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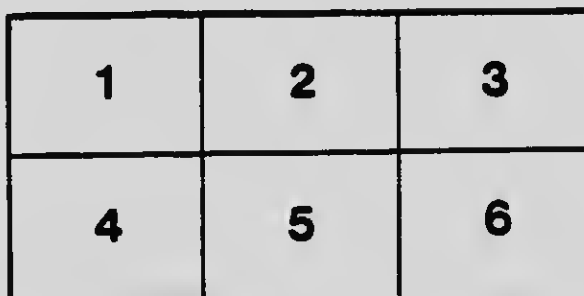
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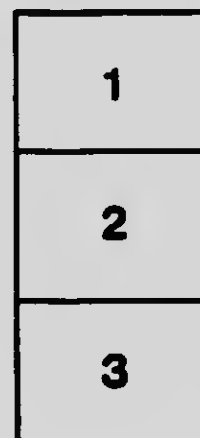
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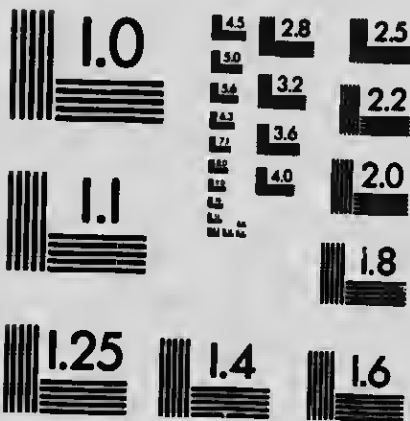
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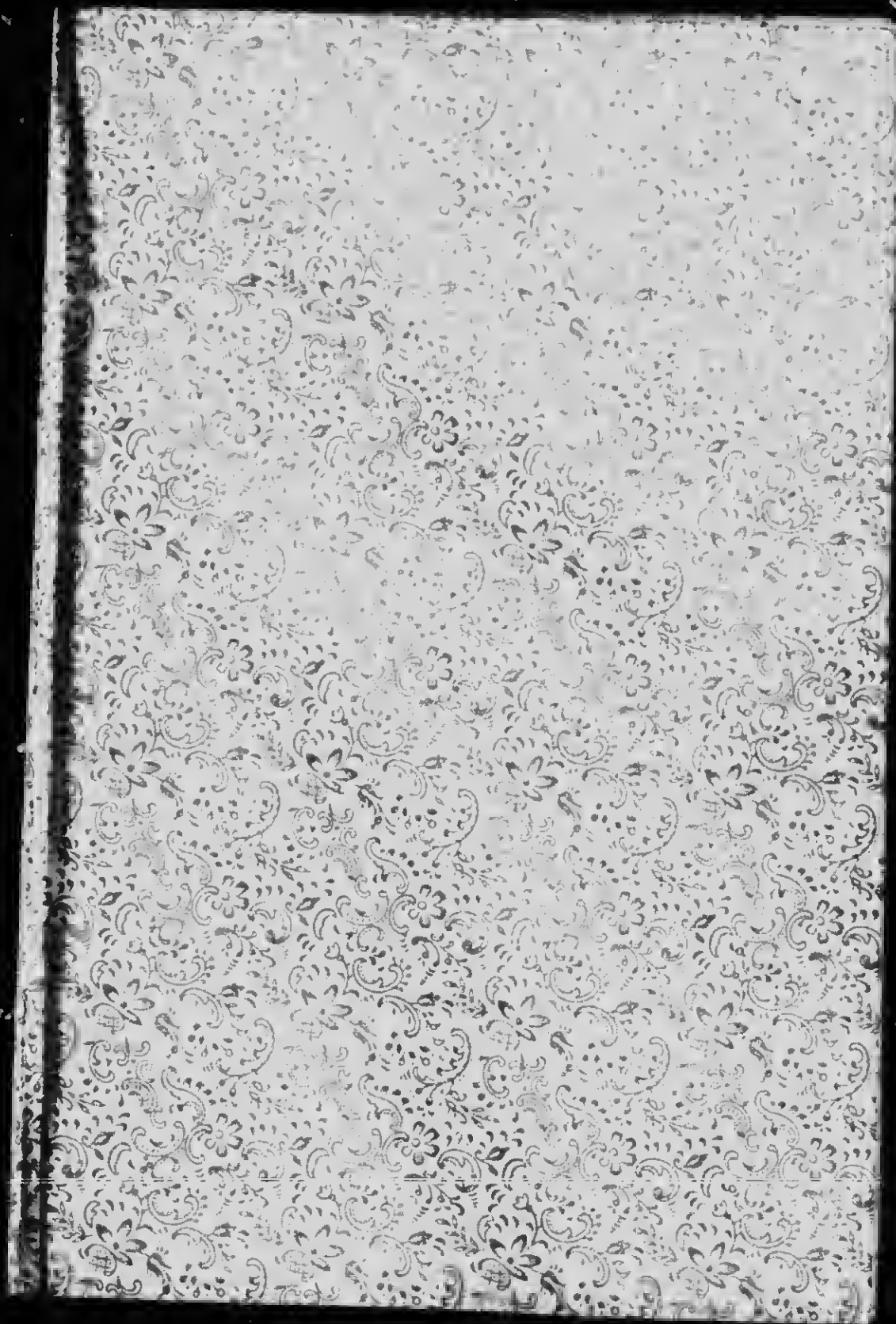
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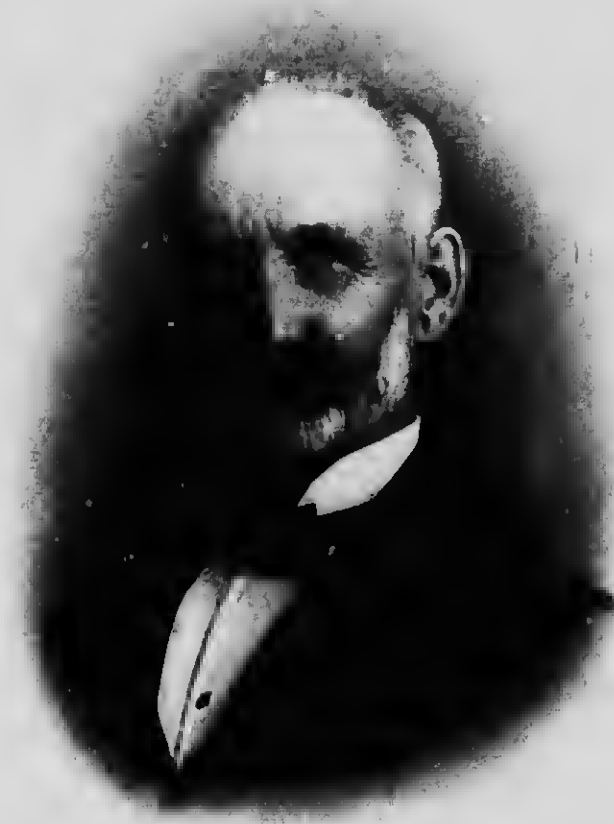
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Wm Rimmie

SUCCESSFUL FARMING



654.

Successful Farming

HOW TO FARM FOR PROFIT
THE LATEST METHODS

BY

WM. RENNIE, SR.
Late of the Ontario Agricultural College

ILLUSTRATED

TORONTO:
WILLIAM RENNIE'S SONS.
1908

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PREFACE TO REVISED EDITION

Since the first publication of "Successful Farming," scientific agriculture has made rapid advance. Mr. Rennie has, therefore, revised his original work, adding to it much valuable information, which has been the outcome of his later experiences and investigations in the practical science of agriculture. The book is now invaluable to the Canadian farmer, in so much that it is the only practical work on Canadian agriculture that is published. At the same time, Mr. Rennie's scientific principles of soil cultivation, rotation of crops, etc., can be followed to a profitable advantage in any country. Mr. Rennie is himself a successful farmer; he was awarded the first silver medal presented by the Agricultural and Arts Association of the Province of Ontario for the cleanest and most ably managed farm in the province. For six years he was Farm Superintendent at the Ontario Agricultural College, and by his practical and scientific methods so increased the earnings of his department that it showed considerable profit as against a previous annual loss. Again, at the Rathbun Co.'s large farm at Deseronto Mr. Rennie was called upon by the proprietors to take over the farm's management. Before this time the farm was showing a loss of over five thousand dollars annually. Mr. Rennie applied

his methods, and in the second year of his management the farm yielded a *profit* of two thousand dollars, making a difference of seven thousand dollars per year. This is offered as evidence that Mr. Rennie's principles of agriculture are founded on a profit-gaining basis; it also proves that a knowledge of these scientific principles is necessary to the success of any farmer. The author recognized this fact, and his purport in writing this book has been to thoroughly explain in simple language the principles of science as applied to farming. All the ideas set forth in the book may be readily carried out; no impracticable theories are advanced. The article on Alfalfa clover is especially valuable, and should be carefully studied by every reader of this book. The sections on the Restoring and Maintaining of Soil Fertility, the Destruction of Noxious Weeds, the Conservation of Soil Moisture, Shallow Plowing and Crop Rotation are also of special importance. Every department of the farm and farm-home has been given the most thorough attention, and if farmers will carry out the easily-followed scientific principles, they may reasonably expect an increase in profits and a saving of labor, which will add pleasure and zest to their daily duties.

WM. RENNIE'S SONS,
Publishers.

TORONTO, January, 1908.

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SUCCESSFUL FARMING

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CHAPTER I.

SECTION I.

FARMING.

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Farming is the most noble, independent, healthful and interesting of all occupations. The intelligent farmer is a co-worker with Providence in the cultivation of his crops, proper feeding of animals, and the fulfilment of his many daily duties. Men of science have spent years in studying and solving the problems of agriculture, with a result that there has been established a science of farming which elevates it to the ranks of the higher professions. A knowledge of this science eliminates all drudgery and uncertainty and makes farming both pleasant and profitable. The demand for competent young men as farm managers at lucrative salaries is greater than the supply, and this demand continues to increase. Many farms throughout the country are passing into the hands of capitalists, who prefer to have their money invested in this way, provided they can get interest for their investment and increased values through a scientific improvement of their farm properties.

Demand for
Farm
Managers.

The good work done by our agricultural col-

leges and experiment stations in educating our young men is not wide enough in its scope to properly meet the earnest call for more and more scientific agriculturists.

**Agriculture
in Schools.**

It has been truly stated that agriculture is the foundation on which rests all other industries. When we fully understand this fact it is manifest that agriculture should have a more prominent position in the curriculum of our public and secondary schools. Much of the time now devoted to the study of dead languages and kindred subjects could be put to much more profitable use in a careful and interested study of practical agriculture and the laws of science which govern intelligent and profitable farming. Our public school curriculum is certainly not adapted to the necessities of a country life. Every book the children are required to study directs their thoughts to the city. To make a practical course of agriculture possible the consolidated rural-school and high-school systems combined seems a necessity, as at present not more than ten per cent. of the young men in rural districts are in a position to receive a high-school education, which is necessary before taking a course at an agricultural college. If a young man has an inclination for farming, he should be prepared for, and receive, a course of instruction at an agricultural college, so that he may properly fit himself for his profession, and be prepared to fill the highest position his profession offers. Many farmers, without a knowledge of scientific principles of agriculture, have,

by industry and economy laid by a good competency, even in the leaner years, yet a scientific knowledge of their profession would certainly have increased their profits and added a happy zest to their labors. At the same time it is well to remember that, although a young man may thoroughly understand all the up-to-date ideas, if he lacks system and enthusiasm he can never succeed as a farmer.

It is the enthusiast who reaches the top of all professions. The successful man in any business keeps an account of all his receipts and disbursements, and at the end of each year makes out an inventory of his stock, implements, etc. By this means he thoroughly understands his position. The farmer should know how much per acre it costs to grow each crop, including value of manure cultivation, seed, harvesting, threshing, etc. Any crop for which the returns do not exceed the cost of production should be discontinued, if the cause of loss cannot be remedied.

No animal, young or old, should be kept unless it gives a profit over the cost of food consumed and labor required. The returns, for example, can easily be obtained by the use of the scales, when fattening cattle, or in the case of milch cows, the scales and Babcock test. The knowledge necessary for a successful agriculturist is equal to and as complicated as that required for any other profession. He must understand how to restore soil fertility, and maintain it by a systematic rotation of crops.

System.

Knowledge
Required.

SUCCESSFUL FARMING.

He not only studies how to grow and harvest his crops, but also how to dispose of them to the best advantage. He must understand the qualifications of all the various breeds of stock, so that he may select those most profitable for the purpose intended.

It is also necessary to understand horticulture, not only for domestic purposes, but that there may be a good revenue from the orchard and garden.

In fact, in order to obtain the best results, the farmer requires to be an encyclopedist in his profession.

SECTION II.

THE LAWS OF NATURE.

Scientific
Methods
Overcome
Foreign
Competition.

Through the teachings of science and practical experiments, we can now cultivate the land intelligently, so that our farms will yield abundant crops at much less cost than formerly. This is necessary in order that the farmers of this country may be able to compete successfully with those of certain foreign nations, where native labor is worth only a few cents a day.

Our new lands, in their natural condition, were, as a rule, very fertile, so that they produced good crops for a succession of years without any system of cultivation or rotation of crops.

Nature's method, with which the teaching of science is in accord, of supplying food to the soil, is by applying vegetable matter of some kind on the surface, where it is decomposed and made

available for plant food by the bacteria acting on it. This wise provision has only been thoroughly understood within recent years.

SECTION III.

UNDERDRAINING.

The bacteria or germs which are necessary to decompose the vegetable matter can only act in dry, warm soil. Therefore, in order to get the best results, it is necessary to underdrain wet lands, as these are usually too cold. It is not necessary to drain high, dry land; deep subsoiling every three or four years on such land gives very good results, especially on a clay subsoil; a sandy or gravelly subsoil does not require loosening. Underdraining causes the water to percolate through the soil, at the same time retaining sufficient moisture to withstand a period of drought.

Advantages
of Under-
draining.

For underdraining there is nothing better than the ordinary round drain tile. Judgment must be used in the selection of the size of tile to use. It is advisable to have the tile sufficiently large, but not larger than actually required, as the cost of underdraining is governed very much by the size of the tile used. For a main drain, in ordinary cases, five or six inch tile may be used for the lower end, and four inch for the upper portion, and for the laterals, or branches, from two-and-a-half to three inch. Drains should always be from two-and-a-half to three-and-a-half feet deep. The distance apart be-

Size of
Drain Tile.

**Distance
Between
Drains.**

tween the lateral drains is governed by the quantity of water to be carried off, and the quality of the subsoil through which the drains run. In a tenacious clay soil, forty feet apart would be considered an average distance. In a free soil, the lateral drains may be from sixty to seventy-five feet apart.

**Construction
of Drain.**

In commencing to drain, open with an ordinary plow, by passing three or four times in



I. SUBSOIL PLOW.

the same track. The subsoil can then be loosened with an ordinary subsoil plow. (See Ill. 1). In hitching to the subsoil plow, fasten a chain six or seven feet long to the point of beam, and move back on the beam as the drain is deepened. The evener will require to be six feet long, so that the horses will travel outside the earth thrown out (one on each side): the earth thus loosened will require to be thrown out every round made with the plow: this is

done with narrow shovels, until the drain is the required depth. The bottom of the drain should be dug with a narrow draining spade (see Ill. 2) made for the purpose, and the loose earth thrown out with a crummer.



2. DRAINING SPADE.

To secure the proper grade for the bottom of a drain, one method is to use several cross-heads made from strips of one inch boards, three or four inches wide. The length of standards varies according to the depth of the drain. A cross-piece, about two feet long, is nailed on the top of the standard. Place the cross-heads so that the tops of the cross-pieces are in line. The proper grade is ascertained by using an ordinary spirit level. When ready to lay the tile, set a

Grading.



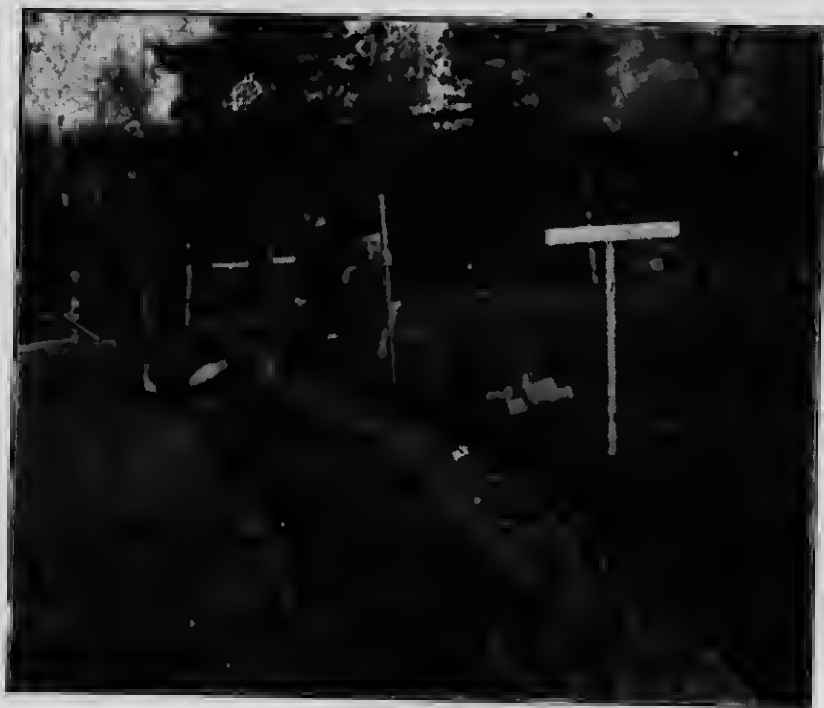
3. CRUMMER.

standard or the handle of the crummer (see Ill. 3) at the bottom of the drain, and mark in line with the top of cross-heads; this will, by testing every few feet, give a true grade for the tiles. (See Ill. 4). A second method is to fasten a spirit level on a straight edge about eight feet

long; first find the grade that can be secured, and mark the level accordingly, which will decide the grade on bottom of drain.

Laying.

When laying the tile, turn them so that the joints fit close, and see that they are firmly laid. In making connections, make an opening in the



4. DRAINING.

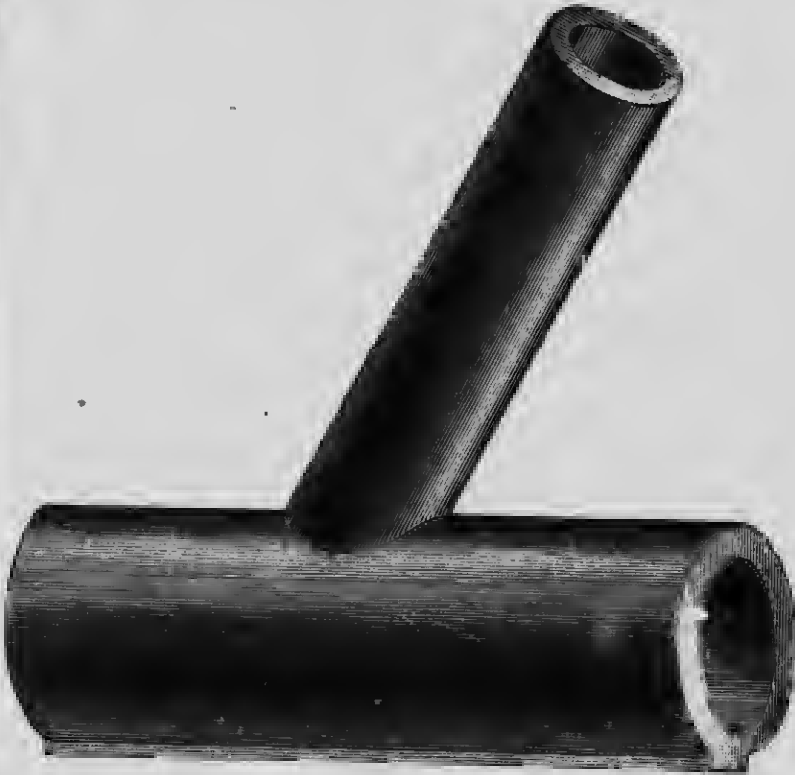
main drain tile with a small mill pick, and fit the lateral tight. (See Ill. 5.) Tiles made with connections are more convenient. In covering, put the sods or the black surface soil next to the tiles. The reason for this is that the black surface soil is composed of vegetable matter, and

UNDERDRAINING.

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will prevent the subsoil from getting in at the joints. If the drains are properly laid, the least perceptible fall is sufficient to carry off the water without clogging.

A correct diagram of all drains should be made and kept for future reference.



5. DRAIN CONNECTION.

Ditching machines have not yet come into general use. Some years ago the writer invented a ditching machine, at great cost, which did good work, but it is not manufactured at the present time, as it was found to be too expensive. (See III. 6.)

Ditching
Machines.

SECTION IV.

CULTIVATION OF THE SOIL.

**Causes of
Worn-out
Land.**

Farms that have become exhausted in the older sections of the country have, as a rule, been caused through deep plowing and burying of the vegetable matter with the crude subsoil which is not available for plant food. This is directly in opposition to the laws of nature. In our new and fertile lands we find the vegetable matter on the surface, where it properly belongs. By "shallow plowing," "thorough cultivation," and a "systematic rotation of crops," the fertility of the soil can be maintained indefinitely. Worn-out land is really land on which the vegetable matter (humus) has been buried, or destroyed by a continuous cropping with grain. This can only be renewed by applying vegetable matter on the surface, and incorporating it with the surface soil, so that it will decompose quickly and form what is termed *humus*.

Humus.**Humus
Retains
Moisture.****Humus
Fixes
Ammonia.**

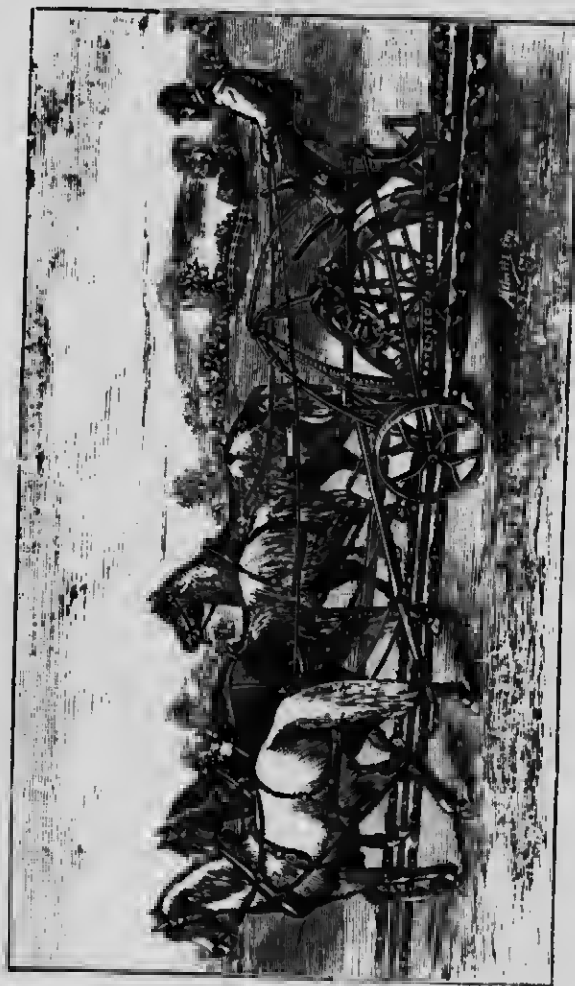
Humus has a distinct value, apart from the plant food it contains. It absorbs and retains moisture much more readily than any other ingredient, so that a soil that is rich in humus will withstand drought without drying out and becoming hard. Humus also aids in the decomposition of the mineral matter in the soil, changing unavailable into available plant food. It fixes ammonia of animal matter in the soil, and thus prevents its being lost by leaching or evaporation. It improves the texture and mechanical condition of a heavy soil, making it lighter, more porous, and less adhesive or sticky.

CULTIVATION OF THE SOIL.

19

On a sandy soil humus serves to bind together the loose particles of sand, and so prevents the soil from drifting, and the excessive leaching of plant food.

Humus
Improves
Texture.



6. DITCHING MACHINE.

Mineral fertilizers, such as gypsum, lime, salt, etc., may be used to advantage on a soil

Fertilizing.

Artificial
Fertilizers
Largely
Stimulants.

which is well supplied with vegetable matter to change it into available plant food quickly; but as these are used more as stimulants, and contain little plant food in themselves, their continued use must, and does, exhaust the soil of its supplies of vegetable matter, so that the result is a more rapid and complete exhaustion of the soil. Without humus the soil has lost its retaining power, so that when those mineral fertilizers are dissolved, they either evaporate or leach down beyond the reach of most plants. This is why the use of land plaster does not give as good results now as in former years, when the soil was in its natural condition.

Scientists tell us that there is sufficient mineral matter in all ordinary soil to supply the necessary amount of phosphate required in growing crops for hundreds of years, provided a systematic rotation of crops is followed, whereby clover or some other deep-rooted plants are grown every three or four years to penetrate the subsoil and act on the crude mineral matter, making a certain portion available for plant food to supply the following grain and other crops forming the rotation.

Native Sod.

The practical florist understands that the best soil he can use for growing plants successfully is rotted sod, and none is better than the native sod from land that has never been plowed or mixed in any way with the crude subsoil. The sod is cut three or four inches thick, taken and piled up for a time, then turned over frequently, and exposed to heat, air and moisture

How to
Rot Sod.

—the three essentials for rotting vegetable matter.



7. LAND ROLLER.

After it is thoroughly rotted and mixed with well-rotted farmyard manure, it is ready for use, and the pots may be filled and the plants set in them and watered. The plants will grow and develop perfectly with but little attention. This kind of soil will hold water like a sponge, and never get hard or crack open.

Rotted Sod
for Potting.

The old idea was to take soil, regardless of vegetable matter, have it analyzed, and find exactly what proportion of nitrogen, potash, phosphoric acid, etc., were required for plant growth. After the soil was thoroughly prepared with the necessary fertilizers incorporated in the soil, the pots were filled with plants and watered the same as in the soil made from rotted sod.

The results, however, are entirely different. The soil prepared with fertilizers will require to be watered every day or two, otherwise it will get hard and compact, and the plants will die for lack of moisture. If it is kept thoroughly watered, the fertilizers will soon become dis-



8. SPRING TOOTH CULTIVATOR.

solved, and leach down beyond the reach of the roots of the plants, so that it will not derive any benefit from the fertilizer.

Benefits of
Vegetable
Matter.

From the above illustration we understand that the fertility of a soil depends largely on the amount and quality of vegetable matter it con-

erent.
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tains. When we speak of worn-out land, we do not mean the quality of the subsoil, as that undergoes little or no change. The whole difficulty is the lack of vegetable matter on the surface. When this is destroyed, through deep plowing and without a proper system of rota-



9. STIFF TOOTH CULTIVATOR.

tion, the soil will get hard and crack open, unless there is rain every few days through the summer months—a thing which rarely occurs.

Soil which lacks decomposed vegetable matter (humus) is of a light color, while a rich soil, filled with humus, is a dark color.

In adopting a system of rotation of crops, a

Bare
Summer
Fallow
Destroys
Humus.

bare summer-fallow should not be included, because plowing, cultivating and harrowing the land several times during the summer season adds nothing to its fertility, and is particularly destructive to the *humus*. It temporarily puts the soil in better condition by improving the tilth, thus making the plant food already in the soil soluble, so that a crop of fall wheat or any other grain will grow luxuriantly, but before the land is used for another crop a large portion of the plant food is lost by leaching and evaporation. Besides, there is an additional loss of a season's crop, and much of the labor in cultivating the land.

How to
Renew
Worn-out
Land.

There are different methods of renewing worn-out lands, which simply means soil that lacks vegetable matter on the surface and incorporated with nitrogen. Vegetable matter and nitrogen are the two most essential elements to improve the fertility of the soil, and both are easily supplied by adopting shallow plowing, and growing an abundance of alfalfa, red clover or other leguminous plants that are adapted to collect free nitrogen from the atmosphere, and deposit it in the soil, where it remains in an available condition for a grain or any other crop that requires nitrogen, and can only make use of what is in the soil. As for potash, phosphoric acid, etc., alfalfa and red clover roots act on the crude mineral matter, and make it available for plant food.

Preparing
for
Rotation.

To prepare worn-out land for a systematic rotation of crops, plow in the spring not more

than four inches deep, then roll with a heavy roller (see Ill. 7); this will press the shallow furrow on the subsoil, so that the moisture will rise from the subsoil into the furrow by what is known as capillary attraction; to prevent the moisture from escaping by evaporation, harrow



10. GRAIN DRILL.

frequently, and do not allow a crust to form. By keeping the surface pulverized, a mulching is formed, which keeps the soil moist and hastens decomposition. The three essentials for rotting vegetable matter are: "heat," "air," and "moisture." These may be secured as follows:—"Heat" by plowing in warm weather, "air" by

plowing shallow, and "moisture" by rolling and harrowing. If there are any thistles, couch grass, or weeds of any kind, they will soon start to grow under this kind of treatment: when nicely started, cut them off two or three inches below the surface with wide points on the cultivator, either the spring or stiff tooth (see Ills. 8 and 9), then harrow, shaking out the roots to dry in the sun; in about ten days repeat the cultivating and harrowing.



11. PLOW WITH REVOLVING COULTER.

The land should now be in good condition to grow a green crop to plow under later to supply vegetable matter. Sow with a grain drill (see Ill. 10) the following mixture:—1 bushel of peas, or vetches, $\frac{1}{2}$ bushel buckwheat, 4 lbs. Essex rape. When the peas and buckwheat are in bloom plow the whole under about four inches deep, using a chain attached to beam of plow and the end of evener, so as to draw the green crop under the furrow. Many prefer to use a revolving coulter (Ill. 11), instead of the common

straight coulter. Roll and harrow soon as plowed. In about ten days the green crop will be sufficiently rotted to use the cultivator, following with the harrow. If any, or all of the land that has been treated according to the foregoing directions is wanted for fall wheat, apply farmyard manure at the rate of ten to twelve loads per acre, well rotted, so as not to interfere

Fall Wheat.



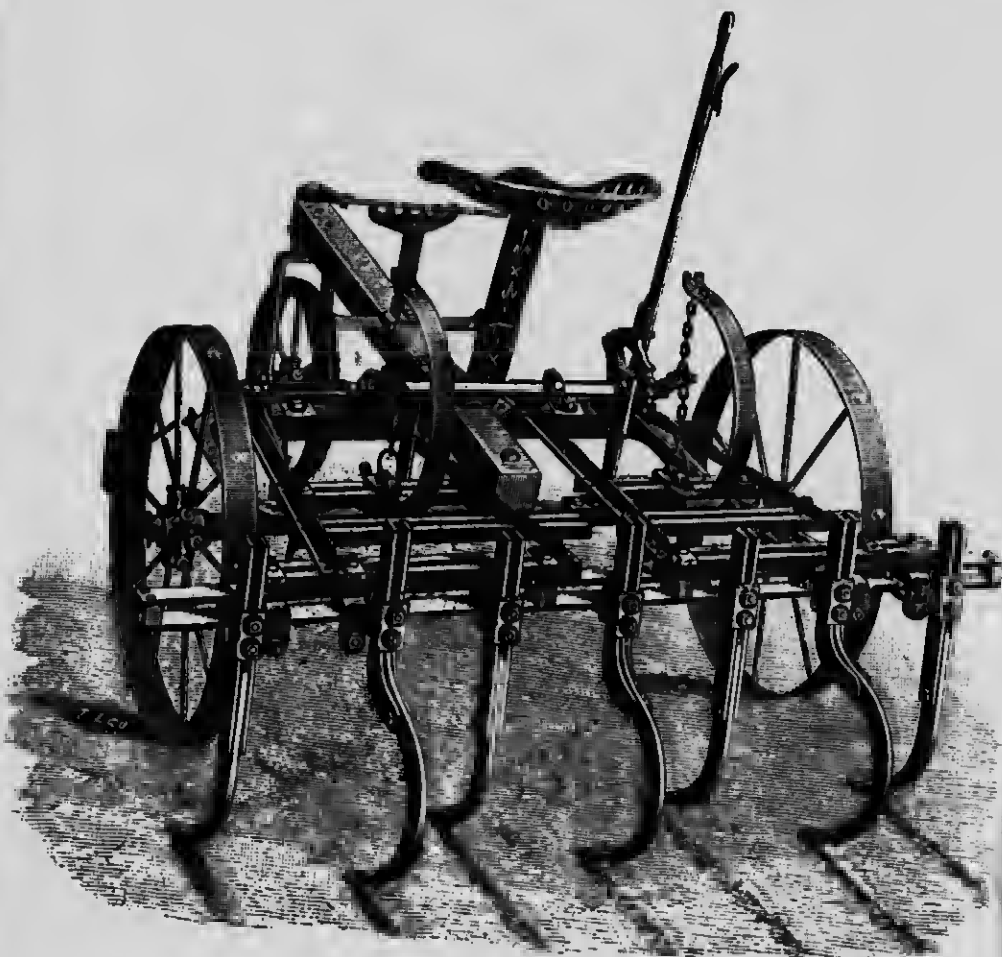
12. MANURE SPREADER.

with cultivating, which is preferable to plowing under before sowing. In order to pulverize the manure and spread it on the land evenly, so that it will not interfere with the cultivation or drilling in of the grain, it is advisable to use a manure spreader. (See Ill. 12.) Evidently this implement has come to stay. It not only spreads the manure more evenly, but does the work more expeditious.

Manure
Spreader.

If the manure is not sufficiently rotted, so

that it interferes with the cultivator, gang plow the manure in shallow, then roll and harrow.



13. FOUR-HORSE SUBSOILER.

If the subsoil is a tenacious clay, it is advisable to loosen it with a subsoil plow (see Ill. 1) or a four-horse subsoiler. (See Ill. 13.) If the sub-

plow
row.

soil is very hard, it may be necessary to cross-cultivate, in order to break up the subsoil to, say, ten inches deep before sowing. If the subsoil is sand or gravel, deep cultivation is not necessary. It is advisable to sow fall wheat with the grain drill, to secure a uniform depth, then finish off with a harrow. (See Ill. 14.) It is an advantage to level off the surface, to prevent water lodging in the creases made by the grain sprouts and freezing in winter, which is liable to injure the wheat plants. With the above preparations a good wheat crop may reasonably be expected, and a fair start in a systematic rotation is made. While the green-crop and farmyard manure which has been prepared and worked in the surface soil will provide the necessary amount of vegetable matter and nitrogen for the wheat crop, provision should be made for increasing the fertility of the soil by seeding the fall wheat with clover, to provide a further supply of vegetable matter and nitrogen, two essential elements of fertility. Three pounds of timothy seed may be sown at the same time as the fall wheat; sow the grass seed in front of the grain sprouts, so that it will be scattered between the rows of grain. If sown behind the sprouts, the grass seed will fall in the creases with the grain, and is liable to be choked out by the wheat. The clovers require to be sown in the early spring with a grass seed sower (see Ill. 15)—say, eight pounds of red clover and three pounds of alsike clover seed per acre. After the clovers are sown, it is an advantage to

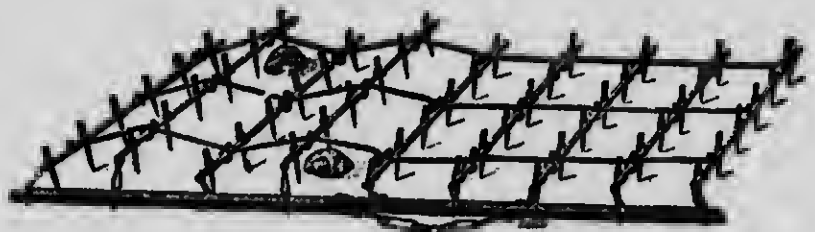
Sowing
Fall Wheat.

Increased
Fertility.

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harrow across with a Breed's Weeder or harrow, to pulverize the crust that will have formed during the winter.

Another method of preparing exhausted land for a systematic rotation is to plow the land shallow with either a single or two-furrow gang plow as soon as the crops are off in the early

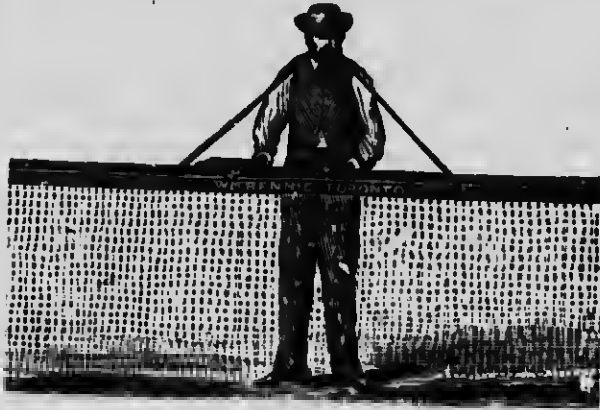


14. ADJUSTABLE HARROW.

autumn; roll and harrow immediately. In about ten days cultivate and harrow, to encourage the growth of any weeds and weed seeds that may be in the soil. Cultivate again in about ten days with the wide points, to cut off all weeds, then give a stroke with the harrows to shake them out to dry. In the month of October spread ten or twelve loads of farmyard manure per acre as far as can be had, and cover same by ribbing the land with a single or double mould-board plow, or, better still, a set of three ribbers attached to the frame of either a spring tooth cultivator or four-horse subsoiler. (See Ill. 17.) With this attachment one man and a pair of horses can rib eight acres per day. Make ribs about twenty inches wide, so that they may be easily levelled down in spring by harrowing and

cultivating. If the subsoil is clay, it should be cultivated deep (say ten inches), so that water will not lie on the surface, which is injurious to all crops. If the subsoil is composed of sand or gravel, shallow cultivation is preferable. Plowing either clay or sandy soil should always be

Plow
Shallow.



15. GRASS SEED SOWER.

shallow; it is a great mistake to bury the surface mould (humus) with the crude subsoil, be it clay or sand.

Land prepared in this manner will be in the best possible condition for early spring seeding. In order to clean the land of weeds, it is not necessary to make a bare summer-fallow during the whole summer, as this is most destructive to the humus. To destroy or exterminate weeds is now a much easier work than it was before we had little or no knowledge of their nature or methods of feeding and growing.

Over twenty years ago the late William Burgess, a well-known gardener, in an article

**Deep Plowing
Transplants
Thistles.**

upon this subject, stated that 'no man can transplant Canada thistles better than the farmer with his plow.' We can understand the force of this statement when it is known that all the buds or eyes on a thistle root are near the surface of the ground, as with all perennials. The roots that run down deep into the subsoil



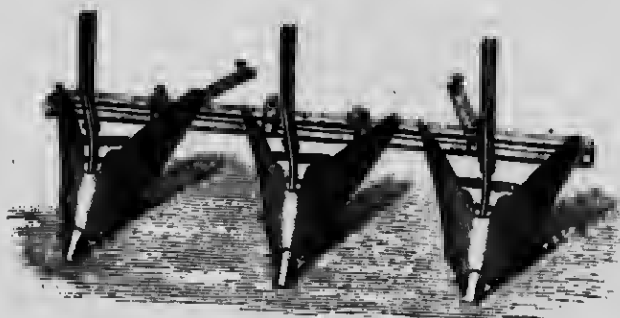
16. DRILL PLOW WITH POTATO DIGGER ATTACHMENT.

are only feeders, and have no buds or eyes to start a new plant. By plowing, say, seven or eight inches deep, nearly all the buds are in the furrow, and will sprout and grow quickly, several plants from each root, so that in many cases plowing multiplies the plants, instead of reducing them. Plowing down weed seeds of any kind is ruinous to the land. Many varieties of weed seeds will retain their vitality in the soil for fifteen, and some as long as twenty years, if excluded from the air.

The correct method to adopt for increasing soil fertility and ridding or cleaning the land of

weeds, both annual and perennial varieties, is shallow plowing and thorough cultivation early in the autumn, using the wide points on the cultivator and harrowing alternately. The only exception is the loosening of a clay subsoil occasionally with a subsoil plow or stiff tooth cultivator, when a green crop has been plowed

How to
Clean Land.



17. SET OF RIBBERS.

under, and the ground rolled and harrowed as before described. All seeds near the surface will germinate and grow quickly, and the roots of perennials, such as Canada thistles, couch grass, etc., will quickly send up shoots. The simplest method of exterminating these is to cut them off below the surface when about three inches high or before the leaves are fully developed. This work can be done expeditiously with either a spring or stiff tooth cultivator, with wide points, regulated to cut about two inches below the surface. (See Ills. 8 and 9.) When the weed plants are growing, they derive their nourishment from and through the roots, but after the leaves are fully developed they collect a certain

amount of nutriment from the atmosphere; care should then be taken that they are cut down before any of the leaves are fully developed.

After the land has been thus cultivated, and given one stroke with the harrows, a *hot* summer sun will kill all the weeds cut off. If this operation is repeated at intervals of two weeks until September, the land will be cleaned of all perennial weeds and annual foul seeds that are on or near the surface. Land treated in this manner should be in a good condition to grow a grain crop of any kind. Seed fall wheat with four pounds of timothy in the fall, and seven pounds of red clover and three pounds of alsike in the spring. Before sowing fall wheat, it is desirable to spread well-rotted farmyard manure over the land, and thoroughly incorporate it in the soil with the cultivator. If it is decided to sow grain in the spring, instead of fall wheat, coarser manure may be spread over the surface, and ribbed in October with a double mould board or drill plow (see Ill. 16) or ribbing attachment on the cultivator frame. (See Ill. 17.) An ordinary plow may be used instead, in a manner known as "Cut and Cover," by allowing the nigh horse to walk in the furrow. Ribbing prevents the soluble plant food from leaching away during the winter with rains and melting snows, which will run off in the furrows without interfering with the humus or manure which is in the centre of the ribs. Make the ribs about twenty inches wide. When land is ribbed in the fall it allows the frost to break up the subsoil

Ribbing.

Ribbing
Preserves
Plant Food.

and loosen it. Run cross furrows wherever necessary to carry off all surplus water, and make proper outlets to same, so that there will be no pools of water standing on the land intended for seeding. This is a most important matter that is often neglected. In the spring these ribs are harrowed, and cultivated down with a spring tooth cultivator, if the subsoil is a sandy loam, but if a clay subsoil it will be necessary to use a stiff tooth cultivator, and loosen the subsoil nine or ten inches deep. The ground should be again harrowed before the grain drill is used. Sow the grain, wheat, oats or barley, as early as possible in the spring. There is quite an advantage in having the land ribbed in the fall and cross-furrowed, as it can be worked much earlier in the spring, and more especially when the ribs run north and south, so that the sun can shine into the furrows and dry out both sides of the ribs. Use only sound and well-matured grain for seed. When every kernel is fully developed and the soil in a high state of cultivation, the following quantities are quite sufficient per acre: Barley, one - and - a - half bushels; wheat and oats, one-and-a-quarter bushels. In sowing clover seed with grain, when the grain drill is used, the best method is to sow the clover and timothy in front of the grain sprouts, so that it will be scattered on the surface. After sowing, give a stroke with the harrows or Breed's Weeder crossways, to smooth the surface.

Spring
Cultivation.

Advantages
of Ribbing.

Do not roll until the land is thoroughly dry, When to
Roll.

**HOW TO RESTORE & MAINTAIN SOIL FERTILITY,
SYSTEMATIC ROTATION OF CROPS,
A FOUR YEARS COURSE
180 ACRE FARM.**



18. DIAGRAM OF FARM.

even if by that time the grain is two or three inches high. When land is rolled early in the spring, when damp, a crust is liable to form, which will encourage capillary action, and so cause the moisture in the soil to rise to the surface and evaporate. This is prevented by not rolling until the surface is dry. When dry ground is rolled, the lumps of earth on the surface are pulverized, and this fine mould forms a mulching, which prevents evaporation. If the above directions are followed, there will be no failure in securing a catch of clover.

To further increase the humus in the soil, cut the clover early the following year for hay—say by the middle of June. When the second growth is coming into bloom, plow under about four inches deep, using a roller coulter and chain, as before described; when plowing under a green crop, roll and harrow thoroughly. In about two weeks the sod will be sufficiently rotted to cultivate with a spring tooth cultivator. By using a spring tooth or stiff tooth cultivator with wide points several times and harrowing alternately during the summer and early fall, all weeds and weed seeds should be destroyed; then spread over the surface about ten or twelve loads of farmyard manure per acre. Rib as before described. The manure will then be in the centre of the ribs, and safe from being leached away by rainstorms or melting snows. In the spring, when the ribs are levelled down, the manure and rotted clover sod are thoroughly incorporated; this makes the

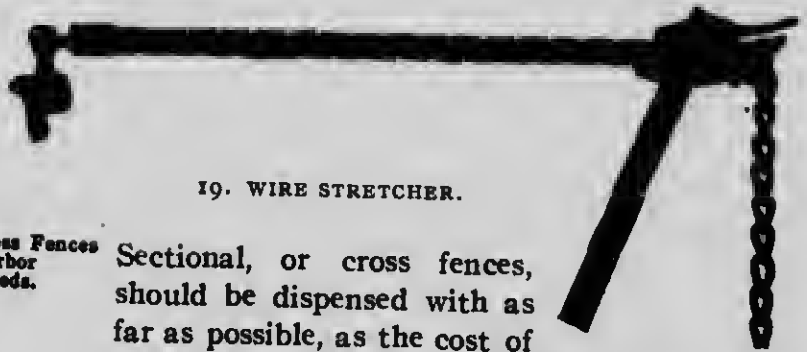
How to
Destroy
Weeds.

very best quality of vegetable matter to grow crops of all kinds. Land thus treated will be in good condition to grow abundant crops continuously, provided a systematic rotation is followed, such as described further on in this book.

SECTION V

FENCING.

In considering the best system of farming, fencing is a very important matter. The outside, or border fence requires to be a substantial structure, so that it will turn any animal and at the same time not be unnecessarily expensive.



19. WIRE STRETCHER.

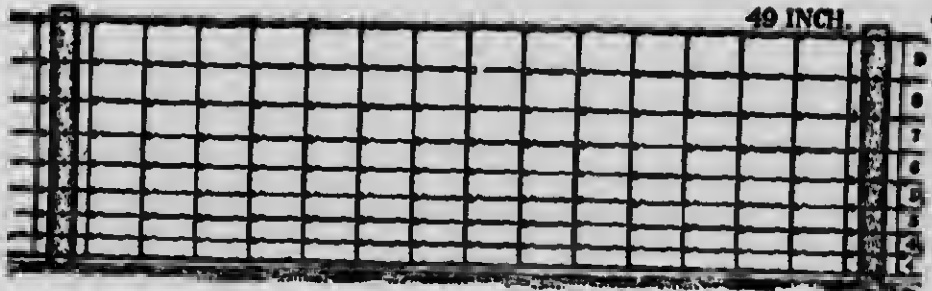
Cross Fences
Harbor
Weeds.

Sectional, or cross fences, should be dispensed with as far as possible, as the cost of erecting and maintaining these is considerable, and besides which, they are harbors for weeds. It is not necessary, even in a stock farm, to have more sectional fences than are shown on the accompanying diagram of a farm laid out for a four years' rotation of crops. This is the longest course advisable in order to maintain the fertility of the soil. In a three years' rotation, fewer sectional fences are required, and when

few animals are kept during the summer, all the inside or cross fences may be dispensed with, except those around the orchard, lawn or private grounds, and that enclosing a small field of permanent grass near the barn to be used for pasture and cutting for green feed. (See Ill. 18.)

PORTABLE FENCES.

There are many styles of portable wire fences offered for sale at the present time, several of which are cheap and efficient. A good portable fence which is being introduced in many sections of the country with entire

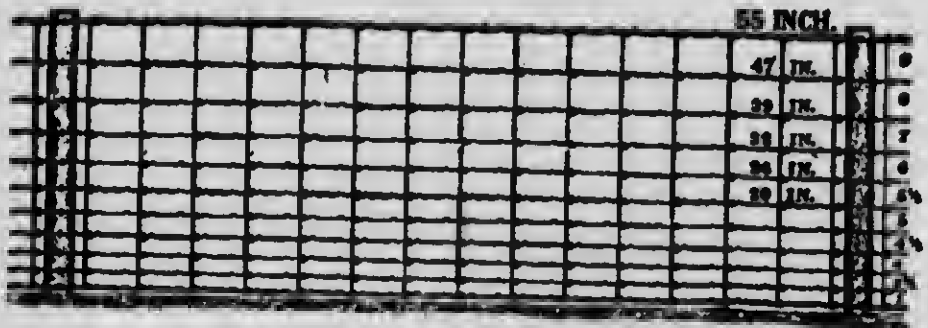


20. HORSE AND CATTLE FENCE.

satisfaction is constructed by using one of the many styles of woven wire fencing that are manufactured and sent out in rolls, each roll being from twenty to forty rods in length.

The posts to be used should be about four inches in diameter and seven feet long, sharpened at one end. Hard wood is preferable. Take them, with the wire, to the field in a cart or waggon, and with a round iron bar sharpened at one end, make a hole in the ground eighteen

or twenty inches deep, in line with the stakes set for the fence. Then take a post, and inserting the sharpened point, drive it down about two feet with a maul or sledge while standing on the waggon. Then drive the waggon to where the next post is required, say thirty feet and repeat the same operation. A few minutes' time is all that is required to set



21. HOG, CATTLE AND HORSE FENCE.

each post. When the posts are all set, unroll the woven wire, fasten it secure with staples to the end post and tighten with a stretcher used specially for this purpose (see Ill. 19) and fasten the woven wire to each post with staples. This completes the fence.

There are several styles of stretchers.

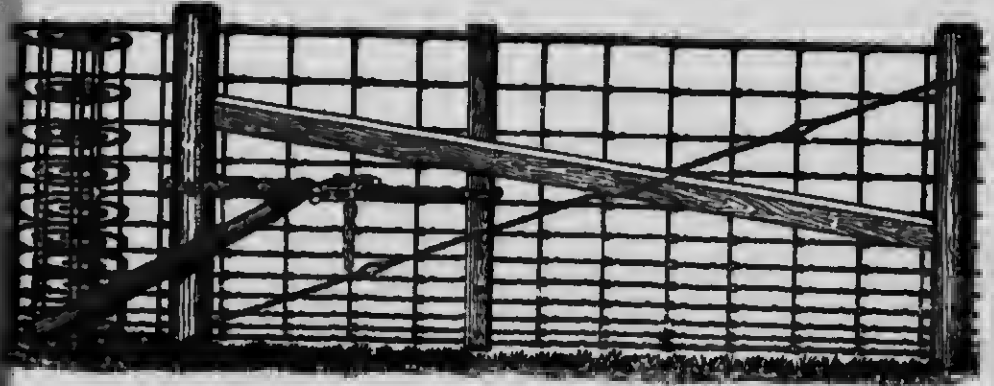
The cost of the woven wire is from forty to sixty cents per rod, according to the style used. The cost of posts about ten cents each, or say five cents per rod additional.

In removing a portable fence all that is required is to draw out the staples and roll up the wire. Commence to roll on a barrel and

the work is not then so liable to break the wire. After the wire has been rolled up, take out the posts and place all under cover for shelter. By doing this the posts will dry hard and become more durable, lasting for many years.

PERMANENT FENCES.

In the construction of permanent fences the durability of the posts is a very important matter. They should be of cedar about six



22. BRACING AND STRETCHING FENCE.

inches in diameter, set between three and four feet in the ground and extended about two inches above the top wire of the fence. They should either be rounded on the top or cut on a slant to run off the water, then painted with some mineral paint or cement wash. On ordinary level land the posts may be set from twenty to thirty feet apart. The next consideration is the style of fence. The woven wire appears to be the general favorite. As to

the construction, a design similar to the following will be satisfactory, provided the wire is of good quality: Number nine wire "*Coiled, spring steel, galvanized.*" A fence made of this material will expand and contract with heat and cold without getting out of shape, and will last for many years. For a suitable style of fence for horses and cattle (see Ill. 20), and for a hog, cattle and horse fence (see Ill. 21). To prevent hogs from raising the fence between posts, fasten a wire to a piece of wood about four



23. LONDON FENCE MACHINE.

inches in diameter and a foot long; bury this about twenty inches deep underneath the fence and fasten the wire that is attached to block to the bottom wire of fence. Place these at such distances as are found necessary. For bracing and stretching wire in the construction of woven wire fence (see Ill. 22).

On hilly land there is some difficulty in making a satisfactory fence with woven wire. This can be overcome to a certain extent by setting the posts closer. A more satisfactory

fence can be made by stretching the strands of wire independently and putting the upright stays on either by hand or with a machine made for the purpose. A satisfactory machine for this purpose is the "London Fence Machine" (shown in Ill. 23).

FARM GATES.

Both single and double farm gates are now supplied by the manufacturers of woven wire fences at a reasonable price; the frames are wrought iron and filled in with woven wire; they are both durable and ornamental.

SECTION VI

ROTATION OF CROPS.

To secure the best results from our farms certain principles must be adhered to in order that the fertility of the soil be not only retained but increased, and that at the least possible cost. In order to do this, one of the first steps to be taken is to adopt a system of rotation of crops which will be best suited to the circumstances. One must consider the location, the kind of soil, and the number and kind of animals to be provided for. In adopting a rotation it is essential that a crop of clover sod be plowed under every three or four years, in addition to the farm manure made on the farm, in order to restore the required amount of vegetable matter for the growth of cereal and other crops. It is not only necessary to fill the soil with animal and vegetable matter, but these must be made

Clover and
Manure.

available for plant food before the crops can derive any benefit from them. This is accomplished by thorough cultivation in warm weather; vegetable matter will not decompose when it is cold.

Mixed Farming.

Four Years' Course.

The following rotation is recommended for mixed farming, and was followed by the writer for a number of years upon his own farm, and during the six years as farm superintendent at the Ontario Agricultural College with such marked success. The course extends over four years. (See III. 18.) The farm proper is divided into four sections instead of many small fields as is customary throughout this country, and is cropped as follows: First and second years, Nos. one and two sections, grass, including hay and pasture. Third year, No. three section, hoe crops, viz., corn for silage, rape, turnips, potatoes, mangel wurzel, etc., the balance of the section in peas. Fourth year, No. four section, grain or cereal crops, say wheat, barley and oats, all of which should be seeded down with the following mixture: Red clover seed, seven pounds; Alsike clover seed, three pounds; Timothy, four pounds, per acre.

Variations in Rotation.

Plowing Sod.

In this four years' rotation, several variations may be made. If more grain is required, and less meadow and pasture, a portion of number two section may be plowed shallow after first year's grass, early in August, rolled and harrowed immediately. The harrowing should be done thoroughly, as it is by having a fine tilth on the surface that moisture is con-

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24. TWO FURROW GANG PLOW.

served in dry weather, and this is one of the essentials in rotting sod quickly.

Harrowing
Overlapping.

It is surprising how few people understand the mode of harrowing properly. When harrowing twice in a place they invariably return in the same track, instead of half lapping so that all land may be harrowed equally, which is desirable. The three essentials to decompose vegetable matter quickly and form humus, are *heat, air and moisture*. This is according to the teaching of science, and to put this into practice, we get the necessary heat by plowing about the end of July or beginning of August.

Shallow
Plowing

To let in the air, plow shallow, say four inches deep; the moisture is conserved in the sod by first compacting it with a heavy roller, thus drawing the moisture from below through capillary action; then harrowing prevents evaporation taking place. By this treatment, the sod will rot quickly, so that by cultivating, using the wide points and harrowing alternately until the fall, the land will be cleaned from weeds, and a large amount of plant food will be made available for fall wheat or spring grain. The following year, the whole of number two section, including the sod left from the previous year, and the stubble land, may be plowed with a two furrow gang plow (see Ill. 24) by adding a third horse for the sod. If the land is too dry and hard, use a single plow with wheel to regulate the depth. (See Ill. 11.) By keeping the humus on the surface there will be no difficulty after a few years in plowing the sod in the

Cultivate
and Harrow
Alternately.

Plowing in
Summer.

summer, as humus will not get hard. To hasten decomposition as described above, immediately after plowing, have the ground rolled and harrowed.

Early fall is the best time to clean the land of weeds and weed seeds for the following season's hoe crop, and with proper implements, while there is no crop on the ground, the work of fall cultivation can be done thoroughly. What is required is to keep the broad share cultivator and harrows going alternately at short intervals until October, when the land should be in fine tilth, and free from weeds and weed seeds that may have been near the surface.

Fall
Cultivation.

Cleaning
Land.

All the farm manure that is on hand should be spread on the surface at the rate of about fifteen two-horse waggon loads per acre, and covered by ribbing the land with the attachment on the cultivator frame (refer to ribbing attachment), making the ribs about twenty inches wide. This puts the farm manure in the centre of the ribs which prevents it from leaching and being lost. The decomposed vegetable matter acts as an absorbent, and prevents the liquid manure and ammonia from escaping. The furrows tend to drain the land and allow the frost to act on the subsoil. The ribs referred to can also be made with an ordinary plow, but not so perfectly. By running the ribs north and south the land will dry several days sooner in spring. Do not neglect cross furrows, where ever necessary to carry off surface water.

Drilling in
Manure.

If there is only sufficient manure on hand

**Winter
Manuring.****Manuring
Rolling
Land.****Manuring
for Peas.****Preparation
for Field
Roots.**

for a portion of this section, it is advisable to leave the balance on the level without being ribbed, so that it can be manured on the surface during the winter months; if the land were ribbed, the manure would fall into the furrows and be washed away. In spreading manure, about double the quantity should be put on the knolls or small hills, as a certain portion will leach to the lower land. On high, rolling land, it is advisable in order to prevent waste, to manure and rib in the fall, so that all the liquid in the manure will be absorbed in the rotted sod contained in the ribs. This completes the fall work on section number two, which is to be followed with the hoe crop in section number three. (See Ill. 18.) After making due allowance for the hoe crops, including corn, rape, turnips, potatoes, mangel wurzels, etc., in this section, the balance is sown with peas, the highest portion of the section preferred as it is usually followed with fall wheat. Supposing this sod land was thoroughly cultivated the previous autumn and manured during the winter with coarse stable manure (coarse manure is preferable for peas), before sowing the peas, the beginning of May, plow the coarse manure under with the two furrow plow about four inches deep. This keeps the soil dry and warm which is a very desirable condition for peas.

The portion of the land intended for mangel wurzels, sugar beets and carrots should be prepared by thorough cultivation, manuring

and ribbing according to the above directions so that the soil will be in good condition for early cultivation in the spring. which is desirable for growing these root crops successfully. It is important that the seeds be sown early in the spring, say the end of April or early in May.

Farm manure should be applied previous to the hoe crop, as it promotes a rank growth which is desirable for fodder, corn and roots, but not so in the case of grain crops. The second year after manuring is preferable for a good crop of grain.

Manure
Hoe Crop.

For peas, plow the farm manure under shallow, then harrow the land thoroughly to get a fine tilth. When this is completed sow the peas; this is best done with an ordinary grain drill (see Ill. 10) which will plant the seeds at a uniform depth and so ensure the plants making an equal start. If the seeds are not planted at a strictly uniform depth the crop returns become a question of the survival of the fittest, the rank luxuriant plants choking out the others. As to the depth to plant peas, in fact all seeds, a good rule to follow is *plant four or five times the depth of the diameter of the seed.*

Drilling
Peas.

The quantity sown per acre is from two to three and a half bushels, according to the size of the grain. As peas do not stool from the root like other grain they require to be sown thicker.

Quantity
per Acre.

The time to harvest peas is before they are quite ripe, as the straw of peas is of exceptional

Harvesting
Peas.



25. TOLTON PEA HARVESTER.

value, rating next to clover hay which is the highest in nutritive value among fodder crops. The most satisfactory implement for harvesting peas is the Tolton pea harvester with bunching attachment. It can be attached to any mowing machine. (See Ill. 25.) It is advisable to draw the peas into the barn soon after being cut, say within one or two days. A shower of rain will very materially injure the feeding value of the straw, long exposure to the sun will injure the straw by making it brittle and unfit for fodder.

Peas may be successfully threshed with the ordinary threshing machine by placing pulleys on each end of the cylinder shaft, double the circumference of those ordinarily used. This will run the cylinder at half speed, while the other machinery is run at full speed. Take all the spikes out of the concave except four.

Threshing
Peas.

In view of the prevalence of the pea-bug, many farmers have given up trying to grow this valuable crop. In sections of the country where the pea-bug prevails the seed should be treated with carbon bisulphide so as to destroy the bugs. This should be done early in the fall while the insects are in the embryo (germ) state, and before they have materially injured the pea. The method of treatment is to use an air tight box that will hold say ten or twenty bushels. Fill the box with peas and set a dish, on top of the peas, containing one pound of carbon bisulphide, which is sufficient to treat fifteen bushels. Close the lid, making it as near

Destroy the
Pea Bug.

air tight as possible, and leave for three days. By this time the carbon will have evaporated and penetrated all the peas in the box and destroyed every germ of insect life without the slightest injury to the peas. If all the farmers in a neighborhood would unite and treat their peas, it would not be necessary to repeat this every year.

Cultivation
After
Pea Crop.

As soon as the peas are taken off the land, it should be plowed about four inches deep with the two furrow plow. This will turn the coarse manure on top that was plowed under before sowing the peas. After plowing, roll and harrow immediately, then cultivate and harrow alternately until it is time to sow the fall wheat; the rotted sod, good farm manure and pea stubble supply the nitrogen and other elements necessary for the healthy growth of a crop of fall wheat or any other grain.

Preparing
for Fall
Wheat.

Before sowing fall wheat, the land should be subsoiled as deep as possible with four horses (see Ill. 13) unless the subsoil is sand, or of a porous nature. Harrow and roll the ground before the grain is drilled. If there has been a heavy rain it will not be necessary to roll.

Time to
Sow Fall
Wheat.

For Central and Northern Ontario the time to sow fall wheat is the end of August or beginning of September, and in Southern Ontario, from the tenth to the fifteenth of September.

Quantity
per Acre.

Sow fall wheat with the grain drill at the rate of one and a quarter bushels per acre, using only good, clean and thoroughly matured seed.

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26. SELF BINDER.

Should there be any indication of smut the wheat should be treated with formalin.

**How to
Destroy
Smut Germs.**

A simple and effectual method is to make a solution in the proportion of half a pint of formalin to ten gallons of water. This is sufficient for twenty-five or thirty bushels of wheat. Having prepared the necessary amount of solution, spread the wheat on the floor and sprinkle the formalin solution over it with a watering can; the wheat should be shovelled over while being sprinkled so that every grain will receive a portion of the solution. After sprinkling, dust the wheat over with slacked lime to dry it so that it can be sown with the grain drill. Do not put the grain into bags many hours before sowing, as this will cause it to heat and seriously injure its vitality. Every germ of smut must be destroyed, otherwise it will develop and produce smut the following year.

**How Smut
Spores Feed.**

Botanists inform us that the spores cling to the kernel, and when it germinates the spores feed on the plant, finishing with the grain, so that the kernels become smut instead of wheat. The same principle holds good with oats and barley.

**Sow a
Productive
Grain.**

While it is important to have the soil and other conditions as favorable as possible, the best results cannot be obtained unless a variety of grain is sown that will give the largest yield per acre, and that of the best quality. It makes all the difference between profit and loss that a productive variety is sown.

**Varieties of
Fall Wheat.**

Fall wheat, like all other grain, has its day. Every farmer who has had experience in the

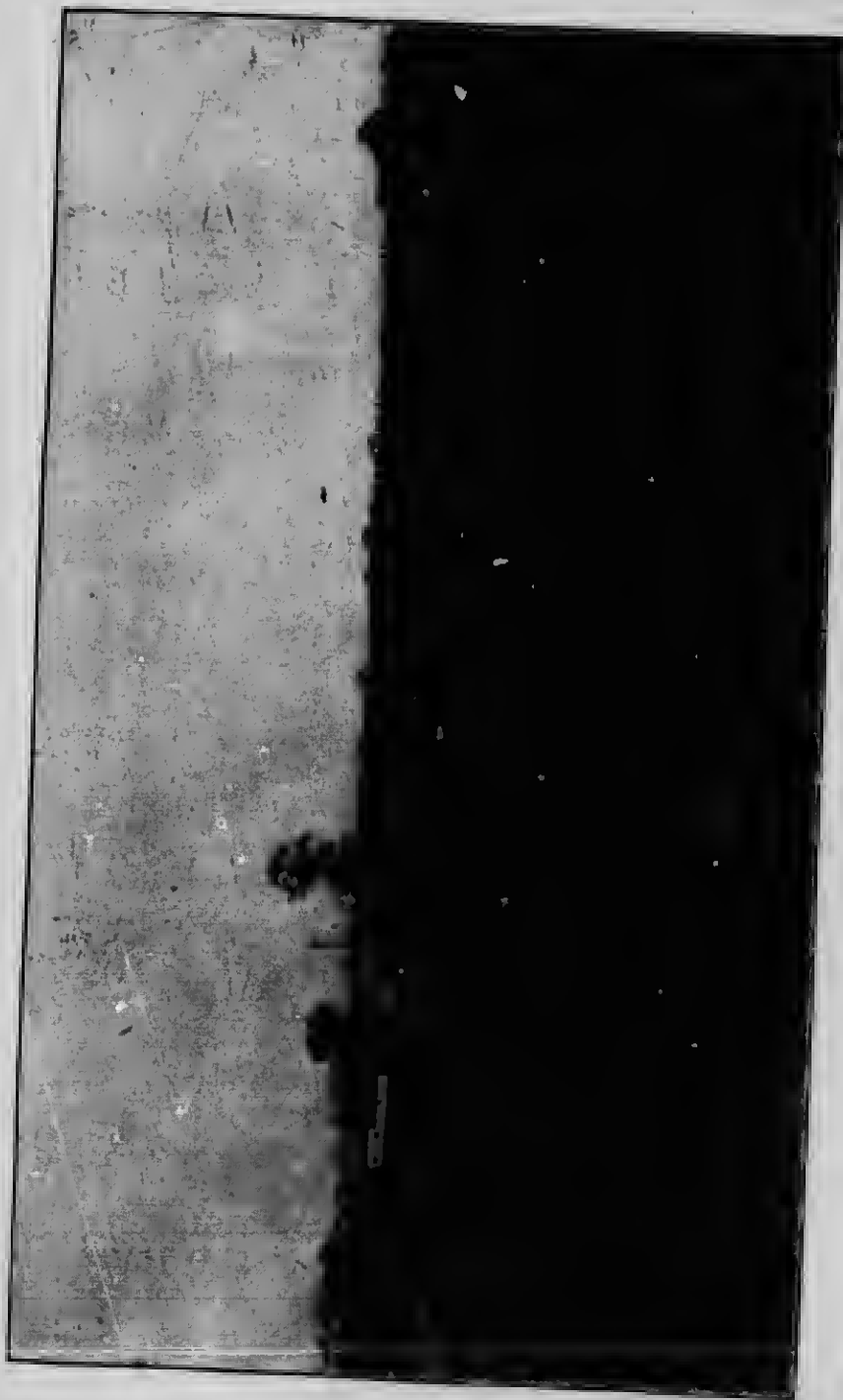
growing of fall wheat will remember varieties which excelled all others for a few years then had to give place to something new, through hybridizing (frequently self-hybridized). No doubt grain would not depreciate so rapidly if only the best grains were sown each year. Among the leading varieties at present is Dawson's Golden Chaff, a white variety that has been a favorite with the farmers for many years on account of its productiveness. There are also several amber colored varieties that are close rivals in yield and which are said to make a superior quality of flour. It is well, then, to note, that in order to obtain the best results, the land must be in good condition and the grain sown must be carefully selected for productiveness and milling qualities.

Hybridizing
Grain.

Fall wheat should be cut when the grain is in the firm dough state; according to analysis, this gives the best quality of flour. With the improved harvesting machinery of the present time there is no excuse for allowing the grain to get over-ripe. The only harvester; or harvesting machine of sixty years ago was the sickle. After this came the scythe with the bow, then the grain cradle. This was followed by a very crude style of reaping machine. Several inventions followed, all of which a man had to put the grain off the platform with a fork or rake. The next advance or improvement was the self-raker, followed by the Marsh harvester, on which two men rode and bound the grain as it was elevated. To-day we have the wide cut

Harvesting
Fall Wheat.

Improvements in
Harvesting.



27. OATS IN LONG SHOCKS.

self-binder complete (see Ill. 26) a machine that will cut and bind the heaviest crop of grain, and do the work in the most perfect manner.

In setting up sheaves to dry, the long shock or stook, is preferable. (See Ill. 27.) The sheaves are set up firmly in pairs, ten or twelve in a shock, it should stand with ends north and south, so that both sides will be exposed equally to the sun. There is little gained by placing on the sheaves what are known as cap-sheaves, except on a round shock, for if the centre of the latter gets wet with rain it is difficult to dry out. Wheat should stand a week in the field after being cut, so that it may dry out thoroughly and the grain become hard.

Shocking in
the Field.

Shocking
Grain.

It has been pointed out above that great progress has been made towards perfecting harvesting machinery; an equal advance has been made in threshing machines. In the early history of this country all the grain was threshed with the flail, or trod out by oxen or horses on a floor. In the writer's younger days he has threshed all winter with the flail, from the time it froze up in the fall until seed time the following spring. The first thing we had in the shape of a threshing machine was simply a cylinder set in a frame, with beaters instead of spikes. The grain had to be separated from the straw and chaff by hand. After this there was a succession of improvements, until now we have the self-feeding thresher and separator, that will thresh and clean ready for market, and do the work as fast as two men can fork the sheaves into it. (See Ill. 28.)

Threshing
Machines.



28. MODERN THRESHING MACHINE.

SECTION VII.

SPRING CULTIVATION FOR ROOTS.

Sod land, that has been plowed shallow in the early autumn and thoroughly prepared according to previous directions, also manured and ribbed, is in the most desirable condition for a root crop, especially mangels, sugar beets and carrots, that require to be sown as early in the spring as the soil is sufficiently dry and in fine tilth. The first operation in spring, is the levelling of the ribs by harrowing and cultivating. If the soil is of a sandy nature and porous, five or six inches will be sufficiently deep to cultivate, but clay soil should be loosened ten inches deep with either the subsoil plow (Ill. 1) or the four horse subsoiler (Ill. 13), cultivating both ways (crossways) to loosen the subsoil, so that all rain water will percolate into the subsoil and allow the air free access into the soil to warm it and assist the bacteria to act on the vegetable matter and make it available for plant food. Another object in loosening clay soils is to allow the rootlets of deep rooted plants free access to feed on the mineral matter contained in the subsoil. When these roots are fed on the farm the quality of the farm yard manure is improved very materially, for growing succeeding crops.

Shallow
Plowing.

Subsoil
Clay Land.

After subsoiling, harrow and cultivate shallow until there is a fine tilth, then roll if dry. While good results are produced from sowing on the level, still, the writer prefers shallow

**Shallow
Drills.**

drills, which are made with a double mould board drill plow with marker (see Ill. 16) so that the drills are of equal width. This is an advantage for horse hoeing. Drills for all root crops, including potatoes can be made with two or three ribbers attached to the frame of a cultivator, this makes a great saving in labor.



29. CULTIVATOR FRAME WITH RIBBERS.

One difficulty found in using the ribbing attachment for making drills for hoe crops is keeping them straight and even, which is important to the proper regulation of the horse hoe (scuffler). (Ill. 34). This may be overcome by using long straps from horses to the point of pole, so that the pole is carried by a castor wheel, and instead of the horses guiding the

drillers, they are kept in place by the use of a lever. (See Ill. 29).

In making the drills, have the mould boards set wide, so that the furrows will meet at the top without going deep, as the composition of the drills should mainly be rotted sod and farm manure, which makes a complete fertilizer for growing roots and corn. The drills for mangel wurzels and other field roots should be twenty-eight or thirty inches wide.

Making
Drills.

The seed should be sown with a horse turnip drill, as it is commonly called. (See Ill. 30). This machine sows two drills at a time; it has concave rollers, so that it is adjustable to any width of drill. This is the drill generally used in this country, but can be greatly improved by having two stationary cannisters with revolving shafts, on which are attached brushes to force the seeds out of the holes, which can be adjusted for the different kinds and sizes of seeds to be sown.

The quantity of mangel wurzel and sugar beet seed advisable to sow is four pounds per acre. Less seed will do, but in order that there should be no blank spaces, it is better to sow plenty of seed. With carrots, three pounds per acre is quite sufficient. These and the mangel wurzels should be sown the end of April or as early in May as the land can be got in proper condition.

Quantity of
Seed per
Acre.

As soon as the drills become dry after sowing, roll them with a heavy land roller. This will assist capillary action, so that the moisture from

Cultivation
after Sowing.

Pulverize
the Surface.

below will rise to the surface; to prevent evaporation the surface must be loosened. A very satisfactory implement for this work is the "Breed's Weeder," which will cover two drills. It is advisable to take out the two teeth which come in the centre of each drill, so that the seed will not be disturbed. There are several advantages to be gained by keeping the surface loosened even before the plants appear



30. HORSE SEED DRILL.

Soluble
Plant Food.

above the ground. It lets the air into the soil and conserves moisture. It also assists the bacteria to act on the humus and make it available for plant food, so that as soon as the plants commence to grow, they are provided with a full supply of soluble food.

Thinning
Mangel
Wurzels.

Commence thinning mangel wurzels when the plants are from one inch to one-and-a-half inches high, leaving the plants about twelve

inches apart in the row. It is scarcely ever necessary to stoop and use the fingers. The work can be done with the hoe that is made for the purpose. (See Ill. 31). This hoe should be kept quite sharp, and square at the corners. The operator walks at the side of the drill, and draws the soil on the near side, and pushes the soil at the far side, and with the corner of the hoe cuts out unnecessary plants, leaving only one plant in a place. A man who understands how to do this work properly will hoe and leave in good shape from half an acre to one acre per



31. TURNIP HOE.

day. Carrots take more time, as they require to be left closer—not more than eight to ten inches apart. The Breed's Weeder is the only implement required until the plants are from two to three inches high; then the "Horse Hoe" (Ill. 32) should be used frequently during the growing season. On no account should a crust be allowed to form on the surface. All root crops should be cultivated on the level; even potatoes should not be hilled up when growing, as this throws the rain water from the plants.

Thinning
Carrots.

The Mammoth Long Red variety of mangel wurzel, as a rule, is the heaviest cropper. The Giant Yellow Intermediate is a close rival. These will average, under favorable conditions,

Varieties
of Mangel
Wurzel.



32. HORSE NOE OR SCUPPLER.

a yield of thirty tons per acre. It is generally supposed that the yellow mangels are the most nutritious, but, according to analysis, there is very little difference; the sugar mangel is the richest of all. One objection to the long red is that when harvesting and putting in the cellar, many of them are broken, which injures their keeping qualities. The broken or bruised roots should be fed first.

The best variety of sugar beet for farm purposes is the Giant variety. It is a heavy cropper, one which will average, under favorable conditions, between twenty-five and thirty tons per acre. It stands well out of the ground, so that it is easily harvested. Sugar beets are more nutritious than any other field root, and will keep longer.

**Sugar
Beets.**

In Central and Northern Ontario the time to harvest mangel wurzels and sugar beets is from the 15th to the 25th of October.

**Time to
Harvest.**

When pulling, it is preferable to twist the tops off by hand, as when topped with a knife they are more liable to decay. For convenience in loading into the waggon, throw four drills into one row. Providing there is no danger of frost, allow them to remain on the ground for twenty-four hours after being pulled and topped, as this will improve them. If there is any indication of frost, they should be either housed or covered every night, as three or four degrees of frost will injure mangel wurzels and sugar beets after they are pulled.

**Pulling and
Topping
Mangels.**

When putting roots into a cellar, it is ad-

**Storing
Roots.**

visible to run them over a slatted chute, so as to riddle out the earth. No tops should remain on the roots, as they will soon decay and injure the roots. Where the roots drop into the cellar they are liable to heat, unless an opening is made, funnel shaped, nearly to the bottom. There are two important matters in connection with the successful storing of roots. The first is to keep them sufficiently cool; the second, to prevent them from freezing. To accomplish this, stone basements underneath barns should be sheeted and battened on the inside of stone wall, and also sheeted overhead or under the upper floor.

**Making
Cellar
Frost Proof.****Ventilating
Cellar.**

The principle of ventilation in a root cellar is the same as that required to cause a draught in a stove. The openings above are useless without small openings below, similar to a damper in the front of a stove. In a root cellar a number of small drain tiles can be put in the bottom of wall next to cattle stable, and near to the top of same wall have large openings, which should remain open all winter. The outside windows should be kept open every day until the winter sets in—say until the beginning of December. About the 25th of December it will be necessary to bank up the windows with stable manure to keep out the frost.

**Pitting
Roots.****Making a
Pit.**

Where there is not sufficient cellar room, the balance of the roots may be pitted successfully.

Mark out a long pit of the required length and about six feet wide, and excavate three or four inches. The earth should be laid along the

sides. Dumping carts are more convenient than waggons for unloading roots into pits.

Build the roots up to a point four or five feet high (see Ill. 33), then cover with straw about three inches and with earth six inches. This covering is sufficient until the end of November, then re-cover with an addition of three inches of straw and twelve inches of earth. In order to get sufficient mould, it is advisable to plow around the pits a number of furrows not exceed-

Covering
the Pit.



33. ROOT PIT.

ing nine inches in depth, as the surface soil, which is composed of vegetable matter, is more impervious to frost than clay. To make provision against excessive frost, it is advisable to cover the pit, the last of December, with stable manure to the depth of about ten inches.

To ventilate a pit, set three-inch drain tiles on top, with one end resting on the roots; place about eight feet apart near the bottom of the pit, two-inch tiles, so as to cause a draught. Fill the tiles with straw in December.

Ventilating
Pit.

For field culture, the White Intermediate

Variety of Carrots.

carrot is unquestionably the most profitable variety for the farmer to grow for feeding purposes. The nutritive value is equal to any of the white varieties, and it is much more easily harvested than the others. For yield it takes the lead. Under favorable circumstances this carrot will yield from twenty-five to thirty tons per acre.

Yield per Acre.**Cultivation of Carrots.****Harvesting Carrots.**

The cultivation of carrots is similar to mangel wurzels and sugar beets, with the exception of thinning. The carrot plants should be from eight to ten inches apart in the row. The time to harvest is in the last week of October. In harvesting, the tops can be readily taken off with an ordinary hoe, while the roots are still in the ground. Then, with an iron plow without the mould board, or a subsoil plow (see Ill. 1), the roots can be turned out. The plow should be run only sufficiently deep that the share will cut the points off the roots. This work may be done first and topping done afterwards with a knife. A very little frost will injure them after being pulled, so that it will be necessary to cover them at night if there is any danger of frost.

Carrots are grown chiefly for feeding to horses and milch cows. The Danish sugar beet is taking the place of the white carrot, on account of the saving in labor in hand-hoeing and thinning. Horses are as fond of sugar beets as carrots, and the sugar beet is quite as nutritious. The same method of keeping mangel wurzels and sugar beets during the winter is required for the keeping of carrots.

There are many varieties of the Swede turnips offered at the present time. These have been improved from the original "Skirving"—a work which is carried on extensively by growers of seeds. The type of a root is fixed by growing seed from a certain type for a number of years. It would be difficult to say which, for all purposes, is the leading swede at the present time. While some of the newer varieties are large and smooth, their quality for table use may not be equal to that of some others. As a rule, the bronze top varieties are superior to the purple top for table use. In some sections of the country the practice of growing swede turnips for export to the United States for table use has become quite an extensive business. The wisdom of doing this is another matter, for, aside from the ready cash derived, we must consider the fact that it takes double the *nutriment* from the soil to produce a crop of turnips than it does for a grain crop.

Swede
Turnips.

Improving
Swedes.

Again, the farmer should consider the great loss of fertility to the soil by selling and shipping the whole product, instead of feeding it on the farm, and returning it again to the soil, as only a small percentage is retained by the animals for the production of beef or milk.

Feed
Turnips on
Farm.

In preparing soil the previous fall for swede turnips, while it is preferable to have the land manured and ribbed, it is not so important, as turnips do not require to be sown as early as mangel wurzels, sugar beets, and carrots. It is advisable to have swedes follow a clover sod

Turnip
Culture.

**Preparing
Soil.**

which has been thoroughly decomposed, and which has been manured in the fall or during the winter with about fifteen waggon loads of farm manure per acre, thoroughly incorporated with the surface soil. Before making the drills, if the subsoil is clay, it should be loosened as deep as possible, using a four-horse subsoiler. (Ill. 13.)

In order to do the work thoroughly, it is advisable to first set the subsoiler eight inches deep, then across about two inches deeper; this method is most thorough.

The next proceeding is to harrow and roll the land before making the drills, which are made the same as for mangel wurzels—shallow and twenty-eight or thirty inches wide.

**Time to
Sow Swedes.**

The time to sow swedes is from the fifteenth to the twenty-fifth of June. If sown earlier they are liable to be more woody and are subject to the turnip louse (*Aphis*).

**Quantity of
Seed per
Acre.**

The quantity of seed necessary is from two to three pounds per acre, and is best sown with the ordinary turnip horse-drill. (See Ill. 30.)

**Conserving
Moisture.**

In twenty-four hours, if the drills are dry, roll them down with a heavy land roller, so as to hasten capillary action; and, as with mangel wurzels, pulverize the surface to conserve the moisture. If the surface is kept pulverized with a Breed's Weeder, there will be no difficulty in getting a catch, even if there is no rain.

Thin the same as mangels, with a turnip hoe. This work should be done early, while the plants are in the second rough leaf. To secure best

results, level and thorough cultivation should be continued during the growing season.

There are many varieties of fall turnips, and while their nutritive value is not equal to the swede, yet they have certain qualifications that recommend them. Some being more rapid growers can be sown later, as a catch crop, after a crop of early potatoes or clover sod. The last of June or the first part of July is not too late for some of these. They should be sown in shallow drills, and cultivated and harvested in the same manner as swedes, for early feeding.

**Fall
Turnips.**

Some farmers prefer to sow these on the level, using an ordinary grain drill, each alternate spout being stopped. They then feed them off on the land in the fall. Sheep and young cattle thrive well on this succulent food, and it will be found particularly advantageous when pasture is dry or scanty; this soiling crop gives stock a good start for the winter.

Among ordinary turnips the most suitable varieties are the Yellow Aberdeen, Greystone and the ordinary white.

In Northern Ontario the time to harvest swedes is the last days of October. The first week in November answers in Central Ontario. There are various methods of doing the work. Where help is plentiful, the old method of pulling and topping by hand, throwing the roots of four drills into one row for convenience in loading into the waggon, is preferable. In many cases, however, other methods have to be adopted in order to save hand labor. One of these is to

**Time to
Harvest
Swedes.**

**How to
Harvest.**

top the turnips with an ordinary hoe, and drag them out of the ground with the harrows, by harrowing across the drills, letting the harrows half lap if necessary. This method answers well in sandy soil, but in clay soil the turnips are considerably injured in the process, and, as a rule, there is more earth clinging to the roots than is desirable.

Another method is to top with the hoe and cut off the roots with an iron plow without the mould board and having the wing of share wide and sharp to cut off the tap roots.

Still another method, and one generally followed in many sections of the country, is to use a heavy hoe or mattock both to top and to root.

Turnips should be left on the ground for a day or more after being pulled, as they are not so easily injured by frost as other roots. Indeed, it has been found that three or four degrees of frost rather improves their keeping qualities.

Storing
Swedes for
Winter.

The same directions for storing mangel wurzel both in cellar and pits, hold in the storing of turnips for the winter.

SECTION VIII.

HOW TO GROW ROOTS FOR EXHIBITION.

It may be interesting to many, especially young people, to know how to grow monstrous roots for exhibition purposes. It is like feeding and preparing animals to win prizes, which is, of course, more for glory than profit. However, it is interesting to demonstrate that a mangel

wurzel seed planted, say, on the 10th of April, will, by the 10th of October, with proper care and surroundings, develop into a root weighing over sixty pounds (a bushel), developed from one small seed in six months.

The first thing to be done in the preparation of the soil is to thoroughly underdrain it. Then, in the autumn, open out with a plow where the drills are to be made. In this case the drills should be made five feet apart. This will require two rounds—that is, four furrows—with the plow for each drill. Then loosen the subsoil with a subsoil plow, after which scatter over a portion of the compost prepared several months previous. When making up the drills incorporate the compost thoroughly with the soil, and, after the drills are finished, spread a covering of the compost over the whole surface to remain as a mulching.

Making
Drills.

The compost heap should be made of the following mixture:—Well-rotted farm manure mixed with that from pigs, sheep and poultry. The latter is superior to the others. Decomposed night soil, if obtainable, may be added. Incorporate with this considerable old sod and bone dust. Each time the compost is turned over (which should be every two or three weeks), scatter over a considerable quantity of gypsum to prevent the ammonia from escaping.

Compost
Heap.

The seed should be sown early in April. On the drills, at intervals of three feet, sow five or six seeds. After the plants have grown one or two inches, thin out to three plants, and event-

Distance
Apart.

ually to the one most vigorous. Follow the above plan for mangel wurzel and sugar beets; carrots and parsnips should be sown two feet apart. Turnips should be sown early in the month of May, and afterwards thinned as indicated above.

**Cultivation
for
Mammoth
Roots.**

Subsoil between the drills as deep as possible, and sow salt over the whole surface, then cover with a heavy coat of farmyard manure, to act as mulching to retain moisture. Loosen the soil frequently during the whole season, and on no account allow a crust to form on the surface. In growing mammoth roots and vegetables for exhibiting, much valuable knowledge may be gained by the grower.

SECTION IX.

CULTIVATION FOR POTATOES.

The most suitable soil for potatoes is a thoroughly rotted clover sod, which is prepared by plowing shallow in the autumn, then rolling, harrowing and cultivating alternately until October. Then cover with well-rotted farmyard manure, and rib as in the preparation for mangel wurzels. In the spring the cultivation must be thorough. If the soil is a clay, it should be subsoiled as deep as possible to let in the air, warm the soil, and assist in the decomposition of vegetable matter.

**Drilling
Potatoes.**

The drills are opened out with a drill plow, with marker thirty inches wide (see Ill. 16), or with ribbers attached to the frame of a cultivator. (See Ill. 29.) The drills should be made

from four to five inches deep. Plant medium-sized potatoes, cut in sets, with from two to three eyes in each. Drop the sets in the drills, twelve inches apart. Then cover with the same plow, and after ten days harrow down nearly level and smooth with a "Breed Weeder." The "weeder" should be used freely at this stage, and even after the potatoes have made some considerable growth. Use the horse hoe frequently during the growing season. The cultivation should be on the level, and on no account must the potatoes be banked up. The last time the work is done, the teeth of the scuffer may be changed so as to throw the earth towards the potatoes, and thus prevent their being sunburnt.

Potato
Sets.

Horse
Hoeing
Potatoes.

While there are machines for cutting seed potatoes, and some of them do the work fairly successfully, the ordinary farmer is content to cut the sets by hand. To do this work properly, cut off the stem end of the potato first. This will invariably have one or two eyes. Then revolve the potato in one hand and cut with the other, so as to leave two or three eyes in each set. Split the seed end. By experiment, this has been found to give the best all-round results.

How to Cut
Potato Sets.

The time to plant early potatoes depends largely upon circumstances. If wanted for the early market, it is necessary to have the land thoroughly prepared the previous fall. Plant about the middle of April. The soil being cold so early in the season, in addition to deep subsoiling, lime may be used to advantage in warm-

When to
Plant Early
Potatoes.

ing it, so as to make the plant food available. In all cases it is advisable to plant early varieties early in the spring, so that they will be matured before the hot dry weather and in good time for the early market.

**When to
Plant Late
Potatoes.**

It is better not to plant late varieties until the end of May, in order that they will keep on growing during the hot weather, and be ready to harvest by the 10th of October.

**Varieties to
Plant.**

To recommend, from the long list grown at the present time, the best variety to plant, is a difficult task and an unsatisfactory one, more especially as potatoes run out so quickly, and those varieties which are so popular at the present time may, in a few years, be far behind some other varieties now unknown.

Early.

The "Early Rose" may be considered an exception, for, whereas this variety held first place for many years, it is to-day a close rival for first place as an early potato. The "Early Market" and "Early Ohio" are among the first of extra early varieties, and "Rose of the North" for second early.

Late.

Among the late varieties the "Empire State" stands among the first.

**Harvesting
Potatoes.**

There are many kinds of implements used in harvesting potatoes, ranging from the spading fork to the expensive combined digger and picker. The common plow, however, is generally used, although the Dennis potato digger (see Ill. 34) is a decided improvement, as with it the potatoes are nearly all spread on the surface, ready to be picked up. The potato-digging

attachment for the drill plow (see Ill. 16) works satisfactorily.

Potatoes will keep much better during the winter if, after digging, they are pitted in the field for ten days, that they may sweat. Cover the pit with straw and a light covering of earth.

Pitting
Potatoes.



34. DENNIS POTATO DIGGER.

The straw prevents the earth from mixing with the potatoes.

Store for the winter, and ventilate according to the directions given for mangel wurzels. Potatoes stored in pits are usually firmer, and of better quality in the spring than those stored in cellars.

Storing.

SECTION X.

RAPE.

"Dwarf Essex" rape is a succulent fodder plant that should be cultivated more extensively in this country than it is, as it grows luxuriantly, and is of great value as a fodder. An ordinary crop will yield over twenty tons per acre of a most nutritious food. By sowing, say, half an acre or more early in May, it will be ready in July for the lambs at weaning time, and also for

young growing pigs. It can either be fed on the land or carted to the stables.

When to Sow.

The general crop should be sown from the 20th of June to the 1st of July. The same preparation of the soil is required as that necessary for a root crop. Rape grows to the greatest perfection when sown in drills the same as turnips. The drills should be twenty-five inches wide. Two pounds of seed per acre is sufficient.

Cultivation.

The cultivation is similar to that of turnips, excepting that hand-hoeing is not necessary. Rape can be grown successfully as a catch crop after early potatoes or grain are harvested.

Feeding - Rape.

All animals do well when fed a daily ration of rape during the fall. Milch cows may be fed a limited quantity at noon each day, until January 1st, without injury to the milk. In order to keep rape for early winter feeding, it should be cut about the 20th of November with an ordinary scythe, and forked into heaps and carted into the stable as required. When frozen, leave it in the stable to thaw out before feeding.

Rape for Early Winter.

SECTION XI.

PREPARATION FOR CORN.

In the preparation of land for corn, we must take into consideration that this plant is, to a certain extent, semi-tropical, and is better adapted to a warmer climate than ours. However, by preparing the soil with a view to keeping it warm during the growing season, we may expect good results. In the first place, the land, a well-rotted clover sod, must be either naturally

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SCUFFLING CORN AT THE ONTARIO EXPERIMENTAL FARM.

or artificially drained, and thoroughly cultivated and manured the preceding fall, and ribbed the same as for roots. If the land is manured in the winter, it will be necessary first, in the spring, to gang-plow it shallow, say three or four inches deep, so as to incorporate the manure with the surface soil. Then harrow and cultivate thoroughly, and before sowing, if a clay subsoil, loosen as deep as possible not less than ten inches deep, then harrow and cultivate alternately until the land is in fine tilth.

Time to
Sow Corn.

In Central and North Ontario, as a rule, the best results are obtained by sowing silage corn about the 24th of May.

Varieties to
Sow.

There are many varieties to choose from when making a selection. Every farmer will have to be governed according to soil and locality. In Southern Ontario a later and larger variety can be grown than could be further north. It is useless to grow a variety for silage which will not be in a firm, dough state by the 15th or 20th of September. The "flint" varieties are invariably earlier than the "dents." For Northern Ontario I would name "North Dakota" and "Compton's Early," both of which are flint varieties. The former is white and the latter yellow. From the roots of these (and many other flint varieties) grow up a number of shoots, which makes the harvesting more difficult when done by hand than when dent varieties are used. For Central Ontario larger and heavier yielding varieties may be grown, viz.: "Wisconsin Earliest White Dent"

Corn for
Northern
Ontario.

Corn for
Central
Ontario.

and "White Cap Yellow Dent." These are both dent varieties, and do not throw up any shoots. Under favorable circumstances they will yield twenty tons per acre, one-fifth of which will be ears. While the bulk yield of the flint varieties named is rather less in the total than the dent varieties, the proportion of ears is about the same.

For cutting and feeding green, the sweet varieties are considered preferable. "Mammoth Sweet" is one of the heaviest yielders, and is of fair quality.

Soiling
Corn.



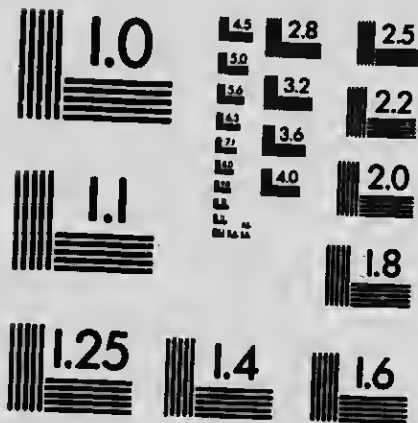
35. HAND CORN PLANTER.

There are several methods of sowing or planting corn, each of which has advantages under certain conditions. If the land has not been thoroughly cleaned of weeds and weed seeds the previous fall, it is necessary to plant in hills, so that the land can be cultivated both ways. This can be done by the use, first, of a corn marker, marking both ways. Drop four or five grains in each cross, either by hand or with a hand planter. (See Ill. 35.) The American check row planter is expensive, but does the

Planting.



(ANSI and ISO TEST CHART No. 2)



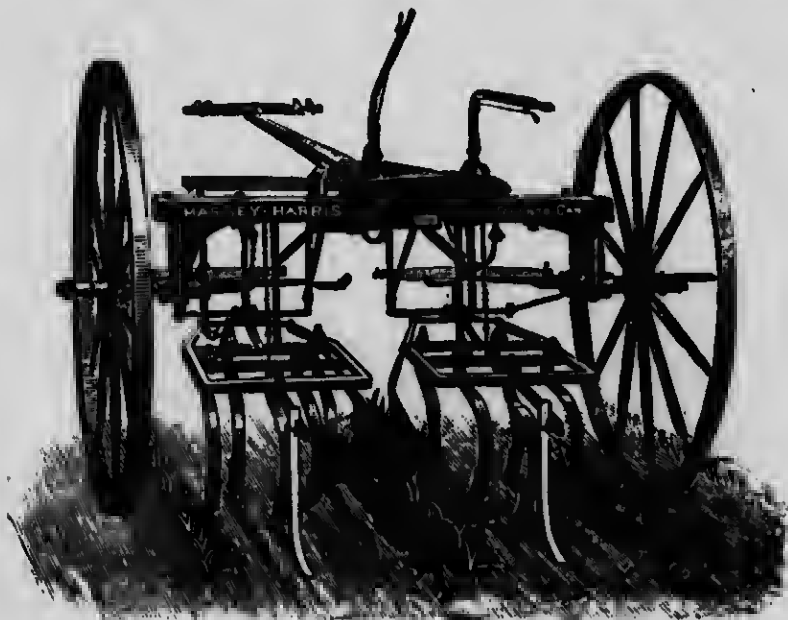
APPLIED IMAGE Inc

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work satisfactorily. When planting in hills forty inches apart, about ten pounds of seed per acre is sufficient.

**Sowing Corn
with a Drill.**

When the land is fairly free from weeds and weed seeds, corn can be sown with an ordinary grain drill (see Ill. 10), stopping all the spouts but two, leaving six spaces, between which are



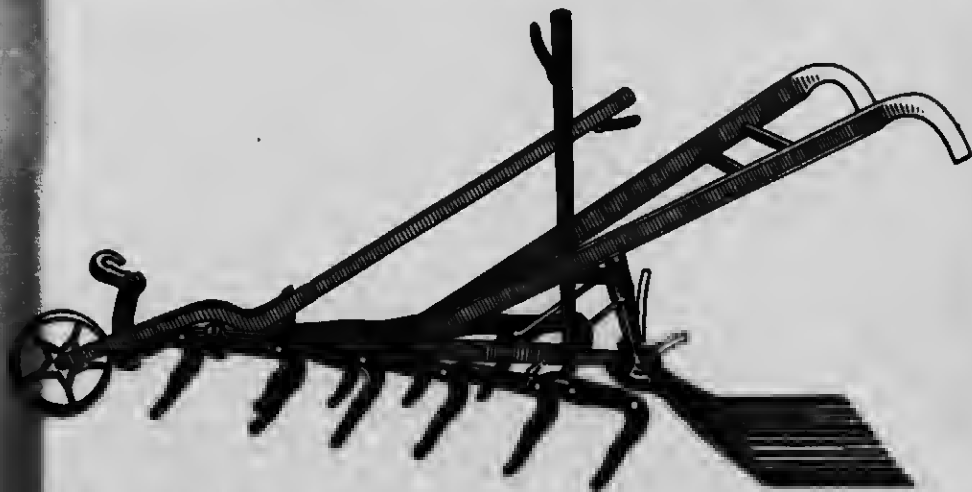
36. CORN CULTIVATOR.

forty-two inches. A drill with an odd number of spouts—say, eleven or thirteen—is preferable, as the teamster will not be so liable to make a mistake. A careful driver should make the drills perfectly straight and even, and sow twelve acres per day. Fifteen or twenty pounds of seed corn per acre is sufficient. As soon as sown, the

land should be crossed with a light harrow or Breed's Weeder, then on the angle and again across, until the corn is up, after which use the weeder lengthwise, covering two drills at a time, taking out two teeth in line with each row of corn.

Cultivating
Corn.

When the corn is a few inches high, start the two-horse cultivator. (See Ill. 36). Use the narrow points first, so as to loosen the soil several



37. COMBINED HARROW, CULTIVATOR AND PULVERIZER.

inches deep. This is followed with Breed's Weeder, to make a fine tilth, and not only to kill weeds, but to assist the bacteria to act on the *humus* and make it available for plant food. Corn, being a gross feeder, requires a large amount of soluble food, which can only be prepared by thorough cultivation. The weeder and the two-horse cultivator should be used alternately until the corn is too high to work over,

then it becomes necessary to use a one-horse hoe (see Ill. 32), which should be continued until the corn is about six feet high. After this, a scuffler with harrow teeth is all that is required to pulverize the surface. (See Ill. 37.) All cultivation may cease after the corn is in tassel.

When to
Harvest
Corn.

The time to harvest corn for silage is when it is in the firm, dough state. Until recent years most of the corn was cut either with the reaping hook or corn knife, or with a stone boat having two pieces of saw blade, sharpened on the edge,

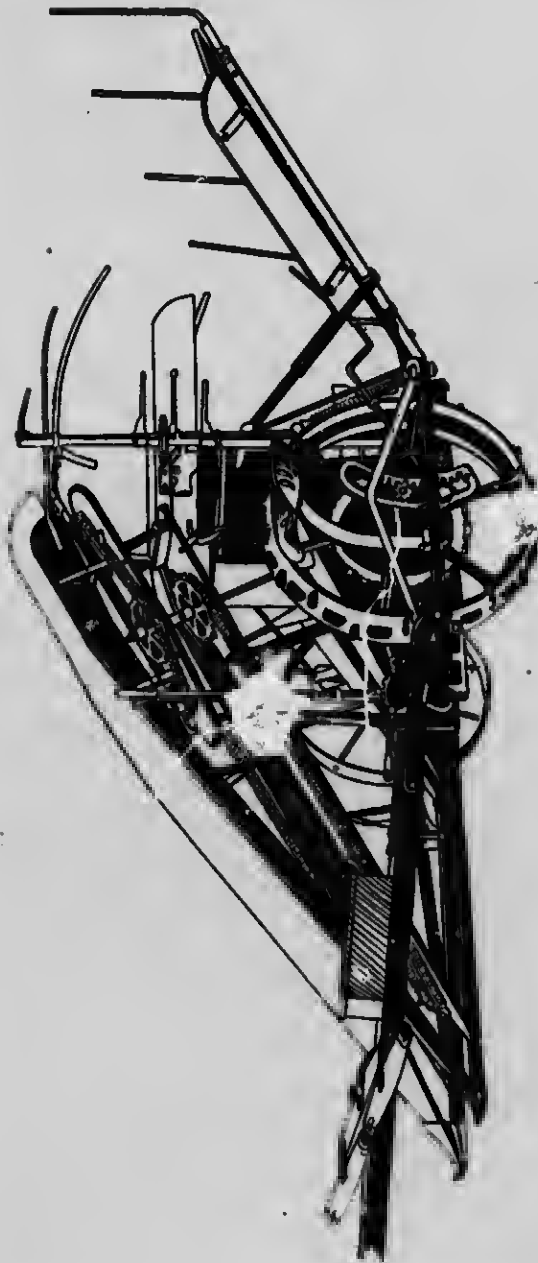


CORN HOE.

and fastened to the sides of the boat, and the corn hoe. On account of the scarcity of labor these methods have been discarded.

How to
Harvest.

At the present time the most common implement is the corn harvester. (Ill. 38.) With this implement a man and team can cut and bind in bundles six acres per day. Whether or not the corn be taken to the silo immediately after being cut depends on its condition. If rather green and full of sap, it is better to lay on the ground after being cut, for half a day or more, to wilt, otherwise the silage will be sour. If the corn is frozen, the sooner it is put into the silo the better. If it becomes over-dry, water may be added as the silo is being filled.



38. CORN BINDER.

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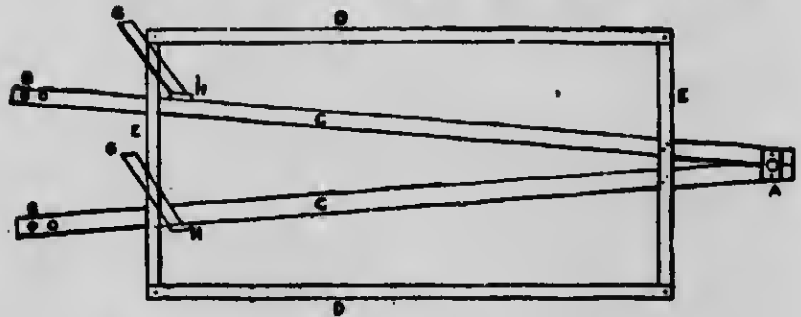
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**Hauling to
Silo.**

A low platform, attached to an ordinary waggon, is what is required for hauling corn to the cutter at silo. (See Ill. 39.)

The accompanying cut is a sketch for a home-made platform for drawing corn, used by a good many silo men, in connection with ordinary waggon gear, the reach and front bolster being removed. The two main pieces (C C) are eighteen feet long and eight inches wide by



39

39. CORN PLATFORM.

three inches thick. The point A rests on the front axle, the king-bolt going through a hole where the two pieces come together. B B are bored holes through which the clips F F, made of three-quarter-inch round iron, pass. These go over the hind axle, and extending down through the planks, are fastened below with nuts, thus holding them to the under side of the axle. The side pieces of platform D D are eleven feet long, and the cross-pieces E E six feet long and two inches thick—all made of hard

wood and securely bolted together. G G are two upright pieces of scantling, five or six feet long, slanting back and upward from H H, two iron clips fastened through C and bolted at H H. These act like stakes to keep the corn from pressing against the hind wheels. The whole frame should be covered with pine boards. The corn is laid on sideways.

Regarding the best silage cutter, there are several styles, any of which are quite satisfactory. The self-feeding table is an advantage, and the blower is an improvement over the carriers, although it requires more power. To elevate from eight to ten tons per hour, from thirty to thirty-five feet high, requires an engine of from twelve to sixteen horse power. (See Ill. 42.) The most suitable length to cut corn for silage has been a debated question for years, but it is generally conceded that a half-inch cut is about right.

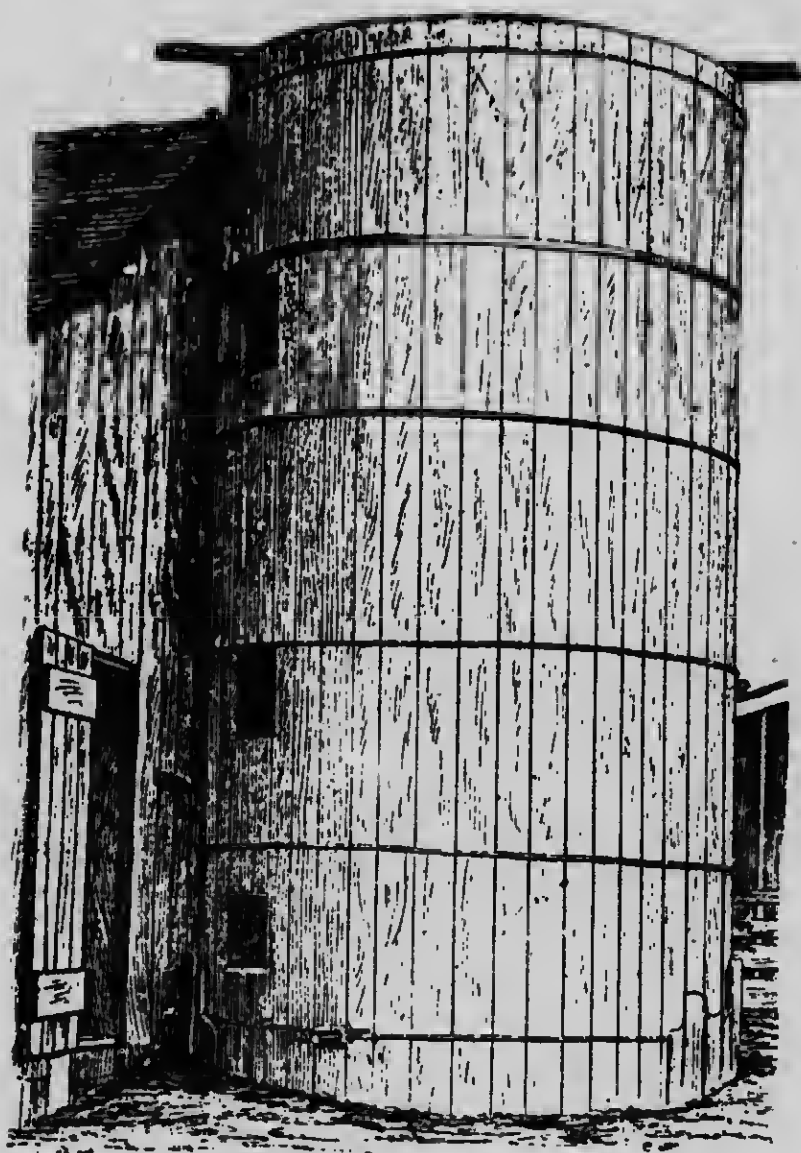
SECTION XII.

OTHER SILAGE CROPS.

In addition to corn, which is preferable to all other fodder crops for silage, are the clovers, which make a good quality of silage. Clover is specially adapted to feed with corn and other carbonaceous foods. Alfalfa gives the largest yield of any of the clovers, and, being a perennial, it can be cut in succession for a number of years. Alfalfa and Orchard grass, or Brome grass, make a better balanced ration than any individual plant (including corn), and, being

Corn. Preferable for Silage.

Clover and Orchard Grass for Silage.



41. ROUND STAVE SILO.

perennial, they will stand for years, and give an abundance of succulent food without any expense for cultivation, except a top dressing every winter with good farm manure. The time to cut and put in the silo is when the clover is in bloom. The first cutting of Alfalfa and Orchard grass, or Brome grass, is usually heavy and difficult to cure for hay; this can be put into the silo as soon as cut. The second and third cuttings can be cured for hay, or pastured. The latter is preferable.

The time has come when silos are no longer an experiment. In sections of the country where corn cannot be grown successfully, every farmer should build a silo and fill it with some green crop adapted for his section—say, peas and oats mixed, and cut green; this will make an excellent quality of silage for winter feeding. In filling a silo with corn, or any other fodder crop, it should be kept level and tramped, particularly around the sides, as this will assist in excluding the air, and, after fermentation commences, the silage will settle quite rapidly. As soon as the silo is filled, or, say, all that is to be put in at that time, scatter salt over the top, then cover with five or six inches of chaff or cut straw, and sow over it barley or oats, water every day for a few days until the grain commences to grow; this will make a close air-tight covering.

Peas and
Oats for
Silage.

Covering the
Silo.

A cloth saturated with crude petroleum makes a good covering, but the cloth will not last longer than two years.

**Time Re-
quired for
Curing.**

It requires five or six weeks for silage to cure and be ready for feeding. In the meantime it is well to have sufficient corn shocked, either in the barn or outside, to cut daily as required for feeding.

**Constructing
the Silo.**

At the present time there are several styles



42. CORN CUTTING AND SILO.

**Round
Stave Silo.**

of silos in use, which are constructed of various materials. To decide which is preferable will depend to a certain extent upon circumstances. The round stave silo (see Ill. 41) has certain advantages. It is simple in construction and is the cheapest. The cost will be about seventy-

five cents per ton. That is, a silo of one hundred tons capacity will cost about seventy-five dollars. Most farmers will have no difficulty in constructing a round stave silo. The staves are cut generally two by six inches, the length varying according to the height of the silo. For a thirty-foot silo use staves sixteen and fourteen feet, joined alternately, so that the joints will not be opposite each other. The joints are made by sawing a groove in the ends, and fitting in a piece of hoop iron. It is advisable to have a cement floor in the silo. The hoops may be made of heavy band iron or three-quarter inch round, each hoop in two sections, so arranged that they can be tightened or loosened as required. In making connections use a block of wood or casting. (See Ill. 41.)

Openings eighteen by twenty-four inches each, three feet apart, can be cut after the silo is built, to throw out the silage. Cut in a slant, so that they will fit closely. The stave silo has the advantage of being portable, so that a farmer on a rented farm can take it with him at the expiration of his lease.

Portable
Silo.

The stave silo can be improved very materially by bricking it up inside, four inches thick, the same as wells are bricked, and plastering inside with cement. This makes the silo airtight and frost-proof, which are two very important factors necessary to secure and maintain a good quality of silage.

Bricking
Inside.

A second form of wooden silo is here shown (see Ill. 42), which is more substantial than the

Second
Round
Silo.

stave, and is perfectly air-tight. A similar one is used in the dairy department at the Ontario Agricultural College. The framework is made of two-by-six-inch uprights and fifteen-inch



43. CONCRETE SILO AT THE ONTARIO EXPERIMENTAL FARM.

centres, for a silo thirty feet high. The uprights may be farther apart for a lower silo. The inside sheeting is two layers of half-inch lumber, with tar paper between. The outside is of half-inch

matched lumber. Openings must be made at the top and bottom for air, between the outside and inside sheetings. These should be covered with wire screen to prevent mice getting in. Doors, eighteen by twenty-four inches, can be cut after the silo is built, and at intervals of three feet at the side most convenient for feeding. The cost of the above silo is about one dollar and a quarter per ton capacity.

For a silo that is durable and satisfactory in every respect, I would recommend the cement silo. (See Ill. 43.) As a rule these are built round; occasionally one is built octagonal in shape. By building these designs, iron rods can be built in the walls, to bind the structure together, so that an opening can be left from top to bottom, instead of using doors through which to get the silage. These openings, twenty inches wide, are closed when the silo is being filled, by setting in inch boards, one foot wide, with an overlap to break the joints. Set them against cleats nailed to the door frame, two inches back from the inside face of the wall, so that, when set in place, the boards are even with the wall. These boards are set in as the silo fills, and taken out and tacked about four feet above as the silage is taken out from the top. This is a very convenient way of getting the silage out. There is an advantage in building a long silo, so that a partition can be put across in order to make two compartments, one of which is about double the size of the other. The ensilage of the large compartment is reserved for winter feeding and

Cement
Silo.

Partition in
Silo.

the smaller for summer use. It does not require a mechanic to build a cement silo. It is scarcely necessary to give details in this work, as the manufacturers of cement send a man, free of charge, to instruct their customers how to construct silos and other farm buildings. The cost of building a cement silo is from one dollar and a quarter to one fifty per ton capacity. When building a cement silo, the walls may be filled with large field stones, which lessens the cost very materially, but the stones must be kept two inches from the sides of the silo, otherwise the silage next the stone will be injured, through freezing and thawing.

**Capacity of
Silos.**

In estimating the capacity of a silo, allow fifty pounds per cubic foot for a silo twenty-four feet deep and under, and forty-five pounds for a silo thirty feet deep.

**Taking out
Silage.**

In taking out silage, commence at the top, and keep the surface level; a heavy rake is the most suitable for the purpose.

**Quantity
Required.**

The amount of ensilage to winter full-grown animals is about four tons each.

**Dry Corn
vs. Silage.**

Some are under the impression that corn shocked in the field, and cut or shredded in the winter as required, is equal in feeding value to silage. According to analysis, there is little difference, except that there is less water in the dry corn, but in making practical experiments in feeding there is a very great difference in favor of silage.

SECTION XIII.

FALL CULTIVATION.

Having now given the cultivation, harvesting and storing of the hoe crops grown on number three section in the rotation for mixed farming, I will now give the fall cultivation of the land, after corn and roots, which is to be followed by spring grain. If the corn land is entirely free from weeds, all that is required is to rib the land with the drill plow or the ribbing attachment on the frame of the cultivator, as shown in previous illustrations, making the ribs twenty-one inches wide, so that there will be a row of corn roots in each alternate rib, the corn rows being forty-two inches apart. If the land is not perfectly free from weeds, an iron plow without the mould board is an excellent implement to turn out the corn roots, so that the land can be harrowed and cultivated with the wide points. When the roots of corn are not too strong, the land may be cultivated across with a stiff tooth cultivator, then thoroughly harrowed. The land should now be ribbed with the double mould board drill plow, or the ribbing attachment, so as to put all the surface soil in the centre of the narrow ribs. By so doing the soluble fertility is prevented from leaching away during the winter, as the rains and melting snows will run off in the furrows without carrying away any of the humus. Another advantage is that this allows the frost into the sub-soil to loosen it. Land ribbed in the fall will dry out much earlier in the spring, and will make

Ribbing
after Corn.

Treatment
of Corn
Stubble.

Ribbing
Root Land.

a much better seed bed. The root land cannot always be cultivated on account of the tops; especially is this true of the turnip land. If there should be an occasional thistle, cut them off with a garden hoe or a spud, but if at all possible, cultivate all root land with the wide points before ribbing in the fall.

**Spudding
Thistles in
September.**

The month of September is a specially good time to cut off all thistles on the farm. Cut close to or below the surface. By so doing the top is prevented from nourishing the root, and the next growth will be destroyed by the frost before it is sufficiently matured to feed the root. This severe drain on the root will weaken it considerably, and a heavy crop of clover or grain the following season will be free from thistles.

**Rib Root
Land in
Fall.**

All root land should be ribbed (not plowed) in the fall, about twenty inches each in width and across the drills, so as to incorporate the tops evenly with the surface soil. Run furrows in the low portions to carry off the surface water. Land which is ribbed will keep much drier than land which is plowed in ridges of, say, fourteen feet wide. Besides, the following crop will be much more abundant, as it will be more uniform.

When root and corn land is plowed in the fall, the following crop will frequently be lodged in the centre of the ridge, where a double portion of vegetable matter has been gathered, and, in the furrows where the vegetable matter has been turned off, there will not be half a crop. These are facts which are the experience of every farmer.

SECTION XIV.

GRAIN SECTION NUMBER FOUR.

(See Diagram, page 36.)

We will now deal with number four section, which is all grain. The spring grains follow the hoe crops—corn and roots—which received all the manure made on the farm the year previous. This has been kept on the surface along with the rotted clover sod from the previous fall, which gives us two or three inches of available plant food of the very best kind suitable to grow an abundant crop of grain and clover. The fall wheat was sown the previous fall, after the peas, and was seeded with timothy at the same time that the wheat was sown. The Red clover and Alsike are sown in the spring, with a grass seed sower (see Ill. 15), at the rate of seven pounds Red clover and three pounds of Alsike per acre. As soon as the land is dry, cross-harrow the wheat to break up and pulverize the crust that has formed by the melting snows and spring rains; this will improve the wheat and insure a catch of clover.

Spring wheat should be sown as early as possible in the spring following corn and roots. The rills that were made up in the fall are harrowed and cultivated down. If the subsoil is clay it should be loosened nine or ten inches deep with the subsoiler or stiff tooth cultivator and narrow points, using three or four horses. Again harrow to make a fine tilth. Then sow the wheat with a grain drill at the rate of one-

How to Sow
Spring
Wheat.

and-a-quarter bushels per acre of good sound grain. The treatment for smut is exactly the same as that described for fall wheat on page 54.

**Sowing
Grass Seed.**

Clover and grass seed should be sown at the same time in the following proportions: Seven pounds Red clover, three pounds Alsike, and four pounds Timothy. Sow these seeds in front of the grain spouts, so that the seeds will be sown on the surface, and the grain spouts will throw the seeds between the rows of grain, where they will not be liable to be choked out.

**Harrow
after
Seeding.**

After the grain is sown, harrow across with a light harrow or "Breed's Weeder" to smooth the surface. Do not roll until the land is thoroughly dry, even if by that time the grain is three or four inches high. The roller will then pulverize the lumps of earth without making a smooth surface, which would encourage evaporation of the moisture in the soil.

**When to
Roll Land.**

Oats.

Oats must be sown early in the spring, the same as wheat, and are best drilled, at the rate of one-and-a-quarter bushels per acre, and seeded with the same grass mixture as spring wheat. For the very best results it is not only necessary to cultivate the soil on scientific principles, but it is also equally necessary to sow selected grain from a variety that will give the largest yield of grain, and that of a good quality.

**Imported
Seed Oats.**

It is well known that oats develop to greater perfection in Great Britain than in Canada, and a change from there to this country increases the yield very materially. The first year after importation both the yield and quality are inferior,

but after they are acclimatized, for several succeeding years, there is a marked superiority over those crops grown from imported seed. According to experiments at the Ontario Agricultural College, the variety known as the "Siberian" has stood at the head for several years in yield. This is a white oat. Whether we grow the heaviest yielding variety or not is one of the things which makes the difference between profit and loss.

While barley requires to be sown early in the spring for best results, it will not stand so much cold and wet as spring wheat and oats. It is advisable, therefore, to sow the latter first and the barley later. The land is prepared for barley the same as for wheat and oats—viz., by harrowing and cultivating down the narrow ribs made in the fall. While it is necessary to loosen the subsoil in clay soil for other crops, it is more so for barley, as it will very soon turn yellow in cold wet soil. Sow with a grain drill at the rate of one-and-a-half bushels per acre of the heaviest yielding variety known.

Barley.

According to experiments, the "Mandscheuri" barley stands highest as to yield. We should also import a change of seed barley every few years, from either Great Britain or Europe, where the grain grows to greater perfection than in this country. The "Mandscheuri" variety was imported from Russia. Barley ground should also be seeded down with the same mixture as wheat and oats, so that the whole section number four will be in grass the following year.

Importing
Seed Barley.

**Caps for
Barley.**

While it improves barley to cover the shocks with caps, it is a question whether or not it pays to do so. It is true that the same caps may be used for the clover—a great advantage in a wet season.

**Seeding
Thin Places.**

As soon as each of the grain crops are harvested, and before the stubbles are horse-raked, if there should be any portions of the clover rather thin through the grain lodging, or from any other cause, it is advisable to scatter seed over these places by hand, or with a grass seeder. By fall these parts will have made sufficient growth to stand the winter, and thus a uniform crop the following season will be assured.

**Number
One Section.**

The following year number one section (see Ill. 18) will be in hay or pasture, as desired. If the soil is in proper condition, it will require no attention further than to keep all live stock off it. Pasturing stock early in the spring, as soon as the grass begins to grow, is an injury to both the grass and the animals. Harrowing meadows and pastures in the spring with a chain harrow improves them. (See Ill. 44.) It pulverizes and smooths the surface, and consequently hastens vegetation.

**Seeds for
Meadows.**

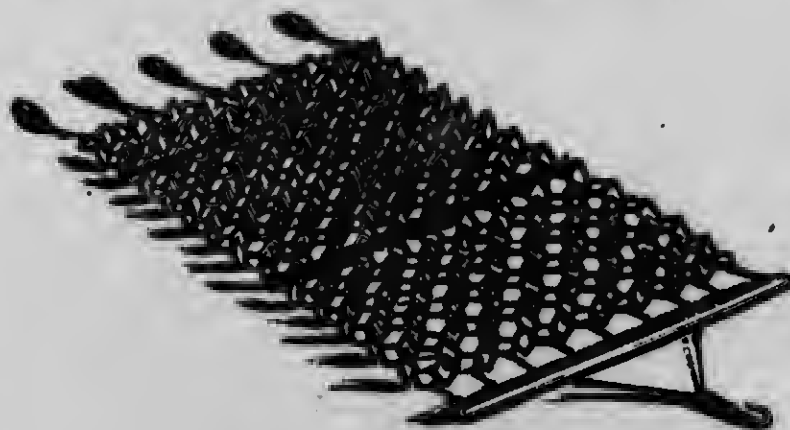
In deciding on a mixture of grass seed the first thing to consider is the soil and purpose for which it is seeded. For hay it is necessary to sow a mixture which will mature at the same time.

**Seeds for
Pasture.**

For pasture, although it is not absolutely necessary, it is preferable to sow varieties that mature at different times during the summer.

In a rotation where the crop will be required both for meadow and pasture, and where the land varies, so that some portions are dry while other parts are wet, the mixture recommended previously will give general satisfaction, viz: Seven pounds Red clover, three pounds Alsike, and four pounds Timothy per acre. The first crop will be nearly all Red clover if the land is dry. The wet portions will yield only Alsike and Timothy. The

**General
Mixture.**



44. CHAIN HARROWS.

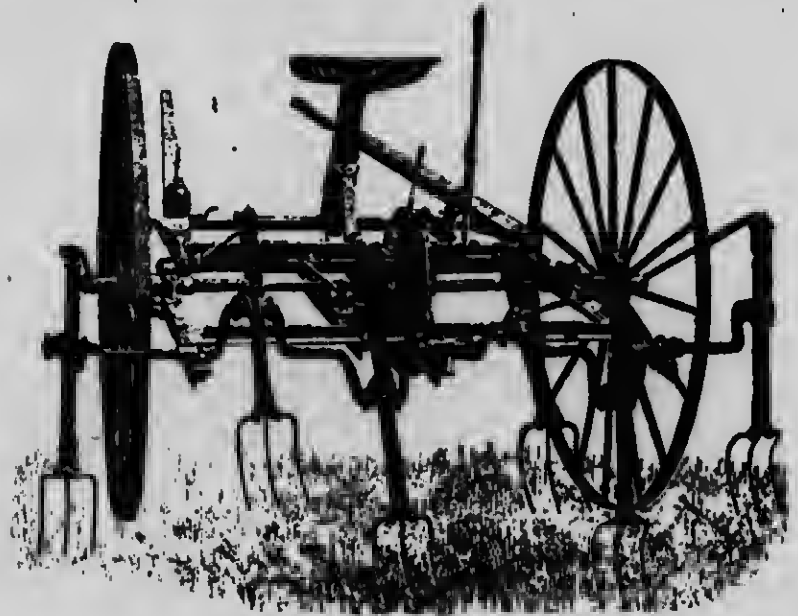
second year the crop will be nearly all Alsike and Timothy, as the Red clover is a biennial, while the Alsike and Timothy are perennials. Whereas it is not always necessary to mix any of the grasses with the clovers, it is always advisable to sow clover with the grasses; the latter are nitrogen feeders, and must have it in the soil, otherwise they will become sickly. It is well known that Timothy sown without Red clover will soon run out, whereas, if sown with Red

**Sow Clover
with
Timothy.**

clover it will grow luxuriantly for several years after the clover has died out.

**Clover as a
Fertilizer.**

As a fertilizer our common Red clover is a most valuable plant. It collects the free nitrogen from the air, and deposits it in the roots, near the surface of the soil, through the bacteria of nitrification. The tap roots strike deep into the



45. HAY TEDDER.

subsoil and bring up soluble mineral matter sufficient to develop the plant, and this is made available to feed other crops. Thus, by growing clover, in a short rotation of crops, the fertility of the soil can be maintained. Again, the clover roots perforating the subsoil and decaying, leave

**Clover as a
Subsoiler.**

it more porous than it can be made with any implement.

According to analysis, clover hay, when properly cured, is worth considerably more than any other hay, for feeding live stock of all kinds, including horses and pigs. It is the best flesh former and strength giver. It improves and balances the other rations, so that there will be less waste when feeding concentrated foods.

Clover for Feed.



46. HAY CAP.

The curing of clover is an important matter. It should be cut when coming into full bloom, and be shaken out with a hay tedder (see Ill. 45) soon after being cut. When it is sufficiently dry rake it into wind rows and put into ricks. All that was cut in the forenoon might thus be put up in the afternoon, or more, if the weather is hot and dry. The proper place to cure clover is in the rick. Hay caps (see Ill. 46) are very little used in this country, on account of the expense, they cost about thirty cents each.

Curing Clover.

Hay Caps.

Clover Seed.

The Province of Ontario is especially adapted to the growing of both Red clover and Alsike for seed, and an immense quantity is exported to Great Britain and Europe annually. The seed from Alsike matures in the first growth; it is

Fertilization of Clover.

fertilized by the honey bees distributing the pollen as soon as it comes into bloom; also by the wind scattering the pollen from the stamen



47. SELF-RAKE REAPER.

plants. For the best success in raising Alsike seed it is advisable that a few colonies of bees are kept in the neighborhood, and then, with the wind and bees, it may reasonably be expected that the clover bloom will be well fertilized, without which there can be no seed.

Cleaning Clover Land.

The most important consideration in growing Alsike clover for seed is to have it free from weed seeds. "The Seed Control Act," passed by Parliament in 1905, makes this a absolutely neces-

sary. Every farmer who intends to grow Alsike and Red clover for seed must first clean his farm of weeds and weed seeds. This can be accomplished by plowing a field at the beginning of August about four inches deep, then roll and harrow twice to form a mulching, so as to start the weeds and weed seeds to grow. In about two weeks cultivate about three inches deep; then harrow; again roll and harrow to make a fine tilth to encourage every seed in the soil to grow. Every two weeks cultivate with the wide points and harrow until October; then spread eight or ten loads of well-rotted farm manure (free from weed seeds) per acre, rib the field as described after a hoe crop. In the spring, level the ribs down with a harrow and cultivator, then drill in either barley or oats, one and a quarter bushels per acre. Sow in front of the grain spouts twelve pounds of pure Alsike clover seed entirely free from weed seeds (even Timothy seeds). The same treatment applies to Red clover, which should also be sown at the rate of twelve pounds to the acre, and be free from weed seeds.

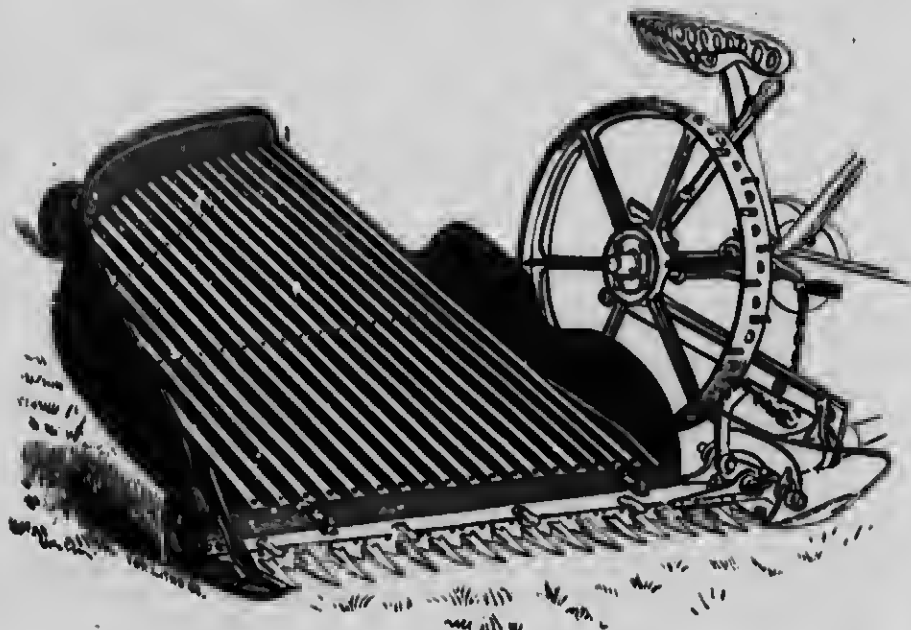
The ordinary mixture of Red clover, Alsike and Timothy may be sown, and the first growth cut for hay. When the crop of grain is growing, it is well to go through the crop and pull out any stray weed that may have escaped being destroyed by the previous cultivation.

The seed from Red clover is matured in the second growth, on account of the fertilization being done by the young bumble bees, which are

not sufficiently developed for the first growth of clover, as they are all hatched in the spring; only the queen humble bees live through the winter.

Avoiding the
Clover
Midge.

To get the largest yield and best quality of Red clover seed the first growth should be cut for hay early in June when the first clover heads appear. This is necessary in order to escape the



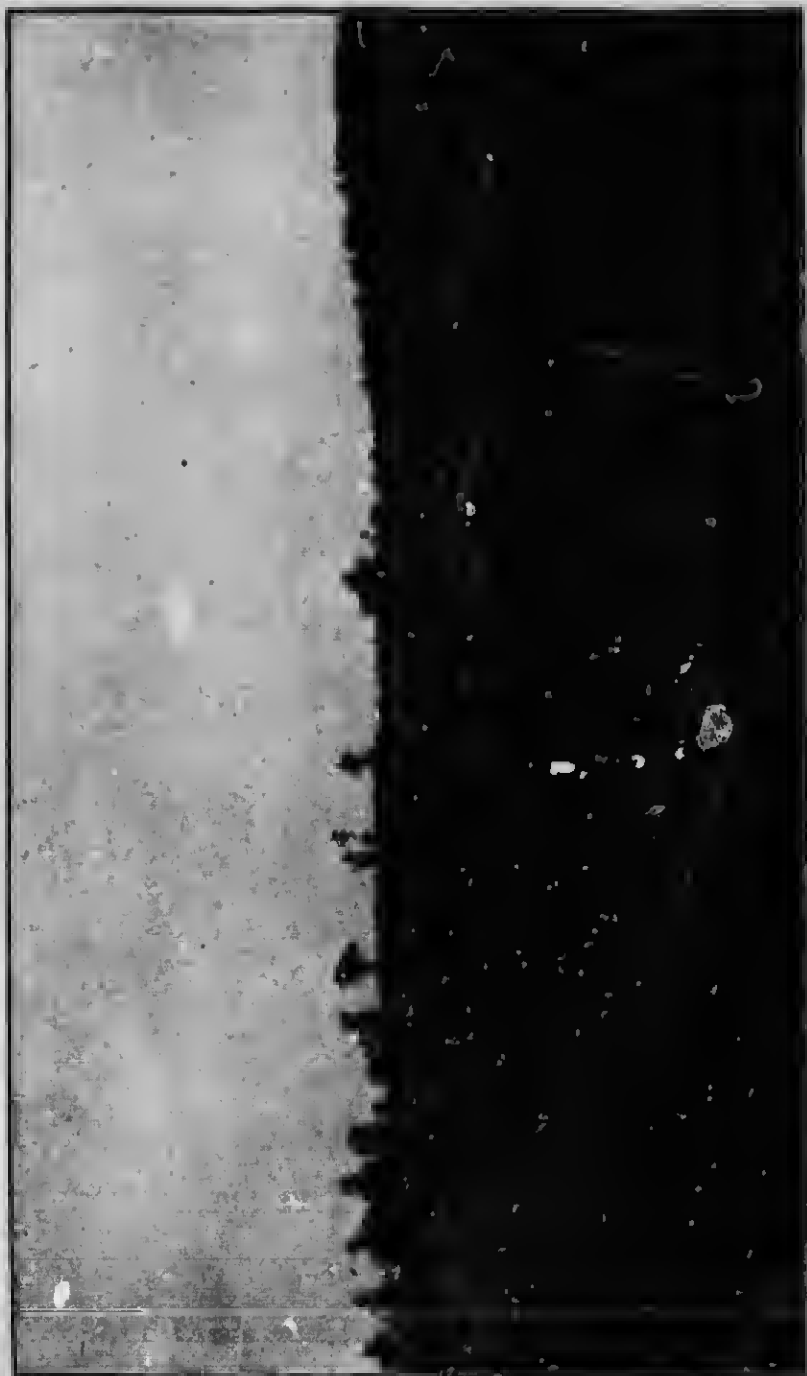
48. MOWER WITH CLOVER SEED ATTACHMENT.

Red clover midge which has proved so disastrous to the raising of Red clover in most parts of Ontario for several years. The larvæ from the first brood of the midge is deposited in the clover heads immediately they appear and before the bloom shows (when the midge are numerous very little bloom ever appears). When the clover is

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49. HAYING AT THE ONTARIO AGRICULTURAL FARM.

cut at this time and cured for hay, most of the larvæ is destroyed, and, even if any survive, the second crop of clover will be in bloom before the second brood of midge are developed. Occasionally, we get a good crop of Red clover seed by cutting the first crop late, say July, so that the second crop of clover will bloom between the second and third broods of midge. But this is uncertain, and has not nearly the same advantage as is gained by destroying the midge by cutting early.

If the first crop has been pastured, the cattle should be taken off by the 10th of June and the land gone over with a mower to cut off any weeds and also to give the clover an equal start. It is worthy of note here that a heavy growth of clover will check Canada thistles, and materially assist in cleaning the land of weeds.

**How to Cut
Clover for
Seed.**

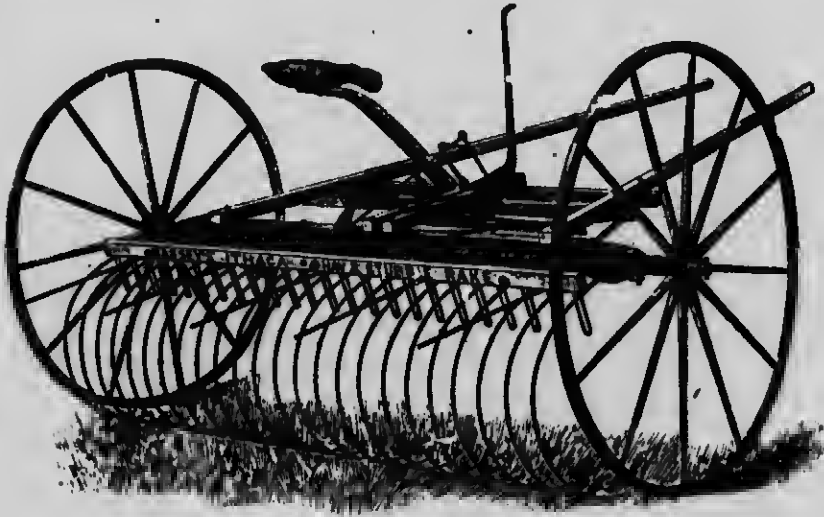
Cutting clover for seed, both Red and Alsike, is usually done with an old self-rake reaper (see Ill. 47), so that the clover can be put off in small sheaves. It requires to be turned occasionally that it may dry thoroughly. This work should be done carefully with a straw fork, otherwise the best seed will be lost. A second method of cutting clover for seed is to use a mowing machine, with a platform fastened behind, on which the clover drops. (See Ill. 48.) A man puts it off in sheaves, using a fork or rake. It should remain out a week or ten days after being cut, or until it is sufficiently dry to be put into the barn or threshed. The best quality of clover seed, both Alsike and Red, is got by threshing it as taken from the field.

**Threshing
Clover Seed.**

The curing of timothy hay is, as a rule, an easier matter than curing clover. While the very best quality of hay, especially clover, is made by putting it up into ricks and allowing it to stand a few days (see field of hay in ricks at the Ontario Experimental Farm, Ill. 49), this is not always necessary. If the weather is dry and warm, shake out with the tedder (Ill. 45) soon after it is cut, and rake it into wind-rows with a

Timothy
Hay.

Curing
Timothy.



50. HORSE RAKE.

horse rake. (See Ill. 50.) If the weather is favorable, timothy hay may be sufficiently dry the day it is cut to be taken into the barn. It is loaded on the wagons either with forks or with a hay loader. (See Ill. 51.) In conjunction with the hay loader is the side delivery rake. (See Ill. 52.) These are certainly two great labor-saving implements for handling hay. The

rake turns the hay and leaves it loose to dry out and in the best shape for the loader to handle it.

**Permanent
Pasture.**

In laying out a farm, it is advisable to have a field near the barn for pasture and soiling crops. Eight acres, perhaps, is sufficient for permanent pasture. Adjoining this, about six acres might be seeded to Alfalfa clover (called "Lucerne" in



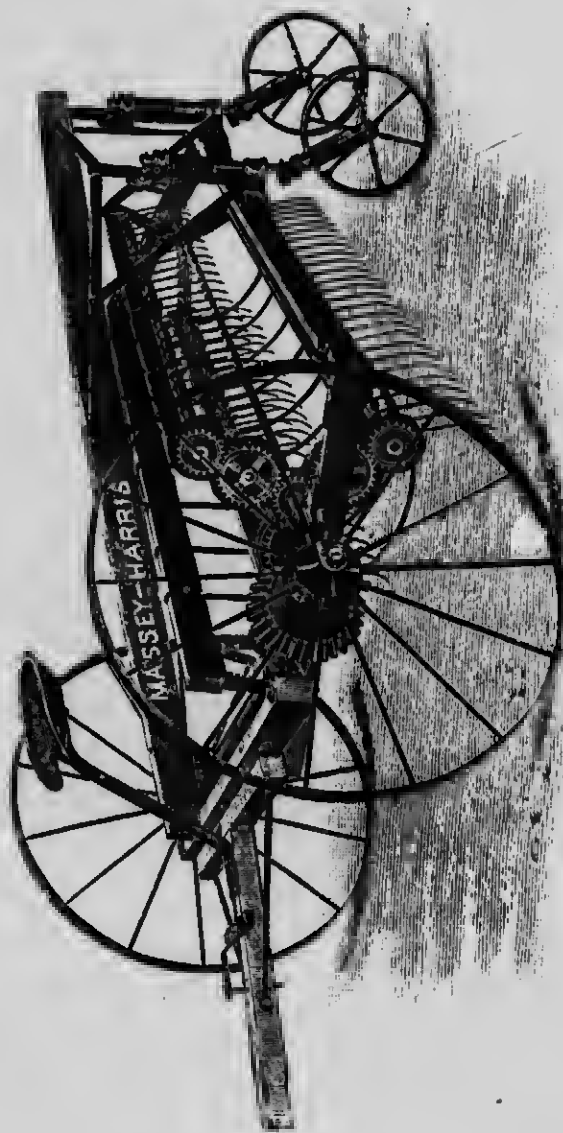
51. HAY LOADER.

Europe). High dry land is preferable. This is one of the most profitable crops that a farmer can grow.

Alfalfa.

Alfalfa is destined to revolutionize farming in this country. Being the greatest flesh-forming and milk-producing plant known, it is indispensable for arriving at the best results in feeding animals, especially dairy cows and hogs. It gives the earliest and best quality of feed in spring. It will keep green and continue to grow

**Earliest and
Best Feed
in Spring.**



52. SIDE-DELIVERY RAKE.

**Collects
Nitrogen.**

**Penetrates
Subsoil.**

**Alfalfa in
Canada.**

**Alfalfa Most
Nutritious
Food.**

during the driest weather until autumn, supplying an abundance of the most nutritious and succulent food during the whole summer. As a fertilizer, Alfalfa is the most valuable plant known to science. Being a leguminous plant, it is a collector of nitrogen, and on account of its luxuriant growth all summer it collects a very large amount of this, the most valuable of all fertilizers. The roots penetrate the soil several feet, and act on the subsoil, bringing mineral matter to the surface that would never be reached by any other plant. When the Alfalfa is plowed up and the roots decay, the whole subsoil is perforated, so that the air and water have free access into the soil. Alfalfa is a great soil renovator, gathering nitrogen from the air, opening up the soil, and bringing large quantities of mineral food from the subsoil.

The writer has had considerable experience in growing and feeding this highly profitable fodder crop, and the following explanation of its cultivation, if carefully followed, will lead to the successful growing of Alfalfa clover in any part of Canada where Red clover may be grown. Alfalfa has the advantage of being perennial, so that if the conditions are favorable it will produce three heavy crops each season for many years, and that of the most nutritious food for all kinds of animals; according to analysis, it is nearly equal to bran. For convenience in feeding green during the summer to horses, cattle, pigs, etc., it is advisable to select a few acres convenient to the stables. If the land has not been

prepared the previous fall according to directions for early crops, it may be prepared in the spring in time to grow Alfalfa as follows: Plow shallow, roll and harrow. In ten days cultivate and harrow. If the soil is clay loosen ten inches deep with subsoil plow or the four-horse subsoiler. Again harrow, then spread fifteen or twenty loads of well-rotted farm manure per acre; after which cultivate and harrow until the manure is thoroughly incorporated with the soil; then sow fifteen pounds of Alfalfa seed to the acre with a grass seed sower. (See Ill. 15). Sow about the beginning of June (without any grain); also sow by hand, five pounds of Orchard grass to the acre. The Orchard grass and Alfalfa are both rapid growers, and make a better balanced ration, especially for horses and cattle. This will be ready to cut in about two months. Do not cut too close, as the crowns of the Alfalfa are above the surface. Do not cut or pasture late in the fall. After the first season it can be cut three times for hay and four or five times for green feed, as both the Alfalfa and Orchard grass are perennials. There will be no cultivation required for years except a coat of farm manure each winter when the land is frozen to make up for the vegetable matter that has been taken off with the crop.

In some parts of Canada Alfalfa has not been a success, owing, it is believed, to the want of proper bacteria in the soil. "Nitro-Culture," with full directions how to apply it, is being sent out free by the Government to all farmers who

Preparation
for Alfalfa.

When to
Sow.

Well Bal-
anced
Rations.

How to Cut
Alfalfa.

"Nitro-
Culture."

**Inoculating
the Whole
Farm.**

make application for it. After a farmer once gets a start he has simply to take surface soil from an inoculated field (about two hundred pounds per acre) and sow it over a field prepared for seeding. In this way the whole farm may be inoculated in due time. The writer has, however, tried Alfalfa in several districts in Ontario, and found no difficulty in getting an abundant crop without any "Nitro-Culture," but simply by preparing the soil in the way previously explained, and sowing only when the soil is warm. The best months are June and July. The bacteria cannot work in cold soil.

**Sow When
Soil is
Warm.****Alfalfa
Adapted to
Side Hills.**

Alfalfa is specially adapted to side hills that are liable to wash and difficult to cultivate. Such land should be seeded, with Alfalfa fifteen pounds, and Orchard grass or Brome grass five pounds, per acre. This makes a good mixture to cut for hay or pasture. For best results the first growth only should be cut for hay, after which it will provide abundance of good pasture during the dry summer season, which is decidedly preferable to cutting two or three crops in one season.

**Fertilization
of Alfalfa.**

Alfalfa clover is fertilized by the honey-bees the same as is Alsike: Either the first or second growth of Alfalfa can be allowed to ripen for seed. The second growth is preferable. In a few years this should be an important item of the farm. In the Western States, Alfalfa meal has come to be recognized as an important food for bringing cattle up to fine condition, especially show animals, including swine and poultry. This

**Alfalfa
Meal.**

meal is made from Alfalfa and sugar-beet molasses, in the proportion of seventy-five per cent. Alfalfa and twenty-five per cent. sugar-beet molasses. There are a number of factories engaged in the manufacture of Alfalfa meal. The hay must be kiln-dried before it can be ground; there is certainly nothing added to the Alfalfa by kiln-drying and grinding, nor to the sugar beets by being manufactured into molasses. Equal results may be obtained by cutting the Alfalfa hay and mixing it with pulped sugar beets, and at a fraction of the cost.

Before seeding down a field for permanent pasture, the land should be thoroughly cultivated, and, if necessary, underdrained; then manured and ribbed in the fall, so that it will be in good shape for spring cultivation, which should consist in harrowing and cultivating the ribs down level. Then, with a grain drill, sow barley at the rate of one bushel per acre. At the same time sow ahead of the grain spouts the following mixture of grass seed: Alfalfa, four pounds; Red clover, three pounds; Alsike, three pounds; White clover, one pound; timothy, three pounds; blue grass, three pounds; Red top, three pounds; total, twenty pounds per acre. After seeding, level off with a light harrow or "Breed's Weeder."

Seeding for
Pasture.

About two acres of the pasture land should be planted with Maple trees (see diagram of farm 18); both for the purpose of ornament and for shelter to the cattle. It is advisable not to seed this portion the first year, as the trees will make

Shade Trees
on Perman-
ent Pasture.

more rapid growth by keeping the land cultivated for another year. Mulch with farm manure.

The Silver Leaf soft maple is hardy and will make more rapid growth than the hard or sugar maple. The former are desirable in this case, as they are wanted for shelter as soon as possible. It is advisable to plant the trees not more than twenty-five feet apart, so that the whole surface of the soil will be shaded and kept cool in the summer.

SECTION XV.

SOILING CROPS.

There are, possibly, certain districts in Canada where Alfalfa and Red clover will not grow successfully, and in these sections other crops will require to be grown for summer feeding (soiling) while green, as a succulent food. This feeding is essential to get the best results from all animals, including pigs, lambs, calves, and especially milch cows. Peas and oats, or vetches and oats, forty pounds of each (eighty pounds in all), mixed, makes an excellent mixture. Sow one or two acres early in spring and a second sowing three or four weeks later. If this should be more than is needed for feeding green it can be cured for winter feeding. At the end of May one or two acres of sweet corn may be sown in drills and thoroughly cultivated; this should yield fifteen tons per acre of a succulent food of the best quality. The writer would also recommend dwarf essex rape, one or two acres sown at the beginning of June in drills twenty-six inches

Seeding for
Soiling
Crops.

wide, and thoroughly cultivated. All animals are very fond of rape, and when mixed with other foods it gives the very best results. Rape should only be fed to milch cows in very limited quantities, as it is liable to taint the milk.

All soiling crops should be grown convenient to the stables. For sheep, calves or pigs it is necessary to have two or three acres of pasture near the barn. (See Ill. 18.) For shelter they require a building to go to at will. As previously explained, all pastures should have a group of Maple trees, and these will grow quickly if cultivated in summer and mulched in winter for two or three years. Calf Pasture.

SECTION XVI.

THREE YEARS' ROTATION.

Having fully explained a four years' rotation of crops, according to the diagram 18, which, with certain variations, may be adopted on many farms in this country with success, I will now explain, briefly, the advantages and disadvantages of a three years' rotation. Divide the farm proper (that which is under cultivation) into three sections. In brief, omit the second section of four years' rotation (see diagram 18). Cultivate as follows: One section in clover, mostly Red, for hay and pasture, is plowed in August, harrowed and cultivated until October according to previous directions, then manured and ribbed. This is followed with a hoe crop and peas, then with a grain crop, again seeding with clover. This system is desirable where a

**Increased
Fertility.****Even Dis-
tribution
of Labor.****Outlying
Lands.****Fertility
Maintained
Without
Manure.****Only Two
Years'
Grass.****Destroying
Wire
Worms.**

limited number of cattle are kept in the summer, the object being to feed cattle and lambs during the winter for export and home consumption. The advantages of this system are, firstly, the increasing and maintaining of soil fertility by plowing under the second growth of clover every third year, and feeding all the roots, corn, fodder and coarse grains; secondly, the labor on the farm is more evenly distributed throughout the year by this system. With a disconnected or outlying portion of land it may not be convenient to manure and cultivate in the regular rotation.

A three years' rotation may be followed by leaving out the hoe crops and farm manure, viz., two sections grass, hay or pasture, and the third section grain; seeding with the regular mixture mentioned in the four years' rotation. The section that has been in grass for two years is plowed in August, and thoroughly harrowed and cultivated alternately until October, then ribbed and sown with grain the following spring, and again seeded. With this system the fertility can be maintained without applying manure.

In any rotation, land should not remain in grass longer than two years, as it becomes filled with wire worms and other insects, so that the two following crops become more or less injured. Land intended for pasture only should be renovated every few years by plowing in August, and, in order to destroy the wire worms which are almost certain to be in the soil, harrow and cultivate alternately and continuously until the inter, say November. The object is, first, to rot

the sod, and, second, to rid the ground of wire worms by disturbing them late in the fall or beginning of winter, so that they will be frozen and then destroyed.

Seed again in the spring with the pasture mixture of grass seed mentioned on page 115, seeding with any kind of spring grain (barley preferred), sown according to previous directions.

Re-seeding
Pasture.



MR. AND MRS. WM. RENNIE, SR., AT HOME.

CHAPTER II.

SECTION I.

BEAUTIFYING THE FARM.

No other class of the community have so many opportunities for beautifying their homes as the farmers, and yet farm homes and surroundings are sadly neglected as a rule. A very little care spent on laying out the grounds around the house will give the place a park-like appearance that cannot be had in the city. The artist, when selecting a subject for a painting of an ideal home, invariably selects a country home in preference to a city mansion. There are home comforts and privileges about the farm, that cannot be had in any other occupation. It is to be regretted that more farmers do not take advantage of their opportunities, and endeavor to make their calling more elevating and pleasant, so that the young people will not be attracted to our towns and cities.

Attractive
Homes.

Privileges of
the Farm
Home.

There is no necessity for making farming a drudgery. There should be a system on the farm, the same as in a factory or in a business office. Systematized work saves time and labor. While it is necessary to rise early in the morning, it is equally as necessary to quit work at six o'clock in the evening, so that there will be sufficient time for reading and enjoyment. Every farmer should subscribe for one or two good agricultural journals, a religious paper for

Time and
Labor Saved.

Reading

Sunday reading, a ladies' journal, and a daily newspaper, so that it will not necessitate any member of the family going to the blacksmith's shop, shoe-maker's, the store, or the tavern, for the news of the day.

Every member of the family should have the opportunity of reading for himself, or herself, and so keep apace with the times. The present age demands knowledge in all things. Less manual labor and more thought would bring many farmers better results than they now enjoy.

Few Failures.

Farming is more healthful, interesting and independent than any other occupation or profession. While only a small percentage of business men make a success, only a small percentage of farmers make a failure. This is a well-known fact, and with our present knowledge in agriculture, farming should be made more profitable now than ever before.

Acquire Knowledge.

Other professions are more than filled, but, as we pointed out, there is a great demand at present for farm managers. Every farmer should have a thorough knowledge of his business, including the cultivation of the soil, feeding and care of live stock, dairying, horticulture, etc.

A farm home can be made attractive and comfortable at very little cost. Many farm-houses are much too costly. If one-quarter, or even one-third, of the cost had been spent in laying out the grounds and planting trees properly arranged, it would not only have added to the comfort and appearance of the place, but

would have increased the value of the farm much more. Indeed, the value of this cannot be reckoned in dollars and cents. It should be the ambition of parents to make home the brightest and most attractive spot on earth for their family.

Ornamentation Increases Value of Farm.

In improving a farm one of the most important things is to decide what quantity of land is desirable to enclose for orchard, small fruits, vegetable garden, and lawn; provision should also be made for a small pasture at the back for calves, etc. (See Diagram 18.)

Having decided on this, clear away all old fences and rubbish of every kind on the whole space intended to be enclosed.

Clear Old Fences.

If any grading is required, it should be done before commencing to cultivate. Do no more grading than is necessary, as grounds have a more natural appearance when they are somewhat undulating. The portion intended for the lawn should be heavily manured with farm manure before plowing. The whole enclosure should be plowed shallow, and thoroughly harrowed and cultivated alternately until the land is cleared of all weeds and weed seeds. The subsoil should be loosened as deeply as possible with the subsoiler.

Grading.

Cultivation for Lawn.

Then prepare a plan, and work to it the same as a mechanic working to a plan prepared for a building. Every farmer will require to have a plan especially adapted to his own place. In preparing this, he should consider the location of buildings and the lay of the grounds. Getting

Prepare a Plan.

the right effect belongs to landscape gardening. Good ideas of what will best suit circumstances can be got by securing one of those inexpensive books on this kind of work.

**Enclosing
Grounds.**

A wire fence should be erected around the whole of these grounds, and evergreen trees planted inside the fence. The most suitable trees for this purpose are the Norway spruce, which answer well both for a wind-break and hedge.

Hedge.

White cedar (*arbor-vitae*) make the most compact hedge. Trees about twenty inches high are sufficiently large for planting. Nursery trees that have been transplanted are preferable, the cost of which is about six dollars per hundred. For a hedge, plant them about sixteen inches inside of the fence, and from thirty to forty inches apart. For a wind-break Norway spruce should be planted from eight to ten feet apart. These will grow up with little attention, and soon become both ornamental and useful.

**Wind
Break.**

**Double Row
Wind
Break.**

For various reasons it is not advisable to plant a double row for a wind-break. In a few years the inside branches die for want of air, and it requires so much nourishment to support a double row that no vegetation will grow near the trees. It is injurious to fruit trees to be too closely hemmed in by evergreens.

Fruit trees require a certain amount of air to purify the air and drive away the moths and other insects, which are also more likely to collect in closely confined grounds.

A single row, planted not too closely, will

make a more healthy and more graceful wind-break, and will not have the objection of preventing sufficient wind from passing through the orchard.

Single Row
Wind
Break.

For wind-breaks and grouping nothing can beat the Austrian pine. It is very ornamental, having a heavy, dark foliage; and it is also especially adapted to dry, sandy soil. In addition, the Norway spruce and Yellow and White pine make desirable wind-breaks. The White cedar (*arbor vitae*) is also suitable.

In a country with long winters, and when the deciduous trees are without their foliage, the home is more attractive and comfortable when surrounded with evergreens. A few groups properly located in the grounds improve the scenery.

Groups of
Evergreens.

Slope the sides of hedges so that the bottom leaves will get a share of rains and dews. Cut the top even with the upper wire of fence, which should not be too high.

Slope
Hedges.

In a long hedge it is advisable to allow a tree to grow twenty-five inches higher every fifty or sixty feet, and round the top. This improves the appearance by taking off the plainness. At each side of gates leave a tree about thirty inches above the hedge, trimmed round, or any desirable shape.

Trimming
Evergreen
Hedges.

For hedges, the most desirable are the Cedar and Norway spruce, and, where the winter is not too severe, the hemlock, with its drooping branches, makes one of the most graceful hedges.

Evergreen
Hedges.

The White cedar is of slower growth, but

**How to
Make Hedge
Stock Proof.**

makes the most compact hedge of any of the evergreens. All evergreen hedges should be grown close to a wire fence, so that the branches will grow through and outside the fence. After being trimmed for several years, the branches will have become so interwoven with the wires that, even after the posts have decayed, the wires will remain in place, and make the hedge thoroughly stock proof, thus providing a useful and ornamental live hedge, which will last for fifty or more years. There are many deciduous shrubs that make beautiful hedges during the summer months, but on account of casting their leaves in the autumn, they add no beauty to the grounds when most needed. These also require the protection of a wire fence. *Spirea* makes a beautiful hedge when in bloom.

**Curved
Walks.**

In laying out drives and walks, give them graceful curves whenever possible; avoid a straight walk from the front door of the house to the road. Before seeding a lawn, make sure that it has been cultivated sufficiently to destroy all weeds and weed seeds.

**Seeding
Lawn.**

The lawn can be seeded with success any time between early spring and the 1st of October. If sown after this date in Northern Ontario, the White clover will not stand the winter.

**Lawn
Mixture.**

Sow the following mixture: Five pounds White clover, five pounds Red Top, and five pounds Kentucky blue grass per acre, with half a bushel of barley. Sow all broadcast on the surface, after which give one stroke with the harrow or "Breed's Weeder." After the barley

is up several inches, cut and leave it on the ground as a mulching. By keeping barley cut, the lawn will soon have an attractive appearance.

Each spring, sow a little White clover, and brush harrow (see Ill. 53) the lawn thoroughly

Brush
Harrowing
Lawns.



53. BRUSH HARROW.

to pulverize and smooth the surface, which is usually made uneven by earth worms. This is preferable to rolling. The chain harrow (see Ill. 44) does the work more thorough.

Clover is of very great importance in a lawn to keep up the fertility, as it collects nitrogen to

Clover in
Lawn Seed.

feed the other grasses, and keeps the lawn green during the summer.

**Cutting
the Lawn.**

If the land has been thoroughly cleaned of weeds before seeding, it will require very little attention in after years. The portion used for amusements in the summer evenings will require to be cut frequently with a lawn mower. (See Ill. 54.) The balance should be cut the beginning of June. This can be done with a horse-mowing machine, but it is better not cut during the hot summer months.



54. LAWN MOWER.

**Grouping
Trees.**

Groups of trees on the lawn give the place a park-like appearance—say, one group in front near the road, and the other at the back. A variety of evergreen and deciduous trees may be planted in these groups. One or two weeping elms are ornamental and agreeable during the summer months.

Groups of flowering shrubs on the lawn are interesting. In order to get the best results, it is advisable to dig around them.

**Shape of
Groups.**

In grouping trees, or shrubs, and in making flower beds, have no sharp angles, but round off

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WEST VIEW.

the corners. This takes off the stiffness, and gives a place a more natural and easy appearance. In arranging groups, do not plant three shrubs or trees in line. It is much more natural to have them set irregular.

In making a selection of flowering shrubs, two things must be observed, viz.: Select varieties sufficiently hardy for the locality in which they are required, and choose a collection that will bloom at various times, from early spring until autumn.

**Selection of
Hardy
Flowering
Shrubs.**

The following are a few varieties that have proved sufficiently hardy at the Ontario Agricultural College grounds, Guelph, where the thermometer occasionally reaches from twenty to twenty-five degrees below zero: The rose-colored Weigelia (*Diervilla Desboisi*), the white flowered Weigelia (*Diervilla Hortensis Nivea*), the large flowering Hydrangea (*Hydrangea Paniculata Grandiflora*), the Honeysuckle (*Lonicera Tartarica Grandiflora*), the Japan Quince (*Pyrus Japonica*), the Germander leaved Spirea (*Spirea Chamandrifolia*), the Gudder rose-leaved Spirea (*Spirea Operlifolia*), the Purple Lilac (*Syringa Oblata*), the White Lilac (*Syringa Vulgaris Alba*), the Snowball (*Viburnum Nudum*).

The above list of shrubs will give satisfaction. There are many others which might be added for sheltered situations, such as the Flowering Almond, etc., but which could only be grown with difficulty.

Flower Beds

The size and shape of flower beds will depend upon circumstances. A family who are fond of

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NORTH VIEW.

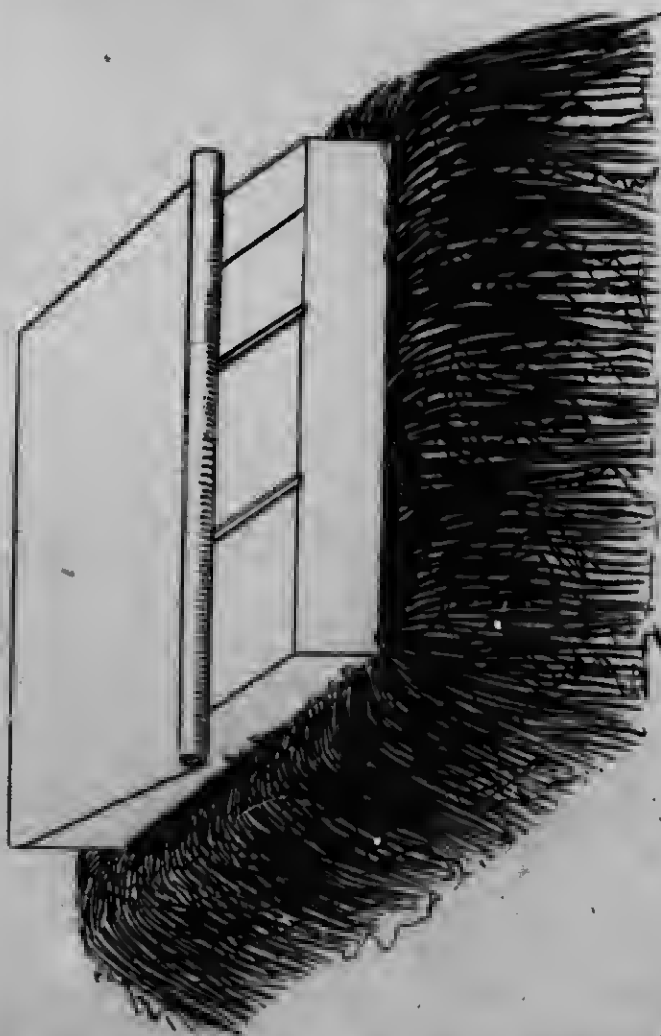
flowers will care for a larger and more varied collection than others whose tastes run in other lines. Two or three flower beds on the lawn are necessary for variety. These should be of varied shapes, and, to get satisfactory results from them, a collection of autumn bulbs, especially tulips, should be planted in October or November, and covered with leaves or stable manure. Snowdrops and crocus are the first to bloom in the spring, and should, therefore, be included in the collection.

Rake off the covering on the first signs of spring, and give the little beauties a chance to show their colors. Tulips are the most popular of all Holland bulbs for outdoor planting. Between the single and double varieties it is simply a matter of choice. Both make a magnificent display. A few hyacinths in a flower bed, in addition to their beauty, add a pleasant odor. It is not necessary to continue the list of bulbs suitable for outdoor planting, as full illustrated lists may be had free from any seedsman. Fall-planted bulbs will continue in bloom from early spring until the beginning of June, when the flower beds should be refilled with bedding-out plants, which will continue to bloom until late in the fall.

How to
Make
Hot-bed.

It is not necessary for a farmer to buy either flower or vegetable plants, when he can buy the seed for a mere trifle, and, by making a hot-bed, grow all the plants he may require at very little cost. (See Ill. 55.) The situation for a hot-bed should be dry underneath, be sheltered on the

north and north-west by some kind of wind-break, and be fully exposed to the sun. It



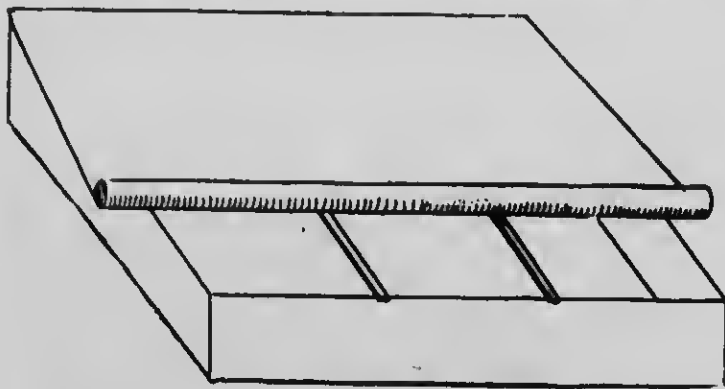
55. HOT-BED.

should be built up from two to two-and-a-half feet high, and wider by one foot on each side than the frame which is to be placed on the heating

material which forms the bed. This heating material should be fresh horse manure, with the usual amount of litter. This is thrown into a pile, and in a few days, when fermentation has taken place, it is again turned over and carefully shaken out, and formed again into a pile, which is left until the second fermentation takes place. It may now be placed in position for the hot-bed; shaped and trodden down, so that it will remain uniform. Supposing the frame is made six feet by nine feet, twelve inches high at the back and eight inches high at the front, facing the south the manure bed should be eight by eleven feet. Instead of covering the frame with glass, factory cotton is all that is necessary. It is much cheaper than glass and requires less attention. Get a cotton sheet made larger than the frame, so as to overlap a few inches. Have a roller made about ten feet long, and the cotton tacked to it and to the upper side of the frame. This will hang over the ends, and prevent the wind from moving the cotton. The cotton can be rolled up to air the plants when required. After the first intense heat has passed off, cover the manure over with about six inches of soil, which should have been prepared the previous fall with rotted sod and cow manure. When the hot-bed is completed, it is advisable to let it stand two or three days until the heat moderates before planting the seeds. The time to make a hot-bed in Central Ontario is the beginning of April, so that the plants will be ready to set out by the 1st of June.

The selection of flower seeds best adapted for growing bedding-out plants is a matter of fancy. As a rule preference should be given to those that bloom from the time they are set out—say, the 1st of June—until late in autumn.

The following should be included in the list: Varieties of
Flowers.
Petunia, Phlox Drummondi, Verbena and Geranium. The latter can be grown in a hot-bed from cuttings. For a full collection of flower seeds, see any of the seedsmen's catalogues.



56. COLD FRAME.

It is very desirable that a portion of the hot-bed be reserved for vegetable plants for early planting—say, tomato, lettuce, cabbage, cauliflower, etc. Melons can be started in a hot-bed by inverting sods in the soil and planting seeds in them. By having a few plants in the hot-bed at the close of the season it will be both ornamental and useful during the summer. Hot-Bed for
Early
Vegetables.

In addition to a hot-bed, every farmer should Cold Frame. have a cold frame (see 56) to start vegetable plants early in the spring, such as cabbage, cauli-

flower, tomatoes and lettuce. A few plants of the latter may be started in the hot-bed, and transplanted to the cold frame, where they will soon be ready for use. Early lettuce is relished by most people, and provision should be made by all farmers to have some ready for use in the home as early in spring as is possible.

**How to
Prepare
Soil.**

The preparation of the soil should be done in autumn, by digging in a quantity of well-rotted farm manure, and covering a foot deep or more with coarse stable manure, to prevent the soil from freezing, so that it can be planted early in the spring. Use the same frame as for a hot-bed. When wanted for use, remove the manure and put the frame on the soil, using the same manure to bank the frame on the outside.

**Covering
Cold
Frame.**

Cover the frame with cotton, provided with a roller, the same as for a hot-bed. It is necessary to have strips three feet apart, to prevent the cotton from sagging in the centre. Loosen up the soil with a spading fork before sowing seeds.

**Time to
Sow.**

The cold frame must be sheltered from the west and north. By making due preparation, and sowing the seeds by the last of March, the plants will be ready to set out in the open ground by the end of May. These dates are for Central and Northern Ontario. For more southern latitudes, the time for sowing the seed and planting in the open ground will vary according to situation.

**Large
Cold Frame.**

When more space is required to grow plants, it is not necessary to make separate frames, but enclose in one space, by setting short posts at

back and front, and nail eight inch boards on the front and twelve inch at the back. Closely board the ends, and bank with either earth or manure. A cold frame of this description can be extended to any required capacity.

In addition to a flower bed of annuals on the Flower Bed. lawn, there should also be a bed of flowering perennials. These require very little attention. Make the bed of irregular shape, with rounded corners. Dig in considerable farm manure and mulch every winter. Plant such flowers as are Hardy Perennial Flowers. hardy and showy and that will bloom profusely in their season during the summer.

The following is a list of hardy perennials to select from. The common names only are given, and the colors are named.

Bleeding heart, pink.

Coreopsis, yellow.

Dwarf Phlox, white, rose and crimson.

Gaillardia, red.

Garden Pinks, white, striped and rose.

German Iris, white, yellow and purple.

Helianthus, yellow.

Hollyhock, white, pink, yellow and crimson.

Japanese Iris, white, blue and crimson.

Larkspur, mixed colors.

Lemon Lily, yellow.

Lilium Candidum, white.

Oriental Poppy, scarlet.

Pæonies, white, rose and crimson.

Rudbeckia, yellow.

Sweet William, mixed colors.

The above list will provide a collection of

**Cut
Flowers.****Rockery.****Planting
Ferns.****Hardy
Climbers.****Boston Ivy.****Clematis.**

hloom most of the summer, sufficient to brighten several homes with cut hloom, in addition to the outdoor ornamentation. Another attraction on the lawn is a rockery in some shady corner, oval in shape and raised in the centre with a few wheelbarrow fulls of rich mould. Spade in sufficient well-rotted farm manure to prevent the soil getting hard or forming a crust. When the bed is in shape and raked, place five or six rustic stones on the bed, not in line or formal, but irregular. It will then be ready for planting. The first thing to get is a collection of native ferns. This is an interesting work. Plant one root of each variety. There will be no difficulty in collecting fifteen or twenty distinct varieties in our woods or swamps. After the ferns are planted, put in a few perennial flowers, such as the Japanese and German Iris, Dwarf Phlox, Bleeding Heart and Garden Pinks.

A rockery requires to be shaded especially from the south and west. Frequently there is a shaded corner close to the house that is suitable for a rockery, one which will look cosy and will require very little attention.

A few hardy climbers around the house gives a home-like and interesting appearance. A few plants of Ampelopsis Veitchi (Boston Ivy), planted so that they can get hold of the wall, will cover an ordinary house in a few years. It requires no other support than the wall to which it will cling, be it stone, brick or wood, and although it does not hloom it is very attractive.

Clematis Jackmanii has a large, dark purple

flower, and the Clematis Paniculata a small white fragrant flower. These are both hardy climbers.

A border of summer flowering bulbs dividing the lawn from the vegetable garden is quite attractive, and as the bulbs multiply each year, the principal cost is in the commencement.

Summer
Flowering
Bulbs.

For the first row next the lawn the writer would suggest Gladiolus, the flowers of which are of various colors and charming appearance.

Varieties for
Border.

Second row: Cannas, Crozy's Dwarf sorts.

Third row: Dahlias, mixed colors, including the Cactus varieties.

The rows should be thirty inches apart, so that the cultivating can be done with a horse. The bulbs require to be taken up in the autumn and kept in a cool cellar where they will not freeze. Should there be any danger of frost, sprinkle a little sand or mould over them in the early part of the winter.

Horse
Cultivation.

This subject would not be complete without mentioning the queen of flowers—the Rose. In order to complete the floral department, plant a row of hardy Roses, four feet from the row of Dahlias, so that the cultivating can be done with a horse. There are such a large variety of Roses I will only name the following varieties as being suitable for outdoor blooming, and refer the reader to the nurserymen's and seedsmen's catalogues for a larger collection:—

Roses.

Coquette des Blanches, white; General Jacqueminot, scarlet; Paul Neyron, pink; Persian, yellow.

For hardy climbers the two well-known

Climbing
Roses.

varieties, "Baltimore Belle," bluish color; "Prairie Queen," rose color; and "Rambler," still hold their own.

SECTION II.

VEGETABLE GARDEN.

Value of
Vegetable
Food.

Diet
According
to Climate.

The vegetable garden should be looked on as one of the important departments of the farm. A succession of fresh vegetables from early spring until winter is necessary for the health of all classes in this country. It is a wise provision of Nature that the food we should eat can be grown in the climate we live in. In tropical climates we find the people living almost entirely on fruits and vegetables. Were they to eat fatty foods they could not live long, as such a diet would encourage disease. In our temperate zone, where we have both heat and cold, we should govern ourselves accordingly, and so arrange that our diet during the summer season be composed largely of fruits and vegetables. According to analysis, from eighty to ninety per cent. of fruit and vegetables is water. The same holds good for grass. We know that our animals never thrive better than in spring, on fresh grass without any additional food. The lesson we deduce from this is that a vegetable food in summer is what we require, but for outdoor life in winter we need a more concentrated and heating food. In Arctic regions the food of the natives is principally the fat of whales and other sea animals, called "blubber." This is necessary to supply heat for the body.

It is advisable to have land for the vegetable garden thoroughly cultivated in the early fall, and an endeavor should be made to destroy all weeds and weed seeds; this will save a large amount of hand labor the following season. Before the crops are planted is the best time to clear the land of weeds. In October, when the land is in good shape, spread twenty or twenty-five loads of farm manure per acre over the surface, then rib the land with either a double mould plow or ribbers attached to the frame of a cultivator as previously described in this book. Run all necessary cross water furrows so that no water will lie on the surface. In the spring, as the land is required for planting, the ribs should be levelled down by harrowing and cultivating. If the soil is clay it should be loosened ten or twelve inches deep with a subsoil plow (Ill. 1), or a four-horse subsoiler. (See Ill. 13.) The above system of cultivation is recommended for market gardeners. As a rule they spread on the surface a heavy coat of manure and bury it about a foot deep with an ordinary plow, turning the crude subsoil on top, which will take a whole season's cultivation to make it available for plant food. This system is in direct opposition to the laws of Nature, which is to keep the vegetable matter on the surface where the bacteria can act upon it and make it available for plant food as required. Half the quantity of manure will give better results by incorporating it with the surface soil by cultivating and harrowing. If market gardeners consulted their best inter-

Preparing
Vegetable
Garden.

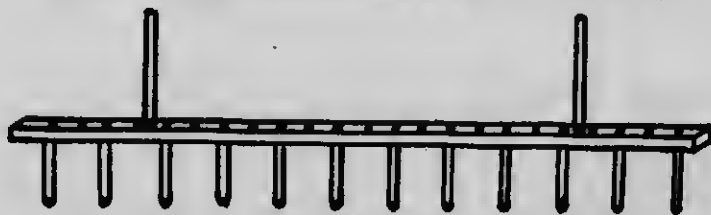
ests they would seldom, if ever, use the ordinary plow. The writer's first lesson on the cultivation of the soil according to the laws of Nature was given to him by a successful gardener, the late Wm. Burgess, whose advice was, "Throw your plow in the fence corner."

List of
Vegetables.

The following is a list of vegetables suitable for a private garden. The directions for cultivation are suggestive.

ASPAR-
AGUS.

Asparagus is one of the earliest vegetables in the spring. Plant in rows thirty inches apart, the plants left nine inches apart in the row, for



57. THE DIBBLER.

hand cultivation. For best results, the land must be thoroughly enriched with well-rotted manure the preceding fall. As it is a gross feeder, apply a good sprinkling of salt in the spring. A good variety of asparagus is the "Palmetto." The roots can be purchased from any seedsman.

BEANS.

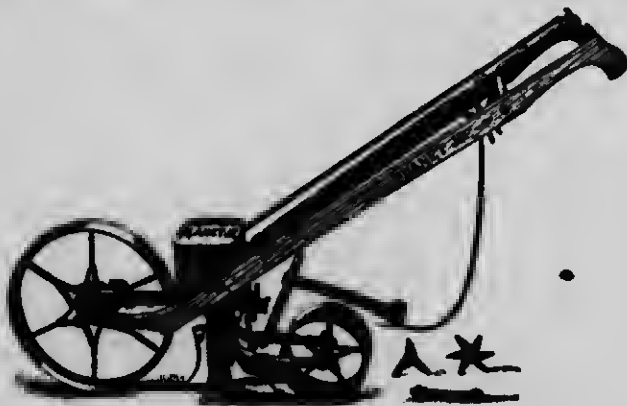
Beans, dwarf or bush. This vegetable, being a "*Legume*," is known to be of the most nutritious, and best as a flesh forming food.

A succession of sowings should be made from early spring until the middle of summer. Plant in drills two feet apart, and the seeds three inches apart in the drills and about two inches

deep. The rule governing the planting depth of all seeds is from four to five times their diameter.

Two varieties suitable to sow are the "Valentine," having green pods, and the "Kidney Wax," which has a yellow pod.

For early use, sow Beets in the spring, as soon **BEETS.** as the ground is fit to work, in drills two feet apart, and thin the plants to six inches apart in the drills. For winter use it is advisable to sow



58. HILL DROPPING SEED DRILL.

in June, as this will give a more crisp and superior quality.

By using a dibbler (see Ill. 57), beets, and, in fact, most seeds and plants, both flower and vegetable, can be grown at the desired distance apart without any variation. This gives a garden an attractive appearance. For those who grow vegetables on a larger scale a "Hill" dropping seed drill is preferable. (See Ill. 58.)

"Crosby's Egyptian" and the "Eclipse" are two very popular varieties of beets.

CABBAGE.

There can be no mistake in growing a large quantity of cabbage, for should there be more than is required for home use, the balance can be fed at a profit to the animals. The plants are taken from the cold frame as soon as all danger of frost is past, and planted in the vegetable garden if wanted for summer use, but those intended for use during the winter should be planted about the end of June.

Plant in rows two feet apart, with the plants eighteen inches apart in the rows.

For the early variety, "Winningstad" answers well, and for a late variety "Fottler's Drumhead."

**CAULI-
FLOWER.**

Cauliflower is a plant that requires abundance of moisture in order to get the best results. It would stand a shower bath every evening when near the time for heading, but as this is seldom practicable the next best thing is to cultivate the soil every two or three days, so as to conserve moisture.

As soon as the heads begin to show, break down the top leaves, which will prevent the heads from getting discolored; or tie them together with a string.

Among the really reliable varieties are "Earliest Erfurt" and "Snowball."

CARROTS.

Carrot cultivation is similar to that of beets, excepting that the plants should be four inches apart in the row instead of six.

"Oxheart" and "Chantenay" are two satisfactory varieties for table use.

CELERY.

Celery requires a cool, moist atmosphere, and

a rich black muck is especially adapted for this plant. The seeds should be sown in a cold frame, or in the open ground, early in the spring. Celery, cabbage and cauliflower plants are made more stocky by shearing off the tops once or twice before transplanting. The best results are obtained by transplanting from the frame into plant boxes, then transplanting in July into rows three feet apart and six inches apart in the row. It is not necessary to plant celery in trenches. When transplanting, firm the soil with the feet to insure a start. In four or five weeks begin to earth up to teach the plants an upright growth.

For blanching, or whitening, first use a hoe, drawing up the leaves with one hand and packing the earth around the plants with the other. Subsequent banking up can be done with the horse and plow. To prevent the earth getting among the stalks, wrap twine once around each plant. The last banking should be done ten or fifteen days before it is required for use or to be stored.

In storing for winter use, dig up before the time of hard frosts and take immediately to a cool cellar and set on the floor with boards at the sides. Bank up with sand or earth the same as for blanching in the field.

Celery is now being fed to poultry in the feeding process for table use. It imparts a desirable flavor to the flesh.

"White Plume" and "Paris Golden" are two excellent varieties for table use.

No garden would be complete without a **SWEET CORN.**

supply of sweet corn for table use. Plant after all danger of frost is past, either in hills three feet each way, or in rows three-and-a-half feet apart, and eight inches in the row. Corn requires continuous cultivation during the growing season to conserve moisture. Desirable varieties are "White Cory" and "Stowell's Evergreen."

CUCUMBER. Cucumber plants for early use can be started in the hot bed and set in the open ground as soon as all danger of frost is past. At the same time the general crop may be planted by putting a few seeds in hills four feet apart. Pick the fruit, whether it is required for use or not, otherwise the vines will die off. Varieties for table use and pickling: "Long Green" and "White Spine."

LETTUCE. Lettuce may be sown early in the spring in rows two feet apart. Thin out for table use or for the poultry, and allow a certain number to heart. If sown every three weeks, fresh lettuce may be had during the summer season. "Hanson" and "Nonpareil" are good varieties.

MUSK MELONS. Musk melons are greatly relished by most people, and should be cultivated in every garden. A light warm soil is preferable; one made rich with well-rotted farm manure. The cultivation necessary is the same as for cucumbers.

Musk melons and cucumbers should be kept some distance apart, otherwise they are liable to become inoculated. The "Hackensack" is a reliable variety of musk melon.

WATER MELONS. The cultivation of the water melon is exactly the same as for musk melons. "Ice Cream" will be found a delicious sort.

The citron, so well known for preserving, **CITRON.** should be given a place in all gardens. It requires to be grown some distance from the water melons. Give the same cultivation as for melons. The "Red Seeded" is a suitable variety.

Onion seed may be sown quite early in the **ONIONS** spring, as a few degrees of frost will not injure the young plants. Sow thin in rows eighteen inches apart.

After the bulbs are about half an inch in diameter all that are required for use when thinning may be left on the ground to dry off. These can be kept over winter and planted for early use the following spring.

Varieties: "Yellow Globe Danvers," "Red Wethersfield;" and the "Silverskin," for pickling.

The parsnip is one of our most nutritious **PARSNIP.** vegetables. Sow the seed early in the spring in rows two feet apart, and thin to six inches in the rows. Leave them in the ground until early winter, as they are improved by the early frost.

A good variety is the "Hollow Crown."

Peas, being one of the *legumes*, should form a **PEAS.** portion of our daily diet. Sow early in the spring in rows two feet apart. Cultivate thoroughly. Make two or three sowings at intervals of three or four weeks. Varieties suitable are:

"Extra Early" (for first sowing), followed by "Little Gem" and "Stratagem." The last two are large, green, wrinkled sorts.

All the pumpkins required for table use may **PUMPKINS** be grown along with the corn. The "Large Cheese" is a good variety.

RADISH.

Radish must be grown quickly in order to be crisp. Sow at intervals from early spring until autumn. To hasten vegetation harrow or rake in land plaster before sowing. Sow in rows two feet apart. Varieties: "Scarlet Turnip" (white tip) and "Long Chartier."

RHUBARB.

Rhubarb seed may be sown in spring, in drills two feet apart, and thinned to same distance, or it may be grown more satisfactory by dividing the roots. For this plant the soil cannot be too rich. Mulch in winter. "Johnston's St. Martin" is a good variety.

SQUASH.

The squash as a vegetable is increasing in popularity. The cultivation is similar to melons, excepting that the hills should be eight feet apart.

For summer and early fall use, sow the "Boston Marrow" and for winter the "Hubbard."

TOMATOES

The tomato plants are supposed to be started in the hot bed or cold frame. For best results transplant into flat boxes, and when all danger of frost is passed transplant (on a cloudy day if possible) three feet apart each way. Reliable varieties are the "Earliana" and "Livingston's Perfection."

TURNIP.

For early turnips, sow in spring, in drills two feet apart, and thin to eight inches. For an early variety "Early White Globe" is satisfactory. For winter use sow a "Bronze Top Swede" about 1st of July.

POTATOES

In the cultivation of potatoes for the early market, the largest profit is from the very earliest, so that there has now come to be quite

as the first among gardeners to be first. In order to gain this, the soil, if not naturally dry and warm, must be made so by underdraining. In the autumn give a good coat of farm manure; then put up in narrow rows for the winter. In spring harrow and cultivate these down, and, if clay, loosen the subsoil ten or twelve inches deep. Again cultivate and harrow thoroughly, then open the drills with a plow, four inches deep and thirty inches apart. Plant whole potatoes of medium size; if large, split them, dividing the seed end; plant eighteen inches apart in the row. Cover with the plow, and in eight days harrow down. Keep the surface pulverized with a "Breed's Weeder" or harrow tooth cultivator. (See Ill. 27.) Cultivate frequently while the potatoes are growing, to conserve moisture. The last time, the earth may be thrown up towards the potatoes, to cover any that may be exposed to the sun. Do not hill up potatoes.

Two weeks before planting spread the seed potatoes on the floor in a warm room, where there is plenty of sunlight, so that the hardy sprouts will start. These should not be injured. This method will ensure an early crop. Among the innumerable varieties two old sorts are worthy of mention, as these are still among the first: the "Early Ohio" and the "Early Market."

In gardening, follow a rotation as far as practical. After the early potatoes are harvested, sow peas and huckwheat to plow under. This will add fertility, in addition to improving the texture of the soil.

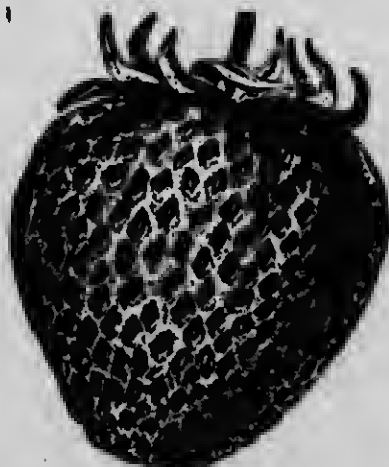
Rotation in
Garden.

SECTION III.

SMALL FRUITS.

The same preparation of the land necessary for vegetables is required for small fruits.

The first of these to ripen is the wholesome and appetizing strawberry. These should be grown in every garden. The surplus can always be disposed of at remunerative prices.

**STRAW-
BERRIES.**

59. WILLIAMS STRAWBERRY.

**Planting
Straw-
berries.**

The plants can be set out at any time from early spring until October, in thoroughly prepared soil. Set in rows three feet apart, and eighteen inches in the row. Cultivate frequently the first season, and destroy all weeds. Renew by setting out one-third of the whole in new plants every year.

**Renewing
Straw-
berries.**

An equal portion of the old stock may be plowed under and used for some other crop. This

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60. GOOSEBERRY—DOWNING.

**Mulching
Straw-
berries.**

rotation will give superior fruit. Mulch late in the fall with coarse farm manure. Uncover the crown of plants early in spring, and leave the manure for mulching.

The varieties are so numerous that it is difficult to make a selection.

**Williams
Strawberry.**

The "Williams" (see Ill. 59) is regarded as one of the best standard varieties at the present time, having a perfect flower. Ripens medium early; fruit very large.

**GOOSE-
BERRIES.****Varieties of
Goose-
berries.**

While gooseberries do not grow to the same perfection in this country that they do in Great Britain, yet the following varieties give, as a rule, very good results: "Downing," green in color (see Ill. 60); "Whitesmith," yellowish white and smooth; "Industry," dark red, hairy. Plant gooseberries in rows four feet apart each way. Train the hushes in the form of a tree.

**Cultivation
for Fruits.**

In the cultivation of fruits of all kinds, there should be an abundant supply of vegetable matter incorporated with the surface soil, to supply plant food and act as a mulching to conserve moisture. The cultivating should be done during the spring months. In July, sow Red clover between the rows of hushes, and sometime during the following spring spread between the rows some rotted farm manure, and plow under lightly, then harrow and cultivate according to the previous directions.

**RED
CURRANTS.**

No farm home would be complete without a supply of currant jelly. The planting and cultivation of currants is similar to that of gooseberries, except that currants may be grown in

bushes instead of a single stalk. By this means, the wood can be renewed by cutting out the old stalks. As a suitable red currant we would



61. CURRANT—BLACK CHAMPION.

suggest the old reliable "Fay's Prolific," and for **BLACK CURRANTS.** a black variety the "Black Champion." (See Ill. 61).



62. RASPBERRY—MARLBORO.



63. BLACK CAP BERRY—HILBORN.

**RASP-
BERRIES.****Planting
Rasp-
berries.****Pruning
Rasp-
berries.****Varieties of
Rasp-
berries.**

Raspberries come immediately after the strawherry season, and give abundance of delicious fruit at little cost. Plant and cultivate according to directions given for other small fruits. Cut out all the old wood and weak shoots each spring, leaving not more than six stalks for fruiting. No suckers should be allowed to grow outside the hills. From the long list of red varieties the following might be named: "Marlboro'" for earliest (see Ill. 62), and "Cuthbert" to follow. For a yellow variety "Golden Queen."

**BLACK
CAP
BERRIES.****Black-
berries
(Brambles).****Varieties of
Black-
berries.**

For black cap berries, there will be no mistake in selecting either the "Hilborn" (see Ill. 63) or the "Gregg." Blackberries (hrambles) are generally relished on account of their peculiar aromatic flavor. The cultivation is the same as for raspberries, except that the rows should be seven feet apart, and the plants four feet apart in the row.

In selecting a variety, there can be no mistake in choosing either the "Snyder" (see Ill. 64), or a newer variety that is claiming first place, the "Wilson Junior."

GRAPES.

If one fruit is more highly esteemed than another, it is the grape. Besides its delicious fruit, the vines can be trained on a trellis or an arbor, so as to be both ornamental and useful. To ensure success, the cultivation and pruning must receive proper attention.

**How to
Plant
Grapes.**

Set out in the spring, selecting good, strong vines. The soil must have been thoroughly cultivated and subsoiled. Plant in rows eight feet



64. BLACKBERRY—SNYDER.

How to
Prune
Grapes.

apart, and about sixteen feet in the row. Allow grape vines to grow the first summer without pruning. In the fall prune back, leaving three or four buds at the bottom. The following spring allow only two of these shoots to grow, and in the fall cut them back to about four feet. The following spring these two shoots may be fastened horizontally to the lower wire of the trellis. (See Ill. 65.)

How to
Train
Grapes.

The uprights should be from ten to twelve inches apart. In the fall the upright shoots



65. GRAPE TRELLIS.

should be cut back to two or three buds, and only one of these allowed to grow in the spring. In tying up grape vines use some soft material, as tow or raffia.

Cultivation
of Grapes.

The cultivation of grapes should be thorough, and only in the spring and early summer. At the end of July some crop should be sown, and allowed to remain on the surface as a mulching until the following spring. A suitable crop for this purpose is vetches and buckwheat (mixed). The advantage of this method is that the crop will use a large portion of the moisture (of the soil) during the months of August and Septem-

Mulching
Grapes.

ber. This will allow the wood and fruit to mature earlier and in its proper season. This mulching also prevents the frost from injuring the roots in winter, and keeps the grapes from starting to grow too early in the spring.

Ripening
Grapes.

By plowing this under shallow, along with well-rotted farm manure, in the spring, and cultivating as in the previous year, you will insure an abundance of matured fruit.

Fertilizing
Grapes



66. GRAPE—BRIGHTON.

During the past few years many new varieties of grapes have been introduced, and after a trial have been found wanting. The following varieties can be relied upon: "Campbell's Early" and the "Concord" (black color), the "Brighton" (see Ill. 66) and "Moyer" (red), "Moore's Diamond" and "Niagara" (white).

Varieties of
Grapes.

SECTION IV.

ORCHARD.

**Exposure
for Orchard.**

It is considered that the most suitable location for an orchard is a north-east by east exposure, for the reason that the trees thus exposed are later in blooming, and consequently there is less danger of frost destroying the fruit when it is forming. This, however, can in a measure be obviated by mulching in the autumn.

**Draining an
Orchard.**

Before planting an orchard the land should be put in proper condition by first under-draining, the drains placed thirty-five feet apart, and arranged so that there will be a drain between the rows of trees. If close to the trees the drains are liable to be choked with the rootlets. A clover sod plowed and manured in the fall the same as for root crop (see cultivation for field roots) is the most desirable preparation of the soil for planting an orchard.

**Planting an
Orchard.**

The early spring is the proper time to plant all fruit trees. Plant an apple orchard in rows thirty-five feet apart, and thirty-five feet in the row. Set alternately so as to allow more space for the trees.

Pears, plums and cherry trees would do with twenty feet space, but when only a few of each of these are required for home use it is advisable, for convenience in cultivating, to keep them in line with the apple orchard.

In planting, make the holes large enough to admit the roots without cramping or bending, and deep enough to bring the tree to its natural

depth. If the subsoil is clay, loosen, after the hole is dug, with a spading fork ten or twelve inches, so that all rain water will filter down below the roots of the tree when planted. The fine surface soil should be used for covering the roots, and this should be carefully worked among them. If the ground is dry, it is well to pour in some water when the hole is partially filled. See that the ground is firmly packed over all parts of the roots by exerting the full weight of the planter upon it, so that there will be no opportunity for dry air to enter and destroy the roots. Fill the holes full enough to be even with the surrounding surface after the fresh earth settles. Never put manure in contact with the roots. The young trees should be staked and tied, so that the wind will not loosen the roots.

When the trees are planted, they should be mulched with coarse farm manure four or five inches deep, for a space two feet more in diameter than the extent of the roots. This keeps the earth moist and of even temperature.

The following spring, a strip of eight or ten feet wide in line with the rows of trees should be plowed shallow; then harrowed and cultivated with wide points, to clean the land and conserve moisture, at intervals of two weeks until July. Then seed this strip with either Alfalfa or Red clover, to remain over winter as a cover crop. In the following spring the clover should be plowed under, harrowed and cultivated until July, and again seeded with clover as in the previous year. After three years of this treat-

ment, the strip in line with the trees may be seeded with Alfalfa, and allowed to remain for two years without plowing. This will allow the Alfalfa roots to penetrate down among the roots of the trees, and perforate the subsoil, letting the air in among the roots of the trees.

A hoe crop may be grown between the rows of trees the first season after planting, followed with a grain crop the second year, seeding with Alfalfa; or the space between the rows of trees may be seeded with Alfalfa clover when the trees are planted. Provided the land is clean and in good condition, it can remain for a number of years without plowing. The first growth can be made into hay, or cut and fed green; all animals are very fond of it. It is advisable not to remove the after-growths. Whatever is removed from the soil, its equivalent should be returned in farm manure and spread over the surface in winter.

The advantages of Alfalfa are that it collects a large amount of free nitrogen from the air. The roots will go down two or three feet, and bring up soluble mineral matter. Besides, they perforate the soil among the roots of the trees, and let in the air, which is very essential. A cover crop of clover and farm manure also prevents the trees from blooming too early in the spring. Although the above directions are specially applicable to the apple orchard, they are equally beneficial for other fruit trees. Following in the order according to Diagram 18, the cherries will come in order next to the grapes. Standard trees are more suitable than dwarfs for

horse cultivation. Reliable varieties of acid cherries for preserving are "Montmorency" (a red) and "Louis Phillipe" (also a red). (See Ill. 67.) The following are three satisfactory



67. CHERRY—LOUIS PHILLIPPE.

sweet cherries for table use: "Governor Wood" (a pink), "Elton" (a yellow blush), and the "Black Tartarian."

This most delicious of fruits, the plum, has PLUMS.



68. PLUM—DUANE'S PURPLE

suffered severely in past years from the "Curculio" and "black knot," but now that we are able to combat against these and other pests, by spraying with certain compounds which will be given later in apple culture, the plum should be grown.

Plum
Culture.

For an early plum the "Niagara" might be named. This is a seedling from the "Bradshaw." Its color is dark blue. For second, the early "Duane's Purple" is a favorite (see Ill. 68), and for an autumn variety the "Reine Claude," a greenish plum marked with red.

Plum
Varieties.

Hardy peaches for Central and Northern Ontario are yet in the experimental stage, and, no doubt, this desirable object will be obtained within the next few years. Already several nurserymen claim to have new seedlings which will grow in more northern latitudes than our present varieties.

PEACHES.

The cultivation of the pear is extending as its value is appreciated. The melting, juicy texture, the fine flavor and delicate aroma of the pear give it a high place among fruits.

PEARS.

A pear orchard, properly attended to, will yield larger returns than an apple orchard, but pears require special care, particularly in picking and packing, both for home use and for shipping.

Pears,
their Value.

Two reliable summer varieties are the "Bartlett" and "Clapp's Favorite." (See Ill. 69.) For the autumn "Sheldon" and "Flemish Beauty" are suitable, and for early winter "Beurre D'Anjou" and "Beurre Clairgeau."

Pear
Varieties.

The apple orchard should be divided into two

APPLES.



69. PEAR—CLAPP'S FAVORITE.

departments; the first for domestic use, and the second for export purposes. For home use, in ordinary cases, two or three trees of each of the following varieties will be sufficient for summer and early winter use.

Varieties
for Domestic
Use.

One of our best and earliest varieties is the "Yellow Transparent." This is a Russian variety which was imported in 1870 by the Agricultural Department. Then follow the "Duchess of Oldenburg," "Stibbard's Seedling," "Snow" or "Famuse," and "Wealthy." The balance may be reserved from the winter varieties grown for export.

Apples for
Export.

The export trade is bound to increase, as this country is specially adapted to apple culture. Our farmers should, therefore, take advantage of their opportunity, and be prepared, each for his portion of this trade. My idea is that the farmer's part of the business is to grow the apples, and sell them outright to the shippers in the autumn, so that he can attend to his other farm work and let the shippers see after the picking, packing, etc. Many farmers who have orchards in full bearing and of a suitable variety for export, are deriving handsome returns.

Sell on the
Tree.

In planting out an orchard, first decide on the variety you intend to grow for the export trade, and see that you get good, healthy young trees. For export it is necessary to have a good winter variety; one of the best is the "King of Tompkins" (see Ill. 70). It is a good shipper and commands a high price in the British market, but it is a scant bearer, unless grafted on healthy

Plant
Healthy
Trees.



70. APPLE--KING OF TOMPKINS.

growing stock, such as "Talman Sweet," than which none is better. By doing so the yield will be increased double. This is done by planting out an orchard of "Talman Sweet" trees, and the second year grafting "Kings" on half of the top.

Grafting on
Talman
Sweet.

If there are four or five main branches to form the top, graft each alternate branch about three inches from the trunk and horizontal, to form the top properly, and the balance the following year. Do not cut off the whole top in one year. These trees will commence to bear in three or four years after grafting. Satisfactory results are obtained from grafting "Kings" on the "Wealthy," "Duchess" and "Ben Davis" The latter is one of the most prolific and best shipping apples, but the quality is inferior. As a long keeper it has no superior, if equal. There are many orchards being planted with this variety, and should the market get overstocked, either "Kings" or "Northern Spy" (see Ill. 71) can be grafted on the "Ben Davis" trees. The "Northern Spy" will bear in four or five years, whereas on their own stock they will not bear for fourteen or fifteen years from time of planting.

How to
Graft.

Advantage
of Grafting.

Apples for
Export.

Graft
Northern
Spy.

Any of the following varieties will give satisfaction for export, without grafting, viz., "Ontario," "Sutton Beauty" and "Baldwin."

Varieties
Without
Grafting.

Pruning fruit trees is an important matter. The time to begin is before the tree is planted, when the branches should be cut back and the top formed. Pruning should be done as the

Pruning
Fruit Trees.



71. APPLE—NORTHERN SPY.

leaves are opening, end of May or first of June. When this work is attended to annually and properly, there will rarely be any large limbs to cut off.

The ideal shape is an inverted umbrella with a centre upright branch, so that the sun and air may reach the fruit. No two cross branches should overlap each other.

Shape of
Tree Top.



72. SPRAYER.

The last but not the least important work in connection with fruit culture is protecting the trees and fruit against insect pests. With the proper utensils and materials this can be accomplished (see Ill. 72). First secure a good brass spraying pump mounted on a barrel supplied with an agitator. Set the barrel on a cart,

Spraying
Fruit Trees.

**Selecting
Spraying
Apparatus.**

waggon or hand-cart. Select a nozzle which is easily cleaned, and that will break up the solution so that it will leave the nozzle like a mist. As a fine spray cannot be thrown any distance, it is advisable to attach two nozzles to a bamboo pole by a T (see Ill. 72), and the hose fastened to the other end of the pole.

**Apple
Insects.**

The solution to be applied for masticatory insects, such as caterpillars and beetles, is one pound of Paris green to two hundred gallons of water. For suctorial insects, such as Aphides and Scale insects, use kerosene emulsion, made after the following formula: Hard soap, one-half pound, or soft soap, one quart; boiling water (soft) one gallon; coal oil, two gallons. After dissolving the soap in the water, add the coal oil and stir well for from five to ten minutes. In using, dilute with from ten to twelve parts of water.

**Kerosene
Emulsion.****Apple Scab
Treatment.**

For treating the scab, use a Bordeaux mixture made according to the following formula: Copper sulphate, four pounds; lime (fresh), four pounds; water, forty gallons. Suspend the copper sulphate in five gallons of warm water. This may be done by putting it in a bag made of coarse material, and hanging it so as to be covered by the water. Slake the lime in about the same quantity of water, then mix the two, and add the remainder of the forty gallons of water. It is best to combine the Paris green and the Bordeaux mixture, and in this way apply a combined insecticide and fungicide. The results are as good as if each were applied

**Spraying
Solution.**

separately. The following is the proper treatment for an orchard: For destroying codling moth, bud moth, tent caterpillars, canker worm, apple spot and leaf blight (first spraying) apply Bordeaux mixture and the Paris green (four ounces of Paris green to a barrel of the mixture) when the buds are swelling.

Second spraying: Bordeaux mixture and Paris green before the blossoms open. Time to
Spray.

Third spraying: Bordeaux mixture and Paris green when the blossoms have fallen.

Fourth and fifth sprayings: Bordeaux mixture and Paris green at intervals of ten and fifteen days.

A sixth application may be necessary if any scale should appear on the fruit or leaves.

The same pump and barrel is used for spraying potatoes for the beetle (*Doryphora* and *De-comlineata*). The preparation for this purpose is one pound of Paris green to a barrel of water, placed on a cart or other one-horse vehicle so that while the horse is walking in one drill the wheels will be in the two adjoining. With the drills thirty inches apart, a T sprayer can be made with one-inch iron gas pipe so as to spray four or six drills at a time. One man sits behind and attends to the sprayer and another works the pump. Spraying
Potatoes.

CHAPTER III.

SECTION I.

FARM IMPLEMENTS AND BUILDINGS.

Purchasing Implements.

In the first place it is desirable to purchase only such implements as are necessary and best suited for the different kinds of work for which they are intended. An expensive implement is not always the best. The rule should be to buy only such implements as are necessary and up-to-date, and on no account to buy an implement that is not required on the farm. The whole assortment of implements should be cared for in the best possible manner, with a view to extending their time of usefulness.

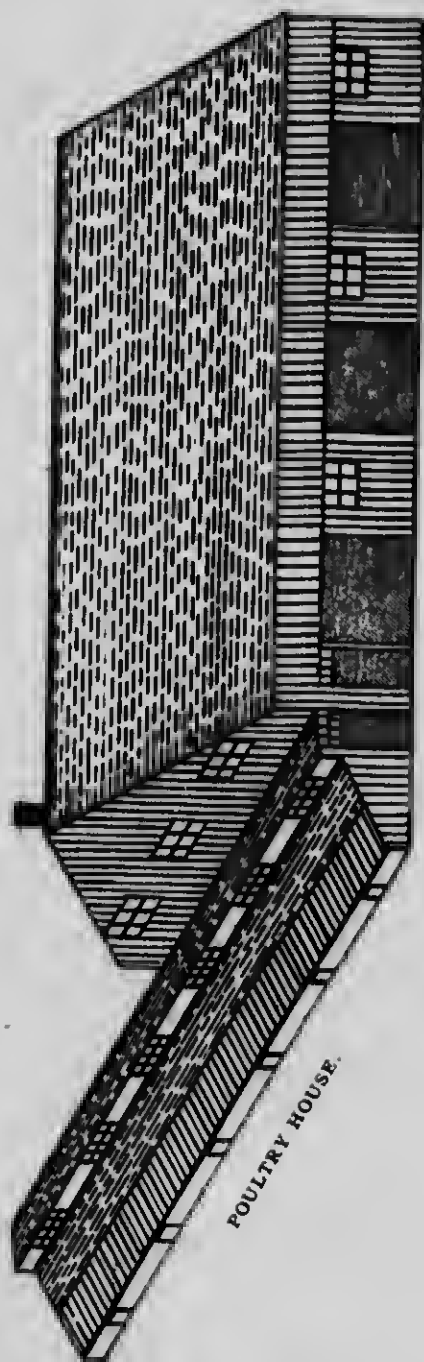
Implement House.

The first thing to be done is to provide an implement and tool house (see elevation, Ill. 73), and the second to see that every implement and tool is under cover, and in its proper place when not in actual use.

Exposure Ruins Implements.

Exposure to rains and sun is ruinous to implements, even to those which are constructed of iron or steel. It is a saving of time and money to keep all the farm machinery, implements, etc., under cover, and in their place, and keep every implement in good working order. The implements and tools should be painted occasionally, a work which may be done on mild days during the winter season.

In one end of the implement house there should be a forge (a cheap fan forge is all that



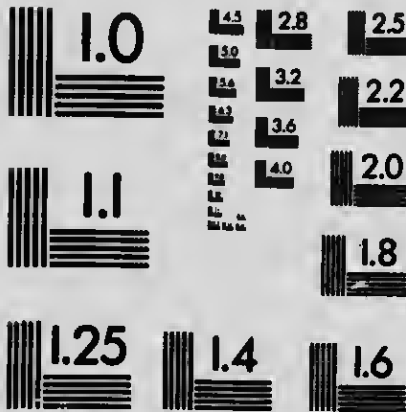
73. ELEVATION OF IMPLEMENT HOUSE.

POULTRY HOUSE.



MICROCOPY RESOLUTION TEST CHART

(ANSI and ISO TEST CHART No. 2)



APPLIED IMAGE Inc

1653 East Main Street
Rochester, New York 14609 USA
(716) 482 - 0300 - Phone
(716) 288 - 5999 - Fax

**Blacksmith
Forge.**

is necessary), with an anvil and a few blacksmith's tools. Most men, if at all "handy," can do ordinary repairs on a farm, and save not only expense, but also the time of going to the blacksmith shop, which is often worth more than the cost of repairing.

**Work
Bench and
Tools.**

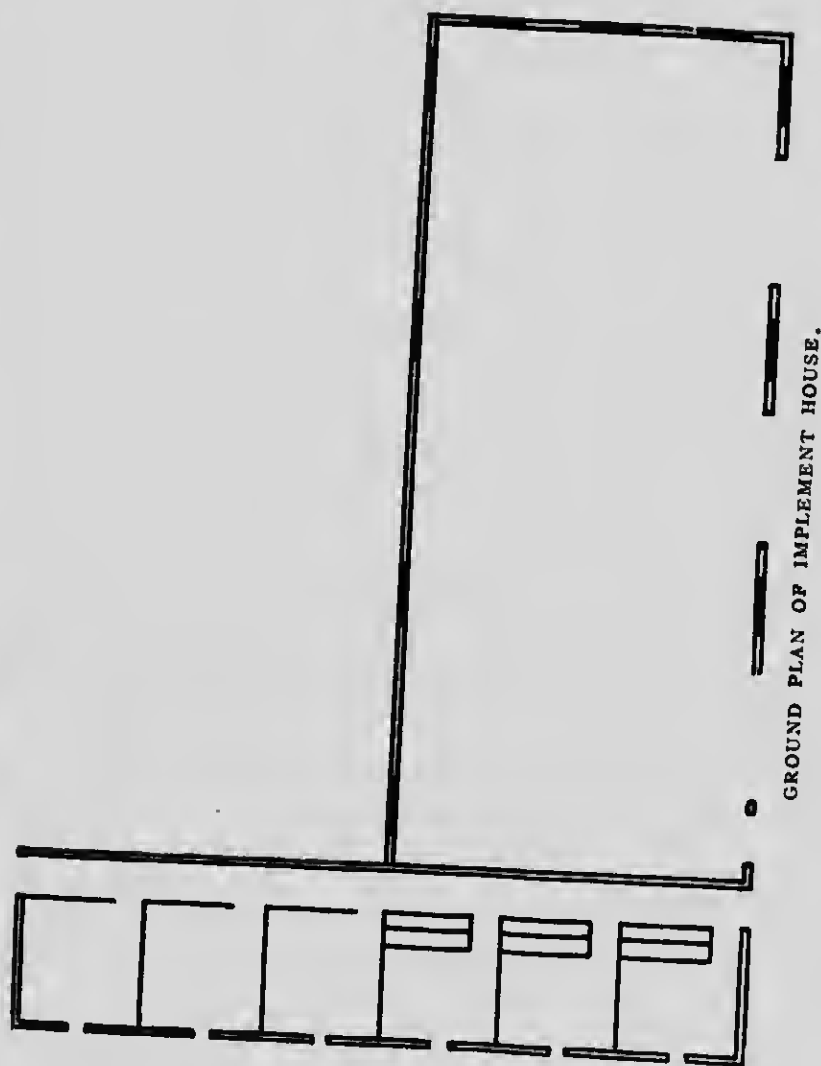
In addition to a blacksmith's bench and tools, in the same end of the building, there should be a carpenter's bench, provided with such tools as are necessary to do ordinary woodwork repairs. Extra sets of whipple trees should be kept on hand in case of breakage and hooks for all the spades, shovels, scythes, forks, etc.

The location of the building should be convenient to both the barn and the house (see diagram of farm, 18), and at the same time be isolated for safety in case of fire.

**Dimensions
of Building.**

The size of the building must correspond to the requirement of the farm. For a farm of one hundred and fifty acres, a building sixty feet long by twenty-six feet wide (see plan, Ill. 74), will not be too large for all the farm machinery, implements, waggons, sleighs, carriages, cutters, etc. The building need not be high unless the loft is required for hay. This, however, is not desirable, as more or less dust will get through, and, besides destroying, will make the implements and vehicles look untidy. The floor should be low so that the waggons and implements can be taken out or put in by hand. An earth floor, slightly higher than the surrounding ground, is all that is necessary. In a building

Low Floor.



GROUND PLAN OF IMPLEMENT HOUSE.

74. GROUND PLAN OF POULTRY HOUSE.

Doors with
Rollers.

sixty feet long three doors are all that are required, each nine feet wide, with the spaces also nine feet. Hang the doors with pulleys on an iron bar running the whole length. The doors can all be opened without interfering with each other.

SECTION II.

FARM BARN.

System of
Farming.

The most important building on the farm is the barn. The location of the barn has much to do with the profits of the farm. Not only have the handling and storing of the crops to be considered, but the housing of the live stock, so as to get the best results at the least cost. The first thing to consider is the system of farming to be adopted. If dairying, will it be home dairying, or will the milk be sent to the factory, or is the intention to raise pure-bred stock. It may be that the farm and location are suitable for summer grazing, selling the stock in autumn. In this case little or no stabling is required. The method that many are following with good results, that is, buying stock in the autumn, fattening them during the winter, and selling in the spring, this requires considerable stable-room.

Farm Barn.

These all require buildings, especially arranged, and, in giving the design for a barn, I will have to go on general principles. In the first place, it is desirable, for convenience, to have the live stock under one roof, or in buildings close together. Horses and cattle do all right in a stone or concrete basement, sheeted on the

inside with lumber; sheep and pigs do better in separate and wood buildings.

Sheep and
Pigs
Separate
Buildings.

Whether a barn with an end or side drive is preferable is a debatable question. With an end drive, that is one in the centre, there is a large amount of space lost, since the driveway comes under the highest part of the roof. In a side drive, where the barn is over sixty feet long, it is necessary to have two drives.

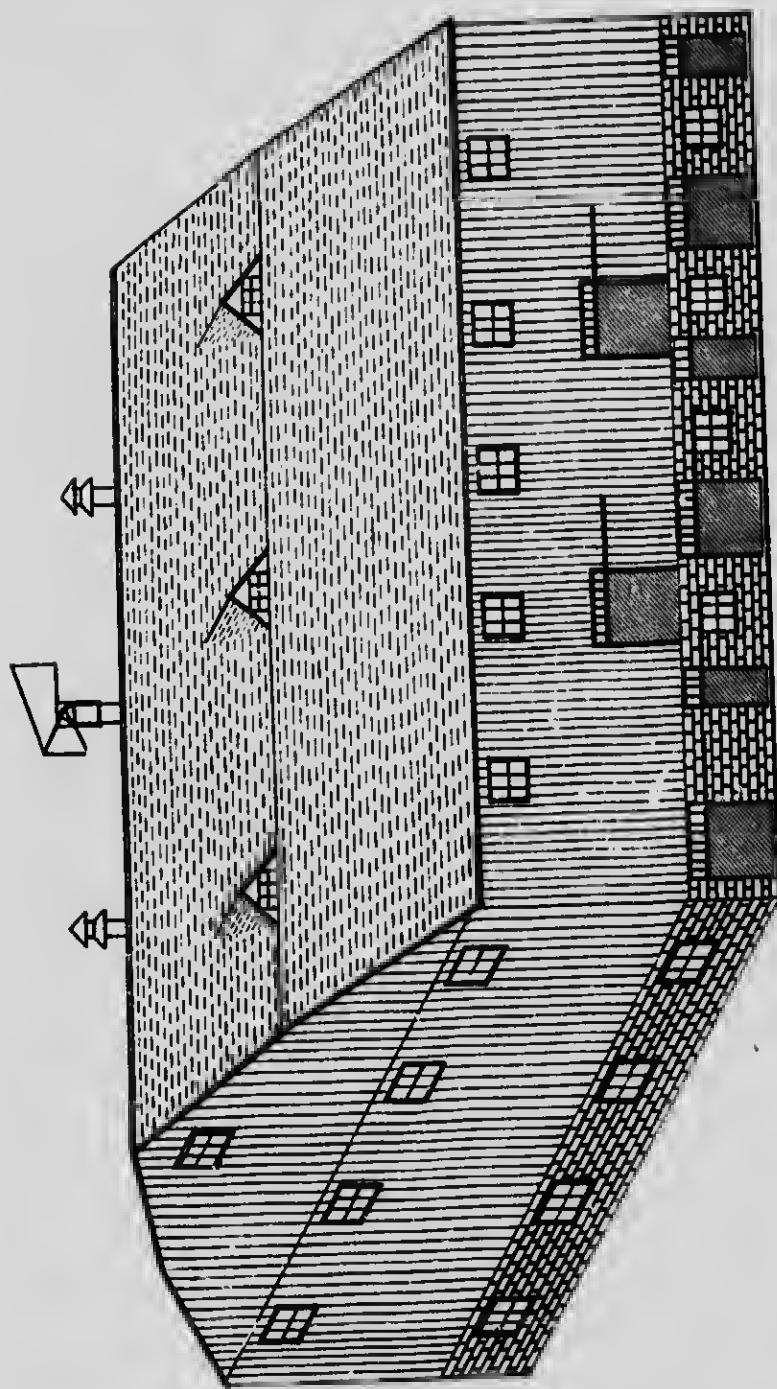
End Drive
or Side.

For a farm of from one hundred and fifty to two hundred acres, the barn should be sixty feet wide by one hundred feet long, with twenty-four feet posts (see elevation 75). The mows are twenty-seven feet deep; the driveways twelve feet each and the space between twenty-one feet, half of which is for the granary. The balance between the driveways is convenient for turning the waggons on, by driving in one way and out the other. When not required for storing grain, it can also be used for storing chaff or straw, which is too valuable to be stacked in the yard.

Size of
Barn.

The whole of the ground floor should be covered with two thicknesses of inch boards twelve inches wide. First cover with inch hemlock nailed to the joists. Then cover over with tar paper, then a layer of pine boards, laid so as to break the joints. These also require nailing to the joists to prevent rising, caused by the steam from cattle underneath. The tar paper, in addition to keeping vermin from eating the floor, prevents dust from passing through. It is advisable to have as few beams as possible.

Flooring
Barn.

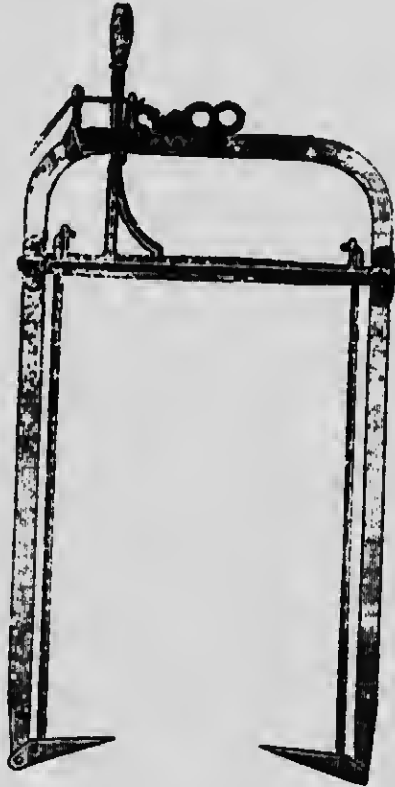


75. ELEVATION OF BARN.

The barn doors should be hung with rollers on an iron bar. There should be sufficient windows for light, and these so arranged that even when the barn is filled with the crops a number of them will not be covered.

Doors.

Windows.



76. DOUBLE HARPOON HAY FORK.

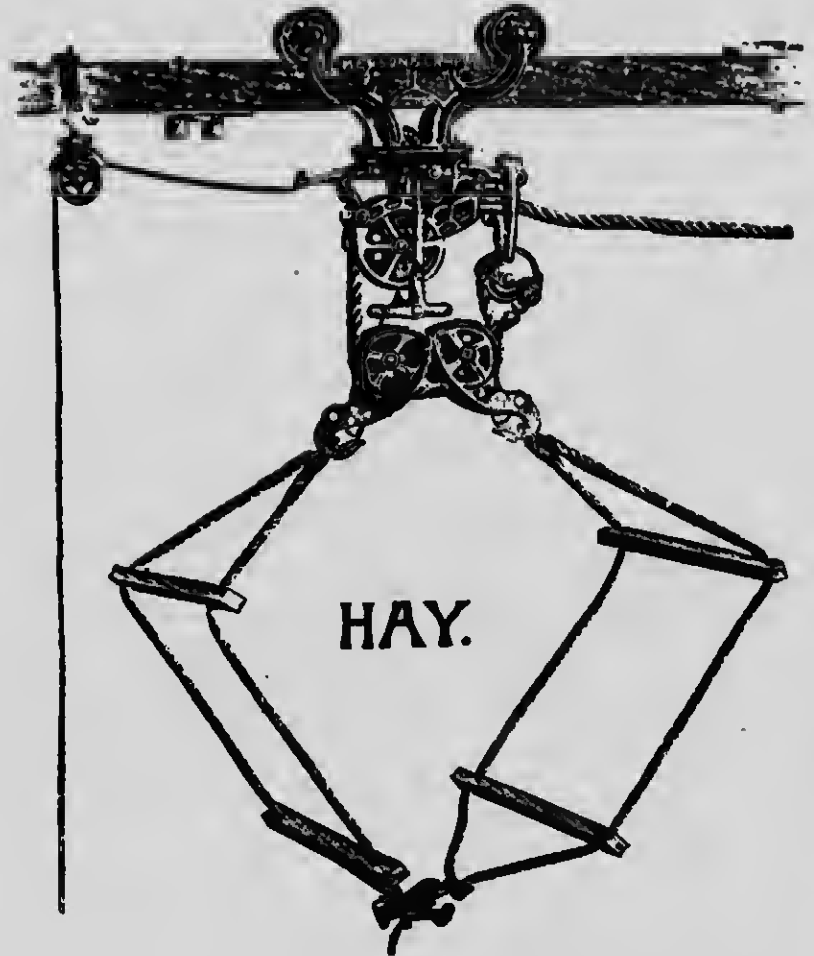
The roof should not be higher than is necessary, which will save considerable in the cost. A curb roof economizes space, and with this style the barn can be better lighted (see elevation 75).

Roof.

The sheeting for the outside of a barn, and

Sheeting Barn.

the other farm buildings, should be of pine boards, one inch thick and ten inches wide, and dressed on the outside. The joints should be



77. HAY CARRIER AND SLINGS.

covered with battens, one inch by two and a half, which should be nailed on perfectly perpendicular.

In order to save time and labor, the storing of crops requires special attention. There is no difficulty in filling the bottom portion of the mows, but the unsolved question is the most economical and practical method of filling the top portions, particularly with sheaves. The Double harpoon hay fork (see Ill. 76) is all right for hay and peas, but is useless for sheaves.

Filling the Barn.

The slings with double power pulleys (see Ill. 77) handle both sheaves and hay or peas satisfactorily, but they are expensive. Besides there is considerable time lost in the field putting them into proper shape. The rack lifter has many advocates, but there is also time lost in raising the load and again lowering the rack and replacing it on the waggon. For a moderately high barn, and for lofts, the harpoon horse fork is satisfactory for both hay and loose grain. The sheaves can be handled satisfactorily by having an extra man on a scaffold.

Unloading Grain.

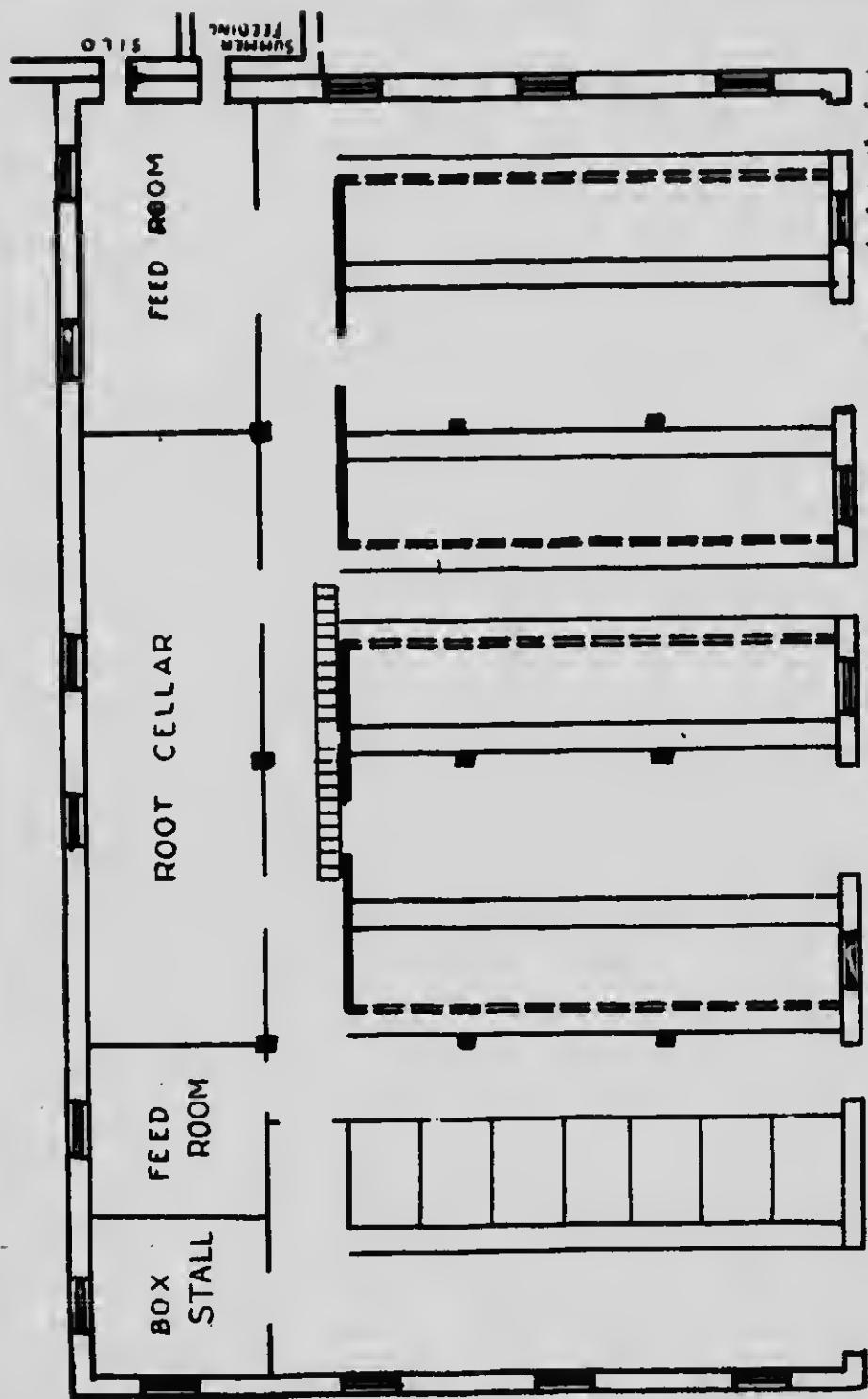
It is an advantage, but not necessary, for a basement barn to be on the side of a bank. For the driveways it is advisable to build a wall, twelve feet from the barn, and cover it with plank. This will keep the embankment back from the basement wall, and will allow more light and air into the basement. The material for a basement may be either stone, brick, or concrete, the latter being durable and satisfactory. The floors should be concrete.

Entrance to Barn.

Concrete Floors.

In building and arranging a basement for barn (see Ill. 78) intended for live stock it is essential to provide for light and pure air. (See

Light and Air Essential.



Scale 1/4 inch to the foot.

78. BASEMENT OF BARN.

ground plan.) According to recent scientific experiments, light is a preventative of many infectious diseases. It destroys most bad germs, such as those of consumption (Tuberculosis) and diphtheria. It is, therefore, important that we should arrange to get all the light possible, not only into our cattle stables, but also into our dwelling houses.

The old bank barn, with the projecting roof in front, is too dark. The floor of the basement should be above the barn yard, the walls ten feet high, with all the windows possible on all sides, so that the stables will be nearly as light as it is out of doors.

Old Style
Unhealthy.

The ventilation is all important. By properly arranged ventilation the impure air is removed and replaced by pure. This constant change of the air in the stables is absolutely necessary to preserve the health of the animals.

Ventilation
Important.

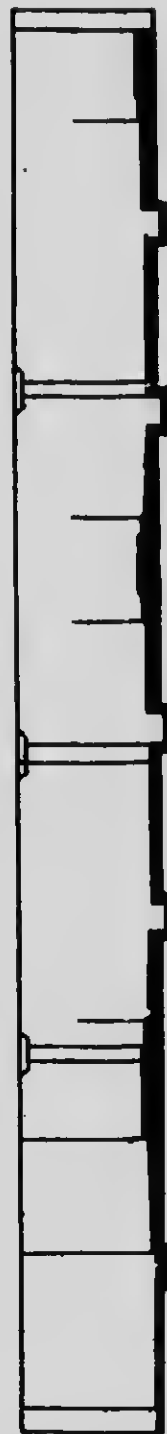
Many systems have been tested during the past few years, but so far none appear to be perfect in every detail. Perhaps the nearest approach to a satisfactory automatic ventilation is the stand-up pipe, with a cowl on the top to face the wind, which conducts the fresh air down and into an underground pipe leading into the stable. The distributing openings may be near the ceiling, instead of the ground floor. As fresh air is charged with oxygen, it is consequently much heavier than the impure air that has been breathed by the animals, and will fall to where it is required, while the impure air, being lighter than the incoming fresh air, rises upwards

Scale $\frac{1}{4}$ inch to the foot.

78. BASEMENT OF BARN.



79. STATIONARY STANCHION.



81. BASEMENT FLOOR.

Scale $\frac{1}{4}$ inch to the foot.

through flues, which open into the stable at the ceiling, and run up by a post through the roof. The portion above the roof may be a round galvanized pipe, twelve inches in diameter, with a flange around the top, and a dome one foot above to cause a suction. The one objection to this system is the cost. The second system is to have the cowl on the barn (see elevation 75), and the pipe leading down to the ceiling of the stable. About twelve inches below the ceiling erect a platform of inch boards, about four or five feet square, for the down draft to strike and be distributed. This system gives abundance of fresh air, but it is not of so even a temperature as it would be if first passed through an underground drain. A third and still cheaper system is to have openings like fan-lights, say twelve by thirty inches, at intervals around the wall, close to the ceiling. Fit in these openings frames hinged from the bottom, and made to open inwards from the top about one-third, or, say, at an angle of about forty-five (similar to the upper lights in our railway coaches to supply fresh air); tack muslin or cheap factory cotton on these frames. When the wind is blowing, the draft will be along the ceiling, instead of on the animals, and even when closed they will let in sufficient fresh air to keep the ceilings and the animals dry.

The following plan of basement (see basement plan, Ill. 78) is arranged for seven horses and fifty-two cows (or other cattle), and a loose box. The stable is so arranged that box stalls can be

Plan of
Basement

made in the cattle compartment by using
Feed Rooms. hurdles. Then there is horse and cattle feed



80. SWINGING STANCHION.

**Cattle
Stanchion.**

rooms, and also a root cellar on the north side. The size of barn and basement can be increased or decreased according to the requirements. The stanchion used has the advantage of a draw rod, which opens all the stanchions in a row (see Ill. 79), which can again be closed as soon as the cattle are free; the swinging stanchions allow the cattle more freedom (see Ill. 80) (stalls in a cattle stable are found to be useless). By having the cattle dehorned they may be let loose, for exercise, in the stable without being turned out of doors in cold weather. Cast iron water basins are fastened on the partitions, arranged so that one basin will supply two animals. For details see the plan of basement (81).

SECTION III.

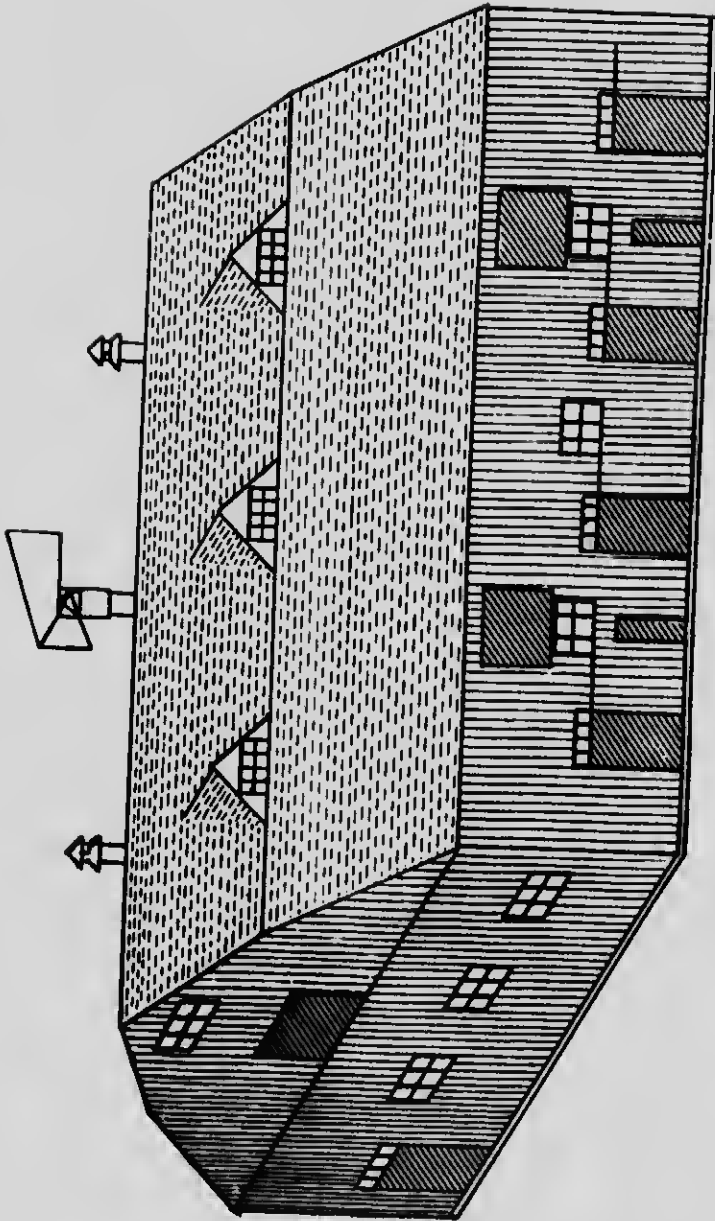
SHEEP PEN.

Sheep Pen.

For location of the sheep pen see farm diagram 18.

**Cattle and
Sheep
Separate.**

As cattle do not thrive on the same pasture along with sheep, it is advisable not to keep

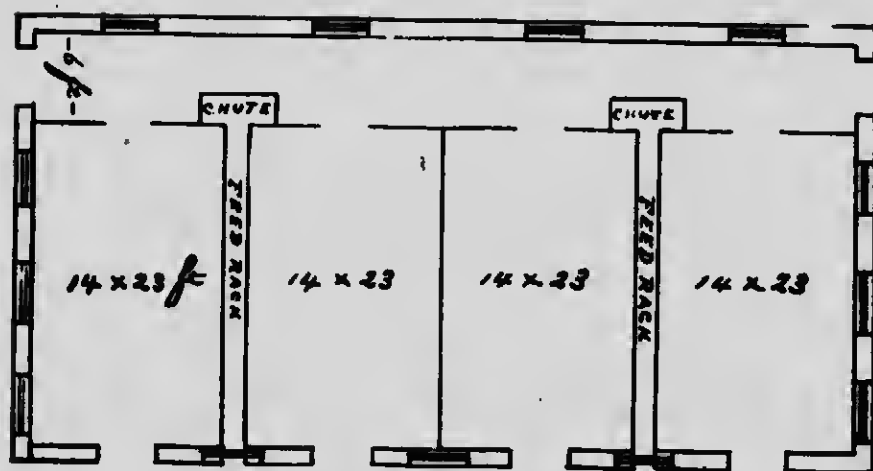


82. ELEVATION OF SHEEP HOUSE.

both, unless they can be kept on separate pastures. For winter feeding, sheep (particularly lambs) give good returns when properly managed. In the first place, they require a dry building with plenty of light and fresh air. (See elevation 82.)

Plan of
Building.

In deciding on the size of a building, allow from twenty to twenty-five square feet for each animal, according to the size. For the best



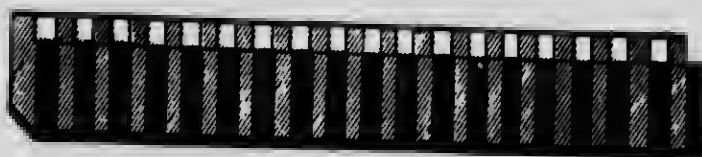
83. GROUND PLAN OF SHEEP HOUSE.

Scale $\frac{1}{8}$ inch to the foot.

Compartment.

average results there should not be too many together. A flock of sixty sheep will require a building thirty by sixty feet, with a passage on one side of five feet, leaving an inside space of fifty-nine by twenty-three feet for the sixty sheep. This should be divided into four compartments (see ground plan 83) of fourteen by twenty-three feet each in the clear, which is ample for fifteen sheep. The centre is a plain

partition, while the other two answer the double purpose of partition and feed rack. (See diagram 84.) The bottom of the rack is a plank, sixteen inches wide, raised from the floor eight inches, and on each edge a six-inch board is nailed, projecting above the plank four inches to form a trough. Another six-inch board is made stationary, parallel to form top of rack, leaving a space between of two and a half feet. The uprights are inch boards, eight inches wide and three feet long, nailed at the bottom and top, leaving spaces between of seven inches for

Feeding
Rack.

84. FEED RACK.

the sheep to put in their heads and feed. Whether it be grain, roots, or coarse fodder, each sheep secures an opening, and cannot be moved by another. The rack has an opening at each end. The entrance next the passage is for feeding, the other is to clean out the refuse into the yard. (See plan 83.) Portable racks made on the same principle are convenient for feeding sheep in the yard or field. (See Ill. 84.) An earth floor is all that is necessary for sheep. From floor to ceiling should be ten feet. The length of posts are sixteen feet from the ground to the plate, and with a curb roof leaves ample provision for hay and other fodder.

Portable
Rack

**Interior and
Ventilation.**

The stone foundation should only rise a few inches above the surface on which the posts stand. The outside sheeting should first be inch boards, put on horizontal, and covered with tar paper. Then cover with ten-inch hoards, and two and a half inch battens (perpendicular, the same as on the barn). It is most important for the health of the sheep that they receive plenty of light. (See plan elevation 82.) The ventilation should be on the same principle as that of the barn. (See Ill. 75.) Sheep manure should not be allowed to accumulate in the pen, the gas from it being very injurious to the health of the animals. Two flues which open from the ceiling and lead to the ventilators on top of the sheep pen should be constructed. These are same style as on the barn, but of smaller size.

**Fresh Air
and Light.****SECTION IV.****PIGGERY.**

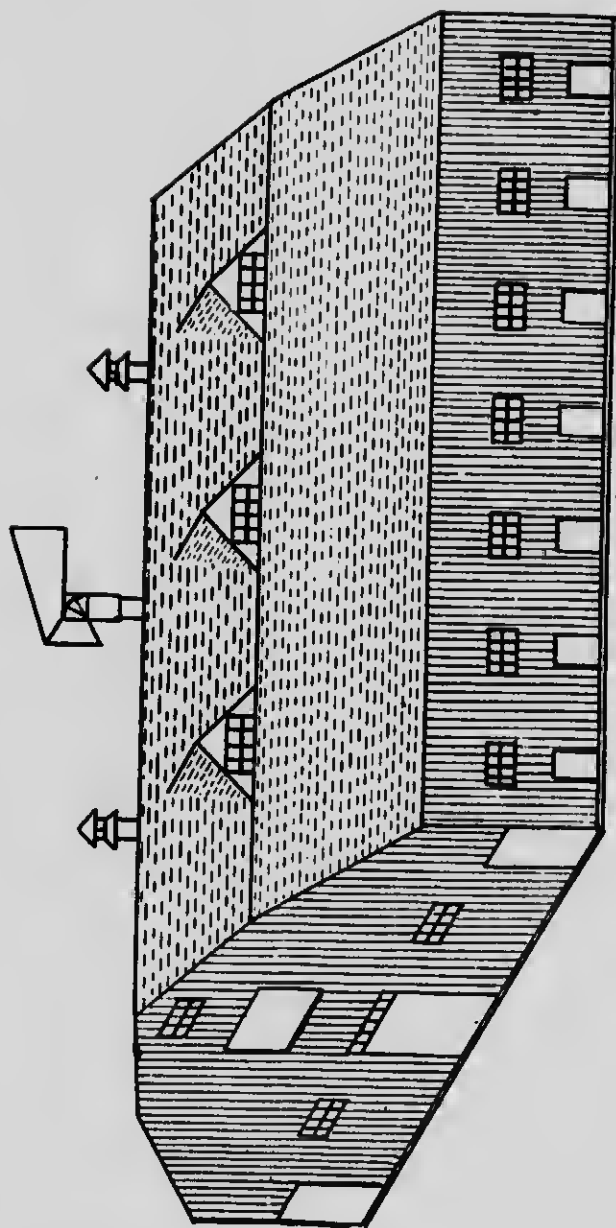
The last, but not the least important of the farm buildings, is the piggery. The number of pigs that can be profitably kept on a farm depends on circumstances. Pigs are more profitably fed in conjunction with a dairy.

**Skim Milk
Pork.**

They make greater gain and give a better quality of pork when fed skim milk along with middlings and other foods.

**Size of
Piggery**

In deciding on the size of a building for a piggery, estimate for four or five feeding pigs to consume the hi-products of each cow, say forty-five feeding pigs for ten cows (see elevation 85); and for space, estimate twenty square feet for



85. ELEVATION OF PIGGERY.

each pig weighing from one hundred to two hundred pounds each. A pen eight by ten feet—that is, eighty square feet—is sufficient for four pigs not exceeding two hundred pounds each.

**Clean
Animal.**

While the pig is by many considered a filthy animal, yet, when proper provision is made, there is none more cleanly. In summer there is no difficulty in keeping the pens clean when they have an outside yard, but in winter, when they must be kept inside, where it is dry and warm, care and attention are necessary. While other animals are protected against the cold with a good coat of hair or wool, the pig has almost no covering. For that reason it requires special protection in order to get the best returns for the food consumed. The doors leading to the outside yards must therefore be closed in winter.

**Require
Protection.**

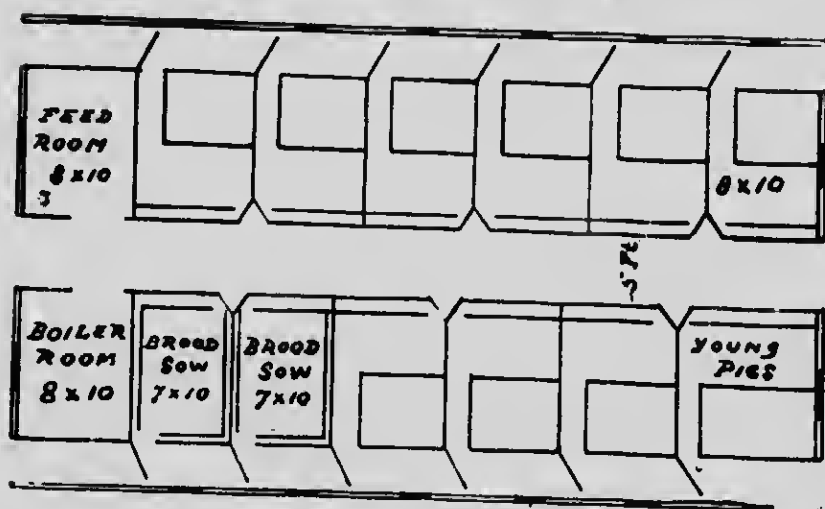
**Gutters
Inside.**

It is necessary at the back of pens to have a gutter, which should be three feet wide and three inches deep. It is advisable to have the entire floor of the piggery made of cement, the beds to be covered with two-inch plank for protection against cold and dampness. The beds should have a three-inch scantling nailed on the edge to keep in bedding. The two seven-foot pens for brood sows (see ground plan 86) should be covered entirely with plank; also have a plank eight inches wide nailed to sides horizontally eight inches from the floor, to prevent the sow lying on her young pigs.

It is important that a piggery should be constructed so as to be both dry and warm in

winter. A wooden building on a stone or cement foundation is considered the most satisfactory. The building should be double sheeted on the outside, with tar paper between, also sheeted on the inside. The posts may be twelve feet high from the foundation, which is level with floor of piggery—viz. eight feet to the ceiling and four feet above. For the health of

Stone or
Cement
Foundation.



86. GROUND PLAN OF PIGGERY.

Scale $\frac{1}{16}$ inch to the foot.

the animals, it is necessary to let in all the light possible. (See elevation 85.) The size of building given in plan is thirty-two feet wide by fifty-seven long. This allows three feet each for the gutters in the rear, ten feet in depth for the pens, and five feet for the centre passage. The floor of the pen may be level when the bed is elevated. Any filth that may accumulate can be swept into the gutter at the back.

Provide for
Light.

Size of Pens.

The trough is made V shaped, and, for this cement is the most durable. The partition over and in front of the trough should be on hinges, so that, for convenience in feeding, it can be swung to the inside edge of the trough.

Style of
Building.

The roof should be the same style as the barn and sheep pen for light and uniformity.

Ventilation.

The ventilation should be on the same principle. (See elevation 85.) The two ventilators extend from the ceiling to the top of the building. Windows should be hinged on the bottom, and open inwards from the top. By covering each alternate window with muslin or cheap factory cotton, instead of glass, fresh air is admitted which will keep the piggery dry.

SECTION V.

CONVENIENCE OF BUILDINGS.

Painting
Buildings.

Farm buildings constructed according to the plans and specifications given are economical, considering the advantages for convenience and health of the animals.

Painting farm buildings outside gives them a more attractive appearance, besides adding to their durability. In the erection of buildings it is advisable to have all the lumber dressed on the outside. The first thing to decide is the color. This should not be too loud. A drab with the trimmings, viz., cornices, window and door casings, a shade darker, is quiet and attractive. The trimmings in all cases should be painted darker than the body of the building. The following mixture makes a satisfactory drab

and is not expensive: Seventy-five pounds of mineral drab and twenty-five pounds of white lead, mixed with boiled linseed oil, and thinned with creosote or benzine. The darker shade for the trimmings can be made by adding a little lamp-black or mineral red to the ground color. For a brown color, use pulverized mineral, mix with linseed oil to the consistency of cream, and thin with creosote or benzine.

It is preferable to decide on a certain color, and have all the buildings, fences, etc., made to harmonize. Buildings,
etc., to
Harmonize.

For a cheap and durable paint or whitewash, the writer would recommend the following, which is used on the government buildings of the United States :—

Slake half a bushel of good stone lime in boiling water, keeping it covered while slaking; strain and add half a peck of salt dissolved in warm water, three pounds of rice boiled to a thin paste, half a pound of clear glue dissolved in warm water. Mix all together, and let stand for several days. Keep in a kettle, and apply as hot as possible with a clean brush. It can be colored by adding ocre, lamp-black, blueing, or any other color to suit.

CHAPTER IV.

SECTION I.

ECONOMIC FEEDING.

The economic feeding of live stock is, at the present time, receiving more attention by those in charge of our experiment stations than any other subject in connection with agriculture. The object is to get the largest results at the least cost. During the past few years much knowledge has been gained in preparing and balancing the foods for the different animals, so that the rations may be composed of the proper constituents and quantities most suitable for the desired objects to be gained at the minimum cost. With our present knowledge we receive as good results at about half the cost of former years.

Balanced
Rations.

June
Conditions.

Composition
of Foods.

Succulent
Food.

Our first object lesson we get from the laws of nature is "June conditions." When the weather is warm, and the grass in a succulent condition, the best results are obtained from our animals. Especially is this noticeable in milch cows. According to the teaching of science, the food should be of a certain composition to obtain the required objects, be it milk, flesh, bone and muscle, or fat. In practice, the preparation of the food is found to be of equal importance. While the grass is in a succulent condition all animals thrive and do well, whether it is balanced according to science or not. As soon as the

grass becomes dry there is a falling off, especially noticeable in milch cows. Provision should be made for a continuous supply of succulent food during the whole year, both by carrying over a quantity of silage, and by growing soiling crops, sown at intervals, say an acre or more of mixed peas and oats (fifty pounds of each), sown early in the spring, and an equal quantity a month afterwards. When this is fed, early sweet corn sown last of May, will be ready for use. If Alfalfa can be grown successfully, there will be no need of sowing any other soiling crop for summer feeding. (See page 110.)

Soiling
Crops.

This brings us now to the fall, when the pastures are again green, and with corn, rape and mangel wurzels the cows should continue to give a full supply of milk, and all the other animals on the farm keep on improving with little or no grain, provided "June conditions" are maintained, by keeping the animals warm and comfortable.

Autumn
Feeding.

No farmer can afford to have his animals exposed to cold weather in the fall of the year. When the weather becomes cold all animals should be comfortably housed, and not let out of doors except when the weather is quite warm, not even for exercise. According to experiments, cattle do very much better when kept in a warm and properly ventilated stable all winter, without being turned out of doors.

Warm and
Comfort-
able.Ventilated
Stables.

In that case it will be necessary to have them dehorned, so that they cannot injure each other. (See Ill. 87.) Dehorning has now become quite

Dehorning
Cattle.

common throughout the country. It makes the animals more docile, and less fretful, consequently they do very much better. With the proper appliances, and an operator with some nerve, the work is simple and expeditious. The



87. DEHORNING CATTLE.

horn should be cut off close to the head, otherwise a nubbin of a horn will grow again.

**Exercising
Animals.**

With stables and stanchions arranged as in plan 78, the animals can be turned loose with little trouble. It is advisable to divide the

cattle, when loose, in groups of eight or ten each, with temporary partitions between. They will be more contented. If there is no provision for a water supply, a tank should be kept in the stable, filled with water, so that the cold chill may be taken off. From this the cattle may be watered with a pail.

Small
Groups.

Water in
Stable.

The preparation of the food for cattle in winter will have to be varied according to the supply on hand. The first essential is clover hay, either Alfalfa or Red clover. Clover is a flesh former, and gives strength to the animal. It improves and balances the ration when mixed with other and more concentrated foods. For economic feeding, corn silage is one of the most profitable crops that a farmer can grow. According to analysis, valuing Alfalfa and Red clover hay at six dollars per ton, silage is worth two dollars and fifty cents. Practical results depend very much on the preparation of the food.

Winter
Feed.

Corn Silage.

While dry fodder corn, according to analysis, compares favorably with silage, yet in practical tests, there is considerable difference in favor of the silage. While field roots are composed of from eighty-five to ninety per cent. water, yet they are essential in the preparation of a succulent winter food. With a supply of clover hay, straw and chaff, silage and roots, prepared according to the following directions, satisfactory results will be gained.

Nutritive
Value of
Fodder
Crops.

First, spread on the floor of the feed room a layer of cut clover and cut straw or chaff, three or four inches deep. Over this sprinkle a little

Preparation
of Food.

salt, estimating that each animal receive half an ounce per day. It is better to dissolve the salt in water, and sprinkle it over the cut feed with a watering can. The second layer is silage about two inches deep. The third is another layer of cut clover and chaff with another sprinkling of salt. The fourth layer pulped turnips, mangels, or sugar beets between one and two inches deep. The above order to be kept until the heap is about four feet high. It should be tramped and kept perpendicular at the edges. The size of the heap will of course vary according to the number of animals to be fed. It is advisable to prepare at each time sufficient for a day and about twelve hours ahead, so that the whole mass will become quite moist by the liquid from the roots soaking through the cut feed, and the fermentation from the silage warming up the whole mass, making it succulent like grass

Allow
Twelve
Hours to
Moisten.

Quantities
of Mixture

In preparing the mixture the following proportions may be taken as a guide: Silage, twenty-five pounds; roots, twenty pounds; cut clover and chaff, twelve pounds; total, fifty-seven pounds. This should be varied according to the capacity of the animals. As a substitute for clover hay, pea straw may be used with satisfactory results, as this is also one of the legumes.

Alternative
for
Deficiency.

In case of a shortage of pulped roots, the cut feed may be moistened with water, and in case of a shortage of silage, additional grain should be fed. When feeding the above mixture

commence at one end so that the quality will be equal for each animal. To get the best results from feeding grain it should be ground and mixed with bran, and in case of all the cattle getting grain, it is advisable to put the required amount on each layer of cut clover and chaff. Usually this is not practicable, as the several animals require more or less grain according to circumstances; as in the case of milch cows, those that give forty pounds of milk require more grain than those giving half that amount.

Feed Proper
Proportion.

Feeding
Meal in
Mixture.

SECTION II.

HOW AND WHEN TO FEED.

How and when to feed animals has much to do with the results. Cattle should be fed early in the morning during the winter season, say between five and six o'clock. Have the cows milked, stables cleaned out, cattle bedded and watered before breakfast, and feed no more than they will eat in an hour or an hour and a half. Should any food be left over it must be cleaned away. When animals are not disturbed after being fed in the morning, they will rest contented until noon. No animal should be fed "between meals." For best results this is important.

Limited
Quantity.

Nothing
between
Meals.

For cows giving milk the following ration will give satisfactory results, and at a moderate cost: In the morning, twenty pounds of the mixture, prepared as directed. If no ground grain and bran have been put in the mixture, scatter over the ration when in the manger

Ration for
Milch Cows.

three pounds of ground grain and bran mixed, two pounds of the former and one of the latter. At noon give fifteen pounds of the mixture and fifteen pounds of mangel wurzels or sugar beets, fed whole. Good results are obtained by feeding clover hay and mangels whole at noon without grain. The evening ration is the same as that in the morning. The feeder must of course use judgment in varying the amount of feed to suit the individual requirements of each animal.

**Feeding
Store
Cattle.**

Heifers and cows not in milk require only twenty-five pounds of the mixture in the morning, clover hay at noon, and twenty-five pounds of the mixture in the evening; total cost, seven cents per day. This is sufficient to keep them in good growing and healthy condition. It is understood that they are to be comfortably housed and not turned out of doors in cold weather, otherwise it will require grain in addition to the above ration to keep up the animal heat.

**Commercial
Foods.**

Good results can be obtained without commercial food. A limited quantity of oil cake and cotton seed meal may be fed to milch cows and heefing cattle to advantage, provided the cost is in proportion to the nutritive value of other foods. For the health and development of young cattle, they should be fed foods that will produce flesh, bone, and muscle, viz., clover, bran, roots, rape, etc. Fattening foods tend to disease and stunted development.

**Flesh
Forming
Food for
Young
Cattle.**

While every provision may be made for the comfort of animals, and the feeding done strictly

in accordance with the above directions, the animals will not give adequate returns for the food consumed unless they receive kind treatment. This is particularly noticeable with milch cows, say in the month of June, when on pasture and giving a large quantity of milk, if brought from the field hurriedly by a dog or a person on horseback, and milked while they are excited, the average results will be about half the usual quantity. Some of the more nervous cows will not give one-fourth, and according to experiments it is found there is less butter fat in the milk. Any farmer who will abuse his animals, or allow them to be abused, had "better go out of the business." He cannot expect to get returns for the food consumed.

Kind
Treatment.

Results of
Abuse.

Cattle must also be kept free from vermin during the winter. The cattle should receive about three applications of seal oil (fish oil) and crude carbolic acid, mixed, one gallon of the former, and five tablespoonfuls of the carbolic acid. Apply with an ordinary cattle brush, rubbing the cattle over the whole body, or use a sprayer. For about three months during the summer, when the horn fly is annoying the cattle, apply the above mixture once a week, and that tormentor will not trouble them. Although it is claimed that warbles come from the stomach of the animals and out through the skin on their back at the same time it is a fact that cattle which have been treated for the horn fly in summer with this preparation are not affected with warbles in winter.

Cattle Free
from
Vermin.

Preparation
for
Insecticide.



88. HOLSTEIN COW

SECTION III.

BREEDS OF CATTLE.

In considering the comfort of the animals, a consideration which is essential to success is protection from the hot summer sun. They may be kept in the house during the heat of the day. This, of course, is attended with some additional labor. Several groups of maple and other trees, a plot a quarter of an acre or more in size, on rising portions of the farm, the trees planted about twenty feet apart, gives excellent shelter to the cattle, besides being ornamental. The advantage of having the trees grouped is that the sun cannot shine in to heat the ground, and when on rising ground there is usually a current of fresh air.

Shelter in
Pastures.

Groups of
Trees.

Plant on
Rising
Ground.

Single trees scattered over a farm give little shelter, and standing in growing crops they are a decided injury to the crop.

Scattered
Trees
Objection-
able.

In addition to the feeding and care of animals, there is the question of the breed that will give the best returns. This is a debatable question, particularly as regards milch cows. The large black and white "Holstein" (see III. 88) is no doubt the largest producer of milk, although as a rule it is not so rich in butter fat as that of some of the other breeds. Yet there are individual animals of the Holstein breed that give rich milk and that have made remarkable records. These animals have excellent digestive organs, and can make the best use of food. A delicate feeding cow is not a profitable animal.

Milch Cows.
Holstein.



89. AYRESHIRE COW.

While the quantity of milk can be increased by judicious feeding, yet the butter fat will remain in about the same proportion, but the flavor and color of the milk is changed materially by certain foods.

Increasing
the
Production.

When cows are exposed to cold weather, the butter will be white in color, even though the food is of the best. Milch cows should be kept housed in the winter in a stable with temperature at about sixty-five degrees, milked regularly and by the same person.

Effect of
Cold.

In the selection of a milch cow, consider the following points: first, the "wedge shape" of the animal; a head fine and long; neck thin; large, square udder, not fleshy; barrel, deep and round. There are other signs, all of which fail in some animals, since the ancestors have much to do in stamping the offspring. There are other things to consider in developing a milker. One is to have the heifer come in at two years of age, and milk for at least one year. The most popular dairy cow in Great Britain is the "Ayrshire." (See Ill. 89.) This breed originated, we understand, from a cross of the small "Durham" and the "Dutch" and "Channel Island" cattle. It is from the latter they owe their milking qualities. They have the typical wedge shape of dairy animals. The horns have an upward curve. The shoulders thin, and the loins broad. The prevailing color is a reddish brown and white. The udder is large. The cows are particularly hardy. After milking for a number of years, they can be fattened better than any

Selecting a
Milch Cow

Popular
Dairy Cow.

Fattening
Old Cows.



90. JERSEY COW—"MARY ANNE OF ST. LAMBERT'S."

of the other dairy breeds. For a fancy cow, and for making "gilt edge" butter, the "Jersey" (see Ill. 90) stands at the head. While the Jersey does not give as large a quantity of milk as the Holstein or Ayrshire, the milk is, as a rule, richer in butter fat, and superior in quality.

Fancy
Butter Cow.

The butter being more marly and firmer does not get oily and soft in warm weather, like that from other breeds. Both the butter and cream command high prices.

As to shape, the "Jersey" has all the characteristics of a dairy cow; body deep, well ribbed, with little space between the ribs and hips, udder large and well up behind, with large milk veins running well forward. The favorite color is a solid fawn. The "Guernsey" is a rather larger animal, with the butter quality of the Jersey. For dairy purposes, the beef breeds are not satisfactory. Some of them give a large flow of milk for a few months, then they commence to put the feed on their back instead of in the pail. The same is the case with many of the cows that are cross bred between the dairy and beef breeds. In using such cows for dairy purposes, it is advisable to milk them until they cease to give a paying quantity of milk, and are ready for the butcher, then sell and replace them with fresh milk cows.

Model
Jersey Cow.

Guernsey
Cow.

Beef Breeds
for Milk.

In deciding on what breed to keep, be governed according to your fancy, and the market for which the produce is intended for, whether for a cheese factory, creamery or a home dairy. If either or both of the former, the "Holstein"

Decide on
One Breed.

Largest
Returns.



91. COW—SHORTHORN "DURHAM."

and "Ayrshire" will give the largest returns. For a home dairy, with an opportunity to work up a fancy city trade in cream and butter, the Jersey and Guernsey will fill the bill. There is an advantage in keeping pure-bred animals over grades. The calves are worth much more. As a rule, one good, pure-bred calf, a month old, will sell for as much as ten grade calves at the same age. After the first week dairy calves should be fed skim milk, with a teacupful of ground flaxseed and middlings. These should be mixed before grinding. To keep them growing feed liberally with bulky succulent food, composed largely of clover, roots and silage. The heifers should have their first calf when two years old.

Prices of
Calves.

Feeding
Dairy
Calves.

It will now be in order to explain the characteristics of the "beef breeds" of cattle, the types of which are entirely different from the "wedge shaped" dairy breeds. In the first place, their general form is broad, deep, smooth and even, with parallel lines. Next in importance is a thick even covering of the right kind of meat in the parts that give the high priced cuts. A broad, well covered back and ribs are necessary, and no other excellencies, however great, will compensate for the lack of this quality. A good feeding animal should handle soft and mellow, have a vigorous constitution which is indicated by a broad chest, well sprung ribs, large heart girth, and general robust appearance. The shorthorn "Durham" (see Ill. 91) has more admirers than any other of the beef breeds. In

Character-
istics of
Beef Breeds.

Beef Breeds.

Shorthorn.



92. HEREFORD COW.

cross breeding the prepotency of the sire is more pronounced than that of any other of the beef breeds. A marked change has taken place in the type of animal, since the demand of recent years is for early maturity, and a plump carcass of medium weight, and minimum offal. The large, rough and patchy animals are no longer bred. The favorite colors are red and roan. The "Hereford" (see Ill. 92) is similar in conformation to the shorthorn and, like them, have been bred for beef, consequently they are seldom kept for dairy purposes. Their native home is Herefordshire, England. Their color is red with white face and white points. Formerly the horns were long and turned up. The present fancy is for shorter horns and turned down. They are excellent grazers. A herd of them is very attractive in appearance.

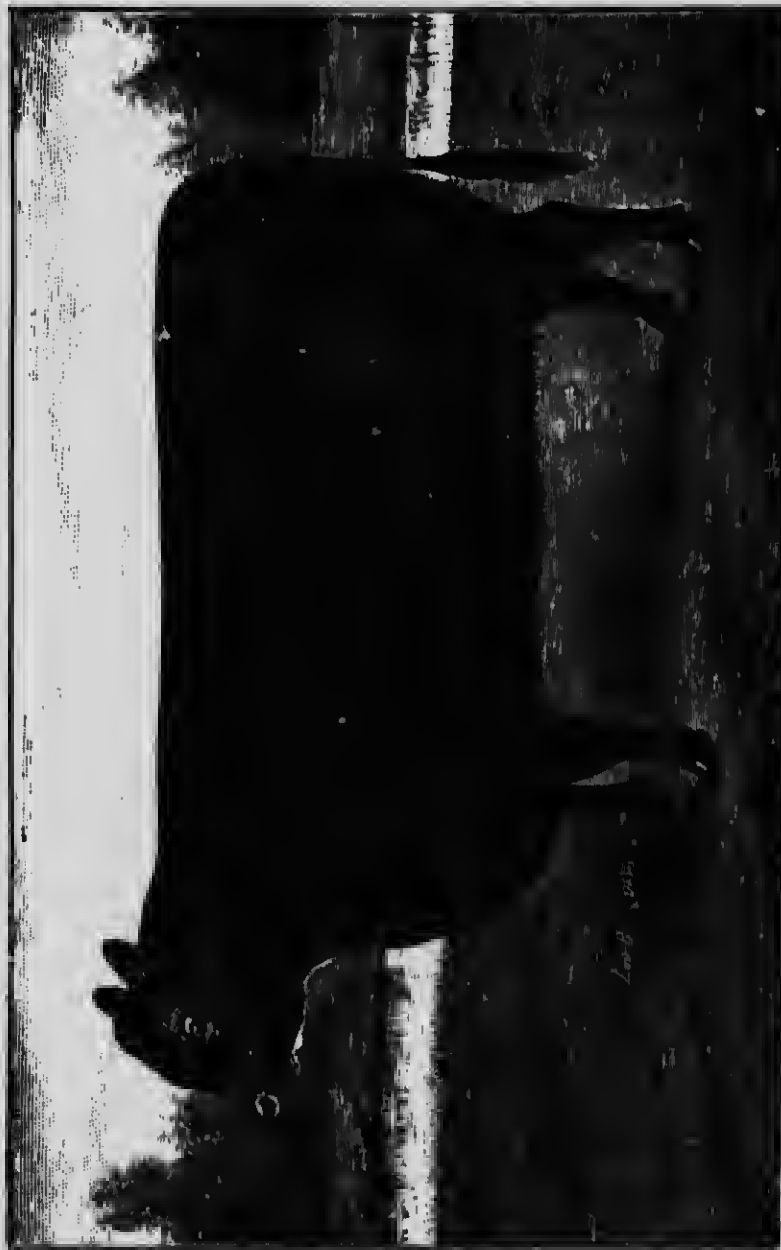
Hereford.

The "Aberdeen Angus" (see Ill. 93) is another of the popular beef breeds of cattle. As their name indicates, their native home is Aberdeenshire, Scotland. Their color is black. They are without horns. For quality of flesh they have no superior. They have been bred for beef; consequently are not intended for the dairy. There are several other beefing breeds of cattle, viz.: "Galloway," "Sussex," "Devon," and the "Highland" cattle. These all have certain good qualities, but on account of their smaller size they have not become generally popular.

Aberdeen
Angus.Galloway,
Sussex,
Devon.

Calves of the beefing breeds require better care and feed than the dairy breeds. In order

Care of
Calves.



93. ABERDEEN ANGUS.

to get the best and quickest returns it is better to feed them whole milk for three or four months. Follow with good, succulent food, composed of clover, rape, roots, bran and silage. Feed little or no grain until the frame is developed.

If there is an abundance of good pasture, buy steers for winter feeding the beginning of October. If pasture is scarce, do not buy until the time for housing. Put in a sufficient number to consume all the fodder, roots, and coarse grain grown on the farm. Buy young cattle, two or two-and-a-half years old. Young growing cattle will increase in weight much more rapidly than those that are of mature age. Judging steers by points may be all right in a show ring, but for practical purposes about fifty per cent. should be on the back, as the most expensive cuts are the back and ribs. Crossing the dairy and beef breeds have made it very difficult to get the most desirable animals for feeding. While the gain of a dairy cross is nearly equal to that of a beef-bred animal, yet the quality is entirely different. The dairy cross has a hard back with little flesh, and a large amount of tallow, which is only worth one-fourth the price per pound of a good roast. For feeding, buy only the blocky, smooth animal with wide back and loose hide.

Buying
Steers for
Winter
Feeding.

Judging by
Points.

Cross Bred
Steers.

Feeding steers for profit is a subject that has received very great consideration, both privately and at our experiment stations. In the first place it has been proved beyond question that

Feeding
Steers.

the best results are obtained by feeding loose. Steers, dehorned and fed loose, will gain as much in five months as those tied will gain in six, and on the same feed. In commencing to feed steers in the fall, it is better not to feed grain. Commence with a succulent food, prepared the same as described for milch cows. Feed this mixture morning and evening, with the addition of one pound of bran.

Feeding Rape.

At noon, give a forkful of rape (Dwarf Essex) during November and December. This is cut with the scythe, and thrown in small heaps, after the ground is frozen, and carted to the stable, and put into the feed room the day previous, to thaw out.

Feeding Roots.

After the rape is done, give the cattle, at noon, twelve pounds of the mixture, and twenty-five pounds of roots. With proper care and this cheap food, ten and eleven hundred pound steers will increase about two-and-a-half pounds each per day. Some will increase over three pounds per day for the first sixty days. The increase is composed of flesh, bone and muscle. For the

Feeding for Frame.

sake of frame work, feeding for fat should be left for the finish. For the third month, mix one pound of ground grain, composed of barley, oats and peas, with one pound of bran, spread on the feed, morning and evening; give no grain at noon.

Increasing the Ration.

The fourth month, add another pound of grain, and the fifth month, another, which makes the grain ration for morning three pounds of ground grain, and one of bran, mixed. Give the same at the evening feed, which makes six

pounds of grain and two of bran, which is sufficient to finish steers between thirteen and fourteen hundred pounds.

It is important to have beef animals finished in five or six months. After that time they will not increase sufficient to pay for the food consumed. Steers that have been bought and fed according to the above directions will make the selling a simple matter, at from one to one-and-a-half cents per pound over the original cost, which leaves a good margin for profit. The ordinary farmer had better sell at home, either to the local butcher or the exporter.

Finishing
Steers.

Selling
Steers.

The allowance for shrinkage, when weighed full, is from four to five per cent., according to the quality of the animal. Four per cent. is sufficient for a well-finished steer or heifer. Cattle that have received no supper or breakfast, and are weighed about eight or nine o'clock in the morning, in the stable, will require no further allowance. If fed in the morning, and driven four or five miles to weigh, no shrinkage allowance should be made.

Shrinkage
to Allow.

SECTION IV.

HORSE BREEDING.

In breeding horses the farmer should have two objects in view, viz.: breeding for his own use, and for the market. My opinion is that he should confine himself to the two following breeds: First, the modern Clydesdale (see Ill. 94), which is a smooth animal and of general good quality.

Two Objects.

Modern
Clydesdale.



94. CLYDESDALE HORSE.

GENERAL CONFORMATION.

Head—Ear clean and pointed, forehead broad, eye prominent and mild, neck well arched, with a good, full mane. General Conformation.

Wither—Prominent; back straight and short.

Croup—Not too drooping; tail, well carried and full haired.

Chest—Breast broad, ribs long and well sprung.

Shoulder—Moderately upright and well muscled.

Elbow—Strong and muscular.

Knee to Foot—Cannon bone flat, tendons prominent, skin lying close to bone, light feather of silky hair; pastern clean, not upright.

Hock—Strong and wedge shape, posterior straight, free from puffiness.

Hock to Foot—Cannon bone flat, skin lying close to bone, light feather of silky hair; pasterns clean, not upright. Avoid large fleshy legs and pasterns covered with coarse hair.

Foot—Strong, tolerably round, concave sole, frog prominent.

Color—Bay or brown, usually white hind feet, and stripe on face.

Skin—Soft and mellow.

Temperament—Docile but energetic, not nervous.

Style and Action—General appearance attractive.

Action—Free; walking action must be specially good.

Weight—Fifteen to sixteen hundred pounds.

Height—Sixteen to sixteen-and-a-half hands.



95. ENGLISH COACH HORSE.

There is an advantage in starting with pedigree mares, so that their line of breeding may be traced back for several generations. If there should be a strain of the fleshy, coarse legged type, have nothing to do with them. You might as well use grade mares whose breeding you know nothing about. Be particular and use only a pure-bred sire, whose ancestors are of the smooth type, and that he himself is quality from the feet up.

Pedigree
Mares.

Grade
Mares.

The second style of horse suitable for the farmer is the Cleveland Bay, or English Coach Horse. (See Ill. 95). This is a most useful general purpose animal for the farmer and for the market; at the present time there is more demand for heavy coach horses than for any other type.

Cleveland
Bay or
English
Coach
Horse.

Demand for
Coach
Horses.

In selecting brood mares give the preference to the pure breed, other things being equal. Select large and stylish ones, with good knee action. Use only a pure-bred stallion, whose line of breeding is of the right type, one full of quality and knee action. A "Hackney sire" has knee action, but they are too small.

Breed Right
Type.

The following is the general conformation of a coach horse:

Confor-
mation of
Coach
Horse.

Head—Ears, fine, and approaching each other at tips when pointed forward—forehead broad, eye prominent, nostrils large.

Neck—Long; head gracefully attached and carried well up; crest well developed and nicely arched.

Withers—Well developed.

Back—Straight and short.

Loins—Broad and strong.

Croup—Only moderately sloping.

Tail—Coming out high up and full haired, carried straight and well out from the body.

Chest—Ribs long and well sprung.

Breast—Full.

Shoulder—Sloping; "Forearm," strong.

Knee to Foot—Cannon bone broad and flat skin lying close to bone and tendons free from long hair, pasterns strong and oblique.

Foot—Medium size and tolerably round.

Sole—Concave.

Frog—Well developed.

Hock—Large and strong, posterior straight, absence of coarseness and puffiness.

Hock to Foot—Hind cannons clean, broader and flatter than the fore ones, skin lying close to bone and tendons, absence of long hair, pasterns strong, medium length and oblique.

Foot—Smaller and more concave than the front ones.

Color—Bay or brown, with dark legs; skin, mellow.

Temperament—Energetic, docile, free from nervousness.

Style and Action—Free and elastic attractive, good knee action, stride long.

Weight—Weight thirteen to fourteen hundred pounds.

Height—Sixteen to sixteen-and-a-half hands.

English
Shire.

For heavy dray work, the English shire is the most popular horse. In Liverpool and London it is quite common to see three of those monster

animals, each weighing over a ton, hitched "tandem" to a large dray.

Monster
Animals.

The "mongrel" or cross-bred horse is usually a disappointment. The Hackneys and Roadsters are fancy animals, but are too small for the farmer. The thoroughbred race horse and trotting horse are for the "sport," and have no place on the farm.

Hackneys
Roadsters

SECTION V.

CARE AND FEEDING OF COLTS.

For the first two weeks after foaling the dam should not be worked, and for some time after that only moderately, and then she should not be allowed to get overheated. When at work the foal is better kept in a roomy box stall. In addition to the mare's milk, the foal might get two feeds each day of cow's skim milk, fresh, with a little ground flaxseed added. As soon as it commences to eat, feed it grass with a little bran and crushed oats. In winter feed cut clover, pulped roots (either carrots, sugar beets or turnips), silage and bran mixed, morning and evening, and for noon whole roots and hay. With kind treatment and a comfortable and roomy place for exercise, the colt should develop its frame and muscles at an early age. Avoid fattening food, as this is liable to produce disease and stunted development in all young animals.

Rearing
Colts.

Feeding.

Kind
Treatment.

Avoid
Fattening
Food.

For winter rations for farm horses that are only working moderately, give cut clover hay and silage, mixed a few hours previous to feeding. Feed morning and evening, all that they

Winter Feed
for Farm
Horses.

will eat in an hour, with two pounds of crushed oats and one pound of bran added at each feed. At noon give cut hay and fifteen pounds of whole roots.

Summer
Ration.

For summer ration, when working hard, give cut clover and silage mixed, all they will eat in an hour, three times each day, with four pounds of crushed oats and one pound of bran added. Water both before and after feeding. Clover hay is a flesh former, and is specially suitable for horses that are working hard, but it must be properly cured, and must not be musty

Watering
Horses.

Moisten
Feed.

It is advisable to moisten the feed with silage, pulped roots or lime water. Hay cut in cutting box should be cut long for horses to prevent irritation of the stomach

SECTION VI.

VARIOUS BREEDS OF SHEEP

This
Country
Favorable
for Sheep.

This country is specially adapted for sheep raising. On account of the clear and dry atmosphere, sheep are not subject to the diseases that are prevalent in those countries where the atmosphere is more humid and damp.

Select
According to
Conditions.

There are breeds to select from which are suited to the various circumstances and conditions. The farmer must decide this question for himself. If he is prepared to give his flock the necessary care and attention, the chances are that one of the long wool breeds will be most profitable, but he must be prepared to house them in rainy weather, or their wool, which is long and open, will hang on them like a wet

Special Care
for Long
Wool.

blanket, which is very injurious. The largest of the long wool breeds is the Cotswold. (See Ill. 96.) They are well proportioned and lay on flesh evenly. They have a prominent crest of long wool on the head, and are well covered below. An ordinary flock of Cotswolds will yield an annual average clip of wool of from thirteen to fourteen pounds each.

Cotswold
Described.



96. COTSWOLD.

The next in order is the Lincoln. (See Ill. 97.) This is a more compact animal. The body is evenly covered with flesh and long curly wool. There is a small crest on the head. The annual yield of wool is equal to that of the Cotswold. The other long wool breed is the Border Leicester. (See Ill. 98.) This is an attractive, up-standing and lengthy animal, with clean head

Lincoln
Described.

Leicester
Described.

and legs, and wool usually in ringlets. One objection to these animals is that they are liable to get bare below at an early age. They are noted for a good covering of flesh on the back, ribs, and hind quarters, which are the most expensive meat cuts. Their average clip of wool is about two pounds less than that of the Cots-



97. LINCOLN.

wold and Lincoln breeds. The English or blue-face Leicester is more blocky, with a heavier fleece, and is better covered below.

**The Down
Breeds.**

The Downs, or fine wool breeds, will endure exposure to rains and damp weather better than the long wool breeds, on account of their fleeces being more dense.

The Oxford Down (see Ill. 99) is a heavy, compact sheep, with medium wool, and with a crest on the head, a brown face and brown legs. This and the other Downes are noted for a superior quality of mutton. The average weight of wool from a flock is from eight to nine pounds each.

Oxford
Down
Described.

The next in order of the fine wool breeds is

Shropshire
Described.



98. BORDER LEICESTER.

the Shropshire. (See Ill. 100.) This is a very compact animal, full of quality, both in flesh and wool. The wool is of a fine silky texture, with which the entire body is covered. The face and legs are dark. The average weight of fleece is from eight to nine pounds each

The most compact and hardy of all the breeds is the South-Down. (See Ill. 101.) This

South-Down
Described.

is a smaller animal than the other breeds, but the deficiency in size is made up in quality both of flesh and wool, which are superior to those of any of the other breeds. The average weight of fleece is from seven to eight pounds.

Other
Breeds.

There are other varieties, as the Dorset, Hampshire, Suffolk, and other breeds, each having their special characteristics. For the first



99. OXFORD DOWN.

it is claimed they will raise two crops of lambs per year, but this is not practicable. Again, having horns, they are said to be able to take care of themselves against dogs. For that annoyance, *lead* is more effectual, and every farmer who has a valuable flock of sheep should keep a loaded gun in a convenient place, and when he finds a dog chasing his sheep he should

Shoot
Dogs.

shoot it. This is in accordance with the Act of Parliament.

The feeding and exercise of breeding ewes requires special attention. In the autumn when being mated, they should receive extra feed; nothing is better than a feed of rape each day. It is advisable to have lambs come early in the spring, provided the ewes have a warm pen.

Feeding
Breeding
Ewes.

Rape for
Feed.

Early
Lambs.



100. SHROPSHIRE.

The lambs should have a compartment in the pen, arranged so that the ewes cannot get in, and where they can receive extra mixed feed of pulped roots, cut clover, bran, bruised oats and ground flaxseed.

The lambs should be docked when a week old. Have some early rape ready for them by the middle of July (weaning time) so as to keep

Weaning
Lambs.

**Dipping
Sheep.**

them growing and develop a strong, healthy frame. Soon after lambing the ewes should be shorn, and both the ewes and lambs dipped with one of the commercial dips, following printed directions. Ewes and lambs should also be dipped in the autumn.

**Winter
Care.**

In winter sheep require a dry and thoroughly ventilated building, which is not too warm, but free from draughts. Not too many sheep should be in a pen. (For this see plan of sheep house,



101. SOUTH-DOWN.

**Feeding
Sheep.**

Ill. 82.) The breeding ewes should have daily exercise, either in a yard or field.

Feed morning and evening the following mixture, prepared a few hours before feeding: Cut clover (salted), pulped turnips, silage and a little bran. The quantity fed should be what

they will eat in an hour. Noon ration, pea straw or clover hay, fed outside in racks constructed as per diagram. (See Ill. 84.) For those farmers who prefer not to breed sheep, but follow the system of winter feeding, I would suggest the following: Buy a sufficient number of wether and ewe lambs to fill the sheep house. In the autumn, for the first two months, feed according to the above directions given for breeding ewes. Then for finishing, add to the mixture a little chopped grain, peas, barley, and oats. The writer found this method very profitable. On no account buy old sheep to feed, unless it is for soap grease.

Winter
Feeding of
Lambs.

SECTION VII.

SWINE.

During recent years all the popular breeds of swine have had to undergo a change, to suit the present demands of the trade, which calls for juicy flesh instead of fat. The big fat hog, that was so popular some years ago, has had to give way to one of an entirely different type (see Ill. 121), one with longer body and hams, for the most expensive cuts (see Ill. 122), and greater depth of body and less width on back. (See Ill. 102.) It should carry its width evenly from shoulder to tail, with light shoulder and gowl, as these are cheap cuts. This change of conformation was first brought about by a desire to cater to the trade of Great Britain, which demands pork of a fleshy and better quality. Our home trade is also undergoing a

Breeds
Required
for the
Trade.

Change of
Type.



102. TYPICAL BACON HOG (SIDE VIEW).

change in the same direction. The fat pork, that was so popular some years ago, is no longer wanted. The fat on the back must not exceed one-and-a-half inches in thickness. What is wanted is a fleshy hog, about eight months old, and rather under than over two hundred pounds. While great progress is being made in the change of type, still, so far none of our present breeds of swine conform exactly to the ideal aimed at. To fix a type will take years to accomplish, even by our most expert breeders, and whether this will be by cross breeding or through one of our present pure breeds is difficult to say.

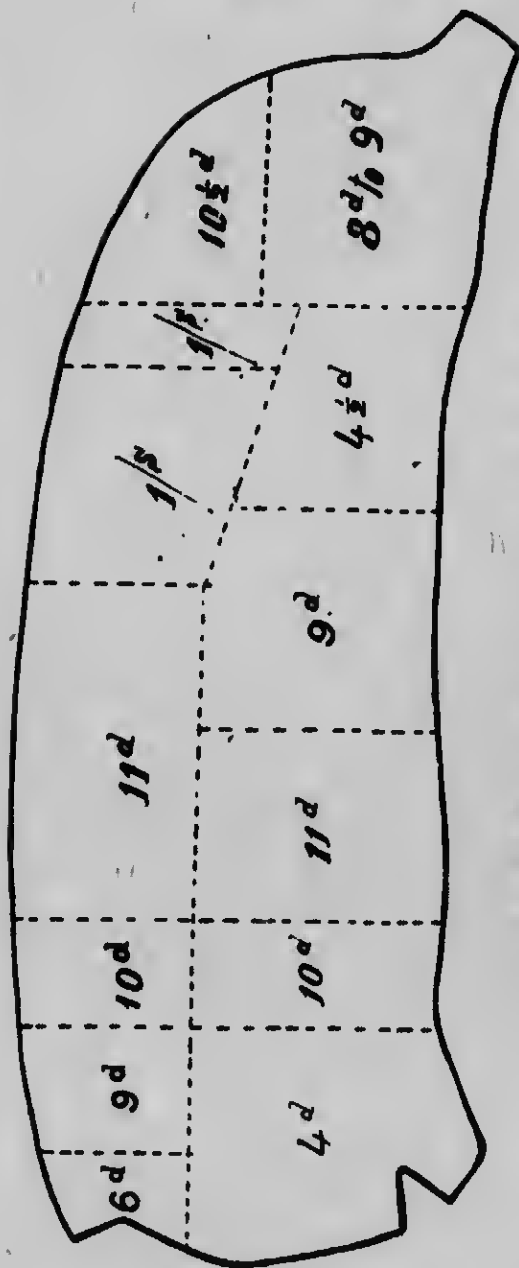
The Fleshy
Hog.

Years to
Fix a Type.

Even after we have got the typical hog, the work is only half done. The compounding and preparing of foods to produce the best quality of flesh is yet in the experimental stage, and will evidently take some time before the results will be entirely reliable, so as to produce a uniform good quality of flesh. According to experiments one thing has been fully demonstrated. In order to keep young pigs growing, after being weaned, they should be given a certain quantity of skim milk, along with other feed, which at first should be composed largely of middlings with a little ground flaxseed. When about three months old add bran, pulped roots, and green clover or rape, and a little ground grain, peas, barley, and oats, mixed. In winter Alfalfa clover should be cut and scalded. Mix the whole together, and feed a limited quantity, morning, noon and evening. When the pigs are five or six months old increase the grain,

Feeding
Swine.

Feed for
Young Pigs.



103. SIDE OF BACON SHOWING VARIOUS CUTS AND THE AVERAGE PRICES REALIZED IN ENGLAND DURING 1897.

and feed less of the bulky food, and for the last six weeks in finishing the morning and evening rations may be largely of chopped grain. Do not give more than they will consume in one hour and a half. At noon feed sugar beets or mangel wurzels raw, without grain. This system of feeding keeps the pigs in a healthy and growing condition, and makes a juicy quality of flesh.

Feed for
Finishing.

During the winter when housed they require old sods, also salt and hardwood ashes. With proper care and feeding, no animal on the farm will give such quick returns and large profits as the pig. This is the friend that has so often been depended upon to pay the rent.

Salt and
Ashes.

To get the best results from a brood sow, she should receive kind treatment, so that she will be gentle and kind. This has a very great influence on her offspring. With proper care she will have two litters per year, April and October, rearing on the average from seven to ten pigs each time. As this means a heavy drain on the system of the sow, she will require to be fed accordingly. In winter, feed skim milk, bran, pulped roots and chopped grain (mixed) morning and evening, and at noon, sugar beets or mangels only. Exercise is necessary, but she should not be turned out of doors in cold weather and allowed to get chilled. As a substitute for skim milk, fill a barrel or milk can with hot water, stir in a little middlings and chopped grain, and cover over for a few hours. Pigs, both young and old, should have in addition all the pure water they wish to drink.

Brood Sow.

Winter
Food for
Swine.



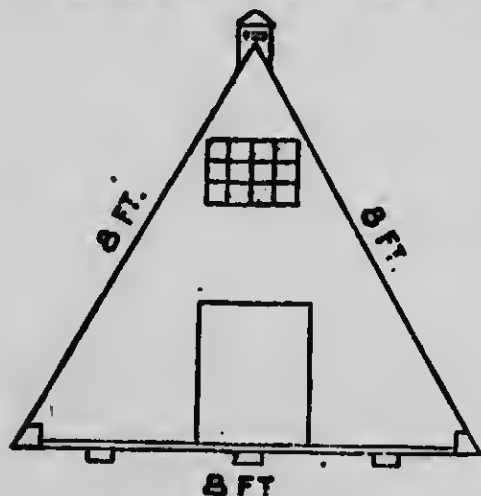
104. TYPICAL BACON HOG (FRONT VIEW).

In summer, young growing pigs should have the run of a clover patch, but when finishing for market, keep them in the house where they will be comfortable and clean.

Summer
Food for
Swine.

The brood sow should also have the run of a clover patch in summer. A small portion of the clover field may be hurdled off, and a portable pig house (see Ill. 105) constructed to shelter the animals from the hot sun and storms.

Portable
Pig Houses.



105 PORTABLE PIG HOUSE.

Each brood sow should have a separate enclosure and a portable house in which to rear her young in summer.

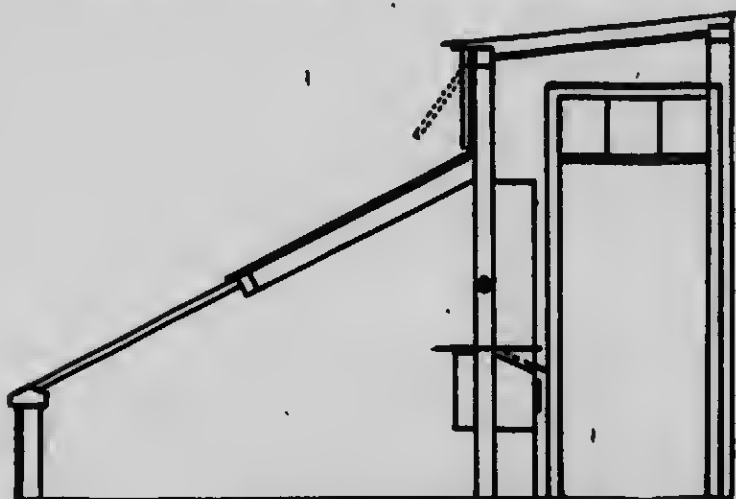
The same style of house may be used for the young pigs during the summer. In order to get the best results, it is necessary to provide shelter in the clover or rape pasture during the summer season. A pair of horses will haul the portable "pig house" wherever required.

SECTION VIII.

POULTRY.

How
Poultry is
often kept.

Poultry is kept on most farms, but, as a rule, receives very indifferent treatment. Seldom have the fowls a house to protect them from the storms and cold weather, and are allowed to roost out of doors on implements, fences, trees,



106. POULTRY HOUSE—END VIEW.

etc., in all kinds of weather. When a house is built for them, it is frequently quite unsuitable for their health and comfort, so that the results are not satisfactory.

Plan of
Suitable
Poultry
House.

For plan of hen house with modern conveniences see Ill. 74, and end view illustration 106, showing position of nest, roost, and feed trough. This is on the south side of the implement house, and isolated from the cattle stables, which is de-

sirable. The size of building here drawn is twelve feet wide by fifty-two feet long. This can be made shorter or longer according to the requirements. There is a passage of three feet on the north side. The balance is divided, with wire netting, into six compartments, which are



107. INCUBATOR.

eight-and-a-half feet square. These are of ample size for ten or twelve hens each. The roof over the passage is eight-and-a-half feet high with a fall of six inches. This is covered with inch boards, tar paper and shingles. The main roof is six feet high next the passage, and is

Specifica-
tions.

covered with inch boards, tar paper and shingles. The south side is two feet high, sheeted on the outside with tar paper and boards. From the top of this lower wall, to the main roof, is glass, at such an angle that in winter when the sun is low it will shine into the pen, covering about two-thirds of the space, and in summer when the sun is high, about one-third. (See Ill. 73.) The inside of the poultry house, including sides, ends and roof, should be lathed and plastered.



108. NURSERY BROODER.

Whitewash the inside of the poultry house every spring. Take out the glass and tack muslin or cheap factory cotton over the openings. This will admit fresh air and will not attract the heat from the sun during the summer season. Some of our expert poultry men use cotton or muslin instead of glass during both summer and winter with very satisfactory results. The writer's experience is that openings near the roof and cov-

ered with muslin or cotton is a decided advantage in keeping the poultry house dry in winter. It also admits fresh air and allows the foul air to escape. The feed trough is placed in the passage, and provided with round uprights, two inches apart, or sufficient for the fowls to put their heads between to feed. They may be watered in the same way. Nests, roosts, and

Feed and
Water
Trough



109. OUTDOOR BROODER.

board for droppings should all be moveable. The latter can be made to tilt into a box or wheelbarrow in the passage.

Every precaution should be taken to make the poultry house frost-proof in very cold weather. Artificial heating is only required in one room for early chicks. These will commence to lay when eight months old, say at the begin-



110. BARRED PLYMOUTH ROCKS.

ning of November, and continue laying all winter, or during a time when fresh eggs are worth three times as much as in summer. In a flock of fifty or sixty hens the difference amounts to considerable. The object should be to raise chicks for winter laying instead of summer.

Winter
Eggs.

Arrange to keep the pullets for two winters, and with proper care and feeding they will be in good condition for table use in the months of May and June, after their second winter laying. At this season of the year poultry brings a high price. The male chicks should be fattened and sold for broilers when four or five months old.

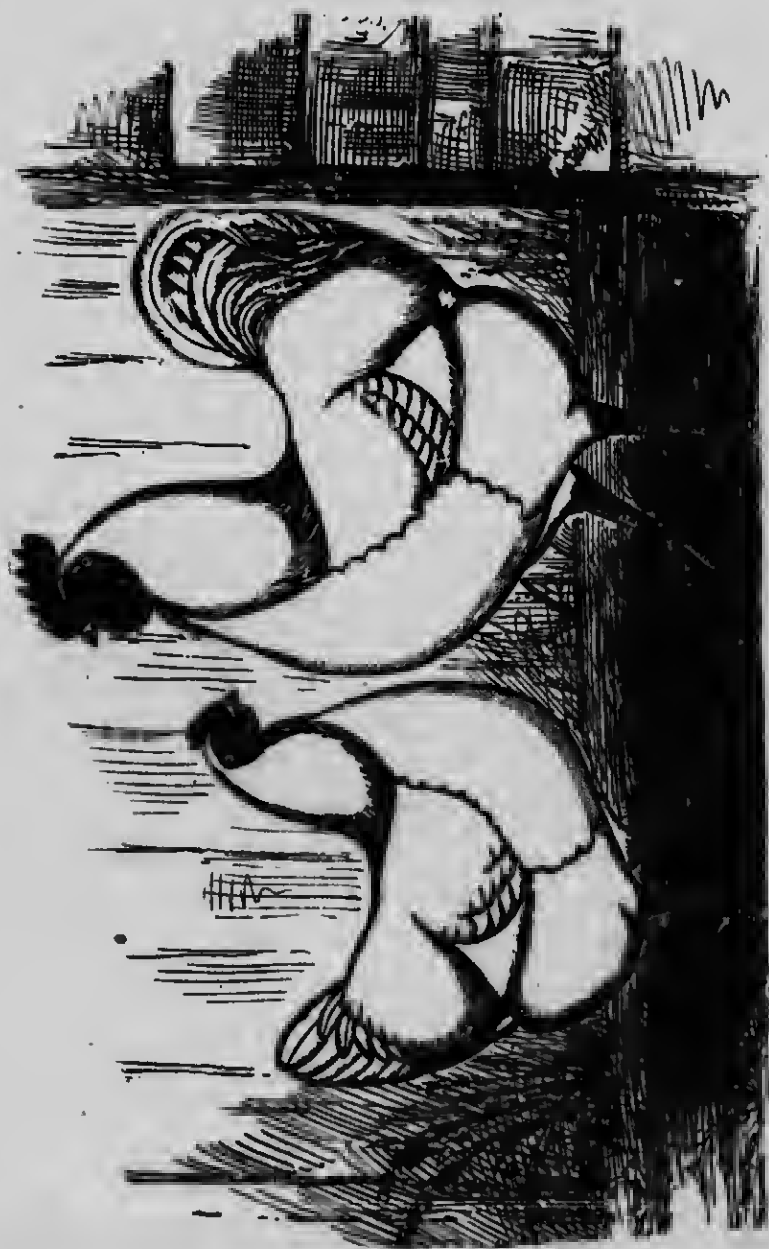
Disposing
of Poultry

At first feed bread crumbs or rolled oats, then ground corn, peas, barley and oats, mixed with skim milk. Also give ground bone and flesh with green vegetables or roots. When fattening, confine to a small pen without exercise. Furnish all the grit and pure water they wish. Give all the feed they will eat, and keep them free from vermin by using some insecticide or kerosene. With proper care it will not be necessary to use the cramming machine in finishing.

How to Feed.

To get the best results from hens in producing eggs, induce them to take plenty of exercise by scattering their food, composed of corn, peas, barley, oats and wheat, among chaff, so that they will have to scratch for it. In addition they should receive a liberal ration of cut clover, ground bone and flesh, also middlings, mixed with skim milk, and all the vegetables they wish, such as cabbage, lettuce, sugar beets, etc., also grit and pure water. The floor of the

Care of
Hens when
Laying.



III. WHITE PLYMOUTH ROCKS.

southern portion of the pen should be covered with fine gravel and sand for the fowls to take a regular dust bath, which is necessary to keep them clean. In summer the hens should have the run of a paddock of green sward, enclosed with a woven wire fence. This may be planted with groups of evergreen and deciduous trees for shelter from the hot sun in summer. In the plan 18 provision is made so that the portion of lawn between the house and hennery, nearly an acre, may be enclosed for this purpose. Digging underneath the trees will help their growth, and make dust baths for the fowls.

Dust Bath.

Trees for Shelter.

The hens selected for breeding purposes should be mated about ten days before eggs are wanted for hatching. After the breeding season is over, either kill the male bird or keep him by himself. According to experiments hens lay more eggs which have a superior flavor, and better keeping qualities when the male bird is kept away from them. Hens should be set in a secluded place. Food and fresh water should be constantly within their reach. In preparing a nest, first put in the bottom a thin sod, and over this a sheet of tar paper. This will keep away lice; then some chaff is all that is necessary. When only a few fowls are kept, nothing more is required than an old hen to do the hatching and caring for young chicks. When poultry is made one of the special departments of the farm, and kept with a view to making money, the incubator (see Ill. 107) has advantages over the hen, viz., if a hundred eggs are ready for setting,

When to Mate.

Separate Male Birds.

Setting Hens.

Poultry a Specialty.



112. WHITE WYANDOTTES.

beginning of February, it might be difficult to get the necessary number of broody hens at that season, whereas the incubator can be got ready in a few minutes, and the hatching done quite satisfactorily. The manufacturers furnish printed instructions with each machine.

The first two weeks is the most critical period in rearing chicks. The self regulating nursery brooder (see Ill. 108) is particularly valuable for this purpose. For summer a simple outdoor brooder (see Ill. 109) may be used.

**Advantage
of Brooder.**

There is a long list of distinct breeds of poultry, each having its own special peculiarity and advantage. The following breeds are specially noted as egg producers: Andalusians, Minorcas, Spanish, Leghorns, Houdans, Dominiques and several of the Game breeds. The above breeds are of various forms and colors. For table use the Brahmas and Cochins are particularly suitable.

**Breeds of
Poultry.**

**Egg
Producers.**

**Table
Breeds.**

For general purpose, first, we had the old English Dorking. This has been superseded by the barred Plymouth Rocks (see Ill. 110), an American breed which has become very popular throughout the country. It is especially adapted for early maturing for table use, and as winter layers they are one of the best.

**General
Purpose
Breeds.**

**Plymouth
Rocks.**

The White Plymouth Rock (see Ill. 111) has all the good qualities of the barred variety, with this additional, that it is more attractive when dressed for the British market, consequently is being preferred. There is also a new buff colored Plymouth Rock which may become



113. BUFF WYANDOTTE.

popular. The White Wyandotte (see Ill. 112) is a still newer breed than the Plymouth Rock, and is quite equal as a general purpose fowl. For young broilers they put on flesh very rapidly, and being white, have the desirable clean and tidy appearance when dressed. They have a rose comb, which is preferable to a single one, as it is not so liable to get frosted. This breed is also one of the best winter layers. The new buff colored Wyandotte (see Ill. 113) is very attractive, and likely to become popular.

With proper management no branch of the poultry business will give larger and quicker returns than duck raising. The "Pekin" variety (see Ill. 114) is recommended very highly. The "Aylesbury," a pure white duck, has many admirers. The "Pekin" is of a creamy white color. These ducks will lay over one hundred eggs each in a season. For breeding put one male with five or six ducks first of December. Do not set the first ten or twelve eggs. A portion of the poultry house (see Ill. 73) is suitable for ducks, except that the roosts are not necessary. Instead, keep the floor of the pen covered with clean litter, either of cut straw or chaff. Ducks require only about half the space hens do. They should have a portion of the lawn or paddock for a run for exercise, the same as hens, but should be kept separated from other fowls by a woven wire fence. The eggs may be hatched under hens or with an incubator. The care and feed of ducklings is the same as described for chicks. They should have all the fresh water they wish

Wyandottes.

Rose Comb.

Management of Ducks.

Pekin Variety.

Aylesbury Duck.

Housing Ducks.

Lawn for Exercise.

Hens vs. Incubator.

How to Water and Feed.



114. PEKIN DUCKS.

to drink, but the trough should be protected by uprights, so that they can only get their heads between to drink. It is not necessary that they should get into it with their feet. They should be supplied with an abundance of green feed and grit.

Grain fed to ducks, old or young, should be ground and mixed with skim milk. Aim to have as many early ducklings as possible, as these will command the highest price. They should be ready for market when between nine and ten weeks old, weighing at that time from four to five pounds each. In finishing ducklings for the market it is advisable to give one feed each day of "celery" during the last week. This imparts a pleasant flavor to the flesh.

Skim Milk
for Ducks.

Time to
Market.

How to
Finish.

In connection with a home dairy where a supply of skim milk is available, the poultry department of the farm should be very profitable. Milk is important for the fattening of chicks and ducklings.

The individual farmer must decide whether geese should also be kept. Under certain conditions they may be made profitable, and that would be as a specialty. However, it may be said that, for the best results, every department of the farm should be made a specialty.

Geese a
Specialty.

The favorite breeds of geese are the "Toulouse," a large gray, and the "Emden," a large white. A young goose will lay about twenty eggs in a season, and an old goose from thirty to thirty-five. In mating put two or three geese with one gander. Geese do not thrive in

Breeds of
Geese.

**Require
Freedom.**

**Fresh
Water.**

**When to
Sell.**

close confinement. They require at least the freedom of a pasture field. The eggs hatch in thirty days. The goslings require the same treatment and feed as ducklings. It is not necessary that they should have water in which to swim, but they should have at all times a supply of fresh water to drink. It is advisable to rush the goslings and sell them as soon as well feathered, say when they are two-and-a-half months old. They should then weigh from twelve to fifteen pounds each. This is the most profitable time to sell.

The Turkey.

A Monarch.

Varieties.

**Allow
Freedom.**

**How to
Feed.**

Mating.

It is a common expression at Farmers' Institute meetings to "leave the big gun for the last," so the "Turkey" is left to the last in this work. Of all fowl this is the most noble. "He is monarch of all he surveys," and that includes the whole neighborhood. The "Bronze" variety is the largest and most popular. The "White Holland" has also many admirers. A shelter should be provided for the turkeys in the winter, but it must be roomy, and the roosts from eight to ten feet high. They will not thrive when closely confined. As the turkey hens are not expected to lay until the end of March or the first of April they should have plenty of exercise during the winter. Feed a little grain, peas, barley and oats, mixed. In addition give cut clover, moistened, and roots. A well-known institute speaker advocates silage for fowls, and all other animals on the farm.

In mating put about a dozen of hens with one male. The young turkeys are rather diffi-

cult to raise at first, but with a warm coop or brooder, having a small pen attached, there need be no loss. Turkeys hatched in June should weigh from twenty to twenty-five pounds for Thanksgiving and Christmas.

Young
Turkeys.

When to
S-B.

CHAPTER V.

SECTION I.

BOOKKEEPING ON THE FARM.

**Book-keeping
Necessary.**

To be successful it is necessary that every farmer should keep a systematic record of his affairs. The most convenient books for this purpose are an ordinary Daily Journal and a small Ledger.

**Daily
Journal.**

The original book of entry should be the Daily Journal, in which, at the close of each day, should be entered, in plain statements, a brief record of the day's transactions; such as hiring of help, threshing, buying and selling, etc., being careful to enter such necessary details as the date, name of person with whom business is done, the thing received or given, price, quantity, quality, etc., and terms of sale or purchase, and of payment. Note prevailing weather also.

**Entries
Disposed of.**

Each entry in this Journal should be disposed of, when time permits, by a further entry, wherever necessary, either (A) to the Daily Journal, (B) Cash Book (see cash book, as found in end of Daily Journal), or (C) in the Ledger.

(A) If a transaction is to be completed, or a note paid to you, or by you, at some future date, turn to specified date in Daily Journal, and make a memo. of it there. (See Daily Journal illustrated.)

(B) If cash has been paid to you or by you, make entry in Cash Book. (See Cash Book illustrated.)

(C) If anything has been bought or sold on account—that is, has not been settled for by cash or note—make an entry in the Ledger. (See Ledger illustrated.)

After disposing of each item in this way, check it thus (✓), to indicate that no further attention is necessary. (See Daily Journal illustrated.)

SECTION II.

CASH BOOK.

In the Cash Book enter cash on hand at commencement, and all cash transactions as originally recorded in Daily Journal, in respec-

CASH BOOK ILLUSTRATED.

DATE.		RECEIVED.	PAID.
1907.			
April 3	Cash on hand.	\$ 13 70	
" 17	H. Miller, paid on account, three cattle.	50 00	
✓ June 29	Paid W. Smith on account binder.		\$ 25 00
" "	Paid T. Moore balance in full of account to date.		33 70
" "	H. Miller paid note due to-day, account balance on cattle.	50 00	
✓ " "	James Hamilton paid account in full to date.	31 75	
Nov. 1	Drew cheque on Dominion Bank.	100 00	
" "	Paid note due to-day on account binder—by cheque.		100 00
" "	Balance on hand.		86 75
	Balance on hand \$86.75.	\$245 45	\$245 45

*DAILY JOURNAL ILLUSTRATED.

WEDNESDAY	APRIL 17	1907		
Light rain during night. Morning cloudy, then clear and warm.				
✓ Sold 3 head of cattle to H. Miller as per agreement of 2nd inst. Rec'd in full settlement, cash \$50. Note due June 29th, \$50				
			100	00
✓ Ordered from W. Smith, one 6 foot self-binder to be delivered June 29th, and settled for then by cash \$25, and Note due Nov. 1st for balance \$100				
			125	00
✓ Sold T. Moore on account, 100 lbs. butter @ 20c.				
			20	00
✓ Sold Jas. Hamilton on account, 50 bush. Wild Goose wheat @ 75c.				
			37	50
Commenced sowing spring wheat. Wild Goose variety.				
SATURDAY	JUNE 29	1907		
Warm during night. Day hot and fine. Light rain toward evening.				
Memo. from April 17th; W. Smith to deliver binder to-day.				
" " " H. Miller's Note my favor due to-day at—				
			50	00
✓ Took delivery of binder from W. Smith, and settled for same by cash \$25 and Note due Nov. 1st for \$100, as arranged				
			125	00
✓ Paid T. Moore balance in full of acc't to date				
			33	70
✓ Rec'd from H. Miller cash in full for Note due to-day				
			50	00
✓ Rec'd from Jas. Hamilton bal. in full of acc't				
			31	75
Hauling hay to barn, 22 loads, 16½ tons.				
FRIDAY	NOVEMBER 1	1907		
Light frost during night. Day fine and rather cold.				
Memo. from June 29th; Note favor — account binder due to-day at — Bank in —				
			100	00
✓ Paid Note acc't binder due to-day by cheque on Dom. Bank				
			100	00
Harvesting and hauling Swede turnips to cellar, 18 loads, 1170 bush.				

* The "Daily Journal" referred to, is a standard annual publication and may be obtained from any first-class stationery.

tive columns as received or paid. The difference between these columns showing the cash on hand.

The balance in bank may be kept on stub of cheque book, amount of each deposit being added to, and amount of each cheque taken from, the preceding balance. Balance in Bank.

To dispose of entries in Cash Book enter in Ledger, under proper headings, all transactions with individuals with whom a running account is kept, taking care to place all items of cash received, on right hand or credit side of Ledger, and all items of cash paid, on left hand or debit side of Ledger. (See Ledger illustrated). Dispose of Entries.

As in the Daily Journal, check each item in the Cash Book thus (✓) when disposed of.

SECTION III.

LEDGER.

In the Ledger, under respective headings, enter all transactions of sale or purchase "on account" as recorded in Daily Journal, also all cash transactions "on account," as already described under heading of "Cash Book," entering on the left hand or debit side all goods or cash given, and on the right hand or credit side all goods or cash received. (See Ledger illustrated.) This system may be extended to cover such other accounts as the farmer may think desirable, enabling him to ascertain how each department of his business is repaying him. Ledger.
Enter Account Transactions.

SUCCESSFUL FARMING.

LEDGER ILLUSTRATED.

T. MOORE, GROCER.

1907.			1907.		
April 17	To 100 lbs. butter @ 20c.	\$20 00	April 3	By balance from old account.	\$11 80
May 10	To 5 doz. eggs @ 15c.	75	May 1	" groceries.	17 40
"	To 40 lbs. butter @ 20c.	8 00	June 29	" "	33 25
June 29	To cash.	33 70			
		\$62 45			\$62 45

JAS. HAMILTON, FLOUR MERCHANT.

1907.			1907.		
Feb'y. 1	To balance from old account.	\$ 9 65	March 3	By flour.	\$15 40
April 17	To 50 bu. wheat @ 75c.	37 50	June 29	" cash.	31 75
		\$47 15			\$47 15

SECTION IV.

TO FIND PRESENT WORTH AND LOSS OR GAIN.

Annual
Statement.

Once each year, say June 1st, take an inventory of all stock, implements, grain, produce, etc., on hand, at their present value. To this add cash in bank and on hand, and all accounts and notes owing you, making your total assets. From this take the total of accounts and notes you owe, and difference is your present worth.

By proceeding each year in a similar manner the farmer may ascertain his annual loss or gain.

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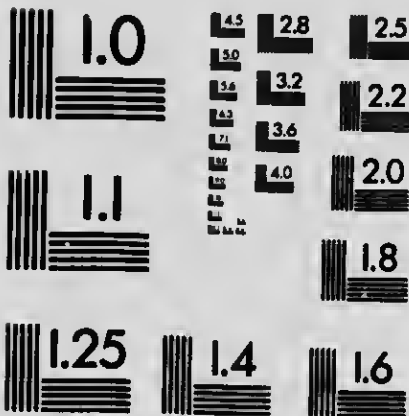
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