

The most successful cultivators cover their plants. Straw, hay, or leaves to the depth of two inches is sufficient. Spent hops, pine leaves, and salt meadow hay are still better. A portion of the mulch may be left on in the spring, which will shade the roots, retain the moisture, and keep the fruit clean.

Mulching of some sort through the fruiting season is a great advantage.

The VARIETIES we recommend for cultivation are, the AGRICULTURIST,† *Austin or Shaker*, BOSTON PINE, *Brighton Pine*, BROOKLYN SCARLET, CRIMSON CONE, *Durand*, *Doroner's Prolific*, *Diadem*, *P. Eclipse*, *P. Green Prolific*, HOVEY'S SEEDLING, *P. Hooker*, *Iowa*, *Ladies' Pine*, P. LADY FINGER, *Longworth's*, LENNIG'S WHITE, McAVOY'S SUPERIOR, *Monitor*, NEW JERSEY SCARLET, *Russell's Prolific*, *P. Scarlet Magnate*, P. WILSON'S ALBANY, TRIOMPHE DE GAND, THE WILDER. (*See Colored Fruit Plate for the AGRICULTURIST and BOSTON PINE.*)

RASPBERRIES and BLACKBERRIES are mostly propagated by suckers or shoots growing from the roots. A rich moist soil is best; if too dry or sandy, apply swamp muck; but a full crop of the raspberry every season cannot be expected from a gravelly or sandy soil. If the soil be deeply trenched when first planted, a plantation of either of these berries will continue in bearing five or six years, when they should be renewed, if the crop begins to be diminished. Pruning should be done early in

* Pistillate varieties are those having imperfect stamens, and therefore fail to accomplish fertilization.

† P. Pistillate. Those in SMALL CAPS are especially recommended.

the spring, or in the fall immediately after fruiting. It consists in cutting out all the old wood, leaving only last season's growth, and cutting that back to three or four feet, and fastening to stakes or trellis. The suckers should all be taken up, whether wanted for planting or not. When the vines grow vigorously summer pruning becomes necessary. The terminal shoots should be pinched off about the last of August, and if they continue to grow should be pinched off again when they have grown twelve inches more. Winter protection is often given with great advantage; the method is the same as that described for the grape. Bend down the canes, throw on enough dirt to hold them, then go through with a plow on each side, and turn a furrow slice over them. An acre can be covered at an expense of not more than sixteen dollars. The *Philadelphia*, *Black Cap*, *American Black*, *American White Cup*, *Surprise*, *Colonel Wilder*, and the *Antwerp* are among the tried varieties of the raspberry; and the *Lawton*, *Kittanning*, *Dorchester*, *New Rochelle*, and *Wilson's Early* are hardy, productive, and marketable blackberries.

The cultivation of these fruits in the vicinity of large cities will never fail to be profitable.

The CURRANT and GOOSEBERRY are propagated by cuttings so readily, that no other mode will be described. Cuttings should be of ripe wood of recent growth, taken off in the fall. Make the cuttings six inches long, cutting smooth just at the base of a bud, and planting as described for grape cuttings. The currant had best be planted in the fall, and the gooseberry in the spring. A deep rich soil, deeply trenched and heavily manured, is necessary, if the most profitable crop is desired. The bushes will grow almost anywhere, but will not produce regular and abundant crops of the largest and best fruit, unless manured and kept free from weeds, and the ground kept mellow

or mulched through the summer. These remarks apply equally to the blackberry and raspberry.

The most common method of pruning and training, is none at all; but a more profitable method is to cut out all dead wood, all wood that has borne for two or three years, and all shoots and suckers that crowd the growth. Six large, vigorous shoots will produce more and larger fruit than double that number of weak and slender ones. The Black Currant is trained as an upright with an open head. The gooseberry is also sometimes trained in this manner; it is accomplished by rubbing off the lower buds on the stem. The most successful varieties of the currant are, the *Deseret*, *American Black*, *Buist's*, *Cherry*, *Dana's White*, *Red Dutch*, *Victoria*, *White Grape*, *White Dutch*, and *White Florence*. The *Cluster*, *Mountain Seedling*, *Downing*, and *Houghton's Seedling* are the only varieties of the gooseberry proved to be worthy of cultivation. (*See Colored Plate.*)

The CRANBERRY has of late assumed so much importance, and its cultivation is so little understood, that we shall give more full directions for it.

LOCATION. The borders of ponds, marshes, and the seashore have proved the best suited to the growth of the cranberry. In fact ninety-nine one-hundredths of all the cranberries grown in the country are in such locations. There are thousands upon thousands of acres of low, wet, swampy, and sandy lands, in all sections of the country, utterly worthless for general cultivation, that are admirably suited to the cranberry; and when we remember that they yield from one hundred to four hundred bushels per acre, and sell for from two dollars to six dollars per bushel, it is no wonder that many owners of such worthless tracts are putting in cranberries.

SOIL. The best soil, if soil it can be called, is *beach sand*; next to this is *common sand*, and then *peat and sand*, which is the

common soil of bogs and marshes. They will run wholly to vines if the soil is rich.

PREPARATION OF SOIL. If the site selected is the sea-shore, or salt-marsh subject to overflow, a dyke must be built to prevent the land being covered with salt water. This can be done by digging a trench about the patch and using the earth thrown out for embanking. After two years' standing to freshen it, it will be ready for planting. If it has not been overflowed by salt water, neither the dyke nor the freshening will be necessary. If on the shores of a fresh water pond, overflowed in winter and uncovered in summer, you have just the spot needed, without preparation. If on the shores of such a pond, and not overflowed, bring it down as nearly to the water level as may be, and if a stream runs through or near it, that may be used to overflow it. Raise an embankment, and keep it covered with water through the winter. (*See Flowing.*) If the place selected is a swamp or marsh, commence by digging a drain all around the piece when it is driest, using the earth thrown out as an embankment, and providing an outlet, if possible. This will drain the piece so that the top, to the depth of one foot or more, can be cut off. This is most valuable manure, and well worth removing from your marshes, even if you do not purpose a cranberry patch. After this is removed, stop up your outlet and flow your patch, if possible. If there is any sand to be had within hauling distance, haul it onto the ice during the winter, and in the spring your patch will be ready for planting. If the sand is not handy, let it stand a year, and the action of the weather will disintegrate it; otherwise it will not be fit for planting. If possible, plow and harrow it.

PLANTING. The plants can be set either in the fall or spring. If the ground can be plowed through the winter we prefer fall planting, otherwise we delay until spring; for if not plowed the

frost will throw out the newly planted vines. There are various methods of planting. The first is the old method of sod planting, that is, the planting of a sod with grass, weeds, vines and all. This is a very poor method. Another and much better method is to separate the vines from the sod and plant them in drills or hills, a half dozen spears in a place, with the tips just above the ground. They should be firmly pressed in. Where the vines can be obtained in large quantities they can be cut about two inches long by a common hay cutter, sown on the surface, and well harrowed in; or they may be sown in drills two feet apart. All these operations must be performed in spring and early summer, unless the ground can be plowed.

Care should be taken to get fruitful plants, as many that appear vigorous are barren. The better way is to carefully examine the beds from which the plants are to be taken at the fruiting time, and observe what portion bears the best crop.

AFTER CULTURE. Where the plants are in hills or in drills they can be hoed the first season, after which they will cover the whole ground and mat together so that hoeing will be impossible. If the weeds and grass are kept down the first year, all that will be necessary in after years will be to go over the patch two or three times during the growing season and pull up the large tufts of grass, briars and weeds, by hand. Nothing else but the cranberry will grow very luxuriantly in clear sand, and if the top has been taken off the marsh as recommended but few weeds or grasses will appear which cannot be eradicated by the first season's warfare, and the vines will soon take possession of the whole.

FLOODING, as we have hinted, is the great aid to cranberry culture. The power to flood or drain at will insures most profitable returns. With an embankment and a water gate at the outlet this may be accomplished. Flood before the ground

freezes hard in the fall, and leave the water on until all danger of spring frosts is past. North of New York city two feet of water is desirable, south of there, one foot is sufficient. The patch that is flooded is not likely to be attacked by the cranberry worm; the danger of winter freezing is avoided; the danger from frost after vegetation has commenced in the spring is done away. In a season of extreme drought the water can be set back onto the patch, and the crop saved. If there are indications of frost before the fruit is ripe it can be covered with water until the cold snap has passed. Almost any one of these advantages is sufficient to justify the ordinary expenses of an embankment and a water gate. If the fruit rots, it is probably too wet, and should be raised by an addition of sand to the surface. It can be applied on the ice, and the plants will soon grow up through it.

GATHERING, PACKING, and MARKETING the small fruits are important items, and can be very much systematized. Women and children are usually employed as pickers, and if a succession of fruits is raised a better class of help can be secured, as they have employment for three months instead of one. For this and other reasons we recommend a succession of small fruits, rather than that a man's whole capital should be staked on one kind. A good succession can be arranged with strawberries, raspberries, currants, blackberries, and cranberries. The fruit should be gathered in dry weather, and not until after the dew is off in the morning. The usual course of large growers is to erect a tent or shed in the field, to which each picker brings the fruit and receives a ticket for the number of baskets. Formerly each grower must provide himself with a large number of baskets, in which to send his fruit to market, but this is obviated by the FREE FRUIT BOX of the Burlington Manufacturing Company of Burlington, New Jersey. (*Fig. 137.*)

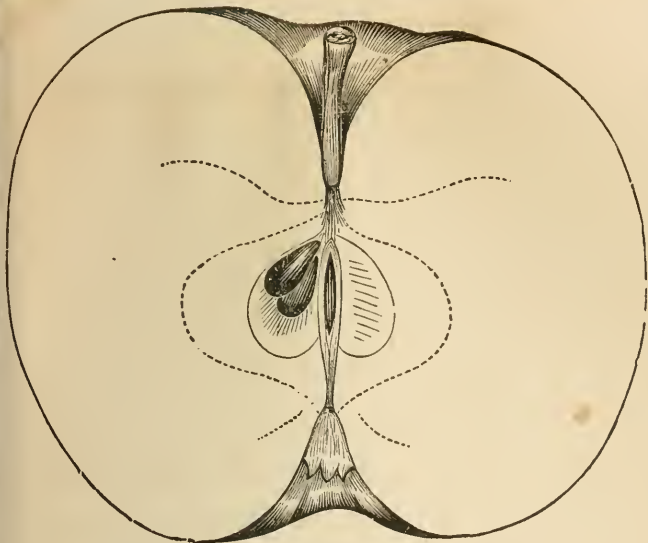


Fig. 135. RHODE ISLAND GREENING.

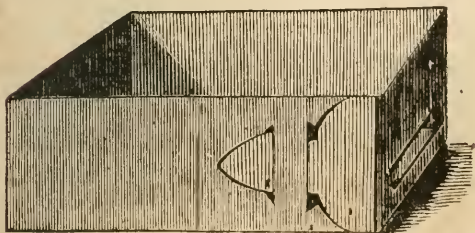
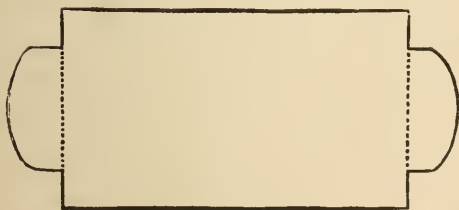
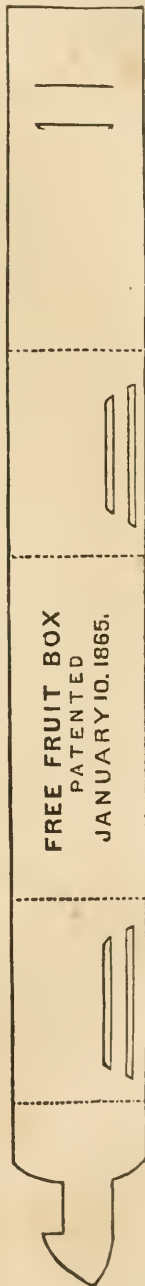
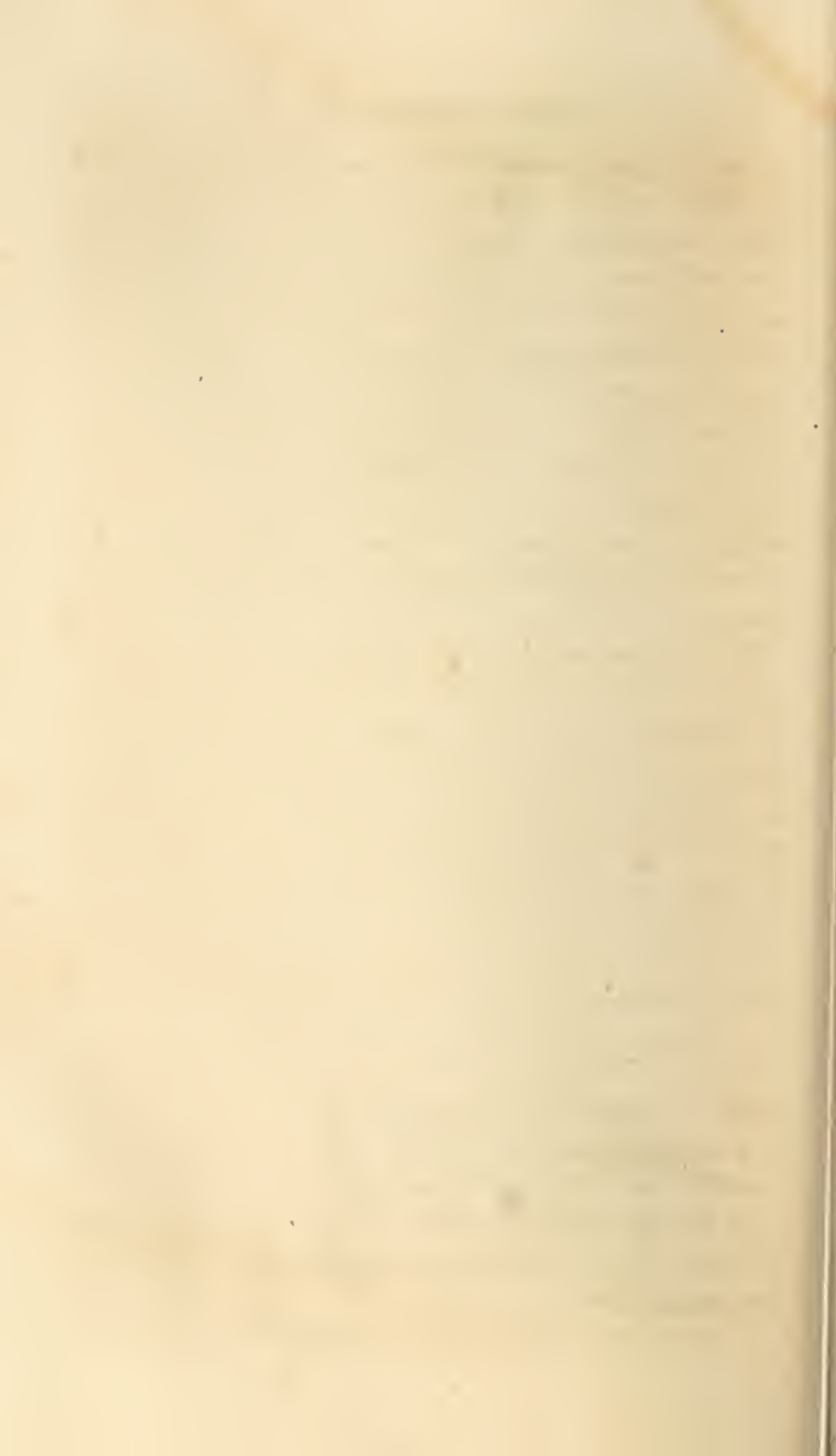


Fig. 137. FREE FRUIT BOX.



FREE FRUIT BOX
 PATENTED
 JANUARY 10. 1865.



This box was invented for the purpose of relieving fruit growers of one of the most annoying incidents—of sending their fruit a long distance to market—the necessity of having their crates and boxes returned to them. It supplies a want which has always existed in the berry trade, and will be sold so cheap that it can be given away with the fruit. In appearance it is remarkably neat, light, but substantial, while the fruit will always go to market in a perfectly clean box. Though given away it will save the grower money, enable him to get a better price for his fruit, and put an end to the annual loss of boxes, besides saving him the necessity of keeping a vast quantity of the boxes and crates on hand to provide for the delay of returning them.

The box is composed of two pieces of veneer. Figure 1 represents a piece which is folded up into four sides of the box. It is scored or cut at the dotted lines, so that it can be folded up into a shell as readily as a piece of pasteboard. The tongue at the left hand end buckles into the two slots at the right hand end, just like closing a pocket book. A notch on the end of the tongue catches so effectually, after being buckled in, as to hold the shell firmly together.

The bottom is shown at Figure 2. The two tongues at the end are also scored or cut at the dotted lines, and being readily turned up, are buckled into the two sets of slots shown on the lower edge of Figure 1. When thus buckled together, the two pieces form a perfect box, as seen in Figure 3, neither nails nor glue being required, and the whole constituting a strong and beautiful box. The bottom being inserted from above, rests upon the strip between the two bottom slots, and cannot possibly fall out. The prominent advantages secured by the use of this box are as follows:

1. The great desideratum of a box always nice and clean.

2. The commission agent being relieved from the great annoyance of hunting up and returning crates and boxes, as well as escaping the loss of them, will sell the fruit for much less than the usual commission.

3. The return freight of empty boxes is saved.

4. Another saving is secured in sending to market, as one hundred of the free boxes, quart measure, weigh only about twelve pounds, while one hundred of the old square quarts weigh fifty pounds. Any one can readily satisfy himself by a calculation of what is thus saved in freight to market, commission, and return of empty crate, that he will really save money by using a box that he can give away.

5. As these boxes are put together without nails or glue, they can be sent to distant growers, in the shape of flats, to be made up by children at odd times during the winter. The flats are scored and bent, ready for folding up, and as the wood bends at the joint without breaking, a small girl will learn in five minutes how to put them together. Many hundred boxes thus packed as flats can be got into a very small compass, and at a trifling cost of freight.

The prices for these boxes are:—

Pints made up per 1000.....	\$8.00
“ “ “ “ 5000.....	37.50
“ in flats per 1000.....	6.50
“ “ “ “ 5000.....	30.00
Quarts made up per 1000.....	9.00
“ “ “ “ 5000.....	42.50
“ in flats “ 1000.....	7.50
“ “ “ “ 5000.....	35.00

Other fruit baskets are: “The American, by the American Basket Company, New Britain, Connecticut, a very nice basket, costing thirty dollars for one thousand quarts. The Hallock fruit box, manufactured by N. Hallock, Queens, Queens County, New

York The Gothic free fruit box, made of veneer, is sent in flats ready to be put together, for ten dollars per thousand. A very common basket is made by D. Cook, New Haven, Connecticut. J. B. Smith's grape box, made at Ansonia, Connecticut, holding about five pounds of grapes, is also suitable for the small fruits; price, sixty dollars per thousand. All these, and many more, are patented.

FLOWER CULTURE will be confined to the farmer's wife and family, but the farmer, if he be a true lover of nature, will be always ready to lend a patch of ground and an occasional hour with the hoe or spade to the flower-garden; himself and his family will be better for the sight of the flowers, and they will be more closely attached to the home thus beautified. We can give but a few plain brief directions for flower culture.

The best soil for the cultivation of flowers, is a mixture of loam, peat, leaf mould, and sand. If peat cannot be had, decayed turf can be used in its stead. Leaf mould can always be had in the country by covering a pile of leaves with earth in the fall, and letting them rot for a year. Prepare a pile every fall, and you will have a constant supply of the most valuable manure for your flower-garden, vineyard, or nursery. The children should be encouraged to gather all the leaves possible in the fall for these purposes.

So small a space as is occupied by the flower-garden, should be spaded, hoed, and raked until it is thoroughly pulverized to the depth of eighteen to twenty-four inches. Flower seeds should not be planted until the earth begins to be warm. If the soil tends to be too cold and heavy, add sand to it. One great mistake in planting flower seeds is to plant too early and too deep, so that the seeds never feel the warmth of the sun, and decay without germinating. No definite rule can be given

in regard to depth of planting all seeds, but the very small seeds should be sown on the surface, and a little finely pulverized earth sifted over them, and pressed gently with a board. Seeds of the size of the cockscomb and amaranth should be planted a little deeper; balsams, asters, etc., from one quarter to a half an inch in depth; sweet peas, four o'clocks, lupins, morning glories, etc., from one half to one inch deep. The ground should be kept moist by light sprinklings, and as soon as the tender plants appear they should be shaded from the direct rays of the midday sun until they are well rooted. All plants should be kept clear of weeds, and the ground frequently stirred about their roots. First on the list of flowers stands the rose. To produce the most perfect roses prepare a trench, or, if for one vine, a hole two and a half feet deep, filling the bottom with broken bricks, crockery, etc., for drainage, and the balance with an even mixture of earth and manure. Roses are best planted in the fall, but as far north as the New England States the planting of all tender varieties must be delayed until spring. New plants are procured by layering, as directed for the grape, or by cuttings; or, as in many cases, by taking up and dividing the roots of a growing plant. In planting the nicest care should be observed in placing the roots. When planted in the fall they will usually be benefited by a winter covering of leaves or stable litter. Cut out all old and decaying wood in the spring. One gardener of our acquaintance recommends two hundred different varieties of the rose for general cultivation. The only remark we shall make in regard to selection, is, select a succession of varieties that will bloom through several months, and, as far as may be, select different colors; from that most beautiful of all roses, the white rose, to the dark purple, sometimes called the black rose. The flowering almond is a hardy shrub, loaded in blossoming time with pretty

pink flowers; it is easily cultivated from suckers or layers. The syringa should be grown in every yard, both for its pure white blossoms and its fragrance. It will grow from cuttings in any good garden soil. The lilac, spirea, woodbine, and honeysuckle are all worthy of a general cultivation, which can readily be done, as they require but little care if properly planted in the beginning. The gladiolus, dahlia, tulip, and like flowers require more care, as the bulbs must be taken up in the fall, and replanted in the spring; but their beauty warrants the use of some time that might otherwise be wasted. The bulbs are taken up as soon as the frost touches the plant and kept dry on a shelf in a cool place, or by packing in dry sand; and about the first of May should be brought out and sprouted in a warm spot, when the tubers should be divided. Each tuber that has a bud will bear a plant. They should be planted out in groups three and a half inches deep, and a stake driven beside them, to which they should be trained.

The peony is hardy, and requires only to be covered with straw through the winter to put forth vigorously on the first approach of spring. The althea or hollyhock, is a neglected but beautiful plant, we think more desirable than the dahlia. The seed should be sown in May, one-half an inch deep, and when the plants have put out six or eight leaves, transplanted. By saving and planting the seed of the double varieties, a mass of beautiful flowers of many colors is produced every season. China asters are to be highly recommended. The ground for these, as for all flowers, should be dug deep and well manured. They are sown in beds from the first to the tenth of May, and come into bloom in August.

The verbena is the most beautiful of all garden flowers for massing in beds; it is however difficult to keep through winter. We can only name a few of the many plants included in the

lists of nurserymen and florists, but it is well not to be deceived by high sounding names into buying common and inferior plants. There are enough well known plants like those we have mentioned to make a little paradise around every home. We come now to speak of a few indoor plants. If you have a south or east window that you can spare through the winter, you can raise the most beautiful plants. In cities where the light is excluded, and the dry furnace heat chokes the plant by day, and the gas by night, it is difficult to raise good house plants, but in the country, if you will, you can have them to perfection. Whatever they are, the soil should be the compost we have described. Whether in boxes or pots, the bottom should be covered with broken bits of crockery, and there should be a hole for the escape of the water. When the roots fill the box or pot, the plant should be taken out and a part of the roots cut off, or the plant should be transplanted where it will have more room. House plants, and plants in the garden, should be watered only with soft water, and the water should be applied to the leaves rather than the stem. The geranium stands first among house plants; it is propagated by slips, and the common fault in its cultivation is crowding. Give it light and air on all sides. The same may be said of nearly all indoor plants, which include the cactus, calla, crysanthemums, verbenas, and the various dwarf roses.

PART FOURTH.

RURAL ARCHITECTURE—LANDSCAPE GARDENING—MARKET GARDENING—
FARMERS' GARDENS—AND MISCELLANEOUS ITEMS.

CHAPTER XIX.

RURAL ARCHITECTURE.

FARM BUILDINGS are, in a sense, the measure of the farmer's thrift; for the farmer who "makes his farm pay" will see to it that his comfortable house and capacious barns give evidence of his prosperity. The HOUSE is often the last object of the farmer's care, but it should be the first; for though he is not much in it, his wife and children are, and if he has due regard for them he will see that every thing about the house is as comfortable and convenient as his means will allow him to make it.

Any thing that will lessen the labors or increase the comfort of his wife, any thing that will increase the attractions of his HOME to his children, is worthy of his careful attention.

The location should be the most convenient, healthful, and pleasant spot on the place, well set back from the road, and if possible near a lake, brook, river, or never failing spring of water. A house near the public highway is subject to many annoyances, which can be avoided only by setting it back three or four hundred yards.

The Foundation should not be slighted in any respect. Laying the timbers on boards is a miserable practice. Make the foundation strong, going below frost with the excavation for

the wall, and taking special pains to have the corner-stones large and solid.

Size of Timbers. A small stick of timber of the right shape is better than a big stick. In old houses the amount of timber is sufficient to build three or four just as strong. Much depends also on the form of joints in making a frame stiff. A three inch by four joist would be weak and insufficient, when the same lumber in a joist eight by one and a half inches would be strong enough to support a great weight.

Make the rooms high between joists; ten feet for the lower rooms is none too much, for low, close rooms are a constant source of disease. Put two ventilators in each room, about eight feet from the floor; fresh air will lessen your doctor's bill. The timbers of the frame and all the lumber used should be well seasoned. The farmer cannot be too particular about this. More bad-looking and unsatisfactory jobs are made by neglecting this particular than any other. Nothing detracts from the market value or the comfort of a house more than great cracks and shrinkages in the doors and floors.

We have advocated setting back the house; this will leave a large plot of ground between the house and the road, which should be filled with trees and shrubs. Nothing looks better here than a variety of well-trimmed fruit trees. In such a space the farmer may raise large and small fruits sufficient for a supply the year round, besides furnishing sauces, jams, preserves, and mild wines. If the walk to the house passes under several grape arbors it will add to the attractiveness of his place. Elsewhere will be found instructions for covering these arbors with luscious fruit. *Fig. 138* represents the ground plan of a very convenient farm house. V is the verandah, running across the whole front of the house. h is the hall, with doors opening into both parlor and sitting room. S, front stairs. S, sitting room. P

frame, and nail plank siding on, up and down. The planks should be of about equal width. Batten inside and out with inch stuff three inches wide. To the inside batten nail the lath.

A good cellar is the most cheaply constructed of any apartment in the house, and the others will see little comfort without it. The cellar bottom should be laid in cement or gravel. Gravel and tar floors are not only good for cellars, but for stables and walks.

The right way to make these floors is as follows:—Take a sufficient quantity of small stones, one or two inches in diameter, put them in a pile, and pour over them enough coal tar to coat them all, mixing them meanwhile with a shovel; then spread them over the floor, and rake to a level. They should make the floor about three inches thick. Now a quantity of coarse gravel should be coated with the tar, which can be done by pouring in a pile, making a hole in the top of it, pouring in the tar, and mixing with a shovel. There should be enough coal tar to coat both the stones and gravel, but no more, as it would require more time for the floor to harden. The gravel should be spread over the stones two inches thick. The whole should then be rolled with a heavy stone roller, till the floor is perfectly compact. The corners, where the roller cannot be used, should be beaten down with a mallet. While the rolling and malleting is going on the surface should be strewn over broadcast with fine gravel or sand, to take up the surplus tar. This process should continue till the surface is too dry to stick to one's shoes in walking over it. This kind of floor is water proof, frost proof and *rat proof*, and is, therefore, the best of any. The only objection to it, is that it emits a strong smell for some time; but this smell is healthy, and also helps to keep rats clear away from the barn or house.

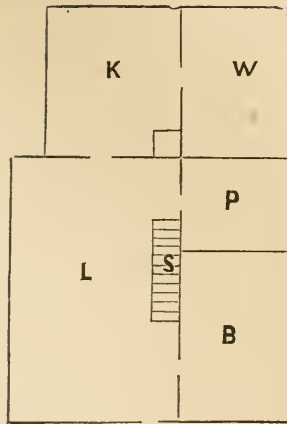
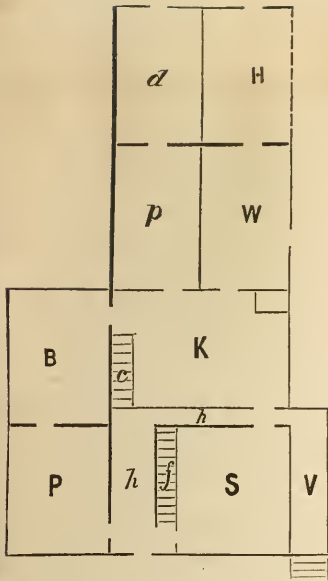


Fig. 139. PLAN OF FARM HOUSE. PLAN OF LABORER'S COTTAGE.

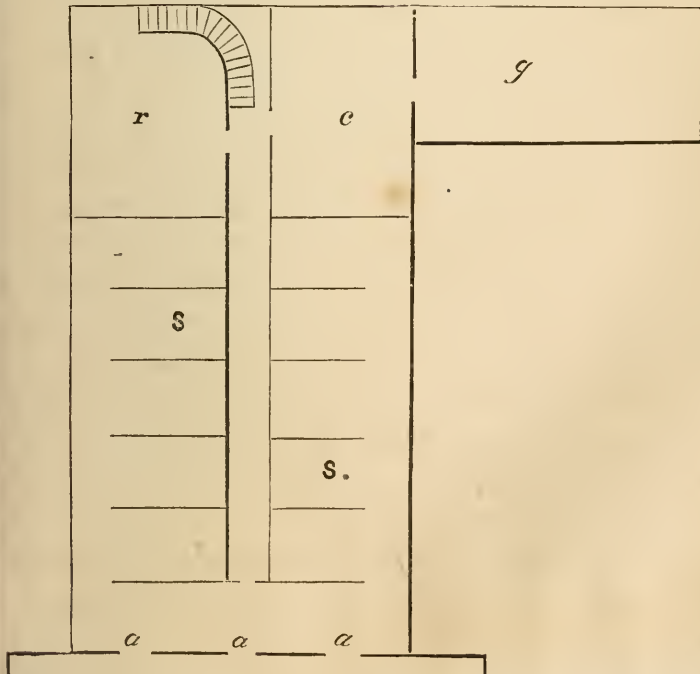


Fig. 141. GROUND PLAN OF BARN REPRESENTED IN FRONTISPIECE.



By the same process as the above, there can be made the very best door-yard walks, sidewalks, and street crossings. Not even the continual passing of teams over the street crossings, nor the heaving and subsiding of freezing and thawing mud hurt them. It only grows harder and more enduring continually. The smell soon passes away in the open air, and is no more trouble.

We have given elsewhere plans of a sheep barn, (*Fig. 85*), a piggery, (*Fig. 90*), and a poultry house, (*Fig. 97*.)

Fig. 141, is a ground plan of the barn represented in our steel engraved frontispiece. *a, a, a* are the doors seen in the engraving, leading into the barnyard. *s, s*, the stalls for cows and cattle. *r*, is the root cellar, *g*, the grain room, and *c*, the cooking room. The barn is in a side hill and the root cellar, cooking room, and granary are nearly all under ground.

The stable floors are made of gravel and coal tar, as described above, and have gutters running to the yard and connecting with the manure well. There is a cistern under the cooking room which is always kept filled from the roof troughs, and the stables are kept washed down. A large amount of liquid manure is saved, and is used as directed in *Chapter III*. This cistern also furnishes a supply of water the year round. The roofs of a large barn forty by sixty, will furnish three thousand barrels of water annually, which would require a cistern holding two hundred and forty barrels to be drained monthly.

Farmers often build small cisterns, and drain a large roof surface into them, keeping them constantly overflowed. A roof twenty by thirty will average one hundred and twenty barrels of water per month. The following, which we found in a Western paper, exactly expresses a great need at the West.

“Farmers in the West have not learned to appreciate the importance of barns, and the annual loss to them in consequence

is immense. But the deficiency of this important farm appendage is the natural result of the circumstances which attend the settler in a new country. The little capital that he sets out with is generally all required to secure his land and erect the humble tenement for himself and family. He may provide a rough shed of poles for his work horses, but his cattle must seek shelter in winter under the trees or behind fences; and his grain is threshed out in the field, as soon after harvest as circumstances will admit. His hay is stacked up near his stable, and thus, from what he is at first compelled to submit to from necessity, the habit of neglect is formed, and, in after years, when the circumstances will admit of providing such conveniences, he has arrived at the conclusion that they are not necessary.

“In travelling through portions of Pennsylvania, we have often been struck with the evidences of the foresight and economy of the early Dutch settlers, in providing barns of capacity sufficient for the protection of most of their hay and grain, their horses and farm stock, while their dwellings for themselves and families are small and of the most humble style.

“The loss sustained by the Western farmers for the want of suitable barns, amounts to many millions of dollars annually. Besides the injury to his hay and grain crops, he labors under great inconvenience, and is subject to heavy losses in feeding his stock during winter; and, besides this, his animals require much more food to maintain them in order through the winter than when they are comfortably sheltered. If they do not receive an extra amount of food, to keep up the animal heat during the long, cold winter, they consume the fat that they have accumulated through the summer, to supply the deficiency of food. Heat is maintained from one of these two sources, by a sort of combustion, analogous to the fuel in a stove, or the oil

in a lamp. If the fat is exhausted to make up for the deficiency of food, the animals are turned out in the spring, poor and emaciated; and if they survive the trying month of March, they will consume one half the summer in restoring the flesh they have lost. This is no fancy picture, but one that may be almost everywhere witnessed around us.

“Besides these losses and the numerous inconveniences the farmer is subject to in preparing the food and taking care of his stock, for the want of a well constructed barn, arranged with all the improvements of the present day, he loses an immense amount for want of shelter for his crops. In 1855 there were millions of bushels of wheat in the United States, either totally lost or greatly injured by exposure in the shock to the rains. This injury was so extensive, that in many sections of the country sufficient wheat—that had not been sprouted—could not be procured for fall sowing; and the query was made in almost every agricultural paper, whether sprouted wheat would answer for seed.”

A RAT PROOF CORN CRIB may be built by laying pillars of flat stones twelve inches square, two feet high, and capping them with smooth flat stones two feet square.

AN ICE HOUSE is not only a great advantage, in connection with the dairy, but there are many ways in which it adds to the comfort and economy of housekeeping. The ice house should be wholly above ground, and never less than twelve feet square on the inside. The walls should be double, with twelve inch space between them, filled with sawdust or tan bark. A double row of posts, ten feet long and set two feet in the round, answers as well as any thing else for a frame.

We could wish that more attention was paid to the position of farm buildings as affecting their looks. If they are arranged about a hollow square, and partially hidden from passers by

fine shade trees, it will be an advance upon the common, bare irregular haphazard appearance usually presented. Such attention to looks will pay, if you or yours should ever wish to dispose of the property to a man of taste.

We have already spoken of trees and arbors intervening between the house and the road. We hope this suggestion will be heeded. An osage orange hedge, in place of a fence, will add to the attractiveness of such a plot.

To any one who would really like to build a tasty house, or alter an old one with but little extra expense for ornament, we recommend a perusal of Mitchell's, ("Rural Studies,") Wheeler's, Todd's, Woodward's, or Allen's works on Rural Architecture.

CHAPTER XX.

MARKET GARDENING AND FARMERS' GARDENS.

MARKET GARDENING can only be carried on, on a large scale, within a few hours reach of large cities, but near all villages and incorporated towns there is always a moderate demand which is seldom fully supplied. And even if there were no demand beside that of the farmer's own table, a variety of fresh vegetables is so desirable, so wholesome, and so cheaply secured, that we should say to every farmer, keep a well stocked garden.

A good garden well stocked and well tended, in connection with the farm, is acknowledged by all experienced in domestic economy to be the most profitable portion of the farm, according to the expense and care required. Yet it is a portion which has been, and is, too much neglected by most farmers in this country, much to their loss, in both health and comfort. The time necessary to its successful culture is often wasted or lost in running to the store for articles that might not have been needed, had there been a good garden to go to instead.

Half an acre devoted to garden purposes will, if properly cultivated, furnish a large family with a considerable portion of their living from spring to midwinter, or till spring comes again; and instead of the more heating meats, stale bread, and old potatoes, to which so many farmers' families are confined in winter and spring, we have a successive and refreshing variety

of good, wholesome, fresh vegetables, fruits, salads, berries, etc.; and when the warm weather of spring comes, and the system requires a less stimulating, more cooling diet, we have a variety offered to tempt the appetite, which can be procured at so little expense or trouble, in no other way.

Not only should the garden contain, and have cultivated in it, the more common vegetables usually grown on the farm, but all the choice varieties, as also fruits, etc., desirable for family use, that can be grown in the climate.

The garden spot should, when a choice is to be had, have a gentle descent or slope towards the south, as this exposure is preferable on many accounts to any other. The effects of a slight frost are more readily recovered from, if the air gets gradually a little warmed before the direct rays of the sun strike the plants that may be touched. Protection ought to be afforded a garden from cold northerly winds, if in no other way, by tight high board fences, it is better if protected by woods, high hills, or buildings.

When the half acre is selected, it should be subsoiled or trenched, and, if at all inclined to hold water, it should be drained. (*See Chapter I.*, for advantages of draining.) Peter Henderson, in a work on market gardening, records an instance of eight acres, the products of which were increased two thousand dollars a year by drainage, which cost five hundred dollars. It would seem as if a word to the wise on this subject ought to be sufficient.

Next to the draining and deep plowing is the manuring, which should be liberal. The great advantages to be secured are earliness, large yields, and extra quality; none of these can be secured without plenty of manure.

A half acre intended for a garden should receive ten cords of good compost. Here is just the place for liquid manure, on the

growing crops. The garden being near the stables and yard, should receive many barrels of liquid manure during the season.

Each subsequent season this heavy manuring should be continued, but the compost should be varied. If manure from the hog pen is composted this year, use horse manure the next, night soil the third, etc. Rotation of manures is often as essential as rotation of crops.

COLD FRAMES. One-half the enjoyment and two-thirds of the profit in raising garden stuff is in having it early in the season. This is accomplished by means of cold frames or hot beds. The cold frame consists simply of plank, set on edge around the garden beds, and covered with sash. Two or three weeks can be gained by the use of these in growing early vegetables, lettuce, tomatoes, cucumbers, etc. Cold frames and hot beds should face south, or southeast, and be protected on the northeast and northwest by a tight board fence. We would advise every man to have a small hot-bed for forcing a few early plants. Dig a trench four to five feet wide, two feet deep, and ten feet long. Board it up with any old plank to eighteen inches above the level of the ground, making the portion above ground pretty tight. You can nail slats across the frames in any shape, to receive your sash. The heating material is fresh horse dung composted with its equal bulk of leaves. Draw them to the vicinity of the hot-bed and mix them in a conical heap, until they heat, which will be shown by the escape of vapors, when the heap should be turned over and left for the second heat. When this takes place fill the trench, treading down the compost till it is even with the surface. Now put on the soil six inches deep. A portion of the surface soil that was thrown out, mixed with one-third the quantity of old hog manure, will be the best.

Market gardeners use straw mats for covering their hot-

beds, but an old carpet or blanket or coverlid will answer the purpose. There is no part of the country where a variety of plants may not be started in March, by the use of the hot-bed.

POTATOES. A few early potatoes should be grown in the farmer's garden, as those usually eaten after the first of June are absolutely unwholesome. The farmer may also use his garden to test the qualities of any new sorts before he invests largely in them. Ashes in the drills, covered with one inch of earth, form a most fertile bed for the potatoes. We recommend the **EARLY ROSE** for garden culture, as the best early potatoe ever grown in this country.

BEETS should be sown only in a deep rich loam. Clay or gravel is not suitable. None but well decomposed manure should be used, with the addition of ashes and a little salt. An ounce of seed will sow over one hundred feet of drill very thickly. Two crops should be sown, one as early as the ground can be worked, and the other six weeks later, for fall and winter use.

The drills may be one foot apart, and when the plants get two inches high, they should be thinned. These little plants make the best of greens, and if a large bed is gradually thinned will furnish a daily dish for two or three weeks. The market gardeners make these small beets and tops pay for the labor of thinning the crop. Six inches apart in the drills is the distance at which they should stand, when the thinning is completed. They should be kept free from weeds, and for this purpose, and for all the operations of the garden, "Allen's weed killer" will be found a very efficient implement. The long smooth blood beet for the late crop, and the early blood turnip rooted beet for the early crop, are the two varieties we recommend. The seed is good two years.

CARROTS will usually pay about double the profit received

from potatoes as a market crop, and for the farmer's garden a few may well be sown in the poorest spot in the garden, as rich soil is apt to make them rank. Sow the Early Horn for the first crop, and thin, the same as directed for beets. The Long Orange is the best for later sowing and winter keeping.

TURNIPS for winter use should be sown about the first of August, but a few "purple top strap leaved" sown in May, or the first of June, afford a desirable addition to the summer table. For winter keeping, the White Dutch, Finland, Yellow Dutch, and White Purple Top are recommended. (*See Chapter VII.*)

ONIONS, though discarded from society, are too good to be banished, and we advise a bed of onions in the farmer's garden, by all means. The mode of cultivation is described on another page.

The PARSNIP is exceedingly desirable, as they may be left in the bed over the winter, and afford fresh vegetables as soon as the frost is out in the spring. The free use of the parsnip at this time is most beneficial to the system, after the somewhat limited fare of the late winter months. Its cultivation is the same as for the carrot and other vegetables of this class. Plant in rows one foot apart, and thin to four inches. A half ounce of seed is sufficient for a hundred feet of drill.

The RADISH is much esteemed in cities, and is desirable in every garden. It gives a relish to other articles of food, otherwise rather insipid. A light rich soil, deep and finely pulverized, will grow radishes in six weeks from the planting. Sow in drills an inch deep and six inches apart. Thin to two inches apart after they are well up. A drill six feet long sown in the hot-bed the first of March, another in the cold frame the first of April, a third in the open garden the first of May, a fourth, fifth, and sixth, at intervals of a month, between the rows of asparagus, will furnish your table daily from April to October.

ASPARAGUS. It is so easy a matter to secure a good bed of asparagus, that we should think every farmer's garden might be provided with one. The preparation of the bed requires some labor, but when it is remembered that it will last for twenty or thirty years, it seems small indeed. Lay out a bed in the warmest, mellowest part of the garden. Throw out all the soil to a depth of two feet; throw in a layer of well rotted compost, and then a layer of the soil, forking the two over in the trench. When filled a little above the level, mark rows *across* the bed an inch deep and twelve inches apart. Soak the seed in milk over night, and drop in the drills an inch apart. When the plants are two or three inches high, thin them out to nine inches apart in the rows. In the fall cut off the stalks and add six inches of compost, half manure and half soil. Add another dressing in the spring, and each succeeding spring. North of New York the bed should have a fall dressing to protect the plants from the frost. No plants should be cut for the first three years. Salt should be put on when the bed is made, and with each spring dressing.

CELERY. Sow in April in the cold frame, or May in the open ground. Thin and weed the plants until July, when they should be transplanted to rows three feet apart. When they attain twelve or fifteen inches in height, bank them up with earth from between the rows, pressing it closely about the stalks. As the stalks increase in height, add more earth. For winter use leave the stalks in the rows until there is danger of freezing, then remove to the cellar, covering all but the tops with dry sand. Never plant any of the large kinds. Incomparable Dwarf and "Boston Market" are the best in all respects.

LETTUCE. The universal cultivation of this plant leaves little to be said. It may be sown at various times from April

to July. When transplanted or thinned the plants should stand one foot apart. The seed only requires to be covered with one-fourth inch of soil. The Early Curled Simpson for early sowing and the Curled India for late sowing are the best varieties for garden culture.

PEPPERS should be sown in the hot-bed in March, or the cold frame in April, and planted out as soon as the ground gets thoroughly warm, in rows two feet apart, and eighteen inches apart in the rows. The Squash Pepper is the most productive and the Sweet Mountain the largest and mildest flavored.

RHUBARB or Pie Plant is exceedingly convenient for making pies at a time when nothing else is available. Five heads will supply a family of twenty persons. All that is required is to set out a piece of root and it will grow. Dig the soil deeply, manure it richly before putting out the plant, and fork in a quantity of heating manure every spring. Market gardeners apply one hundred tons of manure to the acre, and realize an average *profit* of three hundred and fifty dollars per acre.

TOMATOES, in this latitude, may be planted in the cold frame in April, or the hot-bed a month earlier. They are now in universal favor, and an early crop is always in the market at good prices. A few plants will suffice for an ordinary family, and these can be started in a box, in some warm, protected spot. The ground, if in good fertility, should not be enriched for the plants, as they will run to tops. The old early smooth red, and the later large red and large yellow, are as good as the modern varieties.

BEANS are, perhaps, as generally cultivated as any garden crop, and yet but few cultivate them rightly. They contain a larger proportion of nutriment than any other plant or vegetable, and as a garden or field crop deserve more attention than they get. All beans require a light, mellow soil, *well enriched*.

A wet, cold soil, or a barren soil, is no more fit for raising beans than for wheat; and the product of an acre in beans will support life nearly twice as long as the product of an exactly similar acre of wheat. The Lima is the best garden bean; but the ill success of many gardeners in raising them has brought it into disrepute. There is no trouble, however, if rightly managed. Dig the spot intended for Limas the last thing in the fall. Set down your poles as soon as the ground will do to work in the spring, three feet apart each way. Grease your beans, by turning on to them melted fat (not hot) of any kind, and plant six to a hill, with the eye down. If all the beans sprout, pull up two, leaving four plants at each pole. The greasing prevents their rotting, which has been the great objection to them. The Dwarf Bean is planted in drills twelve inches apart; two inches deep and six inches apart is about the right distance to drop the seed. If the drills are directly underlaid with hen manure or night-soil compost, the growth will be rapid and the yield large. For string-beans, the Indian Chief is preferred. The Concord and Rhode Island Butter bean are desirable for shelling. Beans should be hoed often, but never when the leaves are wet. It is best not to plant them until the ground is warm, as they are not hardy like peas. A succession may be planted from May to August, and the table constantly supplied with corn and beans. We shall speak of the culture of beans and peas as a field crop in another place.

PEAS may be sown as soon as the ground can be worked in the spring, even if it freezes up and is covered with snow afterwards. If the ground is trenched two feet deep in the fall, it will be several days earlier in the spring. Warm, light soils, moderately enriched by stable manure or bone dust, are best adapted to the pea; but if the ground has been manured the year before, no further manure is desirable. For the early

crop sow the Daniel O'Rourke or Tom Thumb. Get some in just as early as you can, and then sow a few every two weeks until July. The early kinds will need no brush. The best varieties for later planting are the Champion of England and the Marrowfat. In planting peas, soak the seed in warm water from twelve to fourteen hours before planting. The rows of the smaller kinds may be six inches apart, but the large kinds should not be less than twelve inches apart, and three inches apart in the rows, for garden culture.

SWEET CORN needs no recommendation—every body uses it, but farmers' gardens usually get but one planting; whereas if a few hills were planted every two weeks from the first planting, there would be a constant succession of "roasting ears." Stowell's Evergreen, and Early Darling, are two excellent varieties. Pop-corn is also desirable, as it affords, without expense, an evening treat throughout the year. The winter evenings are made bright and cheerful for the girls and boys by means of pop-corn, molasses candy, and such simple pleasures; and who can tell what influence these bright home scenes may have in turning the young away from sinful pleasures, the bar room, and the gaming table.

The CABBAGE requires a rich loam, and lime. Pound up your oyster and clam shells as fine as may be with a sledge hammer, and put them into the soil, but, until they are decayed, apply lime and barnyard manure. Sow the seed in the cold frame, or, after the ground is warm, in the open garden. Transplant to rows two and a half feet apart, and two feet apart in the rows. The frequent application of liquid manure to these plants will produce an astonishing growth. In the garden is a good place to try the value of the liquid manure we recommended in *Chapter III.*; and you will soon see that one half your manure has been going to waste, at a great loss.

The Wakefield and Early York are the best early varieties, and the Drum Heads and Savoy the favorite late kinds. These last are not planted until May, and transplanted in July.

The CUCUMBER, though tabooed by the Doctors, is still a favorite, and if used for nothing but pickles, is still almost indispensable. Every good housewife appreciates a jar of cucumber pickles. The holes for planting cucumbers should be dug about eighteen inches deep, and filled with a mixture of soil and rotted manure. A shovelful of night soil in the bottom of the hole will do wonders. Fill up the hole to two or three inches above the level, and in this raised mound plant a dozen seeds, covering them an inch deep with fine dirt, patting it down with the spade. When the plants are up, thin them down gradually to the four strongest ones. The White Spined and Early Frame are the best early varieties, and the Early Cluster where pickles are the main object.

SQUASHES and MELONS should be planted in the same way as cucumbers. A few early melons might be started in the hot-bed, then transplanted to the cold frame, and finally to the garden. After the hot-bed is disused, a hill of cucumbers, melons, or squashes might be planted in it. The Hubbard Squash should have a place in every garden, as most delicious pies can be made from it all winter. A few watermelons and muskmelons can be raised in almost every garden, and are an inexpensive luxury. If any one is entitled to such luxuries it is the farmer surely.

THYME, SAGE, SUMMER SAVORY, and SWEET MARJORUM should also be grown in the farmers' garden for the accommodation of the housekeeper in her seasonings. The Thanksgiving turkey or the Christmas goose cannot be just right without them. All stuffed and baked meats are improved by their use. The seed is sown in May, in rich, mellow soil, and

the plant kept entirely free from weeds until they are transplanted in June or July. Set twelve inches between the rows and eight inches between the plants. Keep down all weeds by the frequent use of a rake. In September, cut every other plant.

Having now given directions for the home garden, we wish to speak of those crops which it will pay the farmer to cultivate as "field crops" for town or city market. And we would say here, that a wide field is open to Southern cultivators in supplying the Northern markets with early vegetables and fruits, melons, etc. Any crop that will ship and that can be brought to New York City a few days before it can be grown on Long Island or in New Jersey, must pay enormous profits. New York will pay extravagant prices for having an early supply. Nothing will so well pay the Southern people on the coast, or rivers, or railroads, as to devote their energies to the early production of garden crops.

MARKET GARDENING may be so conducted as to be very profitable, but the cultivator cannot calculate upon extraordinary profits with ordinary cultivation. Constant attention and large outlays are required to secure large crops and large profits. Two hundred and fifty dollars per acre is the lowest estimate at which we put the cost of producing the most profitable crops, and, as a rule, the man who can spare but five hundred dollars on his crops should cultivate but two acres, and in that proportion for a larger working capital. Some few farmers may, perhaps, get good profits from a few acres with less outlay.

An average profit of four hundred dollars per acre has been realized, for ten years, by the market gardeners about New York, where competition is greater than anywhere else in the country. If the soil has not been drained the expense will be

greater; but drainage is a permanent investment, more permanent and more certain than any other the farmer can make.

Seventy-five to one hundred tons of manure per acre is used by the regular market gardener, who raises two or three crops on the land thus manured. Mr. Henderson makes the following estimate of expenses and receipts per acre.

EXPENSES.

Labor \$300, horse labor \$35	\$335.00
Seventy-five tons manure	100.00
Rent, seeds, and tools	70.00
Cost of selling	100.00
	<hr/>
	\$605.00

RECEIPTS.

12,000 Early cabbages at five cents per head . . .	\$600.00
14,000 Lettuce at one cent per head	140.00
30,000 Celery at two cents per head	600.00
	<hr/>
	\$1340.00

Leaving a profit of \$735.00.

"A crop of early beets or onions, followed by sweet herbs or horseradish, would have given about the same results." Three hundred dollars per acre seems a large sum for labor, but it comes back with interest. One half of this amount for labor and fifty tons of manure might serve for the farmer, as he will not be likely to crowd the crop to such good advantage as the regular gardener.

The manure is prepared by the hogs, as follows: A manure yard is laid out, dug out two feet deep, and enclosed by a board fence six feet high. The green manure is thrown in pretty evenly; also, refuse chips, muck, peat, sods, bone shavings, and all animal and vegetable matter. Enough hogs are kept in it to keep it constantly worked over, and these hogs are fed the

refuse vegetables, tops, etc. Peruvian guano and bone flour are the best fertilizers; but the farmer can make manure cheaper than to buy it, and we refer him to *Chapter III*. Henderson relates the following: "It is a grave blunder to attempt to grow vegetable crops without the use of manures of the various kinds in about the proportions I have named. I never yet saw soil of any kind that had borne a crop of vegetables that would produce as good a crop the next season without the use of manure, no matter how rich the soil may be thought to be. An illustration of this came under my observation last season. One of my neighbors, a market gardener of twenty years' experience, and whose grounds have always been a model of productiveness, had it in prospect to run a sixty-foot street through his grounds. Thinking his lands sufficiently rich to carry through a crop of cabbages without manure, he thought it useless to waste money by using guano on that portion on which the street was to run, but on each side sowed guano at the rate of twelve hundred pounds per acre, and planted *the whole* with early cabbages. The effect was the most marked I ever saw; that portion on which guano had been used selling off readily at twelve dollars per hundred, or about fourteen hundred dollars per acre, the other hardly averaged three dollars per hundred. The street occupied fully an acre of ground, so that my friend actually lost over \$1,000 in crop by withholding \$60 for manure." Another fact stated by the same gardener is, that head crops, as cabbage, lettuce, etc., should be followed by root crops, and *vice versa*.

If our Southern friends will commence careful cultivation and heavy manuring, with a view to bringing large early crops into our Northern markets, they will find it abundantly profitable. The crops to which their attention should be thus devoted are beets, cauliflowers, radishes, cucumbers, peas, beans, sweet corn, onions, lettuce, tomatoes, early

squashes, early potatoes, sweet potatoes, cabbage, and melons. To these the Northern farmer can add asparagus, carrots, turnips, spinach, rhubarb, horseradish, and watercresses. We shall describe the approved methods of culture adapted to both North and South. The culture of carrots, turnips, beets, potatoes, and sweet potatoes has been given in the Chapter on roots. The main object now being earliness, larger quantities of manure and more thorough and careful cultivation should be given, and two crops taken from the same soil yearly. It is better to cultivate five acres thus liberally than to give ten acres ordinary cultivation. The implements required are Allen's cylinder plow; the subsoil plow, the marker, (*see Fig. 66,*) as in cotton culture, only with small teeth and but six inches apart; the harrow, with fine teeth on one side and short coarse ones on the other; a hand roller for covering the seed; the digging fork with flat tines; the scuffle hoe; Allen's "weed-killer" hoe, (*Fig. 50;*) a steel or iron tooth rake; a seed sower, (*Fig. 48;*) and a dibbler. The latter is made of a crooked stick, two or three inches in diameter, and the point shod with iron.

ASPARAGUS. Sixteen to eighteen thousand plants are set to the acre, requiring five to six pounds of seed. One pound of seed then will produce plants enough for one-sixth of an acre, and you can regulate your sowing accordingly. The plants are first sown in a seed bed, and transplanted the second season. The ground should be thoroughly prepared.* Drop the seed in rows one foot apart. The "marker" makes them only six inches apart, but every other row can be omitted. Keep the plants

* To avoid repetition, we shall suppose that all ground for vegetables will be plowed deeply and *sub-soiled* and (unless we state otherwise) heavily manured also. Fifty tons of stable manure per acre, or its equivalent in fertilizers, is the smallest amount we shall designate. Any exceptions to these rules will be noted, as we proceed.

carefully hoed and clear of weeds *all the time* during the first season's growth, and they will be ready to transplant the second year; otherwise you must wait till the third year. Transplant as early in the spring as the ground is in working order, setting the plants in two-foot rows, and eight inches apart in the rows. The trench, or drill, in which they are set, should be wide enough so that the roots can be spread out, and deep enough so that the crown of the plant shall be covered about two inches. Sow one hundred pounds of refuse salt per acre on the beds in the spring. Fork in five hundred pounds per acre of superphosphate of lime. (*See Garden Culture.*) Do not gather any the first year, and only moderately the second; after that cut until it begins to spindle. Cut it always below the surface and with a slanting cut. One thousand dollars per acre clear profit is often realized from this crop by the market gardeners. It always meets a sure sale at remunerative prices.

BEANS. As we have before stated, the bean is the most nutritious of all vegetables, and is profitable food for man and beast. They bring a good price, and the market is never full. The common white bean can be grown on any corn land, and needs no more manure and less labor than corn. They should be sown at about the same time as corn, in drills from two to two and a half feet apart, and from three to six inches apart in the drills. If a seed sower is used and the seed distributed evenly, three pecks per acre is sufficient. Cover the seed with the roller.* As soon as the plants get two or three inches high, go through with a cultivator and hand hoes, and clean out every vestige of weeds. When the weeds show again, repeat the process. At the next cultivating turn up a light furrow against each side of the row.

Beans may be harvested by mowing or cradling them when

* All seed had best be rolled after planting.

most of the pods are ripe, and before they begin to open; they should then be thoroughly dried, and threshed on a clean floor. Care must be taken to avoid loss from scattering during the drying, and they should, if possible, be sheltered from rain during this curing process. Where the crop is small, the pods are usually gathered by hand. In either case they must be very thoroughly dried by exposure to the sun or to the heat of a drying kiln before they are put up in bulk, in bags, barrels or boxes; for if any moisture remains in them they will be certain to heat and become mouldy and worthless. They should therefore always be kept spread out thin on a dry floor until they are completely cured.

The White Marrow we consider the best for field culture, although the Red bean is the one usually cultivated. The White Kidney and China Red Eye make good field crops, although not often so grown. Forty bushels per acre can be raised on good corn land with the same manuring and cultivation required to produce a good corn crop. The bulk of the Southern crop is shipped to New York in the green state for string beans, and meet a rapid sale at high prices. With increased attention to the crop it could be readily doubled and brought into market a few days earlier.

CAULIFLOWER and BROCCOLI are substantially the same thing under different names; the latter being planted for fall use, and the former for the summer market. Any soil that will grow early cabbages, will also grow cauliflower; but the latter being a more valuable crop will repay extra manuring and preparation. Watering in dry weather, even by hand, is advantageous. The gardeners of Charleston, Savannah, and Norfolk have a great advantage in raising these vegetables. The seeds are sown in September or October. In four or five weeks transplant into cold frames, and plant out in March or April.

The Northern gardeners do not get their crop in market until June. The sale is limited, but it pays fifteen hundred dollars per acre.

CABBAGES. It is a fact not generally known that cabbages are the largest and most profitable crop grown by the market gardeners at the North. The seeds are sown in September and the plants carefully wintered in cold frames, yet they pay a handsome profit. But at the South, where the temperature does not fall twenty degrees below the freezing point, the seed can be sown in the open ground in October, and planted out on the first opening of spring.

Put out the plants in rows twenty-four inches apart, and sixteen inches apart in the rows. Set the plant down to the first leaf, so that all the stem will be covered. Between the rows, lettuce plants can be set out twelve inches apart. The lettuce will all be off in six or eight weeks, before the cabbage is large enough to occupy the ground, and the cabbages are off soon enough to plant a second crop. A crop of cabbage and lettuce so raised will often bring one thousand dollars per acre. Late cabbage is a crop the Northern farmer can raise; the soil and cultivation is not so important. Sow the seed in May, and plant out in July in rows three feet apart, and two feet apart in the row, and work the crop with the cultivator or light plow. On Long Island they are set out after a crop of peas or early potatoes have been removed. Eight to twelve tons of stable manure is put in the rows. As the early cabbages are raised at the South and shipped North, so the late cabbage grown at the North are shipped South. Both early and late varieties are named in "*Garden Culture.*"

EARLY SWEET CORN can also be raised to advantage at the South for the Northern market. Where the planting can be commenced in April the crop, if highly manured, can be brought

forward at least a month earlier than it can be raised at the North. Plant as soon as the weather is settled, and plant only so much as you can faithfully attend. Earliness is the main point, and faithful cultivation hastens its maturity. We prefer drill sowing in rows four and a half feet apart, and six to eight inches apart in the drill. Northern farmers can realize double the profit from sweet corn sold green that they can for ripe corn, besides getting the whole off in time to sow turnips for a second crop. The stalk of the sweet corn is much more nutritious than that of the common corn, and it is as fodder that we chiefly recommend it to the farmer. Sow a few acres in drills or broadcast, and it furnishes a fodder excelled by nothing else that we know. Early Darling and Stowell's Evergreen are the best market varieties, but any sugar corn will answer for fodder.

The CUCUMBER is well fitted for Southern culture, and the profits on an acre in cucumbers, ready for market a month earlier than they can be raised near New York, will exceed the average profit on ten acres in cotton. A new method of forwarding the plants, originated by Mr. Henderson, is to plant the seeds on reversed sods, in cold frames, covering them with half an inch of rich mould. The sods are two or three inches thick, and three seeds are planted to each sod of four inches square. The seeds are sprinkled thoroughly with a watering pot, and the sashes kept on until the plants come up, which will be inside of a week. They should now have air daily from nine to three o'clock, for two or three weeks, when they can be planted out in hills, three feet apart each way. In the vicinity of New York this cannot be done before the first of June, while at Charleston it might be done a month or six weeks earlier, the seed being sown early in April. When set out they should be manured in the hill. (*See Garden Culture.*)

Immense quantities of later cucumbers are used for pickling, and we have before us the advertisement of a Chicago house for five hundred acres of cucumbers for pickles. In growing them for this purpose, land from which some early crop has been taken can be used, and the cucumber seed planted at any time from the first of June to the last of July. Mark out the ground as for corn, four feet each way, and add a shovelful of well rotted manure, dug in at each angle where the hills are to be. Sow about a dozen seeds in each hill. The Gherkin and Early Cluster we deem the best for extensive cultivation.

HORSERADISH is one of the most important and most profitable second crops of the New York gardeners. The average weight of the crop is five tons per acre, and the average price two hundred dollars per ton; and, notwithstanding there are over two hundred acres grown near New York, the price has steadily advanced for twenty years. The following is a summary of Mr. Henderson's method of cultivation: "In preparing the roots for market in winter, all the rootlets are preserved, cut in pieces five inches long, and put away in sand. Tied in small bundles, and a layer of sand between each bundle, they will not heat, if kept in boxes in a cool cellar or buried in the open ground. After the cabbages or cauliflower are set, these rootlets are set between the rows, usually about the first of May. The planting is done with the crowbar; a hole being made eight inches deep and the root dropped in so as to be two or three inches under the surface. It can be grown between the rows of beets or any other vegetable. It should be dug the same season, just before the frost closes up the ground. Grown in the deep rich soil of our market gardens, horseradish has been, for the past twenty years, one of our most profitable second crops."

LETTUCE may be sown the middle of September, and a month

later planted in cold frames for winter, or sown in the hot-bed in early spring, February or March, transplanted to the cold frames in April, or in the South to the open ground. If not set between the rows of cabbages as before described, place them in rows, one foot apart each way. For after crops the seed may be sown in the open ground. The Early Curled Silesia is preferable for fall sowing. The Simpson is a trifle earlier, but not so good. The Tennis Ball is the proper variety for early spring sowing in the hot-bed, and the Green Winter, Curled India, and No Plus Ultra for spring and summer sowing.

MELONS are legitimately a farmer's crop. The grounds of the market gardener are too valuable for melon growing. Melons require a sandy loam, and but half the amount of manure required by the vegetable tribe, say twenty-five to fifty tons of stable manure to the acre. They should be planted in rows marked out as for corn, with a portion of the manure in each hill, and cultivated the same as for corn. The Southern cultivators will do well to force their crop, planting their seeds on reversed sods, as directed for cucumbers. Watermelons received in July can be sold by the million in the New York markets, at from fifty cents to one dollar each.

The Black Spanish watermelon is one of the earliest and best varieties. The Mountain Sprout is a large, handsome and productive variety. Skillman's Netted is the earliest of the muskmelons, and the Borneo the largest. The Green Citron, Nutmeg, and White Japan are excellent, and the Persian is a favorite Southern variety. Great care should be observed in selecting melon seeds, as directed in the latter part of this Chapter.

ONIONS form one of the few crops that should be grown on the same soil for a succession of years. The early crop of half ripe onions is the crop for the market gardener, and the Southern cultivator. For producing this crop, seed is sown very

thickly in poor soil, early in spring, and taken up about August, when they will be about the size of a walnut, and smaller; the smaller the better. These "sets" are dried and housed until the next spring, when they are planted out early, in highly enriched and thoroughly pulverized ground, three inches apart, in drills nine inches apart. The drill should be deep enough so that the bulb can be covered with earth, which should be rolled over them with the hand roller. Twice hoeing and weeding is usually sufficient in clean ground, but the weeds should be kept down until the onions are half grown, say in May at the South, and in June at the North, when pulling may be commenced.

Field cultivation is described nearly as follows, by one of the largest onion growers in Fairfield County, Connecticut, Mr. J. B. Wakeman: "Select a deep loam if to be had. Avoid wet clay, stoney land, or side hills. Cultivate the ground for two years with some hoed crop; I prefer corn one or two years. It should be highly manured, and not a single weed allowed to go to seed. When the corn crop is gathered, prepare the ground *in the fall* for the next year's crop of onions, by putting on twenty cart loads of well-rotted manure, fifty bushels to the load, per acre. It should be free from weed seed, and ploughed in deep, and not harrowed in the fall. I have plowed my ground both spring and fall, manuring at the same time. It is not more than half the work to prepare ground for the seed that was plowed in the fall, and the yield is as good, if not better. Hog manure is the best, but any kind of strong manure will do. All manure should be free from seed. Manure, either fine or coarse, should be ploughed in deep. If ashes are to be had, put on one to two hundred bushels to the acre. The crop of onions will pay for them the first year, and they will last from five to eight years. Bone dust is a fine manure. The ground in the spring should

be prepared for the seed as soon as it is dry, by harrowing with tooth and brush until the ground is level. It needs to be very mellow, about an inch deep, and raked off level. It requires from three to four pounds of seed to the acre. I sow them by a machine made very simple, and costing from two to four dollars. It sows two rows at once, twelve inches apart. The first row must be perfectly straight, which will be a guide to the second, and so on. To cover them up, I take a hoe that stands in well, and push it along over the line where the seed is. When they get up so that I can see the rows, I commence hoeing them, and as soon as there are any weeds to be seen weed them; and continue to hoe and weed as long as there is a weed to be seen. It will not pay to sow a piece of onions if they are not taken care of, and no crop pays better if well tended."

The main points are to prepare the land very thoroughly, to put on a large quantity of manure, and not less than fifty bushels of ashes, and to keep down the weeds. Six bushels of salt to the acre, after the first hoeing, is beneficial. After the crop is gathered, free the land from weeds; let none go to seed. To keep onions in the winter, store them so that they will have a circulation of air around them, and still not be subject to freezing and thawing. The Danvers Yellow is the best onion, and the Red Globe, or Wethersfield Red, the most profitable one grown.

Onions are the most profitable crop that a farmer can raise, and the quantity has been increased from three hundred to nine hundred bushels per acre, and I think one thousand bushels or more can be grown by proper cultivation. Red onions are now wholesaling at three dollars per barrel, and white ones at four dollars per barrel. One year I sold my onions at one dollar a bushel, and sent them to market in the fall before housing. I have sold red onions as high as five dollars a barrel, and white ones at six dollars. There has been no time

within twelve years, but that onions would bring two dollars a barrel in the course of the year.

PEAS. (*See Garden Culture.*) A crop of early peas can be taken off in time to get in a crop of late cabbages or turnips. It is a good crop to raise, for it benefits the soil, and the tops of both peas and beans are good food for stock, and excellent fertilizers if plowed under green. Peas are good for horses, sheep, or any other stock, and what cannot be sold at good prices in market can be profitably used at home. Early peas bring enormous prices, and if our Norfolk friends can supply the early demand they will find it remunerative.

RADISHES, grown at Norfolk and received at New York in advance of Northern cultivators, bring an average of ten dollars per barrel, and, as there is no danger of glutting the markets, we advise increased cultivation. The seed is sown broadcast and harrowed in. The ground therefore requires thorough preparation. The crop comes off in time for a second crop of later vegetables. The long Scarlet Short Top, Scarlet Turnip, White Turnip, and Scarlet Olive Shaped, are the best varieties for extensive cultivation.

RHUBARB requires the *deepest* cultivation and the *heaviest* manuring. Any piece of a root that has a bud will make a plant. Set either in fall or spring, in rows three feet apart each way. Plow in stable manure in the fall or spring. Three hundred and fifty dollars per acre may be realized from it for a number of years. It is extensively grown in some localities for wine. By setting barrels without heads over the plants in the fall and filling them half full of hay, to be taken out as soon as hard freezing is over in the spring, very early and tender stalks will be secured. Leave the open barrels over them until it is settled warm weather.

SPINACH for early spring use is sown late enough to get half

grown before winter. (September 15th, in the vicinity of Philadelphia.) Sow in drills one foot apart. That for later use is sown in early spring between the rows of early vegetables; it requires little labor, and is readily sold about six weeks after sowing. It pays about three times the profit of potatoes on the same soil, but requires more manure.

SQUASHES as a farm crop should be much more largely grown, for none of the large markets North or South have ever been supplied. The Boston market is perhaps more nearly supplied than any other. A light warm soil is best suited to the squash. A clay, if not too heavy, may be so ameliorated by sand, drainage, and high manuring as to be made to produce a fair crop. A drained meadow will produce a large quantity of almost worthless squash, unless large quantities of sand and loam are worked into it. A sandy loam, moderately gravelly, gives the best results. On such lands the squash will do well on freshly broken sod. Manure, not in such large quantities as required for some of the other crops, but at the rate of at least ten cords to the acre, should without fail, be applied. Night soil is the best; hen, pig, and sheep dung next, and barnyard manure, muck, superphosphate of lime, guano, and wood ashes, about equal in value. Night soil should be thoroughly composted with muck or loam as directed in *Chapter III*. If the soil is very sandy, the hill should be filled with peat; excellent crops have been raised on sandy plains by this method. Wood ashes should not be mixed with the other manures until just before they are applied.*

Guano, superphosphates, and other concentrated manures are applied directly in the hill, before planting, but the bulk of the manure should be plowed or harrowed in broadcast; for the

* See note at close of Chapter III.

roots run as far as the vines, and should find food wherever they go. The ground should be mellowed by the harrow, clod crusher, and roller; then the manure spread and harrowed in, or plowed under with the cultivator. Two great mistakes are usually made in planting: the hills are too near, and unnecessary labor is given in preparing them. The hills for the mammoth varieties should not be less than twelve feet apart each way; the Hubbard, Turban, and Yokohama, ten feet; the smaller marrows, eight feet; and the summer varieties, four to six feet. A chain dragged across the field each way, at the above distances, will mark the places for the hills, where the lines cross. A small hollow like a plate is made at these crossings, and a handful of guano, or one of the other fertilizers, thrown into it; a shovel of earth is thrown onto this, and the whole thoroughly worked together with a flat-tined fork. Unless this working of the fertilizers into the soil is thorough, there is danger of heating. Plant four seeds (*no more*) in the hill, and when the plants are out of danger of destruction from bugs thin to two in each hill. Keep the weeds down with the cultivator until the vines run so as to interfere, when the piece must be let alone. The first of May, in this section, is the time for planting the seed. Hoeing the earth in large quantities about the vines is a waste of labor, as just enough to steady the vine in the wind is sufficient. Summer squashes are sold long before ripening, and are of no value after the shell can be felt with the thumb nail; but winter squashes are to ripen on the vine. Ripeness is indicated both by color and by the drying up of the stem. When the stem is cut from the vine, the squash is turned under side up, and left for a few days to dry, unless there is danger of frost, when they must be brought into piles and protected. A house with double walls, double doors, and double windows, and provided with a stove, is the best for wintering squashes. If some

arrangement cannot be readily made for keeping them at an even temperature, they had best be disposed of in the fall. A very dry cellar will keep squashes well. The cellar of a barn on high ground, in dry soil, with double walls above ground, is a good store-room. The average fall price of the Hubbard squash is thirty-four dollars per ton in the Boston market, while in the spring they bring eighty to one hundred dollars per ton. There is nothing more delicious for a winter pie than the Hubbard squash, and it is as good as sweet potatoe when baked. The Turban and Yokohama stand next, and the Boston or Autumnal Marrow is quite inferior to them. The Summer Crookneck and the white and yellow Bush Scollop are the best summer varieties.

The TOMATO has come to be one of the most important of farm garden products. If Southern cultivators will force them in hot-beds, commencing the last of January, they may put them in market two or three weeks earlier than now, and realize a large profit from the operation. The following is the proper method of culture; the only difference in the South being the date from one to two months earlier. Sow the seed in the hot-bed about the middle of March in the locality of Philadelphia. Previous to the last of April the plants will be large enough to reset in the cold frames; and four weeks later they may be planted out in the open ground, in light soil, three feet apart. A shovelful of the best well rotted stable manure should be thoroughly mixed with the soil in the hill before setting out the plants. The Early Smooth Red and Cook's Favorite are the best early market varieties. The Red and Yellow Plum tomato are grown for pickling and preserving; for a late crop, where large quantities are desired for catsup and canning, the Large Red and Large Yellow are preferable to any others.

WATER CRESS. Many farmers in the vicinity of New York

realize more profit during a couple of weeks in spring from water cresses than for their whole year's work in growing farm crops. Any farmer who has water on his farm in the shape of a brook or pond will do well to plant water cresses along the margins. The seed can be had of any seedsman. If some patch suitable for cranberry culture is planted with water cresses instead, and flowed as directed for cranberries, several thousand dollars per acre may be realized from it, we have no doubt.

The growing, SELECTION, and PRESERVATION of SEED is a subject on which we have not touched in the preceding pages, but it is equally important in garden crops as in any of the heavier farm crops. With many of the preceding crops, as the beet, cauliflower, cabbage, carrot, lettuce, onion, and turnip, the seed are grown by setting out in the spring a plant of the previous year's growth. In all cases just such plants should be selected for seed plants as it is desirable to raise. If earliness is desired, select the earliest specimens that perfect, and let no consideration of price tempt you to part with them. Many of these crops can be made a week earlier by the careful selection of the earliest fine specimens. If size is desired, select the largest and best shape for the seed. The shape of the red onion has been entirely changed within a few years by this selection of seed specimens. With the squashes, melons, and cucumbers the same is true; select the very best specimens for seed. The seeds of the melon class are not ripe when the plant is, but ripen upon the inside for some time after gathering. The earliest beans, peas, corn, tomatoes, etc., are rushed off to market, but they should in all cases be retained and ripened for seed.

Purity of seed is a matter of the greatest importance to the gardener, and each had better raise his own. Of course the late ripened specimens will produce later crops than earlier ripened ones. Another point is to have the seed free from other varie-

ties; two varieties grown in close proximity will mix in spite of all you can do. The melon and squash are particularly liable to this. *We should never have any crops of these, or in fact of hardly any other vegetables or fruits, were it not for the busy bees, who carry the pollen from one plant to the other; but they are just as liable to mix two varieties as two plants.* Great care should therefore be taken to separate differing varieties of the same species, else a crop of Hubbard squashes may turn out to be half pumpkins. There are a few regular and reliable seed growers, from whom it is safe to order what you want, but not from the stock of the seedsmen.

Seeds should be thoroughly dried and kept in a dry, cool place. Thus kept, beans, peas, peppers, carrots, thyme, sage, and rhubarb are good the *second* year; asparagus, lettuce, spinach, and radish for *three* years; cauliflower, cabbage, celery, and turnip, *four* years; and beets, cucumbers, melons, squashes, and tomatoes, *five to eight* years. The following tables, taken from Mr. Henderson's work, will be exceedingly useful to the beginner in vegetable gardening. Amount of seed per acre:

	About.		About.
Beans.....	1½ bushels.	Radish, in drill.....	5 pounds.
Beets.....	8 pounds.	“ broadcast.....	10 “
Carrots.....	5 “	Turnips, in drill.....	2 “
Cucumbers.....	1 “	“ broadcast.....	4 “
Musk melons.....	1 “	Squashes.....	1 “
Watermelons.....	1½ “	Spinach.....	10 “
Onions.....	6 “	Peas.....	1½ bush.
Parsnips.....	8 “		

Number of plants from one ounce of different seeds:

	About.		About.
Asparagus.....	500 plants.	Celery.....	4,000 plants.
Cabbage.....	2,000 “	Lettuce.....	3,000 “
Cauliflower.....	2,000 “	Peppers.....	1,000 “

	About.		About.
Tomatos.....	1,000 plants.	Sage	1,500 plants.
Thyme	5,000 "	Rhubarb	500 "

Number of plants required to set an acre at given distances :

1	foot by 1	foot.....	43,560	2½	feet by 2½	feet	6,970
1½	"	1½ "	19,360	3	"	3 "	4,840
1	"	3 "	14,520	4	"	4 "	2,722
2	"	2 "	10,890	5	"	5 "	1,742
3	"	2 "	7,260	6	"	6 "	1,210

CHAPTER XXI.

MISCELLANEOUS INFORMATION.

UNDER this head we shall discuss various matters not coming under either of the previous heads, and shall also insert the opinions of several good authorities upon matters not coming within our own personal knowledge.

FENCES.—We build ten times too many fences. The fences on many thrifty farms are a great tax upon the owner. It is a useless custom. No fences are absolutely required, except the fence about the pastures and a few hundred rods of movable fence, that can be set up anywhere at short notice. Highway fences and division fences are an unmitigated nuisance. The great objection to them is their cost, but they also occupy good land and harbor weeds and briars; they are in the way in cultivating and harvesting our crops; the sooner we stop building them the better. We do not say tear down good new fences; but build no more, except extra high and strong ones around the pastures. But, says one, if the highway fences were down the cattle would destroy the crops. So they would, if allowed to run in the streets. But which can be done with the least trouble or expense, keeping stock in the pasture or keeping millions of dollars worth of fences? But the law requires that I should build highway and division fences. So it does; but in whose hands is the law? Yours. If the farmers demand that this burdensome system be done away, and more stringent laws passed in regard to restraining stock, it will be done. There are now communities where there are no fences, and we say to the new settlers in the West, and to the impoverished land owners of the South, do not let this burdensome tax be settled upon your industry, but repeat the cry, down with the fences.

FOREST TREE CULTURE is a matter of vast importance in agriculture. We have stripped the country of forests, diminishing its productiveness; and these forests must be in part replaced.

Mr. A. S. Fuller delivered the following address on forest trees, at a late meeting of the Farmers' Club of New York:

Eight years ago I had the pleasure of reading an essay before this club upon the subject under consideration to-day. I then called your attention to the importance of not only preserving those forests which we still possess, but to that of rearing others for future need. The hundreds of letters that I have received since that time, asking for further information upon the subject, have convinced me that our people are slowly but surely awakening from that careless indifference which has in many instances not only permitted, but aided in, the destruction of some of our most noble and valuable forests; and these, too, on land that is comparatively worthless for other purposes. Instances are not wanting to prove that thousands of acres of valuable timber is annually destroyed by men who have no use for the land after the trees are removed; at least they possessed more acres that are already cleared than they can properly cultivate. I do not now refer to the cutting of timber that is required for building or fuel, but to the many instances where the sole object in its destruction was for the purpose of allowing the proprietor to obtain a slightly lengthened view from his dwelling, or that which is more probable, pampering to that foolish weakness which is far too general among land-owners, for having it said that they possess a few more acres of cleared land. The first act of a settler in a timbered country is to clear away the forest, so that he may have land to cultivate and produce the necessaries of life. But he does not stop when he has accomplished this, but continues to cut and hew away at the forests as though it was the only object of his life, and as each monarch of the old woods falls to the earth, making it tremble with its weight, he imagines that the echoes which come back to him are so many plaudits to his industry. With many of our people destruction is synonymous with improvement. And there is no doubt but that the destroying of forests in our Eastern States has become a matter of habit with our people. The grandfathers, and in a few instances the fathers, of the present race of farmers cleared land because it was actually needed for cultivation; and as each successive generation imagined that it was incumbent upon them to make further improvements, they readily followed in the beaten path made by their ancestors, forgetting that an act which might show great wisdom at one time would be foolish imbecility at another.

The young man builds his dwelling upon elevated ground, and probably clears away the trees because they obstruct his view, for he values prospect more than protection; but later in life he will sigh for a few of those grand old trees to shield him from the burning sun of summer and the keen blast of winter. Is it not passing strange that a majority of mankind find no useful lesson in the history of the past, but continue to travel in the channel

which has been worn wide and deep by previous generations in their downward course to destruction. Entire countries have become barren wastes in consequence of the destruction of their forests; nations have become impoverished, and those beacon lights of greatness, the arts and manufactures, extinguished, and the sole cause was the scarcity of wood; and yet in regions where it is plentiful, the same improvident waste is going on, as though the supply was inexhaustible, and that no deleterious effects would result from a total annihilation. It would be folly for me to attempt to estimate the value of forests to any country, for it is beyond the comprehension of the human mind. The rain and dew that refresh and support vegetation, the rivers and rivulets that pour down from the mountains and hills, often owe their very existence to the great forests. This view of the subject, you may say, is only visionary and theoretical. Be this as it may, I would remind you of one simple fact, and that is—all we know of trees, or are likely to know of them, has its origin in the great primeval forests. It is by studying the natural distribution and characteristic of the different species that enables us to cultivate them successfully.

HEAVY SOIL FOR OAK.—We learn from nature that certain species of oak flourish far better upon a heavy, moist soil than in one of an opposite character; and the same is true of almost every other genus. The chestnut prefers the old red sandstone regions, and avoids the limestone, while the reverse is true with the hard maple and beech. The elm and soft maple grow more luxuriantly in the low alluvial soils near our rivers than elsewhere. By further investigation we find that the quality of the wood is greatly influenced by the soil upon which it is grown. For instance, hickory that grows upon a sandy soil is far more brittle and less valuable than when grown upon a rich, deep clay; but just the opposite of this is true in regard to the common locust.

GROWING TREES FROM SEEDS.—We also learn from nature some of our most practical lessons in regard to the growing of trees from seeds. A few species ripen their seeds early in the season, and these must be planted very soon thereafter, as they will seldom remain sound until the following spring. This is particularly the case with the elm. Swamp and silver maple, or their seeds, ripen about the first of June; but the sugar and negundo maple do not perfect their seeds until autumn, consequently they may be sown at that time, or preserved in any moist, cool place until spring. The different species of foreign maples, such as Norway, English, and sycamore, ripen their seeds about the same time as our sugar maple, and may be treated in the same manner. Chestnut, oak, hickory, beech, black walnut, butternut, etc., all ripen their seeds in autumn; and I believe it is the best plan to sow them soon after being gathered, unless it be in sections of the country where the land is liable to be frequently frozen

and thawed during the winter. In localities where the weather in winter is very changeable, all kinds of hardy trees seeds may be safely preserved in the following manner: Select a tight, strong box; in the bottom of this place a thin layer of sand; on this put a layer of seed; then a little more sand, and so on alternately until the box is full; nail on the cover, and then bury the box in the open ground, covering it a foot or more deep. A dry, sandy knoll is the best place, if handy; if not, set the box on the ground, and make a large mound of earth over it. The common sweet chestnut is generally thought to be a difficult seed to keep through winter, but, buried in sand as I have described, it will usually be as fresh and sound in spring as when first gathered from the tree. I have also preserved the chestnut and similar seeds by packing in damp moss, and then placing them in a cool cellar. Rats and mice are very fond of most kind of tree seeds, and they should be placed beyond the reach of these pests of the farm and garden.

VALUE OF DIFFERENT KINDS OF TIMBER.—It is scarcely necessary for me to call your attention to the fact that forest tree culture can be made a profitable business, even more so, in many localities, than any of our ordinary farm crops. Neither will you expect me at this time to designate the best species of varieties for culture, inasmuch as soils, locations and markets differ very widely, and each may demand a particular kind. For instance, the common white birch is usually considered one of the most worthless species of native trees; still, near some of our manufacturing towns, where its wood is used for making spools, it commands a much greater price than oak, hickory, chestnut and many similar kinds of timber. Even the much despised alianthus for some locations and soils is a most valuable tree. It grows rapidly even upon poor light soils; and although it does not attain a very large size, still its wood is well adapted to many other purposes besides that of fuel. There are many other similar instances that might be named where the local value of a species is far above its general one. But all these things will be learned in time, and the most we can expect at present is to call the attention of the masses to the importance of the subject, for we know full well that when our people become aware that there is a rich field open to them they are ready to occupy, and make it yield a full return. We have to regret that the art of planting forest trees has not received that attention from our people which its importance demands.

It may be said that, as it is a branch of horticulture, it is encouraged by nurserymen and all others who are engaged in the cultivation of trees. But I do not believe that arboriculture will ever reach the high position which it deserves until it is studied and encouraged as a separate profession. With your permission, I will at some future time give a few practical hints as to

the best methods of growing the different kinds of trees, as well as a list of the most valuable species and varieties.

ABOUT GATHERING NUTS—TIMBER GROWING, ETC.—Black and white walnuts should be gathered as soon as they fall from the trees, and planted at once, as follows:—Draw furrows six feet apart and three or four inches deep, drop the nuts from two to four feet apart in the row, cover them four or five inches deep and step on each one, or what is better, roll with a common two-horse roller; this packs the soil and prevents them from drying out, so that the frosts of winter will burst the shells, and most of them will come up the ensuing spring. Should any of them fail to come the first season, they are very sure to come the second. Besides these, the chestnut, and horse chestnut, and the beech nut may be obtained at a trifling expense from the States east of us, where the timber abounds, and the trees produced without any difficulty, if you are careful to prevent the nuts from becoming dry, by placing them in moist earth or sand, and keeping them secure from mice and frost till the time for planting in the spring; then plant the same distance apart as other trees, and cultivate two or three seasons so as to keep down all weeds; or, what is better, as soon as the trees are up a foot or two, mulch thoroughly with straw or slough hay. All trees, fruit, or forest thrive much better for mulching, as all trees in their natural positions, in groves or large tracts of timber, are annually mulched by the falling leaves, which keep the ground moist about their roots, except in long continued droughts. If we imitate nature in this respect, we shall doubtless find trees flourishing just as well in a prairie as a timbered country.

In addition to the above named, or any other of our deciduous forest trees, every man wants evergreens in proportion to his means to purchase, and the room to be occupied. But, in the second place, *where* do we want trees? If our location admits our building on the north or west sides of the road, we want thick belts of timber north and west of our buildings,—evergreens, if we can afford them, as being altogether a better wind-break than deciduous trees; but, at all events, *plant trees*, and plant them so close (two or three rows would be better than one) that after a few years they will prove a pretty effectual barrier to the cold blasts of winter, furnishing a grateful shelter to man and beast. If you have to build on the east or south side of the road you cannot have the same amount of shelter without obstructing the view of the road; but even in these situations, by no means the most desirable, by setting your buildings farther back from the road, if on the east side, plant north of your buildings a belt of trees as thick as they will grow, with rather more in front of the house than would be admissible if the house faced the east or south; likewise, if your house is south of the road, plant your trees plentifully on the west, but on the east and south of your

buildings plant few or no trees, especially near the buildings, for it is a fact well known to physiologists that all animals, human or brute, require plenty of fresh air and sunshine in order to a full development of their physical frames and the enjoyment of vigorous health. Indeed there can be no doubt that many an individual has passed away in the morning of life, and now fills a consumptive's grave, who, with plenty of pure air to breathe by night and by day, with suitable exercise every day with nothing to shield them from the sun and the wind but the broad canopy of the skies, might have lived to a good old age in the enjoyment of health and strength. I rather like the idea expressed in my hearing a few years ago, by a gentleman recently a graduate of one of our Eastern colleges, now pastor of a church in a flourishing town in an adjoining county, who said, if going to build a residence for himself, he should want it to face the northeast, southeast, or southwest, so that the sun might shine some part of each day in every room in the house. This may be considered eccentric or extravagant by some, but the suggestion seems to me worthy of consideration. Pardon this digression.

Furthermore, we want belts of forest trees, evergreens, (if we can afford it,) to protect our orchards, and if our orchards are large, rows of evergreens interspersed among our apple trees, and every man who has forty acres or more of land, wants a grove more or less for the sake of the fuel and timber it will afford, and for the protection it will give his growing crops as well. Should any object to planting trees as thick as recommended, let them remember that after ten or twelve years, if they appear too much crowded, it will be very convenient to cut out from the thickest places occasionally, as needed, and trees planted as thick as they can grow to advantage will be much more valuable for timber, growing taller and straighter. If it be true, as we read in the Good Book, that "parents ought to lay up for their children," surely no more imperative duty rests upon the present inhabitants of our beautiful prairie country than to plant trees for shelter, for fuel, for timber. For, treat the question of timber as we may, it is a fact that should be impressed upon the mind of every man, that as the population and wealth of the country increases, the want of machinery, particularly agricultural implements, increases in a much greater ratio. In the States east of us, where most of the timber is obtained for the manufacture of these articles, I speak advisedly when I say that the quantity is rapidly diminishing, and in many places it has quadrupled in value in the last twenty years. Would it not be well to pause and ask ourselves the question: Where are we to obtain the necessary supply for these purposes, (to say nothing of the amount required for buildings, furniture, etc.,) twenty-five or fifty years hence, when the demand in this Western country shall have increased tenfold? How much better for the rising generation,

and for the State as well, if some of those seeking a permanent investment for their surplus wealth, instead of laying it out in railroad stock, bank stock, mining companies, oil companies, in corner lots of paper cities, or in any of the thousand and one schemes invented to relieve people of their money, they should invest it in land on our broad prairies, improve it and plant with oak, walnut, ash, hickory, chestnut, wild cherry, etc. Surely their children and grandchildren would rise up and call them blessed, and more certainly than upon him who causes two spears of grass to grow where but one grew before, will future generations look upon them as benefactors of mankind.—H. G. NEAL, *Davenport, Iowa.*

RAISING TWO OR MORE CROPS TOGETHER.—Farmers with but little extra trouble can raise two or more crops upon one piece of land by selecting certain varieties that will not mix or draw the same substances from the soil, and in this way not retard the growth of the main crop, but greatly lessen the expense of producing it. Squashes, beets, dwarf peas, etc., will thrive finely with potatoes, while beans pumpkins, tomatoes, and turnips do well with corn. Melons, pumpkins, and squashes should never be planted together, or in the immediate vicinity of each other no more than sweet and common corn, for one will partake of the nature and qualities of the other to such an extent as to greatly deteriorate their value for the particular uses to which they are put.

The kitchen garden is valuable to every family, and should not be neglected by any, but much of the products usually grown there may be raised with tenfold less expense by the farmer in the field. Beans in the corn hill if planted with the corn, are raised abundantly without extra labor; turnips sown between the rows when cultivating the last time are grown with no trouble, and a tomato plant set beside each hill of corn on the outside rows thrive well, and when the vines are laden with fruit they may be tied up to the corn stalks, where the fruit will ripen to the best possible advantage.

Thus from a single acre a full crop of corn may be obtained, besides five or six bushels of beans, many loads of pumpkins and turnips, and all the tomatoes a dozen families could use. From the potato field a full supply of beets, squashes, peas, etc., are received without incurring extra expense, or adding but little if any labor to the cultivation of the main crop.

It is true that where land is heavily cropped, an extra amount of manure is required to keep up the fertility of the same; but every farmer knows that the more a single acre can be made to produce by manuring, or any other means, the greater profit it is to the owner. Where three hundred bushels of corn can be raised from four acres the crop pays, but when six or eight acres are required to produce that amount, it is not a paying business. We do not remember where we found the above extract, but we commend

the view of getting the largest possible amount from every acre by heavy and continual manuring.

THE CULTIVATION OF PEANUTS.—The extraordinary number of peanuts that have been brought to market this fall, says the *Southern Farmer*, induced us to make some inquiries concerning their cultivation, and the uses to which they are applied. The crop is one very easily grown, yielding a large product, and commanding good prices.

The price this season has been lower than for several years past, ranging from sixty to eighty cents per bushel, according to quality; but even at that price there is perhaps no other crop yielding so much profit. The soil best adapted to the ground pea is a moderately rich loam, neither very heavy nor very light. A stiff soil will not admit the stems bearing the fruit to penetrate it with facility, and a sandy soil is too thirsty. Again, if the soil is too rich, the tendency of the plant is to run to vine instead of the formation of fruit. Any soil of the requisite texture, capable of producing five or six barrels of corn to the acre, is well adapted to the growth of the ground pea without the addition of any manure. But should manure be used at all, it should be in small quantities.

The ground is prepared by laying it off in rows three feet distant, and very slightly ridging, as in culture of cotton. When manure is applied, it should, as in case of cotton, be put in the drill. Through the entire cultivation, the chief object should be to keep the ground clean of grass and as level as possible. The slight ridge on which the seed is planted will be nearly or quite worked down by the first hoeing. As the vines extend over the surface, it is necessary to keep the ground well stirred with a trowel, hoe, or other implement that does not turn it over. A couple of plowings and occasional working with the hoe is regarded a sufficient amount of cultivation—less than what is required for cotton, and not exceeding that of the corn crop.

As soon as the vine is killed by frost, the harvesting should commence. The first operation is to run a colter close to the vines on each side, for the purpose of loosening the earth. The plants are then taken up with a hoe, and laid bottom upward on the ground to dry. There they are to remain for several days until they are cured—the time being longer or shorter, according to the state of the weather. If it rains, it will do the crop no injury. When sufficiently cured, the vines should be packed away in a barn, or under any good shelter, where the fruit may be picked at leisure.

A fair crop may be regarded as about seventy-five bushels per acre, and is frequently as much as a hundred. Some of the farmers in the lower counties raise as much as five hundred or a thousand bushels. The crop has, to some extent, taken the place of cotton, requiring much less manure, and being more profitable.

A great advantage attending its cultivation consists in the value of the peas remaining in the ground after the crop is gathered. The hogs are turned on the field, where they thrive rapidly. So rich is the nut in nutritious matter, that many farmers think the portion remaining in the ground after digging is equal in value, as food for hogs, to the entire crop of corn the land would have produced.

MAKING THE MOST OF A FARM.—In every neighborhood a striking difference in the productiveness of farms may be noted; and this variation, when acre is matched against acre, cannot, in most cases, justly be attributed to the diversity of the soil, but rather to the effect of the methods by which the farming is conducted. It is the difference of character in the farmers, and of the objects they aim at, which are illustrated in their labor and its products. And various as are these methods and their results, yet we have little doubt but every farmer flatters himself that, considering circumstances, he is making the most of his farm. We will briefly sketch some of the various ways by which farmers strive to reach the same end.

One adopts the skinning process; his cultivation is shallow but spreads over a good deal of surface. In measuring land he never considers depth but breadth only; so he sows as many acres as possible, but slightes the work and grudges the expenditure of every dollar in that direction. A rich farm and fine improvements are not so desirable in his eyes as a *large* farm and money at interest. He farms at as little expense as possible, and makes his property,—if he is so fortunate with crops of wheat yielding ten bushels per acre, corn twenty, and grass a ton,—by saving and pinching. If he dies young he dies poor, but if he lives to an old age, by miserly economy he may amass considerable property. Another considers the farm a sort of a mine from which he may draw treasure. He works with skill and patience, and spends freely for necessary or profitable labor. He keeps good breeds of stock, for there is the most profit in such, and builds barns and sheds to shelter them. He sees depth to the soil, as well as breadth, and works accordingly. He underdrains and subsoils, cultivates well, and performs all labor in the best manner. His object is to get the most from the soil, and he transforms its products into other forms of wealth. Such a course may answer for one man's lifetime, but in the end his farm will resemble the "squeezed orange," or the mine whence the ore has been taken and the lodes run out. The majority of what are termed our best farmers in this country are pursuing this plan. It is one that adds little real wealth to the aggregate, for it is substantially but transforming the wealth of the soil into other forms, and as the soil is not inexhaustible the time must come when the supply from that source will diminish. A third, and the smallest of all classes of farmers, adds to thorough and skilful cultivation the more im-

portant idea of constantly replenishing the soil with the plant elements which crops have extracted from it. The coarse products are consumed on the farm, and more food for stock, or special fertilizers, are bought to replace the fertility carried away in the animals and cereals that are sold. We said there are few farmers of this class, few that have matured and practice a system of farming by which the maximum of products may be produced from the soil, and yet maintain it as fertile and productive for a century.

But we have not yet arrived to the condition where American farmers will work for the future. The American farmer is not permanent enough in his location; the abundance of land in proportion to the population, the fertility of the soil, the rapid advance in prices, stimulate the restless element in his nature, and render him too migratory to become a scientific agriculturist. It needs an ordinary lifetime to develop, with legitimate means, scientific agriculture on American farms; and not until the young farmer shall come to look upon his domain as his future home can we hope for this attainment.

We commend the above view of three systems of farming to our readers. The latter will be found fully illustrated in previous pages of this volume.

WINTER WORK ON THE FARM.—Everybody knows what work to do on the farm during the summer. The different crops in their order require the farmer's attention, and in this way work provides itself; but in the winter there seems to be little to be done, but threshing grain and cutting wood. But to a farmer who is desirous of obtaining the greatest income there will ever be plenty to do in winter.

Threshing especially, in the Middle and Eastern States, is generally done during the winter season. It should be so arranged that it can be done on stormy days, and fair days devoted to outdoor work, unless the rise or fall in prices of the grain should render it expedient to do otherwise.

To those farmers who have had a crop of flax, and pulled it, the cold dry days of the season will be the proper ones to work it out. During a cold dry day the "shives" separate more readily from the lint than at other times. A farmer who has little to do will find working out a crop of flax straw a profitable job, especially at the present high prices. Cutting a stock of firewood sufficient for at least a year to come should now be attended to. Secure a good supply of wood, and work it up for the stove, either by hand or horse power, and pile it up in a dry place. Any one who has tried both plans of getting firewood, namely, getting enough prepared in winter for a year, or cutting a few sticks every day through the summer, and that often green, will not need much argument on this subject.

Material for fencing, if any be needed, should be procured and prepared for use. Posts should be dressed and holed, rails split,

and spliced, logs taken to the saw-mill for posts, railings, plank, or any other lumber required on the farm during the year; it would be well to have a good, well seasoned white oak, ash or hickory log sawed up for wagon tongues, harrow or plow beams, or other similar purposes, and the farmer, if he be much of a workman, could thus repair many of his own implements, or he could furnish what he knew to be good material for his wheelright to do it.

Farmers who have manure cellars should secure a supply of muck, leaves, etc., in the early part of the winter, for increasing the manure pile; leaves can be raked together in great quantities in early winter, and no better material can be had for keeping the stables and pig sty dry and comfortable.

In time of peace it is well to prepare for war, and so during the leisure of winter is the time to make preparation for the active campaign of the summer. If any implements or fixtures are needed on the farm during the summer, the farmer now has time to make them for himself. He can now make a sled to mark his ground for corn, boxes for hens' nests, coops for his chickens, traps for varments, or do a dozen things that he may want done when he has not time to do them. But during all his fixing and doing he should allow himself time for recreation and improvement, and for the reading and study of agricultural books and papers.

THE BIRD QUESTION.—[From the *Germantown Telegraph*.] The Western New York Fruit-Grower's Society had a discussion at its last meeting on the question of the value of birds upon the premises of fruit-growers, and the burden of the comments was against them, particularly the robin. Some of the leading fruit-growers were down on the red-breast, and recommended the shooting of as many as would clear the premises. One of the speakers was a friend to hawks, crows, and owls, but said the robin was very destructive upon cherries, strawberries, etc., etc.

Another, and a solitary one, advocated birds. He said he had an abundance of birds and an abundance of fruit, etc. Our own premises are full of birds, and we encourage them to take up their abode about us in every possible way. They are rather greedy, it is true, and take much more than their share of the cherries, especially the early ones. But is not the robin only; the black-bird, the blue-bird, *sparrow*, orioles, and particularly the cat-bird, all freely help themselves, and, with the exception of the black-bird, are heartily welcome. We lose only a few strawberries, and these among the early ripening; but the robin here is not the only depredator upon these. The cat-bird is its full match, and a much slyer thief. It is especially destructive upon the Delaware and some other small grapes in September.

But there is a remedy for the depredations of birds upon the early fruit which is very easy to apply. That is, to plant here

and there a *black mulberry tree*. The birds prefer this fruit, on account of its being free from acidity, to both cherries and strawberries; and, as the mulberry is a good fruit of itself and liked by many people, this would add to the inducement to plant it. Therefore, we hope our belligerent fruit-raisers, instead of shooting the robin, will feed it on mulberries, and it will, no doubt, be very thankful.

[We hope the suggestion to plant the black mulberry and "spare the birds" will be heeded by all the friends of these spring and summer warblers. The "wild cherry" would also be the favorite of the "robins," and thus save other fruits.]

EGGS BY THE POUND.—One of our exchanges has started this idea:

A few days since, while making our purchases of provisions in market, we were forcibly struck with the difference in size between the eggs in the baskets of several farmers, although the price asked was the same for each. So great was the disparity that we purchased a dozen each from three different baskets, and for the purpose of ascertaining their weights correctly, took them to the warehouse of Fairbanks & Ewing, where they were carefully weighed on Fairbanks' standard scales, with the following results: Number one, one pound ten and a quarter ounces; number two, one pound seven and a half ounces; number three, one pound three and a quarter ounces. It will be seen that there was a difference of nearly one-half a pound between number one and three, and yet the price asked for them by those who had them for sale was the same. It may be said that this is an extreme case; we admit that it may properly be so considered, but if we take the weights of number one and two, we find a difference of nearly three ounces, or a little more than twelve per cent. As great difference is frequently found in the weight of oats, corn, wheat, and other grains, and this disparity is largely increased where the measurer is skilful at his business, we should be glad to have the opinion of practical farmers on this subject.

DAMP STABLES.—When I first came to the farm which I now hold by purchase, I found the stables built under large trees and near a spring of water, with a northern aspect. My horses were soon in poor condition, with long and rough coats, and almost always lax in their bowels, nor could I get them up by extra food or lighter work; but my cows suffered the most, for they were always sick. Their milk fell off and their butter was poor, and of a bad color and taste, and four of them slipped their calves before time. When the spring came they left their winter quarters in a worse state than I had ever seen them, and two of them died from scours on going to pasture. On inquiry I found that the tenant who had left had always been what the neighbors termed unfortunate in his horses and cattle, and from that cause

more than any other he had not been able to make both ends meet. The truth flashed upon me in an instant, and in a very little longer time than it has taken me to tell my story. I had commenced pulling down the stable, the unhealthiness of which had been, I was convinced, the cause of all the evil and the loss; and it was no more than two days before there was not left one stone upon another of the whole fabric. I now set to work and erected another on higher ground, removed from water, and clear from the shade of trees, with a southeast aspect, and dry capacious yard; and from that day I have had neither sickness nor sorrow in my out door household. My horses live on less food, are always sleek and in good condition, and my cows are a credit to their keep. Our butter brings two cents a pound more in market, and for the last year our sales are more than doubled from the same number of cows and the same pasturage, and no more premature calves. Instead of watering my cattle as heretofore, at the spring under the trees—the water cold, with a deadly taste and bad color—I sank a well and put in a pump; and at a long trough in the yard for the summer, and another under shelter for the winter, my cattle slake their thirst without setting up their coats, as they used to do after drinking at the hole under the trees. Even when the weather was warm they were accustomed to shake all over, as if they were in a fit of ague after drinking their fill of this water; and to this, with the bad aspects of the stables, I attribute all the sickness and misery which I have experienced amongst my cattle and horses.

TO PROTECT HORSES FROM FLIES.—Take two or three small handfuls of walnut leaves, upon which you pour two or three quarts of cold water; let it infuse one night, and pour the whole next morning into a kettle and let it boil for a quarter of an hour; when cold it will be fit for use. No more is required than to moisten a sponge, and before the horse goes out of the stable, let those parts which are most irritable be smeared over with the liquor, viz., between and upon the ears, the neck, flank, etc. Not only the lady or gentleman who rides out for pleasure will derive benefit from the walnut leaves thus prepared, but the coachman, the wagoner, and all others who use horses during the hot months.

THE TEETH OF A HORSE AS AN INDICATION OF AGE.—At five years of age a horse has forty teeth—twenty-four molar or jaw teeth, twelve incisors or front teeth, between the molars and incisors; but usually wanting in the mare.

At birth only two nippers or middle incisors appear.

At a year old, the incisors are all visible on the first or milk set.

Before three years, the permanent nippers have come through.

At four years old^d, the permanent dividers next to the nippers are cut.

At five, the mouth is perfect, the second set of teeth having been completed.

At six, the hollow under the upper, called the mark, has disappeared from the nippers, and diminished in the dividers.

At seven, the mark has disappeared from the dividers, and the next teeth or corners are level, though showing the mark.

At eight, the mark has gone from the corners, and the horse is said to be aged. After this time—indeed good authorities say that after five years—the age of the horse can only be conjectured. But the teeth gradually change their *form*, the incisors becoming round, oval, and triangular.

HOW TO FIT COLLARS TO HORSES' SHOULDERS.—It is very important to have a collar fit nicely and snugly to the shoulders of the horse. It enables him to work with a great deal more ease, and to apply a great deal more strength. It prevents galling and wounding, as the friction is avoided. Collars are so made, or should be so made, as to throw the chief force on the lower part of the shoulder. The horse can apply but little strength on the upper part, and for this reason breast collars are coming greatly into vogue—as the strength is exerted on the lower part of the shoulder. But we started out to tell our readers how to make a new collar fit the shoulder of the horse. The collar should be purchased of the proper size; just before putting it on the first time, immerse it in water, letting it remain about a minute, and immediately putting it on the horse, being careful to have the lames so adjusted at top and bottom as to fit the shoulder, and then put the horse to work. The collar, by being wet, will adapt itself to the shoulder, and should dry on the horse. When taken off it should be left in the same shape it occupied on the horse, and ever after you will have a snug fitting collar and no wounds.—*Valley Farmer*.

DEVON COWS—BUTTER MAKING.—We have said elsewhere that the Devons are not a dairy breed, but that they sometimes make excellent dairy stock is proved by the following: D. H. Prest, of Ontario, having seen Mrs. Cragg's statement about her butter product in the "*Rural*," sends a communication giving his experience in butter making. Four years ago, having purchased a Devon cow, it was resolved to test the value of the purchase by keeping an account of the butter made from her milk. The first week's cream was churned by itself, and produced fourteen pounds of butter. The milk stood from morning till night, and from night till morning, and was skimmed and fed to the calf before it got sour. That calf, when a heifer two years old, was milked separately like the dam, and produced in a week ten and three-quarter pounds of excellent butter. Another heifer, from the same mother as the last, came in also at two years old, and in the second week in March produced ten and eleven-sixteenths pounds

of butter, which was sold at forty-seven cents per pound. Our correspondent adds: "I was not trying to beat any one, but only testing the character of the Devon cows as compared with others I had on hand. I think I could better this by a good many pounds should I make it my study."

CARRYING MILK.—In France, milk is packed in small tin cans, easily moved by one man, and by a simple contrivance the stopper screws close down upon the contents of each can, so the motion of the railway cannot churn the milk *in transitu*. The cans are then placed in covered wagons, and in summer are wrapped in cloths, which are watered from time to time so as to promote coolness by evaporation. The result of this care, which costs but little, is that the milk supply of Paris is proverbially excellent.

AGRICULTURAL FAIRS were intended to be and are a good thing when properly conducted, but the prominence now given to fast horses and trotting is disgusting, and injurious to the interests of agriculture. Read the following:

What proportion the trotting horses bear to the number of horses, or what their proportional value may be, I am uninformed. Their value is considerable, I am aware, but that their raising and training is proportionally pecuniarily advantageous to the farmer I am unprepared to believe, or that the "horse trot" at our agricultural fairs is of greater advantage to the farmer than all other interests combined, I am equally unprepared to admit.

For farm purposes, a somewhat different style of horse is needed, as also for all general purposes, from the trotting horse. Yet as there is a taste and demand, which will be supplied, for trotting and fast horses, farmers will endeavor to breed those having that quality to recommend them, and with this enterprise I have no fault to find, neither would I desire to be understood as finding fault with the agricultural society or its managers for offering premiums in the aggregate greater for trotting horses than for all other interests, for they have that privilege; but, as the trotting horse interest is of minor importance to agriculturists, a corresponding value ought to be attached to it by our agricultural societies.

If we are to have the inevitable "horse trot," let us have that as a distinct exhibition, not mix it up with exhibitions of farm stock proper and products.

As to the advantage to the farmer of breeding fast horses, with that object only in view, I might bring the expressed opinion of many eminent agriculturists and writers; but it is unnecessary, and I refrain, believing that the intelligence of the farm community will eventually regulate this matter, by holding fairs devoted to the true interests of agriculture.

W. H. WHITE.

ALSIKE CLOVER.—Allow me to advise my bee-keeping friends

who are farmers to cultivate the Alsike clover. For while it is, for pasturing or hay purposes, decidedly preferable to red clover, it fully equals it in the secretion of honey, and far surpasses the white. Its cultivation would, therefore, greatly increase the forage for bees, which is very desirable. I have ever contended that no plant can be cultivated with profit for bee-pasturage alone—that bee-keeping is profitable from the fact that bees gather what would otherwise run to waste; yet the bee-keeper may often cultivate a crop that, while it proves remunerative as such, will, at the same time, increase the pasturage for his bees.

Perhaps nothing will better meet the wants of the bee-keeper in this respect than the Alsike clover. Not only so, but the farmer who does not keep bees would find it to his advantage to sow Alsike clover instead of red clover, as will be seen from the following account of the experience of the Shaker family, near Albany, New York, furnished to the "*The Country Gentleman*," by Mr. Chauncy Miller, a member of that family:

"We find the Alsike clover a very superior grass in the following points:

"1. For its value as a hay crop on a great variety of soils, being of a growth, in height, varying according to quality of soil, from ten inches to two and a half feet, and yielding from one and a half to three tons per acre; thus comparing with our best red clovers.

"2. For fineness of stalk or haum.

"3. For its multitude of sweet flowers, blooming, perhaps, three or four times as much as red clover, making, when in bloom, literally a sea of flowers.

"4. Its adaptation to heavy soils, clay, or heavy clay loams, as well as sandy soils, not being so liable to heave out by frosts in winter and spring as red clover, on account of the root being more fibrous, partaking somewhat of the character of the white clover.

"5. To all farmers who keep bees largely, the crop would be of great value, for bees can work upon the flowers equally as well as upon white clover, the blossoms being about the same size, and precisely of the same habit as the latter, but much more abundant in honey; bees are as fond of the flowers as of mignonette, and, in its season of flowering, which lasts about six weeks, are continually upon it, from dewy morn until dusky eve.

"6. To those farmers raising clover seed for market, the Alsike clover, in our opinion, would be of great value, as it seeds enormously, and the seed threshes easily, by flail or machine, leaving a beautiful quality of hay, the stalks retaining their greenness when most of the seed is quite ripe."

According to the above, it would be advisable for farmers to cultivate it whether they keep bees or not. That the above is not overdrawn is fully proved by those who have tried it in Canada.

H. M. Thomas, of Brooklin, Ontario, had it grown to a much greater height than that mentioned in the above extract, in places measuring four and a half feet. It is abundant in seed, yielding from five to eight bushels to the acre; after threshing, the haum is equally as good, and is by many considered better for cows than red clover hay. In this county (Ontario) many able and intelligent farmers are ordering seed, being well satisfied that it is, for all purposes, superior to red clover. So great is the demand in the United States that the seed is retailing at one dollar and ninety cents per pound, at the Rochester seed store, though I believe, with us, it sells at thirty cents a pound, or fifteen dollars a bushel.

J. H. THOMAS.

CHINESE YAM.—Having fully investigated the character and merits of this yam, I have some positions to announce in regard to it, which I should have much hesitation about advancing, if I were not well assured of their triumphant verification by my countrymen. I assert, that this esculent, by its concentration of each useful property, transcends in importance every other edible vegetable of the earth, and that it is destined to supersede the tropical and unreliable potato in all northern climates. The combination of its admirable properties as food for man constitute it also the most estimable vegetable boon, and the most nutritious aliment, for man and domestic stock, which God and nature, in their all-pervading beneficence and benign provision, have bestowed upon the inhabitants of our globe. I shall discuss all these points on a future occasion in the ample sense to which they are entitled. The present article is intended solely to impart such practical facts and advice in relation to the plant as will aid those who are now commencing its culture. I desire, however, to make known that there are more than fifty varieties of various colors and forms, and varying in length from seven inches to two feet.

Characteristic Points.—This yam is a native of the northern limits of the temperate zone, and will flourish in the coldest regions of our country, and of the British territories, and will endure, everywhere, the winters in the open ground. Its produce is more than double the crop of any potato, and it never rots. It will flourish best on the now useless sandy lands of New Jersey and Long Island, and of the entire coast range, and it will also succeed on any other soil but a stiff clay. It does not require replanting annually, but reproduces abundant crops from the fragments and small tubers that are left in the earth. There can be no fragment, however diminutive, that will not vegetate. From tubers, the roots attain ten to twelve inches in length, and weigh four to six ounces. From sections of the root, such as used for the regular crop, the roots attain eighteen to twenty-four inches in length, and weigh from half a pound to one and a half pounds, and often more. A plantation of this yam, in China termed "a permanent magazine of food," and the roots may be dug fresh for

use daily, from early spring to winter, thus furnishing new yams continuously. It is more palatable than the best Mercer or any other potato. Its taste and flavor are intermediate between the finest potato and arrowroot, of an exceedingly delicate farinaceous character, and, like the potato, it is devoid of all insipid sweetness. It is free from any ligneous or fibrous substance, and possesses the peculiar property of not being subject to rot or decay, but will remain perfectly sound and excellent in a dry state for a year, thus rendering it exceedingly valuable for long sea voyages, and for the prevention of scurvy. It is much more nutritious than any other edible vegetable used by man, and more so than wheat or any other grain. It is the only vegetable of all the earth which combines an ample portion of azote, the grand constituent of animal substances which imparts vigor to the muscular power of man and beast; and it is by the possession of this essential equivalent in this esculent that the use of animal food is rendered unnecessary by the Chinese and Japanese nations, whose immense populations comprise nearly one-half the inhabitants of our globe.

The culture of this most estimable and productive of all vegetables, on the sandy soils of the south side of Long Island and throughout the sandy region of the Atlantic portion of New Jersey, which are of a character precisely adapted and congenial to its growth and development, and where the crops will consequently be much greater than in other locations, must impart a value to those lands which no one has yet anticipated; and they may soon command higher rates than any of the firm soils of the north side of the Island or of the upper section of New Jersey.

Preparation of the Soil.—The ground for planting tubers should be rendered mellow and permeable to the depth of fifteen inches, and for roots to the depth of twenty inches. Old decayed stable manure, or decayed peat or wood mould, should be mixed moderately throughout. Over-manuring is injurious, and pou-drette is unsuitable.

Planting.—The season for planting is as soon as the freezing has ceased and the ground has become settled.

Tubers.—These should be planted in a double row—the rows twelve inches apart, and the tubers ten inches apart in the rows.

Roots.—The sections of root should be about one and a half inches in diameter. They should be planted in a double row—the rows fifteen inches apart, and the roots at twelve inches apart in the rows.

There is no plant whose culture is more simple and easy than that of this yam.

Its extensive cultivation promises to our country a vast and inexhaustible resource, derived from such soils as have hitherto been most unproductive and unpromising. It will supersede and far more than replace the failing and uncertain crops of the potato, with the addition of this potent and comprehensive fact, that this

esulent will succeed and yield ample and reliable crops throughout all the northern sections of the country.—*Canada Farmer.*

STACKS FOR HAY AND GRAIN.—In a stack for hay or grain care should be taken, as in the construction of a house, to have a good foundation. Great quantities of both hay and grain are annually lost by lack of attention to this matter. Sometimes the hay or grain becomes frozen to the ground; at other times water is carried up far into the stack. It is often the case that the stack has no better foundation than some brush, coarse weeds, poles or straw; and not unfrequently the stack rests directly on the ground. It is no wonder that farmers who commence their stacks in this manner complain of great waste of hay or grain in the stack.

In England great care is taken in providing a good foundation for stacks. Ordinarily there is a permanent inclosure for a stack-yard. The stack foundations are also permanent. Sometimes stone pillars capped with broad flat stones are used, which not only protect the stack from moisture but from vermin. Iron rails and pillars are also used for the same purpose.

In this country it is hardly necessary to go to so great an expense to secure a good foundation, since lumber is comparatively cheap and plenty here. It would always be well, however, to build the stack on timbers or poles placed on the ends of posts which should project about two feet above ground. A set of such foundations would last for years.

The shape of a stack for either hay or grain should be nearly that of an egg, the small end up; the bulge in a rick should occupy the same position. Care should at all times be taken, in stacking grain, to pack the heads of the bundles some inches above the butts, so as to protect the grain from rain. For the better ventilation of stacks some farmers recommend to place a barrel on the foundation, gradually raising it as the stack goes up. This will insure a draft through the whole length of the stack.

An excellent covering to the upper portion of the stack may be made by working in a small amount of long straw or tall grass, letting the ends hang over on the outside. This may be put in at intervals of a few feet apart from where you begin to taper, and it will be of much use in protecting the grain beneath.—*Agriculturalist.*

THE FARMER'S GRINDSTONE.—There is no tool so essential to the farmer as a good grindstone; and a very correct idea may be formed of the management of the farm by the appearance of this homely but useful article. If the neighboring saw or edge tool factory has furnished one of its cast off "hubs," which is hung on a wooden shaft and suspended in the crotch of a tree, or in a fence corner, you may rest assured that such a farm will not produce four hundred bushels of potatoes, or forty bushels of wheat to the acre. But such cases are rare now-a-days, as this article has kept pace with the wonderful improvements in mowing

machines and farming implements generally. The old fashioned unfinished stone, with square hole and uncertain grit, has been superseded by the finished stone, with self-adjusting shaft, friction rollers, and treddle; so that one person can turn the stone, and grind any ordinary tool without assistance. In olden times, the only grindstones in use came from New Castle, in England; and, although very good for some purposes, they were not suitable for farmers' use, the grit being too coarse. The Nova Scotia stones were next introduced, and found to be a great improvement on the New Castle. The Ohio grindstones are very largely used by the farmers and others throughout the West, although our Pennsylvania farmers prefer a good blue Nova Scotia stone; but recently a most excellent article has reached us from the shores of Lake Huron, having a fine, sharp grit, leaving a fine edge, and cutting pretty fast.

Hoping these remarks may induce our farmers to give this important tool the attention it deserves, a few hints how to put it in order may not be out of place.

1st. Always keep your grindstone under cover, as exposure to the sun's rays hardens the grit and injures the frame.

2d. Don't let the stone run in water, or stand in water when not used, as this causes soft places where none exist; but allow the water to drip from a water-pot—an old white lead keg will answer—fixed above the stone, and stop it off when not grinding.

3d. Clean off all greasy or rusty tools before sharpening, as grease or rust chokes up the grit; and always keep the stone perfectly round by razeing it off when necessary; and finally, every farmer should have a good grindstone of his own, always ready for use, and no one should be so improvident as to waste the cost of a stone by running to his neighbors to grind his tools.
—*Cor. Farm and Fireside.*

FARM LABORERS are at present very unsatisfactory and unreliable; and this is in part the farmer's fault. If the farmer would encourage the hiring of married men, even at a small increase of wages, and provide these men with comfortable houses at a small rental, keeping them employed the year round, he would find it to his profit. We give elsewhere a plan of a laborer's cottage. (*Fig. 140.*) which can be built for from four hundred to six hundred dollars, and the farmer can charge the interest of the money for the rental. The better class of labor he would be able to secure by such a course would well pay for the trouble. We heartily commend the following, by L. A. Hine, from *The Ruralist*:

Farmers are now provided with the necessary hired help and are pushing the work of the season. Probably about half the cultivators of the soil for a business and a livelihood perform their own work without hired hands. The other half have from one to four, and in some cases more, men employed at monthly wages.

In behalf of these men we now address a few words to their employers. The larger part of them will be worked during the season, and on the approach of winter will be dismissed. They are receiving on an average about seventeen dollars per month and board, which for eight months' time will amount to one hundred and forty-five dollars. During the balance of the year they will find but little, and many of them absolutely nothing to do. They must get through as best they can until the next spring. Many of them will go to the towns and into the cities hoping to procure an occasional day's work, or at least find a more agreeable variety amid which to kill time. Temptations are on every hand, and few of them will have a dollar left or decent clothes in the following March, when they will again be seeking for places on the farms. This condition is very discouraging and humiliating. It is well calculated to break the manly spirit, induce recklessness, and increase the vices and the crimes of the country. What we would suggest, is the obligation on the part of the employer to furnish work for their men the year round. If a profit has been made out of their labor during the summer, they can be worked during the winter at slightly reduced wages without loss to the employer. There is much good time for work during the winter, and considerable labor preparations for the next busy season can be performed. In consequence of a lack of hands, much goes to waste during the winter that might be saved. The manure heap might be largely increased by keeping the stables and yards well cleaned up, and large quantities of muck, leaves, rotten wood, sod, or rich soil from the ravines for composting. A hired man could in this service alone more than make his wages for the intelligent farmer, by working no more than half the time. Then there is ditching and underdraining, which can be performed better in the winter than any other season, especially when the ground is not too severely frozen. It would pay to haul leaves or straw and spread along the lines of ditches, to prevent the ground from freezing, so that digging can go forward at any time. There are very few days too cold to work with comfort. Most farmers can make ditching profitable, and while the ground is soft and water will run is the time to do it. There is plenty of work that a farmer may provide for his men during the winter. It is cruel and destructive of the public interest to employ men during the summer, and turn them out with nothing to do during the winter.

It would be a good plan for those who have one hundred acres or more to build one or more cottages, in which laboring men with families can permanently reside. This will be of great benefit to both the employer and the employed. It will give a fair rental to the farmer and afford the laborer something like a home, in which his family can be comfortable, and be encouraged to be respectable. It would give the employer the advantage of the same hands from year to year, and thus avoid the trouble and the risk of trying new men every summer.

Indeed we are convinced that the farmer cannot afford to dismiss his hands in the fall. This practice leaves work undone that should be performed before the spring season opens, in order that the best advantage may be taken of the first days of good weather for getting in oats, spring wheat, and barley. When the winter has been devoted to rest and the "chores," there is such a rush of every thing to be done that much is lost by being behindhand with every thing.

We hope that all employers will take these hints into serious consideration, and trace out the argument at length, which we have not now time or space to complete. Even if nothing could be made out of hired help in the winter, moral considerations demand provision for the men the year round. But there is no doubt on the subject of profit out of such labor. Those who have intelligence ought to act on elevated principles, and have some regard for the welfare of others; they can make it pay, because intelligence is the capital that always yields a profit.

HOW TO OBTAIN WATER ON THE PRAIRIES. DRIVE WELLS.--In many instances these have given great satisfaction, in others partial, and in others have proved a failure. It is certain that these results are accidental; the mere subjects of chance.

While we have a high opinion of the value of this system of obtaining water, we have some suggestions to make on the mode of putting it into practice. In the first place these pumps have been mostly in the hands of what are known as pump peddlers, who have charged enormous prices for putting in the pumps; though always, to their credit, ready to warrant a supply of water, and, so far as we know, have carried out their contracts faithfully. But the high price charged has been ample to protect them against loss. In one extreme case that has come under our observation, the pipe was driven down into the band of blue clay to the depth of one hundred feet, without reaching water, when the pipes could neither be driven down nor withdrawn, and the whole proved a loss to the contractors. Some persons have taken the precaution to bore a hole of the size of the pipe and projecting bands. This is cheaply done by welding a two inch, or what is better, a two and a half inch auger to a common square three-fourth inch rod. An iron handle of sixteen inches, with a square hole punched in the centre, a trifle larger than the rod, so that it can be made to slide up or down readily, will enable one to stand at the surface to turn it. When the auger has been bored down to the top of the rod, say six inches, it must be withdrawn. This is done by taking hold of one end of this handle, which by pressure against the sides of the rod prevents it slipping, and it can be drawn out, when not at a very great depth. Additional lengths can be welded to the rod as desired, or the rod can be put together by cap joints similar to those in the pipes, always, however, with a key to prevent uncoupling when under the necessity of turning it back. With this

latter arrangement a deep hole can be bored without the expense of a high scaffold, which is necessary when the whole is welded together.

We have several reasons for preferring the use of the auger, the most prominent of which is that of cheapness and certainty of results. We take no risk in this case. Suppose we put down a well of twenty-five feet, which may be considered the average depth of what we call shallow wells. We bore down fifteen feet and strike a small stone; our only remedy is to begin again. If we drive down the rod, we have to do the same. While the driving requires a large amount of labor, the boring is easily done. There is no battering of the threads on the pipe, to be fixed up so they will pass for the time, but really of no value, and in time to disappoint us.

All know that success with this kind of well depends upon striking a strata of sand or gravel. In boring through clay it adheres to the auger, while the sand or gravel will not do so; but in passing through the strata again into clay, it at once adheres, and we are at no loss in regard to the result. If we have been careful to note the thickness of the sand or gravel strata, we shall be at no loss in regard to the exact position to locate the perforated point. In fact we do not need this point at all; the open end of the tube is just as well, for we must pump up the sand and soil that is mixed with the gravel bed, in case of gravel or the sand in the sand strata immediately surrounding the pipe. If we pump up a cubic foot of sand we have space for a cubic foot of water, and this forms the reservoir of our water supply. It is not probable that we shall displace a very large quantity of sand, and unless the supply of water is abundant we can only raise the water when the reservoir is filled above the small holes in the pipe. Therefore, if we had the end of the pipe thrust to the bottom of this cavity, it would be better than the long point perforated with holes for sixteen inches of its length. At least so long a space should not be exposed to air. With a limited supply of water, as must be the case in most of these wells, we must wait until they fill up, to renew the pumping; whereas, if the reservoir was large, we would have an abundant supply.

In driving down these pipes we may pass the water supply, or thin sheet of sand that contains it, and, driving into the blue clay, cut it off completely, and thus make a failure; but with the auger no such blunder need occur. We therefore recommend, in every case where these pipes are to be used, that they be put down by the aid of an auger.

When the supply of water is not abundant, or when it is obtained in the seams of the clay or from small veins, as is most generally the case, we must have a large reservoir to hold a supply for use; and in this case there is but one way to obtain it, and that is by sinking a well. But there is no need of walling this well to

its full depth, but we may complete our reservoir of the desired size, and arch it over and fill all above with clay, after having put in the pipe and coating it with coal tar. Ordinary wells are sunk of the diameter of four feet; the brick work will occupy eight inches, leaving three feet and four inches,—a very convenient size to get down for the purpose of cleaning out or for repairs. If a well of this size is walled up, say six feet, we shall have a reservoir sufficiently large for all practical purposes, say of fifteen barrels. By enlarging the well at the bottom, which is practicable in a stiff clay, the space could be doubled, if desired.

In arching over and filling above with clay we have several advantages, which these gas-pipe pumps give us. There is no danger from rats, mice, or rabbits getting into it, nor will autumn fill it with leaves; consequently it will need no annual cleanings to keep the water pure, but at all times will be reliable. In the next place it will be free from surface water, the slops of the kitchen, or, if near the barn, the drippings of the barnyard. These are all desirable qualities, but yet there are some others. An iron pump costs little, if any, more than a wooden one, but the cost of brick walls that can be dispensed with is something to consider. To wall up a four foot wall of twenty-five feet will require two thousand two hundred and fifty brick; for six feet with arch, six hundred and fifty, making a difference in favor of the gas-pipe well of one thousand six hundred brick. These brick at the kiln are worth at least sixteen dollars, often more, and, taking the average distance, to haul them would cost not less than nine dollars; which makes a saving of cash and labor of one dollar a foot, or twenty dollars for a twenty-five foot well. This twenty-five dollars would build a small cistern or do something towards a large one. We may offset the filling in of clay against the walling up of brick, and then we have no trouble about making the platform mouse and frog proof, nor is the water fouled by the rotting of the pump stock. In either case the digging of the well is the same, but the saving of brick is more than sufficient to pay for an iron pump and pipe. Well buckets, well sweeps, and windlass are thus swept away by this new invention.

In this case we need no perforated point, and we simply have the pump, which costs from six to eight dollars in Chicago, and twenty feet of pipe, (the pump making five feet,) which will cost thirty cents a foot, if of one and a quarter inch pipe. These pumps and the pipe are sold by large quantities in Chicago, and by several houses, and the prices given are for single pumps and accompanying pipe. At wholesale they cost fifteen to thirty per cent. less, according to amount of invoice.

The pipe is in lengths of from four to seven feet, and to obtain a pipe of the required length one length must be cut and a new thread worked on it by hand. The wholesale men do not fit these pumps: they simply sell so many pumps and so many bundles of

pipe, containing a given amount of feet, while the retailer fits the joints, cuts the pipe to the given length, and packs them in suitable condition for shipping by freight or express.

The pump peddlers purchase at wholesale, deliver and put the pumps in the wells at a given figure per foot. When one of these pumps comes from the city, the farmer must have the tools to put it together. A small iron vice, costing ten or twelve dollars, is almost indispensable on a farm. This, with a good monkey wrench, will be ample for the purpose. A pump of twenty-five feet will cost about as follows:

Pump.....	\$7.50
Twenty feet of pipe, 50 cents.....	6.00
Cartage and package.....	50
	\$14.00

To this must be added freight; and in case one prefers to drive the pipe, he will need in addition a perforated point, costing two to two and a half dollars, and also a driving plug, costing two dollars, a pair of grappling tongs, and a wrench.

By comparing the above prices with those of the local pumpman, any person will know how he can best attain the end desired, and the relative cost —*Prairie Farmer*.

CHAPTER XXII.

DOMESTIC ECONOMY AND FAMILY RECIPES

IF what use is a crop of wheat, or potatoes, or a fine piece of beef or mutton unless we know how to cook them? They may be made in extreme cases to support life, but their value is only known when they are properly cooked. This Chapter then is as important to the farmer as any in the book, and although he may not read it himself, his wife and daughters will draw from it information that will increase both his comfort and his health. An intelligent domestic economy is that which teaches when to cook, what to cook, and how to cook it. The three objects of food are to supply the lungs with heat, to make muscular power, and to supply bone and brain. About five-sixths of our food goes to furnish heat to the lungs. Constant exposure to cold, then produces a necessity for a large supply of those articles of food which furnish heat for the lungs, while intense and protracted muscular action makes necessary a supply of muscle producing food. The good house wife should know how to adapt food to the various conditions of her household.

The articles of common food producing the greatest proportion of heat, are hog fat, mutton fat, olive oil, butter, white of eggs, fresh milk, bolted wheat, roast beef, veal, oat meal, peas, potatoes, and beans. The common foods giving the largest amount of muscle and strength producing substance, are eggs, unbolted wheat, animal fibrine or lean meat, animal caseine from beans, rice, milk, venison, dried beef, roast veal, cabbage, oats, barley, and potatoes. Those articles of food which contain in themselves both properties in large proportion are eggs, wheat, rye, corn, and oats, when made into light bread or otherwise prepared for food; the lean meat of the deer, ox, sheep, and hog, and, lastly, milk. Milk contains a large portion of oil, and therefore does not readily digest in some stomachs, but if such persons will let their milk stand for twelve hours and skim off the cream, they can then drink the skimmed milk with impunity. We have placed wheat in this list; but, as it is at present prepared, nearly all the nutrition is bolted out of it for the sake of making very white flour. This is a grievous mistake, and we are glad to know that the demand for unbolted wheat is steadily increasing. *A loss of about*

twenty-five per cent. of the cost of fine wheat flour is incurred in separating from it its best and most nutritious ingredients. The time required for digestion is another important consideration, for if any nutritious substance takes too long to digest its value is impaired. It also decides what should be eat at night, as it is injurious to lie down for sleep with undigested food upon the stomach.

The following articles of food digest in one hour: Boiled rice, boiled pigs' feet, boiled tripe. In one hour and a half, boiled trout, barley soup, sweet apples, venison steak, and sago. In two hours, tapioca, broiled beef liver, boiled salt codfish, sour apples, raw cabbage with vinegar, and skimmed milk. In from two to three hours, poultry, lamb, hashed meat and vegetables, green beans, parsnips, potatoes, and boiled beef. In three hours, raw oysters, soft boiled eggs, beefsteak, salt pork, mutton, bean soup, apple dumpling and corn cake. In from three to four hours, roast mutton, corn bread, sausage, stewed oysters, roast beef lean, cheese, fresh baked wheat bread, turnips, hard boiled and fried eggs, beets, and boiled corn. In four to five hours, boiled salmon, roasted poultry, beef and vegetable soup, fried pork, boiled cabbage, and boiled pork, recently salted. Roast pork and beef suet require over five hours to digest. It will be seen here what a difference is made by the mode of cooking. Pigs' feet soured and boiled digest in one hour, while roast pork requires five hours and a quarter. Raw cabbage and vinegar will digest in two hours, while if the same cabbage is boiled it requires four hours and a half to be digested. The three most desirable general articles of food, in strict accordance with these conclusions, are venison, which contains nearly the largest per cent. of strength producing substance and yet digests in one hour and thirty minutes; rice, which contains a very large proportion of heat producing substance and digests in one hour; and milk, which contains both and digests in two hours and fifteen minutes. Upon these articles of food, life and health can be maintained as long as upon any other three known. But as venison cannot be supplied in large quantities, beef, mutton, poultry and eggs must supply its place. In addition to the substances named, the system requires lime, potash, and bone forming material, and it is mercifully provided that a wide range of both animal and vegetable food is provided for us. The roast fresh pork, of which most of us are so fond, is proven to be an indigestible and unnecessary dish, while salt fat pork is essential to the working man who in cold weather is exposed to the cold air. Grain, fruit and vegetables, with mutton and beef, are much better for summer consumption than pork in any shape. Wheat bread and milk are, above, all things else, the proper food for growing children, supplying phosphates for the bones, muscular power, and brain producing material. Ripe fruits and berries, eaten with the regular

meals, are most wholesome and useful in the economy of the system.

COOKING MEATS.—Beefsteaks should never be fried, but always broiled on a gridiron with narrow bars. A bed of coals is easily made by burning round sticks of hard wood. The heat should always be intense when the steak is first put over the fire and be gradually reduced, either by withdrawing the meat or sprinkling ashes over the coals. Rare done beef is much more nutritious and digestible than when the red color is all cooked out of it. The fibre of beef is worthless; it is only the juice that is of any avail in nourishing the body. Roast beef requires a slow, steady, but not too hot fire. Beef for soup should be cut in small pieces and put over a slow fire in cold water; let it stand over the fire for four hours without boiling, then add your vegetables and seasoning, and let them boil from half an hour to an hour.

STUFFED BEEFSTEAK.—Prepare a dressing of bread scalued soft and mixed with plenty of butter, a little pepper, salt, sage, a little onion, and an egg. Lay it upon one side of a round of steak, cover with the other, and baste it down with needle and thread. Salt and pepper the other side of the steak and place in a dripping pan, with half an inch of water. When baked brown on one side, turn and bake the other. Watch closely that it does not burn.

A BEEF OR VEAL PIE.—Take the cold pieces, after baking, and make a light crust, like tea-biscuit, only a little shorter, lay the crust around the dish, not on the bottom; then season your meat with salt and pepper, and butter between each layer; add water to make it moist with gravy, then lay on the cover, and bake three-quarters of an hour. It makes a fine dish occasionally.

SAVORY BEEF.—Take a shin of beef from the hind quarter, saw it into four pieces, put it in a pot, and boil until the meat and gristle drop from the bones; chop the meat very fine, put in a dish and season it with a little salt, pepper, clove, and sage, to your taste; pour in the liquor in which the meat was boiled, and place it away to harden. Cut in slices and eaten cold.

TO PREPARE MINCE MEAT.—Housekeepers may, if they choose, prepare their meat for mince pies for the winter's use at one time, and that time may be when they are making sausage and headcheese, and doing up the other work after butchering.

Boil your meat tender.—I think one part of pork to two of beef is a good proportion; when cold chop fine, and season with nutmeg, cloves, cinnamon, and alspice. Put in some boiled eider and molasses, and sugar enough to make it fit for use. Set it on the stove and let it simmer half an hour, stirring it occasionally. Then remove from the fire and put it into a stone jar; cover closely and set in a cool place. When wanted for pies

take one-third of this prepared meat, and two-thirds chopped apples, and water and unboiled cider enough to make the mixture as moist as you wish. And chopped suet if you like.

When your mince meat is thus prepared, it is no more work to make mince pies than any other pies. MRS. E. S. SANDFORD.

ROAST MUTTON requires about an hour and a half to cook well; it should be basted with the drippings. To boil a leg of mutton, dust it with flour, wrap it in a towel, throw it in boiling water with a little salt, pepper and herbs, and move it occasionally while boiling. Broiled chops, should be sprinkled on both sides with pepper and salt, dipped in melted butter, laid on the gridiron over a hot bed of coals, and turned two or three times while cooking. As will be seen by the table on a succeeding page. Mutton is more nutritious than any other flesh, and quite digestible.

TO FRY CHICKENS.—Cut up the chickens and let them lie in salt and water twenty minutes, drain and season with salt and pepper; prepare six eggs well beaten, and five crackers, rolled fine, stir well together; roll each piece in this, and fry brown in hot lard.

TO ROAST TURKEY.—Wash the turkey very clean, and let it lie in weak salt and water over night. When ready to put to roast, rub it dry in the inside, and sprinkle in a little pepper. Make a stuffing of two-thirds wheat bread and one-third corn bread, rubbed fine, and softened with butter and beaten yolk of egg, and seasoned with salt, pepper, parsley, and celery. Mix the stuffing well together, and fill the turkey. Rub the breast of the turkey with salt, pepper, and butter. Have water and lard in your dripping pan, and baste often. It will require three hours to roast. Pea fowl and Guinea fowl are roasted and dressed in the same way. Cranberry sauce is almost indispensable with this dish. Celery, too, usually accompanies it.

FRIED LIVER AND BACON.—Cut the liver rather thin, say about half an inch thick, but first soak it in warm water about one hour; chop a quantity of parsley, season it with pepper, and lay it thick upon the liver; cut slices of bacon and fry both together, but put the bacon first into the pan; add a little lemon pickle to the gravy made by pouring the fat out of the pan flouring, and adding boiling water.

TO MAKE SANDWICHES.—Rub a teaspoonful of mustard flour into half a pound of sweet butter: spread this mixture upon thin slices of bread. From a boiled ham cut very thin slices, and place a slice of ham between two slices of bread prepared as above; cut the sandwiches in a convenient form and serve. Some chop the trimmings of the ham or any other cold meat very fine, and lay them between the slices of prepared bread. This is a good dish for lunch or evening entertainments.

CHICKEN PIE.—Cut up the chickens into joints, and season them with salt, pepper, and parsley. If they are old, parboil them a few minutes, and save the water to put in the pie. Make rather a rich paste, and cover the bottom and sides of a deep dish with it. Then put in alternate layers of chicken, six hard-boiled eggs cut in slices, butter, pepper, celery, and a little flour from your dredging box. Fill the dish two-thirds full of cold water, and add half a teacup of cream or milk. Put on a top paste, and close the pie around the edge, and make an opening in the middle with a knife.

RECIPES FOR COOKING TRIPE.—We find in the "*Utica Herald*" the following recipes for cooking tripe—a dish which is greatly relished in some families.

1st. Make an egg batter the same as for pancakes, only a little thinner; take some pickled tripe, cut it in pieces four or five inches square; lay it in the batter while you are preparing the spider or griddle with butter or pork fat; when sufficiently hot, drop the pieces of tripe in; cook brown on both sides; season according to taste while cooking; when nicely browned it is done. Served up hot.

2d. Take pickled or fresh tripe, roll in Indian meal; prepare the griddle or spider the same as No. 1; brown it nicely on both sides; season to taste, and serve it up the same as above.

3d. *Broiled Tripe.*—Broil the same as you would beefsteak; season with butter, pepper, salt, etc. You can use either fresh or pickled tripe for this.

4th. Take fresh tripe, place it in an earthen jar, and pour over it new sour buttermilk; cover it up; let it stand twenty-four hours; take it out and cook either in batter or Indian meal, or some prefer it fried without either, with the exception of a little butter, seasoning nicely.

5th. *Tripe Stew.*—Take fresh or pickled tripe, cut in small pieces, then slice up some onions, potatoes and turnips; put all in a pot together, with sufficient water to cover; boil slow and season to the taste while cooking; when the vegetables are done take it out and serve up hot.

6th. *Spiced Tripe.*—Take fresh tripe, cut it up in pieces four or five inches square; take an earthen jar, put in a layer of tripe, then sprinkle a few cloves, allspice and peppers (whole) over it; then another layer of tripe, then spice, and so on till the jar is full; take good cider vinegar, scald it, pour over it, filling the jar full; cover it up and stand it away in a cool place for a few days until it tastes of the spice, then serve it up cold for supper or any other meal you wish. It is an excellent relish.

PIGS' FEET.—Boil four pigs' feet until the bones drop out. Draw out the long bone and place them in a dish to cool. Split each foot, take the liquor in which it is boiled, add the juice of a lemon and some salt, and turn over the feet. They may be dipped in batter and fried in salt pork.

MINCED FOWL.—Take the remains of a roast fowl, and cut off all the white meat, which mince finely, without any skin or bone; but put the bone, skin and *et ceteras* into a stewpan, with an onion, a blade of sage, and a handful of sweet herbs tied up; add nearly a pint of water; let it stew for an hour, and then strain and pour off the gravy, putting in a teaspoonful of sauce. Take two hard-boiled eggs and chop them small; mix them with the fowl; add salt, pepper, and sage, according to taste; put in the gravy; also half a teaspoonful of finely-minced lemon peel, one-table spoonful of flour, made into a smooth paste with a little cold water, and let the whole just boil. To every twelve pounds of meat take three tablespoonfuls of salt not much heaped, three tablespoonfuls black pepper, eight tablespoonfuls of sage, and a teaspoon half full of red pepper.

TO MAKE SAUSAGES.—Thirty pounds of chopped meat; salt, eight ounces; pepper, two and a half ounces; two teacups of sage, and one and three quarter cups of sweet marjoram. Pass the two last through a fine sieve. Thyme and summer savory may be substituted for the latter.

PRESERVING SAUSAGE MEAT.—Pack the meat in a jar until nearly full, then fill the jar up with melted lard; cover with a linen cloth, then tie a brown paper over the top.

TO MAKE A POT-PIE.—Make your sponge as you would for biscuit, only shorter; when you do it up let it get just light, putting into the batter a little saleratus and salt; when light take it on to the board, and cut it in pieces like biscuit, only let them lie and rise without kneading them at all. When the meat is tender there should be enough water to come just over the meat. Season it well with salt and pepper, and dissolve flour in cold water, and stir in enough to thicken it well. If the meat is very lean fry it in butter, and when boiling hot lay the crust in over the surface and shut it up close, and not allow it to be opened again in half an hour, when it will be ready for the table, and as light and nice as sponge.

OYSTER OMELETS.—Allow for every six large oysters or twelve small ones, one egg. Remove the hard part, and mince the remainder of the oyster very fine; take the yolk of eight and the whites of four eggs, beat them until very light, then mix in the oysters, with a little pepper, and beat all up, thoroughly; put in the frying-pan a gill of butter, and move it about until it melts; when the butter boils in the pan skim it and turn in the omelets, stir it until it begins to stiffen, fry it a light brown, lift the edge carefully and slip a round-pointed knife under; do not let it be overdone, but as soon as the underside is a light brown turn it on to a very hot plate; never fold this omelet over, it will make it heavy. If you want to brown it highly you can hold a red-hot shovel over it.

EGGS AND POTATOES.—Remove the skins from some boiled Irish

potatoes, and when perfectly cold cut them up in small pieces about the size of a grain of corn, and season with salt and pepper. To a quart of potatoes thus prepared, take the yolks of six eggs, and the whites of three, and beat them well together. Have some butter in a frying-pan, and when it is melted, put in the potatoes. When they are quite hot, stir in the eggs, and continue stirring so as to mix them well with the potatoes, and until the eggs are set. Then pepper, and send them to table in a hot dish.

A BENGAL OMELET.—Take half a dozen fresh eggs, beat the whites and yolks up well together in a clean basin; chop half a dozen young onions fine, a little fresh parsley, and add a tea-spoonful of catsup. Mix it all together, and fry them after the form of a pancake. When done brown take a fork. roll them up, and send to table.

HOW TO MAKE EGG BALLS.—Boil four eggs hard, take out the yolks and pound them, add to them a few bread crumbs, and pepper and salt, and the yolk of one raw egg; mix them all well together, take them out, and with flour on your hands roll them into balls; boil them two minutes.

EGG TOAST.—Soak some slices of stale bread in cream or milk, but not long enough to become soft; then dip them in beaten egg with a little salt, and fry brown.

FISH gives, generally speaking, about two-thirds as much nutriment as meats, but having no juice like meat, is not a muscle producing diet. It is more appropriate for women, students, and those who waste but little muscle. To cook fish, a wire broiler that folds together is absolutely essential, and such a broiler is much the most convenient of any for broiling steak or chops, and for toasting bread or crackers.

TO BROIL FRESH FISH, rub on them a little butter and salt, and hold them over a quick bed of coals, as for beefsteak, so as to crisp the outside quickly without burning. Squeeze a few drops of lemon juice over them before eating. The small fresh water fish are best fried. Cut slices of pork, and let them soak over night. When the fish is to be cooked fry the pork crisp, roll the fish in corn meal, wheat flour, or powdered crackers, and lay them in the pan. As soon as one side is crisp either reduce the fire or sprinkle a little ashes over it. Nothing but the best pork fat is suitable to fry brook fish in.

SALT MACKEREL should be soaked two days in cold water with the flesh side down. Just previous to cooking lay it in a dish, and cover it with hot milk. Rinse it with cold water and wipe dry with a cloth. Broil the same as fresh fish, and squeeze a lemon over it just before eating.

TO COOK SALT CODFISH.—Cut into pieces two or three inches square, dip the pieces in batter, and fry with butter. The batter is made by mixing two eggs with grated crackers. Another and

very simple way to cook salt codfish is to pick it up into small pieces at night, and allow it to soak over night. In the morning rinse with fresh water, and set it over the fire just covered with cold water. Just before this water boils turn it off, and put milk in its place. As soon as the milk is hot stir into it wheat flour, or grated cracker and butter. When these have boiled a few minutes stir in beaten eggs, from one to six, according to the amount of fish.

TO MAKE A CHOWDER.—Lay four or five slices of salt pork in the bottom of the pot; let it cook slow that it may not burn; when done brown, take it out, and lay in fish cut in lengthwise slices, then a layer of crackers, sliced onions, and very thin sliced potatoes, with some of the pork that was fried, and then a layer of fish again, and so on. Strew a little salt and pepper over each layer; over the whole pour a bowl full of flour and water well stirred up, enough to come up even with what you have in the pot. A sliced lemon adds to the flavor. A few clams improve it. Let it be so covered that the steam cannot escape. It must not be opened until cooked, to see if it is well seasoned.—*Skilful Housewife.*

TO COOK OYSTERS, take them from the liquor, add to the latter if strong a little water, and season to your taste; or milk may be added instead of water. Bring this broth to a brisk boil, and then add the oysters, letting the whole boil two or three minutes longer.

SCALLOPED OYSTERS.—Take a quart of oysters, separate them from the liquor, and crush a pound of crackers. Put a layer of crackers on the bottom of a dish, then a layer of oysters, and so on, seasoning each layer with salt, butter, and lemon juice. Pour the oyster liquor over the whole, and bake forty-five minutes.

KNICKERBOCKER PICKLE, FOR BEEF, HAMS, ETC.—Take six gallons of water, nine pounds of salt, three pounds of coarse brown sugar, one quart of molasses, three ounces of saltpetre, and one of pearlsh; mix and boil the whole well, taking care to skim off all the impurities which rise to the surface. This constitutes the pickle. When the meat is cut, it should be slightly rubbed with fine salt and suffered to lie a day or two, that the salt may extract the blood; it may then be packed tight in a cask, and the pickle having become cold, may be turned upon and should cover the meat. A follower, to fit the inside of the cask, should be laid on, and a weight put on it in order to keep the meat at all times covered with pickle. In the spring the pickle must be turned off, boiled with some additional salt and molasses, skimmed, and when cold returned to the cask.

CORNED BEEF.—Put the beef into cold water for twenty-four hours, to draw off the blood. Let it drain well before putting it into the brine. Take one gallon of salt to eight gallons of water, one-half a pound of saltpetre, a quart of molasses, a pint of sugar, and one or two pods of red pepper. Boil and skim it, and when

perfectly cold, pour it over the beef. If the weather is warm, add one quart of salt to the above. If the pickle sours, pour it off, boil, let it cool, and pour over the meat again. Keep the meat under the brine by weights.

TO KEEP MEAT FRESH.—Simply immerse it in buttermilk. This will keep it for several days, when the milk should be changed, and fresh milk substituted. In this way beef, veal, etc., can be kept for several weeks, and it will be as sweet and fresh at the end of that time as when first put in. Our butcher furnished us with the receipt. The whole neighborhood is now saving its meat in this way. It is equally efficacious in the hottest weather.—F. G., in *Rural World*.

TO KEEP MEAT FRESH.—The following plan is recommended: Cut the meat in slices, pack in a jar in layers, sprinkle with salt and pepper, just enough to make it palatable. Place on the top a thick paper or cloth, with salt half an inch thick. Keep this on all the while. Meat, it is said, can be kept three weeks in the summer in this way, and the last will be as good as the first.

TO MAKE TOUGH BEEF TENDER.—To those who have worn down their teeth masticating poor, tough beef, we will say that carbonate of soda will be found a remedy for the evil. Cut the steaks the day before using into slices about two inches thick, rub over them a small quantity of soda, wash the next morning, cut into suitable thicknesses, and cook to notion. The same process will answer for fowls, legs of mutton, etc.

TO PRESERVE EGGS.—You have only to rub them in lard while fresh, making sure that every portion of the surface has been smeared. This closes the pores of the shell and excludes the air. Eggs will keep all winter if served in this way.

PRESERVING SWEET CORN.—Boil the green ears a minute or two, just to harden the milk, then cut from the cob and spread on a cloth in the sun for two days, taking it in at night; it will then keep anywhere. When cooked, it is better to soak it a few hours, and boil in the same water. In cold weather all that is wanted for a week or two may be wet. It cooks quicker and tastes better. A little milk and flour boiled in it is almost as good as cream.

COOKING VEGETABLES.—The potato should be steamed rather than boiled. If new and tender brush off the skin with a stiff brush; if old scrape it off with a knife; put them into a strainer over a kettle of boiling water. The water must keep a steady boiling for twenty minutes and upwards, until the potatoes are steamed through. If the practice of boiling is still continued, let the potatoes stand a few minutes after turning off the water with a cloth over the top of the kettle. Never put a tight cover over the potatoes to keep them warm; it condenses the steam in them and makes them soggy.

POTATOES FOR BREAKFAST.—Take the mashed potatoes left from dinner the day before, mix them smooth with a little hot milk and

butter, put them by spoonfuls into an iron biscuit pan, previously heated, and brown them in a hot oven. They are very light and nice.

FRIED POTATOES.—Cut in three slices; have hot lard on a brisk fire and let them be entirely covered by the lard until fried.

BLOTS' POTATO CAKE.—Steam your potatoes and mash them. To every quart of the mashed potato add the yolks of three eggs, three ounces of sugar, and a little grated lemon rind. Stir in three ounces of *hot* melted butter and the whites of the eggs. Put on the fire long enough to heat the whole through and mix thoroughly, then take it off and bake it for half an hour in a hot oven.

GOOD WAY TO COOK ONIONS.—It is a good plan to boil onions in milk and water; it diminishes the strong taste of that vegetable. It is an excellent way of serving up onions, to chop them after they are boiled, and put them in a stew-pan, with a little milk, butter, salt and pepper, and let them stew about fifteen minutes. This gives them a fine flavor, and they can be served up very hot.

FRIED ASPARAGUS.—Four tablespoonfuls of flour, salt, cold water, stirred together in a bowl to a thick batter. Beat two whites of eggs to a stiff froth, and stir in with the rest. Throw the tops of asparagus in boiling water, with a little suet, till half done. Then throw them in the batter, hook them out and fry with hot fat.

HOW TO BAKE APPLES.—Bake without breaking the skin. Bake from three to five hours. When the pulp is perfectly tender break the skin; if that is silken, like the cuticle of the hand, you have your fruit done. If you break the skin baking, the heat and moisture will escape, and your apple will dry. The peel prevents evaporation, and is a good conductor of heat. Bake on paper and there will be no dishes spoiled or needed to be wasted.

CAULIFLOWERS.—Separate the green part, cut the stalk close, let it soak a while in cold water, tie it in a cloth, and lay it in boiling milk and water, observing to skim it well. When tender, which will be in an hour and a half or two hours, take it up and drain it well; send it to the table with melted butter in a boat. Broccoli is cooked in the same manner.

ASPARAGUS.—Cut when two or three inches long, wash and place the heads all one way, and tie in bundles with thread or twine. Have your water boiling, with a little salt, and lay it in, keeping it boiling half or three-quarters of an hour, according to its age. Toast two slices of bread, moisten it with the water in which the asparagus is boiling, season with salt, and lay on a small platter or dish. Then drain the asparagus a moment, and, laying the heads inward, spread it on the toast, pouring over it melted butter and pepper.

BEETS.—Wash them clean with a cloth, rubbing them well. Be careful not to cut them, unless they are very large, and then you

may cut them in two, not splitting them. They require, when grown full size, three or four hours, boiling. When tender all through, scrape off the outside, split or cut them in thin round slices, and pour over melted butter, and sprinkle with pepper. Boiled beets sliced, and put in spiced vinegar until pickled, are good. The tops of beets are good in summer boiled as greens. Beets should be kept in the cellar, covered with earth to keep them fresh. It is said that they are nicer roasted, as potatoes, for the table.

SPINACH.—Pick it clean, and wash in several waters. Drain and put it in boiling water, and be careful to remove the scum. When tender, drain and press it well. Chop it fine, and put it in a sauce-pan with a piece of butter and a little pepper and salt. Set it on hot coals, and let it stew five minutes, stirring it all the time. It requires about ten minutes to boil.

STUFFED CABBAGE.—Take a large fresh cabbage and cut out the heart. Fill the place with stuffing made of a cooked chicken or veal, which should be chopped very fine and highly seasoned, rolled in balls with yolk of egg. Then tie the cabbage firmly together, and boil in a covered kettle for two hours. It makes a very delicious dish, and is often useful for using up small pieces of cold meat.

RHUBARB.—The best way of cooking this delicious substitute for fruit is to bake it. Cut up the stalks into a pie dish, sprinkle sugar over, cover with a plate, set in the oven and bake fifteen or twenty minutes, just long enough to be tender and retain its fresh green color, like green apples. It is an excellent supper dish to eat with bread and butter or cream.

EGG PLANT.—Boil them in a good deal of water a few minutes, to take out the bitter taste, then cut in slices, and sprinkle a little salt on them. Then fry them brown on a griddle, with only enough butter to keep them from sticking.

BROILED PARSNIP.—After they are boiled tender, let them become perfectly cold; slice thin lengthwise, and broil until nicely browned; spread them with butter, and season with pepper and salt. To be served with roast, broiled, or fried meats.

BEAN SOUP.—Boil the beans for soup in the usual way, in water only, seasoned with salt and pepper to taste. Add savory herbs if desirable. When ready to take up, cut several large slices of light, stale bread into pieces half an inch square; add a good-sized lump of sweet butter, and fry on the stove or bake in the oven; when done brown and crisp put it into the soup tureen; pour the bean soup over and serve hot.

TO BAKE TOMATOES.—Season them with salt and pepper; flour them over; put them in a deep plate with a little butter, and bake in a stove.

TO BROIL TOMATOES.—Wash and wipe the tomatoes, and put them on the gridiron over live coals, with the stem down. When

that side is brown, turn them, and let them cook through. Put them on a hot dish, and send them quickly to the table, to be there seasoned to taste.

BAKED BEANS—Soak the beans half a day in warm water, then turn off the water and boil until soft. When the beans are put into the baking dish bury a piece of fat salt pork in the middle.

We give below the average time for boiling the ordinary vegetables. Cabbage two hours. Green corn half an hour. Turnips and parsnips one hour and a half. Asparagus twenty minutes. Green peas half to three quarters of an hour. Carrots two hours. Beets three hours. Squash one hour. String beans one hour.

RICE is one of the most edible of all vegetables, and if used in connection with meat, beef or mutton, furnishes the best possible addition to the bill of fare.

Rice should be put in warm water to swell, on the top of the stove or in a moderate oven, where it will not boil, for an hour or so; then put to boil in salted water for fifteen minutes, afterward pouring on rich milk, and a little butter. It is better, at this point, to put it into a pudding dish, and bake half an hour. The addition of a few raisins or English currants will improve it much.

This should be eaten with a thoroughly beaten dressing of butter and sugar, flavored with wine and nutmeg or sweetened cream.

Rice needs to be thoroughly cooked to be palatable or digestible, but if overdone, so that the *kernels lose their shape*, it becomes a sticky, unsavory mass.

Some enjoy the old fashioned rice pudding, with the usual condiments of spices, fruit, eggs, sugar, etc., but it is really more inviting without, when cooked according to these suggestions.

When fruit is scarce, rice can be made a very pretty addition to the tea table. Boil in the morning, and turn into buttered teacups; when cold, turn out the contents of the several cups on to a platter; make a little cavity in the top of each of these beautifully shaped moulds, placing a teaspoonful of some kind of jelly in the openings, and, with a pitcher of sweetened and flavored cream, you will have a fancy as well as nutritious dish. If more convenient, turn into a good sized bowl, and you will have the same results with less trouble.

A beautiful dish can be arranged, by putting cold rice on a plate with a layer of jelly, jam, grated apple, fresh strawberries or raspberries on the top; then another layer of rice and fruit, and so on until you have the mound as high as you like,—leaving the rice at the top, and being careful to trim the edges neatly, to show the stripes of fruit. This is delicious cold, for tea, or baked half an hour for dessert, with a good dressing.

The rice which may be left from dinner, if put to soak in milk over night, is nice in griddle cakes. It is also a charming variety to the breakfast table, mixed with a little egg and flour, made into patties with the hand, and fried in the skillet.

If you like a rice pie, take care not to use too much rice; let the solidity consist in the eggs.

RICE PIE.—Cut up a fat chicken, and boil till tender; cook one pint of rice in the water in which the chicken was boiled; mix with it six well beaten eggs, (if eggs are plenty you may put eight,) one cup of milk, one tablespoonful of butter, salt and pepper to your taste. Put into a baking dish alternate layers of chicken and rice, having rice last, and bake slightly.

HOW TO HULL CORN.—Shell a dozen ears of ripe, dry corn; put it in an iron kettle and cover with cold water; put in the corn a bag of two teacupfuls of fresh wood ashes, and boil until the corn looks yellow and tastes strong of the alkali; then take out the bag and boil the corn in the lye over an hour; then pour off the lye, add fresh water, and simmer until the corn swells. If the hulls do not come off by stirring, turn off the water and rub them with a towel; add more water and simmer for three or four hours, often stirring to keep it from burning; when it swells out, and becomes soft and white, add salt to liking, and let all the water simmer away. Eat warm or cold, with cream or milk.—*Co. Gentleman.*

TO COOK CRACKED CORN OR WHEAT, OATMEAL OR HOMINY.—Let the meal be dry and a little warm. Have water boiling briskly; throw into it a small lump of water and a little salt; add the meal by handfuls until it is thick, keeping it boiling and stirring it constantly. After it is thick enough, let it stand for half a day over a slow fire. Cracked wheat and oatmeal require only a half to three quarters of an hour's boiling; otherwise they are cooked the same as the corn. These dishes are at once very nutritive, wholesome, and easily digested. Samp, hominy, and mush, made in this way, are much more desirable for suppers than meat. They should be eaten with milk or molasses and cream.

BREAD is the staff of life, or would be, if the best part of it were not bolted out of the flour to make it look white. Making bread is considered the most important acquisition, and to make good, light, sweet bread is an accomplishment to be proud of. No rule can be set for it, for success depends upon the flour, the rising, the heat, and the moisture. Yeast or yeast cakes should be mixed with potatoes, boiled dry and mealy. If the upper surface of the loaf is moistened with milk just before it is placed in the oven the crust will be improved. Dr. Nichols, in his *Chemical Lectures*, gives the following as the method of bread making employed in his family:

Sift five pounds of good flour and put it into an earthen pan suitable for mixing and kneading. Have ready a ferment of yeast, prepared as follows:—Take two potatoes the size of the fist, boil them, mash, and mix with half a pint of boiling water. A fresh yeast cake, of the size common in the market, is dissolved in water, and the two solutions mixed together and put in a warm place to

ferment. As soon as it commences to rise, or ferment, which requires a longer or shorter time, as the weather is warm or cold, pour it into the flour, and, with the addition of a pint each of milk and water, form a dough at night, and allow it to stand until morning in a moderately warm place; then mould and put it pans, and let it remain until it has become well raised; then place it in a hot oven and bake.

The points needing attention in this process are several. First, the flour must be of the best quality; second, the potatoes should be sound and mealy; third, the yeast cake is to be freshly prepared; fourth, the ferment must be in just the right condition; fifth, the kneading should be thorough and effective; sixth, the raising of the dough must be watched, that it does not proceed too far and set up the acetic fermentation, and cause the bread to sour; seventh, after the dough is placed in pans, it should be allowed to rise, or puff up, before placing in the oven; eighth, the temperature of the oven, and the time consumed in baking, have much to do with the perfection of the process.

Jennie F. Hazen, a newspaper correspondent, describes the following as the method by which her mother made bread; it is new to us:

She took an earthen pitcher and put into it a pint of new milk, a teaspoonful of sugar, one of ginger, a little soda and salt; then poured out of the teakettle into this a half pint of boiling water. When it was cool enough to hold her finger in it comfortably, she stirred in flour enough to make a thick batter, set it in a kettle of warm water, and put the kettle where it would keep warm. After it had stood two or three hours, she added two large spoonfuls of flour and stirred it rapidly for five minutes. When the rising was up to the top of the pitcher, she warmed three quarts of good sweet milk, turned the rising into it, and stirred in flour to make a sponge. Covering it closely and setting it where it was warm, she left it to rise again, which it proceeded to do in the course of half an hour, at the end of which time she kneaded it into loaves and set it to rise for the last time. When it was baked the crust was of a rich golden brown, and we considered it the treat of treats to have it broken while it was hot, and to receive from her hand a great piece, well buttered.

BREAD BY STEAM.—A choice loaf of bread may be made by preparing the dough in the usual way, and then setting the loaf to be baked into a steamer, and bake in this manner by steam for fifty minutes. When taken out, dry a few moments in the oven, and it is then as beautiful a loaf of bread as need be eaten,—being without crust. We need hardly add that the dough must be good, or the bread will not be.

POTATO BREAD.—Sift four pounds of flour into a pan; boil one pound potatoes, skin, and mash them very carefully through the colander; mix this with equal quantities of milk and water, stir

with a knife; add a tablespoonful of salt, a cup of yeast, and beat well. .

BROWN BREAD.—Three pints of coarse corn meal scalded with four pints of boiling water; when cool add two pints of coarse rye meal (not flour); mix thoroughly; put in stone ware pots, covered over, and place in an oven cool enough for the bread to warm slowly for two or three hours; after which bake slowly for four hours, if made in one loaf; let the bread stand in a cool oven one or two hours. It should be light, moist, and sweet, with a moist, firm crust. It will require experience and skill to perfect the making of this bread, but in health and deliciousness it pays.

RYE AND INDIAN BREAD.—Mrs. Angier, of Wyandot County, Ohio, tells the New York Farmers' Club how her grandmother made rye and Indian bread:—Sift the bread tray half full of Indian meal; have a teakettle of hot water put in a dipper of boiling water to slack the heat; then scald the meal, stirring well with the pudding stick; let it stand three hours or more over night, when the weather is cool, then add one-third as much coarse rye flour as there was meal; put in a quart of light, sweet hop yeast, mix with both hands, using warm water; have the dough stiff enough to heap a little; dip the hand in water, and smooth the mass and sprinkle with flour; let it rise till the surface cracks, then put in iron basins; smooth again, let it rise for a few minutes, then set it in the brick oven, heat it till you can only hold your hand and count three, bake four or five hours; when taken out wet a clean cloth in water and cover each loaf.

GRAHAM OR COARSE WHEAT BREAD.—Two-thirds unsifted wheat meal, one-third fine flour, a little molasses; mix with warm water. One large cup of potato yeast will make two good sized loaves. Mix and rise over night, and your bread is ready to mould and put in your pans before breakfast. Do not let it rise too long the second time; much bread is spoiled by so doing.

GRAHAM OR BROWN FLOUR BREAD.—To one cup of light wheat sponge add two tablespoonfuls of molasses, one tablespoonful of melted butter or lard, half a tablespoonful of soda dissolved in a cup of warm milk; lastly, add sufficient brown flour (sifting only a part) to hold the spoon upright for a moment. Set it in the pans to rise. Just before putting it in the oven wet the top, to keep the crust soft.

BROWN BREAD.—Two bowls meal, one bowl flour, two bowls sweet milk, one bowl sour milk, one teaspoonful of soda, three tablespoonfuls of molasses, and a little salt. Bake two or three hours in a moderate oven. This makes a four quart loaf.

GRAHAM BISCUIT.—One pint of sour milk; two tablepoonfuls of butter or lard; one tablespoonful of molasses; an even teaspoonful of soda, stirred in the milk; half a teaspoonful of salt;

flour (Graham) enough to make as stiff as can be stirred with a spoon.

Dr. S. L. Hendrick, in the *Western Rural*, gives the following: Into a quart of cold water stir enough unbolted or Graham flour to make a batter a very little thicker than for griddle cakes. Have your pan heated quite hot and well buttered; fill the cups, and let it stand upon the stove a minute or so, before putting it into a very hot oven. They will bake in twenty minutes. These may be eaten while warm, even by the most delicate.

RICE BREAD.—Boil half a pound of rice in three pints of water till the whole becomes thick and pulpy; with this, and yeast, and six pounds of flour, make your dough. In this way, it is said, as much bread will be made as if eight pounds of flour without rice had been used.

GOOD CORN BREAD.—One pint of wheat or rye flour, two pints of corn meal, one teaspoonful of soda, one tablespoonful of melted shortening, one egg, and sour milk or buttermilk enough to make it pour easily; steam three hours, remove, and bake one hour.

FAMILY INDIAN LOAF.—Two quarts of scalding hot skim-milk, one tablespoonful of salt, one quart of corn meal stirred in by handfuls two-thirds pint of sifted rye meal; stir thoroughly, then add one cup of cold milk, stirring smartly. After standing twelve minutes, bake five hours in a cast iron basin covered with another basin.

HARD BISCUIT.—Two pounds of flour, two pounds of butter, two eggs, half teaspoonful of salt; rub the flour, butter, and salt, then add the eggs and as much milk as will mix it into a stiff dough; knead well, roll it out quite thin, cut with a round cutter, prick them with a fork, place them on tins, and bake crisp in a moderate oven.

BISCUIT.—Two quarts of flour, one tablespoonful of butter, one teaspoonful of soda, half teaspoonful of salt; mix with cold water, and beat well.

JOHNNY CAKE.—Rub two tablespoonfuls of butter into a quart of corn meal; add a small teacup of molasses to a teaspoonful of brown ginger; pour on slowly sufficient water or milk to make a soft dough. Bake in shallow pans, in a *hot* oven.

EGG BREAD.—Three quarts of milk a little sour, seven eggs, two ounces of butter, a teaspoonful of saleratus; add corn meal to make a stiff batter. Bake by a brisk fire.

CORN BATTER BREAD.—Six tablespoonfuls of flour, three of corn meal, and a little salt; make it a thin batter, with four eggs and milk. Bake quickly in shallow pans.

VICTORIA BUNS.—Two ounces of pounded loaf sugar, one egg, one and a half ounces of ground rice, two ounces of butter, one and a half ounces of currants, a few thin slices of candied peel; flour. Whisk the egg, stir in the sugar, and beat these ingredients well together; beat the butter to a cream, stir in the ground rice, cur

rants, and candied peel, and as much flour as will make it of such a consistency that it may be rolled into seven or eight balls. Put these on a buttered tin, and bake from half to three-quarters of an hour. They should be put into the oven immediately, or they will become heavy; and the oven should be tolerably brisk.

NEW ENGLAND JOHNNY CAKE.—Take one quart of buttermilk, one teacup of flour, two-thirds of a teacupful of molasses, a little salt, one teaspoonful of saleratus, one egg (beat of course). Then stir in Indian meal, but be sure and not put in too much. Leave it thin, so thin that it will almost run. Bake in a tin, in any oven, and tolerably quick. If it is not first rate and light, it will be because you make it too thick with Indian meal. Some prefer it without the molasses.

ROLLS.—Take a pint of milk and scald it, then add half a cup of butter while the milk is hot; when this is cool, add half a cup of sugar, and half a cup of yeast. Pour this mixture on to two quarts of flour, and let it stand until the next morning, then knead it and let it stand in the pans until it is risen properly.

FRENCH ROLLS OR TWIST.—One quart of lukewarm milk, a teaspoonful of salt, a teacupful of yeast, and flour enough to make a stiff batter. When very light add a beaten egg, and two table-spoonfuls of butter, and knead in flour until stiff enough to roll. Let it rise again, and when very light roll out and cut in strips and braid it. Bake thirty minutes on buttered tins.

How Good Rusks, which we find at first class hotels are made. The recipe is direct from a cook in one of the best hotels in the West.

Two tea cups of sugar, two-thirds of a cup of butter, two eggs. Beat these well together, add one pint of sweet milk and one of good lively yeast, and flour sufficient to make a soft sponge. Set it where it will be warm. Next morning knead in more flour and let it rise again, then mould into biscuits, and when light bake them in a moderate oven.

RUSK.—Three pints of flour, two eggs, one cup of sugar, and a tablespoonful of butter. Beat the eggs and sugar well together, and add the butter; mix in the flour with warm water, in which a cake of yeast has been dissolved; put in a place to rise. When well raised, knead in a teacup more of flour and make in small rolls. Bake a light brown. Be careful not to burn them, as the sugar would cause them to burn easily.

CORN RUSK.—Take one pint of corn meal and scald it with one quart of milk, a half a teacup of lard or butter, a little salt, three eggs, yeast enough to make it raise; then stiffen it with wheat flour; let it stand and raise about three hours; then roll and let it raise again; bake it and eat warm.

CORN MEAL RUSK.—Take six cupfuls of corn meal, four of wheat flour, two of molasses, and one teaspoonful of saleratus:

mix the whole together and knead it into dough; make two cakes, bake three-quarters of an hour.

COMMON DOUGHNUTS.—Two cups of sugar, one and a half of milk, two eggs, one nutmeg, two teaspoonfuls of cream of tartar, one of soda.

PLAIN CORN CAKE.—One quart of sweet milk; three eggs; teaspoonful of salt.

Another Way.—Two cups of sour cream; two cups of sweet milk or water; one tablespoonful of sugar; one teaspoonful of salt; one teaspoonful of soda; a handful of flour stirred in with the meal.

STEAMED CORN BREAD.—One pint of sour milk; one half cup of hard or finely chopped suet; one cup of molasses; one teaspoonful of allspice; one teaspoonful of salt; one teaspoonful of soda. Leave the batter quite thin. Steam one hour and bake the same.

FRUIT JOHNNY CAKE.—Two cups of sour cream; two cups of sweet milk; two tablespoonfuls of sugar; two eggs; one teaspoonful of salt; one teaspoonful of soda; one cup of chopped raisins; one cup of chopped citron; a handful of flour stirred in with the meal.

SALLY LUNN.—One quart of flour, four eggs, one gill of yeast, a little salt; mix with milk to a stiff batter, and add a piece of melted butter; pour into a buttered baking pan and let it rise over night. It makes a delicious warm bread for breakfast with plenty of butter.

INDIAN MEAL CAKE FOR BREAKFAST.—Pour enough boiling water in a pint of corn meal, to make a stiff dough; dissolve in a little hot water, half a teaspoonful of saleratus, and stir it in the meal with a teaspoonful of salt, two eggs well beaten, a tablespoonful of butter; stir the materials well together, and bake it in tin pans for half an hour in a quick oven. Serve it hot.

PARSNIP FRITTERS.—Boil six parsnips tender, then skin and mash them; mix them with two eggs well beaten, and two teaspoonfuls of flour; make up in small cakes and fry them in a little lard or beef gravy; make boiling hot before the cakes are put in; a little salt should be added.

MISSOURI CORN CAKES.—Sift three pints of corn meal, add one tablespoonful of lard, one of salt, and a teaspoonful of soda in a little warm water. Make it to a dough with milk, then add gradually a pint of hot water, beating it for half an hour. Bake on a hot griddle.

PASTRY.—Pies are the least desirable articles in our bill of fare, as the pastry is often indigestible in spite of all the care and skill that may be exercised.

AUNT SMITH'S RECIPE FOR PIE CRUST.—To a quart of flour a teaspoonful of salt; measure equal quantities of water and lard.*

* In all cases butter is preferable to lard in making pastry.

Put the butter into the flour and work it in with the hand, gradually adding the water. Work in the flour slowly, and keep the paste soft. Another rule: One pound and a half of flour, and half a pound of butter wet with cold water till it makes a stiff paste. Work it well and roll it out several times. Another rule: Take equal weights of flour, butter, and sugar; rub the flour and butter together, mix in the sugar.

APPLE PIE.—Stew the sliced apples in a very little water, when nearly done add butter, sugar, and spice. When cold place them in the paste with an upper crust, and bake till the crust is done.

SQUASH AND PUMPKIN PIES.—Cut the squash into pieces the size of two fingers, and stew in just enough water to cover them. When soft strain through a sieve. Add from one to four eggs, (as you have them,) to each quart of milk. Sweeten either with sugar or molasses, and season with ginger, nutmeg, cinnamon, and a little salt. Have your oven hot, and bake till the centre rises up. We consider these about the only pies suitable for daily use,

MINCE PIES.—Three and one half pounds of chopped beef to seven pounds of chopped apples, two pounds of sugar, one pint of best molasses, one ounce of nutmeg, a pound of suet; cider, citron, raisins or currants to your taste.

IMITATION APPLE PIE.—Use raw pumpkin instead of green apples; slice thin; add equal parts of vinegar and water, thicken with wheat flour, season to suit the taste, and bake thoroughly. It requires more salt and longer baking than apple pie, but when done is in no respects inferior.

MOCK CUSTARD PIE.—Take a heaping spoonful of flour, mix smooth with a little water or milk, pour on boiling water, proceeding as if making starch, (corn starch may be used instead of flour to good advantage;) make as much of it, by pouring on more or less water, as will be half enough for your pie; add a piece of butter the size of a walnut, a half cup of sugar, an egg well beaten, after having cooled the starch by adding a half cup of cold milk or more. Flavor highly with nutmeg or lemon. This has the taste of a cream pie to a considerable degree. A little practice is needed to enable one to judge as to the quantity of water to use. When eggs and milk are scarce, it is a good deal better than no custard pie.

CRACKER PIE.—Eight crackers pounded fine, on which pour boiling water to soften, eight tablespoonfuls of vinegar, eight of sugar, one lemon; if too stiff add water.

A GOOD LEMON PIE.—One cupful of boiling water, one cupful of sugar, one tablespoonful of corn starch, one lemon; place between a rich paste.

CRUMB PIE.—Mince any cold meat very finely, season it to taste, and put it into a pie dish; have some finely grated bread crumbs,

with a little salt, pepper, and nutmeg, and pour into the dish any nice gravy that may be at hand; then cover it over with a thick layer of the bread crumbs, and put small pieces of butter over the top. Place it in the oven till quite hot, and, should the bread crumbs not be sufficiently brown, hold a salamander over them.

WASHINGTON PIE.—To one tablespoonful of butter add one cup of sugar, half a cup of milk, two cups of flour, one egg, one teaspoonful of cream of tartar, half teaspoonful of saleratus. This will make two pies. When cold divide with a thin knife and add the jelly.

LEMON PIE.—The juice and grated rind of one lemon, one cup of water, one tablespoonful of corn starch, one cup of sugar, one egg, and a piece of butter the size of a small egg. Boil the water, wet the corn starch with a little cold water, and stir it in; when it boils up, pour it on the sugar and butter; after it cools, add the egg and lemon; bake with under and upper crust.

TO MAKE LEMON PIES.—Take the yolks of three eggs, one and a half cups of sugar, one cup of water, one tablespoonful of flour, the juice and rind of one lemon; chop the peel, stir all up together; bake as custard; then beat the whites of the three eggs to a froth; add four tablespoonfuls of sugar; put on the top, bake until done.

DELICIOUS LEMON PIES.—The juice and rind of one lemon, one cup of sugar, the yolk of two eggs, three tablespoonfuls of flour, milk to fill the pie plate; line the plate with the paste, pour in this custard, and bake until it is done. Beat the whites of two eggs, add four tablespoonfuls of powdered sugar, spread over the pie, and brown lightly in the oven.

LEMON PIE.—Two teaspoonfuls of flour and one of butter rubbed together, one cup of sugar, one egg, one tablespoonful of water, and the juice and grated peel of one lemon. This will make the inside of one pie. Bake in a crust of pastry, either barred across the top or with plain cover.

CAKE.—The following are Mrs. Laura E. Lyman's general directions for making cake:—"First of all, let them materials be each in their kind first class. Lard is never, at any time, a good substitute for butter; and good cake cannot be made from poor butter. The sugar need not necessarily be crushed loaf or perfectly white. A good article of cake can be made of light brown sugar. The quality of flour is of chief importance, as flour that will make palatable bread will not make good cake. The eggs should be well beaten; the fruit should be carefully prepared. Raisins should be seeded and chopped fine; then rubbed in flour and dried, which will prevent their sinking to the bottom. Citron should be cut in small, thin slices. The materials should all be collected in a warm room some time before mixing together. An earthen bowl is the

best article to mix cake in. Generally the butter and sugar are stirred together until white; then the eggs are added, then the flour, then the spice, then the saleratus is dissolved and added. The cream of tartar should be sifted with the flour. Put in fruit last. Have your pans well buttered or, what is much better, lined with white paper buttered. Move the cake as little as possible, and never jar it while baking. Most kinds of cake require a quick oven, but fruit cake is best with a moderate heat. The cake is done when a straw may be run into the heart of the loaf without any dough sticking to it."

SPONGE CAKE—TWO RECIPES.—Take ten eggs,—be sure they are fresh,—beat the whites and yolks separately. When the whites are beaten to a froth, add one pound of fine white sugar, three-fourths of a pound of sifted flour, the grated rind of one lemon, and half the juice. Stir rapidly fifteen minutes, pour into buttered pans, and bake in a moderately heated oven.

Measure Sponge Cake.—Three eggs, two small cups of sugar, half cup of cold water or sweet milk, a teaspoonful of cream of tartar, and half a teaspoonful of soda; flavor with lemon extract or the grated rind.

LEMON SPONGE CAKE.—Take ten eggs, separate them; a pound of granulated sugar, half pound of flour, the grated peel of two lemons, and the juice of one; beat the yolks with the sugar, and the whites alone; then add them, and sift in the flour by degrees; beat well, and bake with a quick heat.

FRUIT CAKE.—One cup of butter, two cups of sugar, three eggs, one cup of sour cream, one teaspoonful of soda, one tablespoonful of ground cloves and cinnamon, half a nutmeg, two cups of raisins and citron, flour to make stiff enough.

TUMBLER CAKE.—One egg, well beaten; one tumblerful of sugar; half tumblerful of sweet milk, filled up with thick cream; one teaspoonful of soda; two teaspoonfuls of cream of tartar, rubbed in two tumblerfuls of flour. Add nutmeg or rose water.

SNOW CAKE.—The white of ten eggs, one tumbler and one-half of sugar, the same of flour. Mix one teaspoonful of cream of tartar in the flour. Flavor with rose.

WHITE CAKE.—One cup of sugar, one-half cup of butter, one-half cup of sweet milk, whites of five eggs, two cups of flour, one teaspoonful of cream of tartar, and one of soda.

TEA CAKE.—One pint of new milk, two pints of flour, two eggs, two tablespoonfuls of butter, one tablespoonful of soda, one tablespoonful of cream of tartar.

RAISIN CAKE.—One pound of sugar, half pound of butter, one and a half pounds of flour, four eggs, half pint of thick milk, one teaspoonful of soda, same of cream of tartar, one nutmeg, half pound of raisins, half pound of currants.

LEMON CAKE.—One cup of butter, three cups of sugar, four cups of flour, five eggs, one cup of thick milk, one teaspoonful of soda, the rind and juice of two lemons. Bake in bread dishes.

MOLASSES CAKE.—One quart of molasses, half pint of thick milk, one teaspoonful of soda, quarter pound of shortening, butter and lard, ginger and cloves to taste, flour sufficient to roll out.

TEA CAKE.—Three and a half cups of flour, two of sugar, one of butter, four eggs, teaspoonful of soda in tablespoonful of milk, grated nutmeg. Bake carefully.

COFFEE CAKE.—Five cups of flour, one cup of made coffee, one cup of sugar, half cup of molasses, one cup of butter, teaspoonful of soda, two teaspoonfuls of cinnamon, one of clove, raisins or currants.

PUFF CAKE.—Three cups of flour, two and a half cups of sugar, one of milk, three eggs, piece of butter large as an egg, one teaspoonful cream of tartar, half a teaspoonful of soda, half a teaspoonful of salt.

CUP CAKE.—One cup of butter, two of sugar, three of sifted flour, and four eggs. Beat the eggs and sugar well together, add the butter, and lastly the flour; a small teaspoonful of soda dissolved in a very little of buttermilk. Soft ginger cakes made by the same recipe, only using molasses or syrup instead of sugar, and measuring the flour before sifting instead of after. Add a tablespoonful of ground ginger.

PLAIN CAKE.—One cup of sugar, one cup of cream, one egg, one cup of English currants, one teaspoonful of soda, nutmeg; stir to stiff dough and bake slowly.

POUND CAKE.—One pound of flour, three-quarters pound of sugar, one-half pound of butter, three eggs, one glass rose water; bake immediately.

GRAHAM TEA CAKE.—One cup of cream, one egg, one teaspoonful of salt, one saltspoonful of soda, one cup of sugar; stir to the consistency of soft gingerbread and drop on tins, or in rings.

RYE DROP CAKE.—One cup of cream, one-half cup of sweet milk, one teaspoonful of salt, two eggs, a pinch of soda; drop on tins, or in cups. By adding one cup of sugar to the above they are a very nice tea cake.

COFFEE CAKE.—One and a half cups of sugar, one of molasses, one of cold coffee, four of flour, one teaspoonful of cream of tartar, one-half teaspoonful of soda, one of cloves, one of cinnamon, three eggs.

FRENCH LOAF CAKE.—Three cups of light bread, two cups of white sugar, one cup of butter, three eggs, one nutmeg, one small teaspoonful of soda; rub the butter and sugar together, then work in the eggs, and lastly the bread and fruit. Bake in a loaf one hour and a half.

MARBLE CAKE.—*White.* One cup of butter; three cups of white sugar; four cups of flour; half cup of sweet milk; whites of nine eggs; flavor with lemon.

MARBLE CAKE.—*Dark.* One cup of butter; two cups of brown sugar; one cup of molasses; one cup of sour milk; one teaspoonful of soda; five cups of flour; yolks of nine eggs; one whole one; spices of all sorts. Put in pans first a layer of dark cake, then a layer of white, and so on, finishing with a layer of dark. Bake in a moderate oven.

PLAIN CAKE.—One cup of sour cream; one cup of sugar; one teaspoonful of salt; one teaspoonful of soda. Form the batter thin, and bake quickly.

CREAM CAKE.—Break two eggs in a coffee cup and fill the cup with sour cream; one cup of sugar, one and a half cups of flour, one teaspoonful of soda, one of cream of tartar; to be baked in layers, whipped cream or frosting to be put between each layer.

RAILROAD CAKE.—One cup of sugar, one of flour, two tablespoonfuls of melted butter, two tablespoonfuls of milk, three eggs, one teaspoonful of cream of tartar, one half a teaspoonful of soda; flavor with lemon.

QUEEN CAKE.—Mix one pound of dried flour, the same of sifted sugar, and of washed currants; wash one pound of butter in rose water, beat it well, then mix with eight eggs, yolks and whites beaten separately, and put in the dry ingredients by degrees; beat the whole an hour; butter little tins, teacups or saucers, filling them only half full; sift a little fine sugar over just as you put them into the oven.

PLUM CAKE.—Five cups of flour, one of butter, two of sugar, one of sour milk, one of molasses, one teaspoonful of soda. Cinnamon, cloves, allspice, mace, one or all, as you fancy. One half pound of chopped raisins, or same of Zante currants; two ounces of citron sliced thin, if you like it, but it is very good without. This is a good cake, and it will keep moist a long time.

MOLASSES POUND CAKE.—One cup of butter, one of brown sugar, one of molasses, three eggs, one tablespoonful of ginger, two tablespoonfuls of cinnamon, a cup of cream, of tartar, and flour enough to make batter about like pound cake. Bake in a loaf.

COTTAGE CAKE.—One cup of butter, two cups of sugar, three cups of flour, three eggs, one cup of milk, one and a half nutmeg grated, half a teaspoonful of soda, the same of cream of tartar, both of which dissolve in the milk.

PORTUGAL CAKE.—Put one pound of sugar, one pound of fresh butter, five eggs, and a little mace in a bread pan; beat it with our hands till it is very light and looks curdling, then put in a pound of flour, and half a pound of currants very dry; beat them together, fill the pans, and bake them in a slow oven.

NUT CAKE.—Beat two cups of sugar and two-thirds of a cup of butter, and two eggs together for fifteen minutes. Mix two teaspoonfuls of cream of tartar in three cups of flour, and add it to the sugar, butter and eggs. Then dissolve a small teaspoonful of saleratus or soda in a cup of milk, and stir it all well together. Pour it into a broad pan that has been well buttered. Sift sugar over it, and then cover it with the meats of walnuts. Bake it twenty minutes.

COCOANUT CAKE.—Peel the cocoanut and cut into thin slices, cut these again crossways into threads half an inch long; put a pound and a quarter of brown moist sugar, a teacupful of cold water and the sliced cocoanut into a saucepan, and boil for some time over a slow fire, stirring frequently to prevent it burning. Wring out a coarse kitchen cloth in cold water, and lay it over a large dish, drop a tablespoonful of the mixture at intervals on the damp cloth. This is the way cocoanut cakes are made in Jamaica, and they are extremely nice.

CHOCOLATE CAKE.—One pound of sugar, one of flour, and half a pound of butter; four eggs beaten separately until very light, half a pint of milk, one teaspoonful of soda, and two of cream of tartar. Bake in two cakes. Beat three cups of powdered sugar with the whites of three eggs, add chocolate to taste; spread a layer of this icing between the cakes and on the top and sides. Cocoanut cake can be made in the same manner by substituting half a grated cocoanut for the chocolate in the icing.

DELICATE CAKE.—One and one half cups of white sugar, or half cup of butter; rub these to a cream; add one half cup of sweet milk, in which dissolve one half teaspoonful of soda, and two cups of flour, in which rub one teaspoonful of cream of tartar; add a little salt and flavor with vanilla, lemon, or nutmeg. Beat the whites of four eggs to a stiff froth, and add last. Bake slowly an hour in a moderate oven. The recipe will make a two quart basin loaf, and if the proportions are followed exactly a beautiful cake will be the result.

COCOANUT CUP CAKE.—Two cups of rolled white sugar, one and a half cups of butter, one cup of milk, one teaspoonful of soda dissolved in a little hot water, four eggs well beaten, nutmeg, rose water, the white part of one cocoanut, grated; flour to make a stiff batter; beat it well, and put it in buttered pans an inch thick in a quick oven. When done frost it, and cut in pieces.

ICE CREAM CAKE.—Two cups of white sugar, two cups of flour, six eggs, two teaspoonfuls of cream of tartar, one teaspoonful of soda dissolved in two tablespoonfuls of hot water. Stir the flour, sugar, and cream of tartar well together; break the eggs in the mixture, then the soda and water. Beat them well together about five minutes.

For the cream, take one pint of milk, one and a half cups

sugar, half a cup of flour, two eggs. Boil the milk, beat together the sugar, eggs, and flour, stir in a little milk, when the milk boils stir in this mixture. Salt a little, and flavor to the taste.

Let both the cake and cream get perfectly cold, then cut the cake open and spread the cream between.

TRICOLORED CAKE.—Take one spoonful of finely powdered white sugar, nearly half a cupful of butter, half a cupful of sweet milk, the whites of five eggs, a teaspoonful of cream of tartar, half a teaspoonful of soda, and orange-flower water to flavor. Beat the sugar and butter together until it is creamy; mix the cream of tartar with a cupful of flour, stir it gradually with the mixture, alternately a little flour, then a little milk, (leaving only about a thimbleful of milk to mix the soda in,) until the whole is well mixed; have the whites beaten to a firm froth; mix evenly; in the same time put in the flavor; and, for the last thing, stir in the soda, dissolved in the reserved milk. The mixture should be as stiff as batter for muffins. Butter two square tin pans, put paper inside, after they are buttered; then put in the mixture evenly, and bake as quick as possible without scorching. Take just half of the above measure, substituting brown sugar in the place of white sugar, and flavor with the juice of half a lemon and the peel of the half lemon grated, or extract; bake this in one pan. Now take five yolks, light brown sugar in the same proportion as for the white cake, and have two or three ounces of sweet almonds blanched and chopped fine; mix smoothly, and bake in two pans the same as above. When all is done, and the cake is cold and firm, shave the tops of the cake smoothly and evenly, with a sharp knife, (the bottoms of the cake will not need shaving unless they are too brown to look well without;) put them together with fine jelly, so that they will stick firm—the pink cake in the centre, and the yellow at the top and bottom—and frost if you like. Cut it in any form; it is the prettiest cut in finger pieces; that is, cut it in slices an inch or an inch and a half wide, then in squares.

DRIED APPLE CAKE.—Three cups of dried apples soaked over night. Chop the apples, and simmer them fifteen minutes in two cups of molasses. Then add one-third of a cup of butter, two eggs, half a cup of sugar, five cups of flour, half a cup of milk, two teaspoonfuls of soda—spice to your taste. Allow the apples and molasses to *cool* before adding the rest.

RICE CAKE.—Quarter of a pound of ground rice, quarter of a pound of finely powdered white sugar, five eggs. Beat all well together till it froths; pour quickly into a tin lined with buttered paper. Bake three-quarters of an hour in a moderate oven.

SOUR MILK CAKE.—One cup of butter, two of sugar, two of our milk, half a cup of molasses, five of flour, one teaspoonful of oda; raisins and spice.

TONGUE TOAST.—Take a cold smoked tongue that has been well boiled, and grate it with a coarse grater, or mince it fine; mix it with cream and beaten yolk of egg, and give it a simmer over the fire; having first cut off all the crust, toast very nicely some slices of bread, and then butter them rather slightly; lay them in a flat dish that has been heated before the fire, and cover each slice of toast thickly with the tongue mixture spread on hot, and send them to the table covered. This is a nice breakfast or supper dish. For tongue you may substitute cold ham finely minced.

SOFT MOLASSES GINGERBREAD.—Dissolve two teaspoonfuls of soda in a half pint of milk, add a teacup of butter or lard; mix with a pint of molasses, a tablespoonful of ginger, a pint of flour, and a couple of beaten eggs. Fresh lemon peel, cut very fine, improves it.

GINGER CAKE.—One cup of molasses, one cup of sugar, two-thirds of a cup of butter, one cup of sweet or sour milk, two eggs, one teaspoonful of soda, ginger to suit your taste. Make your batter as thick as a common cup cake.

HARD GINGERBREAD.—Two cups of flour, one of chopped suet, one of raisins or any other dried fruit, one egg, two tablespoonfuls of molasses, one teaspoonful of soda, one cup of new milk, spice to suit the taste. Steam one and a half hours. Eat with liquid sauce.

GINGER CRACKERS.—One pint of molasses, one cup of sugar, six ounces of butter, cloves and ginger to taste, flour enough to roll out and cut.

RICH GINGERBREAD.—Melt together three-quarters of a pint of molasses and a half pound of butter, and pour them hot on a pound of flour mixed with half a pound of sugar and three-quarters of an ounce of ginger. When the paste is quite cold, roll it out with as much more flour as will prevent its adhering to the board, and bake in a slow oven.

GINGER COOKIES.—Two cups of molasses, two-thirds of a cup of butter or lard, one teaspoonful of soda, one teaspoonful of alum, dissolved in two tablespoonfuls of hot water and one teaspoonful of ginger. Add the alum after stirring in all the other ingredients.

TO ICE A CAKE.—For a good-sized cake use eight ounces of finely sifted sugar, put it into a mortar with four spoonfuls of rose-water and the whites of two eggs, beat and strain it well, and whisk it; then, when the cake is nearly cold, lay on the icing evenly with a feather. Put it in the oven to harden.

HARD MOLASSES GINGERBREAD.—One cup of molasses, half a cup of butter, a large teaspoonful of saleratus, a little salt, a teaspoonful of ginger, same of cinnamon; roll it about an inch thick; bake quickly. This is not really hard, but it is good.

SWEET POTATO CUSTARD.—One pound of potato mashed and sifted fine, one-half pound of sugar, a small cup of cream, and one-fourth

pound of butter; four eggs; nutmeg and lemon to suit the taste. If you have no cream, put half pound of butter. This makes two large custards.

COOKIES, No. 1.—One cup of sugar, one egg, one-half cup of butter, one half cup of lard, one-half cup of sweet milk, one-fourth teaspoonful of soda, and flour to harden. Roll thin, bake quickly, and sprinkle with sugar.

COOKIES, No. 2.—Three cups of sugar, three and a half cups of cream, one cup of water, three eggs, two teaspoonfuls of saleratus; salt and season to taste.

COOKIES, No. 3.—(A superior article.)—One teacup of white sugar, half a teacup of butter, one egg, two table spoonfuls of butter-milk, one teaspoonful of soda, with nutmeg.

SOFT GINGERBREAD.—One egg, one cup of cream, one cup of molasses, one teaspoonful of soda. Mix quite soft.

BOSTON GINGERBREAD.—One pound of butter, one pound of sugar, one pint of molasses, one pound of flour, six eggs, one gill of cold water, one teaspoonful of soda, one quart of fruit—citron and raisins.

DROP CAKE FOR BREAKFAST.—Half pint of milk, four eggs, one pound of flour, and add a little salt.

APPLE CAKE.—Two cups of *stewed* dried apples boiled in two cups of molasses. Drain off the molasses (for the cake) from the apples, add two eggs, two teaspoonfuls of soda, four cups of flour, one cup of butter, one cup of sour milk. Spice of all kinds. Then add the apple (which was drained as above). The apples should be soaked the night before stewing for the cake.

ORANGE SNOW BALLS.—Wash well half a pound of Carolina rice, put it in plenty of water, and boil it rather quickly for ten minutes, drain, and let it cool. Pare four or five small oranges, and clear from them entirely the thick white inner skin, spread the rice in as many equal portions as there are oranges upon some pudding or dumpling cloths; tie the fruit separately in these, and boil the snow balls for an hour and a half. Turn them carefully on a dish, and strew plenty of sifted sugar on them.

CINNAMON CAKES.—Beat up six eggs with three tablespoonfuls of rose water, put to it a pound of sifted sugar, a dessertspoonful of powdered cinnamon, and enough flour to form it into a paste; roll it out thin, and cut it into any shape you please. Place them on paper and bake them. Remove them from the paper when done, and keep dry.

PEPPERNUTS.—Take four eggs and beat them light with one pound of sugar; then take half a pound of butter, beat it up with eggs and sugar; one gill of milk, one nutmeg, half an ounce of saleratus, and flour enough to make a dough stiff to roll out.

MARVELS.—Dissolve one teaspoonful of soda or saleratus in a cup of milk. Season with nutmeg or cinnamon. Make it stiff with flour. Roll it very thin. Cut them round, as large as a cookey, and fry them. Sift sugar over them while hot.

MUDGE CAKES.—Three eggs, half a pound of sugar, one cup of butter, one pint and a half of flour, rolled thin in sugar.

DOUGHNUTS.—One cup of sugar, two eggs, three teaspoonfuls of melted lard, one cup of sweet milk, two teaspoonfuls of cream of tartar, one teaspoonful of soda, one teaspoonful of salt; add a little nutmeg. Knead all together and fry in hot lard.

APPLE CUSTARD.—One pint of good stewed apples, half a pint of cream, the eggs beaten light, sugar and grated nutmeg to taste. Stir the ingredients together, and bake in a stiff paste in a moderate oven.

BREAD CAKES.—Break the bread in small pieces and soak in cold milk; when soft, add one teaspoonful of saleratus, one of salt and flour, for a good batter.

CORN STARCH CAKE, No. 1.—One cup of corn starch, one of butter, one of sweet milk, two of sugar, the whites of six eggs, one teaspoonful of cream of tartar, and a half teacupful of soda. Flavor with lemon or vanilla.

CORN STARCH CAKE, No. 2.—One cup of butter, two of sugar, two of flour, one of cornstarch, one of sweet milk, whites of seven eggs, one teaspoonful of soda, two of cream of tartar. Mix the butter and sugar well together, put the soda in the milk, the cream of tartar in the corn starch, add them to the butter and sugar, then put in the flour and eggs, stir ten minutes, and bake in a moderate oven.

STRAWBERRY SHORTCAKE, No. 1.—Mix some dough precisely as you would for biscuit. Bake in one cake, on a round tin. When it is baked, split it open and butter it well. Have your berries prepared with sugar, and cream also, if you like; pour them upon the lower crust of your cake and place the upper one over them.

STRAWBERRY SHORTCAKE, No. 2.—One cup of sour cream, half a teaspoonful of soda, flour sufficient to make a stiff dough. Roll it out large enough to cover a large pie tin. Bake it in a quick oven. When baked, split it open and spread it with butter; take a pint of strawberries, cover them with sweet cream, sweeten them to your taste, spread them on the lower crust, and put the upper crust over them—and you have a dish fit for a wedding.

WAFFLES.—One quart of sour milk, one cup of cream, two teaspoonfuls of melted butter, three eggs, and a little salt. Let the irons be well heated before baking.

BUTTERMILK WAFFLES.—One quart of buttermilk, two eggs, one small teaspoonful of cream of tartar, one large teaspoonful of soda, and flour to make a batter.

RAISED WAFFLES.—One quart of milk, two eggs, one tablespoonful of lard, one tablespoonful of butter (or two of butter), one-half teacup of corn (or of Graham) meal, one-half teacup of yeast, one teaspoonful of salt, and flour enough to make a batter; bake when light.

Another.—One quart of milk, five eggs, one and a quarter pounds of flour, one half pound of butter. Beat well together. If you make before time to bake, put in one spoonful of yeast. Sift on cinnamon and sugar; one-half teaspoonful of soda, and one teaspoonful of cream of tartar. Bake immediately. Waffles should be wet with milk or sauce as fast as baked.

PLUM PUDDING.—One pound of raisins, one pound of currants, one pound of suet, and two and a half pounds of flour, with one pound of sugar, three eggs, and a tablespoonful of ground allspice, one ounce of candied lemon, one ounce of orange peel. Prepare these ingredients as usual, and boil this pudding at least seven hours. Always place an old plate at the bottom of a saucepan in which a pudding is to be boiled, and do not imagine that a plum pudding can be overboiled. We never knew any instance of this, but we have known many a pudding perfectly dry in the centre for want of a sufficient quantity of water, or too small a saucepan in which to boil it; and we have also known a rich plum pudding appear at table in the form of a very thick soup, for lack of being firmly tied when put into the pudding cloth for boiling. Never omit to dip your pudding into a pail of clear, cold water for about three minutes, when taking it up for being dished; this renders it firm, and prevents the cloth adhering to it.

BREAD PUDDING.—Take light white bread and cut in thin slices. Put into a pudding shape a layer of any kind of preserve, then a little slice of bread, and repeat until the mould is almost full. Pour over all a pint of warm milk, in which four well-beaten eggs have been mixed; cover the mould with a piece of linen, place in a saucepan with a little boiling water, let it boil twenty minutes, and serve with pudding sauce.

COUNTRY PUDDING.—(Easily made.)—Put a layer of stale bread crumbs in the bottom of your pudding dish, then a layer of tart apples, sliced thin. Sprinkle a little sugar over the apples, add another layer of bread crumbs, and another of apples, until your dish is full. Crumbs should form the top layer; pour a custard (made same as for pies) over it, and bake one hour. Eat with sweetened cream.

POVERTY PUDDING.—Soak your bread in milk the night before using; when ready, butter your pudding-dish, and place in a layer of the bread. Have a dozen apples pared and sliced, and place a layer of apples on the bread, another layer of bread, then of apples, and so on, till your dish is filled. Let the last layer be bread and bake it an hour. To be eaten with sauce.

MINUTE PUDDING.—One quart of milk, four tablespoonfuls of flour, stirred up with a little milk, then stirred into the boiling milk. Take from the fire and pour into a dish; beat four eggs and stir in while hot. After it becomes a little cool, sprinkle over the top one cup of white sugar, and a little grated nutmeg; pour over that one cup of wine.

BLACKBERRY OR HUCKLEBERRY PUDDING.—Dissolve a teaspoonful of soda in half a teacupful of very warm water, stir in one pint of molasses, a teaspoonful of cinnamon, one of allspice, a quart of huckleberries; then stir in flour, and make it quite thick, about as thick as pound cake. Tie in a pudding bag, and boil two hours and a half; serve with wine sauce.

BAKED APPLE PUDDING.—Two ounces of butter, quarter pound of pulverized white sugar, quarter pound of boiled apples, the yolks of three eggs, the whites of two eggs, the rind and juice of one lemon. Mix the whole well together, and bake it in a puff paste one hour.

SWEET POTATO PUDDING.—One pound of sweet potatoes, boiled and mashed fine, or grated while hot; six eggs well beaten, three-quarters of a pound of sugar, the same of butter, a grated lemon rind and nutmeg, a wine glass of brandy; line the dish with paste. When baked sprinkle the top with fine sugar.

RICE PUDDING.—Soak three ounces of rice in cold water for an hour; then throw away this water. Cover again with fresh water, place on the stove, and let it soak until quite soft; then add one ounce of sugar, two eggs well beaten, and then gradually mix with three-quarters of a pint of milk and half an ounce of butter. Mix all well together, and bake in a gentle oven.

RICE PUDDING.—Half a pint of rice boiled; drain off the water, and let the rice get cold; two ounces of butter, four ounces of sugar, one quart of rich milk, five eggs beaten very light, a tablespoonful of nutmeg and cinnamon. Stir all together.

BAKED CHICKEN PUDDING.—Cut up two young chickens; season them with pepper and salt and a little mace and nutmeg. Put them into a saucepan with two large spoonfuls of butter, and water enough to cover them. Stew them gently, and when about half cooked, take them out and set them away to cool. Pour off the gravy, and reserve it to be served up separately. In the mean time make a batter, as if for a pudding, of a pound of flour stirred gradually into a quart of milk, six eggs well beaten, and added by degrees to the mixture, and a very little salt. Put a layer of chicken in the bottom of the pie dish, and pour over it some of the batter; then another layer of chicken and some batter, and so on, having a cover on the top. Bake it till it is brown. Break an egg into the gravy which you have set away, give it a boil, and send it to the table, in a sauce tureen, to eat with the pudding. This is a rather expensive dish for people of moderate

means to indulge in, but it is presented to all to use or not use, as they may see proper.

BAKED INDIAN PUDDING.—Boil a quart of milk, stir into it, gradually, three gills of Indian meal and half a pint of molasses, and let it cool. Butter a dish, put into it half a pound of beef suet, chopped, and a spoonful of salt; then turn in the pudding, and a quart of cold milk. Stir it up well, add a pint of cold milk. Bake four or five hours.

LEMON CUSTARD.—The lemons grated, one pound of sugar, eight eggs, a piece of butter the size of a walnut, Beat the yolks, sugar, lemons, and butter together, the whites to a froth, which are not to be added until ready for the oven. Bake on pie crusts.

SOLID CUSTARD.—Half a box of gelatine boiled in one quart of milk, and pour, while boiling, over eight eggs and eight spoonfuls of sugar well beaten together. Flavor to taste, and put in moulds in ice. To be eaten with cream and sugar.

APPLE IN JELLY.—Peel and quarter some good apples, and take out the core; cook them with just enough water to cover them, some slices of lemon and clarified sugar, until they are soft. Take out pieces of apple with great care, so as not to break them, and arrange them in the jars; then boil the sirup until it will jelly, and pour it over the pieces of apple.

LEMON BUTTER—FINE.—One pound of powdered white sugar; six eggs, leaving out the whites of two; the juice and grated rind of three lemons; one quarter of a pound of fresh butter. Boil these together till as thick as honey. One teaspoonful is enough for a tart or cheese. Will keep well if tied up in jars, covered with paper dipped in the white of eggs.

CANNING FRUIT.—This we call a very simple process when rightly understood. We always have an abundance of the small fruits put up in glass jars. We think the trouble less, the fruit better, and less expensive, than by the old process of preserving in sugar, pound for pound. We use the Spencer jar with a japanned cover, and a rubber ring around its edge. We heat the fruit to a boil in a bright tin pan; have the jars filled with quite warm (almost hot) water to warm them; pour out the water, and dip the boiling fruit rapidly into the jar, until it comes slightly above the shoulder in the inside of the neck of the jar. The end of a string, about one-eighth of an inch in diameter, is dropped inside on the fruit, retaining the other end in the hand. Now crowd in the cover down on to the shoulder, at same time withdrawing string, and the work is done. Any extra juice or air will follow out with the string.

Those who fail in putting up fruit to keep, do not exclude the air. This is done by having the fruit hot, and by being sure to fill the jar, so that when the cover is pushed down a little of the juice will be pressed out with the string. You may sweeten the

fruit or not, just as you please. It is not necessary in order that it may keep. Neither is it necessary to put the fruit into the jars to boil. It necessitates extra trouble, and often loss, by the breakage of the jars.

DIFFERENT METHODS—PEACHES, APRICOTS, AND PEARS.—As you peel, halve and seed them—drop them into cold water to prevent discoloration; then fill your jars as full as they can be filled; prepare your sirup in the proportion of one pound of white sugar to a quart of water; boil your sirup five minutes, then pour it on your fruit; let the jars be filled with the sirup up to the neck; as soon as each jar is filled, screw on the cap against the rubber, so that all air may be excluded; then place your jars in the boiler with cold water to the neck of the jars, and then let them boil fifteen or twenty minutes (keep your jars from striking each other when boiling); then take them out, screw down the cap firmly with the hand, and as soon as the fruit has cooled, the wrench should be applied; then put them away in a cool place.

ANOTHER WAY TO DO PEACHES.—Place your sirup on the fire, and throw in your fruit, after preparing as above. Let it remain in the hot sirup until it is thoroughly heated through; then fill your jars; be sure your jars are warm before putting in the hot fruits; then pour on the sirup (screw them up immediately, each one as you fill, as firmly as you can with the hand), and as they cool off apply the wrench; then place them in a cool place.

STRAWBERRIES, RASPBERRIES, BLACKBERRIES, AND CHERRIES.—Sirup same as peaches; let the sirup be cold before pouring it on the fruit; then fill your jars with berries as full as possible; pour on the sirup, if cold, to the neck; screw the cap down to the rubber; place the jars in the boiler with cold water up to the neck, and boil fifteen or twenty minutes; then take them out; screw the cap firmly with the hand (as the fruit cools apply the wrench).

PLUMS AND CURRANTS.—Sirup, two pounds of white sugar to one quart of water; boil five minutes (plums are best with the skins taken off); have your jars warm, then fill them up with the fruit; pour on the hot sirup; screw on the cap firmly with the hand as soon as you fill each jar, and as they cool off apply the wrench.

QUINCES.—Sirup one and a quarter pound of sugar to one quart of water; parboil them in water soft enough to run a broom whisk through them; fill your jars with them; pour on the sirup while hot; screw down the cap when cool; place them in a boiler of cold water up to the neck, and boil fifteen or twenty minutes; take them out; screw the cap firmly with the hand; when cool apply the wrench. The water that the quinces are parboiled in may be used for jelly.

TOMATOES.—may be prepared as for stewing; let them boil twenty minutes; fill your jars (have the jars warm before you fill

them; screw on the cap firmly with the hand as you fill each jar; as they cool apply the wrench. Do not season them until they are used for the table.

PRESERVED STRAWBERRIES.—Pick off all the stems, and to every quart of fruit add a quart of sugar; mix well with the sugar and put them over a slow fire till the sirup commences to form, then pour them over a hot fire, and let them boil quickly for fifteen minutes, skimming it well. Put them boiling hot into stone jars, seal up tightly.

PRESERVED APPLE.—Core and pare a dozen good sized apples and cut into eighths; make a sirup of a pound of sugar to a half a pint of water; let it boil, and put in as much apple as can be boiled without breaking; remove them carefully when tender; after all are done, add a little more sugar, boil up, and flavor with vanilla or lemon, and turn over the apple.

PRESERVED CHERRIES.—The bright red cherry is the best. Do not take off the stems; wash and drain them, weigh them, and allow three-quarters of a pound of sugar to a pound of cherries; put them into wide mouthed bottles, cork them tightly, place the bottles in a kettle of water, cold, (keep the bottles apart to prevent them from striking,) put the kettle on the range, and let it boil for nearly three hours. As the water boils away, replenish it; after the bottles are taken from the water and cooled a little, cement the corks closely and put in a dry place.

MARBLEHEAD PRESERVED PEACH.—Take a peck of ripe peaches, stone and pare them, allow a bowl of white sugar to a bowl of peach; put a layer of peach into the stone jar, then a layer of sugar, and so on till they are used up. Let them stand for two days; drain off the sirup, boil and skim and turn over the peach, let them stand for two days; drain off the sirup, scald and skim, and again return to the peach, and it is fit for use.

PRESERVED QUINCES.—A pound of sugar to each pound of quince (after paring and quartering); take half of the sugar and make a thin sirup; stewing a few of the quinces at a time till all are finished, make a rich sirup of the remaining sugar and pour over them.

TO SEAL PRESERVES.—Beat the white of an egg; take good white paper (tissue is the best), cut it the size you require, and dip it in the egg, wetting both sides. Cover your jars or tumblers, carefully pressing down the edges of the paper. When dry it will be tight as a drumhead.

APPLE JAM.—Weigh equal quantities of sugar and good sour apples; pare, core and chop them fine; make a sirup of the sugar, clarify thoroughly; then add the apples, the grated peel of two or three lemons, and a few pieces of white ginger. Boil till the apples look clear and yellow. This resembles foreign sweetmeats;

the ginger is essential to its peculiar excellence; it will keep nice for years.

APPLE SWEETMEATS.—To twelve pounds of sweet apples add four pounds of sugar, one pint of vinegar. Put the vinegar and sugar together to dissolve, then put in the apples, with lemon, ginger root, cloves, etc.

PIE PLANT.—The pie plant may be dried for winter use like any other fruit. Prepare as for cooking, and set in a moderately warm oven or near a fire till thoroughly dried. To prepare for use, scald in two waters, and cook the same as dried peaches.

APPLE SAUCE.—Let your stock of apples be picked over several times in the course of the winter, and all the defective ones taken out. Let the good parts of these be pared, and if not used for pies, be made into apple-sauce. Boil it in a preserving kettle, and to a pailful of cut apples put one sliced lemon. After the apples are tender, add a pint bowl of brown sugar, and boil them gently fifteen minutes longer. Toward spring, when apples become tasteless, a teaspoonful of tartaric acid, dissolved in a little water, should be added to this quantity of apple.

CURRANT JELLY.—Pick fine red, but long-ripe currants from the stems; bruise them and strain the juice from a quart at a time through a thin muslin: wring it to get all the liquid; put a pound of white sugar to each pound of juice; stir it until it is all dissolved; set it over a gentle fire; let it become hot, and boil for fifteen minutes; then try it by taking a teaspoonful into a saucer; when cold, if it is not quite firm enough, boil it for a few minutes longer.

BLACK CURRANT JELLY.—Boil the currants till the juice flows, then strain through a jelly bag, and set it over the fire for twenty minutes, after which add half a pound of sugar to a pound of juice, and boil for about ten minutes.

RASPBERRY JAM.—Pick them carefully, take equal quantities of berries and sugar, stir it continually; put the fruit first into a sauce-pan, and when the watery particles are evaporated add the sugar, simmer slowly fifteen or twenty minutes.

BOILED CIDER JELLY.—To each pint of boiled cider add one pound of sugar and boil ten minutes. This will make a beautiful jelly for tarts.

CURRANT WINE.—Take perfectly ripe currants, mash and strain; to each quart put two of water and three of sugar; stir the whole well together, and let it stand twenty four hours without stirring; then skim and set in a cool place where it will ferment slowly. When it becomes clear it is fit to bottle. This will be good in the course of six months, but is much improved by being kept two or three years. I have currant wine two years old, made according to the above recipe, which is far preferable to Madeira in sickness.

RASPBERRY WINE.—Bruise the finest ripe raspberries with the

back of a spoon; strain them through a flannel bag into a stone jar; allow one pound of fine powdered loaf sugar to one quart of juice; stir these well together and cover the jar closely. Let it stand three days, stirring up the mixture every day; then pour off the clear liquid and put two quarts of sherry wine to each quart of juice or liquid. Bottle it off, and it will be fit for use in a fortnight. By adding cognac brandy instead of sherry the mixture will be raspberry brandy.—*Germantown Telegraph*.

BLACKBERRY WINE.—To one quart of juice add two quarts of water and three pounds of sugar; the berries to be mashed cold, and the juice expressed and strained; the sugar dissolved in the water and strained. The whole then mixed in kegs and placed in a cool cellar; the bung-hole to be left open until fermentation has nearly ceased, then closed tight and left standing until the ensuing April, when it should be carefully drawn and bottled.

RASPBERRY VINEGAR.—Pick the raspberries and place them in vinegar over night, sufficient to cover them. Then strain through a cloth, adding one pound of sugar to one pint of the juice. Boil and skim until clear; and when cool bottle and cork, setting in a cool place.

BLACK CURRANT VINEGAR.—Pour three pints of vinegar on five pounds of very ripe black currants, stir them twice a day for three days, then squeeze and strain off the juice, boil it ten minutes, add one pound of loaf sugar to every pint of juice, boil and drain it about twenty minutes longer, and bottle it when cold.

TO MAKE GOOD VINEGAR.—One pint of strained honey and two gallons of soft water. Let it stand in a moderately warm place. In three weeks it will be excellent vinegar.

PICKLES.—Mrs. W. T. Warrensville, Ohio, gives the following directions for preserving pickles from scum: Pack the cucumbers, or whatever is to be pickled, in a jar or tub, pour a weak brine upon them, and let it remain three days. Pour off the brine, and pour on boiling hot vinegar enough to cover the pickles, and let them stand twenty-four hours. Reboil the vinegar, and pour on as before. Do this three times, letting the pickles stand twenty-four hours each time. Then throw this pickle away, and add enough fresh vinegar to cover the cucumbers, or whatever is to be pickled. Add a small lump of alum the size of a marble to a gallon of pickle; half pound of sugar and spices to taste. Bring to a boil, skim, and then turn upon the pickles while hot. Let them stand, well covered, for ten days, and they are ready for use. Peaches, pears, sweet apples, etc., are served in the same way, excepting the use of brine. The author of this recipe has pickles two years old, preserved in this way, as free from rot and scum as when first put down.

PICKLED CABBAGE.—A correspondent of the *Country Gentleman* says: "In response to the inquiry, 'how to pickle cabbage?'"

I send the following, which my folks have tried several years, and I know to be good, and is liked by those who have eaten it. It keeps well a year, and how much longer it would keep I am unable to say. If one is not over nice in regard to the form in which it is served, I think it will suit the palate of any who are fond of the like pickle. Take any quantity of well formed cabbage heads, and thick-meated squash, or bell-peppers, and chop them fine and mix. Use about one-third pepper, and two-thirds or more of cabbage after being chopped; for each gallon take one heaping teaspoonful of ground cloves, about half the quantity of ground cinnamon, half a teacupful of whole mustard seeds, and two tablespoonfuls of fine salt; mix thoroughly and place it in a stone jar, and pour over it scalding hot cider vinegar; cover and set in the store room, where it will keep cool and not freeze. It will answer to use after twenty-four hours. Small green tomatoes or other vegetables may be added, if desired, and pickled whole. One who does not like to be at the trouble of stuffing peppers will here find an excellent substitute. The vinegar should not rise above the cabbage, only well saturate the mass.

SWEET CUCUMBER PICKLES.—Take cucumbers when fully ripe, pare them, cut lengthwise, and take out the seed. Put them into weak brine over night. In the morning, drain them, boil till tender in weak vinegar and water, drain again, and put into jars, and turn over them the sirup, hot. For the sirup, or “sweet pickle,” allow to each pound of fruit (?) half a pound of sugar; and one pint of vinegar to each four pounds of fruit. Boil the vinegar and sugar a few moments, then add mace, cinnamon, and cloves, to your taste; let it boil, and skim well. This pickle is as good for cantelopes, peaches, or other fruit as for the above.

TO PICKLE BEET ROOT.—This vegetable makes an excellent pickle, and from the brightness of its color has a very pretty effect in a glass pickle-dish or jar. Wash the beet perfectly; do not cut off any of the fibrous roots, as this would allow the juice to escape, and thus the coloring would be lost. Put into sufficient water to boil it, and when the skin will come off it will be sufficiently cooked, and may be taken out and laid upon a cloth to cool. Having rubbed off the skin, cut the beet into thick slices, put it into a jar, and pour over it cold vinegar, prepared as follows: Boil a quart of vinegar with an ounce of whole black pepper and an equal weight of dry ginger, and let it stand until quite cold. The jar should be kept closely corked.

CAULIFLOWER PICKLES.—Break them into neat branches, put them in a white cloth, (nothing stains more easily;) boil them very slightly in salt and water. Spread them to cool. Pack them in jars, and pour over them vinegar, prepared as follows, and then seal up tight. Grind three ounces of coriander seed, and one ounce of white mustard seed; pound and then grind one ounce of white

ginger root. Boil the whole in three quarts of the best cider vinegar in a porcelain or bright tin kettle, and strain over the cauliflower.

PICKLED EGGS.—Boil the eggs until done; when cold shell them and cut them in halves lengthwise; lay them carefully in large mouthed jars, and pour over them scalding vinegar, well seasoned with whole pepper, allspice, a few pieces of ginger and a few cloves. When cold tie up closely, and let them stand a month. They are then fit for use. With cold meat they are a most delicious and delicate pickle.

TOMATOES FOR WINTER USE.—After skinning perfectly ripe tomatoes, cut out any green around the base. I think leaving in this hard green core is the immediate cause of the loss of the fruit. Place them in a bell-metal kettle over the fire; season with salt as if for immediate use; then allow them to come to a boil; while hot, put in stone cans or small mouthed gallon jars, cork and seal. If proper judgment be exercised you will never lose one jar. Do not use tin.

TOMATO CATSUP.—Scald and peel your tomatoes; then place them in a kettle to boil. When done, cool and strain them through a sieve; then add pepper, salt, and cloves. Scald them again, and add one tablespoonful of brandy to one pint of the catsup; place in bottles, cork and seal while hot, setting it in a cool place.

TO PICKLE PEARS.—Steam your pears until quite done; then to three pounds of pears add one pound of sugar, and vinegar enough to cover them. Put the vinegar on cold. Mace, cloves, and cinnamon to your taste.

KEEPING CIDER SWEET.—When fermentation begins in a barrel draw off the liquor into another, straining through flannel. Put into the cider three quarters of an ounce of the oil of sassafras and the same of the oil of wintergreen, well shaken up in a pint of alcohol. But one difficulty is found, and that is—that it is so palatable that people will not let it keep long.

TO MAKE SUMMER DRINKS.—To make root beer, take a quantity of sarsaparilla roots and sassafras bark and some hops, and boil till the strength is extracted. To three gallons of liquor, after it is strained, add one quart of molasses and a cup of yeast. After standing in a warm place eight or ten hours, strain again and bottle. It will be fit for use the following day.

FOR GINGER BEER, take one pint of molasses and two spoonfuls of ginger, put into a pail to be half filled with boiling water; when well stirred together, fill the pail with cold water, leaving room for one pint of yeast, which must not be put in till lukewarm. Place it on the warm hearth for the night, and bottle it in the morning.

FOR SPRUCE BEER, take three pounds of sugar, four gallons of water, one ounce of ginger, a little lemon peel, or essence of lemon,

and a little essence of spruce to give it a flavor. Stir all together warm it a trifle; add a cupful of good yeast. When fermented, bottle up close.

MEAD is made by dissolving one part of honey in three of boiling water, flavoring it with spices, and adding a portion of ground malt, a piece of toast steeped in yeast, allowing the whole to ferment.

WASHING MADE EASY.—Rub the clothes in two waters, use plenty of soap; then after wringing dry, place in a tub, and pour on clear boiling water to cover them. Let them remain until cool enough to bear the hand; wring and put out to dry, using no hard water about them. This saves nearly half the usual work, besides the steam from boiling, which is very unpleasant, especially in winter.

Bar soap should be cut into pieces of a convenient size, and laid where it will become dry. It is well to keep it several weeks before using, as it spends fast when it is new.

Good soft soap can be made in the following manner: To one pound of saponifier (to be had at the groceries or drug store) add three gallons of rain water. Set it boiling and then put in four pounds of soap fat, (any offal fat saved in the kitchen,) or tallow. When the solution is clear and the fat all combined, which is seen by the disappearance of all fatty eyes or spots in the liquid, add twelve gallons of soft rain water, and when cold your soap is ready for use. The "saponifier," being concentrated lye, is better than wood ashes and potash, and is by no means dear.

ARTHUR'S HOME MAGAZINE says that a little alum dissolved in hot water and thrown into a tub of soapsuds, will precipitate the soap and dirt to the bottom, and leave the water clear and soft enough to be used again. Or the alum may be put into boiling suds, permitting the scum to boil over and leave the water clear, soft, and as useful for washing clothes as it had originally been.

A THOUSAND DOLLAR RECIPE.—Take one pound of sal soda and half a pound of unslacked lime, put them in a gallon of water and boil twenty minutes; let it stand till cool, then drain off and put it in a stone jug or jar. Soak your dirty clothes over night or till they are well wet through, then wring them out and put on plenty of soap, and to a boiler of clothes well covered with water add one teaspoonful of washing fluid. Boil half an hour briskly; then wash them thoroughly through one suds and rinse well in water, and your clothes will look better than the old way of washing twice before boiling. This is an invaluable remedy, and we want every poor, tired woman to try it.

TO REMOVE STAINS.—Table linen or any white clothes that have coffee or fruit stains on them, before being put into soapsuds, should have boiling water turned on them, and remain in it till the water is cold. If they are put into soapsuds with the stains

on they will be set by it so that no subsequent washing will remove them.

TO WASH CALICOES.—Put wheat bran in a bag, boil and take half the water to wash in, half to rinse in; use no soap. This will cleanse without fading, and stiffen them without starch. Iron on the wrong side and they will look as if just out of the store.

TO CLEAN CLOTH GARMENTS.—Upon the collars and wristbands of coats rub benzine plentifully, and after some ten minutes rub on soap. Have ready some hot water and a sponge; wash thoroughly, and rinse in warm water. Then get some clean suds, and with a brush go over the whole garment, brushing it in the right way of the cloth. Pull and stretch them into shape, and hang them up to dry.

WASHING SCARLET FLANNEL.—A handful of flour mixed with a quart of cold water and boiled ten minutes. Add it to the water you have ready to wash in. The articles will require many rinsings in clean water after being washed in this mixture; but, if carefully done, the most brilliant scarlet will lose none of its brightness. If flannel is soaked in pure cold water before making it up, it never shrinks at all. Get a washing trough filled from the pump, and in this the flannel is placed. As soon as it sinks to the bottom it is taken out and hung up, without any squeezing. It drains itself, and does not lose the appearance of new flannel when dry.

TO STARCH CUFFS AND COLLARS.—To make them look glossy as when first bought, add to the starch a little gum arabic dissolved in warm water. Iron wet, with a cloth over them. To prevent the iron from sticking, stir a little salt in the starch while hot.

A CLOTHES LINE REEL is a great convenience, and easily made. A strong box nailed to the end post, or against the building, with a crank through it, is all that is required. Fasten one end of the line to the crank in the box, and you can always have your line in good shape when washing day comes.

PRESERVING FURS.—Ladies are often anxious about keeping furs free from moths during the summer months. Darkness is all that is necessary. The "miller," from whose eggs moths are hatched, only moves in light; the moths themselves work in darkness. Hang the furs in a very dark closet, and keep the door shut; keep it always dark and you can have no trouble. But, as closet doors are sometimes left open, the better way is to enclose the articles loosely in a paper box; put this in a pillow case, or wrap around with cloth, and hang up in a dark closet. Camphor, spices, or perfumes are of no use; continual darkness is sufficient. And do not take out the furs in June or July to give them an "airing," for even then cometh the enemy, and it may be that in fifteen minutes after exposure it has deposited a hundred eggs. If you con-

sider an airing indispensable, give the furs a good switching and put them quickly back.—*Country Gentleman*.

HOW TO WASH FURNITURE.—Mahogany may be washed in very weak suds made of hard soap, and immediately rinsed and rubbed dry with a clean cloth. Some think water must never touch furniture, but once or twice a year; this method may be used to advantage; it makes the articles look as if newly varnished. White spots made by heat, on varnished furniture, may be removed by rubbing with a flannel cloth saturated with coal oil. I have often done so with perfect success. It is much easier than the old hot paper plan.

HOW TO WASH WHITE PAINT.—As little soap as possible should be used with this, and that in the water and not on the cloth. It not only makes the paint yellow, but, after a little while, removes it altogether. A friend of mine, noted as a housekeeper, would never allow either soap or hot water to be used on paint, except in case of grease. Cold water and a scrubbing brush were her weapons of offence in waging a warfare with dirt; but I should rather pay for painting once in a while, than expend as much strength and time as such a process requires. However, it gives a very fresh look to paint, and saves soap and fire, if one is inclined to try it. For greasy spots prefer a little soda (carbonate) in the first water, to be immediately rinsed off and wiped dry.

RUST ON DINNER KNIVES.—Cover the steel with sweet oil, well rubbing it on; let it remain forty-eight hours, and then, using unslacked lime, finely powdered, rub the knife until all the rust has disappeared.

HOW TO CLEAN TIN.—Never use lye to clean tin; it will soon spoil it. Make it clean with suds, and rub with whiting, and it will look well, and last longer.

CLEANSING WOOL. The *Maine Farmer* gives the following recipe for cleansing wool of gummy matter:—Take one pound of saleratus to twelve pounds of wool, dissolve in water not quite boiling hot, then put in the wool and stir occasionally for one hour; take it out and squeeze it thoroughly, or, what is better, run through a close wringer, rinse in cold water, and spread on grass ground to dry. This process will remove all dirt from any kind of wool, and make it much better for custom work.

RESTORING COLOR TO SILK.—When the color has been taken from silk by acids, it may be restored by applying to the spot a little hartshorn or sal volatile.

CLEANING WINDOWS.—If the sash are to be cleaned, it is done with a small brush or soft cloth, as you would any other varnished or painted wood. If you wish to clean the glass by washing in water, have a tub of moderate soapsuds and another of clean water beside you. Wash the window first in the suds, and then riuse

thoroughly in the pure water; set the windows away to drain and dry without wiping. When dry, rub thoroughly with soft paper, and your window will be faultless. If there are any spots of paint or putty on the glass, put strong soft soap, or soda wet into paste, for a few minutes, to remove it. A mixture of whiskey and water will cleanse glass nicely. Whiting spread on the glass wet and rubbed off when dry, will also clean it well, and is easily practised when you do not wish to take out the sash.

HOW TO WASH GRAINING.—Take clear warm water, a clean white cloth, and wash a small place, and wipe dry with another clean white cloth. Do not wet any more space than you can dry immediately with your cloth, as it must not be left to dry in the atmosphere. It must be rubbed dry; hence the necessity for perfectly clean white cloths. If the paint has been neglected until very much soiled with greasy fingers, or specked with a summer's growth of flies, a very little hard soap may be put in the first water, and then rinsed off with clear water; but avoid soap if you possibly can.

FAMILY GLUE.—I make my glue in the following way:—Crack up the glue and put in a bottle; add to it common whiskey; shake up, cork tight, and in three or four days it can be used. It requires no heating; will keep for almost any length of time, and is at all times ready to use, except in the coldest weather, when it will require warming. It must be kept tight, so that the whiskey will not evaporate. The usual corks or stoppers should not be used. They will become clogged. A tin stopper, covering the bottle, but fitting as closely as possible, must be used.

COATING FOR IRON. A mixture of three parts of lard and one of rosin, melted together, is one of the best coatings for all steel or iron implements. The lard makes the rosin soft, while the latter is a sure preventive against rusting. The mixture is good for plows, hoes, axes, and implements, as well as knives and forks packed away.

PRESERVING SHINGLES. An "old farmer" recommends sprinkling shingle roofs once a year, either in spring or fall, with slacked lime. He also says new shingles can be made to last much longer by soaking them for a few days in thick lime water, well stirred up.

TOOTH POWDER.—Powdered chalk, half an ounce; one drachm of powdered myrrh, the same of orris root, two of powdered bark. Mix all together. This dentifrice is good for both the teeth and the breath.

A CANDLE TO BURN ALL NIGHT.—When, as in case of sickness, a dull light is wished, or when matches are mislaid, put finely powdered salt on the candle till it reaches the black part of the wick. In this way a mild and steady light may be kept through the night by a small piece of candle.

HOW TO MAKE GOOD BUTTER.—Good butter requires cleanliness to the highest degree. One drop of water in a pan of milk

causes fermentation. It also requires intelligence. The cream must be removed at just such a period of the fermentation of the milk. If taken too soon, before the milk has clabbered, it has a bitter taste; if allowed to stand until spots form upon it, it loses its sweet flavor; if left until it wheys, it is nearly worthless. So it requires a practised eye to skim it at the exact moment, to retain all its sweetness and flavor. A dairy containing three cows should have its milk skimmed morning, noon, and night.

A stone pot is the best receptacle for the cream, as tin is not easily kept sweet. Every time fresh cream is added, stir the whole contents from the bottom. Put a large tablespoonful of salt into the first cream that goes into the pot, and mixing it daily tends to keep it all from moulding. If possible churn twice a week. Churn early in the morning before the kitchen fire is lighted, or, if this is inconvenient, churn down cellar, so that the cream will not become too warm. Cream should be at a temperature below sixty degrees when put into the churn, as beating it always increases its temperature. In the end much time and labor is saved by purchasing a small thermometer, on purpose to test your cream: fifty-six or fifty-eight degrees to commence with will bring your butter in fifteen minutes.

Butter making in our family is a most easy process. Three cows are kept. The butter never fails to come in fifteen, often in ten minutes. Churn, cream jar, and pans are all washed before breakfast; and the butter worked over and salted. There is a great dispute with good butter makers upon the question of washing butter in water. I think that water washes out the sugar of milk, which supplies all the sweetness of the butter; without it the butter is tasteless. So I use large lumps of ice which do not melt easily. As soon as the butter is thoroughly separated from the buttermilk, reverse the crank, and draw on all the milk, turning the crank slowly; work it in this way twenty minutes, and the labor of working out the buttermilk is much expedited. Then put in small pieces of ice, which quickly hardens the butter, so it is easily removed from the churn. Have large pieces of ice in the butter-bowl, lay the butter on them, and allow it to remain until cold enough to work without sticking to the hands. Scald the butter-paddle, then put it on the ice for a while, and work the butter thoroughly with it. Work the butter until the little water melted from the ice runs clear; then add salt to suit the taste. A tablespoonful heaping full of salt to each pound is a good rule; but tastes differ.

For keeping butter one year sweet and good, take two pounds best Ashton dairy salt, one pound of white granulated sugar, one pound of saltpetre finely powdered, sifted through a muslin sieve. Mix all these well together, keep in a jar, and put one and a half large tablespoonfuls to one pound of butter; mix this well with the butter, and it will keep perfectly. There is nothing deleteri-

ous in this compound. The saltpetre is in too small quantities to prove injurious; but it prevents the butter from turning rancid. While the sugar supplies the required sweetness, the salt retains its flavor, and the result is the best of butter the following May.

In the summer season, if it is wished to keep butter perfectly sweet and fresh, make it in balls, print them both sides, (if large,) then put a layer hardened in ice into the butter crock, place over it a clean cloth, dipped in ice water; then another layer of butter cakes, another cloth wet in ice—so on until the crock is filled. Make a brine of two quarts of water, two pounds of Ashton salt, one pound of granulated sugar, one pound of saltpetre; dissolve, and strain it through a cloth to remove all impurities. Fill the crock to the brim, put a plate over the upper cloth, and a very clean stone on the plate. Then cover tight, and the butter will be as good in six weeks or two months as the first day. Indeed, if not used daily it will keep till next August. If you do not fill the crock the first time, pour off all your brine, put another layer of cakes, another of cloth, until filled, then strain the brine through a sieve into the crock. It must be kept filled, or moisture and mould would gather on the sides. The advantage of the cloth layer is, that each layer of cakes is kept from the air, and not disturbed until the upper layer is removed. Prepare the brine, keep it in a stone jar,—be sure to keep the plate, with a stone for weight, on top of it,—and your butter will keep sweet for weeks. The brine will not need renewing for a long time; when it does, boil it, and skim, and it is again ready for use. Large bunches of sweet clover tied up and laid upon the milk shelves, or hung in the windows of the dairy, take away any mustiness, and give a very sweet odor to the place.

To put down butter in firkins, be sure to select hard wood firkins, then soak in sour milk or strong brine for several days. When one is to be used, rub it well with fine salt all about the inside of it, and scatter salt on the bottom before putting in the first layer. Then pound it down well,—some use a pestle to pack it tightly,—if little crevices are left the butter will not keep as well. If you cannot fill your firkin at once, fill it to the brim with strong brine, pouring it off when more butter is added, and filling up again, unless the butter fills the firkin. Put a cloth tightly over it, scatter salt over the cloth, and pour on brine. If salted with the saltpetre compound, your butter is good for one year.

If in winter, when the cows feed chiefly on hay, a little coloring is needed to take away the tallowy look of the butter, carrots will impart it, and they are sweet delicious food. Take two large sized carrots, clean thoroughly, then with a knife scrape off the yellow exterior, leaving the white pith, soak the yellow part in boiling milk for ten or fifteen minutes. Strain boiling hot into

the cream; this gives the cream the desired temperature, colors it nicely, and adds to the sweetness of the butter.

PACKING BUTTER IN THE SUMMER.—A Vermont butter-maker writes to the New York Farmers' Club, concerning packing butter to keep: Pack it in well soaked tubs or firkins; put a little damp salt in the bottom and place it in a cool dry cellar, on a bench of wood eighteen inches from the cellar bottom and the same from the wall. Stone or earthenware does not keep butter well, as the moisture from the surrounding atmosphere in warm weather, condenses on such vessels and soon effects the butter. Put no salt on or between the layers. Fill to within half an inch of the top. Place a clean wet cloth over the butter, pack the edges down with a knife, and then spread thinly wet salt over the cloth. Having made and dealt in butter for some time, I can say the above mode of packing and keeping butter will be useful to many, and cause a smile of delight to the buyer.

TO DEODORIZE MILK.—It frequently occurs in the Spring, when the farmers are feeding their cows upon ruta-bagas, or turnips, that the milk becomes so strongly impregnated by their disagreeable taste and odor as to be unfit for butter making. To obviate this, put a pinch of finely powdered saltpeter into every gallon of cream. A little saltpeter worked into butter that has become sour, or rancid, will render it sweet and palatable.

CHAPTER XXIII.

THE FAMILY PHYSICIAN.

DISEASE comes alike to all, and many friendly foras are hurried away, that with the knowledge of some simple remedies might have been spared to us.

When first attacked by disease, some simple remedy will accomplish what a few hours later the most powerful medicine will fail to effect.

The treatment therefore prescribed in this chapter will be first, *preventive*, or such as shall tend to prevent attacks of disease; second, *arrestive*, or such as shall arrest disease in its first stages; and lastly, *curative*.

We consider the first the most important of all. The prevention of disease should be the study of the parent and the teacher, as the cure of the disease is the study of the physician.

The foundations of disease are often laid in infancy, and with infancy we shall commence our instructions. The care of the infant is the loving task of the mother, and we are therefore sure that we have only to show what is the right course to be pursued and it will be joyfully taken.

The mother is willing to sacrifice any thing or everything for her children, and yet few mothers take the time and trouble to study the causes, nature and treatment of the simple diseases of infancy and childhood. It is the testimony of every physician with whom we have met that tens of thousands of little ones are lost through the ignorance of the mothers; mothers, too many of them, who were accomplished in music, languages, literature, and the teachings of the schools, but ignorant in that highest and most sacred trust ever imposed upon woman, the care of children. And it is not so difficult a thing as may be supposed; there is no unfathomable mystery about the little form, but the laws of its life and well being are so plain that every woman of ordinary intelligence may master them by a few hours' careful study each week.

"The young mother falls into that very natural and frequent error of supposing that the first sign of discomfort that a babe

exhibits, the first wail that comes from the darkened chamber, is an indication of hunger, and crams the little stomach with food not supplied by nature. Does she in this commit the simple error of over feeding the child? Far graver is the mistake. Within the first three days' when the infant requires scarce any thing but sleep and quiet, she may lay the foundation for an infancy tormented by colic and a mature life cursed with dyspepsia. Every physician who has been much in families will testify that where one has during these first days of life suffered for lack of nourishment, ten have been injured by over feeding."—*Lyman's Philosophy*.

Dr. King's twenty-five rules are very simple, minute, and the result of a life-long practice. We therefore introduce them here with very little modification:—

1. Let the child be put to the breast, if the mother is able to bear the fatigue; but if it cannot procure any milk it should be withdrawn, and fed very sparingly upon a thin infusion of slippery elm, until milk can be had from the breasts.

2. Let no mother refuse to nurse her own child, unless the reasons for doing so are insurmountable.

3. Never permit the babe to be fed so long as you can supply it sufficient nourishment from your own breasts, and to secure this point you should pay constant attention to your diet, airing, and exercise.

4. Dress the neck and arms of the child in flannel, and make all its clothing subservient to health and comfort, rather than to fashion.

5. The belly-band is the most important part of the child's dress, and should always be of flannel, cut bias, and tight enough not to compress the stomach.

6. Protect the child carefully against all unnecessary wet, and when it is discovered to be in this condition, it should be changed as quickly as possible; and it is desirable that the diaper should be not simply dried, but washed and dried before it is applied again.

7. Use as few pins as possible.

8. Exercise in the open air as soon as your health and the weather will permit.

9. Never subject yourself to *partial* exposures, but remain indoors until you can go out or be taken out of the house.

10. Confine your diet to such things as do not affect you unfavorably,—for when any kind of food perfectly agrees with you, it will seldom or never disagree with your babe.

11. As soon as you find any articles to disagree with you, stop using them at once, as whatever disagrees with you will surely disagree with your child.

12. The child in health should sleep in a bed or crib by itself, during the night.

13. In case of illness of the mother, or a failure of the breast milk, feed the child from a bottle rather than a spoon.

14. To give uniform distention to the stomach, and thus to obviate indigestion and gripes, keep the infant in as nearly an upright position as possible while feeding either from the breast or bottle.

15. Take the child from the breast frequently while sucking, holding it away for a minute or two.

16. Expose the child as early as possible to the fresh air; if properly clothed in flannels the air will only do good.

17. Do not keep the room at an excessive heat, and then take the infant from it into cold air, but let the air blow freely into an adjoining room, then close it up and take the babe into it.

18. Wash a strong child in cool water, and a weak one in tepid water.

19. Keep the child perfectly clean, and as quiet as possible.

20. Never make the infant laugh heartily. It is very pretty to see the baby laugh and hear its giggle, but it is also dangerous.

21. Place the infant on its right side when asleep.

22. Rub a young child all over night and morning with the hand, to promote the circulation.

23. Encourage the child to stretch, and thrust out its limbs, and to crawl about, thus promoting the circulation and strength.

24. When the child is in good health, and has cut four teeth, wean it at nine months old, but if after weaning it should be attacked with any serious disease, it may require the breast again.

25. Avoid frights, tight bandages, patent medicines, frequent feeding in the night, close air, and sudden changes.

TEETHING is usually accompanied by more or less inflammation and other troubles. If the bowels are closed, give a little castor oil. Let the diet be lessened and diluted; if the child is sucking, the mother should take little beside liquids, gruels, etc. If the gums are red, swollen, and painful, lance them. The cut will soon heal, and will in thousands of cases prevent convulsions or other serious consequences. Difficulty in passing water at any time may be overcome by flaxseed tea. For sore eyes, use a wash made of equal parts of slippery elm and peach leaves.

THRUSH.—The symptoms of this disease are, white specks upon the tongue and lips, with dribbling of saliva, hot mouth, disagreeable breath, etc. These specks increase, fall off, and show ulcers. The pain often prevents sucking, the child grows emaciated, and of course fretful. Wash the mouth with a decoction of golden seal, sweetened with honey, and sprinkled with powdered alum. If the golden seal is not at hand give sage instead. If the bowels are loose give *Prescription No. 1*. For chafing, wash the parts with Castile soap and dust with powdered starch or slippery elm flour. For stoppages of the nose, rub some animal oil about the roots of the nose.

CONVULSIONS OR FITS.—When the child is in a fit, unfasten the clothes, raise the head, and do not let it lean back or fall forward; give fresh air, rub the body with the hand, place the child in a warm bath, at the same time applying cloths wet in cool water to the head and face. Give an injection of molasses and warm water; repeat this injection several times at intervals of fifteen minutes. Every family should have a syringe. Elastic syringes are the best, and cost not over one dollar and fifty cents.

WORMS.—The certain evidences of the presence of worms in children are, paleness, itching of the nose, starting and grinding of the teeth during sleep, irregular appetite, fetid breath, hard swelled belly, swollen upper lip, sore mouth and nose, *one cheek flushed*, itching of the anus, drowsiness, and nervous starts. The treatment should be both to remove the worms and give vigor to the stomach. The best remedy to have always on hand is prepared as follows:—Take of fresh black alderberries one pint, cedar or juniper apples (recent) one pound, bruise them, and soak in a quart of alcohol for fourteen days, then strain and add one pint of molasses. Give a teaspoonful three times a day to children upwards of one year old. As soon as purging is accomplished, reduce the dose, and continue for two or three weeks as a tonic.

SUMMER COMPLAINTS are best treated by *Prescription No. 1*; but often nothing has been provided beforehand, and this negligence renders other expedients necessary. Pain in the stomach and bowels is evidence of the possibility of some severe attack, and something had best be given the sufferer. Ginger is always at hand. Pour half a pint of boiling water upon two tablespoonfuls of ginger; add sugar and milk, and let the patient drink it hot. Or two tablespoonfuls of gin may have a tumblerful of hot water and a little sugar mixed with it. At the same time flannels wrung out in hot water and laid over the stomach and bowels will assist in the relief. The trouble with us as a people is that we let all slight affections go, and think we cannot spend time to be doctored for a cold, a colic, or a diarrhœa. By this foolish course many valuable lives are lost, many hours of pain and wretchedness are endured, and injured constitutions and impaired powers are the result. We therefore rank *arrestive* treatment as next in importance to *preventive*. To arrest the progress of disease in its *first* stages is wisdom. A diarrhœa is readily arrested in its *first* stage by a few doses of "chalk mixture," to be obtained of any druggist, or even by a dose of ginger and molasses, but if left to run on, it may soon become dysentery and death. The diet should be reduced at once when cholera morbus, colic, or diarrhœa are present. Take some simple remedy to check the disorder, reduce the diet sufficient to give the stomach an opportunity to recover, and the chances are as nine hundred and ninety-nine to one that you will be saved further trouble. Cherry brandy

and all decoctions of the black cherry, and also of the blackberry are good in summer complaints. When there is a constant griping in diarrhœa, an injection is better than physic. Make an injection of a tablespoonful of castor oil, two of molasses, and a pint of warm water.

INFANTILE REMITTENT FEVER is distinguished by its appearance at night and disappearance during the day. Give the child a little rhubarb and magnesia, bathe the skin in warm water, keep the feet warm and the head cool, and for a regular drink give an infusion of slippery elm and peach leaves. Roast onions for a foot draught is usually better than any other, and always readily obtained. *Prescription No. 1* should be given, if the bowels are very much out of order. Give catnip tea when the fever is on, and apply onion poultices to the pit of the stomach for vomiting, giving also parched corn or oatmeal coffee.

SCARLET FEVER, or "*Canker Rash*," is one of the most fatal of all children's diseases, and all symptoms should be carefully watched, so that the most prompt action can be taken on its first appearance. The mother who gives over the care of her children to another may have this disease in full force before she is aware of it. "It commences with chilliness succeeded by heat, quick pulse, languor, thirst, more or less headache, redness of the eyes, and sore throat, with some difficulty of swallowing. In two or three days numerous specks or patches of a fiery red color appear about the face and neck; within twenty-four hours this red eruption extends over the whole body. In about four days a gentle moisture appears on the skin; the eruption gradually disappears, and the scales fall off. But often the above symptoms are more violent, and vomiting, pains in the back, wildness, ulcers in the throat, and difficult breathing accompany them. The first thing to be done, when the symptoms are plainly discovered, is to give an emetic. The eruption cannot be mistaken for measles, on account of its fiery color. For an emetic for children we consider nothing equal to *Prescription No. 2*. A mixture of the sirup of ipecac and the sirup of squills is also effective; but, if these are not at hand, boneset tea, thoroughwort tea, or any herb tea that will produce nausea and vomiting, should be resorted to at once. The next step is to produce a profuse perspiration. Sometimes the hot drinks given for an emetic will accomplish this; if not, give sage or catnip tea, or any warm drink that will force out the perspiration. Hot water to the feet, sides, etc., will assist in procuring perspiration. After it is secured, and while the patient is still sweating, give a cathartic,—castor oil, senna, mandrake, or any other cathartic, if these are not to be obtained. If these remedies do not break up the fever, they must be repeated the next day. For the sore throat in scarlet fever, use sweet oil and camphor in equal parts, bathing the throat with it three or four times a day,

wrapping the throat in flannels wrung out in hot water after bathing it. The room should be frequently purified with chloride of lime, by turning on a little vinegar. Scarlet fever is infectious, and children should be kept away from the sick-room.

MEASLES.—*Symptoms.* Chills, fever, and other fever symptoms; quick breathing, hoarseness, dry cough, flushed face, eyes red and watery, sneezing and discharge from the nose. In three or four days red spots appear, usually on the head first, and extend over the body. Give an emetic, and a constant drink of slippery elm tea and honey. If the eruption does not appear within the time specified, give a gin or whiskey toddy, and apply mustard poultices over the abdomen, feet, ankles, and wrists. If the bowels are very costive, give a mild warm injection of Castile soapsuds, or molasses and water. When there is tightness across the chest, which the slippery elm and honey do not relieve, apply a mustard poultice to the whole chest. Great care must be exercised in regulating the diet and preventing exposure until a cure is perfected, for a relapse is attended with great danger.

LUNG FEVER.—*Symptoms.* The usual symptoms of fever, with pains in the chest, constant difficulty in breathing, distressed cough, swollen cheek or lips, etc. Give an emetic, and, if necessary, repeat it the second and third day. Bathe the body with warm water several times a day. Apply hops to the chest and mustard to the feet; or, in the case of infants, apply onion poultices to the feet, back, and breast. A constant drink of slippery elm or liquorice tea must be given. In severe cases Dr. King recommends the following: Slippery elm, two ounces; lobelia leaves, one ounce; bloodroot, two teaspoonfuls. Add to these one quart of boiling water, cover tightly, and allow it to keep for an hour. When cold, strain it and sweeten with honey or molasses. Give a teaspoonful every hour or two. Keep the bowels open.

CROUP is one of the most dangerous of the diseases of early childhood; and its appearance is usually first indicated by the child suddenly waking from sleep with a hoarse, metallic cough, followed by a hissing sound as he draws in his breath. The voice is hoarse, often reduced to a hoarse whisper; there is a sense of distress in the throat, the child struggles for breath, the head is thrown back, and the hand often put to the throat as if to remove the obstruction. Prompt action is required, as death is the sure termination of the disease, unless checked. Give *Prescription No. 2* every few minutes, until the child vomits freely. If you have not this prescription at hand, give some other emetic without delay,—sirup of ipecac., onion sirup, almost any thing that will produce instant vomiting. At the same time apply cloths wrung out in hot water to the throat and upper part of the chest, renewing them before they cool. As soon as the breathing is easier.

smear a piece of muslin with lard, sprinkle it with snuff, and keep it on the throat and upper part of the chest until all the symptoms are removed, changing it two or three times a day. Keep up an expectoration by giving goose oil on sugar. During an attack of croup a child may be put into a warm bath and kept in it ten or fifteen minutes. Keep the feet and body warm. Through the day let the drink be flaxseed tea, or slippery elm tea, and with a little lemon juice in it. Keep the bowels open. Have every thing ready for an attack the second night, and proceed upon the first symptoms of its return as directed above.

HOOPING COUGH.—Give an emetic, the *Prescription No. 2*, if possible; keep the bowels open; put a plaster between the shoulders. Let the child go out in pleasant weather, during the warm part of the day, and exercise moderately. Let the diet be the most nutritious that can be easily digested,—boiled chicken, chicken broth, beef tea, etc. Let the sleeping room be ventilated in some way without the air blowing on the bed. If possible, remove the child to some other vicinity, as a change of air often effects a cure without other means.

“The most frequent of all the complaints which the housewife or mother is called upon to relieve is a COLD. This affection, if taken in time, can be cured with very little trouble and the most simple medicines; neglected and allowed to fasten upon any important organ of the body, the most disastrous results ensue.

“Colds are caused by a check to the insensible perspiration; therefore the first thing to be done is to restore perspiration.” (Here let us caution all our readers against taking cold. We quote from the “*American Family Physician*.”) “Cold is undoubtedly the most common cause of disease. To experience the injurious consequences of cold does not require that one should remain in a cold atmosphere until chilled through; it is equally pernicious to pass suddenly from a very warm apartment to a cold one, especially if the former be dry and the latter damp; to stand for a time upon a cold pavement or floor, or upon snow or ice, until the feet become cold; to remain standing in a cold, damp place for a long time; to remove the coat or vest when in profuse perspiration, even in midsummer, or in winter to toast the feet by a warm fire and then to get into a cold bed.”

One seldom takes cold while in active exercise, even if thinly clad, in cold weather; but a moment's cessation may produce that result. One is not as likely to take cold if the whole person is exposed at once to the cold atmosphere, as when, through some open door, raised window, or insidious crack, a draft comes which cools only one portion of the body. Children take cold by being taken from the chair, crib, or bed and placed on the floor. There is always a cooler current of air near the floor. Young girls lay the foundation of most terrible sufferings, and often death, by exposing themselves during the menstrual period. We urge upon

mothers that, putting aside all objections, they fully instruct their young daughters as to the dangers from cold feet, wet feet, cold baths, and cold draughts at this time. Flannel under garments prove the best possible protection against the evil consequences of the sudden changes we have referred to. When the first symptoms of a cold are discovered resort may be had to some active and long continued exercise, or the feet may be soaked in warm water, warm herb drinks taken, wet cloths applied to the body, and perspiration thus produced. The two points upon which we insist are, that perspiration shall be produced, and that, after having been thus sweated, the patient shall remain for at least twenty-four hours in an even temperature. To "take a sweat" at night and go about one's business in the morning is usually a hazardous proceeding. One would think we might spend at least one day in curing a cold, for, if it be the first day, one will be amply sufficient. We can point to the cases of those who thought they would wait till Sunday, but when Sunday came were beyond the reach of earthly aid, and say, *Beware!*

FEVERS.—*Symptoms.* The general symptoms of all fevers are pretty nearly the same, though they may vary in severity; they may be named in the following order:—

1. Languor or dullness; perhaps a dull headache and unpleasant dreams.
2. Chills more or less severe, with more or less thirst, small pulse and quick breathing.
3. White coat on the tongue; perhaps nausea or vomiting.
4. Fever or quick pulse, with increased heat of the body.
5. Thirst.
6. Tongue coated brown or black.
7. Bowels costive, urine diminished and high colored.

Treatment. As a general rule, all fevers may be successfully treated alike in their different stages. By the following treatment, if promptly and energetically used, nearly all cases of fever *will be broken up at their commencement*, and the further services of the physician will not be required.

The first thing to be done is to give an emetic. We have mentioned several on previous pages. Continue the doses until vomiting is secured. It will frequently occur that this alone will break up the fever, the pulse will become natural and the skin moist. If not then, resort must be had to profuse sweating, for which also we have given directions; any one of the warm drinks named with warm wrappings, hot bricks, bottles of water, etc., will bring out the perspiration. As soon as the sweating is profuse give *Prescription No. 3*, or some other cathartic, if this is not at hand. Senna, castor oil, mandrake, and many other articles may be used to move the bowels. Repeat the dose once in three hours until an operation is secured. Every thing has now been done that is likely to be of service, and the fever is usually

broken off, but if not, the same course must be pursued the next day.

FEVER AND AGUE, treated as above, will yield in its first stages, but if long continued, *Prescription No. 4* must be given between the sweat and the next chill. Take also the following tonic. To half a pint of strong coffee add two tablespoonfuls of lemon juice and half a gill of good brandy or whiskey. Drink this when the chill is about to come on; or wild cherry bark one ounce, inner bark of white oak one ounce, fresh horseradish root one ounce, seneca snake root one ounce; add cinnamon, cloves, and sulphur, each one half an ounce, good cider two quarts; steep for three hours. Dose when cold a wine glass full three times a day.

TYPHUS FEVER requires the same treatment as prescribed for fevers in general, the only additional directions being that the bowels be kept regular by mild injections. Only one operation daily is desirable. Give a tonic as follows: Take an ounce each of white oak bark, chamomile flowers, boneset leaves, and scullap leaves; turn on them a quart of water, boil twenty minutes; add a pint of vinegar, and sweeten to the taste, allowing the patient to drink freely of it. Buttermilk is a harmless and refreshing drink in this disease.

TYPHOID FEVER is treated the same as the above.

BRAIN FEVER.—The peculiar symptoms of brain fever which distinguish it from other fevers are, confusion of ideas, pain, fullness and heat in the head, redness of the face and eyes, light and noise distressing, ringing in the ears, delirium, etc. No delay is admissible when these symptoms are discovered, but a dose of cathartic medicine should be given at once, the patient bathed in warm water, and a perspiration induced. Keep the head cool by healing lotions, cloths wet in cold water, or vinegar and water, changing them often. Apply mustard poultices to the feet and ankles, and along the lower part of the back bone. Keep the room dark and quiet, no visitors being allowed.

INFLAMMATION OF THE EYES, WEAK EYES, etc., will be relieved the application of the eye wash described on page 336.

QUINCY SORE THROAT.—*Symptoms.* Flashes of chills and heat, difficulty in swallowing and breathing, hoarse voice, swelling of the throat and almonds of the ears, swellings in the throat, which burst and discharge.

Treatment. As soon as the disease shows itself give an emetic; after it has operated give a cathartic. In severe attacks sweat the patient. Steep some bitter herbs in equal parts, vinegar and water, and allow the patient to inhale the vapor. Take equal parts of hops, mullein leaves, and Saint John's wort leaves, steep them in vinegar and water; to every quart of the decoction add two tablespoonfuls of salt. Let the patient inhale the vapor from this decoction, apply the herbs as a poultice to the throat, and

give a tablespoonful of the decoction every two hours. Let the patient drink freely of buttermilk, vinegar and water, lemonade, or orange juice. After the tumors burst gargle the throat with a tea of sage and hyssop sweetened with honey.

BRONCHITIS is accompanied by chilliness and fever, a hard, dry, painful cough, pain and soreness at the upper part of the breast bone, more or less raising of phlegm, and pain across the brow, increased by coughing. The treatment is the same as for fevers, in addition to which give *Prescription No. 5*, to relieve the cough. Keep the patient warm and on a light diet. A drink of flaxseed or slippery elm tea, with the addition of lemon juice or vinegar is beneficial.

CATARRH. INFLUENZA.—*Symptoms.* Sneezing; weight and pain in the head, especially the forehead; difficult breathing; stopping of the nose, and a feeling of pressure at the base of the nose; eyes red and watery; sore throat, dry cough, aching limbs, fever, phlegm and discharges from the nose and eyes. Keep warm, dry, and quiet. Soak the feet daily in warm water, drink warm lemonade, spearmint tea, etc. Reduce your diet to warm gruels, and pursue this course until cured. You may thus escape perhaps those fatal diseases of the throat and lungs which carry so many thousands to their graves. Persons subject to colds and catarrh should bathe the throat and neck, and create a friction by the use of a brush or crash towel, sponging the whole body with salt and water.

DISEASES OF THE LUNGS are the result of neglected colds, catarrh or bronchial, difficulties, and it is a part of wisdom, especially with those who inherit any tendency to consumption, to attend scrupulously to any affections of the throat. Of late years we have concluded that medicines poured into the stomach for the healing of the lungs are seldom of any benefit. Pure codliver oil may sometimes be of temporary service; but modern medical science treats the lungs by inhalation. Of course whatever is inhaled goes directly to the lungs, the seat of the disease. Medicated vapors of various kinds are superseding the use of drugs in diseases of the lungs. Among the best of these remedial agents we place that known as "*oxygenized air*." Oxygen being the food of the lungs, a large proportion of it is inhaled, and the effects in all throat and lung difficulties are speedy and favorable. The writer having both seen and experienced its good effects, confidently holds it up to inspire the hopes of those who feel consumption fastening itself upon their systems. Offices where this "*oxygenized air*" is administered have been established in all the larger cities, and we trust will be speedily extended to every town, village, and borough.

DIPHTHERIA.—*Symptoms.* Intermittent fever; sore throat; depression; difficult breathing; tonsils and other parts of the

throat swollen and covered with a white coating; urine abundant; bowels constipated at first, followed by diarrhœa.

Treatment. An even temperature, a well ventilated room, and the most perfect quiet are desirable. If the patient be in full strength, when attacked, first give an emetic, but if weak this must be omitted. Move the bowels lightly with mild cathartics. Cleanse the throat and apply *nitrate of silver* to all the swollen parts in the throat. One drachm of *nitrate of silver* in an ounce of water is the proper proportion. Apply the solution every day. Sprinkle in the throat often the following mixture one table-spoonful each of salt and vinegar, mixed with a teaspoonful of boiling water; this may also be injected up the nostrils when they are getting filled up. Feed the patient the most nourishing drinks as beef or mutton tea, eggs and wine, wine whey, ale, boiled milk, etc.

PLEURISY.—*Symptoms.* Ordinary fever symptoms; pinching pain on one side, increased by breathing, which makes the person breathe quick and short; often a dry, hacking cough. Sweat the patient profusely, then keep the affected side covered with a hot fomentation of bitter herbs, changing them as soon as they get tepid. Boneset, tansy, catnip, hops, wormwood, hoarhound, or Saint John's wort may be used as they can be procured. Great care should be taken for several days to guard against exposure. If after the sweat pain and difficulty of breathing remain, give an emetic, followed by a cathartic. If the cough remains, give an expectorant of wild cherry and bloodroot, or *Prescription No. 2*.

INFLAMMATION OF THE STOMACH.—**GASTRITIS.**—*Symptoms* burning pain at the pit of the stomach, increased by pressure or by swallowing; nausea and frequent vomiting, thirst, fever, dejection, prostration, and costiveness. Apply mustard poultices to the feet, the pit of the stomach, and along the whole course of the back bone. When these have produced redness without blistering remove them, and apply to the pit of the stomach hot fomentations of bitter herbs, hops, and lobelia leaves, or hops and jimson leaves, changing them before they become cool. In addition to this, if the symptoms should still continue severe, bathe the whole body in weak lye-water, drying with considerable friction. If the bowels are constipated, inject molasses and water, or boneset and molasses; but never give physic. Let the patient drink freely of gum arabic water, or slippery elm and peach leaf tea, or barley water. Quiet, fresh air, and an equal temperature are desirable. As soon as recovery begins give hourly a teaspoonful of French brandy, unless it should prove too stimulating. The diet should be light for some time.

INFLAMMATION OF THE BOWELS.—Symptoms and treatment same as above, except that the pain is in the bowels, and the poultice must be applied to the bowels instead of to the stomach. Give an injection at once.

DYSENTERY.—Is an inflammation of the lower or large intestines, and the symptoms are different from any other inflammatory disease. *Symptoms.* Frequent bloody stools with considerable phlegm; gripings; bearing down and a more or less constant desire to stock or strain; natural excrement in small amount and, when present, in hard, small balls; more or less fever; loss of appetite; nausea and vomiting; stools very offensive; urine scanty and high colored; and great prostration.

Treatment. In nine cases out of ten dysentery can be cured by injecting a quart of warm water into the bowels, and, as soon as this has passed, immediately injecting again a solution of twenty grains of nitrate of silver to one ounce of water. This course should be repeated immediately after every operation from the bowels; three or four injections generally effect a cure. If the pain and inflammation are severe apply mustard poultices and hot fomentations, as directed for inflammation of the stomach.

Injections of slippery elm tea and laudanum, two tablespoonfuls of the former to half a teaspoonful of the latter, should be given, if the nitrate of silver is not at hand, or flaxseed may be used in place of slippery elm. Slippery elm tea flavored with cinnamon may be given for a drink. The juice of ripe fruits, cherries, or blackberries is beneficial. Dysentery may be cured by taking moderate exercise daily, keeping the skin clean, using nourishing but easily digested food, (*see former Chapter*,) keeping the bowels regular, keeping out of the damp night air, and using moderately fresh ripe fruits.

INFLAMMATORY RHEUMATISM.—*Symptoms.* Fever, severe pain, swelling of the joints, shifting pains, increased by moving about. The first thing to do is to cause profuse sweating, after which a gentle perspiration should be kept up by the use of warm herb teas. A poultice of bruised jimson leaves or hops and lobelia leaves should be kept on the painful parts. Keep the bowels regular and open by mild injections.

APOPLEXY.—A person struck with apoplexy suddenly falls unconscious, and breathes slowly and as if snoring. Instantly raise the head; remove every thing from the neck; if necessary, remove him to where he will have plenty of fresh air, and while one person pours a stream of cold water upon the head and neck, another should rub salt upon the head and temples. If the patient does not quickly revive under this treatment, whip or rub the soles of the feet so as to produce redness. Give a cathartic injection.

SUN STROKE should be treated in the same way. Give free fresh air, raise the head, and pour water upon the head and neck. A cloth in the top of the hat, kept wet, is a protection against sun stroke.

ASTHMA PHTHISIC.—Persons subject to asthma should keep on hand jimson leaves which have been soaked in a solution of salt

petre and dried. Smoking these in a pipe, and at the same time toasting the feet at the fire, will almost immediately relieve asthmatic attacks.

HEARTBURN, caused by acidity of the stomach, is relieved by taking a teaspoonful of chalk or saleratus in a tumbler of water.

CHOLERA MORBUS is usually a sudden attack of griping pains, followed by purging or vomiting, thirst, and heat, succeeded by cold sweat. Apply a mustard poultice over the bowels and the pit of the stomach. To a tumblerful of water add a teaspoonful of saleratus and twenty drops each of laudanum and spirits of camphor. After a little quiet give a dose of castor oil.

COSTIVENESS.—Some persons are constantly inclined to costiveness, which in time is the cause of various diseases. To such persons we must secure a daily discharge from the bowels, even if at times they have to reduce themselves to a liquid diet. Cheese, spices, pickles, and other articles tending to constipation should be avoided, and ripe fruits, figs, honey, and other laxative articles of food used in their stead. If a day goes by without a passage from the bowels, the next morning inject warm soapsuds.

HEADACHE is most frequently caused by constipation or indigestion. Many persons who now suffer almost constantly from headache would be relieved if they would use the means described under the head of *Costiveness* for keeping the bowels regular. Late suppers and also improper food at supper is the potent cause of much pain in the head. We have little sympathy for headaches caused by such foolish indulgences. Every person who can read may know what food it is proper to eat, how to have it cooked, and when it is proper to eat it. An hour of indulgence at the table, followed by a night and a day of sick headache, is a species of enjoyment we do not appreciate. *Prescription No. 6*, if given as directed, will usually relieve sick headache. Nervous headache requires exercise, cold baths, dieting, regularity in the bowels, and some tonic, as a teaspoonful of French brandy hourly for a week or ten days.

DYSPEPSIA. INDIGESTION.—Dyspepsia is attended by a great variety of unpleasant symptoms, such as oppression in the stomach, variable appetite, uneasiness, nervousness, low spirits, acidity of the stomach, vomiting, foul mouth in the morning, heartburn, an all gone feeling, even when there is no hunger, a sinking feeling, or fluttering at the pit of the stomach, etc.

Dyspepsia renders the person liable to succumb to the first attack of fever or any acute disease. The best cure for dyspepsia is not to have it, which is accomplished by obeying the plain laws of health in regard to eating, drinking, sleeping, exercise, etc. Eat digestible food at proper times, masticate it thoroughly, exercise regularly in order that it may digest, drink moderately before or after eating, but never while eating, and you will not have

the dyspepsia. To those who already feel its symptoms we say exercise daily in the open air, eat mutton, fowls, and beef, boiled, broiled or roasted, but never fried. Avoid pork, fish, and any food that requires over three hours for digestion, (*see table in previous chapter*,) eat fresh ripe fruits and vegetables, (baked or stewed preferred,) give up the use of pastry, tea, coffee, and tobacco; bathe the surface daily with cold water, seek cheerful society and take either *prescription* No. 7 or No. 8, as is most convenient for you. If your case is so confirmed as to resist these remedies, take No. 9.

SCROFULA can be successfully treated only by internal remedies. No. 10 is an easily procured and effective remedy. To the tumors that have not discharged, a poultice of yellow dock, or burdock, pounded, and made with corn meal and vinegar, may be applied. After the tumors discharge, wash them in Castile soapsuds, to which a little whiskey has been added. Apply to them an ointment made as follows: Scrape a carrot into fresh cream, beat them together, and strain through a cloth.

PILES are the result of a constipated condition of the bowels, which must first be removed. (*See Costiveness.*) Mild laxatives and injections should be used. If the piles descend into the anus, frequent sitting in cool water will relieve them. Castile soap, added to the water or used as a wash, is beneficial. Sitting over a hot decoction of bitter herbs and steaming the parts will often prove successful where other remedies fail. The ointment prescription, No. 11, it is advisable to keep always on hand, when any person in the family is subject to piles.

For any of the lesser scratches, bumps, burns, bruises, bites, stings, sprains, swellings, etc., to which members of the family are liable, we consider nothing equal to tincture of arnica, which should be kept in every family, secure from the reach of children. Dilute it with water, half and half. In cases of sprains or severe inflammation, apply wrappings of cotton cloth and keep them wet with the arnica.

TO RECOVER PERSONS WHEN SUFFOCATED, FROM DROWNING, HANGING, BREATHING GAS, OR ANY OTHER CAUSE.—Treat the person immediately, and in the open air, except in freezing weather. To clear the body of water, place the patient face down, with one arm under the forehead. To excite breathing, turn the body on to the side, and apply hartshorn, snuff, or salts to the nostrils. Rub the face warm with a towel, then dash cold water in it. To imitate breathing, place the patient again on his face, folding blankets or clothes and placing them under the chest. Now roll the body from the face to the side, repeating these turnings deliberately, efficiently, and perseveringly about fifteen times a minute, occasionally varying the side. Every time the body turns upon the face make quick, earnest pressure on the back, between and

below the shoulder-blades on each side, ceasing the pressure immediately before turning the body on the side. After breathing is restored, apply hot flannels, bottles of hot water, hot bricks, etc., to the pit of the stomach, armpits, thighs, and soles of the feet; rub the limbs upward energetically with flannels or toweling. As soon as the power of swallowing returns, give a teaspoonful of warm water, then small quantities of other warm drinks or spirits. Do not give up because signs of life do not at once appear. Persons who have been under water for twenty minutes have often been resuscitated by a vigorous application of these measures, and cases are recorded where no signs of life appeared for three hours.

TO KEEP FROM DROWNING.—It is not necessary that a person should know how to swim to be able to keep the head above water. Any persons who fall into the water may, when they come to the surface, keep the head above water by the following simple rule. *Keep the feet in motion just as if you were going up stairs, and keep the hands under water. You cannot sink if you follow these directions.* If you throw your hands out of the water you will be sure to sink. If where there are waves, when the wave comes draw in your breath, shut your mouth, and keep up the *treading* until it has passed over.

THE USE OF LIQUORS.—Cider, used moderately in connection with the ordinary meals, is a refreshing and beneficial beverage. The same may also be said of the pure juice of the grape; but the use of whiskey, gin, brandy, and other intoxicating drinks, except by the aged and feeble, are exceedingly pernicious to health. Many a strong and vigorous man has been brought low by the use of ardent spirits. Others have gone safely through life, boasting that the indulgence did not injure them; but the physician sees the sins of the father reproduced in the diseases of his children to the third and fourth generation. We add our voice to that of those who proclaim "there is death in the cup."

EXERCISE.—We have spoken of exercise as being indispensable to good health, for both men and women. No class of men get more or better exercise than farmers; and if they would attend diligently to the other laws of health, they might be longer lived and happier men. Many farmers are subject to dyspepsia, on account of the improper use of food and drinks. Many are struck down with fevers and inflammatory complaints, caused by checking the perspiration too suddenly when engaged in active exercise. But while farmers get plenty of exercise, farmers' wives and daughters are apt to get too little. It is true they get plenty of hard work; but active out-door exercise is as necessary for their health as for that of their husbands and brothers. Constant confinement over the stove, the wash-tub, and the sewing basket, will ruin the constitution and the spirits of the strongest and best woman living. We say to farmers' wives and daughters, get out of doors

daily, if possible. Take upon yourselves the care of the poultry and the bees. Cultivate the kitchen garden. Go to the pastures and the woods, for berries, roots, herbs, and flowers. Take nature's invigorator, pure, fresh air.

We will give some rules for exercise especially adapted to women, but not inapplicable to the rest of mankind.

1. Exercise should not be carried to excessive fatigue, or the object will be defeated. Persons not used to active exercise should begin moderately and increase the amount of exercise as it can be borne.

2. The clothing worn during exercise should be loose and easy; the shoes should be larger than those worn at other times.

3. Exercise should never be taken upon an empty or full stomach. If some time has elapsed since eating, take a cracker or a piece of bread. With this precaution, an hour before breakfast is usually the most beneficial time for exercise. Horseback riding is a beneficial exercise for those who enjoy it, but walking is, all things considered, the most natural, complete, and healthful exercise. Running, jumping, skating, and swimming, when moderation is exercised, are all healthful varieties of exercise. Dancing is one of the most delightful and beneficial modes of exercise, when conducted in well ventilated rooms or out of doors, and at proper hours. It exercises not only every portion of the body, but affords pleasant recreation for the mind, which is often of as much service as the former. But the modern practice of dancing, in closely packed and ill ventilated rooms, far into the night, is hurtful and pernicious in the last degree.

GYMNASTICS are a series of exercises so graduated, as to bring in play every portion of the body. Calisthenics are a series of light gymnastics designed for ladies and children. But women living in the country have no need to resort to these contrivances for exercise. With God's free air about them and the garden, the orchard, the hills, and the woods on the right hand and on the left, they have the means for health within their reach, and great will be their condemnation if they do not present themselves and their children with sound bodies, and vigor unimpaired.

SLEEP.—Rest is required for both mind and body, and sound sleep is the most perfect rest of both. For many reasons night is the only proper time for sleep, for persons in the enjoyment of health. Sleep for such persons during the day, is not only unnecessary but absolutely hurtful. The custom of taking sleep after the mid-day meal, is injurious. A state of quiet ease for an hour after dinner is undoubtedly beneficial, but when ease is allowed to become unconsciousness, positive injury is done.

There can be no healthy sleep, night or day, with undigested food upon the stomach, consequently *no food should in any case be taken into the stomach for at least two hours before retiring to sleep.* The violation of this rule has been, as any physician can testify, the cause of an unmeasurable amount of ill health, suffer-

ing and death. The time for sleep is also important, from nine to five being, for adults in health, the most desirable. Whatever time is set for retiring, none but the most urgent considerations should prevent your retiring when that time arrives. Make it a rule, never to be up after ten o'clock, except upon most important business. Never sleep on the first floor if you can conveniently arrange so as to sleep in the second story. During dry days, whether cold or warm, allow your chamber to be open a good share of the day, and the bed clothes to lie over a chair. Some housekeepers, in their anxiety to have the work done up, make the beds early in the morning, before they have time to air properly. Use every means to keep the air of your room pure at all times, day and night, if you would have sound, healthy, refreshing sleep.

(DR. KING'S) PRESCRIPTIONS No. 1. COMPOUND SYRUP OF RHUBARB AND POTASSA. Rhubarb two ounces. Bicarbonate of potassa, two ounces; cinnamon, one ounce; golden seal, one ounce. Best fourth proof brandy one quart. Let stand two days. Press out the juice, and add to it one half drachm oil of peppermint dissolved in a little alcohol. To the residue or cake from which the juice was pressed, add warm water until the strength is exhausted, evaporate this to one quart, and while hot dissolve in it one and a half pounds of refined sugar; mix the tincture with it. This is useful in all diarrhœa and bowel complaints. Dose—a tablespoonful for an adult, a teaspoonful for a child, and half a teaspoonful for an infant. To be taken every half hour in severe cases, every hour in ordinary cases, and once in two hours for the first symptoms.

No. 2. (DR. KING'S) COMPOUND TINCTURE OF LOBELIA. Lobelia, blood root, skunk cabbage, wild ginger, and pleurisy root, each coarsely powdered, one ounce. Cover with one pint boiling water. Cover tightly, and when cold add three pints of alcohol. Let stand two weeks, press out the tincture and filter it. This is an excellent emetic in croup, whooping cough, scarlet fever, convulsions, and wherever an emetic is required. Dose—half a teaspoonful for infants, teaspoonful from one to three years old, tablespoonful from three to six years old. Mix in a little molasses and water and give a dose every ten minutes until vomiting is produced. It is often supposed that the emetic is only to throw off the contents of the stomach, but this is not its main purpose. It rouses the system to action in throwing off disease. The above tincture, in small doses, taken in an infusion of slippery elm, will serve as an expectorant in Asthma, Pleurisy, etc. We advise every family to keep a bottle of it on hand tightly corked or sealed.

No. 3. *Compound Powder of Jalap.* Senna half an ounce. Jalap two drachms. Ginger half a drachm. A valuable purgative.

No. 4. Sulphate of quinia and Prussiate of iron each three grains, mix for a dose. Fever and ague remedy to be taken between the sweat and chill.

No. 5. Mix equal parts of honey, sweet oil, sweet spirits of nitre, and lemon juice or vinegar. This mixture is for the relief of tightness and cough in Bronchitis, Catarrh, Lung fever, etc. Dose—a teaspoonful, to be given as often as required.

No. 6. *For sick headache.* Super carbonate of soda, half a drachm, prepared charcoal one drachm, paregoric one fluid drachm, water a fluid ounce; mix well together and give when the dimness of vision comes on, and repeat every fifteen minutes until relieved. Rest, darkness, and quiet, are indispensable.

No. 7. Golden seal, black alder bark, Solomons' seal root, two tablespoonfuls each, boiling water one quart, mix, steep six hours, strain, sweeten to suit the taste. Dose—a tablespoonful every three hours, or four times a day.

No. 8. Beef gall a gill, golden seal, boneset, prickly ash berries, blue flag root, each a tablespoonful in powder; mix in one pint of whiskey, and let it stand for ten days, shaking frequently. Dose—tablespoonful three times a day, to be increased if the bowels do not move regularly every day.

The above prescriptions are for indigestion, the former being intended for its first stages, and the latter for more confirmed Dyspepsia.

No. 9. Blue flag root, mandrake root, and dog's bane, one ounce each in very fine powder. Blood root fine, half an ounce, red pepper fine, two drachms, saleratus one ounce. Dose—half a teaspoonful in water three times a day. This is for long standing obstinate cases of Dyspepsia, in which costiveness and distress at the stomach are prominent symptoms.

No. 10. *For Scrofula.* Falsegrape, dog's bane, burdock root, and yellow parilla root, each in coarse powder, one ounce; add three quarts boiling water; boil slowly down to two quarts, strain, add four pounds sugar, then bring to a boil for a few minutes, and skim off the scum that rises to the top. Keep in a cool place in tightly corked bottles. Dose—half a gill three times a day.

No. 11. *Ointment for Piles.* Take fresh horse chestnuts and slice them up fine, steep them one hour in lard just sufficient to cover them. Strain out the lard and when cool it is fit for use. Rub it over the tumors and up the anus at night and morning.

No. 12. *Slippery Elm Poullice.* A tablespoonful of powdered slippery elm, to which add hot water enough to thicken. This is a poullice for boils, tumors, etc. Slippery elm makes an excellent poullice for burns, bruises, and sores of all sorts.

No. 13. *Cold Cream* for chapped hands and lips, cracks and skin diseases. Spermaceti ten drachms, white wax one drachm, oil of almonds two fluid ounces; add to this four fluid drachms of glycerine, in which three drops oil of roses have been mixed; stir constantly until cold.

THE FARMER'S CALENDAR OF MONTHLY WORK ON THE FARM

JANUARY WORK.

Prepare for the coming season by reading and laying out your plans. Determine what implements, seeds, roots, potatoes, trees, etc., you will want for planting and order them in good season. Secure the best seed. A few dollars for wheat or oats, that will yield ten bushels more to the acre than you are now getting, and heavier at that, will prove a good investment in the end.

Farm Hands.—We have previously advised that farm hands should be kept the year round. A great deal of work is neglected in the winter for want of help. Now is the time to cut fire-wood and get out timber, fence staff, bean poles, etc.

A Work Shop, provided with the most important carpenters', painters', and metal workers' tools, is what every farmer should have. Let it contain a bench with vice, nails, screws, a hammer, hatchet and drawing knife, saws, planes, chisels, centre bits and stock, and other carpenters' tools, paints, pots, and brushes, of two or three sizes; assortment of files, cold chisels, monkey wrench and other wrenches, a hard-wood block which will do for an anvil, a soldering iron, sheets of tin, wires, rivets, etc.; besides a good stock of boards and timber of various kinds. Add to this a few simple articles of the harness makers' kit, such as awls, wax, thread, rivets, with "set" punches, and leather. Instruct the boys in the use and care of the tools. It will develop mechanical ingenuity. Thus provided, many a profitable day's work may be done.

Buildings.—Lay out all your plans for new buildings and alterations or repairs of old ones, and get out the necessary material to be seasoning. Nothing makes a worse job than unseasoned timber. Remember that manure wintered under sheds is worth double that wintered in the open air, and if you haven't shed room enough calculate to build more in the spring. It is poor policy to let farm buildings run down; keep every board nailed tight, foundation stones firm, doors on their hinges, etc.

Orchard.—See that fences and gates are tight, to keep out all domestic animals. Sprinkle young trees with blood to keep away rabbits, and tramp the snow around the trees to prevent the working of mice. Make surface drains where needed. Cut scions when the trees are not frozen, label carefully, and keep in a cool place; they are usually packed in sand or damp earth, but sawdust is much better; it keeps them equally well, and does not dull the knife used to prepare them for setting. The eggs of the tent caterpillar are readily seen in clusters, near the ends of the twigs; remove them now at any cost or trouble.

Stock.—Stables, for economy of fodder, should be warm as possible; for the health of stock they should be comfortable, clean, and well ventilated. Clean out daily, and sprinkle a mixture of plaster and muck over the floors. Give cows, young cattle, and working oxen a few hours in the yards in the middle of warm days, and a foddering while there. Beeves, that are being fed for market, should be less exposed. Clean the stables, and litter freshly while the cattle are out of them. Sheep should have well littered yards and sheds, water as regularly as any stock, and regularity in feeding. The flocks should be so divided that the strong shall not get more than their share. Oil-cake is a safe and profitable feed for all fattening and milk stock. Keep all stock well fed and in good condition; supply with water and salt regularly. It is economy to cut and cook all food for stock in the winter. It pays in keeping up the stock better. It pays by saving at least one-third the fodder, and it pays in the manure. Upon horses, neat cattle of all grades, and swine, the regular use of the curry-comb and card will be found to pay well. Let no stock run down in flesh. Spring poor cattle are a disgrace to any farmer, as well as a loss. Every time a pound of flesh is lost and replaced it costs money. Fowls should be provided with warm, light quarters, and furnished with powdered shells or bones. The great difficulty with eggs now-a-days is their thin shells. Hens must have bones in abundance, and then they will form thick shells.

Manures should be deposited with muck or peat under cover. Save all the liquid manure and pump it over the compost. Send your men and teams into the swamp and get out a quantity of peat or muck.

FEBRUARY WORK.

Planning is the great thing now. The difference between the successful cultivator, who makes his farm pay, and the unsuccessful one who is always running behind, is, that the one plans carefully and the other does not. Decide now what crops to plant, and where to plant them.

Muck.—In many localities peat and swamp muck can be dug out and hauled now better than at any other season of the year. Upon many muck bogs teams cannot go with safety during the summer or fall, on account of their miry character; but after the ground freezes, teams can go over them anywhere at pleasure. It will pay to get out a large supply now, and haul it to the vicinity of the farm yard.

Sledding out Manure should be attended to before the snows become too deep. The farmer, as well as the cattle, need to work a little every day, and whenever everything is favorable it is better to do this work. If it can well be done, cover up the heaps so made; but it is not easy to do so. Some cover with

poor hay to prevent the constant freezing and thawing of the manure. Sand or loam, if it can be obtained, is very good. *Only well composted manure* should be hauled out, unless it can be well protected. It is a most excellent time, when there is snow on the ground, to haul such manures on to the meadows where wheels cannot go except in mid-summer.

Drains can still be dug to good advantage in many places. The ground is seldom frozen more than a few inches in depth, and in many situations good work can be done in digging and laying stone or tile drains. It may require some little force to start upon such a job at this season of the year, but force is necessary in carrying on a farm successfully, and the successful farmer takes advantage of all times and opportunities, and knows no season but the best—viz.: now!

Gravelling Meadow Land.—No meadow can be fully reclaimed and brought into the very best condition without being thoroughly drained and well dressed with gravel or sand. Some prefer gravel to sand, but our experience is in favor of the latter. This work cannot be done at any season of the year so well as in winter, when the ground is tightly frozen, and still better if there comes after such freezing a light snow, just enough to make good slipping. As the sand bank, especially if it has a southern exposure, does not freeze hard, it can be worked to great advantage.

Animals.—Change the diet of all animals, occasionally. *Horses*, that are scurfy, and whose hair is full of dirt, which the comb only makes worse, usually need roots. Carrots, in small quantities, with a handful of ginger and one of wood-ashes, daily, are as good as any "condition powder." Charcoal dust, mixed with roots or meal, is excellent for all kinds of stock. Make the roots last, you will need them for milch-cows that come in early, and for sows, before farrowing. Feed the cows well. Those, whose calves you mean to raise, should be dried off earlier than those kept for milk, and whose calves go for veal. Take early calves from the dam at birth, and bring them up by hand. Milk is worth too much to be given to calves, when gruel will do. *Beeves.*—Bullocks and dry cows should be in warm, sunny yards, some hours daily, and stalled at night; litter well; feed freely, that they may fatten rapidly. Give all animals sunshine in their stalls or sheds. Keep young stock warm and growing. If the supply of hay is short, look out in time and buy corn fodder and good bright straw, which, with a little oil cake, roots, or grain will do well enough. *Swine.*—Keep hogs at work in the manure. Sows, near farrowing, should be put alone; kept quiet; fed raw roots, (potatoes or beets are best), and the pens abundantly littered; do not let them get too fat, and feed no animal food. *Sheep.*—Provide dry and sheltered yards and sheds. Hemlock, or other evergreen boughs, fed occasionally, are gratefully received. A run on the snow in the middle

of a mild day is exceedingly beneficial. And if the snow is off, an hour's nibble at the grass will do more to keep the system in good condition than any nostrums, such as tar, alum, etc. Especially on the ewes with lambs this short hour of relaxation, whenever the weather will permit, is of incalculable benefit.

MARCH WORK.

Head work is better than *hand work*. *Head work* often saves *hand work*. *Head work* always makes *hand work* more efficient. The difference between "farmer thrifty" and "farmer behind-hand" is nine times out of ten in *head work*. Carefully laid plans seldom fail; hap-hazard plans seldom succeed.

General Work.—Buildings may be repaired and painted inside or out. As soon as settled spring weather comes, cellars should be cleaned out and white-washed, sinks and drains opened and cleaned, foundations examined and repaired if moved by the frost. Replace fences, stone walls, foundations of buildings, gate-posts, etc., heaved by the frost. Set fences, and repair them wherever they need it. Dip posts in gas tar, and roll in sand before setting. Pick up stones loosened by the frost; blast and haul off or bury heavy ones out of the way of the plow. Plow as soon as the ground is dry. Sow spring grains as soon as it is warm. Put in a crop of peas, or peas and oats. Peas alone, in drills, on good soil, will be off in time to plow for wheat, or for turnips to follow. Cut biennial weeds, docks, thistles, etc. Grub up fence rows and corners where shrubs or briars have got a start.

If you have never done it before, do not neglect this spring to grade your barn yard to one corner or to the centre, and sink an oil but or hogshead to save the liquid manure. The urine of your animals is worth just as much as the solid droppings. When you can afford to throw these away then you can afford to allow the urine to run to waste, and not till them.

Harrowing and Rolling meadows and winter wheat, as soon as the frost is out, is an operation that pays. The ordinary long-toothed harrow should not be used, but a harrow for this especial purpose, with a large number of short, fine teeth.

The roots of grains and grasses are raised to the surface by the constant and severe freezings of winter. By passing the roller over the field in the spring, the roots are pressed down into the soil, so that they can at once take hold and grow. It is frequently the case that the use of the roller in wheat fields and meadows in the spring will apparently double the number and size of the plants.

Spring Wheat.—On underdrained land that has been thoroughly plowed in the fall, spring wheat can be sowed, as soon as the frost is out, two or three inches deep. It will only need harrowing and

cross harrowing. Clover can be sown even on a light snow. Ashes operate as manure upon the wheat, even in the limited quantity of eight bushels per acre. They push the wheat forward several days, and in time to escape the hot, sultry days which often prevail about the time of the "heading out" of the wheat; and they strengthen the stem, giving it substance and solidity.

Roads, Drainings, etc.—March is the month to make and repair farm roads, lay culverts of wood or stone, and change the grade of paths, yards, etc., while the ground is loose from the coming out of the frost. Prepare channels for surface water; and if they will wash into gullies, protect them and spread the streams over the surface. Guard against washing in grain fields or fall plowed land. The location of springs may be easily seen by the thawing of snow in spots in the fields, and the places which most need underdraining are easily determined. Much underdraining may be done while the land is still too wet to plow: and much damage may be done by plowing wet soil.

Stock.—Increase the feed and exercise of farm horses, and groom well, to prepare them for hard spring work. Keep all horses, but especially mares with foal, sharp shod for fear of slipping on ice patches. Turn unused horses loose an hour or two daily, one at a time, lest in play they kick each other. Groom oxen and cows and feed well, to prepare the oxen for work. Do not tax them too heavily at first; if unused during winter their necks and feet will be tender. Look to cows at calving time, giving personal attention and aid if required. Feed some roots daily, both before and after calving. Remove the calf at once if it is to be taken away, and milk the cow dry; otherwise let the cow lick the calf clean, allow it to suck, and then milk the dam dry at once. See that all cows are milked dry, twice a day, and it is best to milk young cows three times a day. It increases the tendency to secrete milk. Increase the amount of meal fed to fattening animals, that they may ripen up the faster as soon as they get grass. Throw sods every few days to the hogs and poultry if confined; if possible, let the latter run. Keep sows with young pigs warmly housed. Isolate breeding sows, give warm, well strawed pens. Feed raw potatoes or other roots, sprinkled with a little meal, daily, to counteract any tendency to constipation. Charcoal dust promotes good digestion. Clover hay is good, healthy food, and a few sods will be turned over and munched with great relish. Protect all young stock from severe weather, rain, or wind. Separate breeding ewes and all feeble sheep from the others, and give extra grain, or roots. Give early lambs especial care. Provide abundant water and salt for all animals, and watch the health of all, removing those that are in any way ailing, to comfortable but isolated quarters.

If short of fodder make it up by cutting and cooking what you have with roots and grain.

APRIL WORK.

THE Plow, the Harrow, the Roller, and the Clod Crusher will be in order this month. The Clod Crusher is an implement no farmer would willingly do without after he had once tried it and witnessed its effects. It pulverizes the ground more thoroughly than the harrow *can*, and its use is often of as much benefit as an extra coating of manure. The most thorough possible pulverization of the soil is one of the secrets of large crops. In *plowing*, deepen the soil a little; turn sod over flat; move the soil only when dry enough to crumble; prepare the ground thoroughly for crops both by manure and tillage. Work no wet soil. No amount of harrowing will restore land to the condition it should be, if it be plowed while wet, and dries in hard clods.

Spring Grains.—The earlier the spring grains are put in, the better. Oats and wheat should go into the ground before the 20th, if it is possible to get the land into suitable condition. There are great advantages in *drilling in* all grain. However good condition the land may be in, it is very useful to give it a top dressing of some concentrated manure, like guano, superphosphate, ashes or fine compost. It gives the seeds an early and luxuriant start, causes a larger and stronger growth of root and of stalk. Apply it after the grain and grass seed are sown, and harrow or roll it in.

We cannot take too great pains in laying down land, to get a smooth and even surface, in preparation for the mowing machine and other implements.

Early potatoes on warm mellow land, a sandy or gravelly loam, may be planted now. Manure well with well rotted compost. Do not cut the slices too small, and after being cut let them lie a day or two in the sun for the cut surfaces to harden a little before planting. The potatoes used as seed for the main crop to be planted early in May will bear cutting finer.

The Garden.—If you expect to sell what you grow, remember that the earlier you can get a good vegetable or fruit into market, the more you will get for it. Let your aim be, therefore, to grow things as early as possible. But do not confine yourself to early things. The garden will furnish more solid comfort and return more money, for what it costs, than any part of the farm. Now is the time to lay the foundation of a good garden to last during the entire season. Deep culture is the specific against drought. Deep culture and thorough drainage are the secrets of premium crops. Remember this now and practice it.

Sheep.—April is yeaning time, and the ewes and lambs require a great deal of attention. Give ewes, at yeaning time, warm sheds and sunny yards, and be ever on the lookout for chilled or feeble lambs; wrap such in warm sheep skins, give a few spoonfuls of warm milk-punch, and lay them near the kitchen fire. If far gone

give a warm bath, with brisk but gentle rubbing until dry, warming by the fire or with hot bricks; those apparently nearly dead will usually revive and do well. When fodder is scarce, it is a great temptation to many farmers to turn their sheep out, for they will eat a great deal of the drying grasses that grow among clumps of bushes in hedge-rows and among the stones in the cow pastures. No practice can be worse for the summer pasturage. The only proper pasturage which sheep can have at this season is in bush pastures which were cut over in summer, where the young sprouts of the bush are just starting fresh and green, and in lawns where tussocks of orchard grass or other coarse things disfigure the turf. These coarse grasses and weeds start early, and sheep, goats, or horses, tethered where they will crop them close, will destroy many.

Mulching Fruit Trees.—If a mulching is employed at the time of planting trees they will never need watering. Uniform temperature and a constant supply of moisture are the prime elements of success in fruit culture. Mulching enables us to accomplish this. Mulching acts beneficially in other ways. It prevents, to a great degree, the cracking of fruit, and causes those varieties which are generally spotted and defaced, to become clean and covered with a rich bloom.

MAY WORK.

Farm Laborers should be hired for the season now, as you will be likely to get much better help than if you wait till later. Most farmers employ too little labor and unskilled laborers. The remedy is to employ laborers by the year and build tenant houses for them upon the farm. If every farm had a tenant house upon it, and laborers were employed by the year, the farming communities would be plentifully supplied with reliable resident laborers. A farmer having a tenant house could employ a married man, constitute him his foreman, and entrust him with the interests of his farm operations. He would thus have a safe reliance when he was absent, and always a leader and director of his other help.

Manure should all be worked over and pulverized as much as possible before hauling into the fields. If you apply your manure in the fall, keep the winter made manure under cover, haul dirt and mix with it, let the hogs have constant access to it, if possible, and in the fall it will be in prime condition to haul on newly plowed sod and harrowed in.

Preparing the ground for crops, is the most important work of this month, at the North, and we refer to our remarks of last month on the Roller and Clod Crusher. Give more attention to increasing the yield of your fields. Not one farmer in ten gets the yield he ought. Don't be satisfied to secure the customary

yield. Give an extra harrowing and rolling, extra manure, extra care and attention, and you will get extra crops. Extra cultivation pays. Put the same labor on twenty acres that you have been accustomed to put on thirty acres and you will get just as large a crop without going over as much ground.

Corn should never be planted till the ground is dry and warm. If planted in cold, wet ground it will come up, if it come up at all, yellow and spindling, and will be slow in taking on a thrifty growth. It had better be planted late than in a soil in an unsuitable state. Much corn is planted on poor land and too far apart, causing a great waste of time and labor. Much corn is also planted too deeply. The same is true of most other seeds. Seeds must have air and heat to germinate. If they are planted near the surface they get both. Much of the grass seed fails to germinate by being covered too deeply.

A single handful of manure put into a hill of corn, will often make the difference between four or five little "nubbins," and six or eight great plump ears that will shell their bulk of sound corn. A thousand handfuls count up heavily in the autumn corn crib. How many handfuls of manure are daily lost in *your* stockyards that might be saved in nice order by a little care in heaping up, and covering from washing rain!

An Experiment with Corn.—The following is the result of an experiment with Indian corn. That which was planted at the depth of

1 inch, came up in	. . . . .	8½ days.
1½ " " "	. . . . .	9½ "
2 " " "	. . . . .	10 "
2½ " " "	. . . . .	11½ "
3 " " "	. . . . .	12 "
3½ " " "	. . . . .	13 "
4 " " "	. . . . .	13½ "

The more shallow the seed was covered with earth, the more rapidly the sprout made its appearance, and the stronger afterward was the stalk. The deeper the seed lay, the longer it remained before it came to the surface. Four inches was too deep for the maize, and must, therefore, be for yet smaller grain kernels.

Tomatoes should be transplanted into ground that has been thoroughly plowed and subsoiled. It will do to manure them in the hill. Give generous treatment if you would have an abundance of fruit. Let them stand in rows five feet apart each way. Place a good stout stake beside each one, and tie them up as they grow. Never let the fruit or vines droop over on the ground.

Squashes, Cantelopes, Cucumbers, and Watermelons plant about the 15th. Make rich hills, and be careful to *stick* the seeds into the ground point downward; don't put them deep. We advise

our readers to grow the *winter squash*. They are nearly as palatable as sweet potatoes, and are much more easily kept during the winter. Try the *Hubbard* or *Marrow*; both are excellent—the former is probably the best.

To keep bugs from melons, pumpkins, and cucumber vines, mix flour of sulphur and fine coal dust together, sprinkle the vines with water, and dust them with this mixture. It is death to all bugs.

Beans may be planted by the middle of the month. Add plaster to a generous manuring. Plant in rows thirty inches apart, and let the stalks be two or three inches apart in the drill. The red and brown Valentine are both good. The six weeks' kinds are earlier, but not so good as those mentioned. Beans should be greased before planting, to prevent them from decaying, which they often do, when not greased. Turning any kind of liquid grease on them is sufficient.

Fruit Trees.—Prepare the ground thoroughly before transplanting trees from the nursery. Do not dig a hole and set the tree into it, as is often done; but dig a mellow bed from one end of the field to the other, or where you expect to plant your row of trees. Now is a good time to scrape off all the old, rough bark from young fruit trees and burn it. You will thus not only improve the fruitfulness, growth, and appearance of your trees, but will destroy innumerable eggs and larvæ of insects, which will, by and by, attack your fruit, if not destroyed.

Root Crops.—Farmers are beginning to see the necessity of growing root crops of various kinds for feeding stock, and also for cleaning and ameliorating the soil, by alternating them with the cereals. The most valuable root crops for the farmer are ruta bagas, mangels, carrots, and beets. The ruta-baga, or Swedish turnip is so valuable for feeding neat cattle and sheep that every farmer should cultivate it extensively. A few acres of well prepared soil will yield a large quantity of winter food for animals. Cotswold, Leicester or South Down sheep cannot be properly wintered without ruta-bagas. Carrots are so valuable for horses that every farmer should raise enough to furnish a few pounds daily, to be given to them with other food. Mangel Wurtzel and beets are plants of the same family, possessing similar properties and requiring the same treatment. Both are long keepers, and they are about equally good for milch cows. They do not possess as good fattening properties as the ruta-baga, but they yield heavier crops per acre.

The mangels should be sown this month. Carrots the last of May, or first of June. Ruta-bagas in June or July, and turnips not before July.

JUNE WORK

Weeds.—Now is the time to fight the weeds. Every weed takes up room that should be occupied by something else. Every weed draws sustenance that belongs to the growing crops. Take advantage of all dry, hot days, keep the horse among the hoed crops, thoroughly stirring the soil, to kill weeds. With good horse implements, hoeing by hand may be nearly dispensed with after a stand is established. Before this, hoeing must be done so as to nip the weeds in the seed-leaf, if possible. Soon after corn begins to grow well, the hand hoe must be entirely dispensed with, for weeds between the rows will be taken care of with the cultivators and horse hoes; and most of those in the rows will be killed by the earth thrown upon them. The few which escape should be pulled by hand when the corn is about a foot high.

Keep the potatoes clear of weeds; it will make a vast difference in the crops. Thorough work in June will tell all the rest of the season, and for years to come.

Hoeing and weeding may afford constant employment to men and teams during most of the month, when the ground is dry. Stirring wet soil is not only a detriment, but loss of time. Till deep before the roots of the plants occupy the soil, but more shallow afterwards. Toward the close of the hoeing season, the effect of running a subsoil plow deeply between the rows of corn, or between alternate rows of root crops, is very beneficial.

Another word on Roots.—Sow beets, mangels, and carrots early, and ruta-bagas late in the month. Plow, crossplow, and harrow at intervals before sowing; it does the weeding in advance. A field thus worked before sowing will not only grow more and better roots, but with one-third the labor of weeding. Carrots can be raised by almost any farmer for six cents a bushel after he learns the most economical ways of doing it. We judge carrots to be, all things considered, the best of all the root crops for the soil and for feeding.

“Catch Crops.”—When failures occur in the hills of corn, rows of potatoes, or elsewhere, put in pumpkins, if the ground is rich with manure, or field beans, if it is only in fair condition. There will be spots, also, here and there, which should be filled with something rather than left to weeds. Ruta-bagas, carrots, white turnips, white beans, and peas offer a choice of good things.

Haying.—Nothing seems more necessary to the farmer at this season, than to secure his hay crop well, and it is best to begin early: 1st. because clover and some grass is usually fittest to cut. Grass cut rather green makes sweet, palatable hay, and a good aftermath. Cut a little after the best time, the hay is tough, wiry, and neither so palatable nor nutritious, while the meadows remain bare and brown until the fall rains.

2d. Because the roots sustain less of a shock; 3d. because gentle rains are very likely to occur and give the aftermath a good start. See remarks about hay-making in notes for July work.

Save labor by using the best implements. Cut with the mower, when the dew is off; stir constantly with a good Hay Tedder; rake up at three to four o'clock, and get in at once, or cock up before five, and house the next day.

The true art of hay-making consists in curing the grass just up to the point at which it will do to put into the barn, and no more. Most hay is cured too much. If the barn is properly ventilated, hay may be put in quite green, and will be relished like grass all winter.

On small farms where the horse-fork is not used, much hard labor may be saved by building up one-half of the hay-mow at a time. For instance, with the first hay drawn, fill one end of the bay, up as far as the big beam, then rake down the side, and while this part is settling fill the other half. The two parts being filled at different times, will not settle alike, and of course will not unite, so there will be no use of a hay-knife in winter. The principal benefit of this plan is in lessening the hard labor while unloading. One-half of the mow being lower than the other, the top of the load may be thrown on the highest part, and the balance below, which saves pitching over the big beam. There is still another advantage; the greatest heat caused by fermentation is always in the centre of the mow, and the seam here gives escape to the gasses.

Top-Dressing Grass Land.—The best time to apply manure of any kind to grass is just as it is recovering from the shock of cutting. Carting and spreading manure on grass land is the best rainy-day work to set the hands at during the summer months.

Toads are very useful in the garden. They destroy large numbers of insects. A toad will swallow the largest specimens of tomato worms. Carry every toad you find about your premises into the garden.

Green Fodder.—Sow corn in drills or broad-cast at intervals of two weeks. Millet makes excellent fodder. Sow twelve quarts to the acre about the middle of this month. Rye and oats may be both sown for fodder to good advantage. Sorghum is superior to corn for green fodder. Sow in drills two or three quarts to the acre, and cut just before blossoming. It will soon spring up again, and three crops may be cut during the season. Clover, corn or buckwheat can be sown now to turn under for manure.

Greasing Wheels.—The wheels of all wagons, carts, carriages, mowers, etc., should be oiled, but great damage is often done by oiling too plentifully. Lard should never be used on a wheel, for it will penetrate the hub, and work its way out around the tenons of the spokes, and spoil the wheel. *Tallow* is the best lubricator for

wood axle-trees, and *castor oil* for iron. Just grease enough should be applied to the spindle of a wagon to give it a light coating; this is better than more, for the surplus put on will work out at the ends, and be forced by the shoulder-bands and nut washers into the hub around the outside of the boxes. To oil an iron axle-tree, first wipe the spindle clean with a cloth wet with spirits of turpentine, and then apply a few drops of castor oil near the shoulder and end. One tea-spoonful is sufficient for the whole.

JULY WORK.

Watch the Stock at Pasture, and see that they do not have to crop too closely.

Change their pasture before the supply gets short, or, feed green fodder. Do not let them suffer for either water or salt. Lumps of rock salt in sheltered troughs we consider better than fine salt. If the cattle drink from a pond with a mud bottom, dump in a few loads of gravel at some accessible point, and thus make a good drinking place. Cattle often suck up leeches from the mud.

We approve of *yarding* all stock at night for the sake of saving the manure. Compost the manure with earth, under cover.

Cows should be supplied with abundant and succulent food if we would keep up the flow of milk.

Hay-making is the steady work for the month on most farms. Use machinery as far as possible. Cut hay where orchard grass and clover prevails, first; if Timothy predominates, that usually comes next. Rep-Top is later, and should never be associated with the other grasses or with clover, except to come in as a pasture grass. Cut all common grass before the seed ripens, and if possible, when just passing out of blossom. Clover for hay is best cut in full bloom.

Alsike clover is much better adapted for sowing with Timothy for hay than Red clover, because it matures at the same time as Timothy. Large quantities of hay are spoiled every year by exposure to rain after being cured. Where a mowing machine and tedder are used, the hay can often be got in the same day it is cut. No thrifty farmer should be without hay and grain caps.

There is very little use in raising a fine crop of grass or clover, cutting it at the right time and curing it in the best condition, if it is not put out of the way of damage from rain, by housing or stacking it as soon as possible. Stacks of hay should be thatched with straw or coarse grass to protect them from damage from rain.

Manure grass land with fine muck compost as soon as the crop is off.

The Wheat Crop is so important that everything should be ready for harvesting it, and the moment it is fit to cut everything else should give way for this work. Plow land for winter wheat

as soon as the time can be spared, turning under fine manure, or muck that has been saturated with liquid manure in the barn yard.

Buckwheat.—Sow about the middle of the month, or a week earlier or later. It is an excellent, paying crop, if it can be used as a second crop, following early potatoes, peas, or some early grain crop.

Turnips.—Sow Strap-leaf, Purple-top, or Cowhorn, or other good varieties, any time during the month. If your corn land is in as good condition as it ought to be, beans or turnips can be put in between the rows to good advantage. In such cases, the corn should be cut up at the ground as soon as it is glazed, to let them have the sun.

Cabbages may be set out for the main crop both in the garden, and in the field. They are excellent winter food for milch cows, if perfectly sound.

Soiling crops.—Continue to sow corn for succession, and feed the cows daily at evening, the stalks having been cut one, or even two days, to wilt. Millet and any kind of grain or sorghum may be sown for fall feed, and red clover for feed next June.

Hoed crops.—Avoid disturbing the soil very close to the roots of corn, and root crops. Work more in the middle, between rows, with the plow, but do the weeding thoroughly among the plants by hand. Collect the weeds and gleanings from among hoed crops, if abundant, and give to the swine, if they have not gone to seed.

Hogs will make a vast deal of manure this month, if kept in pens, and well supplied with weeds and other litter, muck, etc.

Thinning fruit, is a work too much neglected, and the consequence is the degeneracy of the fruit, and the failure of the tree to bear regular crops.

When the tree sets a large quantity of fruit, one-half should be picked off by hand.

That remaining will be larger, firmer, and often nearly as great in bulk, and will usually bring more money, and will not exhaust the tree.

Care of Implements.—In buying agricultural machines and implements, farmers should endeavor to get the best, and then to take proper care of them. Some persons, after investing a large sum in agricultural machines and implements, take very little care of them, leaving them "under the weather" when not in use, bleaching and cracking in the sun, or rotting and rusting in the rain. Every farmer should have a suitable building for housing machines and implements, and they should always be kept under cover when not in use. A machine housed and painted will last twice as long as one that is left out under the weather without

even the protection of paint. "A place for everything and every thing in its place" should be the motto of every farmer. Habits of order should be enforced, and nothing allowed to go to loss through carelessness or neglect. Machines, implements, tools, harness, etc., should be kept in their proper places in perfect repair, ready for use the moment they are needed.

Timothy.—The Timothy crop should be harvested with all the dispatch which may be commanded, as after it reaches the point of sufficient maturity it degenerates rapidly in quality and loses in weight. The proper time is after the seed is formed and is full in the milk. It will then give about twenty per cent. more weight than when it is just coming into blossom, and the cattle will eat twenty per cent. less, and keep in their flesh. The roots also will be better able to withstand the drought. It should be cut four inches from the ground, as most of the Timothy is killed by mowing close and early, before it has come to maturity.

Pruning Trees.—There is no period in the whole year so suitable for pruning gum fruit trees, such as peaches, plums, etc., as the present—up to say the 25th of the month. It is the period when the tree is at rest after its first growth and before the second begins. Wounds made at this time by the cutting of branches, nicely heal over and present a neat appearance, instead of producing dead wood and perhaps a diseased spot, as is often the case when pruned in winter and early spring.

AUGUST WORK.

Animals at pasture must not lack an abundance of pure water. A light dressing of plaster and bone-dust applied before the feed gets very short in the pastures, will revive them surprisingly after the first rain. If the feed is scant, drive home the cattle and give green fodder at evening. Hogs intended for early fattening, should be penned, and will fatten as fast on peas as anything we have ever tried.

Sow your Grass Seed.—It is the best plan to sow grass seed early. Any time in August will do well, if it is not too dry. The grass will get well set before winter, so that it will not freeze out, and will make a good crop for mowing next year. Some of the best seeding we have known has been upon oat stubble, in August or early September. If the ground is moist the seed may be sown on the stubble and lightly harrowed, or brushed over and rolled. Oats generally leave the ground comparatively clean and mellow. Put on plenty of seed. If the grass does not occupy the ground entirely, the weeds will fill the vacancies.

Manuring Grass Land.—There is probably no time of the year when top-dressings produce nearly so good effect upon grass as just after haying. The roots revive from the discouragement caused by the sythe and hot sun, and the result is very satisfactory.

Grass seed may be sown at the same time on spots where good grasses are failing, and it is useful to go over the field with a brush harrow to work in the manure and seed with it.

Grass.—On permanent grass land, a good top-dressing every two or three years is most desirable; have fine muck and manure compost prepared, mingled if you please with ashes, plaster, and bone-dust, and apply this at the rate of fifteen to twenty loads to the acre as soon as the grass is cut. Timothy, Orchard Grass, Blue Grass, etc., do well, sowed alone on well-prepared land, and make a sward much quicker than if sowed with grain.

Plowing.—August is the best month in the year for plowing for any crop except Indian corn, sorghum, or some such rank, gross feeder. Any sward plowed now will rot before winter sets in, and once or twice harrowing in autumn will kill hosts of weeds. This is doing spring work, if thereby we prepare mellow, clean seed beds for spring grains, flax, and roots, or for a potato crop. For these crops it is always best to compromise between fall-plowed sod and summer fallow. There remains just that desirable quantity of vegetable mold in the soil, which, except on very rich loams, is most desirable. Plowing and preparation of the ground should be done now.

Root crops need weeding, but, except turnips, none ought to need thinning. On spots where turnips or ruta-bagas do not look well, sprinkle superphosphate of lime close to the rows, and scratch it in with the little weeding hoe. A small subsoil plow run midway between the rows of any kind of roots will almost uniformly be found of decided benefit.

How Turnips can be raised cheaply.—By sowing the Purple-top turnip seed at the last dressing of the corn, and covering with a light harrow, a couple hundred bushels of the best turnips can be raised with very little trouble. The early sowing will be compensated for by the shade afforded by the growing corn. This crop will take the place of the weeds and will not be in the way of harvesting the corn, as it will do the turnips little harm to treat them as though you did not know the crop was there. There will be enough left uninjured to pay all the expenses a dozen times over.

Winter Wheat.—Turn a clover sod well under, plowing say six inches deep and laying the sod perfectly flat; top-dress with lime, and harrow; after three weeks put on a heavy dressing of well-rotted compost, and harrow it thoroughly, drilling in the seed as soon thereafter as convenient, before the middle of September. Always pickle seed wheat.

Oats.—Cut before they get over ripe; the straw is worth much more for feeding and the grain is not lighter; if lodged or very short, mow early and cure as hay.

Potatoes.—Dig, when ripe; dry, and keep dry. The dry rot is much preferable to the wet rot, and dryness checks the extension of both.

Fruit.—Fallen fruit generally contains the larva of an insect that should not be allowed to perfect itself; gather up the fruit every day, and feed it to swine, or let the hogs have the run of the orchard. Have a good supply of self-supporting ladders to facilitate picking. Remove late *caterpillars' nests* and look out for the *borer*.

Grass seed may often be saved in sufficient quantity for one's own use, by observing where any variety grows unmixed and allowing such to become ripe, cutting with a sickle, binding in bundles threshed or rubbed out at leisure. Seeds of many of our best pasture and meadow grasses can only be bought at very high prices, while a little care in gathering them would afford an abundant supply for home use, if not for sale.

Huckleberry pastures, or similar land overgrown with bushes, should be torn all to pieces with a heavy iron tooth harrow well loaded. This is work for oxen. The roots and brush may be piled together and burnt, and the surface again harrowed. Seeding will hardly be necessary except on barren spots, which will need manure also. The natural grasses will soon assert their rights, the sooner if the stones are picked off and the land rolled.

Weeds and Bushes.—Cut all that have blossomed first, put them in piles and burn when dry. Give others to the hogs, also all growths of wet land that will soon decay. The bush hook and scythe should keep the hedge rows clean, and the young growth that starts after this will be very likely to winter kill. When opportunity serves, the roots may be torn out with a pair of cattle and a plow, or with a strong iron hook aided by the mattock or grubbing hoe.

Swamps and Low Lands.—If the low lands can be worked in, improve the time by digging open ditches, cutting bogs, and throwing out muck, clearing stumps, etc. If the swamps are dry enough for teams to work, alders and other bushes and trees may be hauled out by the roots, the surface grubbed, roots laid up to dry, and when dry burned. If the season be favorable for ditching in low grounds, lay out the drains and have the men at work every spare half day; get out as much muck and peat as possible as you progress, throwing it out on one side only of the ditch. Even if the weather be wet the ditch will most likely dry the ground in the immediate vicinity, so that the muck can be hauled out as soon as dry. The drying of peaty land may be sometimes facilitated by thrusting smooth poles obliquely into the peaty mass on either side as far as possible, and at a level not much above the bottom of the ditch. Roots, brush, and tussocks of grass or brakes, may be laid up in piles to dry for burning by and by. The ashes will be an excellent dressing for the soil.

SEPTEMBER WORK.

Wheat.—Finish the preparation of your land for wheat and sow as early in the month as possible.

Rye.—Sow an acre or two after the wheat is in, the last of this month, or in October. This grain, though it does not demand so good soil as wheat, is grateful for good culture, and is very remunerative, especially if the grain be consumed in the family. It is often desirable for long straw, if for nothing else. Hence always aim to sow at least sufficient rye for your own use.

Grass.—Sow alone on well prepared land, using plenty of seed. Clover may be sowed now or in the spring, the latter period being preferred usually. Grass seed may be sown, of course, with wheat or rye, but on well prepared land we prefer sowing it alone and in the spring. The grain detracts from its growth, and on all small patches it is much better to sow grass seed by itself. On land subject to heaving by frost a few oats may be sown as a mulch and winter protection. The land should be prepared with care, top-dressed with fine compost, guano, bone dust, fish manure, or other similar fine fertilizer, thoroughly harrowed in, and a liberal variety of seeds should be used.

Meadows and pastures.—If pasturage is short, do not feed down the aftermath, before it is well grown, at any rate; if possible, rely upon green crops, sowed corn in particular. Top-dressings of pasture grounds prove the best at this season. Pastures should be dressed with fine manure, lime, ashes, bone-dust, plaster or guano, just before the fall rains—not during a drouth. Sow grass and clover seeds on meadows and pastures, and give a thorough harrowing, especially to thin spots, using a light one-horse iron-tooth harrow.

Fodder.—If it will be necessary to purchase fodder, do so in early autumn. Many farmers are glad to sell *straw* at threshing time at a very low price, or will almost give it away. If wheat is cut as it should be when the stalk *begins* to turn yellow at both top and bottom, the straw will be relished by stock all winter equally with the best hay. *Corn Stalks* may often be bought very low, and if well cured, are worth nearly as much as good hay—that is, if cut up, soaked, and properly prepared for feeding.

Wheat and Rye may be sown this month for early feed in spring. Sow both crops at the same time; the rye will be cut first, then the wheat, and this should be followed by late-sowed rye, etc.

Root Crops.—Beets, mangels, ruta-bagas, and carrots, are making their best growth this month, and should be thoroughly clear of weeds, and the ground between the rows kept open. Thin out with an unsparing hand, using the thinnings for cow fodder.

Digging Potatoes.—Many farmers still continue the custom of planting potatoes in hills instead of drills, thereby greatly in-

creasing the labor of digging them. When planted in drills, they are readily thrown out by the plow. Only every other row should be plowed out the first time, and after these are picked up, plow the intervening rows. Of course, two horses should be used, walking one on each side the rows. Some simple machine for this purpose is very much needed.

Threshing.—The grain threshing should be done as early after harvest as may be practicable, in order that advantage may be taken of the market, to sell when it is likely to bring the best price. Let special care be taken to guard against the many dangerous accidents which frequently occur in threshing. Let the platform for the driver be made perfectly secure, and see that the feeder runs in no danger of having his hands mangled by the teeth of the machine. The master's eye should give this work the closest inspection.

Animals.—Do not leave horses in the field by day to be tormented by flies and covered with bott's eggs, but put in cool stables. Cows that come in this fall should be kept on good pasture, but not allowed to get too fat. It is a good plan to let them have rock salt in the pasture; if not, salt regularly once a week.

Swine.—Feed soft corn, or that which is broken down, or old corn if on hand, ground and cooked; feed regularly, giving a few handfuls of fine charcoal as a regulator, about twice a week. A good supply of grass for breeding hogs is of great value. They should be put on pasture two or three weeks before breeding time, as it increases the milk greatly. Breeders, on a good supply of grass, with some corn, will not only retain their flesh, but grow continually, and be easily fattened in the fall or winter, while the pigs will be large and healthy, and their growth will not be checked during the winter.

Poultry ought to have the range of stubble and grass fields, to feed upon the myriads of insects which abound at this season. The more quiet kinds, Brahmas, Cochins, and Dorkings, as well as turkeys, may be driven off to the fields after laying time, like a flock of sheep. They will thus be carried rapidly through moulting, and soon begin to lay freely. Chickens weighing three or four pounds will usually sell, if sent to market alive, at higher prices than they will bring fatted, killed and dressed at Thanksgiving or Christmas time. If confined, feed fowls with animal food. They require it to form their new plumage, and before the hens have moulted they will not lay.

The Orchard is now yielding its harvest, and all fruit should be carefully picked and honestly packed. Apples intended for cider may be shaken from the tree, but when intended for keeping; or for market, never. All such fruit should be carefully picked by hand and carefully laid, *not thrown*, into a basket. The

best for this purpose is a small round basket, holding not over one or two pecks, and provided with a hook for hanging it on the limbs or on the round of the ladder. Step ladders and folding ladders are much better for this purpose than those which rest against the limbs of the tree, often breaking, bruising, and injuring them. Those on the high limbs which cannot be reached from a ladder, should be picked with a "*fruit picker*" attached to a long pole. The pole pruning shears may be made to answer the purpose by attaching a small bag to them. The fruit should be *lifted* till the stem separates from the limb, and not *pulled* off.

Assorting and packing fruit, for market, is a matter which receives altogether too little attention from ordinary cultivators. A crop of apples assorted into three different varieties will bring nearly twice as much money in market as the same crop without assorting. A very few small or defective apples in an otherwise first class crop will often spoil its sale.

This month and next are the months for fairs. The farmer's leisure days are not many, but he should make sure of some, both for himself and his hands to attend the fairs. The recreation is worth a great deal, and one always gets valuable hints and ideas that he would not part with, and be as if he knew them not, for a great deal. Every farm might send something, and it gives a great pleasure to be a contributor, even if no prize be taken.

OCTOBER WORK.

Draining.—As fast as hands can be spared from the essential labors of the farm, set them at draining. A few acres should be drained every fall. There are few farms in the country on which this cannot be done with profit, and where needed, no labor pays half so well.

Animals.—This is *the* fattening time of the year. Beeves, pigs and poultry take on flesh well at any other season, but this month and next, especially before the very cold weather of December comes, they fatten rapidly. All stock should be put in good order for winter. Soft corn, nubbins, grown grain, green pumpkins, and such fruits as are liable to decay, ought to be fed out to the cattle to get them in good condition before cold weather comes on. Beeves should have full feeds of scalded corn meal and oil-cake, on corn stalks or chopped hay. Sheep should have their allowance of grain increased, especially those that are fattening, though so long as pasturage is fair, they should be kept upon it. Swine must have the small potatoes, boiled and mixed with meal; all their food ought to be cooked. Oil meal is excellent and economical food used with other things; so is beef, or even pork seraps. Mix finely powdered charecoal, and a little wood ashes occasionally with the food of hogs, especially if they do not come to the soil; their fattening and growth is much promoted by it.

Select such breeding sows as are wanted for furnishing a supply of pigs for next spring, and keep them in good growing order, but not fat.

The Rams may be put with the ewes for early market lambs. Select good long wool or Southdown rams, for the lambs of such will reward best the care which early lambs demand. It is not best to rear many February lambs.

Corn.—Cut up and put in stooks, if not already done, and as soon as ripe, husk, selecting seed ears. Take medium-sized ones, of perfect shape, close rowed, well tipped out and uniform, from stalks producing two or more ears. Sort out all soft ears and put the rest in well ventilated bins. Bind the stalks in small bundles for curing.

Root Crops.—Dig potatoes when they have done growing, and preserve in cellars or pits, covering lightly at first.

Pumpkins.—Gather in open sheds, or cover with litter before hard frosts; feed to cows after removing the seeds—the green ones first. The seeds are said to check the milk secretion, but do no harm to other stock.

Winter Grain.—Rye may usually be sown during this month, but north of lat. 41°, it is risky to delay sowing to the close. It is a good plan to top dress winter grains where they are thin, with some fine rich compost or hand manure, as this causes them to tiller freely.

Manure.—The barnyards and manure pits should be thoroughly cleared out, and the manure either applied to the land and plowed under for spring crops, or laid up with muck in compost heaps, making alternate layers of muck and manure. Lay in a good stock of swamp muck for composting with manure. If fine, it may be used by itself as a top dressing for grass.

Plowing.—Plow heavy soils, and those which cannot be plowed early in the spring, especially those which are very weedy or wet, so as to expose them to the action of frost during winter. Lay sod land over flat; the destruction of weeds and insects is more thorough. Land not in grass may be plowed rough, or in ridges back and forth, laying two furrows together. The press of other work should not cause fall plowing to be neglected. Extra hands should be hired and the work pushed on. It saves so much time and labor in the spring. Potato ground should be thus prepared, and on very stiff soil corn does better on fall-plowed land. All land on which spring grains are to be sowed should be plowed in the fall. Fall plowing makes most lands a week or two earlier in the spring.

Implements.—Clean thoroughly all implements not needed again this season; coat the steel and iron parts with boiled linseed oil, and put away.

Weeds.—Cut in wet weather, and bring into heaps for burning when so wet that the seed will not shell out. It does more harm than good to remove dry weeds.

Leaves.—If they are needed for bedding for horses or other stock, there is no better mode of using of them. But, when dry, under cover, they make good bedding, and, thrown out with the manure, speedily decay, through its action upon them. When not required as litter for stock, they should be put into the compost heap in alternate layers of manure, leaves and sods.—The fermentation will soon commence, and if the pile is built up some four feet high, the internal heat will be sufficient to keep out the frost for the most of the winter, and on shovelling over in the spring the whole will be found one rich mass, good for the garden, good for the lawn, good everywhere.

NOVEMBER WORK.

Manure.—Collect your stores of muck, leaves, and litter of all kinds, and put under cover. Clear up the yards frequently, throwing all manure and litter into heaps, over which spread muck or soil. Bring into the hog yards all sorts of litter and muck. Dust gypsum over stable floors and on fermenting manure wherever it is. Cut and stack salt marsh hay and similar coarse hay which is produced upon upland swamps; it is of great value as litter and manure. Lay up the manure in compact heaps, which can have liquids pumped over them as often as they get dry, and keep all manure under cover so far as possible. Nineteenths of the food of well fed animals comes into the manure, as a general rule. Hence the great value of fattening animals. Read the remarks in Chapter III. on the value of liquid manure, and do not let another month pass until you have provided for saving it and pumping it over the solid manure every week. *It will double the value of your manure from the same stock.*

Weeds.—Continue the slaughter of weeds as directed last month. Every weed allowed to go to seed re-produces thousands.

Root Crops.—If not already gathered in our latitude, they should be left no longer. Carrots will bear freezing in the ground less than any. Gather them first, and take them to the barn or house-cellar; Mangels and Sugar Beets next; they may be kept in pits or the cellar. White turnips and ruta-bagas bear most frost, but hard freezing is injurious to them. Protect in pits, well covered with straw and earth to turn water. If work presses, the roots may be dug and laid in long heaps as compactly as possible, and covered with five or six inches of earth, and when more leisure comes, the pits may be made systematically; provide ventilation by using drain tiles, loosely filled with straw.

Animals should all be housed before this month is out. Attend to ventilation. Close stables are especially injurious to horses. A very large proportion of the diseases of horses are caused by filthy and ill-ventilated stables. The fumes of the manure are destructive to the eyes and lungs of the horse. Young stock if put into warm stables, will improve in flesh, growth and constitution. Colts need good care and warm stables, if you would see them grow rapidly. Cows having rich feed will make much butter of excellent quality, even though the quantity of milk falls off.

Beeves should be pushed forward now in cool weather, with full feeds of roots, meal and oil-cake, with care not to overfeed. Keep salt before them, and water regularly; if possible, steam the food and give variety.

Hogs should be gaining in weight very fast; cook everything fed to them. Watch the market and kill early, if situated so that you can do so, and thus take advantage of the higher prices which usually prevail before the general killing time.

Sheep should come in from the pastures in good condition; if not, begin at once to bring them up with corn and oil-cake in small quantities. This is the *coupling* season. Do not let the ram run with the flock, but keep him by himself and let him into the flock an hour or so every morning. Keep him in good condition, but not fat, and do not tax his powers too severely.

Fruit.—Pick all market and winter fruit by hand. In picking and marketing apples, too much care cannot be exercised in handling and assorting the fruit. A lot that opens well and runs through evenly, brings a much better price than one that has been picked and barreled carelessly. The old rule that apples should be handled as carefully as if they were eggs ought to be always observed. Instead of having but two market grades, make at least three. Gather windfalls for cider. Apples keep best in lime-barrels.

DECEMBER WORK.

The careful preparation made for winter tells now. Now the well-banked cellars, well-covered root-pits, and warm buildings, stand the test of severe cold and winds. Now the grain, roots, and steamed food liberally fed during the last three months, make their show on the account for pork and beef.

Animals should have special care and attention. Feed steamed or cooked food to all your animals. Feed the beeves bountifully. Give the calves a little meal daily with other good feed, and keep them warmly sheltered in all inclement weather. Hogs will stop fattening if they are too cold to be comfortable, no matter how well they may be fed, and if you cannot keep them warm, you had better kill them early; steamed food is of great advantage in such cases.

Horses should be made comfortable. Don't shut up several horses in a low, close, dark stable unless you wish to breed diseases of the lungs. The horse should have a stable high enough for the circulation of the air over him; there should be no cracks through which the cold air can blow on him. Rub the horses well when they come warm to the stable. (See article on "CONSTRUCTION OF STABLES,"—page 276.)

Sheep should be housed by this time, and coupled with the rams, for April and May lambs. Allowing the ram to run with the sheep is a miserable practice, but if it is followed, no ram should be allowed to run with more than fifty sheep, but if kept apart and allowed but a single or once repeated service, a full grown ram may serve double that number. Obtain a full-blooded ram of the breed you desire to raise, if possible. Poor sheep are poor property; good sheep, of either the wool or mutton breeds are good property.

Brood Mares should be kept in loose boxes, or roomy stalls, so that they may lie at ease, and change their position at will. Have them, and all horses, sharp shod, so that they shall be in no danger of slipping upon the ice. Give regular exercise in a sunny yard or on the road.

Cows giving milk or dry, should be well fed and kept gaining. If the cow is in good condition, she may be milked to within four or five weeks of calving, without injury either to herself or her calf. If in poor flesh, and kept on dry hay and stalks, she should go dry two, three, or four months. A cow that has a hard time in calving should be well fed, to give her strength, and milked until the new milk springs, that the calf shall not be too large. Throw no fodder upon the ground, but feed in boxes or racks. Fodder left by the horses and cows, should be sprinkled with salt and water and fed to the sheep. Have water convenient to the yard, or in it, and protect the pipes, now, against freezing.

Manure.—Well composted manures may well be hauled on the fields whenever there is good sledding, but ordinary barnyard manure should be kept under cover. Spread out all the manure from the stables and yard under the sheds, and do not leave it exposed to the air, the freezing, thawing, and the bleaching which it will get if left out. Never keep the manure of the horse stables by itself, but always mix it with the other manures. Horse manure loses its ammonia more readily than any other manure, and becomes heated, then *fire fanged*, then dry and almost worthless. Nearly one half the value of stable manure is lost by leaving it unprotected through the winter.

Implements.—Now is the time to have a thorough overhauling of all tools. They should all be hunted up, cleaned, and put under cover. The ploughs, spades, hoes, and all iron implements should be rubbed over with an oiled rag to prevent rust. There

should be a tool room on every farm. Before tools are put up for the winter, all those needing repairs of any sort should be attended to. Large machines needing any repairs that cannot be made on the farm, should be sent to the repair shop now, and the work done. A nut can be replaced, a plough point sharpened, or a handle set much more conveniently now, than if left until it is wanted again during the hurry of the working season.

An Ice House is a great convenience on every farm, and almost indispensable where butter is made for market. A cheap ice house can be constructed as follows: Draw sawdust and spread upon the ground at least a foot deep. Build up the cakes of ice upon this foundation seven to ten feet high, and eight to ten feet square, filling the space between the cakes with pounded ice. Set up scantling and board it up about two feet from the ice. Fill in this space with sawdust, and put two or three feet of sawdust on top, covering with boards and slabs. It will keep all summer.

DEFINITION OF WORDS AS USED IN THIS VOLUME.

- ARABLE**—Fit for tillage.
- AMMONIA**—The alkali of manures.
- ABSCESS**—A cavity in the flesh containing pus, caused by inflammation.
- ABATE**—To lessen; to moderate.
- AFFECTION**—A disease or disturbance of the system.
- ALIMENTARY CANAL**—The whole passage through which the food passes.
- AMATEUR**—A person who cultivates any art or science from taste and not as a business.
- ACETOUS**—Sour; acid.
- ALTERNATE**—By turns or in succession.
- BIENNIAL**—Once in two years.
- BRONCHIAL**—Belonging to the windpipe.
- CRANIUM**—The bones which enclose the brains.
- CORONET**—The upper part of the hoof of the horse.
- CONTAGIOUS**—Capable of being communicated by touch.
- CONGESTION**—An unnatural accumulation of blood in any part of the body.
- CLYSTER**—An injection.
- CUTANEOUS**—Pertaining to the skin.
- CASEINE**—The cheesy portion of milk, almost identical with legumens in plants.
- DECOCTION**—A fluid in which herbs or other substance has been boiled.
- DESIDERATUM**—That which is desired but not possessed.
- DEGENERATE**—To grow worse or inferior.
- DEODORIZE**—To remove offensive smells.
- DISINFECT**—To purify from contagious matter.
- ENTOMOLOGY**—That part of zoology which treats of insects.
- EXCRESCENCE**—A swelling, tumor or other enlargement.
- EXUDE**—The flowing of juices from the pores of animals or plants.
- FEBRILE**—Pertaining to or indicating fever.
- FUMIGATE**—Smoking for the purpose of cleansing infected departments, clothing, etc.
- FOMENTATION**—The act of applying warm liquids to the body by means of flannels.
- FIBRES**—Fine slender threads.
- FIBRIN**—Tough, elastic fibres formed in animal and vegetable matter.
- FUNGUS**—A vegetable growth upon plants.
- GESTATION**—Carrying young in the womb.

- GENERATED—Begotten; engendered; produced; formed.
- GLANDS—Small, fleshy tubes for the passage of fluids.
- GLANDULAR—Consisting of, or pertaining to glands.
- GNARLY—Crabbed; misshapen; as a gnarly apple.
- GRADE—An animal having a portion of the blood of some distinct
- IMMUTABLE—Unaltering. [breed.]
- INFECT—That which taints or corrupts by communication from
- JUGULAR—A large vein of the neck. [one to another.]
- LUBRICATE—To make smooth or slippery.
- LIGAMENT—A strong, compact substance serving to bind one bone to another.
- LARYNX—The enlarged upper part of the windpipe extending
- LARVÆ—Insects in the grub state. [into the throat.]
- LUSCIOUS—Very sweet; delicious.
- LONGITUDINAL—Lengthwise.
- LAXATIVE—Loosening; mildly purgative.
- MINIATURE—Small; on a small scale.
- NEUROTOMY—The dissection of a nerve.
- NORMAL—According to rule.
- NEUTRALIZE—To destroy or limit the effect of.
- OVARIES—The depository of the eggs in the female body.
- PHOSPHATE—A salt.
- PURGATIVE—Having the power of cleansing the intestines.
- PUSTULES—An inflamed spot on the skin underneath which is pus.
- PUS—Matter coming from the blood in consequence of inflammation.
- PROGENY—Offspring; descendants.
- PARTURITION—The act of bringing forth young.
- PURULENT—Consisting of pus or matter.
- PUPA—The third state of the insect or grub.
- PROPAGATION—The increase by generation.
- POMOLOGY—The art of raising fruit.
- POMOLOGICAL—Pertaining to fruit culture.
- PARASITIC—Growing from or living upon some other body.
- PISTILLATE—Blossoms having no stamens, and therefore incapable of fertilization
- RUMINATING—Chewing the cud. [ble of fertilization]
- REJUVENATE—To make young again.
- REMITTANT—Having an increase and then diminishing.
- SULPHATE—A salt.
- SINUSES—Long cavities containing pus.
- SACCHARINE—Having the qualities of sugar.
- STAMENS—Organs of fruitfulness in plants.
- TECHNICAL—Pertaining to the arts. [abdomen.]
- THORAX—The chest or part of the body between the neck and
- TERMINAL—Growing at the end of a branch or stem.
- VICE VERSA—The circumstances reversed.
- VIRULENT—Extremely active in doing injury.
- VINOUS—Having the sparkling qualities of wine.
- VENEER—A thin leaf of superior wood for overlaying an inferior one.

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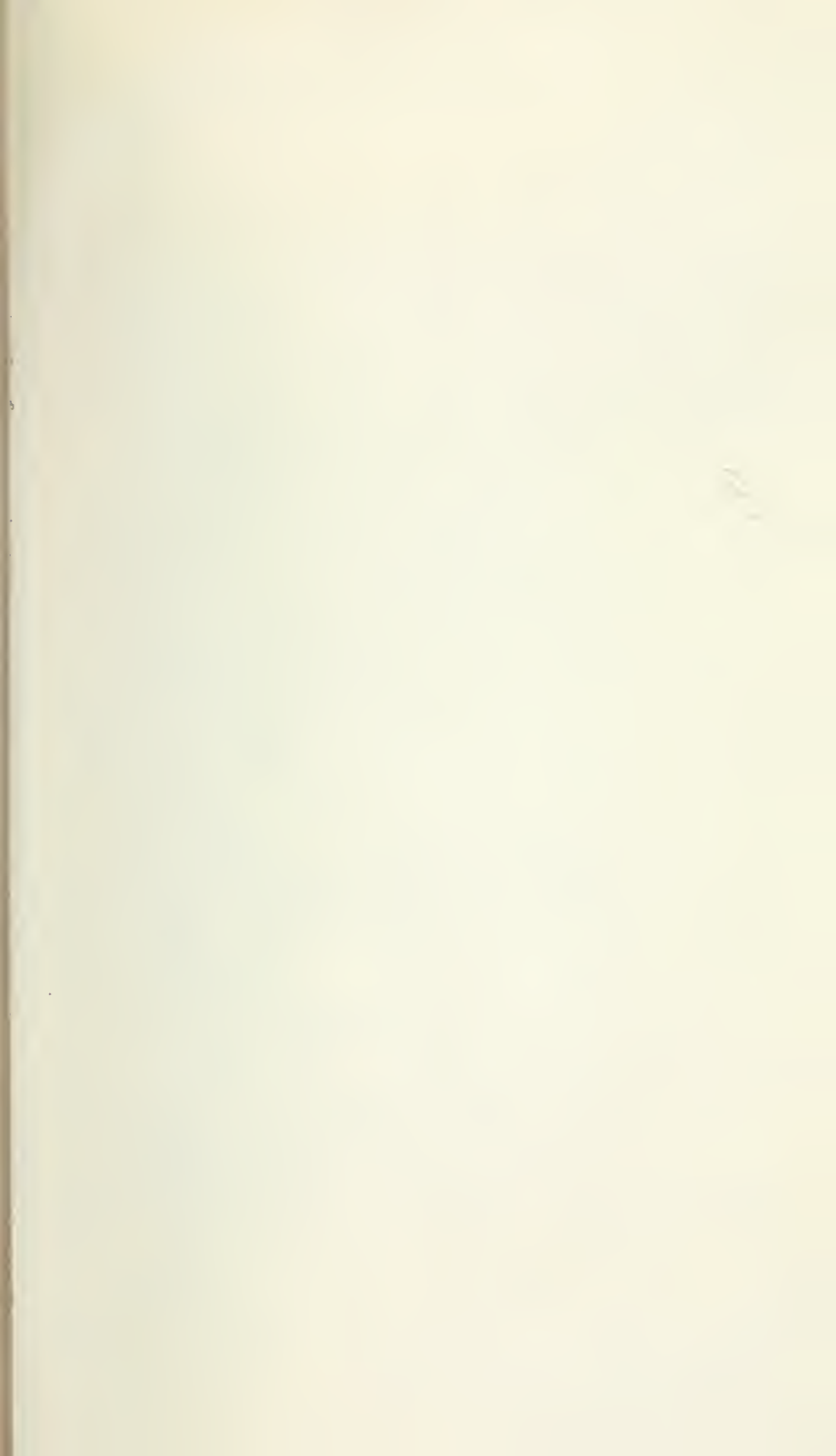
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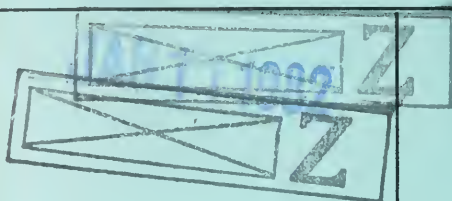
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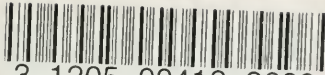


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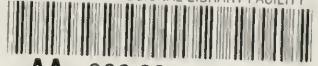
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