THE FARMER'S MANUAL AND Veterinary Guide

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AND

VETERINARY GUIDE

GENERAL AGRICULTURE.

To Find the Horse-power of a Waterfall.

To find the horse-power of a waterfall, proceed as follows Multiply the area of the cross section of the water in feet hy the velocity in feet per minnte, and multiply by 62½, the number of pounds in a cubic foot of water, and this by the vertical fall in feet, and we have the foot-pounds per minute of the fall; dividing by 33,000 gives the horse-power.

Example—A stresm flows through a flume ten feet wide, and the depth of the water is four feet; velocity, 150 feet per minute. Then multiply ten hy four equals forty, and forty multiplied hy 15c equals 6,000, the cuhic feet of water flowing per minnte, then 6,000 multiplied hy 62½ equals 375,000 pounds of water per minnte. Now suppose the fall be twelve feet, we have 375,000 multiplied hy 12 equals 4,500,000; now divide hy 33,000 and we have 133½, the horse-power of the fall.

Apples or Potatoes in a Bin.

To find the nnmber of bushels of apples, potatoes, etc., in a bin, multiply the length, hreadth and thickness together, and this prodnct hy 8, and point off one figure in the prodnct for decimals.

To Prevent Post Hesving.

Posts set in low gronnd will not heave if they are set down abont three feet and pieces of scantling about fifteen or eighteen inches long are firmly spiked on near the bottom end at right angles to the posts. It is well to let the scantling two or three inches into the side of the front hy sawing ont a notch.

Amount of Barbed Wire for Fence.

The following table gives the estimated number of pounds of barbed wire required to fence space or distances mentioned, with one, two or three lines of wire, based upon each pound of wire measuring one rod (16½ feet):

	1 line. lbs.	2 lines. lbs.	3 lines. lbs.
1 square acre.....	50⅔	101⅓	152
1 side of square acre...	12⅔	25⅓	38
1 square half-acre	36	72	108
1 square mile	1280	2560	3840
1 side of square mile...	320	640	960
1 rod.	1	2	3
100 rods	100	200	300
100 feet.....	6 1/16	12⅛	18 3/16

To Find Weight of Hay in Stack.

To ascertain the weight of an oblong hay stack, take the height from the eaves to the top; multiply length by breadth, and the product by the height, all expressed in feet. If the stack be a round one, multiply the area of the base by one-third of the perpendicular height. This will give the number of cubic feet in the stack. Five hundred and twenty-five cubic feet of well packed hay are generally allowed for one ton. Then divide the number of cubic feet by 525 and you have the number of tons in the stack.

To Measure Corn in Crib.

This rule will apply to a crib of any kind. Two cubic feet of sound, dry corn in the ear will make a bushel shelled. To get the quantity of shelled corn in a crib of corn in the ear measure the length, breadth and height of the crib, inside of the rail; multiply the length by the breadth and the product by the height; then divide this product by two, and you have the number of bushels in the crib.

Dimensions of an Acre.

A square whose sides are 12,649 rods, or 69.57 yards, or 208.71 feet long, contains one acre.

Measuring Grain in a Bin.

To find the number of bushels of grain in a bin, multiply the length in inches by the breadth in inches, and that again by the depth in inches, and divide the product by 2,150 (the number of cubic inches in a bushel). Thus a bin of nine feet long, four feet wide and six feet deep would hold 173.65 bushels, which is arrived at by multiplying 108 by 72, and the product by 48, which amounts to 373,248 cubic inches; this divided by 2,150 equals 173.65.

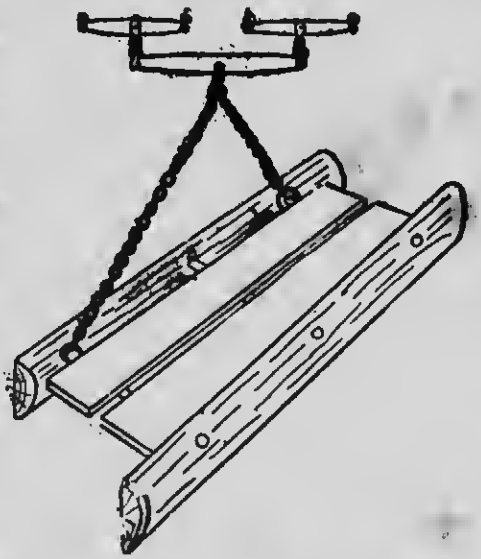
Weight of Ensilage.

It is reckoned that 40 cubic feet of settled ensilage weighs a ton. The following table shows the approximate contents of circular silos:

Diameter.	Height.	Cubic ft	Tons.
10	20	1,455	30
10	24	1,745	43
12	20	2,160	54
12	24	2,532	63
12	30	3,240	80
16	20	3,840	90
16	24	4,608	115
16	30	5,760	144

A Home-made Road Drag.

The system of either dragging or scraping clay roads bids fair to become more general. On the extensive highways of this country, maintained as they must be by a comparatively small population, macadamizing or even gravelling is, in many cases, so expensive as to be out of the question. It is, therefore, imperative to adopt some cheap, effective means of keeping the dirt roads in good condition, and the plan which is being followed in many parts of the American West is one originated by a Missourian, D. Ward King, who about ten years ago made a drag consisting of two halves of a split log nine feet long, placed parallel on edge, one about thirty inches behind the other, with flat sides to the front. They are connected with three strong oak or hedge bars, the ends of which are wedged in two-inch auger holes bored through the timbers. Near the ends of the front log are attached the ends of a chain, to which the double-tree is attached, nearer the right side than the left, so that when in motion the drag is angling, and thus draws the dirt to the centre of the road. After wearing a few months the lower edges of the drag may be shod with iron. The entire cost of making is estimated at $1.25.



DRAG FOR A MUD ROAD.

This implement is used when the roads are yet muddy after a rain. The strong point claimed for it is that, by puddling the clay at this time it quickly becomes hard, making a first-class road.

Home-Made Waggon Jacks.

There are many forms of jacks used on farms for raising the axles of waggons to remove the wheels for applying grease or oil. Three forms of these are described in the accompanying cuts.

Fig. 1 represents a jack that is said to be capable of enabling a man to raise 800 lbs. by its use. The dimensions of the parts are as follows: A, base, 2 ft. 10 in. long and 6 in. wide; B-B, uprights, 2 ft., 2 in. long; C, brace, 1 ft. 8 in. long; D. hand lever, 3 ft. 6 in. long; E, upper lift for hind axle, 1 ft. 7 in. long; F, lower lift for front axle, 1 ft. 10 in. long; G. lock standard, 2 ft. 2 in. long from base, 1 in. by 1 1-2 inch with a plate of iron 1 1-4 by 1-8 inch with six notches to hold lever where desired; H, connecting rods, 10 in. long, with holes for one-quarter inch bolts; J. lock plate screwed on to G; K, plate on hand lever to fit into notches. When an axle is to be raised, the lift E or F is placed beneath it by raising the hand lever D, which is then pressed down and hooked under the notch in the plate J.

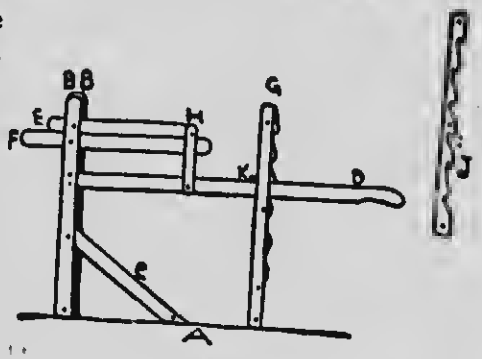


FIG. 1

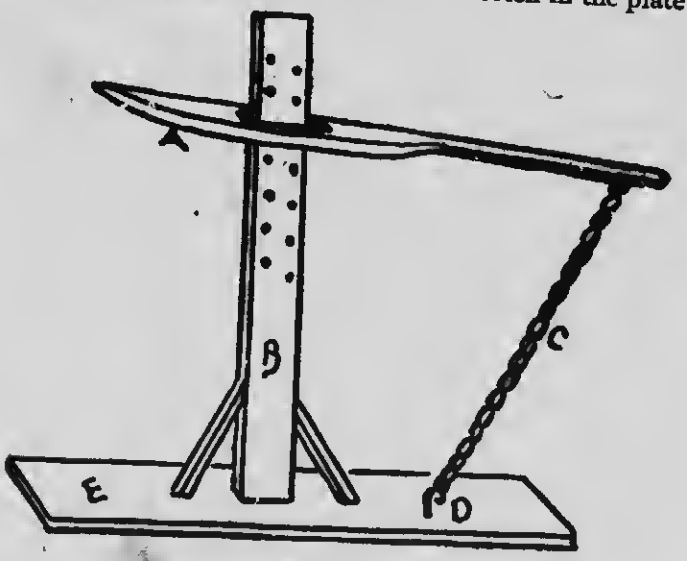


FIG. 2

Another form of jack is represented in Fig. 2. This is a simple and commonly used jack. The platform E consists of a

plank about 8 in. wide and 3 ft. 6 in. long; the standard B is a hardwood inch piece, about 3 ft. 6 in. long, morticed into the platform E and braced as shown. Three-quarter inch holes are bored at intervals of a few inches in the upper half; these are to receive a bolt upon which the lever A. rests. The lever A is a stiff piece of hardwood with a piece cut out about 10 inches from the point through which the standard B passes. C is a chain fastened to the lever and D is a hook attached to the platform E. To raise an axle the point of the lever A is pushed beneath it, the lever where the chain is attached is pressed down and the chain is hooked at the desired link to hold the wheel of the axle off the ground or floor. The lever A should consist of a heavier piece of timber than the illustration shows. Instead of using the chain and hook for holding the lever down one could attach a notched plate on the back edge of the standard B and an iron dog on the top of the lever so that as the handle is lowered the dog would fall into the notches bracing the handle down.

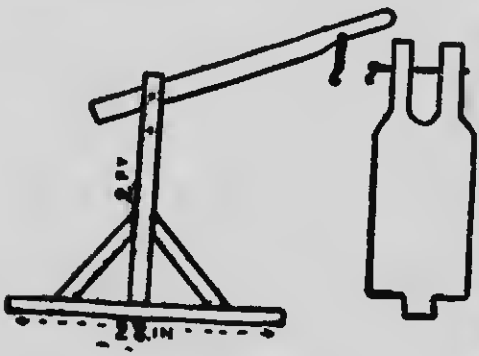


FIG. 3

The jack shown in Fig. 3 is much like that represented in Fig. 2. It is made from a plank of hard wood sawed as shown. A side view of the standard is also shown. The lever is held between the prongs of the standard by means of the bolt which is shown. This jack is operated in the same way as the foregoing.

Preserving Fence Posts.

At the end of a series of experiments conducted by the Department of Agriculture, Germany, in the preservation of fence posts, the following report has been made: Posts used in vineyards were dipped in different solutions to preserve them against rot. The

period of the experiment covered 24 years. The best results were secured with tar. Only nine per cent. of fir posts impregnated with tar had rotted at the end of 24 years. At the end of 20 years, 33 per cent. of those impregnated with copper aulphate (hlnestone) had rotted; nevertheless, tlie ease and cheapness with which posts, particularly green posts, can he saturated with copper sulphate solutions seems to make its use more desirahle than that of tar.

Timber cut between July 15th and August 15th is much more desirable than if cut in January to April. If a tree is cut after the starch which enters into its chemical composition has changed to sugar, say, in March, the worms, being very fond of this sweet, become destructive to the wood; hut if it is cut in July, after the completion of the spring growth, there is less sugar in the sap or wood, and they seek some more savoury food.

A Waterproof Stack Cover.

The following is highly recommended as a simple and cheap process for coating canvas for atock covers, waggon tops, etc. It renders the canvas impermeable to moisture, without making it stiff and likely to hreak. Soft soap is dissolved in hot water and a solution of iron sulphate (otherwise known as copperas or green vitriol) is added. A chemical action takes place between the potash of the aoap and the sulphuric acid of the iron sulphate, forming an insoluble iron soap. This is washed and dried and mixed with raw linseed oil, when it is ready to apply as a paint to the canvas.

Pickling Hams.

A highly recommended method of pickling hams and shoulders preparatory to smoking includes the use of molasses. To four quarts of fine salt and two ounces of pulverized saltpetre, add sufficient molasses to make a pasty mixture. The hams and shoulders having been in a dry, cool place for three or four days after cutting up, are to be covered all over with the mixture, more thickly on the flesh side, and laid skin down for three or four days. In the meantime make a pickle of the following proportions, the quantities here named being for 100 lbs. of meat: coarse salt, 7 lbs.; saltpetre, 2 oz.; potash, half an ounce; soft water, 4 gals. Heat gradually, and as the scum rises remove it. When acum ceases to rise, allow the pickle to cool. When the hams have remained the proper time in the pasty mixture, cover the bottom of a clean, sweet barrel with salt about half an inch deep, pack in the meat as closely as possihle, cover it with the pickle, and place over it a follower with weight to keep the meat down. Small hams and shoulders should remain in the pickle for five weeks, larger ones will require six or eight weeks, according to size. They should be allowed to dry well before smoking.

Rust Preventives.

To protect metals from rusting, that is oxidation, it is necessary to exclude air and moisture from the actual metallic surface. Polished tools are usually kept in wrappings of oiled cloth and brown paper, and thus protected, they will keep free of rust for a long time. When the metals are exposed, as in the case of bridges and other structures, it becomes necessary to protect them by means of permanent dressing or paint. For this purpose the oxide of iron paint is one of the hest preparations. It is made by simply grinding the red oxide of iron to a fine powder and mixing it with boiled linseed oil to the consistency of ordinary paint, when it is applied in the usual way. Another preparation is made in this way: Rub one ounce of graphite to a fine powder, add 4¼ ounces of sulphate of lead, one ounce of sulphate of zinc, and one pound of linseed oil varnish; heat the whole to the boiling point and stir thoroughly. This paint can be used for all metallic articles exposed to the action of the weather.

Dissolving Bones.

A metbod for the reduction and disintegration of bones with lime is as follows: Spread the hones in a layer from four to six inches deep and cover with a layer of freshly burnt quick-lime to an equal depth. Then should follow a layer of abont the same thickness of muck, peat, or good loam. This order is then repeated until the heap is, say, three feet high, the final layer of mnck being somewhat thicker, say, 10 inches or one foot. Now, hy means of a stout, pointed stick or iron rod make a number of holes through the mass and pour in water sufficient to slake the lime. The heap should be of sufficient dimensions to retain the heat caused by the slaking of the lime and the fermentation of the muck for six to eight weeks, when, if all has worked satisfactorily, the bones will be quite hrittle and the heap can then be shovelled over to mix the various constituents.

Bones may also be dissolved with ashes. A strong box or cask should be secured and in it should be packed fresh hardwood ashes and finely smashed bones. Water should be poured upon the mass, which will make lye to dissolve the bones. The box or cask should stand under cover so that the quantity of water applied will be under control. The time it will take to reduce the bone will depend upon the amount of potash in the ashes and the fineness of the hroken bones. Water should be added as it evaporates from the surface. The process can be hastened hy putting into the mass a few pounds of common potash. This is only necessary to save time. When the mass is soft enough to break down with a spade, it can be mixed with land plaster or dried loam to make it convenient for handling. It is a concentrated manure and should be applied with discretion.

To Destroy Weeds on Gravel Walks.

Several preparations are recommended for destroying grass and weeds on gravel walks, such as (1) Carbolic acid, one ounce in a gallon of water; (2) sulphuric acid, one part in thirty of water; (3) arsenite of soda, one pound powdered arsenic and two ponnds of soda in ten gallons of water. and, better than any of these (4) common salt: a strong hrine made of one pound of salt to every gallon of water. This can be poured over the gravel from a watering can and is far better than scattering dry salt, because it leaves very little colour on the walk.

Three-Horse Eveners.

Fig. 1 represents a form of evener that may be used on a seeder, disc harrow or other implement having a tongue. The long doubletree is 36 inches in length, the hole being bored one foot from one end and two feet from the other. A hole is bored in the tongue six inches back of the regular one and a hammer strap with holes corresponding is put on.

FIG. 1.

FIG. 2.

Fig. 2 represents a form of evener that may be used on any implements or machine that has no tongue. The lines extending from the whiffletrees show how the horses are hitched.

Fig. 3 shows another orm of evener for any implement without a tongue.

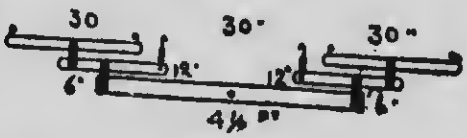


FIG. 3.

Fig. 4 shows still another form which allows the horses to walk close together and be hitched close to their work. For this, use the common whiffletree clips for outside. For inside use heavy strap iron and a four-inch pulley with groove for chain to work in. Use a light chain about two feet long, with short links and a hook on each end of each chain to hook in trace

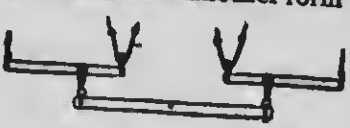


FIG. 4.

The sketch shown at Fig. 5 shows a three-horse evener that can be used on waggon and disc harrow. A hole is made in the tongue

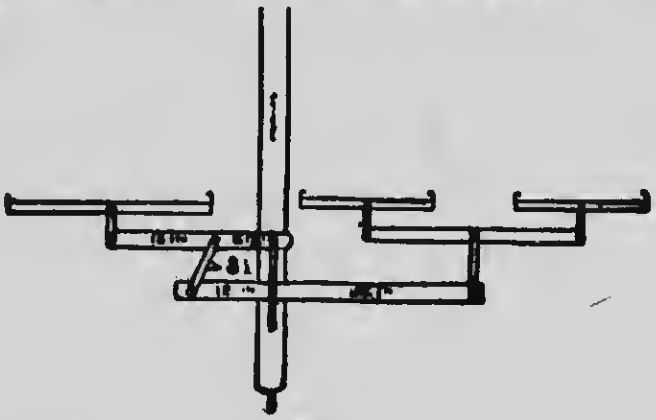
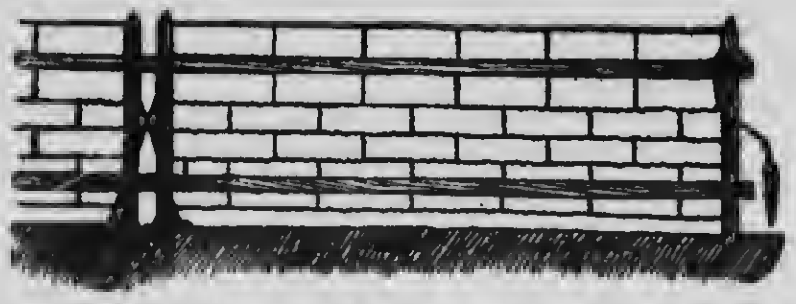


FIG. 5.

six inches back of the regular one, and a hammer strap with two holes in it (to match the two holes in the tongue) is put on. Strap iron is used to connect the two-foot and three-foot eveners.

A Movable Fence.

The accompanying illustration represents a serviceable form of portable fence that is easily and cheaply constructed. The fence is built in sections twelve feet long, and nearly four feet high. Each section contains about twenty-five feet of lumber, and four pounds of wire. It consists of two headpieces, one and one-half by three inches, and two side bars twelve feet long. The wire used throughout, including the cross sections and braces, is common No. 12 twisted fence wire.



SECTION OF MOVABLE FENCE.

In constructing the hurdle, the side pieces are nailed to the head pieces, and project beyond them four inches, to form the connection. The bottom pieces are eight inches from the lower end of the heads. The upper pieces are 12 inches from the top of the heads, and on opposite sides. These form the framework of each section. The wires are then stretched, being secured by

passing the wire throngh three-inch holes in the heads and driving a wooden peg in beside the wire. This holds the wire secure, while the ends are turned down and fastened with staples. The first wire is four inches from the bottom end of the heads, the second is twelve inches above the first, the third is six inches above the second, the fourth seven inches above the third, and the fifth, or top, wire is 8 inches above the upper wooden bar of the frame. The top wire is barbed. The cross wires are then put on, the ends being twisted around the horizontal wires with a hook made for the purpose. The side pieces of the frame, which are donble at top and bottom, are nailed together in the center to hold them tightly.

The hurdles are held in place by wire braces and pegs driven into the ground, as shown in the illustration. The wire braces are 4 feet 8 inches long and are fastened to the upper end of each hesd by a staple in the inside edge of the head. The pegs are made of iron, and are 16 inches lohg and a quarter lnch thick, and one and one-quarter inches wide. Each peg has a quarter-inch hole drilled near the top to hold the wide braces. On one end of each hurdle is an extension of seven inches which is sharpened. This enters a hole made in the ground with a crowbar, and holds the bottom of the feuce secure, while the top is held by braces which cross each other on the opposite aide of the heads, making the connection sure and anchoring the fence firmly.

Blasting Large Stones.

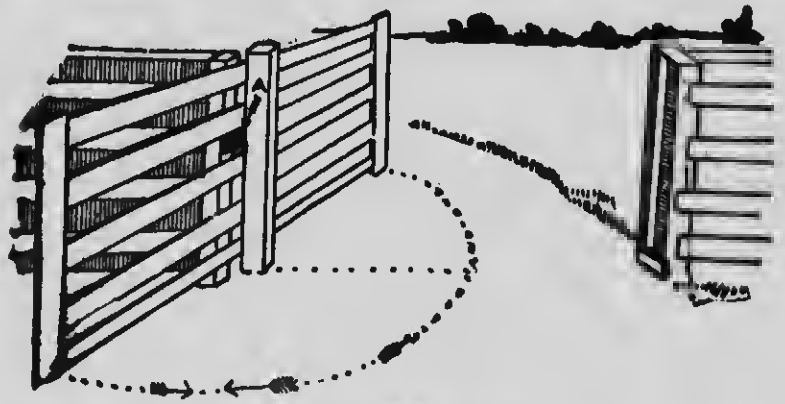
Probably the safest explosive to use in blasting stones on the farm is giant or blasting powder. To prepare a stone for blasting, the ground shonld be removed from around it, and a hole ahould be drilled down about half way throngh it at about the centre of the top. For this purpose steel drills similar to a cold chisel should be nsed. Three or four sizes of them shonld be nsed. The largest, which should be about four-fifths of an inch in diameter, should be abont a foot or more in length. Smaller drills, each a little longer, are used to follow the larger one as the hole becomes cramped. These must be kept sharp and well tempered, so as to wear well, and still not break. In drilling, an ordinary blacksmith's hammer is generally nsed. The drill should be turned a little at each blow and the hole shonld be kept moist with water. A spoon, with a thin straight handle and flat bowl about the size of a ten-cent piece, is used to lift out the stone dust as it is made with the drill. When the hole is drilled the desired depth, abont two or three inches of giant powder is rammed in by means of a wooden plunger. The fuse is placed in the hole snd shonld reach below the top surface of the powder. The hole should now be filled with powdered brick, which should be well rammed down,

care being exercised to avoid breaking the fuse. The fuse should project abont a foot ontside of the hole to give time for the workman to get well away after igniting before the explosion occurs. The work can be done at any season of the year, but it is seldom nndertaken in cold weather. The drills can be secured from any hardware dealer.

Where rough wood is plentiful it can be nsed with advantage in breaking up large stones. The stones should be dug around down to about level with the bottom and a good fire built, which should be continued for an hour or more, or until tbe stone becomes very hot. If a pail of cold water is now dashed on top of the stone it will break up into pieces that can readily be drawn off with a team.

A Simple Farm Gate.

The gate ahown in the accompanying illustration is intended for inside locations npon a farm, instead of b[illegible] or swinging gates which are troublesome and apt to get out of crder, and it will be noticed that the gate is not hung on hinges. It consists simply of a hurdle which atands between two strong posts set so that the gate easily passes back between them. The second bar of the gate rests on



SLIDING GATE WIDE OPEN.

The block ahown at A is a wooden cleat nailed from one post to the other upon which the gate rests and slides.

a cleat A, shown in the illustration. This cleat consists of inch lumber, four inches wide and 12 or 14 inches long. The gate will slide easily if the top of the cleat is greased. As the gate is closed it slips between the two posts, which prevent it from being pushed either way.

Points in favour of this gate over those in ordinary nse are as follows: It is cheaply and easily made; it is not liable to get out of order; quickly and easily operated; requires only ordinary fence posts, no h[illegible]ges, no latch, and it locks automatically.

Measuring Logs.

The following is the Doyle Rule for calculating the number of board feet in a saw log: Deduct four inches from the diameter of the log as allowance for slab; square one-quarter of the remainder and multiply the result by the length of the log in feet. The result will be the quantity in square feet of one inch lumber contained in the log.

Testing Seed Corn.

To test seed corn, take a starch box, glass box, or any other kind of box, put a couple of inches of sand or dirt in the bottom. Take a piece of paper cut the size of the box, mark it off in squares with a pencil and put it on top of the sand or dirt. Then put two grains from one ear on each square, putting the ears you test in a row on the floor or on a board. Put two grains from the first ear on square No. 1, two from the second ear on square No. 2, and so on through. Then put a piece of cloth cut the same size as the box on top of the grains thus placed. Put some more sand or dirt on top of that; moisten the whole and set it in a warm place, in the kitchen or dining room. In about five days lift up your cloth cautiously and see what squares failed to grow or grew weakly. Have your boy throw out these ears as you call the numbers. Then you will know which ears of your seed corn will grow.

Hay From Green Oats.

To make good oat hay, the oats should be cut as soon as they have reached the milk stage—that is when the heads have partly filled with a milky substance. The process of curing oat hay is similar to the curing of ordinary hay from grass or clover. It should be allowed to wilt on the top of the swath, then stirred up or turned and when nearly dry it should be raked up and put into cock. It should cure in the cock until it is moderately dry, when it is ready to put into a stack or shed.

Grasses for Wet Meadow.

There are a few kinds of good grasses which grow in wet land, and one or two, such as Blue Joint and Canary Reed grass, which will actually grow in water. Both of these grasses mature seed and also spread by the root. After wet land is drained there are a great many different kinds of grasses which may be grown profitably. Timothy does excellently well on moist land, and when mixed with alsike or red clover gives heavy crops of hay of the highest quality.

Catch Fodder Crops.

German millet and Hungarian grass may be profitably sown after hay harvest if one finds a shortage of hay or is likely to need a variety.

Millet on good land will prodnce an immense amount of valnable hay if cut in bloom. It makes fibre rapidly and this process should be anticipated by the mower. Pearl, or Japanese Panicle millet sown, or planted in drills, as late as July, will furnish green fodder, if cut frequently, till frost. These varieties grow large, strong stalks, and for best feeding should be planted thickly.

These late crops, on account of being somewhat out of season, shonld be sown on good land and all the work of their sowing should be done with great care. When so managed it is interesting to watch them in their often marvellous hurry of growth—making a good finish from a late start.

Land Plaster on the Stable Floor.

The best kept cattle stables are frequently sprinkled with land plaster. One of its most valuable effects is the fixing of the ammonia if the manure in the pile should tend to heat. In any case, there is a constant tendency for ammonia to escape, and plaster largely arrests this waste. It requires but a very little if it is used in the stables immediately after they are cleaned in the morning. Eight or ten pounds dusted over the wet places each day in a stable containing 30 cattle will suffice. Slaked lime would only accentuate the difficulty. That is, it should be used where you want to hasten decomposition, as when cornstalks, coarse straw and the like, are piled np for the purpose of rotting down into available manure. If plaster is not available, scrape up some swamp muck in the summer, or some black soil from the lowlands, or even dry soil of any kind, all of which should be stored in dry weather in the summer, so that they will be available in the winter as absorbents for the stable. If stored when they are fairly dry and kept for three or four months nnder cover, they will be quite dry when wanted for use. However, none of these materials is as effective as land plaster in arresting the escape of ammonia, nor do any of them condnce to tidiness and sweetness of the stable as does the plaster.

Sawdust as a Manure.

The direct application of sawdust to light soil is not good. If the soil be heavy clay in need of lightening and mellowing, an application of sawdust would do no harm. On a sandy soil crude sawdust might do more harm than good. If, however, it could be first rotted- -as with barnyard manure—it would undoubtedly prove most valuable for the land. As dry sawdust is a clean, easily handled litter, having a high absorbent value, it might well be used in the cow barn, pig pen and other places where there may be liquid manure to absorb. Thus much valuable plant food may be saved, and the subsequent fermentation of this sawdust manure in the heap will tend to liberate the elements of fertility in the sawdust

and partly convert them into humus compounds. The sawdust of hardwood contains more plant food and rots more readily than that of pine. Manure made with sawdust is very apt to fire-fang and spoil if left in too large a heap. It should be kept moist and occasionally turned over. Apply in the spring, lightly ploughing under or harrowing in, just before seeding. Such manure also makes an excellent spring dressing for grass lands.

Saving Liquid Manure.

The old-fashioned cistern receptacle for liquid manure is becoming very unpopular, because of the labour it involves in pumping out and hauling, and also the loss of manurial constituents through fermentation. A much better plan is to have a concrete floor in the stables with gutters behind the animals to catch both the liquid and solid excreta. With these some absorbent material, such as cut straw or dried peat, should be used. Many farmers wheel the manure and soiled litter from the horse stable and spread it in the gutters of the cattle stables daily. The cattle stables are then cleaned out by means of a cart or sleigh, and the manure is taken direct to the field. When this is done, all the manure is saved and applied to the land upon which it is needed without loss from fermentation or other cause.

Building up Worn-out Soil.

Probably the best course to follow in building up a depleted farm is to get some vegetable matter into the soil. This may be done by applying stable manure at the rate of ten or more loads per acre, or ploughing down a green crop. Either or both of these plans would render the soil moist, friable and suitable to seed down with clover. For a quick-growing green crop, buckwheat is, at the rate of five pecks per acre, probably the best to sow, or peas and oats sown together at the rate of nine pecks per acre, would also produce a good bulk of crop to turn under. It would be admirable to plough the land and work it with the cultivator two or three

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times, then after a shower sow the seed for the green crop and plough the crop down before the seeds form, then work it up late in the fall and in spring sow barley thinly and seed down with a mixture of red clover, lucerne, orchard grass and timothy seed; using five lbs. of red clover, six lbs. lucerne, three lbs. of timothy and four lbs. of orchard grass seed per acre. In case an application of stable manure can be given either before the green crop seed is sown or in the fall so much the better for the field.

Wood Ashes.

There is no better fertilizer for potatoes and corn, if the soil contains a sufficiency of humus and nitrogen, than wood ashes. They can also be used to advantage as a top dressing for meadows, their effect upon which will principally be to bring in or encourage the clover. Indeed, wood ashes are valuable for all classes of crops, but must be supplemented with organic and nitrogenous manures on many soils for the best results. The application may be from 50 bushels to 100 bushels per acre, according to the condition of the soil and the character of the ashes. For root crops and corn the application may be made broadcast on the ploughed land in the spring and harrowed in; for meadows and hay lands it can be applied as a top dressing as soon as growth starts in the spring, and may with advantage be supplemented with 100 lbs. nitrate of soda per acre.

Composts.

The materials used in making composts are many, indeed any organic substance—vegetable or animal—which forms a waste product on the farm may be employed to advantage. Straw, leaves, muck, or peat, turf, weeds and kitchen waste are among the more common constituents of compost heaps. In order to induce their decay—and thus liberate plant food in available form—they may be mixed with manure, urine, fish, flesh, etc., which set up an active fermentation and lead to a quick disintegration of the whole mass. In the place of such animal refuse as just enumerated, certain alkaline materials—lime, wood ashes, etc.—are sometimes used, these substances favouring the growth of the bacteria or germs which break down the vegetable organic matter.

The exact size and plan of the compost heap is not a matter of much moment, but it is usual to have alternate layers of the vegetable refuse and of the manure, of about six inches thick, the height being from three to four feet, and the superficial area governed by the amount of material to be composted. The quality or richness of the mature should regulate to some degree the amount necessary, but it is always well to have somewhat more than is absolutely required to set up fermentation throughout the mass, as otherwise weed seeds may escape destruction.

If the vegetable refuse is green and the manure fresh, at the time of making the heap, there will be no necessity to moisten, but if the materials are dry, water, or better still, urine, should be poured over the mass until it is moist throughout. After the heap is built, cover to a depth of a few inches with peat, muck, soil or sods, and allow to stand undisturbed for a few weeks, the length of time depending largely on the character of the weather. Then fork over, moisten again, if necessary, and again cover with muck or soil to keep in the heat and prevent the heap from drying out. With good manure, the forking over may be repeated two or three times at intervals of three to six weeks, and the whole mass of the heap thoroughly composted—in summer time—in two to three months.

Rats.

The ordinary caustic potash, or even caustic soda which is so generally sold in tins as concentrated lye, if placed in the openings of rat holes, will drive away rats for a long time. It is supposed that by running over these salts which absorb moisture from the air, the rats and mice get the material on their feet, which blisters them and makes them very sore, and they leave for pastures new and more agreeable. With the same idea of rendering their habitations uncomfortable, finely broken glass is sometimes put in rat holes. This cuts their feet and makes them sore. A rather barbarous remedy which is also suggested is to mix freshly made plaster of Paris, with dry food, such as flour, oatmeal, or bread, and put this where the rats can get it. When it is eaten, the plaster sets inside them and kills them. A dish of water is placed near the food, which the animals drink eagerly on account of the thirst which the dry powder induces. The same remedy is also sometimes used for cockroaches in Europe. Good rat traps constantly attended to, will soon clear out rats from a house. After a few have been caught, the others seem to understand that something is wrong and disappear.

Poisoning English Sparrows.

Probably the best way to destroy the English sparrow, which has become such a nuisance in many parts of Canada, is to poison them by saturating wheat or other grain in a solution of strychnine. This can be done very satisfactorily by dissolving one-eighth of an ounce of sulphate of strychnia in half a pint of hot water, then with this liquid moisten five pounds of wheat. When the grain is dry it may be scattered where the birds can get at it, but where no domestic animals, or poultry, can do so. It would be as well to keep cats shut up for a day or two when sparrows are being poisoned with this mixture.

Corn and Crows.

About the best treatment to adopt to drive crows away from a newly sown corn field is to sprinkle corn on the ground at several points in the field, and set steel rat traps, covering them very lightly with soil. As the crows are caught tie them there for a day or two. This will give the crows a wholesome fear of the field and they will give it a wide berth in future.

Another plan is to put the seed into an old pail with one or two small holes in the bottom. Fill it nearly full of corn and then pour in hot water enough to cover the seed. Dip a piece of stick or broom handle for about three inches into ordinary coal tar, or put in two teaspoonfuls of the tar, and stir up the seed briskly so that all of it is moved. By the time the water has run out the seed will be covered with a light film of tar which becomes dry in hot water. As soon as the water has all run off, turn the corn out on a cloth or paper and dust thoroughly with land plaster, slaked lime, or very fine road dust. This will soon dry the grain and by the next day it can be planted either by hand or with a corn planter. This treatment does not affect the germination of the seed.

Another plan is to scatter about the corn field a dozen or two of hen's eggs, each containing a small quantity of strychnine. The poison is inserted through a small hole punched in the shell. Crows are very fond of eggs, and those which come for corn will devour the eggs first. The birds which get a tast of the eggs will not leave the field but will be left lying on the ground. In a very short time the flock will vacate the field and, warned by the fate of their companions, will not return.

Destroying Woodchucks, Prairie Dogs, Skunks and Gophers.

The chemical used for killing woodchucks, prairie dogs, gophers, etc., is the same as for destroying bugs in peas, viz., carbon bisulphide. This is a liquid which readily evaporates into gas which is heavier than air. To kill woodchucks or skunks in burrows, about two or three ounces of the chemical should be poured on to a piece of cotton waste or rag which should be thrown down the hole. The hole should then be quickly filled in with earth and well tramped down. The gas will settle to all sections of the burrow and destroy the inmates. This chemical is very inflammable, so that no fires should be brought near it when exposed.

Ants.

The first thing to do in getting rid of ants is to follow some of the insects to their nest or hill and then destroy the occupants by drenching it with boiling water or pouring on a small quantity of bisulphide of carbon. This liquid is very inflammable, and should

not be exposed to fire. If the nest cannot be found, many of the insects may be killed by placing in the runs sponges saturated with sweetened vinegar and water. The sponges should be frequently dipped into hot water, which will destroy all the ants contained in them.

Cutworms.

The best way to clear a garden of cutworms is to spread on the surface of the soil, near to the plants to be protected, small heaps of a bran mash, poisoned with Paris green, or some other poison. This is easily made. Place in an open pan about a gallon of wheat bran, moisten this with half a pint of water in which a tablespoonful of sugar has been dissolved. This will be wetter than is necessary, but can be made dry enough to run easily through the fingers by stirring in a little more dry bran. Shake over this and stir thoroughly enough Paris green to give the mixture a green tinge; about an ounce will be enough. This mixture is particularly attractive to cutworms, and they will eat it actually in preference to green vegetation. When plants are grown in rows, the poison may be distributed along the rows by means of a wheel seeder. Those who have tried this way of fighting cutworms seldom use anything else. It is equally useful in field practice as in gardens.

CUTWORMS.
Showing larva, pupa and adult.

Bedbugs.

If the house infested with bedbugs can be very tightly closed, it would be well to have it thoroughly fumigated with burning sulphur; the fumes will penetrate all cracks and destroy the insects. It must, however, be carefully and repeatedly done to effect a thorough eradication. A useful wash for the destruction of bedbugs is a solution of corrosive sublimate. This material is deadly poison and must be handled with caution. It does not dissolve readily in water; so it is better, first of all, to dissolve an ounce in half a pint of methylated spirits and then mix this with half a gallon of water. This wash should be applied with a brush wherever the insects are thought to be. Spirits of turpentine applied to cracks

and crevices is also good. When bedbugs are in a house there is always more or less danger of their being carried about in clothing unless great care is taken to brush out all seams and folds of the garments in which the insects may hide.

Clothes Moths.

The small creamy-yellow clothes moth which lays the eggs from which hatch the small, but destructive caterpillars which injure woollen goods, furs, carpets, etc., begin to fly in spring, and as soon as these appear it is unsafe to put away articles of winter clothing unless some special precaution is taken that the eggs are not also packed away with them. If there is any chance of this it will be well to beat the clothes thoroughly, and then pack them away in such a manner that they can be examined and again beaten about a month later. If no moths have been seen flying in the house before packing away the goods, they may at once be tied up closely for the summer. Putting some camphor or naphthaline, often called "moth camphor," among the clothes, has the effect of preventing moth from trying to lay their eggs on the parcels. The chief thing, however, is to pack things away early in the spring before the moths appear. For killing moths or their caterpillars there is nothing better than benzine, the vapour of which is destructive to these pests. Any article which is infested with them, or in which they have laid their eggs should be sprayed with benzine, or it may be placed in a tight receptacle along with a saucer containing some of the liquid. It is very volatile and soon evaporates and fills the receptacle with its vapour. Care must be taken in handling benzine that no light is brought near it, or into the room where it has been evaporated until the smell has entirely disappeared, otherwise an explosion is liable to occur

Red Clover Midge.

The eggs of the clover midge are deposited in the clover heads before any bloom appears, are hatched, and live on the substance of the petals. This pest can be overcome by cutting the clover as soon as the heads are formed, which is usually from the beginning to the fifteenth of June, according to the season. The advantage of the early cutting is that the second crop will bloom before the second brood of midge is ready to do any damage. Occasionally good seed is secured from a late crop of red clover, blooming between the second and third broods of the midge.

Grasshoppers.

A mixture for destroying grasshoppers is known as "The Criddle Mixture." It is made up of the following: One part Paris green, two parts salt, forty parts horse manure, by measure. Add

enough water to make soft without being sloppy. Scatter it about the fields in quantity according to the number of grasshoppers. They will he attracted for 40 feet. It is most effective when fresh, but will do excellent work when several weeks old, even after being washed hy rain. Owing to its inexpensiveness, it is certainly worthy of a trial where depredations are feared from these pests.

Potato Bugs.

Potato hugs are very easily combatted hy the application of poison to the potato vines. The most commonly used poison is Paris green. As soon as hugs appear the vines should be treated with the poison in either the dry state, or mixed with water. If applied dry, the green powder should he very thoroughly mixed with land plaster, very fine ashes, or a cheap grade of flour. The right proportion is about one pound of Paris green and 38 pounds of plaster, per acre. It is well to dust it on while the vines are damp with dew. When applied with water one pound of the poison should be mixed with 96 gallons of water per acre. It is well to add one pound of slaked lime to the mixture to prevent the leaves of the potatoes heing hurned hy the Paris green. The solution may be applied with a spraying pump or a watering can with a finely perforated rose. Second or even third applications may be required, if later erops of bugs appear.

Earth-worms.

The best treatment for land where earth-worms are so numerous as to be troublesome is to dust the surface lightly and frequently with freshly slaked lime. If this is done directly after the seeds are sown and every evening for two or three days after the young seedlings come up it will, as a rule, destroy the worms which come to the surface at night, sufficiently, to give the plants a start; they will soon outgrow the condition in which they are injured by worms. During a wet spring these applications may require to be made more frequently.

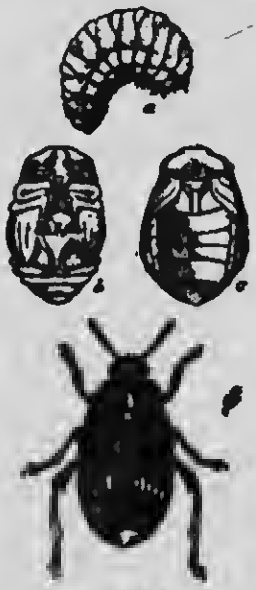
Turnip Fly.

The Turnip Flea-beetle, more commonly called Turnip Fly, is a small, active, shining black beetle with yellow markings on the wing covers. It eats the seed leaves of turnips and other plants of the Mustard Family, directly they appear above the ground, and just when they can least withstand such attacks. Notwithstanding its destructiveness, it is an insect which is very easily dealt with indeed. There are two or three broods in the year, and by carefully watching the dates of their appearance, it has been found that a crop of turnips can be sown at such time of the year that no treatment is necessary. Should it be required, however, to sow early,

so as to get an early crop, a simple and effective means of protecting the young plants, consists of dusting them with a mixture of one Pound of Paris green with fifty pounds of air-slaked lime, flour or any other dry powder. Turnips sown after June 12th in Ontario are seldom bothered with the Turnip Fly.

Pea Weevil or "Pea Bug."

The most convenient way to treat peas which are found to be infested with living weevils is to put them in a tight coal oil barrel, which will hold five bushels or about 300 lbs. of seed. Place on the top a flat pan and pour into this three ounces of bisulphide of carbon, or sprinkle the liquid directly on the surface of the seed, then cover the barrel quickly and keep it tightly closed for two days. As bisulphide of carbon is very inflammable the barrel should be kept in an outside shed, that no accidents may occur. No light of any kind should be brought near it. The seed will not be injured in any way either for planting or for feeding if required. The gas which is formed by the exposure of the bisulphide of carbon to the air is very destructive to all insect life and every insect in the peas will be killed by this treatment. If you cannot obtain bisulphide of carbon put your seed on a barn floor or in a waggon box and sprinkle a little coal oil over it, and turn the seed every day for three or four days so that every pea gets a light coating of the coal oil. Half a gallon of coal oil will treat five bushels of peas, or less will answer if they are thoroughly shovelled over.



PEA WEEVIL.
A, grub; b, pupa, under surface; c, pupa upper surface; d, adult weevil.

Wireworms.

Wireworms, the yellow larvae of the Click Beetles, have so far defied the efforts of those who study insects to find a practical and easy remedy. The insects are more likely to be injuriously abundant in peaty or mucky soils than elsewhere. The only remedy which has given much satisfaction is to plough such land twice in

antumn, the first time at the end of August, when the larvae change to the delicate pupal condition, and as late as possible before frost sets in in October or November, when the freshly-formed beetles are in their cells preparing to pass the winter, hut still in a delicate condition. Many of the remedies which are sometimes recommended from time to time to the press have proved to be useless nnder careful test. Some of these are the sowing of lime, salt, soot and other materials npon the soil. The poisoning of seed grain and the cultivation of various crops supposed to be immune from the attacks of wireworms have all proved of no avail. Barley and rye seem to be less attacked than other grains, so that these are probahly the best crops to use on land which is known to be infested hy wireworms, hut the only remedy which can he said to have given satisfactory results is double plonghing of the land in early and late autumn.

Hessian Fly.

The Hessian Fly is douhle-brooded,—the fall hrood appearing in September and injuring the young plants of fall wheat; the spring hrood appearing in May and June and injnring the more mature stage of the fall wheat as well as spring wheat and barley. The best preventive measures are late sowing, thorough preparation of the land, stimulation hy fertilizers, hurning of refuse after threshing, hurning or ploughing nnder of infested stuhhle when practicahle, and co-operation among the farmers themselves.

There is no absolutely fly-proof variety of wheat. The Genesee Giant, Arcadian, Walker'a Reliahle, Michigan Amber, and Egyptian Amber suffer less than Dawson's Golden Chaff, Turkey Red, or Democrat.

Climatic conditions infinence the time of appearance of the fly in the autumn. A dry rainless Angust will retard the appearance sometimes ten days or two weeks. In normal seasons, with rain during the last two weeks in August, the safe date for sowing varies in different localties from September 5th to September 15th.

Sow as late as yonr local conditions will permit, sow intelligently in a well-prepared seed-bed and on good soil, get your neighbors to do the same, and you will circumvent the Hessian Fly nearly every time.

Potato Scab.

The scah of potatoes is a fungous growth which shows itself in a rough and cankerous appearance on the surface of the tubers. A great amount of work has been expended on this disease and still no absolute preventive is known if the land is inoculated with the trouble.

Of a large number of methods nsed for treating the seed potatoes, soaking them in a solution of formalin, one pound to thirty gallons of water, for two hours, is the most effective. Soak the

potatoes before cutting them, and if they are not planted at once spread thinly to dry. This treatment will kill the disease on the seed, but scab can live in the soil for many years without a known host. Lime, wood ashes and barnyard manure aid the growth of scab, while sulphate of ammonia, muriate of potash, acid phosphate, and dissolved bone render the soil less favorable to the disease.

Potato Blight.

There are two forms of potato blight, the early and the late. The former shows itself in withering the leaves and stalks early in the season; the latter causes the potato rot that is responsible for very serious loss almost every year. The same remedy does for both, viz: spraying the growing vines with Bordeaux mixture at intervals during the season. The spraying should commence when the vines have reached a height of eight inches, and be repeated at intervals of two or three week until the potatoes are well formed at the roots.

When a single barrelful of the Bordeaux mixture is reqnired, dissolve in a coal oil barrel partly filled with water, four pounds of copper sulphate (blnestone). Hot water facilitates the operation. To dissolve quickly place the copper sulphate in a cotton bag or basket, and suspend this in the vessel containing water so that it is entirely immersed. Solution rapidly takes place. In another vessel slake four pounds of fresh lime with as many gallons of water. If the lime, when slaked, is lumpy or granular, it should be strained through a fine sieve or coarse sacking into the barrel containing the copper sulphate now in solution, then fill the barrel with water and it is ready for use. It should be used soon after being prepared.

When a large amount is contemplated it is a good plan to make stock solutions separately, of lime and bluestone, which can be diluted as needed; dissolve 100 pounds of copper sulphate in 50 gallons of water; two gallons when dissolved will contain four pounds of the salt. In another barrel slake 100 pounds of fresh lime and make up a milk by adding 50 gallons of water; when well

stirred two gallons should contain four pounds of lime. When, as before, it is desired to make a barrel of Bordeaux mixture, take two gallons of the stock solution of copper sulphate, and add the same quantity of the milk of lime; if the lime is of good quality it will be sufficient to neutralize it completely. If the lime is air-slaked or impure, the right quantity can be ascertained by applying the ferro-cyanide of potassium test. A two-ounce bottle containing a satur-

MAKING BORDEAUX MIXTURE.

Pouring together the lime milk and copper sulphate solution.

ated solution of ferro-cyanide of potassium, costing five cents, is all that is required for a season's work. If the lime is deficient a drop of the ferro-cyanide of potassium (yellow prussiate of potash) added to the mixture will turn brown. Add the milk of lime till the drop of ferro-cyanide of potassium remains colorless, then add a little more milk lime to make sure that the strength is uniform, and fill the barrel with water

Smut in Wheat.

Bluestone and formalin are the two principal materials used for treating wheat seed for smut. One pound of bluestone dissolved in eight gallons of water will serve to moisten about ten bushels of wheat. The wheat should be placed in a pile on the floor, and while one is shovelling it over another should sprinkle it with a watering can, being careful that all the grains are moistened. The wheat should then be spread out to dry before being sown. Care should be taken to prevent re-contamination from smut that may be about the barn or in old bags. When formalin is used, four and one-half ounces should be diluted with ten gallons of water. The wheat should be steeped in the solution for about fifteen minutes.

Smut in Oats.

One pound of bluestone dissolved in nine gallons of water will be strong enough to destroy the smut, if the grain is immersed in the liquid. The bluestone should be dissolved in warm water, then cold water can be added. A good method of treating the oats is to use a coarse sack into which the oats are placed and then sunk under the liquid and well shaken up. They should not be left in longer than will moisten all the grain. They should then be dried as soon as possible. It has been found that treating with bluestone in this way delays the germination of the oats. Experiments show that oat smut may be prevented without injuring the germinating power of the oats by soaking the seed for 12 hours in a solution of one pound of potassium sulphide to ten gallons of water. Place the seed in a wooden vessel and pour on the solution until the seed is covered several inches deep. Stir the seed and solution several times during the 12 hours. Dry the seed and sow it as soon as possible after it becomes quite dry.

Smut in Corn.

Up to the present time there has been no practical method found for destroying corn smut after it once makes its appearance in the crop. Some spraying compound like the Bordeaux mixture will tend to keep it in check, but such treatment is entirely impracticable in a large field. The slow and tedious remedy of pulling it out by hand as it makes its first appearance and before it reaches maturity, is the only practicable method. On this plan farmers should unite in order to rid a neighbourhood of this pest. If the smutty masses are pulled early in the season and burned, the infection can go no farther, so that smut will finally disappear. Something may be done by fall ploughing, although the spores are often spread from yards. Although experiments have demonstrated that smut is not particularly dangerous to farm animals, yet most persons prefer to have a good ear of corn in the place of a big smutty mass.

Wild Oats.

The best way to clear land of wild oats is to plough in spring and cultivate rather late, then to sow an early variety of barley and cut green for feed. Two cuttings may be got during the summer in most seasons. The wild oats make excellent feed. After the second crop has grown well up, if it is not thick enough to mow a second time, plough the whole down and harrow smooth. The following spring some wild oats will appear from buried seed. If not convenient to grow roots on this land, sow early to barley, and if the oats are sufficiently numerous to be dangerous, cut again as hay. It is claimed that wild oats will remain in the land for a long time without germinating, but most of such statements are much exaggerated.

Clover Dodder.

Clover Dodder is a true parasite on the clover plant, and is a bad weed, particularly if growing clover for seed. This plant belongs to the Convolvulus family, and the seed germinates in the ground, throwing out a thread-like stem, by which it attaches itself to the clover plants and soon sends out suckers by which it holds to the clover and sucks its nourishment from that plant. The connection with the ground soon ceases, and the parasite increases quickly at the expense of the clover and forms large patches. When the clover leaf is broken up Dodder seldom comes up again in the same field. It develops a large amount of seed, which is difficult to separate from clover seed. It is an annual, and in a crop grown for seed the patches should be dug up and destroyed before the seed is ripe. The patches are conspicuous, and the seed does not ripen till late in the season. The seeds are round, of a yellowish colour, and rather larger than those of clover.

Rib Grass.

Rib Grass or Narrow-leaved Plantain is a common weed in clover fields and where clover is grown for seed is a bad weed because the seed is conspicuous and reduces the value of the seed when put on the market. When clover is for feeding it is not of so much importance because this plant makes excellent feed and is actually sometimes grown in Europe as a fodder plant. It is a perennial, hut roots near the surface, so is easily cleared from a field if clover is cut before the seeds are ripe.

Canada Thistle.

Canada Thistle is the ordinary European Field Thistle and is not a native of Canada. It has, however, become thoroughly acclimatized and has now spread over most of the Northern States and Canada. The statement that Canada thistles can be killed by cutting them at a certain time is a fallacy, although it is a good plan to cut down the plants in summer before the seeds ripen, because the flowering stems are produced at the expense of the reserve material laid up the previous year for that very purpose in the underground stems and root stocks. If cut when in bloom a larger amount of this reserve material has been used up and consequently the plants are in a weaker condition than at any other time of the year, but there is still sufficient material left to produce strong stems which will bear leaves enough to feed the plants and lay up a store of food for next year's growth.

The best plan to destroy Canada thistles is to mow them down when in flower, and then plough deeply soon afterwards to tear up as much as possible of the underground stems and roots. As soon as any new growth shows above the surface destroy this by plough.

ing again, or with a flat-footed cultivator or disc-harrow, so as to prevent any leaves from forming and laying up food for the plant. It will be well the following year to grow root crops in the fields which have been treated this season to destroy the thistles.

Quack Grass.

In rich or heavy land, quack grass is frequently extremely troublesome, on account of the long and vigorous underground stems, or root-stocks, which it throws out in every direction from the central plant. If a patch of this weed is examined it will be seen that it very seldom roots more than three or four inches beneath the surface. The best remedy then is to plough land infested with it, about four inches deep during June and July. After ploughing leave the land to dry out for a couple of days and then rake thoroughly with a springtooth harrow or cultivator, dragging the grass roots to the edge of the field where they will dry out and can afterwards be burnt. A week or ten days later cross cultivate again and, if the land is wanted for a late root or feed crop, sow by the middle of July and mow or feed off in the autumn. Quack grass seldom becomes a bad pest in land which is worked under a short rotation.

Bindweed.

Bindweed is a very troublesome weed which winds its tough and curling stems around the stalks of various plants, partially chokes them, and thereby hinders their growth. It is a perennial with a very extensive creeping root which penetrates far into the soil, and any piece of the root possessing one or more buds is capable of starting new plants, hence it is necessary to clean implements very thoroughly after they have been used in a field containing this weed. The flowers are white or rose-colored and one inch across. The seeds, three in number, are large, black, and angular, and are held in a spherical capsule.

Bindweed is a very difficult weed to eradicate and careless cultivation only increases the trouble by carrying the roots from place to place. Salting is recommended by some practical farmers who have succeeded in eradicating this very troublesome pest.

The weed may be kept in check by the frequent introduction of well-cared-for hoed crops into the rotation, and the shorter the rotation the better. The later sown hoed crops, especially rape, are more effectual than those sown earlier in the season. Before the hoed crop is sown, the weed may be kept in check by going frequently over the field with a broad-share cultivator, so as to cut all the plants an inch or two below the surface without bringing up any of the creeping rootstocks. About the 1st July the land may be sown with rape in drills, say 26 inches apart, and during the early growth of the crop the weeds may be kept in check by means

of the horse-hoe, with more or less hand-hoeing. If the land has been well manured or is naturally rich in vegetable matter, the rape will make a rank growth and smother some of the weeds. The rape may be pastured in the fall, and in extreme cases may be followed hy another hoed crop, snch as corn. If the corn is well cultivated and hoed, most, perhaps all, of the plants will be destroyed. Buckwheat sown on summer-fallow and ploughed under when coming into hlossom, followed by surface cultivation with the hroad-share cultivator, will assist very much in killing the weed.

Ox Eye Daisy.

There are two plants known in Canada hy the name of Ox Eye Daisies. The plant to which properly this name belongs has large white flowers with a yellow centre, hut in many parts of Ontario and the Eastern Townships of Quebec the Orange Daisy or Black Eyed Susan (Rudbeckia) is known by the name of Ox Eye Daisy. The white flowered or true Ox Eye Daisy is a perennial plant which roots close to the surface and can easily be destroyed in land which is regularly worked hy simply ploughing down. The seeds, however, are produced in enormous numbers, and it is not easy to clean land with a single treatment. The best agricultural method is to seed down heavily with timothy and clover. These fodder plants are in their best condition for cutting for hay just at the time that the Ox Eye Daisies are in blossom. Although not a good addition to the hay, such plants as grow up in it the first year are of small size and when the lea is ploughed down are destroyed. Ox Eye Daisies increase in land which is left too long in pasture. Much good may be done hy spndding and destroying these conspicuous plants whenever found along roadsides. The Orange Daisy, on the other hand, is a hiennial or two-year plant, and is much easier to clear from land. The young plants do not flower the first year. If cut before the seeds are ripe in the second year no new plants will be formed, and after a second cutting the plants will die out.

Wild Mustard.

A remedy which has been found effective against Wild Mustard, also called Herrick, is to spray the infested fields of grain with a two per cent. solution of copper sulphate or hluestone (that is one pound of bluestone for five gallons of water). This operation must be done before the plants are seven or eight inches high. It requires abont 50 gallons of the mixture to the acre, and this mixture should be applied on a clear still day. If a rain should fall within 24 hours, or if the weeds are older, a second spraying will be necessary. When the plants are not too abundant the best method to destroy them is hand pulling, provided this be done before any of the seeds are ripe. In very large fields, or where water is scarce, a far better

way than spraying is the use of light harrows or of the implement known under the name of Weeder. In this way, not only the seedlings of wild mustard, but those also of many other noxious weeds, are destroyed at the same time, and the growing grain is much benefitted by this surface cultivation. Two such weedings should be given between the time the grain is up until it has shot up seven or eight inches.

Penny-cress, French-weed, or Stink-weed.

Penny-cress is a winter annual and a very bad weed. It is very abundant in Manitoba and is becoming rather common in Ontario. It grows as an erect plant, with a number of branches from the upper part. The plant has a peculiar odour, resembling that of garlic, hence some of the common names. The seed also has a very pungent taste, When eaten by milch cows, it imparts a disagreeable flavor to the milk.

The best method of eradication is continuous growing of hoed crops with thorough cultivation thereof, followed by heavy seeding with rye. In places where the weed is very thick, mowing and burning is a good remedy. When fields are over-run with the weed it is best to proceed as follows: Harrow stubble-ground early after harvest, or gang-plough and harrow. As soon as the seeds have had time to sprout, cultivate thoroughly; repeat cultivation at intervals; and rib up with a double mouldboard plough the last thing in the fall. Put in a hoed crop, either roots or corn, the following spring, and cultivate it thoroughly throughout the growing season. Cultivate and harrow well two or three times after roots or corn, having first run the plough along each row of corn roots to cut the roots and turn them up; and rib up before the frost.

Ragweed.

Common Ragweed, known also as Roman Wormwood and Bitter weed, is an annual which matures a large quantity of seeds which have great vitality, remaining a long time in the soil without injury. The seed does not mature till late in August and afterwards. In clearing land an effort should be made to prevent the seed from ripening by cultivating the land immediately after harvest, and late in the year. Early maturing crops should be used whenever possible. When this weed is eaten by cows it causes bitterness in milk.

Chess.

Chess is a winter annual, with fibrous roots and rough coarse leaves. It has large spikelets, dark green in color, of characteristic shape, and grows from three to four feet high. Many look upon Chess as degenerated wheat, because it appears among fall wheat that has been winter-killed. This idea is erroneous and without foundation. The fact is that Chess will mature seed under adverse

conditions, even though the plant be only a few inches high. The seed possesses great vitality, and is often found in wheat and rye. Chess is a typical plant belonging to the genus *Bromus*. Wheat belongs to the genus *Triticum*. Chess will produce Chess and only Chess, and a seed of wheat cannot be sown to produce Chess, and Chess cannot produce wheat under the most favorable conditions of growth.

Sow Thistles.

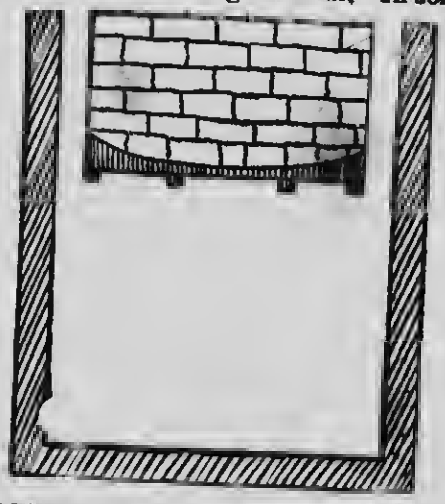
The Perennial Sow Thistle is a terrible pest in every part of the country where it has once got a foothold. It is a deep-rooted plant which lives for many years and throws up strong shoots all round a central plant. These increase year by year until large patches are formed. The best method of destroying this weed is to plough deeply in summer time, if possible just about the time the flowers appear, then seed down heavily with buckwheat, Hungarian grass or rape. The next year cultivate late and put the land under a cultivated or hoed crop. By this time the plant will be so weakened that it can be easily handled. The next year put in again to roots or sow early to red clover alone. Cut this in summer before the flowers of the Sow Thistle, if there are any, go to seed and leave the clover on the ground to act as a mulch and to add to the fertility of the soil. In the autumn the second crop may be cut for fodder and the clover ploughed down the next spring.

The Annual Sow Thistle grows 8 inches high, has fibrous roots and leafy stem, and is not quite so large or coarse as the Perennial Sow Thistle. The leaves are much lobed, and have short, soft spines. Each head is many-flowered; but the flowers are small, about ½ inch across, and of a pale yellow color. To eradicate this weed cultivate stubble-ground and sod early after harvest and throughout the fall. Follow with hoed crop, preferably corn or roots, and cultivate thoroughly throughout the growing season. Use the cultivator, instead of the plough, after roots or corn; sow a crop of grain and seed with clover; if practicable, pull the weeds by hand out of the grain crop; take one or two crops of hay or pasture, and again break up the sod, ploughing, harrowing and cultivating at intervals during the late summer and fall.

FARM BUILDINGS AND MECHANICS.

A Small Cold Storage.

The accompanying illustration represents the form of cold storage chamber used in connection with most of the butcher shops in cities and large towns. It is usually built inside of other buildings. The walls are double and filled in between with about eight inches of dry sawdust or other insulating material. In some cases this space is left as an air space, but when this is done the boarding, both inside and out, must be double with building paper between, in order to exclude air as much as possible. The floor and ceiling must also be air-tight. A double floor of matched boards tarred at the joints and between the layers of boards is best.



CROSS SECTION OF COLD STORAGE ROOM

The cold chamber represented in the cut is 14 feet long, 6 feet wide and about 8 feet from the floor to the ice rack. The ice rack is about 4 feet deep over the whole of the storage chamber. It is supported on stringers, the ends of which appear in the cross-section drawing. This rack will hold about two and one-half tons of ice, which will last about two weeks in summer. A channel is made along the bottom of the ice rack to catch the water as the ice melts. The water is carried off through a pipe passing through the wall which has an S-curve in it to prevent access of air. The floor of the ice rack must be well made and covered with sheet zinc or galvanized iron to avoid leaking into the storage. The house should have heavy double doors and double windows, and the latter should have a coat of whitewash. Care should be taken not to have both doors open at once during warm weather.

To Fill Cracks and Knot Holes.

To fill cracks and knot holes in a floor, make a paste of one pound of flour, three quarts of water, and a tablespoonful of alum mixed thoroughly and boiled. Soak small pieces of newspaper in this mixture till it is as thick as putty. Then force into the cleaned cracks with a knife, and it will harden like wood.

House Heating Systems.

For heating a private residence in town or country, hot water heating is the best and most economical system in the long run; it is more costly to instal, but the best in the end. Steam heating is all right in factories and large buildings where there is a man to keep the fire going. It takes a lot of fuel to turn water into steam, though it would cost about 10 per cent. less to instal.

Hot air is the cheapest for ordinary purposes, though it is not as sanitary as hot water heating. It takes about the same amount of fuel to heat the house, but the objections to it are that it burns the air we breathe, and the dust of the furnace flies out with it. A furnace may be dust proof for the first year or two, but in time the joints become loosened from expansion and contraction, consequently we get the dust in the house.

The cost of a hot air furnace for a nine roomed house would be about $150. A hot water heating plant would cost about three times as much. Steam heating would cost about 10 per cent. less than hot water.

Fireproof Roofing Paint.

An excellent fireproof paint for a shingle roof is red iron oxide with boiled linseed oil for the first coat, finished with a second coat of raw oil. This is a dark brown colour, and the most durable of all kinds of paint, as the oil and the iron oxide make a chemical combination which is absorbed by the wood or unites with a metal roof. The quantity needed is based on the fact that one gallon of the thin first coat will cover four hundred square feet, and the second heavier coat will require a gallon for two hundred and fifty square feet. If the roof is of shingles, it is desirable to paint these on both sides before they are laid on the roof; they will last twice as long as if painted only on one side after the roof is laid. A quick way of painting the shingles is to dip them in the mixed paint, setting them in a trough to drain, thus saving the excess of paint that is not absorbed by the wood.

Measuring Shingles.

A standard shingle is held to cover a space of sixteen square inches; that is, it is four inches wide, and is laid four inches to the weather. Therefore, it will require nine standard shingles to cover 144 square inches, or one square foot, and 900 shingles to cover one hundred square feet; but as there is always some waste in fitting shingles and a certain number of defective ones, allowance is made for this by adding one hundred shingles and saying that 1,000 shingles are sufficient to cover a space of 100 square feet. Usually shingles are put up in bunches of 250, four bunches to the thousand.

Concrete Fireplace.

The plans shown are for an ordinary concrete fireplace, hut it can be made larger. The concrete should be made of one part Portland cement to five parts of screened gravel. The chimney may be made one of cement to seven of gravel. Cement is the best of material to stand the heat, lime mortar is the poorest of all material where fire comes in contact with it. In investigating the buildings after the great Baltimore fire, it was found that cement concrete stood the heat better than any other material, either cast iron, steel or stone. As to the cost of material for fireplace, concrete is the cheapest and best. In building concrete work such as fireplaces, all corners should have bevelled edges, so that they will not be broken off.

FRONT VIEW OF FIREPLACE

CROSS SECTION OF FIREPLACE AND CHIMNEY

Sinking a Well in Gravel.

When digging a well in gravel that runs, the hole should be commenced much larger than the well is to be at the bottom, When a start has been made, a six or eight-sided crib should be put in and lowered as far as possible. A smaller crib should then be slid down inside of the larger one, and so on until a sufficient depth has been reached. The crib may be lowered by weighting it and loosening and removing the gravel from below.

Staining a Floor.

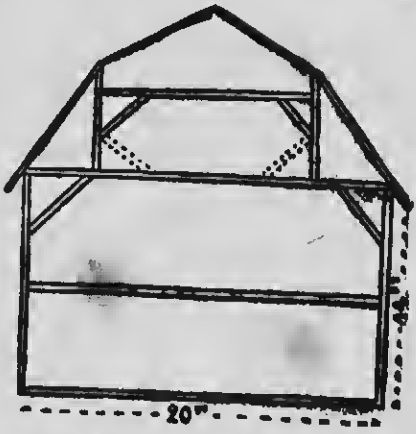
Provided the floor is smooth and clean, staining is preferable to painting, as the stain which soaks into the wood wears well and is very attractive. A very satisfactory staining material is a weak solution of permanganate of potash. This when first applied produces a wine colour, but on exposure to the air quickly oxidizes, becoming a rich oak shade. In preparing the stain the permanganate of potash should be dissolved in water and diluted, and a little of it applied with a brush to a piece of smooth board of the same material as the floor; this should be allowed to stand exposed to the air for half an hour; if the colour is too dark the stain must be further diluted with water until the desired shade is produced. The floor should be made very clean and dry, soiled places being sandpapered. One application of the stain should be given, and when thoroughly dry, one or two coats of good varnish should be given. This will protect the stain, leaving a beautiful surface in which the natural grain of the wood may be seen.

Raising a Roof.

To raise the roof of a small building, place stringers or needle beams across under plate near to each end, then put jack screws under these; loosen the plate from studding; now raise the roof as high as the jack will go, block up the roof, take out the jacks, block them up and raise again, following the roof up with shores until the proper height is reached. Stay the roof from blowing over sideways, then splice on old studding and nail the top of studs to the plate; use two jacks, one at each end, or four, one at each corner, which is safer.

Frame of a Small Barn.

The accompanying plan shows how the end bents for a barn 20 feet wide, are constructed. The upper rafters would be 7 feet long and the lower ones 8 feet. In the centre bent the purlin girth may be dispensed with and the braces represented by the dotted lines put in to stay the purlin posts. If this is done a hay fork may be used in the barn. Some small barns are built without purlin posts, the rafters being fastened together at the hip by means of inch boards nailed to either side, A roof built in this way is not as strong as one in which purlin posts and plates are used.



END BENT OF A SMALL BARN.

Whitewash.

An excellent whitewash, which is very durable, is made as follows: Slake half a bushel of lime with boiling water, covering the vessel during the process to keep in the steam. Strain the liquid through a fine sieve, and add eight quarts of salt previously dissolved in warm water, two and a half pounds of ground rice boiled to a thin paste and stirred in boiling hot, half a pound powdered Spanish whiting, and one pound of clean glue which has been previously dissolved by soaking it well, and then put the whole mixture in a small kettle within a large one filled with water, and hang over a slow fire. Add five gallons of hot water to the mixture, stir it well, and let it stand for a few days covered from the dust. It should be put on quite hot, and for this purpose it should be kept in a boiler over a portable furnace. It answers as well as oil paint for wood, brick or stone, and is much cheaper. Colouring matter, with the exception of green, may be added, and the paint made of any desired shade.

Cement Fence Posts.

Concrete fence posts can be made a success if sufficient care is taken in making them. The gravel must be perfectly clean and free from loam or clay, for if it is coated with earth the cement can not adhere to it, and if the concrete is broken apart the gravel will be loose and can be picked out from the concrete. One should

have gravel rather than sand in making concrete, as it will be far cheaper by using gravel. Concrete made of one of Portland cement to six of gravel will be just as strong as if made of one of cement to four of sand.

For an ordinary fence post, that is, a plain straight one without any mouldings, take planks and make a box with three sides (the one side being left open), seven inches square at one end and six at the other, and the length required; tack a three-quarter inch beveled strip in each corner of the box and bore three-quarter inch holes in the bottom plank the distance apart that the wires are to be when the fence is completed. Place round pins in these holes 2½ inches long. Lay the box down flat and fill with concrete an inch thick well rammed in; then place two No. 9 wires lengthwise of the post along each side of the post and one inch from the plank, then fill in with concrete until within an inch of the top of planks; place two more wires in the concrete, the same as before, then fill to the top of plank and trowel it off, beveling the corners the same as the lower ones. This will leave a wire at each corner of post and will add to its strength very much. For as small a post as the one described, it would be better solid than hollow.

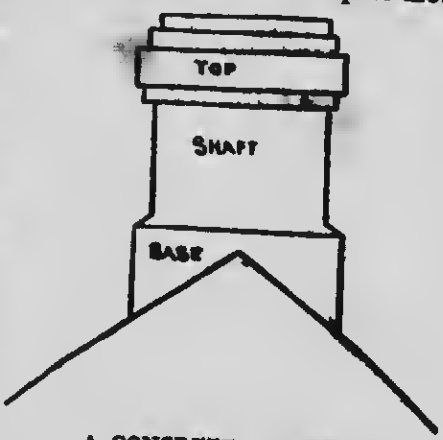
One barrel of Portland cement will make about 15 posts, making the concrete one of cement to five of screened gravel. Frost will have no effect upon concrete if the proper materials are used and it is properly made. A barrel of cement contains from 3½ to 4 cubic feet, so by making the concrete one part cement to five of gravel, it would require about 20 cubic feet of gravel per barrel of cement. Concrete made to resemble moist earth, and well rammed, gives better results than when made sloppy.

Hollow Cement Blocks.

The usual proportions for making concrete building blocks are seven parts gravel to one part Portland cement. If one has gravel of good quality, clean and of the proper grade, use eight parts gravel to one of Portland cement. To make a neat finish on the blocks use fine, clean, sharp sand, two and one-half or three parts of sand to one of Portland cement, according to the quality of sand. In filling the mould with concrete put in on the face side enough of the fine material to fill up voids that may be in the concrete. Make this fine concrete a little more moist than the coarse concrete. On making one block one will be able to judge the amount of fine concrete to use. By moulding the blocks in this way a smooth face may be secured. To keep concrete from sticking to wooden moulds line them with sheet iron, galvanized iron, or tin. Care should be taken to have the moulds perfectly clean before refilling.

A Concrete Chimney.

To build a concrete chimney, first build a stand or rest, if in upper story, about twenty-two inches below the ceiling; on this place the mould, fastening it to the edges of the stand, and have boards long enough to reach six inches above the ridge board on top of the roof. Now place a core of stove pipe or galvanized iron in the centre of the mould, having at least four inches of concrete on the top of the stand under the core; now put in a thimble nine inches below the ceiling and fill in concrete to the top of mould. Make another mould four inches smaller than the first one to form the shaft of the chimney. This reduction of two inches on each side forms the top of the base. The shaft mould should be about three feet high. When this is filled build the top mould, allowing it to project one inch on each side, raise two and one-half inches, project one inch, raise five inches and jug in twice more when the top will be the same size as the shaft. See the plan for a clear understanding. It is well to bed iron bands in the shaft, also in the top, as the building is in progress. Mix the concrete five parts of gravel to one of Portland cement, and ram thoroughly. Finish the outside of the chimney with cement wash applied with a brush. The size of the chimney should be in proportion to the size of the house. In some cases cement chimneys are moulded in sections and then built, but the sections are very heavy to handle on the roof.



A CONCRETE CHIMNEY

A Tar and Gravel Roof.

After applying tar paper to a roof it must be covered with gravel mixed in coal tar. To do this, first have the roof sheeted with matched lumber; then put on two sheets of tar paper commencing at the lower edge of roof, then another sheet, and so on, allowing the layers to lap over each other like shingles, making them three ply. If the paper is three feet wide then every tier of paper should be laid say eleven inches to the weather. The lower edge of the paper should have a coat of tar extending ten inches up and the tar paper laid and nailed down in this. After the tar paper is put on a coat of hot tar is spread over it with a broom and clear gravel sifted into it while the tar is soft, so that the gravel will become imbedded into it.

A Circular Concrete Cistern.

The excavation for a round concrete cistern should be done perfectly plumb, and in a true circle. The forms are made of two half-inch by two-inch iron bands, to which pine boards, three feet long, are attached on the outside. These bands should be about four inches from the ends of the boards. The forms should be in two sections; both ends of the iron bands are turned in toward the centre of the cistern about four inches. These ends, or lugs, have each a hole opposite each other to allow a five-eighths inch bolt eight inches long to go in. This bolt should have thread cut the whole length of it, to allow for four nuts. Two of the nuts are placed between the lugs to spread the mould so as to keep it tight against the concrete, the other two are put on outside of the lugs on the same bolt to loosen the mould from the concrete. Have a strip of sheet iron screwed on the ends of the form to lap over the joint where the forms meet, as the forms are two or three inches apart so as to allow them to come together when being raised. Place the form so as to have a four-inch space between the form and the earth for the concrete to be put in, fill to the top of the mould, and raise as required, repeating the same until the height of the arch is reached.

Now a top has to be put on. Take out moulds, and stand uprights on end; on these place cross-pieces, and cover with boards; place on these loam or sand, making a cone-shaped mould; cover this with tough paper, and lay on concrete. Leave a manhole, or curb-hole, in the centre of the arch at the top. This can be done with either a wooden box or a wide band of iron. After two or three days take out the loam and boards, apply a thin coat of mortar made of two parts sand to one part of cement, and finish with a brush, then put in a bottom three inches thick and finish the same as the side walls. Keep the arch low enough to be well covered with earth so as to keep out the frost.

For a cistern, say six feet in diameter and seven feet high, the walls should be four inches thick. For the concrete mix six parts of clean gravel with one part of cement. The arch should be six inches thick, made of five parts gravel to one of cement. For a large cistern the wall should be thicker, according to the size of the cistern. A cistern built as directed will last for ages, and be perfectly water-tight. Small stones can be bedded into the concrete walls if kept back from face of mould; this applies to a six-inch wall, as the stone would have to be very small to bind in a four-inch wall.

Pitch of a Roof.

By the "pitch" of a roof is meant the relation which the height of the ridge above the level of the roof-plates bears to the span, or the distance between the studs on which the roof rests.

The length of rafters for the most common pitches can be found as follows, from any given span :

If ¼ pitch, multiply span by .559, or 7-12 nearly.
If ⅓ pitch, multiply span by .6, or 3-5 nearly.
If ⅜ pitch, multiply span by .625, or ⅝ nearly.
If ½ pitch, multiply span by .71, or 7-10 nearly.
If ⅝ pitch, multiply span by .8, or 4-5 nearly.
If full pitch, multiply span by .1.12, or 1⅛ nearly.

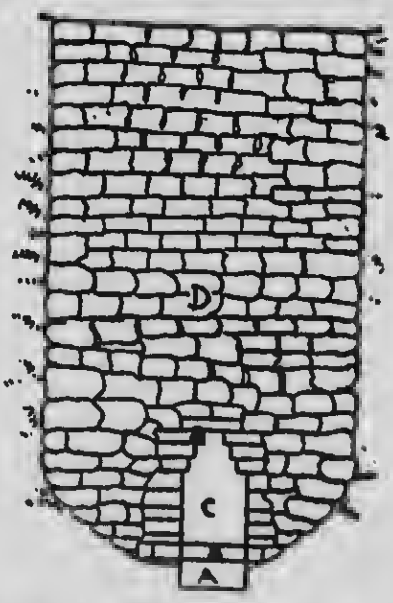
To the lengths thus obtained must be added the amount of projection of rafters at the eaves.

As rafters must be purchased of even lengths, a few inches more or less on their lengths will make a difference to the pitch so slight that it cannot be detected by the eye.

Example—To determine the length of rafters for a roof constructed one-half pitch, with a span of 24 feet—24 multiplied by .71 equals 17.04; or, practically, just 17 feet. A projection of one foot for eaves makes the length to be purchased 18 feet.

A Temporary Lime Kiln.

For a temporary lime kiln excavate into the side of a bank large enough for the size of kiln required. At the bottom of the kiln there should be an ash pit 16 or 18 inches deep; on top of this flag stones should be placed three or four inches apart; these stones answer for a grate and the space between the stones allows the ashes to drop through into the ash pit. The fire hole should be stoned up three feet high then corbelled in until the stones meet (see plan). By standing up pieces of boards or planks around the outside of kiln, filling the kiln with stone and puddling in clay between the boards and bank at the same time, the stone will hold the boards from crushing in, and when the kiln is burned and the lime removed the sides of the kiln will be like one solid brick and will last for several burnings. It ususlly requires about seventy-two hours to burn an ordinary kiln.



A, ash pit; B, flagstones for grate; C, fire hole.

A Granolithic Walk.

It is important that the ground upon which the walk is to be built be well drained. If in clay soil excavate a little to a depth of fifteen inches from the line of the top of the walk; fill in ten inches deep with broken or cobble stone; on this place gravel or cinders enough to fill the open spaces or crevices,—this forms a drain as well as a foundation for the walk. Have tile drains from this to outlets where required. Now place 2 x 5 or 6-inch pieces on edge at each side of the walk, and level with the top surface. Brace these to keep them from spreading. Now mix six parts gravel to one part Portland cement, and put in four inches deep. Small stones can be added to this coat, having them thoroughly bedded. If broken or crushed stone is used, the proportions usually are two parts of sand, three parts of gravel and five parts crushed stone to one part of Portland cement. Ram this thoroughly, keeping it down one inch from the top of the scantling to leave room for the finishing coat. Now mix two parts of fine or screened gravel or crushed granite to one part of Portland cement, apply this to the foundation layer before it becomes set so as to secure a perfect bond. Screed it off, and float with wooden float. Sift dry cement on top of this, allow it to stand for a few minutes, and trowel down smooth. Use an edger and divider and fitter or brass roller to finish the top of the walk.

To divide a walk into blocks use a cleaver to cut through the bottom coat, and fill the space with sand before putting on the top coat. Use a divider in the top coat directly over this division, so as to have blocks properly divided so that they will not break should they be heaved by the frost. If the walks are built on sandy or gravely soil, the under drain is not required. If curbs are wanted either use curbing stone or a six-inch thick concrete wall from the bottom of the excavation up to the bottom of the walk, then build the walk as described above, having it lap over on top of the curb wall.

A Home-Made Suspension Bridge.

There are a large number of woven wire suspension bridges crossing small ravines throughout the country. A view of one of these that has been in use for a number of years is shown in the accompanying illustration. This bridge is 110 ft. long and is constructed chiefly of woven coiled wire fencing.

To build such a bridge as this first ascertain the length the bridge will require to be. Then order the material, consisting of the necessary wire webbing for the bottom and sides, also the necessary posts and other timber, etc., for anchorage.

Begin operations about 12 feet back from the point where the end of the bridge will be located, by digging ditch No. 1, about 10

or 12 feet deep, at right angles with the bridge, bearing in mind that the centre of the ditch must be directly opposite the centre of the end of the bridge. In this ditch place a piece of timber at least 12 feet long and 10 to 15 inches in diameter

Then dig ditch No. 2 exactly where it is intended that the end of the bridge will begin. This ditch should be 4 ft. deep and about 6 ft. long. Now prepare the posts for the end of the bridge. These posts should be of cedar or oak about 8 or 10 inches in

BRIDGE OF WIRE-FENCING WITH PLANK FLOOR

diamater and 10 ft. long. They are placed on the ground 4 ft. 6 inches apart, and at this distance they are secured together by having two pieces of plank spiked on to the two opposite sides immediately at the end of the posts. The posts thus secured together, are stood up in ditch No. 2, the plank end down, and the earth is filled in, and tamped as solidly as possible.

A wire cable is then stretched from the top of each post, and another from the center of each post, (measuring from the surface of the ground to top of post) to the piece of timber in ditch No. 1. A piece of oak timber about 8 inches in diameter and 7 ft. long is then placed against these posts at the point where the bottom of the bridge will be, and it is bolted there. After this operation is repeated at the other end of the bridge, and the earth

filled into ditch No. 1, we are ready to stretch up the wire webbing. The bottom web should be stretched up first. After the wire webbing is all stretched up properly and well secured at the ends secure the bottom web to the sides at intervals of about 12 inches. Then place pieces of scantling 2 x 4 inches and 6 ft. long across the bottom at intervals of 2 ft. and on these place the floor, thus completing the bridge.

Building and Ventilating a Cesspool.

The best way to provide cesspools for a dwelling is to build two, the first to contain the solids, and the second cesspool connected with the first by an overflow drain, to serve for carrying off the liquids. It would be no use, of course, to excavate at a depth below where water is struck. Supposing, however, that water is reached at 8 feet, and that the top of the cesspool is 3 feet below ground level, there is still 5 feet of depth in each excavation for the disposal of sewage. This amount of depth, in a sandy soil, would be quite sufficient.

To ventilate these cesspools, the sewer pipe leading to the first should have a vent running up from the main pipe between the traps in the house and the cesspool, and there should be no trap between this vent and the cesspool, so that air can reach the cesspool without hindrance, and a small pipe, or wooden box, 3 or 4 inches in diameter, running up from the cesspool through the ground, and above ground a sufficient height, will provide ventilation. This latter vent should be provided on each of the cesspools.

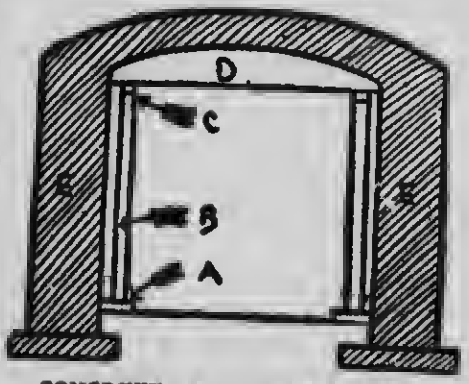
A Cheap Ice House.

A very simple structure will answer for an ice house provided it has good drainage, a tight roof with ventilation underneath it, and sides that will hold packing. Many farmers throughout the country simply use an ordinary box stall in the barn, while others board off a part of a wood shed or implement house; others again put up a lean-to at the north side of a building, using the side of the building for one wall of the ice house. Very rough, cheap lumber will answer for any of these purposes so long as it will hold together and retain the packing. Having a ground surface that will allow water to leak away, an ice house may be made by setting up a firm post at each corner and one in the centre of each side to which boards may be nailed. The posts on one side or end of the house should be four or five feet longer than at the other and those between should be cut so as to allow for the slant of the roof. Scantlings should be spiked from post to post along the side at the top and poles or scantlings across to support the roof which may be of inch lumber laid so that the cracks are covered. The sides need be only inch lumber, and if these are nailed on the inside of the

posts few nails will be reqnired. The doorway requires only inch boards which may be placed in one at a time as the building is being filled and removed in the same manner as the ice is taken out. Snch a building, 12 ft. by 12 ft., may be built for from $12 to $20, according to the quality of lumber used.

A Concrete Road Arch.

Where a span across a stream to be bridged is not more than ten feet the arch can be monlded all in one. When the diameter is greater, the concrete should be moulded into blocks and then laid up the same as stone. If the culvert is not more than five feet wide, the arch may be pnt on flat, but if wider it should have a little crown. The plan shown describes the mode of building an arch. Place a 2 by 12 inch plank on the bed of the stream; on this stand 2 by 4 inch uprights, which should not be more than 2½ feet apart; on top of these a 2 by 4 inch scantling is laid lengthways of arch; then a centre cut out of plank or inch boards and covered with inch lumber to hold the arch. The earth should be well rammed aronnd the wall when filling in. The mode of building the walls is described elsewhere in this book.



CONCRETE ARCH OVER STREAM

A, 2 by 12 in. plank; B, 2 by 4 in. uprights; C, 2 by 4 in. scantling on uprights; D, centre supporting arch; R, concrete.

Ventilation for a Barn.

There are several ways of ventilating basement barns. Most anthorities agree on the same plan or priuciple of the intake or fresh air pipe, bnt some differ as to the proper mode of the outlet pipe or ventilator. To get fresh air into a basement barn lay six-inch tile drain nnder the stable floor with openings in the floor at different points of the basement. This conduit should run ont nnderground 30 feet or more to a stand-pipe, ten feet high or more; the stand-pipe shonld have a cowl on it. This will give the stable plenty of fresh air and it will be distributed thronghout the basement.

There are several ways of taking ont the foul air and steam from the stables. One of the best ways is to have several boxes made of inch boards one foot square, and extending from the basement floor up through the barn to ventilators through the roof.

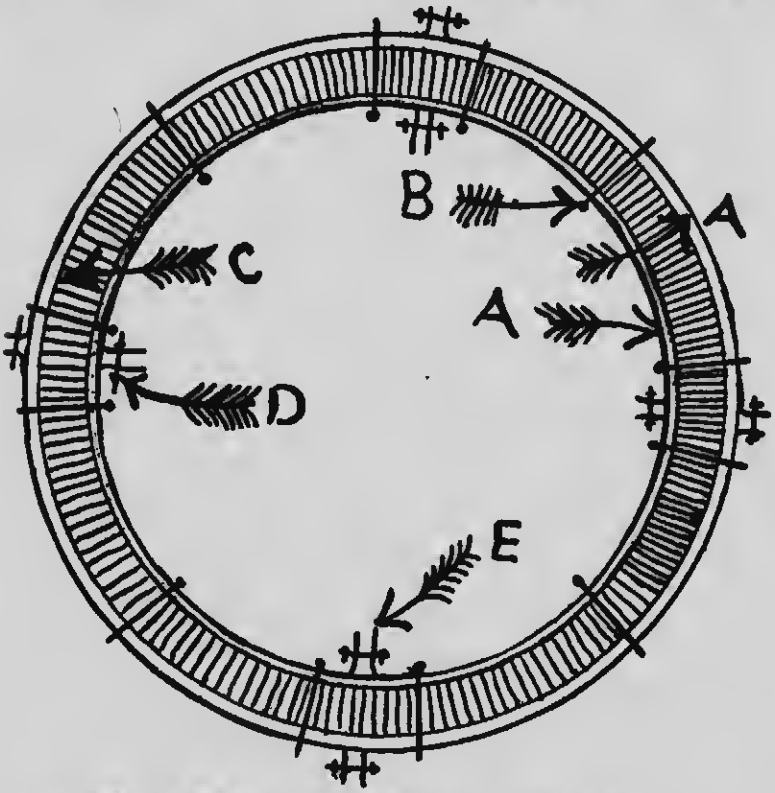
Openings should be provided in these, one at the floor of the basement and another at the ceiling, with a slide at each opening so that either or both can be closed or opened when desired. The only objection to this system is that in very cold weather the steam is apt to freeze at the top of the ventilator and cause it to close up, but taking it the season through it is found to be a good plan. Another plan is to have the boxes made as described, allowing them to extend no lower than the basement ceiling. There should also be a flue made of boards running through the basement under the barn floor and out through the wall at each end; the out-let pipes are connected to this flue. Farmers who have this mode of ventilation claim that it works well and the flues never freeze up. There is a slide at each end of flue, so that they can be closed when required.

A Circular Concrete Silo.

To build a circular concrete silo is very simple after the moulds are set. The moulds consist of two circles, one for the inside and one for the outside, and each circle is divided into four sections (see plan). The sections consist of six-inch boards two feet and a half long, bolted with small bolts on two bands of ⅛ x 2-inch iron, the top band within four inches of top of the boards and the other four inches from bottom. The ends of the band iron should turn out where they join each other in order that they may be bolted together. The bolts should have a continuous thread cut on them, and four nuts on each—two between the band iron and one on each end of the bolts. These nuts are to tighten and loosen the form when desired. There must also be half-inch bolts put through the wall, three in the bottom and three in the top of each section and through the band iron. When the form is raised these bolts are taken out and the form loosened by slacking the nuts on the bolts where the sections join.

At the joints where the sections meet there must be a one-eighth inch iron plate 12 inches wide screwed on to the form, letting the other side lap under the form; this holds the concrete to its place and allows the form to loosen or tighten as desired.

To raise the form, stand four nprights on the inside of the silo where the sections meet, and abont six or seven feet above the wall nail on a plank, allowing the plank to project over the wall; fasten a small pair of blocks to the ends of these planks. There must be



FORM FOR BUILDING CIRCULAR CONCRETE SILO

A, inch boards making form; B, half-inch bolts; C, concrete wall; D, bolt with four nuts; E, band iron 2 inch wide and three-eighths inch thick.

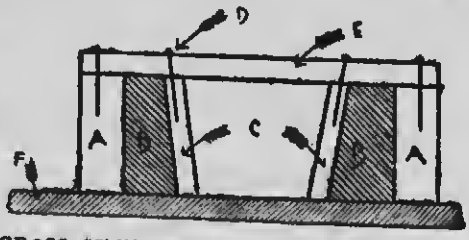
four of these planks so as to raise the form np on all sides alike. Take a short whiffletree and fasten the hooks to both the outer and inner form and the lower block to this whiffletree. A man at each rope will raise the form easily; then tighten up the bolts again. If care be taken anyone can build a silo as true and smooth as a crock.

Capacity of Cistern and Wells.

To find the capacity ot a circular cistern or well, take the diameter in feet, square this and multiply by .7854 and then multiply by the depth in feet; this gives the number of cubic feet in the well; multiply this by 1,728 and divide by 277, and you will have the number of gallons capacity of the well. If for a sqnare cistern, multiply length by breadth and depth, and proceed to multiply the result by 1,728 and to divide by 277 as before.

A Concrete Trough.

In making a small concrete trough first lay the concrete floor; this answers for the bottom of trough. Make a box ont of 2 x 6 inch plank 14 inches wide, inside measurement, and the length required. This box has no hottom. Place it where the trough is required. Make another hox, out of one hy six inch boards to form the core. This should be 1½ inches narrower at the bottom than at the top; place this in the outer box, leaving a space of 2 inches between the two boxes at the top for concrete. Place small hlocks between the boards to keep them from springing in and nail a strip on the top of the moulds to keep them in their places. The concrete should he one part of Portland cement to 2½ parts of fine gravel. In filling the moulds with concrete never put in over an inch at a time and ram it well. When finishing the top leave the edges rounded off. In a couple of hours the core can be lifted out and the outer hox removed. Give the trough a wash of pure cement. In warm weather, after the trough is huilt ten or twelve honrs, it should have a pail or two of water pnt into it and left for several days.



CROSS SECTION OF CONCRETE TROUGH AND MOULD

A, 2 by 6 inch plank; B, concrete; C, 1 by 6 in. boards; D, nails to hold form in place; E, one inch strip; F, concrete floor.

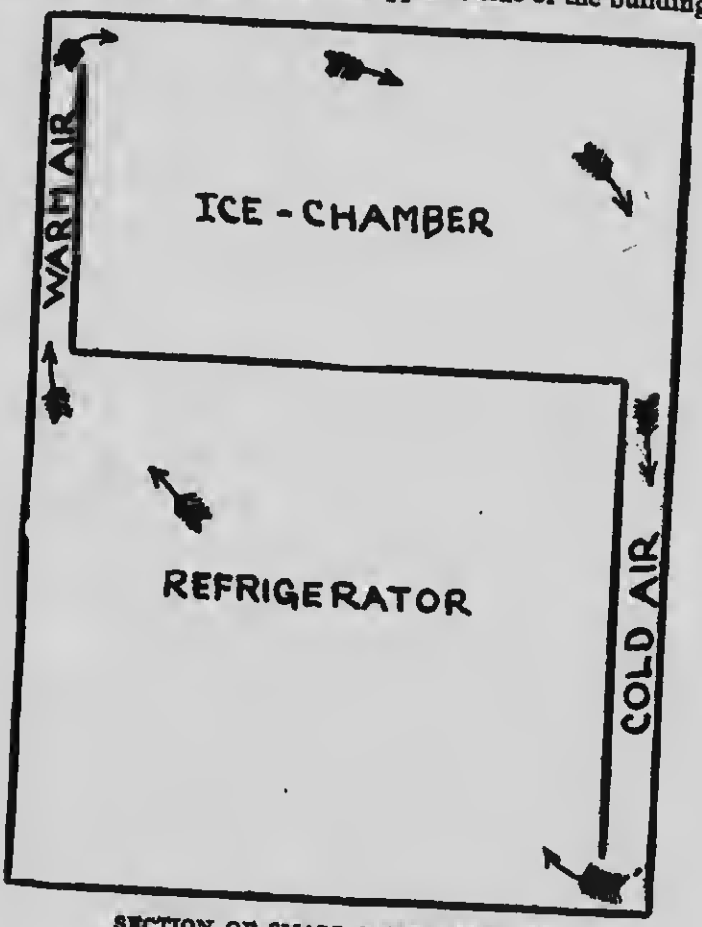
Bringing Water to a House.

There is probably no more satisfactory method of conveying water from one point to another, when a good fall can be secured, than through a galvanized iron pipe. Even though the fall is considerahle, a small pipe should be guarded against owing to the danger of choking up with vegetahle matter. A one inch pipe should answer well. The pipe should be laid below the frost line and the mouth should he protected hy a screen to keep out frogs and pieces of solid material.

Air Circulation in a Refrigerator.

The accompanying diagram shows how circulation of air is secured in a refrigerating chamber. By means of a system of flues, the cold air from the ice chamber enters the refrigerator and the warm air returns to the ice chamber to be again cooled. For these flues, a partition should be constructed along one side of the ice chamber from the floor upward nearly to the ceiling and about eight inches from the wall and parallel to it. A space of similar

width should be cut through the ice chamber floor, so that the air from the refrigerator rises through the flue and finally enters the ice chamber, and is cooled by coming into contact with the ice. The return flue should be on the opposite side of the building, and



SECTION OF SMALL REFRIGERATOR
showing the course of the air current.

should lead from the floor of the ice chamber downward nearly to the floor of the refrigerator. By this means definite direction is given to the air, and the moisture, instead of stagnating in the storage chamber, is carried off and deposited on the ice, so that the circulation results in drying the air somewhat.

Moving a Barn

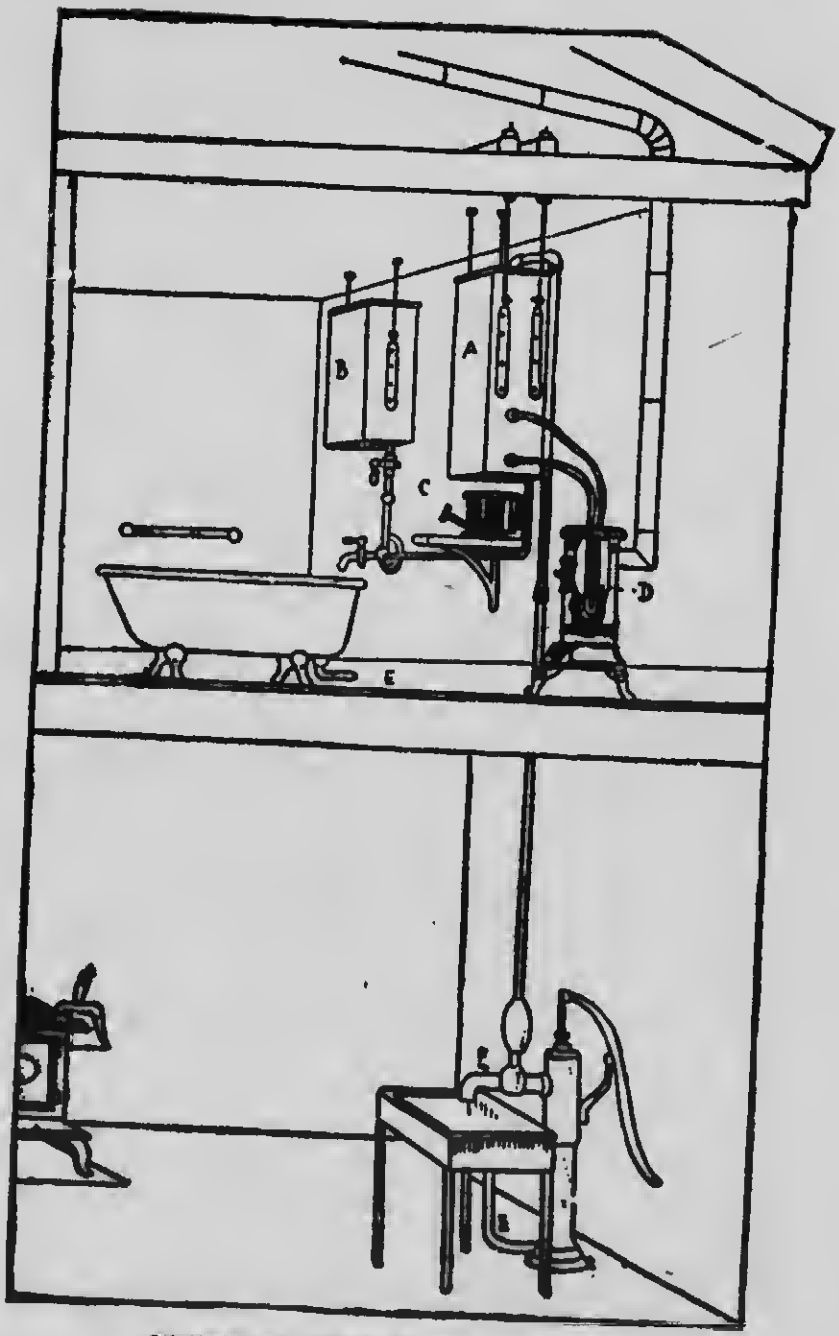
To move a small barn first jack it up high enough to put planks lengthwise on the ground underneath the sills. Place rollers on these and underneath the sills of the barn about eight feet apart. Lay planks on the ground ahead of the sills to receive the rollers

as the barn is moved ahead. Have a couple of extra rollers to lay on these to carry the sills until there is one free behind; then carry this one ahead and use again. Now fasten a sling or chain from each front corner post of the barn at the bottom of the post so as to hook on a double pulley block in the centre of the sling; this keeps the barn from drawing off cornerwise. Now anchor the other end of the double block as far ahead as the rope will allow; hitch on a team and watch the rollers, keeping them in position by striking them with a heavy sledge should they get turned angling. A considerable distance at a time in this way may be gone. Anchor as often as necessary until the barn is moved to the proper place. Should you have to move the barn in a circle, lay the planks in the circle desired and angle the rollers to suit the curve and the barn will follow the plank track.

Domestic Bath Plumbing.

The accompanying plan shows how up-to-date facilities for a bath may be secured at a reasonable cost, given, first, a good soft water supply from well or cistern near the house, and, secondly, deftness of the householder's hands to screw the pipes together, from the water supply to the tub. The cost (completed as shown) would be about $75. This outlay, for a permanent luxury, seems easily within reach of many on farm or roadside.

Having decided upon the location of the tub, in the interior of the house, measure accurately the distance from the water supply, where a 1¼ inch water pipe can be laid, under the ground, through the side of the house or cellar, up to the floor on which the tub is to be located, and thence to a suspended metal tank holding 30 gallons of water. An additional pipe will be required, reaching from the bottom of the first tank to an auxiliary tank, as shown, having a capacity of about 20 gallons. The necessary elbows, stop-cocks and waste-cock for emptying the pipe of water during the winter's cold must also be allowed for. Send these measurements, with a rough diagram of the different courses and turns of the pipe, giving the lengths of each course in feet and inches, to some large plumbers' supply dealer for estimate of cost, including a porcelain-lined tub and copper-bottomed, galvanized tank, the estimate to include threaded ends of pipe, threaded elbows, and cocks, all ready to screw together. The tanks for water should be for the larger 14 x 16 x 31 inches, the other 14 x 16 x 20 inches, cross-braced on the inside both ways to prevent bulging, a "tell-tale" ¼ inch lead pipe soldered into a hole one inch from the top and long enough to pass through the side of the house, to overflow when full, and ears on the sides, as shown, for suspension to ¼ inch hooks that pass up through ceiling and bolt through crosspieces of wood, resting on the garret joists.



SECTION OF KITCHEN AND BATH ROOM.

A, hot water tank; B, cold water tank; C, coal-oil heater; D, coal heater E, drainage pipe from bath and sink; F, stop-cock in pump spout.

The tub shown is 5 feet long, of the usual standard make. Have a piece of lead pipe (E) 3 feet long, soldered to the bent outlet of the tub, to run the waste water out of doors; suspend the tanks as shown, with their tops on the same level, so that both tanks may fill at the same time; then close the stop-cock in the pipe to the smaller tank, keeping the cold water in it to temper the hot water when it is run into the tub.

The connection of the iron water pipe with the pump is accomplished by the use of a piece of rubber hose, to one end of which the usual "force and lift pump" coupling is attached, the other end being wired on to the iron water pipe terminal. The hose may be loosened from the pump and held aside on a hook, to permit the usual uses of the pump.

The larger tank (A) of water is heated by a single blue-flame, wickless coal-oil heater (C). If there is a small stove in the room, used ordinarily for keeping the chill out of the room in the winter time, a portion of the heat of the fire may be utilized to heat the water, without using the coal-oil heater. This is done by having a piece of ½ inch iron water pipe (D), 40 inches long, bent over like a hairpin, and having two rubber-hose connections with tank, by means of two unions, located, one near the bottom and the second a few inches above it. This ensures circulation, and very hot water in the winter, when the bent pipe is lowered into the fire, through hole or holes in the stove cover as shown. The bent pipe may be suspended from a chain and weight so as to be pulled up out of the way when not in use. With either of these two arrangements of water heating, both simple, and of little expense, any temperature of water desirable for bathing purposes may be had.

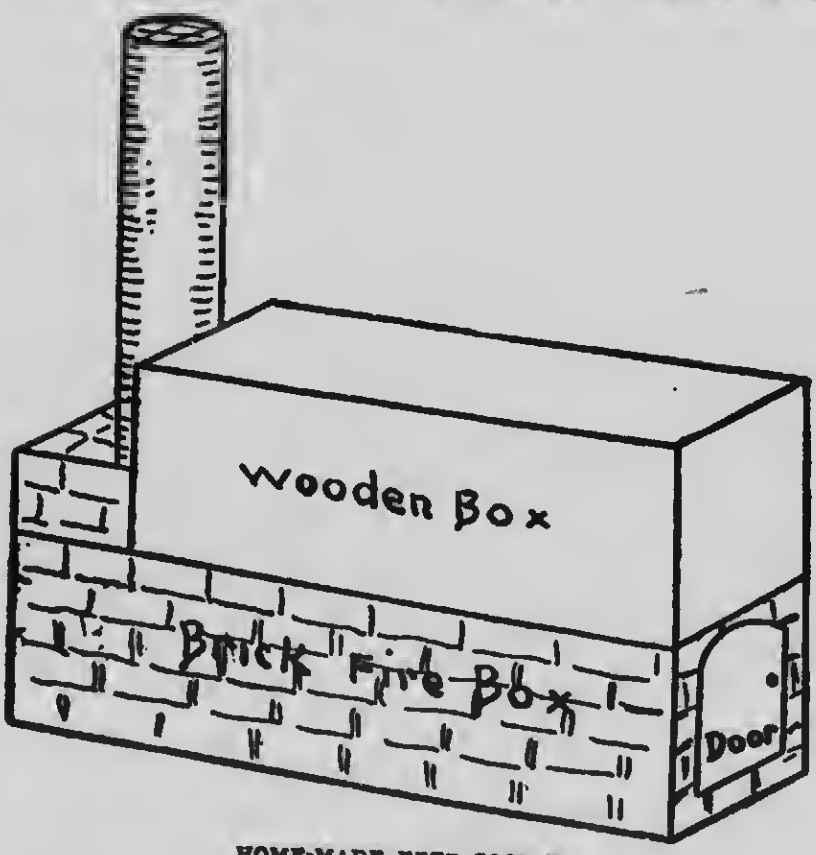
Laying a Concrete Floor.

In building a concrete floor, get grades all properly fixed. Cover the ground with one or more inches of stone or gravel, well rammed, before putting down concrete. Cover this with three inches of rough concrete, ganged six of gravel to one of natural rock cement, or eight of gravel to one of Portland cement. Ram this solid, and put on a finishing coat, one inch in thickness, of two parts clean, coarse, sharp sand or fine gravel, to one part of cement, which is also firmly rammed, while the lower concrete is still soft. The work can be best done by setting a 2 x 4 scantling on edge, commencing at one end of the building, about 3 feet from the wall, holding the scantling in place by two iron or wooden pins. Ram the rough concrete approximately level within an inch of the top of the scantling. Then spread on fine concrete, so that when thoroughly rammed it will be level with top of scantling. Trowel the surface true to grade. Now move along the scantling another three feet, and repeat the process until the floor is finished.

It is absolntely necessary that an iron rammer should be used, so that all concrete. both upper and lower, is thoronghly rammed. Concrete for floors should be thoroughly mixed while dry and not be made too wet, bnt should be only sufficiently moist to ram well and to work np to a good smooth finish. In horse stable floors the utmost care should be taken to have all concrete well rammed.

A Home-Made Feed Cooker.

A feed cooker consisting of a wooden box over a brick fireplace is shown in the accompanying illustration. This cooker is claimed to be superior to iron cookers. The box is made of two-inch planks for the sides and ends and sheet iron for the bottom. The box rests on iron bars which span the fire box and rest on the

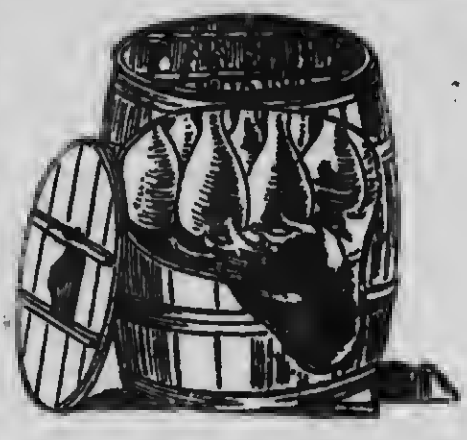


HOME-MADE FEED COOKER.

brick walls. The sheet iron is screwed to the bottom of the wooden box, the joint being made tight by the liberal use of red lead applied when the screws are being put in. The box may be made to hold a large quantity if desired. It should have a tight-fitting cover.

A Barrel Smoke House.

A large cask or barrel may be used for smoking a small quantity of meat. To make this effective a small pit should be dug, and a flat stone or a brick placed across it, upon which the edge of the cask will rest. Half the pit is beneath the barrel and half is outside. The head and bottom may be removed, or a hole can be cut in the bottom a little larger than the portion of the pit beneath the cask. The head or cover is removed while the hams are being hung upon cross sticks as shown in the illustration. The cross sticks rest upon two cross bars made to pass through holes bored in the sides of the cask. The head is then laid upon the cask and covered with moist sacks to confine the smoke. Live coals are put into the pit outside of the cask, and the fire is fed with damp corn cobs, hardwood chips, or fine brush. The pit is covered with a flat stone by which the fire may be regulated, and it is removed when necessary to add more fuel.



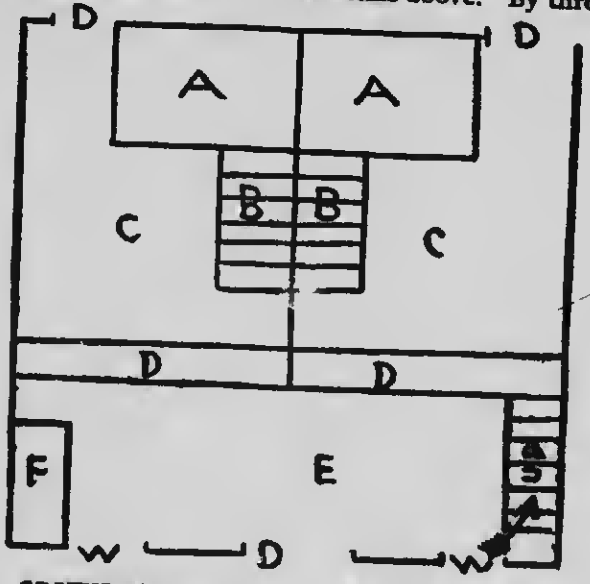
Papering a Room.

To prepare the walls of a room for papering, first give them a coat of weak size. An excellent paste for paper-hanging is made as follows: Put a couple of pounds of fine flour in a pail and add cold water gradually till it forms a thick paste, stirring well all the while. Add about a dessertspoonful of finely-powdered alum to prevent the paste becoming mouldy, and then pour in gradually with constant stirring, about six quarts of boiling water, or sufficient to bring the paste to a proper consistency. This is fit for use when cold.

A Small Hog Pen.

For one who raises only enough hogs for his own use a pen about 18 x 19 ft. is large enough. The accompanying plan shows how to lay out the space. The elevated sleeping pens are about 3 ft. above the concrete floor with a cleated runway to each, made of plank. The doors for cleaning out the pens have windows in their upper half, and the doors are made to hang from the top on hinges, and to swing both in and out. If desired to be kept open they can be fastened up. The feed alley can be converted into a

slaughter house if desired. To do this have two trap-doors in the floor above the feed alley, and a windlass above. By throwing the



GROUND FLOOR PLAN OF SMALL HOG PEN

A, elevated sleeping pen; B, runway; C, pen, 9 feet 6 in. by 12 feet; D, trough; E, feed room, 1[illegible] by 6 feet; F, feed box.

doors back there will be plen[illegible]f room to hoist the hogs. The front door should be four feet wide. The trap doors can be used to ventilate the pens.

To Remove Paint from Wood.

The easiest way to remove paint from wood is to burn it with a lamp specially constructed for the purpose; this softens the paint to such a degree that it is then easily scraped off with a painter's flat-ended knife. If such a lamp cannot be had, the paint may be removed by applying strong soda lye, and after leaving it for some time scraping it off as before. If the wood is to be repainted, it is necessary to go over it first with vinegar or weak acid to "kill" or neutralise the soda which would prevent the paint from adhering.

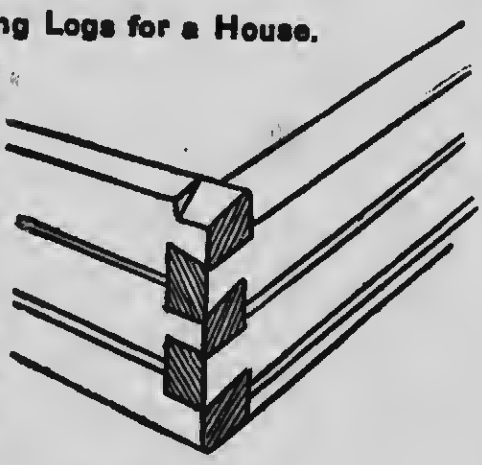
Kalsomine.

Prepared kalsomine can be readily purchased at any large paint store, but if one wishes to prepare his own kalsomine, the following rules will enable him to do so. Soak one pound of white glue over night, then dissolve it in boiling water and add 20 pounds of Paris white, diluting with water until the mixture is of the consistency of rich milk. To this any tint can be given that is desired. Lilac.—Add to the kalsomine two parts of Prussian blue and one part of vermilion, stirring the mixture thoroughly and taking care

to avoid too high a colour. Brown—Burnt umber. Gray—Raw umber, with a trifling amount of lamp-black. Rose—Three parts of vermilion and one part of red lead, added in very small quantities until a delicate shade is produced. Lavender—Make a light blue and tint it slightly with vermilion. Straw—Chrome yellow with a touch of Spanish brown. Buff—Two parts of spruce or Indian yellow, and one part of burnt sienna. Blue—A small quantity of Prussian blue will give a soft azure tint. Dark blue is never desirable. Delicate tints in the foregoing varieties of colours are always agreeable and tasteful, and so great care must be taken that they are not too vivid. The tints will always appear brighter than in the kalsomine pot, and this fact must be kept in mind when adding the colouring powders.

Dovetailing Logs for a House.

The accompanying cut shows the manner in which logs are dovetailed and joined for building. Another method, and one that has cheapness to recommend it, is to notch the logs one into the other, but by this method the ends of the logs stick over.



Fillers for Wood.

A very good filler for hardwood is made by mixing hard boiled linseed oil with enough corn starch to make a very thick paste, adding a little japan, and reducing with turpentine. Add no colour for white oak; for dark ash or chestnut use a little raw sienna; for walnut, burnt umber, and a very little Venetian red.

Use enough colour to cover the white of the starch. Apply with brush and rags, allow it to dry for forty-eight hours, or until it is in condition to rub down with No. 0 sandpaper, without much gumming up, and if an extra fine finish is desired, fill again with the same materials, using less oil but more japan and turpentine. The second coat will not shrink, being supported by the first. When the second coat is hard, the wood is ready for finishing up in any desired style or to any degree of nicety by following the usual methods. This formula is not intended for rosewood and will not be satisfactory if used therefor. What is known as American wood filler is made as follows: Take of pulverized starch, 3 parts; heavy spar, 3 parts; drier, ½ part, all by weight. Mix with enough turpentine to make the consistency of ordinary varnish. For dark wood add to the drier ½ part of umber. Apply with a brush and rub across the grain of the wood with a piece of felt fastened to a piece of wood. Let the wood dry about eight hours, rub with glass paper, then polish and varnish.

A Windmill with Canvas Sails.

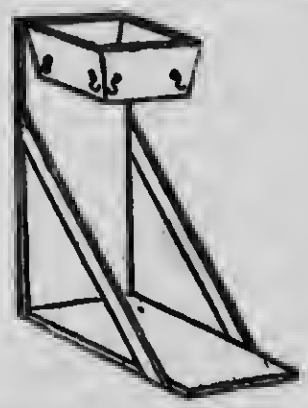
The windmill represented in the accompanying illustration is known as the Dutch or Holland mill. A windmill of this form is used to pump water for a town herd of cows varying from 60 to 100 head near Grand Island, Nebraska. Mills of this style are mounted on tall slender towers, or upon milk houses, sheds or barns. For the four fans covered with duck, are often substituted six fans of thin lumber. The smallest of them are ten to twelve feet in diameter, the largest being about thirty-six feet across. The canvas sails are fitted with brass eyelets and fastened on with rope. The sails are removed or furled when not in use.

Capacity of Coal Bin.

A cubic foot of fair anthracite coal weighs 50 pounds. In order to ascertain how much coal a bin will contain, find its cubic contents in feet by multiplying together its length, width and height, expressed in feet. Then multiply this product by 50, and the result will be the number of pounds of coal the bin will contain.

A Bag Holder.

Think of the labor that would be saved by the use of the simple contrivance shown in the illustration. The upright plank is an inch thick, three and a half feet long, and fifteen inches wide. The bottom plank is of the same dimensions, except that it is a foot and a half shorter. The hopper is easily constructed, and the hooks secured at any hardware store, or possibly improvised at home from bent nails. The base of the hopper is wedged from the perpendicular plank so that the bag may wrap all the way around.



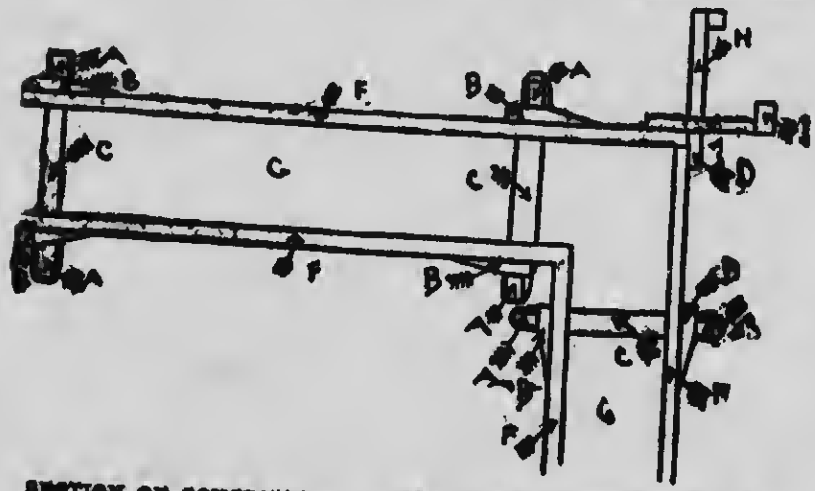
Building a Concrete Wall.

A concrete wall can be built by any man of average intelligence who has mechanical ability, who will follow the directions given below.

First excavate to the depth required. If the soil is soft, dig a trench 10 or 12 inches deep and 22 inches wide around the cellar excavation for the footing course. Fill this with concrete, composed of eight parts gravel to one part Portland cement, adding all the stone fillers you can bed in, ramming well down.

Have this footing so as to project six inches outside of the wall and four inches inside. Now nail two 2 x 10 or 12-inch planks together lengthways, like a trough, and stand them on end for the four outside corners and 2 x 4 inch scantlings for the inside angles. Set these up one foot apart, so as to make a wall a foot thick; wire these together at the bottom and nail strips at the top to keep them from spreading, and brace the outside planks to stakes in the ground to keep them plumb. These planks and scantlings are not moved until a wall is completed. Stand 2 x 4-inch scantlings on end every 5 or 6 feet, both inside and outside of the wall and opposite each other, and 18 inches apart so as to allow for a

foot wall, a two-inch plank and an inch wedge, on each side of the wall. Wire the scantlings at the bottom and brace them at the top, the same as the corner planks. Place 2 x 12-inch planks on edge between the uprights, the outside one flush with the corner planks, and the inside one flush with the scantling at the inside



SECTION OF CONCRETE WALL IN COURSE OF CONSTRUCTION.

A, 2 x 4 in. scantlings; B, wedges; C, wire to bind stakes together; D, upright planks at corner; F, 2 x 12 in. plank; G, concrete wall; H, brace; I, stake.

angle. Put in inch wedges between the planks and the uprights, one at top of plank and one at the bottom, and spread sticks one foot long, between the planks. These will keep the planks firm in their places. Fill between the planks with concrete. After the planks are filled, remove wedges, lift the planks up, allowing them to lap down 1 or 1½ inches on the wall, drive in wedges and spread sticks and fill again (see plan).

Sweating of Stovepipe.

The dark colored liquid, that drips from the joints of a stovepipe when the fire is started, is the tar, etc., contained in the wood. The heat not being strong enough to consume these matters, they are distilled off in the form of smoke, and in coming in contact with the cold stovepipe are condensed into liquid form. The operation altogether very is much like what goes on in a still. The trouble is often due to the stovepipe being too long or to its having too many elbows. When this is the case the remedy is to alter the position of the stove, so that the pipe is shorter and straighter. A subscriber who had considerable trouble in this direction, some time ago described how he overcame it, and as the remedy is a very simple one and apparently very satisfactory, it is well worth trying. Our correspondent wrote :

"A blacksmith that I consulted told me he could stop the leaking without changing the pipes, and sure enough he did. He took a length of stovepipe and cut a hole in it six inches deep and five inches wide; then he took another length, cut it down to nine inches long, cut a hole in it the same size as the first, made the second stove length large enough to go over the first, and put a handle on it (mine has one handle, but it would be better with two). He put two flanges in the first pipe to keep the outside one from sliding up or down. The whole thing is simple enough when you look at it, but it is an effective cure for the trouble complained of. When you shut off the draught the smoke condenses in the stovepipe, and tar leaking all over the floor is the result. When your pipes are provided with this arrangement, all you have to do when the draught is shut is to slide the outside pipe round till you can see in. By doing so you make a draught above the fire, sending the smoke out or up the chimney before it has time to condense."

Home-Made Lightning Rods.

The important points about any lightning rod system are: the upper terminal, the conductor and the ground connection. The upper terminal should consist of one or more sharp, bright, metallic points; two or three barb wires twisted about a strong support would serve the purpose very well. The support should be of iron, and should be soldered at its base with the wire, otherwise the charge entering the support might do injury to the roof.

The conductor itself should be perfectly continuous, that is with soldered joints where joints are necessary, and should avoid sharp turns. Where a turn is necessary, say from the roof to the siding, or from the siding to the ground, the turn should be gradual. Especially, entering turns should be avoided, that is, a turn such as would be necessary at the eaves from the projection at the eaves to the siding of the barn. The sharp turn there following the eaves might conduct the fluid into the barn, causing a side flash. The wire should go down from the projection at the eaves some distance before touching the siding again. Also in the conductor, coils should be avoided. It is the practice with some agents who instal lightning rods, if they have a few feet of surplus wire, instead of cutting it off to form it into a coil, thus taking up the slack. Such a coil, like a sharp turn, is likely to cause side flashing and damage to the building.

The third point in putting up a lightning rod is the ground connection. The rod should be continued to perpetual moist soil, or better still into a well or cistern, provided the well or cistern always contains water. It might be necessary to go six or eight feet, or more, below the surface of the ground in order to strike perpetual moist ground; this is a very important matter and should not be neglected.

The safest time to instal lightning rods is during a dry spell, when the ground moisture is low, and when moisture is reached in these circumstances the soil at such a level will likely be permanently moist. The ground connection should be broom-shaped, that is, a number of wires radiating from the vertical wire. A large space should be cleared from the ground connection and the wires spread out in different directions and firmly soldered to the vertical wire. A very good arrangement for the ground connection is to flatten out an old copper boiler, lay it in the ground and solder the conductor to it. A covering of charcoal upon the ground connection will insure sufficient moisture if moisture is to be had.

A Home-Made Windmill.

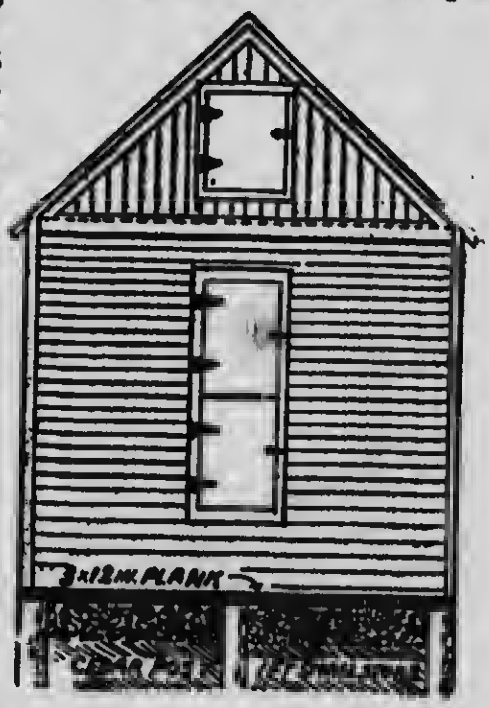
The windmill, represented in the accompanying illustration, was built at a cost of $25. It is in use for pumping water on a farm in Nebraska. The tower which stands 20 feet high is made of 4 by 4 in. scantling, the cross pieces being 2 by 4 in. material. The tower spreads to 16 feet at the base. The axis is 8 inches square and 16 feet long, and the diameter of the mill 16 feet. Each of the eight arms carries a heavy wooden fan, 5½ feet long, and 5 feet at the top tapering to 2½ feet or 3 feet at the bottom. Thus each of the eight fans exposes nearly 25 square feet of surface to the wind. The pumping capacity of this mill is nearly one thousand gallons per hour in a fifteen mile wind.

HOME-MADE WINDMILL.

A Farmer's Ice House.

The site chosen for an ice house should be easily drained. The building may be placed on stone or cement walls, or on cedar posts set in the ground two feet at least. Excavate at least one foot below the sills, and fill with cobble stones or very coarse gravel the whole of the inside between the sills, smoothing off the surface with fine gravel or cinders. If the digging shows a clay soil, a drain should be put in to carry off surplus moisture. Scantlings

can be bedded in the fine gravel on which to place a floor of cheap lumber, place one inch apart to permit the water to pass through readily. It takes on an average from 40 to 45 cubic feet to hold a ton of ice, consequently a building 12 by 16 feet by 12 feet high, would hold about 45 tons of ice well packed. Three by twelve sound pine plank may be used for sills, and for uprights 2 x 6 scantling 12 feet long, placed two feet apart, at each corner, putting in an extra piece to catch lining on the inside. On the top spike 2 x 6 scantling doubled for plates. On the outside of house nail sheeting of common lumber, on which tack a double thickness of building paper, then stripe 1 x 2 and 12 feet long. Over this put a double thickness of building paper and finish with matched siding. This gives a hollow dead air space of one inch to prevent the heat of the sun penetrating to inside lining. On the inside, nail sheeting, filling the six-inch space with cinders, shavings or sawdust, as is most convenient. Over this sheeting nail a double thickness of paper, on which nail one-half inch stripe again, and on these sheeting, thus making two hollow spaces of dead air one inch each and one space of six inches filled, six thickness of building paper, three of sheeting and one of good siding.



End View of Ice House, Showing Foundation

For the roof use 2 x 4 for rafters, lining the under side and filling between the rafters with dry shavings ; under the shingles place two thickness of building paper, placing a ventilator in the centre of the roof, made so that it can be closed inside if desirable. The door should be made in two halves, and a door in the gable over the plate to put in and take out the ice for the two top layers. The gables should be built the same as the walls. If the outside of the building is painted white it will help to keep it cool. In filling the house place the ice on its edge, placing every alternate layer crosswise. Opposite the doors lay short pieces of boards and fill the door space with shavings. When the house is filled place two feet of straw over the ice, tramping it well.

LIVE STOCK.

Thoroughbred, Pure-bred and Standard-bred.

The term "Pure-bred" applies to an animal, which is or may be recorded in a recognized stud book. It indicates animals of well defined breeding without admixture of other blood.

The term "Thoroughbred" is often used in America, but seldom in Great Britain, as a synonym for well bred or purely bred animals of any class; but it was originally and should now be used only as the name by which the English race horse is designated. The same horses are sometimes denominated "blood horses" from the well established purity of their lineage.

The term "Standard-bred" applies to the American trotter or pacer eligible by reason of speed or breeding to registration in the American trotting or pacing record.

Estimating Weight of Cattle.

There are many rules for estimating the weight of cattle by measurement, but one of the authorities on the subject says that "there is no rule that comes nearer than good guessing, and that no two animals will weigh alike according to measurement." The same authority further remarks that a rule, as good as any, is to find the superficial feet by multiplying the girth, just behind the shoulder-blade, by the length from the fore part of the shoulder-blade to the root of the tail. Thus an ox girthing seven feet nine inches, and measuring six feet in length, would contain seven and three-fourths times six or 46½ superficial feet. For cattle, grass fed, the following is given as the weight per superficial foot:

Girth less than 3 feet.....11 pounds.
Girth 3 to 5 feet.....16 pounds.
Girth 5 to 7 feet.....23 pounds.
Girth 7 to 9 feet.....31 pounds.

Thus the steer, as per above measurements, should weigh 46.50 by 31, or 1,441 pounds, gross. Under this rule it is usual to deduct one pound in twenty on half-fatted cattle, from fifteen to twenty pounds on a cow having had calves, and if not fat an equal amount. The author of this rule suggests its use only when the scale is wanting, as the scale is the only true standard.

What a Horse Can Drag.

A modern compilation of engineering maxims states that a horse can drag, as compared with what he can carry on his back, in the following proportions: On the worst earthen road, three times more; on a good macadamized road, nine; on plank, twenty-five; on a stone trackway, thirty-three; and on a good railway, fifty-four times as much.

Halter Pulling.

A very good plan to break a horse of halter pulling is to pass the shank through the manger ring and bring it back between the fore legs, attaching it to a rope tied around the body. Another plan is to pass a double shank back through rings on a surcingle, and fasten them to a rope crupper. When either of the above plans is adopted the animal should be urged to pull back which he is not likely to do more than once.

Feed and Care of a Brood Mare.

A pregnant mare should be fed in about the same way as though she were doing light work ; in fact, a little light work every day would be good for her. She should be fed a fair meal of hay morning and evening, and if idle good oat straw may be given her to pick over at noon. Her grain feed should consist of oats and bran in equal quantities, about three or four quarts of the mixture twice daily. If she appears to be putting on flesh the grain ration should be reduced. Two or three carrots once daily would help to keep her in good health. She should have a loose box to run in or be turned into a yard that is not slippery each fine day. Ploughing in spring would do her no harm, provided she does not become over-tired and does not fret at her work. A mare is the better of light, regular work almost up to her time to foal.

Conditioning a Horse.

A very good diet to build up a horse is oats, barley, bran and flax. The bulk of the food should consist of oats and bran. It is well to have the oats chopped and mixed with one-quarter their bulk of bran. A horse weighing one thousand pounds may receive from four to five quarts of this for the morning and noon meals. In the evening the feed may consist of about three quarts of well-boiled barley, one quart of well-boiled flax and a quart of bran seasoned with salt. The hay fed should be of good quality and be given in no larger quantity than is eaten up clean in one hour three times daily. A horse being fed as outlined should have a box stall to run in or be driven four or five miles daily.

Bitting a Nervous Horse.

In bitting a young and nervous horse, care should first of all be taken to observe whether his mouth be sore or tender, and if so, the mouthpiece should be covered with leather. In any case, a bit with a large, smooth mouthpiece is far better than the sharp, war-like instruments of torture often seen. When harnessing a horse, the bit should be attached to the bridle by the off-side cheek-strap only, and the animal, unless it is tender about the ears or poll, will usually allow the bridle to be quietly adjusted in its proper place.

Then, taking the hanging bit in the left hand and grasping the near-side cheek-strap with the third and fourth fingers of the right hand, insert the first and second fingers in the mouth which the horse will involuntarily open; the bit can then be deftly brought up into its place and fastened almost before the horse is aware of it. Take plenty of time and use the horse very quietly. When gentling a young horse it is advisable for a week or two to keep a mouthing-bit in the mouth while standing the animal in harness, say for an hour and a half in the morning and again in the afternoon.

Teaching a Colt to Back.

Many experience difficulty in training a colt to back. There should be no difficulty in this if proper methods are followed. The following from one of the many champions of the horse will help:

"After the colt fully understands the legitimate use of the halter in leading is a good time to teach it to back—an important and necessary duty in its after life of usefulness—which is easily accomplished by complying with the natural law again, by pressing the extended finger of one hand between the point of the shoulder and the breast bone and using the other hand at the halter strap simply to keep the colt straight in line, to back in any desired direction. Don't try to force the colt backward by 'yanking' at the halter or bit, but simply press in his sensitive chest cavity with the fingers, and the colt will naturally go backward, provided there is nothing of any obstruction behind it. When this pressure has been made at the front and the colt has moved backward (if it is only one step) it should be rewarded for this action; then try it again. About the third time this pressure has been made is a good time to associate the word 'back' with the pressure, and the reader will be surprised to see how soon the colt will comprehend what is wanted, and how willingly the young thing complies with our every wish as soon as it understands what is wanted."

Starting a Balky Horse.

A remedy which will start a balky horse ninety-nine times out of a hundred is as follows: When a horse balks—no matter how badly he balks or how ugly he is—do not beat him; don't throw sand in his ears; don't use a rope on his forelegs or even burn straw under him. Quietly go and pat him on the head a moment; take a hammer or even pick up a stone in the road; tell the driver to sit still, take his lines, hold them quietly, while you lift up either front foot; give each nail a light tap and a good smart tap on the frog; drop the foot quickly and then chirp to him to go. In ninety-nine cases out of a hundred the horse will go right on about his business, but the driver must keep his lines taut and not pull or

jerk him back. This may make some horsemen smile, but a horse has more common sense than most people are willing to give him credit for. The secret of this little trick is simply diversion. With kindness and proper treatment a horse can be driven with a string.

Another method is as follows: Take a small rope and firmly attach it to the horse's tail. Take a turn on the doubletree or cross bar, giving slack enough to tighten the traces. If the horse refuses to pull, tighten this rope until the draft comes on the tail. No horse ever refuses to pull by his tail. When the horse starts, the tail-hold may be relaxed until the draft comes on the traces again. Many balking horses will refuse to start, and others will start off all right, but if stopped will refuse to pull. The way to treat this form of vice is to pull on the tail rope until the draft comes partially on the tail. Then he will go. The tail draft may then be gradually relaxed until all the draft rests on the traces. Persist in this treatment and a permanent reformation is a sure result.

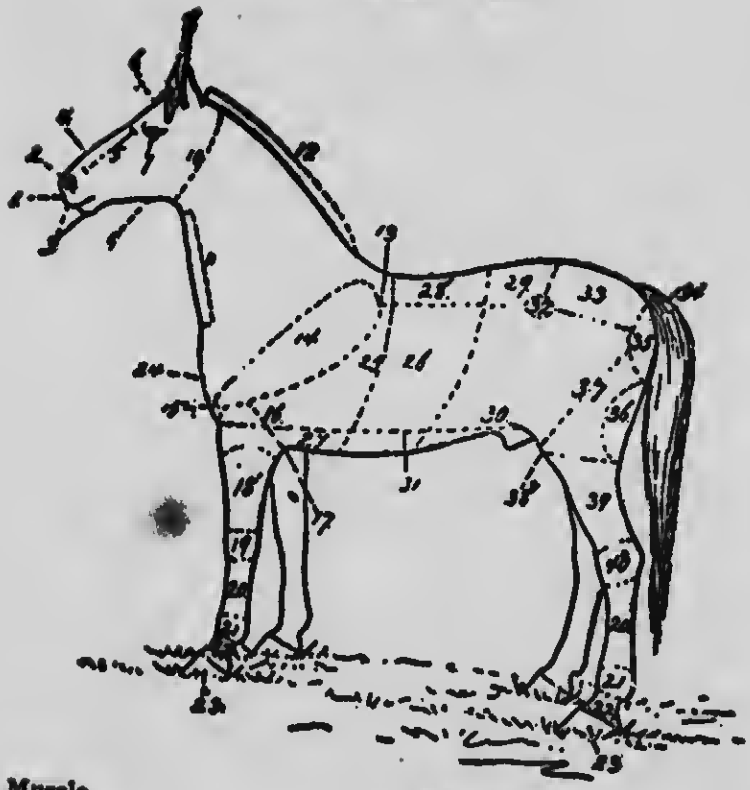
Tonic Feeding Condiment.

It must not be supposed that the following useful condiment will take the place of good feeding and general management in improving the condition of animals: Indian meal, 112 lbs.; wheat meal, 112 lbs.; malt dust, or fine bran, 112 lbs.; gentian root, powdered, 2 lbs.; fenugreek, 6 lbs.; aniseed, powdered, 6 lbs.; flour of sulphur, 1½ lbs.; caraway seeds, powdered, 2 lbs.; locust meal, 28 lbs. Mix these thoroughly and give about 5 ozs. to a full grown cow or horse daily.

Kicking in the Stall.

For the habit of kicking in the stable, it is a good plan to fasten a chain or strong rope across from post to post behind the animal, about three feet from the floor. A horse almost invariably backs up as far as his halter shank will allow before commencing to kick, and if he cannot get back he is very likely to stand up in his place and behave himself. Another plan is to fasten a chain about a foot long to one hind pastern by means of a strap.

Points of the Horse.



1. Muzzle.
2. Nostril.
3. Lips.
4. Nose.
5. Face.
6. Forehead.
7. Eye.
8. Ears.
9. Angle of lower jaw.
10. Throatlatch, throat, or [throttle.
11. Windpipe.
12. Chest.
13. Withers.
14. Shoulders.
15. Point of shoulder.
16. Arm.
17. ~~Elbow~~, or elbow joint.
18. Forearm.
19. Knee.
20. Cannons.
21. Fetlocks.
22. Pasterns.
23. Feet.
24. Breast.
25. Girth.
26. Barrel or ribs.
27. Fore flanks.
28. Back.
29. Loin.
30. Hind flank.
31. Under line.
32. Hip.
33. Croup or rump.
34. Tail.
35. Buttock.
36. Quarter.
37. Thigh.
38. Stifle joint.
39. Gaskin, lower thigh, stifle
40. Hock, [or leg.

How to Catch a Sheep.

A sheep should never be caught by its wool. This method not only causes the animal unnecessary pain, but in the case of fat sheep that are to be killed, it does much harm to the joint of mutton that lies underneath where the wool was pulled. It causes a dark bruise just in the same manner as our bodies become discolored from being bruised.

The proper way to catch a sheep it to take it either by the hind leg just above the gambrel joint, or by putting the hand underneath its jaw or neck. In using a crook it is important that the sheep are not caught below the gambrel joint, as injury to the leg is liable to result from this.

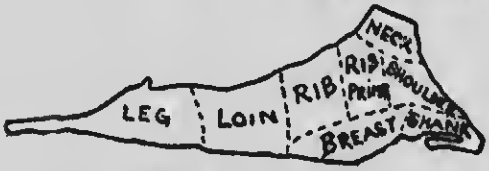
Raising Angora Goats.

Almost any soil except wet and marshy land is suitable for the Angora goat. There preference is for mountainous or rocky land, where they find it necessary to climb hillsides and cliffs to browse. While it is true that goats prefer browse, it is also true that they will subsist nicely upon grass. Given adequate shelter and feed such as they relish, Angora goats will show that they have the ability to withstand both extreme cold and extreme heat. Angora goats can subsist upon vegitation which is utterly useless for other purposes, such as brushwood, briers and weeds, it fact it is claimed that they will desert the finest clover and bluegrass for such a mixture of vegitation. A shelter is necessary during wet spells and more especially if the rain is cold or in case of sleet storms. Dry cold alone is not injurious even to the young after they have reached one month old. Goats should not be left on the range or pasture over night. The pen in which the goats are kept at night should, above all things, be kept dry both from above and below. Goats require a dry place to stand and sleep. The sheds provided for them must be of good size as they must not be huddled together. Goats require a great amount of exercise. Probably the best winter food is oats and if in the sheaf, so much the better. If good clover is given liberally no grain will be required under ordinary circumstances. Overfeeding should be avoided or the goats become fat and lazy.

Kids, like lambs, usually come in the spring. For two or three days after they are born they are very delicate and good care is required to save them. They are more delicate for a few weeks than lambs. If the kids come in cold weather there will be difficulty in saving them. Warm stabling must be provided, and the Does will require extra feeding in order that their milk supply will be liberal. Does should be separated from the flock a few days before kids are due to arrive. If kids are dropped on the range or in the pasture they

must be carried home and special care given to see that the Does are made to own them, for many times they will refuse. A kid does not follow its mother when very young, as does a lamb. The Doe will hide her kid as best she can in the bushes or behind a log or stone, and leave it there while she goes away to feed. The kids may be allowed to run loose in a pen together, until they are large enough to go with the flock, which is when they are from four to six weeks old, or when they are able to jump a board from 12 to 20 inches high placed across the gate.

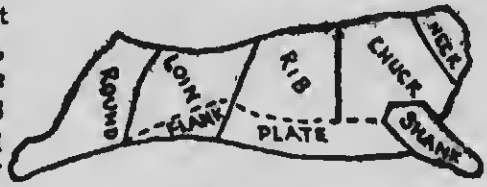
How Meat Carcasses are Cut up.



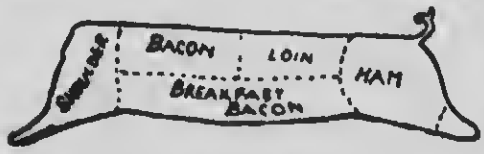
A SIDE OF MUTTON

The accompanying diagrams show how the carcasses of mutton, beef and pork are cut up in many leading butcher shops.

The best markets have become very exacting in regard to the quality of beef and the demand is for an animal that produces the largest proportion of porterhouse and sirloin. A high class beef animal will give not only a larger percentage of good cuts, but will also give better quality in what are considered the inferior cuts such as the chuck. In a carcass that dresses out 346 pounds of first quality, there should be about 92 pounds of porterhouse, 68 pounds of prime rib, and 34 pounds of sirloin. Of second quality beef there would be 362 pounds. In pork production the most valuable meat is found along the upper part of the side as far forward as the shoulder. When the shoulder and neck are reached there is a very material drop in the value. Here a hog with a heavy rough shoulder produces a very undesirable side, because it gives a side which is heavy at the cheap end. The hog should have good length from the back of the shoulder to the ham. The belly meat is cheaper than the part above it. People are demanding more lean and less fat and the butcher buys an animal for the amount of lean meat he is able to cut from it for he desires just as little waste as possible.



A SIDE OF SHEEP



A SIDE OF PORK

Preparing Wool for the Market.

If proper care is exercised in putting up wool for market, it will largely increase the selling value, and should be done at the time of shearing.

1st. Do not stuff fleece with tags or loose locks, for this practice only depreciates the value of the whole lot. Tags have a value, but should be kept separate.

2nd. Keep out, or remove, if possible, all litter. The value of many good clips is greatly reduced on account of being filled with straw, chaff, etc., which a little care would obviate.

3rd. Tie fleece with flesh side out.

4th. Use as little twine as possible, and do not tie fleece too tight, for by so doing the fleece will appear much heavier than is really the case.

5th. Do not, under any consideration, use sisal twine. Some mills will not buy wool thus tied at any price.

Succulent Winter Feed for Sheep.

Roots and vegetables make a valuable feed for sheep in winter. These may be turnips, beets, roots, cabbages or potatoes. All can be fed to advantage and should be distributed through the winter as evenly as possible. The best results from roots, etc., are obtained by chopping or slicing them, and feeding in the morning, together with a little ground grain. Besides containing many fattening and strengthening qualities, the vegetable feed keeps the digestive organs of the animal in a healthy condition.

How to Kill a Pig.

Some butchers stun pigs before sticking them; whether the animal is stunned or not it should be laid on its back where it is held until stuck. Then one man standing astride the body with his feet close against its sides and holding its front legs can easily control it, while the other does the sticking. The knife, narrow, straight-bladed, eight inches long, is inserted into the hog's throat, after making an incision through the skin, just in front of the breast bone. The point of the knife is directed toward the root of the tail and held exactly in line with the backbone. When the knife has been run into the throat six or eight inches, the depth depending on the size of the hog, it should be given a quick turn to one side and withdrawn. The arteries that are to be cut run close together, just inside of the breast bone and will both be cut when the knife is turned, provided it is sharp on both sides of the point. A pig killed in this way will die in a very few minutes and will bleed out thoroughly.

Rules for Sheep Dipping.

1. The best time for dipping is from one to three months after shearing.

2. The sheep should not be over-heated or thirsty at the time of dipping.

3. If the sun is very hot, it is better to have the draining pens under shade.

4. If the nights are cold the dipping should always be stopped soon enough to allow the sheep some time to dry before sunset.

5. See that the preparation is properly mixed, and the correct quantity of water is added. Don't guess at it.

6. Never hurry the dipping. Always take care that every sheep is kept in the bath full time; never less than one minute nor more than two minutes.

7. Have the bath well and regularly stirred up from the bottom always before beginning to dip, and whenever any stoppage occurs.

8. Never allow drippings from the sheep to fall on anything they are likely to eat. If rain comes on before they are dry, keep them off pasture until after it has ceased.

9. When dipping twice, allow an interval of not less than twelve or more than eighteen days between the dippings.

10. Unweaned lambs should be kept apart from dipped ewes for a few hours after dipping.

11. All wash that is left and anything wetted with wash should be kept out of reach of all animals.

Combatting Hog Lice.

Coal oil is sure death to every louse it touches, but does not always kill the eggs, and must be used with caution to prevent blistering the skin of the hog. When a large drove is treated, the work can be done very quickly by using a spray pump having an attachment for mixing the oil and water, and the pump should be so that it will use about five parts of water to one part of oil. When such a mixture is thrown over the hogs in a fine spray, only a little of the oil is used to cover the whole animal, and if the spraying is done in the evening nearly all the oil will have evaporated by morning and there will be no blistering of the skin when the hogs are exposed to the hot sun on the following day. So little oil is used in the spraying that few of the eggs will be killed, and the work should be repeated at the end of a week and again at the end of the second week. If the work is thoroughly done three sprayings will be sufficient.

An ingenious method of applying kerosene or other liquid lice destroyer to hogs has been discovered by an Indiana hog raiser. A good solid oak post, a foot or a foot and a half in height, is placed

in position in the hog lot. One hole is bored in the top to the depth of abont eight inches and two at right angles from the sides at the bottom of the verticle hole. Soft pine pins are driven into the side holes. The upright hole is filled with kerosene, and stoppered. Next a hurlap strip eight or ten inches wide is wrapped around the post over the side plugs. This after a time becomes soaked with kerosene and the pigs will rub against it at the place where it will do the most good.

A Trap to Catch Pigs.

On a hig farm in Illinois, there is in almost daily nse a very valuable hog trap, a device for saving much worry and hard work in handling these obstinate animals. Driven through gates into smaller and smaller quarters, the pig finally stands in a stall so narrow he cannot turn around and a gate slides down behind him. He pokes his nose through an opening between two npright bars of hard wood, rounded to fit his neck, when one of the bars closes npon him tightly and is fastened above, and he can do nothing hut stand still while rings are punched through his snout.

With different holes, pins, keys, etc., these bars may be qnickly adjnsted for a hog of any size, or fastened above when the pig has stuck his head through, and one bar may be slipped ont entirely by simply jerking it npward to let a large hog through after ringing him, and the next minute the trap is ready for the next pig.

This same trap or stall is changed to a hog loader by dropping into it a slanting floor, np which the animal walks into the wagon.

Raising a Calf Without Milk.

A young calf deprived of its natural food is very apt to suffer from digestive derangement unless the food given is carefully prepared with a view to making it very easily digested. A nourishing and easily digested food may be made from finely grounnd oatmeal, flour and finely gronnd flaxseed. In order to render these digestible they should be cooked for several hours on a slow fire. It is well to allow the mixture to simmer on the back of the cooking stove dnring the entire afternoon. When cooked it should be strained through a cloth or fine wire strainer, in order to remove all coarse material. The mixture should consist of three parts oatmeal, two parts flour, and one part ground flax. This should be reduced to a thin sonp, with water, for feeding. It is well to add a little salt to the food. From two to three quarts at a feed should be given, according to the appetite of the calf. If scouring occurs, add a teacupful of lime water and one fresh egg to each feed. An occasional dose of castor oil, about three dessertspoonfuls at a dose, would also tend to correct digestive trouble. The calf should have a clean pen and yard and be given good clover hay, chopped roots, oat chop and bran as early as it will take them.

Grinding or Boiling Grain for Hogs.

Undoubtedly the most economical method of feeding oats to hogs is to have them ground and the coarsest of the hulls sifted out, as these are too tough and fibrous to be digested by hogs. While the animals would doubtless assimilate most of the nourishment of well boiled oats, the hulls would interfere with the digestive system to some extent, and probably cause derangement. A small quantity of ground or boiled flax added to the oat chop would add value to the mixture.

Cattle Lice.

There are two kinds of lice which live on the skin of cattle and suck their blood; they effect especially animals that are weak or diseased. One species, the long-nosed cattle louse, is found especially on younger animals and is rather more than one-tenth of an inch in length. The other, the short-nosed cattle louse, is somewhat shorter. This latter parasite is especially troublesome on the neck and shoulders of the infested animals, and these parts are frequently worn bare of hair by efforts to dislodge the irritating intruder. When in large numbers, cattle lice are not easily overcome; but it is worth while to make a persevering effort to get rid of them, for they can become a source of great loss. Various substances are used to destroy them. A convenient mixture is kerosene emulsion, which may be sprayed over the cattle and then rubbed well in with the hand or with a mop or brush; the cattle should then be kept under cover until they are dry again. Another mixture which is used with great satisfaction is ordinary black oil with about one-quarter of a pound of powdered sulphur to the gallon of oil. A small quantity of this rubbed on occasionally will free the animals of lice. The cattle stalls should also be thoroughly treated with kerosene emulsion or simply with kerosene (coal oil) so as to destroy all lice hidden in the cracks of the woodwork and of the walls.

Keeping Flies off Cattle.

While there is probably no cheap, handy and effectual method of keeping all flies off cows in summer, their ravages may be much reduced by applying to the skins of the animals every alternate morning a little of the following mixture: Seal or fish oil and crude carbolic acid in the proportion of a tablespoonful of carbolic acid to a quart of oil. It is readily applied with a brush. Another preparation that is highly recommended is a mixture of pine tar and lard in the proportion of one part of the former to ten parts of the latter. It is put on with a cloth, and rubbed down the neck, back, chest and loins, where the flies are most troublesome. For a spraying mixture that may be made at home, there is perhaps nothing better than coal oil emulsion—a mixture of coal oil and

soap suds. This has to be applied every day when the flies are bad, as it evaporates in the course of several hours. A good way of applying a spray is to have a large sprayer, arranged to strike the animal at all points, stationed beside a stall built of poles, having a door at each end, so that the cows can be quickly sprayed and run through one after another.

The Product of a 1200-Lb. Bullock.

An extensive packing company gives the following itemized statement of what a 1,200-lb. bullock should yield: Hide, 75 lbs.; head, feet and knuckles, 45; fat, 80; liver, heart and lungs, 35; cheek meat and tongue, 10; coarse fat and entrails, 84; liquid blood, 46; paunch and contents, 106; lip and weasand meat, 4; tail, trimmings and casings, 15; dressed carcass, 700.

Oil Meal for Stock Feeding.

Old process oil meal is a very valuable food for any class of farm stock. It contains a high percentage of potein or flesh-forming matter, and is very palatable and digestible when given in not too large quantities. It has a peculiarly favorable action upon the digestive system, which is readily seen in the increased thrift and improved condition of the skin and hair after a short period of feeding. Milking cows may be given from one pound to a pound and a half daily mixed with crushed grain.

It is particularly valuable for feeding to pregnant and milking ewes, and fattening sheep or lambs. Pregnant ewes may be fed upon it at the rate of one quart to six ewes daily, while milking ewes may receive a larger quantity. It should be mixed with oats and bran. For fattening sheep or lambs, oil meal may form one quarter of the grain ration, which should contain oats, corn and bran.

Oil meal is seldom fed to hogs, although it may profitably form a small proportion of the ration of milking sows and young pigs, more especially if they are not receiving roots or milk.

Feeding Bran to Cows.

For best results in milk production, crushed grain should be fed with the bran. If the mixture can be made into a mash without much trouble it should be fed in that way. A newly made mash is as good as one allowed to stand for some hours, and a cold mash is about as good as a warm one, provided the stable is warm. If a mash cannot be easily prepared, it is well to pulp the roots fed to the cows and mix the bran and mixed chop in equal parts with them, giving each cow from four to five quarts of the bran and chop mixture twice daily.

DAIRY HUSBANDRY.

Making Cheese on the Farm.

The following is a brief outline of a satisfactory method of making cheese on the farm where ordinary household utensils only are available:

Cool the evening's milk to between 65 and 70 degrees F., mix this and the following morning's milk together and heat the mixed milk to 86 or 88 degrees F. for setting, or adding the rennet.

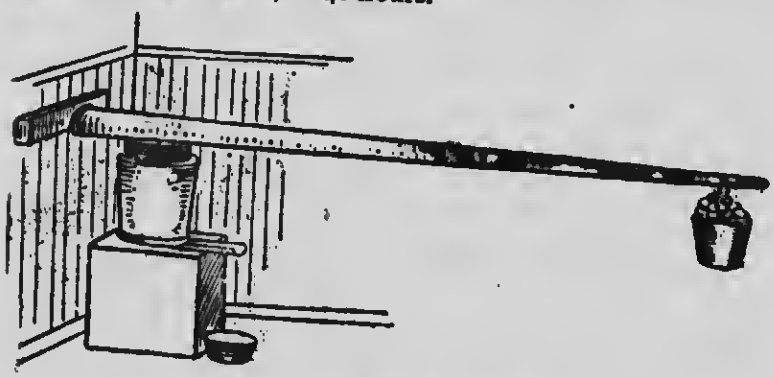
Add rennet at the rate of 4 oz., or more, per 1,000 lbs of milk, or what is practically the same thing, about two teaspoonfuls per 100 lbs. Dilute the rennet with a little pure cold water. Stir the milk gently with a dipper for five or six minutes after adding the rennet, then cover the vessel to prevent the surface of the milk from cooling. When the milk has coagulated sufficiently to break clean over the finger inserted horizontally under its surface, it is ready for cutting. This should take place in from 20 to 25 minutes from the time the rennet is added, and if it takes a much longer time than this it is evident that not enough rennet, considering its strength, has been used.

Next, using a long knife, cut the curd first in one direction, then at right angles to this and then obliquely, so as to cut it into small pieces as nearly equal in size as possible. The curd knives used in cheese factories cut the curd into half-inch cubes or smaller than this. Use this as a guide.

Stir the curd gently with the hand for about ten minutes and free any curd that may be adhering to the sides or bottom, then cook slowly to about 98 degrees, taking about half an hour for this process and stirring the curd gently while cooking. The cooking may be done either by setting the vessel, in which the cheese is being made, in warm water, or by warming a portion of the whey and adding to it from time to time after it is cooked, for the double purpose of firming it and preventing it from matting. An evidence of a curd being well cooked is that when a handful of it is taken up and squeezed together, the pieces will feel elastic or rubber-like and fall apart when the hand is opened. The curd should be ready for dipping, or having the whey removed, in about 2½ hours from the time the rennet was added. After the whey is removed the curd should be stirred until surplus moisture is removed and should be kept from matting together until it is salted.

Salt the curd about half an hour after the whey has been removed, adding at the rate of three pounds of salt per 1000 pounds of milk. Allow the curd to mature well after salting, and do not be in a hurry to put it to press. It should, before going to press,

becoms silky or velvety-feeling. This will usually take from 1½ to 2 hours. The better the curd is matured before going to press the nicer the cheese will be and the more quickly it will ripen. When in the condition indicated, the curd may be put to press. It will be necessary to have a cheese hoop and follower made, and it will be better also to have a bandager or curd conductor. Pressure may be applied by means of a lever with a weight on the end. Pressure should be applied very gently at first and gradually increased until quite a heavy pressure is applied. It is well to press the cheese from 24 to 48 hours.



HOME-MADE CHEESE PRESS.

Once the whey is heated to 98 degrees it should be kept at this temperature until the curd is dipped.

During the greater portion of the time between dipping and putting to press, the curd should be kept above 90 degrees. If possible cool the curd well down to 80 degrees before putting to press.

A temperature of about 60 degrees answers very well for the room in which the cheese is cured.

The Making of Edam Cheese.

In the manufacture of Edam cheese the rennet is added to the new milk at a temperature of 90 degrees. Coagulation takes place in fifteen minutes, when the curd is cut with a knife especially made for Dutch cheese. The whey is then taken off, the curd pressed in the tub, and the remainder of the whey removed by raising the tub and pouring the liquid through a sieve so as to retain the particles of curd. The curd is worked small with the hand, not passed through a mill. It is then vatted in a specially made mould, provided with holes for the moisture to escape, and pressed. It is then put in a cloth cover, transferred to a similar mould, and pressed again for twenty-four hours. The cloth is then removed, and the cheese placed in a kind of cup, where it is turned every day, and salted on the top. After eight days it is washed,

dried and placed on the shelf in the cheese room, where it is turned in the usual manner for several weeks, and rubbed with linseed oil. It requires a gallon of milk to make a pound of cheese, and the cheeses weigh about five pounds each. The coloring varies with the country to which the cheeses are exported. The cheeses are first scraped and cleansed with a very sharp knife, and those sent to America, England or Spain are coloured yellow by means of linseed oil mixed with a little annato, while the others are coloured twice with a mixture of Tourneese twelve pounds, Berlin red thirteen ounces, and water about two gallons, this being sufficient for one thousand cheeses. When this coat has dried the cheeses are rubbed with a little butter coloured with some Berlin red. Good cheese of this kind is covered with a light, greenish-blue, very dry substance, while inferior cheese is fatty, damp and hollow.

Cottage Cheese.

A toothsome and nutritious article of food is made from sour skim milk or buttermilk by allowing the casein to coagulate by the action of acid already naturally formed, and then expelling the water by the aid of heat. A considerable number of products, locally distinct and different in the degree of dryness of the curd, are made in this way. The general process of manufacture is to take sour buttermilk or skimmed milk which has coagulated, heat it gently from 85 to 125 degree Fahrenheit, according to circumstances, and drain off the whey through a cloth strainer. Then reduce the texture of the resulting curd by kneading with the hands or a pestle; salt is added, and the product is improved by the addition of a small quantity of cream or butter. Some persons consider it an improvement to season by the use of one of the more common spices, as nutmeg, caraway, etc. It is largely made only for domestic consumption, but in most cities and villages, especially during the summer months, there is a considerable demand for fresh cheese of this sort, and its manufacture is often a source of revenue to factories suitably located. It is usually sold and eaten in a fresh state, but it may be subjected to certain processes, which quite materially change its character and which vary widely in different localities. This simple kind of cheese is also called Dutch cheese, cottage cheese, and schmierkase.

Cooling Milk for Shipping.

The sooner milk is cooled after milking, the longer and the better it will keep. Milk may be cooled quickly and efficiently by running it over a cooler through which cold water is circulating or flowing. It may be put into cans immediately after flowing over such a cooler. If the milk is to be held some little time before being shipped, the can should be at once set in a tank of cold water

and remain there until shipped. When one has no cooler, good results may be obtained from straining the milk into cans and immediately placing the cans in cold water containing a plentiful supply of ice. Of course the milk will not cool so quickly in large cans as it would when running in thin sheets over a cooler. Where milk is cooled in cans, it is necessary to stir it sufficiently while cooling to prevent the cream from separating to too great an extent. The main thing is to cool the milk as quickly as possible after milking. Some cool their milk to a sufficiently low temperature, but they make the serious mistake of allowing it to stand too long before cooling.

Tank for Cooling Milk.

To make a cement tank, make a box ont of inch lumber large enough to hold the size of cans required, then make another box eight inches larger than the first one and place it on the outside of the first box; this will leave a space of four inches between them for the concrete wall. Fill this space with concrete, and every six inches in height place in wires next the ontside form. After a day the forms can be taken off and the bottom filled np high enough to put a tap in to run off the water when required. Both the inner and outer side should have a coat of plaster left with a trowel finish; This will leave it with a glazed surface and keep impurities from penetrating the concrete. The concrete should be composed of one part of cement to five parts of gravel.

Cream Needed for Pound of Butter.

Cream testing 20 per cent. butter-fat—a very common test for cream from the deep-setting process—will make between 2 and 2½ lbs. of butter per gallon of cream, or about one lb. of butter per 4½ lbs. of cream.

Packing Butter.

A porcelain or stone crock is an ideal package for butter, but the ordinary spruce 56-pound export package or a good butter tub is almost as good. All that is necessary in preparing a crock for the butter is scalding and cooling. A wooden package should be soaked in brine and afterwards coated inside with melted parafin wax applied with a brush. It should then be lined with heavy parchment paper, which should, before using, be soaked in a strong brine for 20 to 24 hours.

After the butter has been worked until the salt is completely dissolved, and a sufficient amount of water removed, it is ready for packing. Butter that is to be packed and held for any considerable length of time should be worked drier than when it is intended for immediate consumption.

The butter should be put into the box in small quantities and well pounded, especially along the sides and corners, so that air will be entirely excluded. Each time a churning is added it should be covered with a layer of soaked parchment paper, then with a clean cotton cloth and a light salt paste. These should all be removed before more butter is added. The box, tub or crock should be filled within an inch of the top, and should be covered with two or three layers of salt paste. A lid should be put on and the butter stored in as cold a place as possible where the air is pure.

Coloring Milk for Cheese-Making.

From one to one and a half ounces of commercial cheese colouring per thousand pounds of milk is the quantity usually used in factory practice. To colour evenly, the required amount of coloring should be added to a large dipperful of milk then be thoroughly mixed by stirring through the whole vat of milk before the rennet is added.

Mixing Cream.

It is very essential in mixing two or more lots of cream which have a different acidity, to allow the mixture to stand six hours or more before it is churned. The cream should be thoroughly mixed and then held at as cold a temperature as possible until churned. This is especially necessary in the summer time, when the gathered cream is very sour on arriving at the factory. This standing for a number of hours and stirring the cream aids in distributing the fermentations through the different lots of cream. If such a mixture as this is churned a short time after mixing, there will be considerable loss in the buttermilk, because the sweeter of the two lots of cream will probably churn before the other lot, and this will leave a great deal of cream in the buttermilk.

Milk Souring Quickly.

The sonring of milk is due to the action of the germs of lactic acid, which are always common and plentiful wherever there is or has been milk. The only way to prevent the milk from early souring is to guard against the action of these germs. This may be done by brushing the udders, sides and bellies of the cows and wiping them with a moist cloth before milking into thoroughly clean, scalded pails; then straining the milk immediately through two or three thicknesses of scalded cheesecloth or absorbent cotton into cans that have been thoroughly washed and scalded. The milk should be quickly cooled by standing the cans in cold water and stirring the milk while it is cooling. All pails, strainers, cans and other utensils with which the milk comes in contact are thoroughly cleansed and scalded before use, and the milk is not allowed to become contaminated before it goes into these vessels, the milk should keep for several days if kept cool.

Preserving Milk Cans.

For prolonging the useful age of the can, one of the most effective agents is the use of a boiling solution of ordinary washing soda, in the proportion of one pound of soda to twenty gallons of water. Provided this solution is applied boiling hot it is beneficial in two ways—namely, by serving as a wholesome and inocuous germicide or microbe killer, and also as a preventive of rust. The cans should afterwards be thoroughly rinsed with boiling water and then inverted on a raised platform, exposed to the sunlight, out of range of any objectionable odours and where there is no floating dust. Sometimes the cleansing can be done by steam at the factory where the milk is delivered, and when so it is undoubtedly the best way. Not only should milk cans thus be cared for, but the interiors should be frequently examined to detect any flaws in the seams, which, with dents, are as dangerous to the sound keeping qualities of milk as rust or dirty rags around the lids. Even in cleaning a can the use of a cloth or rag is not commendable; much better is it to have a good sound brush, for with that all the difficult places both inside and out can be more effectually reached.

Mottled Butter.

The mottled condition which causes buttermakers so much worry is now generally believed to be due to uneven distribution and solution of the salt.

The fact that mottles are seldom or never heard of in warm weather leads to the conclusion that the effect of temperature upon the salt is at the root of the matter. Even distribution and proper dissolving of the salt may be retarded by the use of water of low

temperature in washing the butter. The temperature of the granules may be reduced so low that the salt will not dissolve readily; similar trouble results from having the salt too cold, perhaps in a frozen condition. The effect is much the same when attempting to salt butter that has been overchurned and is in consequence soft and salvy. Many maintain that there is no excuse for mottles where the buttermaker has complete control of temperature and time is taken to work the butter twice or three times if needed. If the butter "comes" cold, the temperature of the wash water should be betwen 56 and 60 degrees. After mixing the salt carefully, work the butter a little and leave it at about that temperature for a couple of hours, then re-work. Good buttermakers declare that the effect of uneven distribution and solution of the salt can always be avoided by working twice under the right conditions.

For a Switching Cow.

The unpleasantness of being walloped about the head and face by a cow's tail while milking is in progress, may be easily averted by throwing a heavy rope over the cow's hips and over her tail, as shown in the accompanying illustration. This plan was recommended by the Family Herald and Weekly Star twenty years ago.

Renovating Butter.

Butter that has become rancid or strong may be rendered fit for cooking purposes by melting and holding for a while at a high temperature, being careful not to burn the fat. If there is any scum on the surface it should be removed and the melted butter should be carefully strained into crocks. After the butter has hardened, a salt paste should be spread over the surface, to prevent the access of air. This paste is made by wetting fine salt to the consistency of thin mortar. Butter that is slightly strong is sometimes freshened by churning in buttermilk. After the regular churning is finished, the lot of butter it is desired to freshen should be cut up into small pieces with the paddle; this can be easily done in the churn. The buttermilk from the freshly made butter should be poured over the butter in the churn, after which the contents should be intimately mixed by churning. If the buttermilk is now drawn off it will be found strongly impregnated with the rancid flavor, while the butter will be found quite palatable. This butter should be washed and salted lightly, as a part of the salt has been removed by the buttermilk. Of course, such butter should not be sold as fresh butter, as it is very much inferior to it and will not keep its flavor very long.

Devices for Kicking Cow.

A number of devices have been recommended for handling kicking cows. One plan is to fasten a rope around the cow's body in front of the udder and back of the hocks as shown in Fig. 1.

The rope should be drawn quite tightly for the first few times it is used. When this is done a cow cannot kick to do any harm, and will soon give up trying. On a heifer that was a bad case a rope was applied for half an hour before milking commenced, with the result that she stood perfectly quiet.

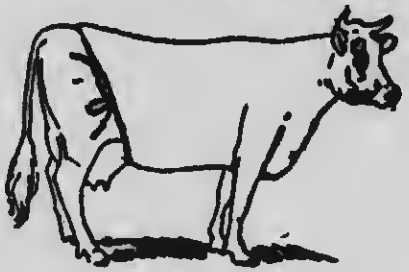


FIG. 1.

Another device is represented in Fig. 2. It is made of a hard-wood stick either half or three-quarters of an inch square and 14 to 16 inches long, into which is fastened a hook made of heavy wire or light rod, with a proper curve to fasten on the outside of the cow's hind leg, with hooks passing half way round. A strip of leather is split half way up and each of the two ends fastened well towards the outer end of the stick as shown. The whole end is passed around the cow's leg and fastened to a buckle, which is attached to the stick at the centre. If properly adjusted this holds the cow's leg so stiff and rigid that it is impossible for her to kick. The ends of hook wires fastened to the stick may be threaded for a nut at that end. The upper hook is larger than the lower, to conform to the size of the leg at the two points. This outfit can be made at very small expense. It can be almost instantly adjusted to the cow's leg.

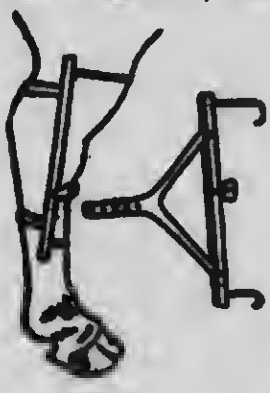


FIG. 2.

Another device consists of a gate with bars opposite the udders left out. The gate is made of light pine lumber; the bottom boards are sufficiently wide apart to allow the arms to be thrust through for milking. The gate is fastened near a wall so that the cow may be tied between the two; a small boy can hold the gate against her side, squeezing her against the wall. If a kicker acts very badly, fasten a rope to the foot near the milker and give it a tie around a post behind the cow. The bottom board should be high enough to allow the milking pail to pass beneath it.

A Quebec correspondent advises the use of rope fastened to the left front foot; the loose end is thrown over the back behind the shoulders and the foot is drawn up to the body. The cow, while standing on three legs, cannot kick her milker.

Butter from Sheep's Milk.

Some farmers in Iceland have recently made butter both from sheep's milk alone and from a mixture of sheep's and cow's milk. Samples of the products of both have been tested by experts in Denmark, who declare that they could detect very little difference between them and butter made solely from the milk of the cow. These experts agreed that there was no reason to pronounce against the use of sheep's milk for butter making. Apropos of this it is interesting to notice that on the score of richness the milk of the sheep surpasses that of any of the other animals of the farm. Analysis show that the average proportion of solids in cow's milk is about 12 per cent., but in the case of the milk of the sheep there is about 17 to 20 per cent., which of course means a proportionately smaller percentage of water than in the milk of the cow. As regards the butter fat content, the milk of the cow and the ewe show a very marked difference. In the case of the first-named an average proportion is from 3.5 to 3.75, whereas average sheep's milk generally yields from 6 to 7 per cent. of fat.

Butter from Sweet Cream.

To make butter from sweet cream, the cream should be cooled down to 40 degrees as soon as possible after separation, and kept below 60 degrees for a couple of hours, when it should be poured into the churn. A quantity of pure culture—about 25 per cent. of the quantity of cream—should be poured into the churn with the cream and the churning should commence at once. Only very rich cream will churn exhaustively at so low a temperature in a reasonable period of time. Records of acidity of the cream and ferment should be made and kept as a guide to the quantity of ferment used so as to secure uniformity in flavor. Considerable experience is needed in order to handle cream and make butter by the methods outlined.

Cream Foaming in the Churn.

In nine cases out of ten the trouble of cream foaming in the churn, so common in fall and winter churning, is traceable to either not having the cream at a sufficiently high temperature when churning, or attempting to churn too thin a cream. Where a cow has been milking for some time and is receiving dry food, the cream is likely to be thin or contain a large percentage of the skim-milk element if the milk is creamed by means of setting it. Especially is this true if the milk is set in deep cans. Obtain as

rich cream as possible, that is, take as little skim-milk as possible with the cream when creaming the milk, then allow the cream to stand for twelve to twenty-four hours in deep cans with a tap at the bottom, and draw off the bottom portion, which will be little more than skim milk. This will make the remaining portion a fairly rich cream, which, at a temperature of 70 degrees, should churn quite readily. Cream raised to a temperature of 70 degrees just before churning will not churn as readily as it would were it at this temperature for a couple of hours before churning.

Pasteurizing Cream.

In farm dairy practice cream may be pasteurized as follows: Put the cream in an ordinary shotgun can, which holds about forty pounds, and lower the can into any vessel that you have convenient that will hold hot water. Pour hot water into this outer vessel and keep the cream stirred until the temperature rises to about 175 or 180 degrees Fahr. The water may be at the boiling point provided the cream is kept constantly stirred. Take out the cream and stand it in cold water until the temperature is reduced as low as required. The more frequently the cream is stirred the more rapidly will the temperature be lowered, provided the water is kept cold. The degree to which the cream is to be lowered will depend on the use to be made of it. If to be ripened and churned, 65 degrees Fahr. will be low enough; if to be sold or used as cream, it should be reduced to 60 deg. Fahr. at least and lower is better.

Box for Shipping Butter.

A box to hold forty-eight pounds of butter will be made up as follows: The box itself will be of 1 inch dressed pine or spruce, or some equally light and strong wood and will be bound with straps of sheet iron passing right around the ends. It should be painted a light color and the owner's name or initials and his address also painted on it.

It is important that it be light in weight. The lid will have loop hinges so that it can be lifted off when opened. The handles for lifting the box may be cast iron chest handles, but leather is much better, put on the same way as on heavy trunks.

The trays, four in number, will hold 12 pounds each. The prints of butter will be put up by the use of a mould for the purpose and as the size of these moulds does not vary very much, the tray may be about the following size, viz.: 9½ by 13½ by 2½ inches deep. Four of these togher with the ice-box will necessitate a box about 12 by 14 inches inside measure by about 15 inches deep. The exact size of these trays and of the box will, however, depend on the exact size of the prints. The material of the trays may be spruce or whitewood or some colourless variety of hard-

wood. Basswood becomes dirty-looking colour and should not be used. The depth should be about one-eighth inch greater than the thickness of the mould or print of butter. The sides of the tray should be one-half inch thick when dressed; the bottom may be lighter. In the top of two sides should be notches for lifting the tray. The box should be enough larger than the trays to admit of two quarter-inch strips on the bottom and one up each corner, these corner strips to extend only to the top of the trays.

The size and style of the ice box is a disputed question. Some prefer one covering the whole inside top of the box, made of galvanized iron with close fitting cover and about two and one-half inches deep. If the market is at a great distance, this box should have a drain pipe to carry off the water, thus preserving the ice better than if not so drained. This is not necessary for short distance shipping. If print butter can be placed in a cold storage chamber at a low temperature for twenty-four hours previous to shipping, it may safely be transported a distance of fifty miles by express without the use of any ice box.

A Home-Made Starter.

Much of the difficulty experienced in getting butter in the fall of the year might be overcome by the use of home-made starters to be added to the cream 12 hours before churning. A good starter may be made from skim-milk. That from a fresh cow gives the best flavour. Place the skim-milk in a closed earthenware or glass vessel, or clean tinware will do, and keep it at a temperature of from 80 to 90 degrees until it is loppered, or has a slightly acid taste. If the quantity thus prepared is not enough, get some clean skim-milk and pasteurize it by heating up to 165 degrees and hold it there for twenty minutes. After it has cooled to about 75 or 80 degrees, add it to the starter already made and allow it to stand at that temperature for a few hours; then cool down as low as convenient. It is now ready to be added to the cream, which should be held till ripe at a temperature not lower than 60 degrees.

Pasteurizing and Sterilizing Milk.

The difference between pasteurizing and sterilizing milk lies in the temperature to which it is heated. Sterilizing is heating the milk to the boiling point and keeping it at a high temperature long enough to kill all germs; in this it is more effective than pasteurizing. Pasteurizing is heating from 145 to 175 degrees Fahrenheit, while in sterilizing a temperature of 212 or higher is used for a considerable length of time. Sterilizing is not practicable in the creamery, as it would be too expensive, and the continuous boiling produces a chemical change in the milk, which, some assert, renders it inferior to that which has been simply pasteurized.

Pasteurized milk and cream show no apparent change in physical characteristics as regards taste or color. Sterilized milks have a more or less cooked taste that is objectionable to many. There is some evidence to show that the continued use of highly heated milks, like sterilized or boiled, has a tendency to produce certain disorders of the system.

Weight of Milk.

The standard measure for liquids is the gallon containing 10 lbs. avoirdupoids of distilled water weighed in air, the barometer being at 30 inches and the thermometer at 62 degrees F. As milk is heavier than water it will weigh more. Average milk will weigh ten and one-third pounds to the gallon. If one buys a gallon of milk he is entitled to a measured imperial gallon, which should weigh from 10.29 to 10.35 pounds.

Drying a Cow.

To dry a cow, give the cow a pound and a half of epsom salts, keep her on dry timothy hay and water for a time, and gradually cease milking her, leaving a little milk in the udder each time.

A Self-Sucking Cow.

There are several methods of dealing with a cow that takes her own milk. One good plan is to place a leather halter having a wide nose band on her head. This band should be studded with sharp nails or tacks driven through from the inside, and having another strap sewed on over the heads of the nails to hold them in position. When the cow attempts to grasp her teat with her mouth, she will prick her flank, udder or leg and abandon the effort.

Another plan is to put a surcingle around the cow and a halter on her head and join the two by means of a strong piece of wood about four feet long, passing between the fore legs, allowing the piece of wood a few inches of play at the halter end.

Still another plan is to place a ring, similar to a bull ring, in the cow's nose, and hang two other rings in it. When the cow attempts to grasp her teat the rings will come in the way and defeat her in her object.

Cow that Holds Her Milk.

The holding of milk by a cow when one tries to draw it, is due to nervousness, and the only way to bring about a cure is to treat her so as to soothe her excitement. It is a good plan to give such animals a brand mash to eat while milking is in progress, and to treat her as kindly and qnietly as possibie. It is also helpful to rub the ndder and teats for a few minntes before commencing to milk.

Working Butter.

Butter, when properly made in the granular form, needs no working other than that done in the churn. This saves more than half the labor and makes first-class bntter. Salt shonld be evenly distribnted throngh the butter and the bntter freed from the bnttermilk and snrplns moisture. Why churn the bntter into a mass and fasten the buttermilk in? Stir the cream well together when more cream is added until enough is gathered to churn. Churn the cream at 62 degrees in a revolving churn without inside machinery nntil the butter comes in pieces about bird-shot size. If so done the bntter will be strictly one thing and the bnttermilk another, and the buttermilk will run out if you give it an opportunity.

Rinse the butter twice with pure water, with salt added. The last rinsing will come nearly clear of buttermilk. Drain the bntter a few minutes, add about two ounces of good dairy salt to the pound of bntter, the butter still being in the churn, revolve the churn a few times, and the salt will intermingle evenly with the butter. It is well to allow a few minutes for the salt to dissolve, and then give it a good banging in the churn, which will give the butter nearly all the needed working. Now pack the butter solidly in tub or crock or work into rolls with the butter ladle. About three-fourths of the large amount of salt in the butter will come out in the brine in working the butter into a solid body.

Long Churning.

A very common canse of trouble in churning is too low a temperature. No one temperatnre can be recommended or adopted—it will vary, according to conditions, from fifty degrees or below to sixty degrees or above. A rich cream from new milch cows receiving succulent food, such as green pasture grass, nsnally churns readily; while a poor or thin cream from cows that have been milking a considerable length of time and are receiving comparatively dry food, will frequently give trouble, and especially if an attempt is made to churn at a low temperature. What amonnts to the same as churning at too low a temperature is holding the cream at a low temperature nntil shortly before churning time and then

raising it to churning temperature. Where this is done the butter fat does not receive time to warm up and become softened sufficiently to churn readily.

Another cause of trouble is attempting to churn too much cream at a churning, and so not leaving sufficient room for concussion. A churn should never be filled quite half, and better not more than about one-third full. Where the cream is made reasonably rich—say, testing 28 to 30 per cent.—and is held at a right temperature for a reasonable time before churning, there will usually be little trouble experienced in churning it, provided always that the churn is not filled too full. Make sure that your thermometer is correct. Many cheap thermometers are four or five degrees out, or even more than this.

For a Tough Milker.

The following for a tough-milking cow has been recommended by an experienced dairyman: "Make a plug of dry slippery elm one and one-half inches long and the thickness of a match at the thinnest end. Let the other end have a head on it similar to that on a horseshoe nail. Tie a piece of silk thread around the head, slip the plug up the teat which milks hard and let it stay until next milking. That teat will give a full, easy stream, but if at any future time it should milk hard, then give it another application. The elm plug swells in the teat. The large head at one end is to prevent further entrance in the teat, as it might by accident get out of sight, in which case the silk thread will be handy to take hold of for withdrawal of plug."

Lard on Cows' Teats.

A dairyman very strongly recommends the use of lard upon cows' teats at milking time, saying: "It is our plan to have a small can of lard conveniently near where the milking is done, and in case of warts, ulcers, chaps or bruises, it is applied regularly to the parts affected after each milking until the trouble is removed. A slight scratch or sore may look insignificant, but be painful to the cow when grasped by the strong hand of the milkman. As the sore is so often broken open during milking, it requires a long time to heal unless given attention. It sometimes happens that large teats become hard and rough after weaning the calf; these are soon rendered soft and pliable by the use of lard. Rubbing with lard will also quickly reduce inflammation of the udder. It will be no loss of time for the dairyman to attend to these teat troubles, for the cows will stand better while being milked, and there will be much less 'crying over spilt milk,' and a greater yield will accrue at the same time."

BEES.

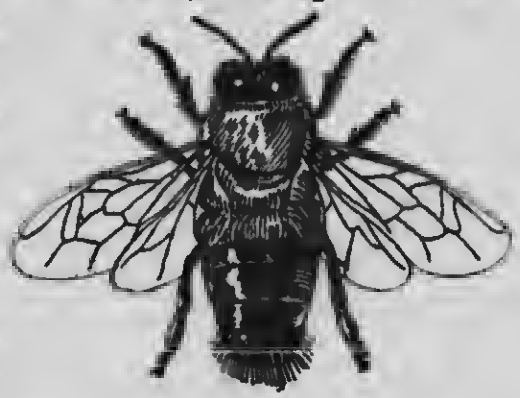
Straining Honey.

Honey taken from the combs without an extractor is called strained honey, and the method of straining it is as follows: The combs containing the honey are finely cut up and placed in an old fashioned colander or other similar receptacle, and this set over some large vessel to catch the honey. Both are then placed near the fire to warm the honey, making it much thinner and more easily drained from the combs. The only way to kept it clear is to assort the combs as they are broken, breaking only those containing light honey first and keeping it covered from the dust. An extractor is almost indispensable in producing good marketable honey.

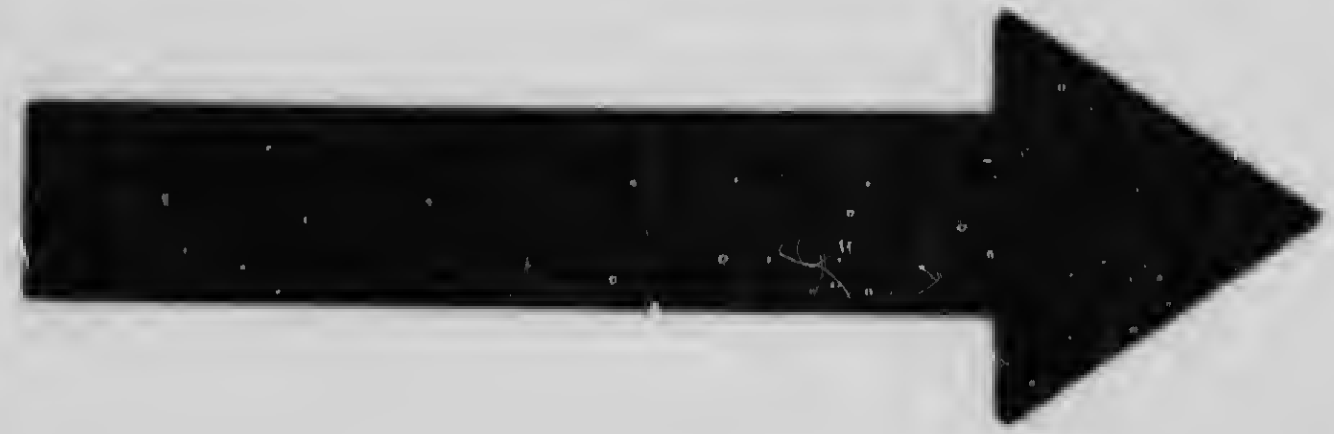
Workers, Drones and Queen Bees.

During the summer months when a hive has its full complement of bees, there will be found three different kinds—workers, drones and a queen. The colour and markings of these are somewhat similar, so that to distinguish them apart attention must be paid to the size and form. Only one queen is tolerated in a colony and her special function is to lay eggs from which are raised all the inhabitants of the hive. Her body is long and tapering and is only half covered by the wings. The head is rounder than that of the worker and the abdomen a little brighter in colour. The drones are the male bees and in size are intermediate between the queen and the worker. They are slower in movement and have no sting. At the height of the honey season they are quite numerous and it is essential that they be present when a swarm issues, to ensure the

WORKER.



DRONE.



MICROCOPY RESOLUTION TEST CHART

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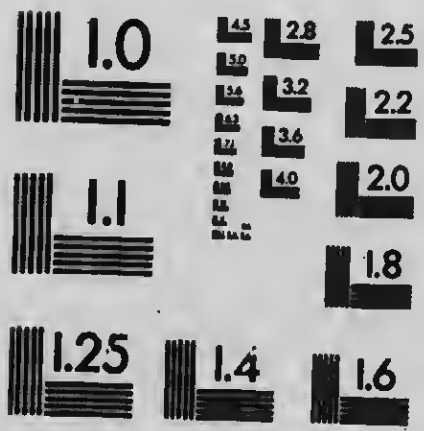

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fertilization of the new queen. Towards the close of the season they are driven out of the hive by the workers. Workers make up the main population of the hive, numbering forty thousand or more in a fully stocked hive. The building of the combs, the gathering of honey and the nursing of the young bees are all done by these active members. Their life during the summer seldom lasts longer than four or six weeks. Those that are reared in the fall hibernate through the winter, thus having a longer term of existence. Stings are furnished to both workers and queens, but it is the worker alone that makes use of this means of defence.

QUEEN.

Packing and Shipping Bees.

The manner of packing and shipping bees depends upon the kind of hive and to some extent the season of the year. Bees can be shipped at any time during the flying season. If the weather is comparatively cool, as in spring and fall, they do not need so much ventilation as through the warm months. There is little danger, however, of giving too much ventilation at any time. Just how the ventilation can best be given depends upon the hive, but with almost any hive the entire top can be covered with wire cloth, to make the colony safe against smothering. If the weather is hot the bees need a supply of water on their journey. This may be given by means of a sponge or a roll of rags saturated with water and placed on top of the frames.

If the hive contains loose hanging frames, these must in some way be made fast. This may be done by driving nails through the ends of the top bars down into the end of the hive, but the nails should not be driven in to their entire depth. The heads must be left projecting so they can be drawn with a claw hammer. When placed on the cars the frames must run parallel with the track; on a waggon they should run crosswise.

The Colonies During Late Spring.

Bees require very little handling during the time intervening between setting them out and the approach of the honey season. It is well not to disturb the body of the hive more than is actually necessary during this time, as useless "tinkering" is not only needless, but in many cases actually harmful. Set the hives on their summer stands, use some kind of packing above to confine

the heat as much as possible to the brood chamber, be sure of plenty of stores, and do not try to know of every trivial change in the brood chamber. Make conditions surrounding them as favorable as possible, and only open the hive itself when actually necessary. If you find it necessary to feed, do the feeding in the simplest possible way with the least disturbance to the bees. A division board feeder is a good kind to use. With this feeder the food is at the side of the brood chamber, while with the simplicity it is above, and unless great care is exercised in replacing the packing, each time much of the heat needed by the colony will escape. Now one word as to the food—you should remember that you can safely feed almost any kind of sweets in the spring, many of which would be very dangerous to feed in the fall. Even maple syrup of poor quality may be used with good results.

Treatment for Mouldy Combs.

Combs that are not too badly moulded can be used again by the bees, as they will clean them up just as clean as new. If they are in very bad condition it is advisable to render them into wax and use full sheets of foundation in their place. The bees will clean up combs that are in quite bad condition from mould. Care should be exercised in giving them to the bees, especially young swarms, as they are likely to leave such combs. It is well to hive the swarm on a single frame of clean comb or foundation, and give the bees the balance of their combs just at nightfall, and by morning they are cleaned and the bees prepared to accept them. You can give an old colony two or three dirty combs at any time and if they have bees to cover them they will at once clean them without difficulty. By following either plan, old combs may be utilized without danger of losing bees by absconding.

Favourable Wintering Conditions.

Colonies wintering on their summer stands should not, of course, be tampered with until near spring. One of the necessary conditions with outdoor wintering is an abundance of good food stored and sealed in the combs before the cold weather compels the bees to cluster closely. Those wintered in the cellar should be occasionally visited to note their condition. Should they be quietly clustered on the combs no attention is necessary. The hum produced by the bees is an infallible guide to their condition. The lower and greater the hum proceeding from the hive, the better condition the bees will be found to be in. When wintering perfectly, little perceptible noise will be heard, so if they are noisy look for the cause and remove it.

The principal causes of unrest in winter are too low temperature, variable temperature, or sometimes mice will enter the hive, causing

considerable damage by gnawing the combs and disturbing the bees, and making them consume their stores more rapidly. Screens should be placed over the entrances to prevent their entering, but if this has been neglected they should be thinned out by means of traps and poison.

All that need be done is to keep the cellar dark, and the temperature even at any point between 42 and 45 degrees and the bees will remain quiet without further attention. Do not disturb them without cause, as an essential condition in wintering is quietness.

Foul Brood of Bees.

The principal symptom of Foul Brood is the brown discolouration of the bee larvæ, and the formation of a putrid mass due to the activity of the bacillus which causes the disease; and if this mass is touched with a pin a long, ropy, tenacious string may be pulled out. In advanced stages the larvæ die in their cells and the cappings become sunken and perforated. The Queen bee may become diseased and may cause the spread of the disease in the hive. There is also good evidence of the specific bacteria being found in the bee eggs.

The cure of the disease is somewhat difficult, and dozens of remedies have been suggested and tried with varying success. For light cases, where the disease is discovered just commencing, a ten per cent. solution a Formic Acid in weak alcohol is placed in a small varnished tin box on the floor of the hive. The vapour from this spreads through the hive, and effects a cure, which in many cases may be hastened by feeding a tablespoonful of the above Formic Acid solution to a quart of syrup. Formic Acid is naturally found in honey, and constitutes the poison of the bee's sting, and when a larger quantity is supplied in the manner above indicated, it acts as an antiseptic, and prevents the growth of the bacillus which causes the disease.

In severe cases, if the hive is filled with comb, etc., it is a good plan to disinfect it with Formalin vapour. Any of the small generators used for disinfecting rooms by Formalin may be employed. Care must be taken, however, to shake all bees from the hive, otherwise they would be killed by the Formalin vapour. This method does not necessitate the destruction of the combs, and it is easily employed; but the remedy usually employed in North America is called the starvation method, and is as follows:

The combs are removed in the evening, the bees are shaken off into their hives, and supplied with frames with comb foundation starters, and the bees are allowed to build comb for four or five days, into which they will store the honey which they took from the old combs. On the evening of the fourth or fifth day, the new combs are taken out and fresh foundation is supplied. The old

combs and the new combs are then either burned or made into wax. It is usually better to disinfect the hive by a thorough washing in a strong hot soda solution. This treatment should always be done in the honey season, and in the evening; otherwise there is a danger of the bees rubbing. If the diseased colonies are weak in bees, two to four weak colonies may be put together.

Feeding Bees in Winter Quarters.

The only way to ascertain the quantity of stores is to lift the hive. It is rather a difficult job to feed bees after they have been placed in the cellar, but perhaps the best way is to place some white comb honey where the bees have access to it either on top of the hive or by inverting the hive and placing on the combs. They may also be fed by making a candy from pure powdered sugar as follows: Take some pure clover honey (any other white honey will do, but clover is best), heat, but do not boil it. Into this mix as much powdered sugar as you can and finally make it like dough until it is stiff enough not to run, but yet not too hard for the bees to work on readily. Another way of making candy is to boil granulated sugar syrup until it will grain readily when stirred. Stir until it hardens and forms into cakes as desired before finally allowing it to cool.

This candy could be placed on the combs if the hives were inverted, but it would be better to leave the hive in its natural position and allow the bees access to the candy through the opening in the hive top provided for the surplus box.

Fall Management of Bees.

The prime factor in successful wintering is an abundance of good stores. It is not only possible but quite probable that hives contain sufficient stores if located in the midst of a profuse buckwheat and golden rod bloom. These are the two principal autumnal honey-producing plants in Canada and by removing the supers — before the buckwheat comes into bloom—the bees are allowed to store all of this inferior honey in the body of the hive for winter consumption.

No successful bee man will, however, trust to chance, the lives of his colonies; he will carefully examine each and ascertain the quantity of honey contained in them. For cellar wintering they should have at least from 20 to 25 lbs. of honey. The quantity of honey may be ascertained by weighing an empty hive with drawn combs and deducting this weight from the gross weight of each colony; the balance may safely be considered as the weight of the honey. Some allowance should be made for the pollen, which is always to be found stored in the combs at this season, for although invaluable in brood-rearing it is of no use to the colony in wintering.

If you pack your bees on their summer stands you should allow more stores per colony, say from 25 to 30 lbs. each, as they will consume more outside than in the cellar, and even with this allowance they will need careful attention in early spring or they will sometimes run out of stores, even if thus well provided for.

Having ascertained the quantity of stores in each hive, and marked it plainly on the hive from where you can readily see it, the next step is to feed any that may lack sufficient stores. The feeding should not be done too early nor yet too late. If too early the bees will use much of it in brood-rearing, if too late they will not store it in the combs readily. The proper time is just after we have had our first killing frost, when the nights are cool enough to discourage brood-rearing and yet early enough for the stores to become thoroughly ripened and sealed in the combs before the bees are prepared for winter. At this season feeding can be done quickly and the danger of robbery minimized.

The syrup for feeding is made by dissolving granulated sugar in an equal quantity of water. If you feed in the proper season you can dissolve the sugar in cold water, but if fed later in the season it will be much sooner carried down by the bees if fed about milk warm.

One thing that every bee-keeper should keep in his mind is the danger of robbing, while feeding is going on. Great care should be taken to avoid spilling syrup on the outside of the hives, or on the ground, or in giving the bees access to it outside of the hives in any way. Do not leave sweets exposed at all during feeding. When you put the feeders on, contract the entrance to a space of one-half by two inches and when the feeder is removed leave the entrance contracted, as it prevents the cold air finding its way so readily to the cluster during the cool days, which are sure to come before the bees are put away for winter.

After feeding, the bees require little or no attention until they go into winter quarters. If wintered outside some time in mid-October, they should be carefully packed with some dry porous material, forest leaves are good, but the season's work is practically done when these preparations for winter have been made. After packing your bees for outside wintering you have only to wait for some dry cold day in the latter part of November to place your bees in the cellar, which will finally conclude the season's work.

Getting Bees off the Combs Easily.

Nearly all bee-keepers know that if there is a time when bees are vicious and bent on stinging, it is in the late autumn when there is little or no honey coming in, and to attempt to take the combs from the hive and brush them one at a time is a task that takes considerable nerve. To avoid this have an assistant to use

the smoker. Go to a hive, give a few puffs at the entrance, pry off the npper story, place it on the wheelharrow, remove the excluder, and put on the cover. This is all done so quickly that the rohbers have not discovered which hive you are working on. Have the assistan' keep watch on the honey on the wheelbarrow, and smoke away any rohbers that may attempt to pilfer. When the barrow is loaded, wheel it into the honey house and stack the hives np near a screen door having an escape. It would be better if the door had several escapes. Let each hive body extend a little over the end of the one beneath it, so that the bees may escape without going clear np to the top. In this way you can pile them up six or seven high, and almost as close together as the hives will atand. The bees will collect on the screen faster than they can escape, and when quite a number have collected on it push the screen door partly ajar and strike it on the inside with the hand. This will dislodge nearly every one. Be quick about it and close the door before many rohbers can enter, for they are sure to be there looking for a chance to get in.

Marketing Comb Honey.

The honey in all bee yards by the end of the summer has been removed from the hives and it is presumed stored in the honey house safe from rohbers and carefully covered to prevent all dust and dirt from coming in contact with it. It is a very good plan if you have much comh honey to thoroughly smoke it with sulphur before opening the supers, to kill any eggs or larvæ of the bee moth that may have fonnd lodgment there The supers may then be opened hy removing the follower and the sections carefully one hy one in such a way as to avoid all danger of hreaking the capping on the honey, for should your honey reach the market dripping, it will surely sell from one to two cents and perhaps some less per pound than if in good condition. With some practice and a little care breakage can be avoided.

As the sections are removed from the supers one by one, clean them of all propolis and propolis stains as far as you can. You will find that for this purpose a common jack knife is the handiest implement you can secure. As you scrape them place them in a hox where they will be away from the dust and in no danger of injury until you have cleaned a hundred or so, when you can place them in the cases ready for the market. The cases can be secured of any supply dealer and should be of sufficient size to hold a dozen sections having three facing the glass. In putting the honey in the cases, care should be taken to secure them a fair average quality, having a uniform appearance for the face sections. Care should also be taken to have each crate, when filled, of nniform weight. This may be done hy having scales handy and filling each case with sections netting a certain weight per dozen.

Before shipping your honey, the cases should be crated in a large crate holding from nine to twelve cases. These crates may be made of any cheap lumber, ripped into strips from one and one-half to two inches in width, and nailed in such a way as to contain the cases and protect them from damage,

The bee-keeper should always aim to produce the very best article possible and place it on the market in the best possible shape; in fact, have it looking so attractive that it will sell itself. It is also a good idea to have a rubber stamp and stamp the outside of each case and in that way advertise your business by the quality of your goods.

From Box to Modern Hives.

To transfer bees from a box hive into a frame hive choose a fine day when honey is coming in plentifully, and about 10 o'clock in the forenoon, when most of the field bees are out, remove the old hive and place the hive into which you wish to transfer the bees on the stand. Turn the old hive bottom up and in it place a box about as large as the bottom of the box hive and in a few minutes the bees will leave the combs and cluster in the box. A few may remain in the combs, but these may be brushed in front of the new hive after the combs are removed. Now with a hammer and cold chisel cut the nails and remove one side of the old hive and with a saw cut the cross sticks, if any. Remove the combs carefully; avoid breaking and bruising those containing brood. These should be cut to fit the frames of your new hive and fastened in by tying twine around the frame. It is not advisable to save all the pieces of comb, but only such as are straight and contain brood. Any containing good honey may be laid aside for eating and the remainder may be rendered into wax. After using all the suitable comb found in the box hive in filling frames, the rest of the frames should be filled with full sheets of foundation. This should be done beforehand, and all placed in the hive that is to contain the bees. The bees clustered in the box should now be shaken in front of the new hive into which they will run, and in a couple of days you may remove the twine used to hold the comb in the frames, and the work of transferring is complete.

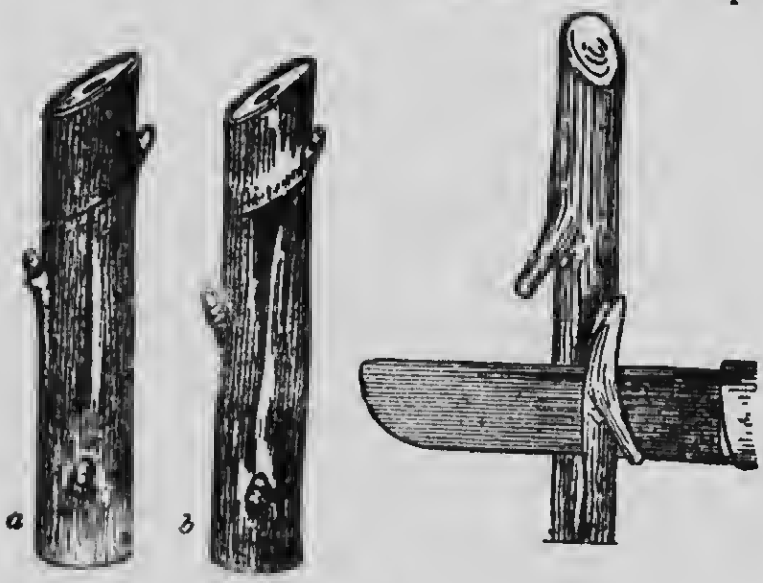
Preventing Swarming.

The only certain way to prevent swarming is to cage or remove the queen. If queen cells are found at the time the queen is caged or removed, they should be destroyed. Eight days later the colony should again be examined and all queen cells destroyed. and a third examination should be made eight days later, and again any cells found destroyed. This will effectually prevent swarming. There are several ways of discouraging swarming, but this is the only sure way to prevent it.

HORTICULTURE.

Budding Fruit Trees.

In budding either fruit or ornamental trees two things are needed, budding wood and suitable stocks. Budding wood must bear fairly well ripened buds. These buds may be separated from the twig on which they are growing, and if properly planted on the stock, will unite and become a part of it. There are various kinds of budding. The commonest type is known by the name of shield budding. The name is taken from the form of the bud which resembles a shield. Budding may be practiced indoors or in the field. In America, it is usually carried on extensively in the field. The stocks which are to be used are planted in the spring



BUDDING.
A. B. preparing the stock. C. cutting the bud.

and are usually seedlings. In July, August or September, depending on the locality, the buds are taken from the wood of the current year's growth and are inserted beneath the bark of the stock. The buds should be placed near the ground, and it must be inserted at a time when the bark can be easily separated from the wood. A longitudinal slit is made in the bark, and at the upper end of this a cross incision. This makes a T-shaped mark. The corners of the bark are raised and the bud which has been smoothly sliced from the cion with a very little of the wood of the cion adhering, is inserted. It is bound in place with woolen yarn,

basswood bark fibre, or raffia, a fibre derived from a southern grass. Wax is not employed. The bud unites, but remains dormant during the winter. The next spring the top of the stock is cut off just above the bud, and if the bud is still healthy, it soon replaces the amputated stock.

Pruning Fruit Trees.

A tree is pruned principally to get large, good and highly-coloured fruit in paying quantities, Judicious pruning also promotes the growth of the tree and gives it a good form, which helps it to withstand the strain of a heavy crop of fruit, and prevents it from splitting, which often occurs in badly pruned orchards. Trees pruned to low heads are better than those with high ones. The fruit is picked easier, there are not so many windfalls, and the windfalls are not so much bruised. A trunk from three to four feet in height is quite high enough and many goods orchardists now grow their trees with little or no t. nks, and find this method very satisfactory. In the colder parts of this country low-headed trees are not so subject to sunscald as those with high heads. Many trees have been ruined in Canada by injudicious pruning. A tree has, perhaps, been growing for eight or ten years without having been pruned. At last the lower limbs interfere too much, in the farmer's opinion, with the cultivation of the ground. They are thereupon cut off and the trunk is lengthened, but at what a sacrifice!

Trees should be pruned back and opended up from the top and outside rather than from below and inside. This will cause the buds to develope at a reasonable distance from the ground, and the arrangement of the fruit buds will be better. Pruning should be planned to obtain the largest crop of fruit of the highest grades with the least spread of branches. Often the whole ground is taken up by trees with long, bare limbs, having fruit buds only at the extremeties of the branches. This condition can be avoided to a large extent by judicious pruning. Pruning is usually done during the latter part of March and April. Wounds often heal quicker when the pruning is done a little later on after growth has commenced, but it is not often practicable to prune at that time.

Protecting Apple Trees from Mice.

There are two principal ways of preventing mice from girdling young apple trees. The first is to bank the trees with soil in the fall. A cone-shaped mound should be thrown up around the base of each tree. If this is raised to the height of ten or twelve inches, it is an almost perfect safeguard against mice, for, as a rule, mice work in the depressions around the base of trees. The snow does not lodge on the mound and offers no protection. This method is a comparatively cheap one if the orchard is cultivated and the soil mellow. It will not cost more than half a cent a tree per annum to bank them.

The second method is to wrap the stems of the tree with some protective material. Tar paper is effective, but should not be left on in summer. The most effective and durable and lasting method of fencing out mice is to use a heavy grade of wire netting. This is cut in pieces the required size, the same as the tarred paper, and fastened loosely about the stems of the trees by means of wire.

Grafting.

There are two methods of grafting commonly employed, cleft-grafting and tongue or whip-grafting. The ordinary method is what is known as cleft-grafting and is employed principally with apples and pears but may also be used with plums and cherries. The best season for this operation is the spring. Plums and cherries should be worked first, for it is very important that these should be grafted before any growth takes place. Pears and apples may be grafted a little later, but the cione ought to be set before the leaves unfold. The operation is conducted as follows. The branch is sawed off at the point where it is desired to insert the cion; it is then cleft and the cion is set in so that the growing part or inner part of the bark is directly opposite that of the stock. The cion should be cut in the form of a long thin wedge. The cleft and the cut end should then be covered with wax so as to exclude water and prevent evaporation. If there are several buds on the cion the one

CLEFT-GRAFTING.

nearest the stock is most likely to grow and should be retained. Should buds on both cions grow, one may be removed.

TONGUE OR WHIP-GRAFTING.

Tongue or whip-grafting is employed with small stocks and in grafting seedling apple roots with improved varities. The cion and the stock should be nearly the same size The parts are held firmly in place hy wrapping them with cotton yarn drawn throngh melted wax. In whip or root-grafting apples, thrifty one-year old stock is taken up in the fall and stored in a cellar. During the winter these roots are cut in two or three pieces snd each grafted with a cion. They are then packed in moist earth until spring, when they are set ont in the nursery row.

In a cold climate it is better that the cions intended for grafting shonld be cnt in the fall, becanse if left on the trees over winter, there is possibility of their being injured hy severe freezing. Of course this possibility will vary considerahly with varities. The main points to ohserve in all grafting operations are to have a sharp instrument that will make smooth clean cuts, and to have the inner barks of cion and stock in perfect contact.

The Sweating of Apples.

The sweating of apples is due to a difference of temperature between the apples and the surrounding atmosphere. If apples are massed in large heaps on the ground or in the cellar, when the weather is comparatively warm, and a sudden change of temperature takes place, there is immediste condensation of moisture on the surface of the fruit. This is usually called "sweating." The same thing occurs when a harrel of apples is taken from a cold storage chamber and brought into a warm atmosphere, moisture is condensed and the apples become wet. This will occur in midwinter as well as in the autumn. As a matter of fact, the apple, until it is decayed, is to be regarded as a living organism, and, as such, has a temperature slightly higher than the temperature of an

ordinary storage room. This is to say, if the temperature of the storage room is at freezing, the temperature in the centre of the barrel is usually five or six degrees higher; and so it is in the orchard, the larger the mass of apples, the more heat is likely to be generated. It often occurs, therefore, that when a pile of apples lies beneath the tree you will find by pushing your hand towards the centre of the pile, that it is quite warm while on the surface a good deal of moisture is condensed. This condition occurs when the surrounding temperature is cooler than that of the apples themselves. This difference in temperature will be less marked as the apple approaches maturity.

The Gumming of Cherry Trees.

When cherry trees are injured in any way gum will ooze out, the disturbance of the regular flow of sap usually causing it, hence cherry trees should be pruned very little. The best time to prune is between early spring and the month of June.

Propping Apple Trees.

Under proper management one should not be obliged to prop bearing apple trees. As a rule, when the branches need to be supported to prevent them from breaking, they are carrying more than they should be allowed to bear. Then, again, the placing of braces of any sort under the limbs causes wounds and cankerous diseases to develop. However, the practice is quite common throughout the country. The simplest way of supporting heavily laden branches is to cut young saplings, leaving the fork at the top, then, simply placing the fork under the branch to be supported and standing the support as nearly upright as possible beneath the tree. Many growers use these supports or props year after year. They are piled in a corner of the orchard and serve a very good purpose for a number of seasons. When these forked supports are used, tying is quite unnecessary.

The Culture of Strawberries.

The methods of growing strawberries may be divided somewhat sharply into two general systems, that for the amateur and that for the professional or commercial grower. If desired for home use exclusively, you can afford to take some special pains in the selection of varieties and in the care of the plants. Choose rich soil. The strawberry can hardly be overfed. Plant in spring. Set plants eighteen inches apart and four feet apart between the rows. Give as good cultivation as is necessary to maintain a dust mulch throughout the season. Do not let the runners grow until the plants are well established. Do not let the plants fruit the first season. When the runners begin to set, train them into the line of

the row and take some pains to distribute them so that the ground will be evenly covered. Do not allow the row to exceed twelve inches in width. In the fall cover the plants completely with straw. Do this after the ground is frozen. In the spring rake the straw into the spaces between the rows. It will help to keep the berries clean during picking season. The amateur can continue a plantation of this kind for another year, while the commercial grower usually finds it more economical to plough it under and replant. In other words, he plants every year. The expense of keeping the plantation clean the second year is much greater than the first. These directions include the principal features of strawberry growing, and they can be applied on a commercial scale or followed by the amateur. Where large berries are desired more intensive cultivation is given and the runners are more rigidly cut off and a system more nearly approaching the hill system is practised. In other words, a comparatively small crop of berries means a crop of large fruit, as a rule. Whereas a large number of plants usually means a large crop of medium-sized berries.

The Apple Scab.

The apple scab is due to a fungus which produces the well known scabby spots upon the fruit, and also attacks leaves and green shoots. To combat the scab, spray thoroughly in spring with dilute Bordeaux mixture, just before the leaf-buds open, or else spray before the leaf-buds begin to swell, with a simple solution of copper sulphate; repeat the application of Bordeaux mixture a little later, just before the blossoms open; spray for the third time just after the blossoms have fallen, adding arsenites for the codling moth if desired; ten days after this third application spray again with the compination or Bordeaux mixture and Paris green or London purple. Do not apply Bordeaux mixture late to early ripening apples.

Gooseberry Culture.

While the gooseberry is an exceedingly hardy and productive plant, yet it is remarkable how few there are who actually make a success of growing it. The first essential in gooseberry culture is a heavy soil retentive of moisture.

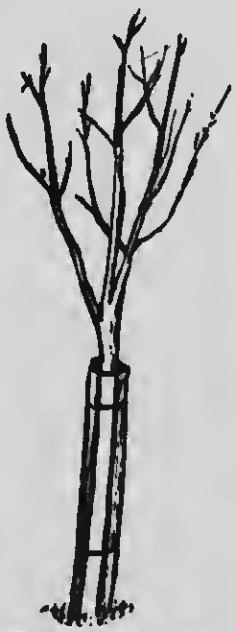
Having the soil, one should then recognize that there are two types of gooseberries. One type is derived from the native species, and these are illustrated by such kinds as Houghton and Downing, which are, by the way, probably standards among gooseberry growers. The other type is of English origin. This is characterized by the larger size of its fruit and also by its greater susceptibility to mildew. Mildew is the bane of the gooseberry grower, particularly the man who attempts to cultivate English varieties; but with favourable soil and a coolish location, mildew may not be

feared. It should be thoroughly understood, also, that this disease may be held in check by using sulphide of potassium (liver of sulphur) as a spray. It should be dissolved in water at the rate of an ounce to two gallons, and applied at frequent intervals during the fore part of the season.

Of those varieties which have proved best adapted to this country, should be mentioned Industry, Whitesmith, Prince Harry, Crown Bob and Chantanqua. These varieties are handled by most of our nurserymen.

Apple Bark Bursting.

Every spring season which is characterized by rapid climatic change causes a good deal of injury to the stems and main branches of fruit trees. This injury takes the form of splits and cracks in the bark. These rifts open up, the bark curls back, and when they extend completely around the stem the tree is killed. On young trees the injury is often very severe. In many cases the trouble is to be charged to severe freezing weather following warm period. Some relief will be obtained by shading the trunks of newly set trees. This bark bursting in the case of apple trees rarely occurs after the rough bark appears. If the trees are shaded by wrapping the stems with building paper or lath screens during the spring months each year till the development of rough bark, it may be expected that they will have passed the danger period.



Tree with trunk protected by lath screen.

Preparing Seed Potatoes.

Mr. William Rennie, who was for some years agriculturist at the Ontario Agricultural College, and who is recognized as an authority on matters of this sort, gives the following advice about cutting potato seed. He says: "First cut off the stem end of the potato; this will invariably have one or two eyes: then by revolving the potato in one hand and cutting with the other, cut so as to leave two or three eyes in each set; then split the seed end."

For eight years in succession an experiment has been conducted under the direction of Prof. C. A. Zavitz, at the Guelph Experimental Farm, in planting whole and cut seed, and it has been found that large potatoes, cut into pieces of about two ounces in weight, give most satisfactory results. It has also been found that larger yields

and better results have been obtained where only one was planted in each place. Under average conditions it is decidedly better to plant potatoes immediately after they are cut rather than to hold them four or five days before planting. The result of eight years experiments showed an increase of 8 bushels per acre from newly cut seed over the produce of seed that has been cut four or five days before planting. The percentage of marketable potatoes was also greater in the crop from the newly cut seed.

Grafting Wax.

A good brand of grafting-wax for top-grafting purposes is made by using the following formula : 4 parts of resin, 2 parts bees-wax, 1 part beef tallow. Melt together and when thoroughly melted pour into a pail of cold water, then grease the hands and pull as if for taffy uutil the mixture is smooth and plastic.

A liquid form of wax may be made by using 4 parts resin, 1 part bees-wax, 2 parts linseed oil. This can be applied with a brush to the stubs of the parts to be covered and works very well.

The Growing of Mushrooms.

As to the growing of mushrooms, probably no one crop has been written about more than this and if the conditions are perfect, no crop is easier to grow. But the condiitions are usually so exacting that failure is more often the result than is success. There is no doubt, however, that when one is successful this is a paying crop ; and if you have a suitable place in which to make your beds, it would cost but little to try their culture. The directions for making the beds are as followa: Secure fresh horse manure, comparatively free from straw and litter, and mix it with one-half its bulk of loam. Keep this under cover, turning each day to prevent heating until the pile is large enough to make the required sized bed. The beds are usually made three or four feet wide, eight or ten inches high, and any length wanted. Make the beds in layers of from two to three inches, pounding down each layer with the back of a spade or with a brick. The bed will heat to a temperature over one hundred degrees and should not be spawned until the heat subsides to about ninety. Then spawn by making holes in the bed about a foot a part and two inches deep into which put pieces of spawn two or three inches in diameter and fill up the holes with the compost, packing it down firmly. The spawn should begin to run through the beds in a week or ten days, when the bed should be covered with a layer of fresh soil to the depth of two inches. Over this scatter two or three inches of clean straw or hay. Examine the bed often, and if dry, sprinkle with warm water. If the spawn has run well you may expect mushrooms in from eight to ten weeks.

Mushrooms spawn may be purchased from any of the first class seedsmen, most of them listing it in their catalognes. The price ranges from fifteen cents per pound, by the single pound, to eight or nine cents by the hundred pounds.

Storing Cabbage.

Cabbages may be stored in either a cool moist cellar or a pit prepared in the field. Many keep cahhages hung up by the roots to the celling of the root house. In this way they remain fresh and sound provided the temperature is kept at a few degrees above tha freezing point. A pit for storing cabbage should not be wider than five feet, nor deeper than one foot, and of any lenth. It should be located in well, drained soil so that surface water will not lie on the flor of the pit. The cabbages should be cut with a faw inches of their stumps left on and huilt up in the pit in the form of a cone. They shonld then be covered with seven or eight inches of dry straw and about six inches of soil. Ventilation should be provided hy means of drain tiles or bunches of straw standing on end as chimneys about 12 foot apart. When very cold weather arrives, the pits should be covered with a foot of horse manure, which should keep the vegetables in good condition till spring.

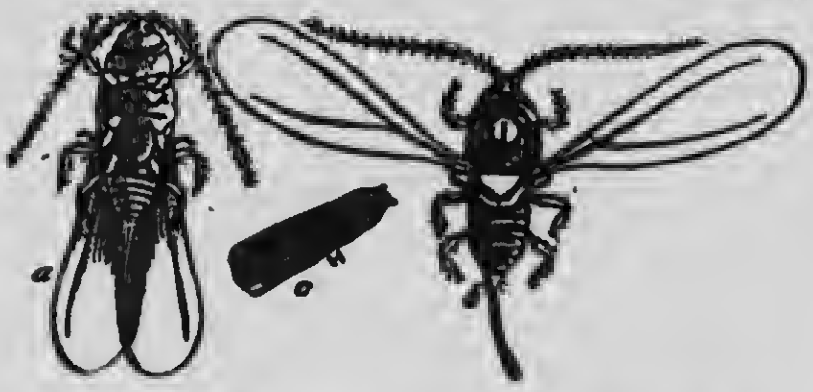
Worms on Grape Vines.

There are two kinds of caterpillars that are freqnently abundant and destructive on grape vines. The commonest is that of the beantiful wood-nymph, which when full grown is abont an iuch and a half long, tapers towards the head and becomes thicker as it approaches the end. The head is orange dotted with hlack, the body pale blue crossed hy bands of orange and narrow black lines. The other caterpillar, the grape-vine sphinx, is larger; when full grown, being about two inches long with a small head and a horn at the end of the body. The colour is a pale green dotted with yellow and with a pale yellow stripe down each side. Down the middle of the back is a row of about seven angular spots varying in colour from red to pale lilac and each spot is surrounded with pale yellow. The horn at the end of the body is one-fifth of an inch long and varies from red to bluish green granulated with hlsck. Both of these caterpillars and all others which feed on the folisge of the grape-vine may be destroyed hy simply spraying the vines with a mixture of Paris gre- and water, one pound of Paris green to 160 gallons of water, and it is slways better, when nsing Paris green to kill insects, to add an equal quantity of fresh lime with the Paris green, which to a large measure prevents its injnring foliage. If you have not a spraying pump you can distribute the mixture either with a watering can or with a whisk, using one ounce of Paris green and one ounce of lime to every ten gallons of water.

Oyster-Shell Bark-Louse

Although so destructive in all parts of Canada, the Oyster-shell Bark-louse is not a particularly hard insect to control, where trees are attended to regularly. The first step to take when an orchard is found to be attacked is to invigorate the trees by ploughing round them and feeding them with some quick-acting fertilizer, such as well rotted manure, or a dressing of wood ashes. When trees have been standing in sod, it is well to break this up. Trees which are planted too closely should be pruned and cleaned out, so that they may be easy of access for spraying and other operations. As soon as winter has set in, the trees should be sprayed thoroughly with a thin lime wash, one pound of lime in each gallon of water. Two coats must be applied, the second immediately after the first is dry. Mild days, of course, should be chosen to do this work. Before very long the lime will begin to flake off the trees and will either carry with it a large number of the scales, or these will be so loosened that they will be washed off or blown away by rain and wind. Where the lime-sulphur- and salt wash is used to protect trees against fungous and insect enemies, there will never be any trouble with the Oyster-shell Bark-louse. The young bark-lice emerge from their mothers'

Twig infested with Oyster-Shell-Bark-Louse.



OYSTER-SHELL BARK-LOUSE—Mganified A, B, male; C, male scale.

scales during June; the exact date should be watched for, and immediately the dust like yellow mites are noticed, the trees should be sprayed without delay with weak kerosene emulsion, or a whale-oil soap solution, using one pound in six gallons of water.

Storing Winter Squash.

Winter squash, of which the leading type is the Hubbard, are stored and kept best in a dry room, the temperature of which should not fall below fifty, and may go as high as sixty-five. If you intend to store a quantity of any variety of squash, it is a first principle to put in only specimens perfectly sound, free from bruises and with the stems on. Often in picking, the stems are broken off. When this is done, it always results in not entering at that point. The temperature necessary to maintain squashes in good condition is about that required for sweet potatoes. Dryness and a reasonably high temperature are demanded. They should, of course, be gathered before hard frost comes.

Keeping Onions Over Winter.

Onions are usually allowed to dry or cure before being put into storage. If this has not been done in the field they should be cured under cover, for the bulbs should be dry and free from dirt when they are put into winter storage. After they have been cured for three or four days the tops are removed with strong shears. The tops are cut off clean, without ragged edges, about one-half inch above the bulb. Mature onions ordinarily will not stand freezing and thawing. Therefore they should if convenient be stored in a frostproof place. They must be kept dry. Onions may be frozen with safety, however, provided they do not thaw out before spring and the thawing is then gradual. They may be stored in a loft or closed shed and be covered with several feet of dry leaves, straw or hay. In the spring the covering should be gradually removed so that thawing will take place gradually. If the onions are dry and clean when put into storage and the tops have been carefully removed, they may be stored several feet deep in narrow bins or cribs.

Cabbage Worms.

The most effective and convenient remedy for cabbage worms is a mixture of one pound of pyrethrum insect powder with four of sheap flour mixed well together and allowed to stand for 24 hours in a tightly closed vessel. The easiest way to apply the mixture is to puff it over the cabbages with one of the instruments known as insect guns, which are sold by druggists for a few cents. On large areas it will be necessary to use either large bellows made for the propose and which can be obtained from seedsmen, or to place some of the mixture in a cheese cloth bag, which is then suspended at the end of a stick and lightly tapped with another stick over the plants. This work is best done while the dew is on the plants, as the powder then adheres better to the leaves.

Kerosene Emulsion.

Kerosene emulsion is made as follows:

Kerosene (coal oil)..... 2 gallons.
Rain water..... 1 gallon.
Soap..... ½ lb.

Dissolve soap in water by boiling: take from fire, and, while hot, turn in kerosene and churn briskly for five minutes with a syringe, or with a spraying pump, by holding the nozzle in the mixture and pumping until the whole is of a cream consistency. To tell whether the emulsion is complete, put a small quantity on a piece of glass, and if it smears on the surface without oiliness it is ready to use. This is the stock emulsion, and when required it must be diluted according to the nature of the tree to be sprayed or the insect to be destroyed. For winter use, as for New York plum scale or oyster shell bark-louse, it may be diluted with 5 times its bulk of warm water; for general use for young scale insects or green plant lice, and on all kinds of foliage in summer time, one part of the stock emulsion should be mixed with nine times the quantity of water. The stock emulsion if put in a cool place, may be kept for years, and when required for use may be easily mixed with warm water.

Onion Maggot.

The Onion Maggot is one of the most troublesome enemies of the gardener and in some years when very abundant no remedies seem to be effective. Among those treatments which have given good results, are the following: White hellebore, dusted along the rows once a week beginning directly the young onions appear above the surface gave comparatively clean onions. By the first of July, in most years, the maggot ceases to be troublesome. The Cook Carbolic wash has given good results. This consists of boiling up one quart of soft soap, or one pound of hard soap, in a gallon of water. When boiling hot add half a pint of crude carbolic acid, boil for a few minutes and stir thoroughly. The mixture is then

ready to be stored away. When required for use, take one part of this mixture, by measure, to fifty of water and spray or sprinkle it upon tha growing plants once a week from the time they appear abova the ground.

Gas lime sprinkled lightly over the surface of onion fields has given fairly good results. For this purposa it must be used quite fresh hut must not be put close to the young onions.

Trimming Spruce Hedges.

A spruce hedge shonld be trimmed twice in a season. The first trimmings should be done a week or two after growth commences, and tha second trimmiog should take place early enough in tha season so that the plant is able to repair the injury in part, by its subsequent growth; in other words, so that the cut ends may be covered up. If pruned very late in the season, there is likely to be some alight drying back of the cut ends.

Plant Lice on Apples and Plums.

The apple Aphis, or plant louse, passes the winter in the shape of small black eggs which may be found on the twigs any time during the winter. If the trees are sprayed early in the spring with kerosene emulsion, the plant lice will be destroyed before they hatch.

After the lice have hatched they may be destroyed with the kerosene emulsion, but with less tronhle with a whala oil soap solution, using one pound of soap in five gallons of water. The Plum Aphis may also be treated with the same solution. Plant lice can also he killed with a Tobacco and Soap wash made as follows: Soak in hot water for a faw honrs 10 lbs. of tobacco leaves. Strain off and add 2 lbs. whale oil soap. Stir this thoroughly until all is dissolved and dilute to 40 gallons. Spray the trees as soon as the plant lice appear, making two or three applications at short intervals.

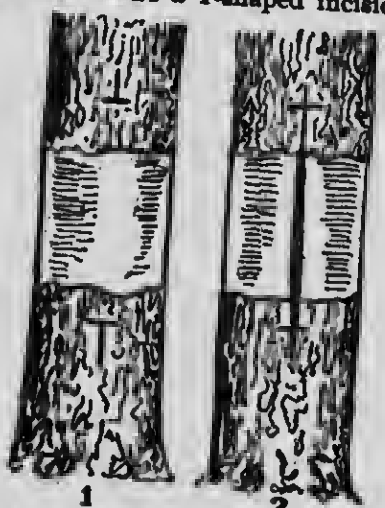
Currant Worms.

The small green worms that eat the foliage of currant bushes early in the season are the larvae of the Imported Currant Saw-fly, and of the enemies to small fruits there is not one perhaps which is more persistent than this insect. Soon after the leaves expand, early in May, the parfect insects which are a little larger than a house fly, may be seen flying about beneath gooseberry and currant bushes. The eggs are laid in regular rows along the ribs beneath the lower leaves, and soon the well known "current worms" make their appearance. There are at least two hroods in the season. The caterpillars of the first of these appear in May and, for this first brood only, a weak solution of Paris-green (one quarter onnce to a pailful of water is sufficient) may be sprayed on the bushes, or a dry mixture of one onnce of Paris green to 6 lbs. of flour, well mixed together, may be dusted over the bushes after a shower, or

when damp with dew. For the second brood of caterpillars, which appears just before the fruit ripens, Paris green must on no account be used, owing to its poisonous nature; but, instead of it, white hellebore, dusted on dry, or in water one ounce to a pailful of water.

Bridge-Grafting Peeled Trees.

The accompanying cut illustrates a method of "bridging" that is almost unfailing. First, get some rather long grafting twigs of last season's growth. When the bark begins to loosen on the trees make a T-shaped incision through the bark below, and an inverted T above the girdled space, the horizontal slit in each case to be about an inch from the edge of the girdled part. Cut the bridge-graft about three inches longer than the cross-cuts of the T are apart. If the bridge is a little curving, so much the better. Bevel off the curved side at both ends, say one inch back from each end. Bevel the bark part of the bridge say half an inch back, by making a cut on each side, so that the end may be somewhat three-sided. Insert the lower end of the bridge in the lower T, holding the left thumb under it to prevent it slipping down too far. Keep the thumb there, bend back the bridge and slip its upper end under the bark of the upper incision, pushing up firm, but still leaving a slight curve in the bridge. The curve prevents the bridge drawing out when the wind moves the tree. Wax each end firmly over, and mound up with moist earth as high as the bridges reach. If the girdled band is wide or high up, wrap the bridge with grafting-cloth strips, made by dipping cotton strips two inches wide into melted grafting-wax. If the earth mound is used, remove it about July. If the girdling is all around the tree, three or four scions will be sufficient for a tree less than six inches in diameter. If the rougher outer bark has been removed all around the tree, but some of the new wood or growing layer still remains fresh, the tree may often be saved by keeping the new wood moist till growth begins. This can be done by covering the wound with grafting wax or a mixture of clay and cow manure, equal parts. If the wound is low, a heap of earth will often be sufficient.



1. T-shaped incisions. 2. Finished graft ready for waxing and grafting.

Peach Leaf-Curl.

One of the commonest and, in some parts of the country, most destructive diseases of the peach is that which attacks the foliage early in spring, causing the leaves to curl up and finally drop off. This is due to a fnngous disease somewnat closely allied to the disease which canses plum pockets or inflated plums. It is called peach leaf-curl. As in the case of most other fungous diseases, it is carried over from one season to another hy means of minnte spores; These find resting places in the hud scales on the young wood. As soon as the leaves begin to develop, they are attacked, and the contortions of the leaves are dne the internal growth of the fungus. The trouhle may be prevented by thoroughly disinfectiag or spraying the tree with Bordeaux mixture before any growth takes place. This spraying mnst be done even before the buds swell, and it must be very thorough. Every part of the bud, twig and hranch must be coated. Late sprayings are useless, becanse the parasite does its damage very early in the season, and when the leaves begin to curl the greater amount of the injnry has already taken place. The trees will throw out leaves agaln later in the season; but they are not likely to develop fruit bnds for the crop next year.

Black Knot.

Black knot attacks the different varieties of plums and cherries. It is found more freqnently on the sour cherries than any other, hnt does not attack apple trees. There are one or two canker diseases of the apple which give the hranches a knotty appearance, hut this is qnite distinct from the hlack knot of the cherry. All these knot and canker diseases are of a type which mnst be treated by pruning ont the diseased portion. Sprays or external applications are ineffective. One should be carefnl inremoving the knot to cut well down into the healtny tissne. If hlack knot appears on the larger branches, it is sometimes impossihle to remove it without cntting off the hranch by a simple surgical operation. The wound shonld then be painted so that water and germs are kept ont. It is important to hurn all knots as soon as they are cut out of the tree. Early spring is a good time to do this.

Rot of Plums, Peaches and Cherries.

Plums, peaches and cherries are affected by a disease variously called hrown rot, soft rot, or gray rot, and technically named Monilia fructigena. This fungous disease affects both wood and fruit. Where a fruit is distroyed, the twig to which it is attached is nearly always attacked also. As the fruit rots, part of it falls to the gronnd, hnt usually a number of fruits dry up and cling to the twig. These wizened specimens contain millions of spores of the

disease, and are largely responsible for carrying it through the winter and spreading it the next season. There are two ways of preventing it. One is hy thinning the fruit so that specimens will not tonch each other and hy picking off all diseased plums during the fruiting season, as well as afterwards. The other is by spraying the trees with ammoniacal copper carbonate solution as the fruit begins to colour. This fungicide is prepared hy dissolving five ounces of copper carbonate in two quarts of strong ammonia, and diluting this with forty to fifty gallons of water. When both of these methods of prevention are thoroughly practiced, the amount of rot may be greatly reduced.

Black Rot of Tomato.

The rot of the tomato is due to a fungous disease closely allied to the disease that canse so much damage to potatoes. However, this disease, like potato rot, may be prevented in large measure by spraying with Bordeaux mixture. The affected fruit should be removed as soon as any indication of the presence of the disease is detected. The vines and fruits should then be sprayed with Bordeaux mixture. Wet, cold seasons encourage the development of the disease, while warm, dry seasons discourage it. Vines trained on stakes are less endangered than those which are allowed to grow naturally on the ground.

Squash Bugs.

There are two kinds of insects which are very destructive to squashes, pumpkins, cucumbers, melons, and other plants of the same family, of which they attack the leaves. One is the striped cucumber beetle (Diabrotica vittata), which is a small beetle one-quarter of an inch long with yellow and hlsck stripes down the back. The other is a true hng and is, therefore, rightly called the squash hug (Anasa tristis; this is a larger insect about three-quarters of an inch long, almost hlack, with a flattened body of a shape somewhat like a bishop's mitre, for which reason, in some quarters it is locally known as hishop bug; it is further characterized by an abominal "huggy" odour when handled.

Remedies—The greatest succes against both the above insects and any others has beeu secured by covering young plants with a square of cheese cloth kept raised hy two flexible sticks crossed at right angles and with the ends stuck in the ground, the edges being held down hy some earth thrown over them. The cheese cloth may also be supported hy frames made of laths to which it is tacked. By the time the plants have grown large enough to require the removal of the covering, most of the first brood of the beetles will have disappeared.

As an insecticide, a mixture of one ponud of Paris green and fifty ponnds of laud plaster, dusted over the plants, has proved more effective t:au anything else.

Sand or land plaster saturated with coal oil or impregnated with carbolic acid and dusted at short intervals over the hills, is iu a measure useful iu keeping away the insects,

For controling the true squash hug, great attention should be given to destroyiug all the old bugs which appear on the plauts early in the seasou. This should be done every day or two duriug the cooler hours of the morning, when the bugs are sluggish. The egg clusters are couspicuous aud should be destroyed wheuever seen on the plauts.

The bugs may be trapped hy plscing shingles or pieces of board on the ground near the plauts, uuder which they will gather. They are theu collected and destroyed by droppiug them iuto a pail containiug a little coal oil snd water.

Cranberry Growing.

The coutrol of moisture is one of the chief essentials in successful cranberry culture, as where iusects aud spring frosts are troublesome it is necessary to flood in order to preveut these from doing iujury. In order to grow a very profitable crop of crauberries the land should all be occupied with the vines and everythiug possible should be doue to preveut the growth of weeds. Three or four iuches of clean sand spread over the surface of the ground before plsuting, and after the land is cleared, levelled and the sod destroyed, will preveut mauy weeds from germinating and also prevent heaviug by frost the first winter after planting. The plants are set about 18 inches apart each way, aud if the gronnd is kept well hoed and free from weeds there should be a full crop iu three years. Draining should be snch thau the first twelve inches of soil should be fairly dry during the summer.

Growing Rhubarb.

There are two ways to start a rhubarb bed: First, by nsing roots, which may be secured from au established plsntatiou. If these are used, they may be plsnted in spring or any time from the first of September until the middle of October, esrly autumn being preferred. The second method is from seeds. If rhubarh seed is sown iu well pulverized soil in esrly spring, the seedling will be large enough to trausplant in the autumn. Or, they may be allowed to staud over uutil the following spring. When the roots or seedlings have beeu set out in the autumn, it is altogether advisable to mulch them heavily the first winter Rhubarh does well on a variety of soils but one which is deep, fairly heavy aud moist is preferable. If you want early rhubarb, select a warm site.

Growing Celery.

Much will depend on the soil in deciding whether to grow celery in trenches or by level culture. If the soil is very heavy, or, on the other hand, sandy, it would be a difficult matter to earth up plants grown level, and it would be better to use the trench method; but with good loam soil one can earth up to good advantage. The trench method is also desirable on dry, leachy soil, while the opposite is true on wet, retentive soil. On damp, peaty soil, use a fertilizer rich in potash but use it sparingly, as celery grows quickly, is composed largely of water and gets its stimulant from the nitrogen that is always present in such soil to an abundant degree. If a commercial fertilizer is needed, use muriate of potash at the rate of three hundred pounds per acre, either just before setting the plants, harrowing it in, or before the first cultivation. From the first to the fifteenth of August is as late as is wise to set out celery plants.

Planting a Hedge.

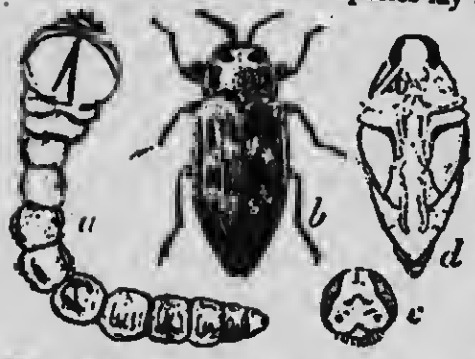
The soil should be properly prepared before planting a hedge. Everything else should be in good condition. The soil should then be turned out in deep furrow where the hedge is to stand, and the plants should be set in this and the soil drawn up to them and firmly tamped about the roots of the plants. The distance apart which the plants are to stand will depend somewhat on the style of the hedge. If a low small hedge is wanted, as one most often sees in England, the plants should be eight or nine inches apart. If the tree or to be allowed to grow larger, say five or six feet tall, the plants should be set wider apart, not less than eighteen inches.

The Bearing Age of Various Fruits.

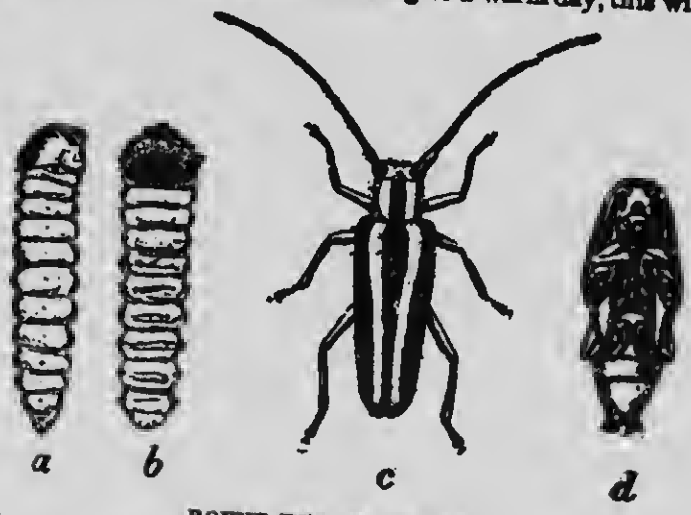
Apples and pears trees are planted at 2 and 3 years of Age peaches and apricots at 1 year, and mulberries at about 3 years. Some varieties of apple trees begin to bear about three years after planting, and among the earliest fruting varieties are: Duchess, Wealthy, Wagener and Ontario. Others like the Northern Spy do not come into bearing until they are ten or twelve years of age. Pear trees begin to bear from 3 to 5 years after planting, some of the earliest bearing being Clapp's Favourite, Bartlett, Flemish Beauty, and Duchess (dwarf). Kieffer bears early, but is inferior in quality. Apricots begin to bear the third year after planting, a few of the best varieties being Montgamet, Royal and Moorpark. Peachs begin to bear the third year after planting and among the best to plant are: Alexander, Early Crawford, Fitzgerald, Garfield and New Prolific. The best mulberries are Downing's Everbearing or New American.

Apple Tree Borers.

There are two species of larvae which bore into the trunk of apple trees, and when numerous they cause the death of the tree. The mature beetles of both species lay their eggs during the month of June, on the bark of the trunk, and the young larvæ upon hatching penetrate into the wood, where they develop in size, tunnelling galleries which increase in diameter as the larvæ become mature. The principal remedy recommended against these insects is the use of alkaline washes on the bark during the month of June to prevent the females beetles from laying their eggs. A good remedy is soft soap reduced to the consistency of thick paint by the addition of a strong solution of washing soda in water. If applied with a brush about the first of June on the morning of a warm day, this will dry in a few hours and form a tenacious coating not easily dissolved by rain. If one pint of crude carbolic acid be added to the gallon of wash, it will make it more effective. Later in the year much good may be done by digging out the larvæ from their burrows by the help of a strong piece of wire.



FLAT-HEADED APPLE TREE BORER.
A, larvæ; b, beetle; c, head of male; d, pupa.



ROUND-HEADED BORER.
a, b, larvæ; c, beetle; d, pupa.

Growing Cauliflowers.

Cauliflowers require moist soil. The seed should be sown in hotbeds during the latter part of March or early in April, depending on the season. As the young plants damp off very easily they must be closely watched and the frames kept well ventilated. It is best to prick them out into cold frames while they are quite small and have still but two leaves. They are then planted from the cold frame to the open ground when larger, if frost is over, and set about 18 by 30 inches apart in rich soil. The ground is then kept thoroughly cultivated. The heads when partly developed are protected from the sun by breaking some of the leaves over them. In order to have a succession of cauliflowers during the season, seed may be sown at different times, the later sowings being made in a cold frame or in the open.

Growing Asparagus.

In choosing the site for an asparagus bed, one should select a location that may be looked upon as permanent; that is to say, where it will not interfere with the planting of the garden or field in the near future, because an asparagus bed when once installed should continue to be productive for fifteen or twenty years. Select a southern aspect, in well drained soil, but one which is retentive of moisture rather than dry in its tendencies. For a commercial bed set the plants two feet apart in rows four feet from each other. The best time to set them out is in early spring. Use good strong crowns. It is essential to prepare the ground very deeply and the asparagus bed should not be set without first subsoiling it thoroughly. The subsoiler should follow in the furrow of the plough, and stir the substratum to the depth of six or eight inches below the layer stirred by the plough. The cultivation the first season is thorough as for any other vegetable crop. Do not wait for the weeds, but maintain a soil mulch by frequent stirring. The tops should be cut off after seed forms No shoots should be cut the first year. If strong crowns have been used, a light cutting may be made the second season, and the third season the bed ought to be in full bearing. It is a good plan to work in fine rotted manure in the fall of the year, but it is not a good plan to mulch the bed heavily unless one is content to wait for late asparagus. Covering with manure in the fall retards the spring development. Some gardeners use a great deal of salt on asparagus beds. It certainly does not injure the plants, and undoubtedly does tend to make available to some extent the mineral food elements of the soil, and, if used in large quantities, will check the growth of weeds. Probably an application of salt once a year will be beneficial. It may be applied at the rate of a ton to the acre.

Raising Early Tomatoes.

There are two methods that the farmer unprovided with a glass-house may employ in order to secure a crop of early tomatoes. First, he may plant his seed in boxes of soil which should be placed in a south window in the house. When the plants have attained a height of four or five inches, they may be transplanted to tomato cans, paper pots, or ordinary flower pots. In this way, by pinching them back, if they grow too "leggy," and giving them all the sun possible, being careful to keep the temperature moderately low, he can grow good sturdy plants for setting out in the early part of May. By this method the plants may be started early in March. The second method is to prepare a hot-bed about the middle of March and sow the seed therein. The plants should be treated essentially the same as the house-grown plants. That is to say, it will usually pay to transplant from the hot-bed either to flat boxes or pots before setting in the open. This transplanting makes the young plants stocky and fits them better for the open ground. The best results from early tomatoes are secured by training them to single stakes. First, select as warm a location as possible on well-drained lightish soil, but thoroughly fertilized, set the plants three or four feet apart, and train to single stakes. In training in this form, the lower side shoots should be removed. The stake method encourages early maturity and prevents rotting to a considerable extent.

Blight in Apple Trees.

The blight which attacks apple and pear trees is bacterial in its nature and for that reason is difficult to treat successfully. It appears to live over the winter just in the margin of the affected part, near the healthy wood, and not in other parts of the tree or in the soil. The only remedy is to cut out the blighted branches well below the affected part, say one foot below any appearance of blight. The knife used for this purpose should be thoroughly cleaned or sterilized before being again used on healthy wood. It is fortunate that the disease sometimes dies out of its own accord, especially in the case of the body blight. It is thought to be conveyed from tree to tree by bees and insects, which would account for the great increase at blossoming time. The blight appears to develop very rapidly, and the maximum amount of damage is done almost as soon as the attack becomes noticeable. It will probably be found that the fall is the best time to cut out the affected wood, as the damage will not be much, if any, greater then than in July, and in the fall one may make sure of getting all the blighted portions. As anything which stimulates an undue growth of succulent wood is conducive to blight, it is well to cultivate and manure so as to produce a medium growth of strong healthy wood.

Onion Culture.

Onions do well on a soil which contains a good deal of vegetable mould, in other words, humus. They also succeed on well-enriched sandy loam and on reclaimed swamp land—land which has been cleared of brush and alders, and afterwards drained. Though this soil is rich in potential nitrogen, it is desirable to supply the mineral constituents by applying greater or less quantities of potash and phosphoric acid. Sometimes and application of lime proves very beneficial. It is a mistake to grow onions on poor soil. One of the peculiarities about them is that they seem to succeed better when successively grown on the same land than when the crop is rotated.

What kind one should grow will depend a good deal on the requirements of the market to which he caters. If the large varieties are desired, as a rule it is better to sow the seed in a hot-bed and transplant them; but if the smaller kinds, such as the Danvers, Globe and Weathersport, are grown, they are started and cultivated directly in the open ground. Seed can be purchased from any reliable seed firm.

A Hot Bed.

In the making of a hotbed, one should be able to obtain fresh horse manure either in the quantity desired or by degrees until sufficient is procured. This manure should be turned frequently to prevent burning or firefanging, and be in a rather moist condition when the bed is made. The bed may be made either entirely under the surface of the ground, or upon the ground. The former method is the better for many reasons. Less manure is required, the heat is retained longer and no unsightly pile of manure can be seen. If one wishes a bed of this kind, a pit should be dug the required size, using plank, brick or stone for the sides and ends. Into this pit the manure may be thrown, treading it firmly until the surface is reached. The frame to hold the sash should then be placed over and the sash put on. This frame may be constructed

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of boards of any size, building it to fit the sash. It should be higher, however, at the back than in front, in order that water may readily run off the sash. Regulation hotbed sashes are six feet long by three feet wide, and the usual size of the frame is twelve by six feet, requiring four sashes. But any sash may be used with good results. After the pit is filled and the frame and sash on, the manure will heat rapidly, often to 100 degrees. When this heat subsides to about 85 degrees, soil may be put on to the required depth. If it is desired to sow the seed directly in the soil and allow the plants to grow until planting out, the depth of soil should be six inches.

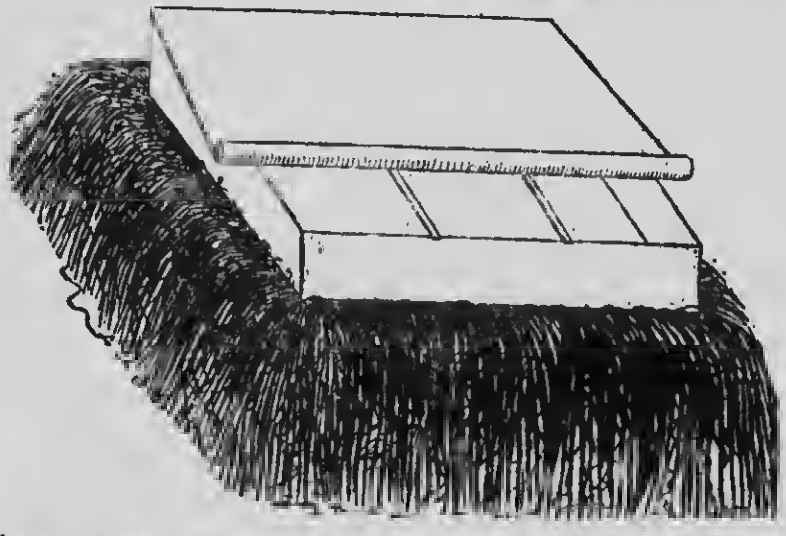
If the seeds are to be sown in boxes, the soil need not be over two inches deep, just sufficient to keep the boxes from the manure and to hold moisture. The latter method of using a hotbed has many good points, as one is able to sow the seeds in boxes in the house, is also able to have each kind of seed entirely separate and can sow at different times. By using boxes it is also possible to transport a lot of seedlings from the bed to the field without danger of the seedlings wilting. It is generally safer to wait for a few days after placing on the soil before sowing the seed, allowing the rank steam from the manure to escape. After the seed is sown, care must be taken to keep the soil moist and the bed well ventilated during sunny days. This is best done by raising the sash at the back a few inches, closing tightly at the approach of cool evenings. If the bed is made above the surface, the manure should be at least three feet in height and extend beyond the size of the frame at least two feet.

Growing Spruce from Seed.

All cone-bearing trees are rather difficult to propagate from seed. The seed germinates readily, but the young seedlings are quite likely to die off a few weeks after they appear above the ground—they are killed by a fungus. All of this tribe of trees should be grown under shade. Prepare a seed bed in sandy loam in a well-drained, sheltered situation. Sow the seed broadcast and cover with half an inch of sifted soil. The bed must be watered regularly. Before the seed comes up, shade the entire bed with evergreen boughs or with screens made of laths. It is not essential that all the sun's rays should be excluded, but it is desirable that the bed should be sheltered during the hottest portion of the day. The young seedlings may be grown in this bed for two years and then transplanted to nursery rows, where they are cultivated for a year or two longer before setting out in their permanent situations. Evergreens grow slowly when young. The seed should be collected in the fall before the scales of the cones expand and allow the seeds, which are at the base of the scales, to drop out.

A Cold Frame.

A cold frame in which to start vegetable plants early in spring, such as cabbage, cauliflower, tomatoes and lettuce, may be made by using the frame of a hotbed. The soil for a cold frame should be prepared in the fall 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 spring. When it is desired to use the cold frame,



the manure covering must be removed and the hotbed frame placed over the prepared ground and the same manure used to bank the frame on the outside. The frame should be covered with cotton provided with a roller so that the cotton may be readily rolled up. It is necessary to have strips three feet apart to prevent the cotton from sagging in the centre. The soil must be loosened up with a spading fork before sowing the seeds or transplanting plants into it from the hotbed.

Transplanting Forest Trees.

In general, probably the best time for moving all sorts of trees, especially forest trees, is in the spring. Nevertheless, summer transplanting is occasionally entirely successful. This is especially true with spruce and pine trees, which may be moved in August with entire satisfaction if the weather is at all favourable. In moving deciduous trees, however, the work should be done either in late fall or early spring. If the trees are small and easily handled, and if the location where they are to be set out is exposed and bleak, then it will be better to heel the trees in. Otherwise they can as well be set at once in their permanent places.

FLOWER CULTURE.

The Care of House Plants.

One of the most common questions asked is : What ails my plants? The leaves are turning yellow and dropping off. A new growth starts, and then dies : or, my plants are not making any growth.

Now, either of two conditions prevail in many of these cases. The first is over-watering ; the second, allowing the plants to become too dry. In the greater number of cases the first conditions prevail owing either to heavy, unsuitable soil, lack of drainage, or an erroneous idea as to the amount of moisture needed by the plants. There is considerable difference between water and moisture, and plants thriving in moist soil and being injured by water standing around the roots. Soil for pot plants should in all cases be porous enough to let the surplus water escape, and yet retentive enough to hold moisture. Bearing this in mind it is always best to add sand and leaf-mould, or light wood dirt, to any soil used for potting, even if the soil is from a fertile garden. Potted plants are grown under unnatural conditions, the roots penetrating to the bottom of the pots, and unless provision is made to lessen the amount of water given at time of need, injury will result. Even with the soil in the best possible condition it is absolutely necessary to have good drainage in the bottom of the pots, or the lower portion of the soil will become sour and heavy. In fact, more failures to grow plants are due to imperfect drainage than all other causes, and when there is trouble concerning the ill growth of plants the drainage should be looked after. Having soil of good texture, ample drainage, and a healthy plant, the larger number of so-called house plants should flourish through the five or six months of house culture. Water plants copiously when they need water ; then do not water again until the soil begins to look dry. Furnish moisture in the air, if possible, by means of shallow pans of water, set on stove or radiator, and spray the foliage as often as the leaves become coated with dust. By so doing, one may have house plants that are the pride of the grower.

Plants in Windows

The position of plants in a house depends altogether on whether you wish a symmetrically developed plant which will look well on all sides and yield pleasure from all points of view, or whether you wish your window to look most attractive from the outside. In the first case you will turn your plants occasionally. In the last you will leave them in the same position all the time.

One ardent lover of flowers has long windows in her parlour, almost to the floor. She gives them up entirely to her plants. In each window is a plant stand filled with various choice specimens of different kinds. The plants get no direct sunshine, but they have good light and the sun's rays fall on them diagonally a part of the day. The plants grow vigorously, hut they are never turned. Of course they grow towards the light and they soon form a beautiful wall of leaves and blossoms, for in growing they accommodate themselves to each other. The plants bloom abundantly and from the outside, particularly toward spring, the window is a mass of blossoms. Of course the greatest beauty is from the outside, but enough can been seen from the inside to affort a great deal of pleasnre.

The Culture of the Cyclamen.

Cyclamens are very sensitive to the lack of good drainage in the pots and will not do well if the soil holds water. A porous soil composed of a good fibrous loam, with one-fourth well rotted manure, one-fourth leaf monld and sand mixed, will furnish a good soil, provided there is good drainage in the bottom of the pot. A temperature of abont sixty degrees should be maintained and the plants grown near the window, bnt shade from entire sunlight through the middle of the day. Keep the soil moist, bnt not wet, and examine the plants for insects. The common green flies or aphids are often found on cyclamens, and if numerons cause damage. They may be brushed off, or the plants may be fnmigated with tobacco smoke. If the bulbs are plump and healthy. they may be neld over nntil the following year ; hut new bulbs are much better. Seed sown in spring would make bnlbs large enough to bloom next winter, although one can rarely be sure of the colonr of the flower from the seeding hulbs. Well-grown, thrifty cyclamen hulbs are very showy house plants and well repay the trouble of growing from seed. The young seedlings should be grown in partial shade through the snmmer, not allowed to become pot-bonnd and taken into the house before danger of being chilled, in the fall. When they are in fnll flower, an application of liqnid manure once each week will increase the size and number of the flowers.

Early Annuals.

Seed of aster, ageratum, alyssum, annual carnations, lobelia, marigold, mignonette, morning glory, nasturtinm, petnnia, phlox and all other half-hardy annuals should be sown in boxes in March the boxes set in a warm sunny place and wstered frequently. When the seedlings have made a few rough leaves, they should be transplanted into other boxes, giving each plant sufficient room in which to grow. These boxes

may be transferred to hotbeds or again set in windows: and when the plants have become well established and have started into growth, they should be given air and allowed to become accustomed to cool weather, or, as the gardener would say, hardened off. This fits them to be planted out much earlier than if they were kept in a warm room or in a close hotbed without air. When the conditions are right for planting the seedlings out, the ground should be prepared by spading in well-rotted manure. Where the soil is incline to be heavy, a good coating of sand or muck will lighten up the soil and create conditions favorable to the growth of the plants. Annuals are short lived plants at the best and in order to give the best results should have all conditions in their favour. In planting out, avoid staight rows, if possible. Plant in colonies or groups of the same colour. A stiff, formal row of asters, carnations or other annuals has not the same effect that masses of one kind of flowers have between the different groups. Plants with pleasing foliage, such as roses, geraniums, lavender, etc., not only break the monotony of the planting, but furnish green material for bouquets of cut flowers.

Planting Sweet Peas.

Sweet peas generally prove most satisfactory when planted as early in the spring as possible. As soon as the ground can be prepared, rake rather deep furrows running north and south, or north-east and south-west, and sow thickly in these furrows, covering only one-fourth to one-half inch deep; if covered too deep, the peas will rot. When two or three inches high, hoe the soil in about the stems, and continue this process at intervals as the plants grow, until the furrow if filled and the surface of the soil is level. The roots will then be in the ground deep enough so that the heat of the summer will not be so likely to check the growth and cause the yellowing of the foliage and death of the plant. In shallow planting, where the sun's rays are hot, the heated soil almost invariably destroys the plant before the blooming period is reached. It will not hurt the plants to freeze. It is well to order seeds of a reliable nurseryman and plant early.

Climbing Plants for Gallery.

Among the quick-growing annual climbers, none is more satisfactory that the Japan hop, usually catalogued as Humulus Japonicus. This comes in two forms, the type having deep green leaves and the variegated form in which the leaves are splashed with white. Either form will grow from twenty to forty feet in a remarkably short time, if given good soil and plenty of water. The flowers are not conspicuous and add but little to the beauty of the plant: the seeds are hardy, and when a plant has grown one year, numerous seedings will come up the following spring. These

seedlings may be easily transplanted or left to screen as before. This vine will cling and wind around any support, hut will give hest results when wire chicken fencing is used. Other rapid climhers are the improved types of Morning Glory and the tall growing Nasturtium. These afford not only foliage for screening. hnt furnish fine flowers for cutting. Seed of planta wanted for quick screens shonld be planted early in boxes and transplanted to the ground as soon as possible. Make the border rich and mellow, and if impossihle to furnish water often, mulch the ground around the plants after a heavy rain with short litter of grass clippings.

Pruning Rose Bushes.

Rose hushes are usually given two prunings—one late in the fall and one early the following spring. The reason for the fall pruning is that if the hushes are left with long canes through the winter, the heavy snows are likely to break them off, unless each bush is supported by a steak ; but if cut back to within eighteen or twenty inches of the ground the canes will be stiff enongh to bear the weight of the snow. In the spring cut back again to about twelve inches. This will hring the new wood close to the ground, making a more compact hush and easy to pick from. All roses are borne on wood of the same season's growth, and enough huds will usnally start below a distance of twelve inches to furnish an abundance of hloom.

Dahlias from Seed or from Cuttings

Many varities of dahlias come true from seed, blooming the first season if the aeeds are sown in March and making tubers of snfficient size to be divided the following spring. The aingle varieties have in the past few years been improved wonderfully, until it is now possible to have aingle blooms that measure from four to six inches across and of a wide range of color. These single hlooms are much more effective as cut flowers than are the double types. The plants are very profuse in blossoms which in almost all cases are borne on long stema. The double and semi-douhle types have also been improved, with the result that an entirely distinct clasa of hlooms has heen obtained. Seed of the various types may be obtained from the leading seedsmen and should be sown through March in pots or boxes, using soil with considerable sand to allow qnick germination. After the aeedlings have made their true leaves they should be transplanted into other boxes containing soil rich in plant food, and after danger of frost is over, planted out where they are to bloom. A sandy loam is hetter than a heavy soil in which to plant them. The soil should be in good condition, hut not too heavily manured.

If one has tubers of choice varieties that are desired to be increased the tubers may be started in March in boxes, by covering them about three inches above the crown and keeping them in a warm light place until growth has been made to the length of three or four nodes or joints; then the growths should be cut down to within one-half inch of the lower leaves and cuttings made of the upper portion. In making these cuttings, it will be necessary to cut just at the node if tubers are wanted. Cuttings made between the nodes will root and bloom, but will not make tubers and are lost after that year; whereas if made at the node, a number of tubers will grow from the roots and a variety may be increased indefinitely.

Care of Rubber Plants.

In the summer months many rubber plants lose their lower leaves. The following simple plan will prove a cure-all for such annoyances if it is followed with due regularity: Every spring the plant should be re-potted in good soil, each time in a larger pot, and during the summer months kept in the shady part of the house, away from the sun, and watered daily. In winter the plant should be kept in a light place in the house, but should not have too much sun. Once a week the entire pot should be thoroughly immersed in a bucket or tub of water and allowed to soak over night, giving the water ample opportunity to soak to its center. Next morning take the pot out of its bath-tub and allow it to drain awhile, and do not give it any more water for two or three days then let it have a drink each morning until time for its next bath. By carefully following this plan you will be surprised to see the beautiful lustre with the large, glossy leaves will show and you will not be annoyed with the leaves falling off.

The Growing of Palms.

While palms are perhaps the most decorative house plants in the list, they are also quite difficult to keep in a healthy condition, as many of them are from moist as well as hot climates and do not adapt themselves to the dry heat of the living room. In fact, a cool side room, where the temperture holds as low as fifty to fifty-five degrees, is better suited to their healthy growth than is a room heated to seventy degrees, unless with this heat moisture can be supplies. The turning brown of the tips is caused by this same dryness of the air hastened often by dryness at the roots also. The first may be overcome by sponging the leaves often with clear water; the latter by attention to the condition of the soil, keeping in mind the fact that a palm in a healthy growing state should have available all the water needed, which means, if the drainage of the pot is good, a liberal watering every day. Tobacco soap solution may be made strong enough to seriously injure the leaves

of the palms as well as most other plants. A very weak solution of tobacco is commonly used, but except in extreme cases where scale or other insects are very numerous, you will find good suds of ivory soap sufficient. In all cases where soap or other insecticide has been used, the plants should be washed with clear water after one or two hours.

Chinese Lily.

Chinese lily bulbs should be grown in water to have them at their best. The bulbs may be placed in water at any time and will bloom in from six to eight weeks from the time of starting. Select a shallow bowl, set the bulb in the center and build up around it with stones or other hard material. This is to keep the bulb in an upright position and brace it from leaning over when the flower stalks have grown. Fill the bowl to the rim with lukewarm water and set in a sunny window. Add water when needed to keep the bowl full. Any dish may be used that is deeper than one-half the depth of the bulb. If a deep receptacle is used, build up under the bulb so that one-third the bulb is out of the water at all times. A glass dish or jar is preferable as the root growth may be seen as the roots develop. The small bulbs should be allowed to remain attached to the large one. The bulb will not force again and should be thrown away after blooming.

Liquid Manure for Plants.

One may stimulate the growth of plants by using either nitrate of soda in solution or liquid manure. The latter is perhaps the better, being usually easy to obtain and safer to use. In using the former make frequent light applications rather than expect to stimulate an excessive growth by one application. A tabelspoonful of nitrate of soda dissolved in a pail of clear water, using a pint around each plant, is the amount recommended. If manure is used fill a barrel one half full of partially rotted manure (that from cattle or sheep being the best, and fill up the barrel with water. Stir the whole mass until the strength of the manure is in the water and dilute with clear water until the colour of dark coffee and use. Make several applications through the growing season and, good results will be obtained.

Growing Poppies.

Among the annuals there are no prettier or more showy flowers than poppies; yet many persons are deterred from growing them because of the popular notion that their beauty is so perishable. This is true of the single but not of the double varieties.

The red carnation poppy is well adapted to outline the walks in a vegetable garden. The colour scheme—vivid scarlet, against a background of green—is very effective.

The cultivation of the poppy is very simple. Open but rich soil is essential. Hoeing and thinning are advantageous, but the plants will not bear transplanting. Early sowing is favourable to the size of the plant and production of bloom. In sections where there is no danger of severe winter frosts, the seed may be sown to advantage in the autumn. When this cannot be done, tt should be sown very early in the spring, even scattering it on top of the snow if necessary.

Plants reserved for seed should have a position sheltered from the wind; otherwise the tiny seed will be scattered. It is an excellent idea, when the seed capsules are about one-fourth open, to tie them up in a small paper bag or thin cloth. Unless some such precaution is taken much of the seed will be lost.

Propagating Climbing Roses.

Root cuttings of climbing roses may be made in June or July from the green wood, taking the growth just below a forming bud, or one may increase his plants by layering; that is, bending a main branch over until it touches the ground. Cut a slit one-half through the cane where it touches the ground, pin the cane down so that it will remain touching the ground, and throw a shovel of soil over the slit. If the soil is kept moist, roots will start on the surface of the cut, and the branch may be detached from the main plant and set out by itself. Roses are heavy feeders, and require rich soil. A mixture of clay, sand and manure would give good results. If the soil is sandy, throw out enough to make room for one-third clay and manure. If clay soil, add the same amount of sand and manure. It is well to lay roses down late in the fall and cover with coarse litter, being sure to remove the covering quite early in the spring.

Geranium Cuttings.

By far the simplest, easiest and best method of propagating Geraniums is to insert the cuttings in the open ground, and there is no better time for this than the last half of August, as the cuttings form roots almost directly in the warm soil, and make sturdy plants by the autumn without becoming too forward, or "winter proud." Any bed of fairly light soil, in an open position, will answer the purpose, but it should be well dug over previously and if a moderate quantity of leaf-mould can be added, so much the better, especially if the soil is of a naturally heavy description. The bed being prepared, draw drills, or shallow drills, where the cuttings are to go—these should be about six inches apart—and then, with a blunt dibber, make holes about four inches apart, put a pinch of sand in each, and then insert the cuttings, making the soil quite firm about them. Give one good watering, and then let them go almost dry for a time, though in hot weather it is well to

give them a good sprinkling overhead daily. They will form root in a fortnight, and in a month will have become fine plants, full of vigour, which only need to be lifted, potted and wintered in a cool house to make grand plants the following season. The comparatively delicate tricolour varieties, both "gold" and "silver." are somewhat difficult to strike, as a rule, and under the pot system many losses are experienced, hut by adopting the method described above, something, likely ninety per cent., of the cuttings will strike, and make healthy, vigourous plants. Keep the bed free from weeds, and lift and pot the plants just before frost comes.

Soil for Pansies.

Pansies thrive in a comparatively heavy soil—one that will retain moisture, hut one that will also drain off surplus water. They also need soil rich in plant food. Black muck fresh from the swamps is not in condition to furnish plant food. This muck should be exposed to air and sun for some time before being used, and is all the better for having a little air-slaked lime to a waggon load of muck.

Keeping Cannas Over.

After a killing frost, the upper growth of cannas should be cut off to within six or eight inches of the ground, the roots carefully dug and allowed to dry, so that the dirt will crumhle away from the roots. They may then be stored in a cool dry cellar throngh the winter. But as the roots are easily injured by frost, care should be taken that the cellar is frost-proof. Any place where potatoes will keep will be snitable for canna roots. If it is found, however, that the cellar is too dry and the fleshy roots begin to shrivel up, they may be put in harrels, filling around them with dirt, as is done with garden beets and other vegetables.

POULTRY.

The Balanced Ration.

A balanced ration is one which contains as nearly as possible all the elements required by the fowls in the needed proportions. For instance, an egg is largely composed of albumen (nitrogenous matter), but the hen requires carbonaceous food to keep up her energy, fat, warmth, etc. She, therefore, requires food containing both of these compounds in properly balanced proportion in order that she may do her best. A balanced poultry ration should satisfy all the needs of the fowls, without loss due to an excess of either nitrogenous or carbonaceous matter.

Fattening Rations.

The old method of allowing fowls that are to be sold to prepare themselves for market while running at large on a daily feed of grain and what they can pick up in the fields is rapidly going out of favour and on many farms the birds that are to be marketed are housed and fattened in much the same manner as hogs and cattle. For either young or old birds the following are good fattening rations:

1. Two parts of finely ground oats and one part of finely ground barley, mixed with skim milk, and feed three times a day for three weeks.

2. Feed in the morning two-fifths ground corn, two-fifths wheat bran, one-fifth wheat middlings. Give this three mornings and the other mornings ground oil cake, mixed into a mash. Noon, boiled potatoes and stale bread. Afternoon, immediately after the noon ration is eaten, clean the troughs, fill with whole corn and wheat, and allow them to remain before the birds for the rest of the day.

A satisfactory fattening ration is one that is palatable and that will produce a white-coloured flesh. Ground oats, finely ground or with coarser hulls sifted out, should form the basis of all the grain mixtures. Ground corn fed in excess will result in a yellow-coloured flesh of inferior quality; ground peas impart a hardness to the flesh that is not desirable. Ground oats, ground buckwheat, ground barley, and low grade flour are the most suitable meals for fattening. Satisfactory meal mixtures are:

1. Ground oats (coarser hulls removed).

2. Siftings from rolled oats (no hulling dust should be included).

3. Two parts ground oats, two parts ground buckwheat, one part ground corn.

The ground meal should be mixed to a thin porridge with thick sour skim milk. On the average, ten pounds of meal require from fifteen to seventeen pounds of sour skim milk.

When sufficient skim milk cannot he obtained for mixing the masbes, a quantity of animal food and raw vegetable food abould be added to the fattening ration.

Feeding for Winter Eggs.

With a fairly comfortable house, bens of proper age and over their moult by the end of October, the following rations will he found effective in the production of eggs in winter :

In the morning eight pounds of wheat.

Noon, 5 pounds ground grain (measured dry), made into mash.

Afternoon, 8 pounds wheat or buckwheat.

Tbree times per week, 8 pounds of cut hone should be given in lieu of the mash. Mangels, pure water, grit and ground oyster shells should he in abundant supply. Sometimes steamed lawn clippings may take the place of the mangels. The ground grains for the mash may consist of 2 pounds of coarse ground oats, 2 pounds of cornmeal, 1 pound of shorts.

The reason for feeding tbe whole grain in the morning is that scattered in litter on the floors of tbe pens the hens start at once to search for it, and exercise is so induced. The whole grain in the afternoon is calculated to send the fowls to roost with their crops fairly well filled.

Poultry Lice.

Tbe fowl mite, or parasite, most commonly called roost louse, remains on the roosts and in crevices during the day. This louse tbrives and multiplies wherever unsanitary conditions exist. There are no known precautions that will entirely prevent infection. Tbe infection is easily introduced and the insect hard to get rid of. It is simply a case of roll up your sleeves and go at it determined to win. First of all, remove all fowls to other quarters and thoroughly dust them with any good louse killer to rid tbem of body lice. Then remove all straw and litter and either bury or burn it. Now remove roosts, nests and all other movable fixtures

and thoroughly wash them in a mixture of boiling water with soap suds and coal oil added. Now dig over the earth in the henhouse to a depth of six inches, and cover same with a few inches of fresh earth or sand. Next make the house as nearly air proof as possible and thoroughly fumigate by placing live coals in an iron kettle and burning sulphur thereon. Allow the house to remain tightly closed for 24 hours, and then wash the walls with hot suds and coal oil, using a brush, applying it well to all crevices. This treatment, if thoroughly administered, will usually give the desired result. If otherwise, repeat the treatment. If this treatment were adopted by all poultry keepers two or three times each year, poultry houses and runs would not be favourable breeding grounds for infections of different kinds.

Rearing Incubator Chickens.

Do not feed newly hatched chicks for 24 or 26 hours depending upon the vitality of the youngsters. Their first food should be stale bread crumbs mixed with a third of hard boiled eggs chopped fine and fed in small quantity from time to time. Vary this with stale bread soaked in sweet or skim milk and squeeze dry. After three days give granulated oatmeal. Feed a little at a time and avoid overfeeding. Give no water for three days and then very little. Overfeeding and too much water are apt to bring on dysentery. Continue this treatment for eight or ten days, when crushed corn in small quantities may be fed. Give whole wheat after twelve or fourteen days. After the chicks have got firmly on their legs, a cheap mash may be made of table or kitchen scraps, etc., and fed in a crumbly condition. All food should be fed in such quantity that it will be eaten up clean. Leave no food about, to turn sour. Milk, sweet or skimmed, is one of the best foods and is very much relished. At first feed a little and often to the young chicks. Afterwards feed once every four hours during the day until so old that they can run in the fields. But at all times feed regularly. Some persons have great success by feeding ground wheat from the first. A run from brooder or coop on the grass is very beneficial. When grain is fed give fine grit. Let the latter be before the chicks all the time.

Continue the crumbly mash, which after 15 or 20 days may contain finely cut pieces of liver. Or the latter may be fed alone, but judiciously. As the chicks grow older the house waste, barring salt and fat food, may be added to the mash. Hard grain may also be given. Crushed corn will be found to be much relished and of great benefit. The rations need not be expensive or composed of all the constituents named. With a grass run and such treatment the chicks will make famous development and ought to weigh six pounds per pair at the end of three months.

Trap Nests.

There are many forms of trap nests. The "Champion" trap nest is a favourite on some of the large United States poultry farms and it is easily made. Fig. 1 shows a general view of three nests, side by side, having a top, bottom and back common to all. Each

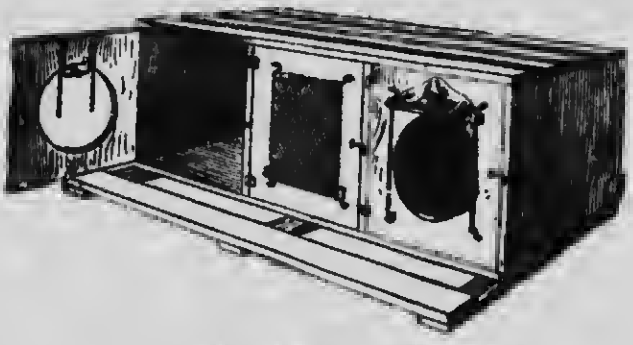


FIG. 1. THE CHAMPION TRAP NESTS.

nest is one foot square, although it may be made larger. The closed door at the right hand end of the box shows the nest set ready for the hen to enter. As she goes into the nest her body presses the suspended wires and the trigger inwards until the latter drops from its rest and releases the curtain, which then falls and covers the opening, as is shown at the centre nest in the illustration. The door of the left hand nest is shown open, revealing the arrangement of the wires. This is better shown in Fig 2. The curtain is composed of a piece of muslin eight inches square. To this is tacked a piece of lath nine inches long, which leaves one-half inch extending on each end past the curtain. The curtain is tacked at the top just above the opening.

FIG. 2.

To set the nest raise the curtain above the opening, slip the trigger through the staple and let the curtain rest on it until a hen enters, when down it will come, leaving her a prisoner until released, and no other hen can possibly get in with her, nor can she get out until her attendant opens the door or lifts the curtain.

Preservation of Eggs.

When preserved on a large scale, eggs are usually stored in cement tanks in the basement of a stone or brick building. When done in a small way for family use, a half barrel or large crock is usually used as a receptacle. The method of preparing the lime-water is simply to slake about one pound of lime with water and and then stir the milk of lime so formed into five gallons of water.

After the mixture has been kept well stirred for a few hours it is allowed to settle. The supernatant liquid, which is now "saturated" lime-water. is drawn or poured off to cover the eggs, previously placed in the tank, crock or barrel.

As exposure to the air tends to precipitate the lime, and thus weaken the solution, the vessel containing the eggs should be kept covered. The air may be excluded by a covering of sweet oil or with sacking upon which a paste of lime is spread. If, after a time, there is any noticeable precipitation of lime, the lime-water may be drawn or siphoned off and replaced with a further quantity of newly prepared.

The following points should receive attention;

1. That perfectly fresh eggs only be used. Put them from day to day, as collected, into the lime-water.

2. That the eggs, throughout the whole period of preservation, should be completely immersed.

3. That a low temperature is desirable towards arresting or checking that "stale" flavour so characteristic of packed eggs. A cellar with a temperature of 40 deg. F. to 45 deg. F., has been found satisfactory.

The eggs are much improved in appearance if dipped into a solution of muriatic acid as they are removed from the lime-water. The exact strength of the muriatic acid solution is not a matter of any great moment, but, of course, the stronger the solution the less time must the eggs be allowed to remain in the acid. Solutions of 2 per cent. and 5 per cent. have both been found satisfactory.

An egg preserving material which has come into very general favour for small quantities of eggs, is a solution of water glass or silicate of sodium which is for sale at any drug store, in a semi-fluid condition. This is mixed with twenty parts water, and poured over the eggs until the top layer is covered. The eggs are left in this solution until they are required for use.

Whitewashing a Poultry House.

Whitewash needs to be well made to do its work effectually; too often it comes off in flakes, once the house is dry, if the woodwork is touched. Finely slaked lime should be dissolved in hot water, making the lime as thick as possible; add a little soft soap and some paraffin, and we get a whitewash that will kill the lice and stick to the woodwork. It should be applied hot, the walls of the poultry house being first swept down to clean them of cobwebs and dirt, and the perches and nest boxes removed. Dabbing the walls with a thin mixture of lime and water does little or no good. The perches and nest boxes should also be treated to a coat of whitewash; the work should be done in the morning, so that by nightfall the house and perches and nest boxes are dry again.

To Hasten Moulting.

When it is desired to bring the fowls into a moulting condition during the summer cut down the ration to one-half its original proportions or what is called a semi-starvation ration. This is done in order to stop all egg production, which will usually cease entirely in about two weeks. When the birds have stopped laying they can be given the full ration again, including some ground meat and linseed. Instead of starting them to lay again as might be expected, the result will be the shedding of the old feathers and the coming in of the new ones.

Killing and Shipping Poultry.

All poultry before being killed should be fasted for at least 24 hours. They should be killed by bleeding in the neck. Plucking should be quickly done while the body is warm, leaving on the head and feet, as well as the feathers on wings and tail. Do not draw the entrails or scald the birds. The last process is readily detected by buyers, who will not pay, within one or two cents per pound of the price they will give for dry picked birds.

Let them cool off, then draw the feet up under the breast and put the head under one of the wings, tie them up plump to keep them in good shape. Before packing, poultry should be thoroughly dry and cold; if packed with the animal heat in, it will be almost sure to spoil.

Sort your poultry carefully, and have the No. 1 stock of uniform quality. Pack the No. 2 stock in separate packages. Pack neatly in nice clean cases holding from 100 to 200 pounds each. Line the cases with clean paper, but never use straw in packing, and never wrap the birds in paper; pack as closely as possible, and fill the packages full, to prevent shifting about while in transit.

Avoid putting more than one kind in a package, as mixtures of geese and ducks, or chickens and turkeys, are more difficult to sell

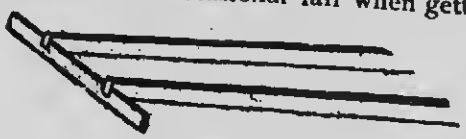
Mark each case with correct weights, gross, tare and nett, also the number of birds contained, so that proper delivery may be cared for.

Eggs without Shells.

The production of eggs without shells may be due either to lack of shell forming material or to inflamation of the shell forming chamber of the oviduct. which no longer secretes calcareous matter. The fowls should be given plenty of such materials as wheat, bran, crushed egg shells, cut green bone, broken mortar, crushed oyster shells; and if they are not allowed to run at liberty in a grass plot they should be given sods and green food daily.

Roosts.

There are several potent objections to roosts which rise one above the other in slanting order, not only so far as the discomfort of the fowls is concerned, but because they are unsightly, unhandy, and filthy. They also take up unnecessary space, and compel the heavy birds to jump higher at the risk of knocking over the small ones, and an occasional fall when getting off is the result. Not ouly are the feet often injured by jumping such a distance, but hruises and jars to the body also result.

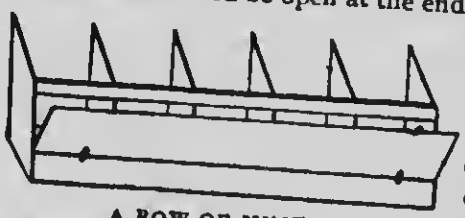


ROOSTS.

The perches should all be on a level with each other, abont eighteen inches above the floor, and should be made so that they can he easily removed. By making the roosts low and level, the fowls will not crowd each other, no injury will occur from getting on and off, and no conflict for preference of position will take place, to say nothing of superior ventilation, etc.

Nests.

In constructing nest boxes, two points should be kept constantly in mind. (1) The box should be of such a nature that it can be readily cleaned and thoroughly disinfected; if it is removahle so that it can be taken out of doors, so much the better. (2) The nests should be open at the ends, so as to compel the hens to walk in rather than fly upon the nests from the top.



A ROW OF NESTS.

The nests should frequently be taken outside of the huilding, and lightly brushed with kerosene, and a lighted match applied. The fire will run over the surface destroying vermin and contagion without doing any harm.

Hens Eating Eggs.

Egg eating is a vice that is not easily cured. Various plans of curing this vice have been tried with more or less success. It is claimed to be a good plan to place artificisl eggs in the nest and about the house so that the liens msy pick at them and get the idea that they are no longer ahle to break egg shells. It is well when doing this to pare off the points of the fowls' beaks until they are quite tender so that to peck an egg would cause pain. It is also recommended to hlow out the contents of a few eggs through a small hole in the shell and fill the space with a paste consisting of mustard, capsicum, aloes or other disagreeable compounds and

leave these where the hens will find them. Another plan is to use darkened nests so arranged that the hens will have to walk along a passage against the wall and back along another passage before they can enter a nest. Perhaps the only safe and sure remedy, apart from doing away with the birds that have contracted the habit of egg-eating, is to use a nest so arranged with a hole in the bottom that when an egg is laid it will roll into a safe receptacle. A handy man may be able to devise such a nest or one of the patented nests that are on the market may be secured.

Feather Eating.

Various causes have been assigned for the habit of feather eating, the most probable being improper rations, insufficient exercise and idleness. As a preventive measure the birds should be given a free run or they should at least be made to scratch for a large part of their food. In some cases the habit is due to insufficient animal matter in their food, and to correct this, meat, bones, vegetables and skim-milk should be added to their ration. The birds should be given their liberty, as the habit is generally contracted while the fowls are in captivity. It has been recommended to pare off the point of the upper beak, so that the feathers cannot be grasped and pulled out.

Scaly Legs.

Scaly legs in poultry is caused by the presence of mites that multiply and work beneath the scales on the feet and legs. A whitish crust or powdery substance forms beneath the scales and raises them up. The disease is strictly contagious and if not checked extends up the leg and also along the toes involving the joints and causing exhaustion of the bird. Treatment for the disease consists in isolating the affected birds in clean qnarters where they must be treated. The house which they have occupied should be thoroughly cleaned. The roosts and all wood work should be scalded with boiling water and sprayed with hot lime wash. The treatment of the affected birds is to soak the feet and legs in warm soapy water until the loose scales may be removed without causing bleeding. The legs should then be treated daily with coal oil mixed with an equal bulk of linseed oil or vaseline; or a mixture of one part carbolic acid and 10 parts of oil or vaseline.

Liver Complaint in Poultry.

The principal cause which gives rise to liver complaint is wrong feeding or over-feeding, which amounts to the same thing. It begins in poultry, as in human beings, with indigestion. The food is either in excess of what the bird can digest, or else it is of the wrong quality, and in either case the liver is not able to discharge

its functions. The blood becomes loaded with impurities, and sooner or later the bird will become a hopeless wreck and die. By unsuitable food, reference is made particularly to food of a starchy nature, such as corn, meal and rice. If poultry keepers would use oats, barley and wheat, more particularly oats, and give up altogether the use of corn and rice, there would be far fewer cases than there are of liver complaint.

Now as to the symptoms of liver disease. These are, first of all, a darkening of the comb; in some parts of the country liver complaint is known as black comb from the purple appearance, turning almost to black, which birds present as the disease progresses. General debility, moping, setting up of the back and drooping of the tail, are other symptoms; so, too, is diarrhoea, the appearance of which indicates the presence of undigested food in in the intestines, which sets up irritation, and so causes this additional trouble. Whenever a fowl is seen to be dark in the comb and to have diarrhoea, it is perfectly certain that death is not far off unless prompt measures be taken.

The thing to do is to put the bird on starvation diet for a few days to enable the system to rest and recoup itself, and also to give time for the fatty degeneration of the tissues to be remedied. Most birds which suffer from liver complaint are more or less fatty in their internals, and a few days' fast will tend towards the absorption of this, because the system, not having ordinary food. will have to live on its own tissues. By way of medicine, give some liver powder or Epsom salts or some other simple remedy in a little barley meal, specially mixed up into a paste, which they will take usually when they are hungry; give also some iron tonic in the drinking water.

Roup in Fowls.

Roup in fowls is a very common and troublesome complaint. Roup attacks the head and throat, and is generally the result of draughty roosts, dirty quarters, tainted water for drinking, and sour, badly-kept food. If you find a fowl with a wheeze in the throat and sneezing, then you should start in with a cure, for a cold is the forerunner of roup. Five drops of tincture of aconite to a quart of drinking water for a few days will generally cure cold if the cause is removed. If not, it turns to roup, when the face and head swells, and there is a discharge from the nostrils and round the eyes. The disease is very contagious, and if you don't take away a bird affected you will soon have them all "smitten." If the bird attacked is valuable you can try to cure it. but if it is not worth a good deal of expense and trouble, wring its neck and burn the carcase. Some people who know their business will never breed from a fowl which has had roup.

Leg Weakness In Chickens.

Leg weakness in chickens is usually due to over-feeding of fat producing foods, or the giving of too little bone making foods. The treatment is to give rest, nourishment and tonics. For food give bran, wheat and oatmeal; instead of water give skim milk to drink. Cook the oatmeal and when cool add 20 drops of diluted phosphoric acid for each bird affected, and give twice daily. Continue the green food and meat but feed all food rather sparingly. As a medicine give a pill three times a day made as follows: Phosphate of lime, 5 grains; strychnine, one-sixth of a grain; sulphate of quinine, one-half grain. This dose is for a half-grown fowl; younger chickens should receive correspondingly less.

A Good Poultry Tonic.

The poultry tonic generally recommended by expert poultry keepers is known as "Douglass Mixture," and is prepared as follows:

To make one gallon of Donglass Mixture use one quarter of a pound of iron, dissolved in one-half gallon of water; to another one-half gallon of water add one-half ounce of sulphuric acid, mix well together to make one gallon of the mixture, the same to be kept in glass or earthen jars tightly corked. To each gallon of drinking water add a tablespoonful of the mixture or enough to give it a brackish taste. It will not do to use a galvanized iron fountain or iron trough, for this mixture will rust either one so that it will be impossible to ever get it off, and besides the water will become so dirty in a short time that the birds cannot drink it, so that an earthen dish should be used.

Rheumatism In Turkeys.

Rheumatism is an ailment to which all species of fowl are subject. The trouble begins with spasmodic jerking of the legs followed by lameness. The feet and joints become swollen, soft and painful at first but gradually becoming harder until the swellings feel like enlargements of the bone. The disease is chronic in its development and affected birds may live a long time. Treatment of affected turkeys is as follows:

As the rheumatism is usually caused by exposure to cold and dampness, the development of the disease in one or more fowls of a flock should be a warning to improve the ventilation and drainage of the houses. The buildings where the fowls live and roost should be thoroughly dry, free from draughts, yet well ventilated, and not too cold. With proper attention to these sanitary arrangements the disease should be prevented. Affected birds should have frequent change of ration with plenty of green feed. Begin treatment with a dose of Epsom salts 20 to 30 grains. The following

day add 30 to 40 grains of bicarbonate of soda (baking soda) to the quart of drinking water, and give 2 or 3 grains of salicylic acid twice a day. Apply camphorated or carbolic ointment to the affected joints. The birds which are seriously affected would be better killed than treated, and the main reliance must be under any circumstances in prevention by securing proper sanitary conditions.

Bumble Foot.

Bumblefoot is caused usually by jumping down from high roosts on to a hard floor. The affected feet should be soaked in warm water for a half hour twice a day and poulticed until the inflammation is reduced. A black spot will be noticed near the centre of the swelling in the sole of the foot, and this should be raised with the point of a knife and removed. Boric acid ointment should be applied to the sores and the feet should be protected with cotton wrapping.

Lameness in Geese.

Lameness in geese is caused by too close confinement, unwholesome food, too warm housing, and close quarters in the fall. Geese housed out under a shed with some litter, even in cold winter weather will be more vigorous than those closely housed. To treat lameness proceed as follows: Place affected birds in dry quarters and give light food, such as stale bread and water. If signs of diarrhœa appear, give to each bird a tablespoonful of castor oil, by holding the beak open and working the oil down the throat.

Black Head in Turkeys.

While Black Head usually attacks turkeys in warm weather, it occasionally shows itself in winter. It is caused by a parasite taken into the digestive organs with food or drink. Treatment must principally consist in hygienic and preventive measures. Where the disease has existed the roosting places, runs and feeding grounds will have become infected. This being the case, adequate measures must be adopted to free the premises from the parasite by thorough

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cleaning and disinfection before healthy stock can be raised. Medicinal treatment for affected birds is not considered of much value. An authority recommends the following relief: Sulphur, 5 to 10 grains; sulphate of iron, one grain, and sulphate of quinine. one grain. This dose should be given two or three times daily for a considerable time to obtain result. Badly affected cases are not likely to recover and should be killed and burned.

Diet for Fertile Eggs.

The surest way to have eggs strong in fertility is by allowing the hens a free run—or as free run as possible—as soon as the snow is off the ground. There is really no best dish to produce strong germs in eggs laid by hens, which have been artificially fed and treated during winter, and perhaps gently stimulated to lay eggs, during that period. Try the following: For morning ration give wheat, thrown in litter on the floors of house and hens so induced to exercise in searching for it. At noon give a light feed of oats, which should give place three times per week to a ration of cut green bone in proportion of one pound to every fifteen hens. In the afternoon give a mash, in quantity of two ozs. to each fowl and composed of two parts shorts, one part ground oats, one part corn-meal, or, ground buckwheat. Or, the mash may be made of such ground grains as are conveniently to be had mixed with boiled turnips, or, other roots. Keep the fowls busy searching for their grain. Have grit, oyster shells, pure water and roots before the fowls all the time. The germs of eggs from hens which have been confined to winter qnarters and laid well are usually weak until the hens have had a run ont.

Cramming Poultry.

After birds have been feeding in crates for abont four weeks their appetites sometimes fail them and if they are then fed on the crammer for a week or ten days, they attain an extra finish that commands a little higher price on some markets. The cramming machine is simply a pail standing on three legs abont four feet from the floor. At the bottom of the pail or hopper is a valve through which the feed is forced into a rubber tube by means of a lever worked by the foot. The tube, which is about five-eighths of an inch in diameter and a foot long, is pnt down the chicken's throat until it enters the crop, then with one hand on the crop to tell when it is full, press the foot on the lever. Take the foot off the lever before withdrawing the rubber tube. This operation is repeated twice a day. If you are catering to a very particular market, it may pay to use the crammer but the average market feeders do not consider it pays to use the machine.

VETERINARY.

COMMON DISEASES OF HORSES.

Chronic Indigestion.

Chronic indigestion is caused by improper food, ravenous or irregular feeding, the presence of other diseases, or by bad water. It may arise from imperfect mastication due to irregularity of the teeth or it may be a constitutional debility of the stomach due to weakness or inactivity of the glands.

Symptoms:—There is loss of appetite or depravity and capriciousness of it, manifested by the animal eating at irregular intervals, or having a desire to eat filth. There is also sourness of the mouth and usually increased thirst. The patient soon becomes hide bound, the hair is dry and erect, and the skin dry and scurfy. Irregularity of the bowels usually shows itself, a semi-diarrhoea and semi-constipation being present alternately; and there is frequently an escape of flatus from the anus. If caused by imperfectly masticated food, evidence will be noticed in the faeces. Colicky pains are frequently indicated particularly an hour or two after eating. There is usually irregularity of the pulse, while in some cases fits of giddiness and even paralysis are noticed.

Treatment.—If possible ascertain the cause and remove it. If due to the process of dentition, non-shedding of the molar crowns, as is often the case in horses under 5 years old, the temporary teeth causing the trouble must be removed. If due to the irregularity of permanent molars, which causes irritation to the tongue and cheeks (as it is in many more cases than suspected), the teeth must be dressed by a veterinarian. If such causes do not seem to be in operation, a change should be made in the diet. If the patient be not too weak it is good practice to give him a moderate purgative, as six drachms Barbadoes aloes and two drachms ginger, either shaken up with a pint of cold water and given as a drench, or mixed with sufficient treacle to make it plastic and given as a ball. It must be understood that in all cases where a horse is to be purged, it is good practice to prepare him for it by feeding bran only for ten or twelve hours before administration, and after dosing bran only should be fed and water with the chill removed given in small quantities and often until the purgative commences to act. This should be followed by tonics, as three ounces each bicarbonate of soda, nux vomica and gentian mixed and made into twelve powders, and one given night and morning

mixed in damp fodder, or mixed in a pint of cold water and given as a drench. The patient should be fed small quantities of grain at first, and the quantity gradually increased as his digestion improves.

Spasmodic Colic.

One of the most frequent and most alarming, though seldom fatal diseases to which horses are subject, is "Spasmodic Colic." It is a form of indigestion and consists in a spasmodic contraction of the muscular coat of a portion or portions of the small intestines. In some cases the large intestines and also the neck of the bladder are involved. It is caused by change in food or water, watering when the animal is overheated, or violent exercise too soon after feeding. Some horses are particularly predisposed.

Symptoms.—The symptoms appear suddenly and are very alarming. The horse drops down suddenly, kicks and rolls violently. jumps up, paws, looks around to his side, throws himself violently down again, etc. If the neck of the bladder is contracted he will probably make vain attempts to urinate, leading the non-initiated to think he is suffering from urinary trouble. The pulse becomes full and frequent during the paroxysms, but is normal during the periods of ease. The pain suddenly ceases. and the animal becomes apparently all right for a variable length of time, commences to eat perhaps, and is again suddenly attacked as at first. The frequency and duration of the attacks vary greatly in different cases, but there are always periods of ease alternated by painful symptoms. In many cases the disease become spontaneously cured, but as there is always a doubt of complications, it is well to treat promptly.

Treatment.—Give an anti-spasmodic drench. For an ordinary sized horse, say of 1200 lbs., the following drench acts well. One and a half ounces each of landanum and sweet spirits of nitre, and half an ounce of finid extract of belladonna in a pint of cold water. Half an ounce of chloral hydrate dissolved in a pint of warm water, also makes a good drench. Repeat the dose in one and a half hours if necessary. It is good practice to follow up with a purgative.

Acute Indigestion.

Acute indigestion which is always serious and often fatal, may arise from repletion of the stomach with solid food, or from the evolution of gases arising from solids or liquids within it undergoing the process of fermentation. The usual causes are ingestion of food in too great quantity greedily swallowed or imperfectly masticated. Sudden changes of food or extra quantities of grain given in order to fortify a horse for some unusual exertion is frequently a cause as well as severe exercise and pro-

longed fasting. Considerable quantities of a food that ferments easily, as fresh clover, turnip tops, grass, etc.. especially if frosted.

Symptoms.—The animal is uneasy, pawing with the front feet, lying down, rolling, regaining the feet, etc. A fullness or bloating is soon noted, especially marked on the right side, and in some cases eructations of gas and attempts at vomition are noticed. This is always a serious symptom, especially if even small quantities of ingesta be vomited, and usually indicates rupture of the stomach, which terminates fatally. The breathing is oppressed. The pulse at first frequent and full, becomes more frequent and weaker as the disease advances, and frequently (in cases that are to terminate fatally), becomes imperceptible at the jaw. Dulness and stupor follow and sweats bedew the body. The symptons of rupture of the stomach are vomition or attempts at vomition, great prostration, tremors of the muscles, heavy breathing, staggering, imperceptible pulse, and haggard and dejected countenances. The pain in all cases is constant, but of varying intensity.

Treatment.—Administer two to four ounces oil of turpentine, in a pint of raw linseed oil, or an ounce of hyposulpate of soda in a pint of water. Repeat the dose every one and a half hours if necessary. Place in a comfortable well-bedded box stall. Foment the abdomen with warm water and give injections of warm water with a little soap per rectum. If pain be excessive, give one and a half ounces of chloral hydrate in a pint of warm water as a drench every two hours. If bloating be excessive, it is well to puncture on the right side, but it is unsafe for any person but a veterinarian to operate. When the symptoms are not relieved within three hours, professional attendance should be secured.

Flatulent Colic.

Flatulent colic is a much more serious disease than spasmodic colic. In this we observe a distention of the intestines with gas. The causes. as in other acute digestive troubles, are changes in food or water, giving food of an inferior quality, and more especially if of a nature that easily ferments. This disease, as well as nearly all other intestinal diseases, frequently appears without any recognizable cause, due, no donbt, to a non-active condition of the digestive glands.

Symptoms.—Pain and distress is usually gradually developed. The horse becomes uneasy, paws, strikes at his belly with his hind feet. The abdomen becomes more or less distended, especially on the right side. The pulse, at first full and strong, becomes frequent and feeble, the breathing difficult, extremities cold, and there is usually twitching of the muscles. The animal usually lies down more carefully than in spasmodic colic, and generally does not act as violently. If relief is not provided (in some cases it

occurs spontaneously) death soon results from rupture of the intestine, suffocation, or blood poisoning from absorption of gases. It sometimes occurs during the progress of other diseases, when it indicates a very grave condition.

Treatment.—Give two to four ounces of turpentine in a pint of raw linseed oil; repeat in an hour, and again, if necessary. Give one and a half ounces chloral hydrate. or two drachms solid extract of belladonna, or two ounces tincture of belladonna in a pint of water as a drench every two hours to relieve the pain. Keep as comfortable as possible in a good box stall. If the bloating be excessive, puncturing may be necessary but this can be safely done only by a veterinarian. As in other acute diseases, when relief is not given in two or three hours, no time should be lost in securing the services of a professional man.

Enteritis.

Enteritis, or inflamation of the bowels, is one of the most painful and fatal diseases to which horses are subject. The mucous or lining membrane of the intestines is first involved, but the inflamation extends and involves all the coats. Its duration is variable. It may terminate favorably or fatally in three or four hours, or it may continue to forty-eight hours, or even longer. The causes are somewhat the same as those of other acute intestinal diseases, especially if the conditions are aggravated by exposure to cold or draughts.

Symptoms.–There is usually general depression, rigors, an anxious expression, quickened breathing and rapid evacuation of small quantities of faeces (often semi-fluid) before abdominal pain is shown. The mucous membranes are injected, the mouth dry and hot, appetite gone, pulse hard, frequent and wiry, the belly tender upon pressure. The animal stamps, strikes at the belly with the feet, lies down carefully (usually making frequent attempts to lie down before he succeeds), looks towards his flanks, pants, blows, and sweats from pain. The pain is constant, distressing and agonizing. The animal sometimes stands and paws for hours, or roams aimlessly around the stall apparently blind, striking his head against the walls. The pulse becomes thready or imperceptible. Sweat runs off the body, the damp coat being sometimes hot and sometimes cold. The pupils become dilated and expressive of delirium. He may throw himself around in a dangerous manner, or wander around the stall or stand and balance himself for a greater or less time, then stagger, fall and expire. When gangrene sets in (as it will when he does not die from exhaustion), the pain will cease, he will stand quiet, and even drink a little water, but the haggard expression remains, the pulse is imperceptible, cold sweats bedew

the body, the abdomen swells, legs and ears are cold, breath cold, and sometimes foetid, and he soon falls and expires.

Treatment.—Make as comfortable as possible, and give large doses of opium, as two to four drachms pulverized gum opium in half a pint of cold water every two hours as long as necessary. Hot applications, as blankets wrung out of hot water, and applied to the abdomen, are serviceable.

Constipation.

The bowels of the horse are naturally somewhat torpid. Constipation of the bowels may be looked upon more as a symptom than as a disease in itself. There will be an absence of the passage of the usual quantity of faeces, and those that are voided are drier and usually darker than normal. There will also be an absence of the normal intestinal murmur, which, in the healthy horse, can be detected when the ear is placed against the abdomen; and in some cases a non-contractile condition of the rectum. The appetite is impaired and the animal dull, but in the early stages no severe or painful symptoms are shown. The non-active condition of the bowels is due to a partial or complete paralysis of their coats.

Treatment.—The first point to be gained is to overcome the paralysis of the muscular coats of the intestines as until this is done, purgatives cannot act, hence the administration of full doses of purgative medicines must be avoided. Give two-drachm doses of nux vomica three times daily and administer an oleaginous purgative of say one pint of raw linseed oil; give injections of warm water with a little soap per rectum, and give easily digested and laxative food in small quantities. If weakness be well marked, give stimulants, as four to six ounces of whiskey in half a pint of cold water every three or four hours, and, if painful symptoms are shown, give an anodyne, as two drachms of solid extract of belladonna or one and a half ounces of chloral hydrate.

Diarrhoea.

Diarrhoea is a term applied to the frequent passage of liquid faeces without co-existent inflammation. It may be a spontaneous effort to discharge from the intestines something that is obnoxious to them or to the system generally. It is induced by a variety of causes, such as indigestible food, sudden changes of diet, particularly from a dry to a moist one. It may also be due to medicinal substances, parasites, derangement of the liver, impure water, copious draughts of cold water when the animal is heated, or foreign matter in the intestines. Some animals are very prone to diarrhoea from trivial causes. Flat sided, short ribbed, narrow loined horses purge on going a journey, and are hard to keep in condition. Horses of this kind are said to be "washy."

Symptoms.—The symptoms are obvious. There is a frequent and copious passage of more or less frequent faeces, loss of appetite with intense thirst. The animal soon becomes weak and drawn up in the flanks, and if the disease is not checked it soon proves fatal through exhaustion.

If possible, ascertain the cause and remove it. If the cause be suspected to be a foreign body in the intestines, give a laxative of a pint of raw linseed oil to hasten its removal; but if the patient shows well-marked signs of weakness and depletion, laxatives should not be given. If the bowels do not regain their normal condition soon after the operation of the laxative or if it is not considered safe to give one on account of weekness, an effort must be made to check the diarrhoea. For this purpose, 1½ ounces tincture of opium and four drachms each of powdered catechu and prepared chalk should be given in a pint of cold water as a drench every four hours until the diarrhoea ceases. Cold water with one quarter its bulk of lime-water should be given in small quantities, say, a gallon at a time, and often. The food given should be dry hay and oats. If the animal is very weak and will not eat, give four to eight ounces of whisky with raw eggs mixed with the water, or drench him with it if necessary, but he is usually so thirsty he will drink it.

Pneumonia.

Pneumonia or inflammation of the lungs consists in an effusion from the vessels and a general alteration of the lung tissue. It is caused by exposure, sudden changes of temperature, chills or over-exertion when not in a fit condition.

Symptoms.—It is usually ushered in by a shivering fit, which is followed by an increase of temperature, and the pulse becomes frequent, full and bounding. Usually a dry cough and coldness of the extremities is present. The patient usually stands, but in rare cases. wanders aimlessly about at first; the appetite is impaired and the mucous membranes injected. The respirations are more frequent than normal and if the ear be placed against the patient's chest, abnormal sounds will be heard. At first the sounds are dry and grating but after a day or two there is almost an absence of sound, and later a reappearance of the sound of a moister character. During all these changes the animal usually stands with legs outstretched and nose protruded. The disease is usually confined to one lung, and that the right but in some cases both are involved, when it is called "double pneumonia." After the first stage the cough becomes moist, and in cases that are about to prove fatal the breath becomes foetid after a few days.

Treatment.—Make comfortable in well-ventillated box stall, exclude draughts and blanket well. In the first stages, when the

pulse is full and strong, give 10 to 15 drops of Fleming's tincture of aconite in half a pint of cold water every two hours until the strength of the pulse becomes reduced. Allow liberal quantities of cold water with two or three drachms of saltpetre in it as often as he will drink. Apply blankets wrung out of hot water to the sides, or rub the sides and above the breast well with mustard mixed with oil of turpentine and water. Blanket heavily, and give two ounces of liquor ammonia acetatis in a little cold water as a drench every two hours until he perspires freely. Hand-rub and bandage the legs. Remove the mustard in five or six hours, and repeat its application if necessary. Give one drachm doses of sulphate of quinine every four or five hours. Feed on soft laxative food. If the pulse becomes very weak, give six or eight ounces of whiskey every seven or eight hours. If he will not eat, give milk and eggs to drink. When convalescent, give drachm doses of sulphate of iron and gentian, three times daily, and good food and care. Care must be taken not to put him to work for at least two weeks after an apparent recovery has taken place, else he is very liable to a relapse, which will probably prove fatal.

Acute Laryngitis.

This is inflammation of the mucous membrane of the larynx (the cartilagenous box at the commencement of the wind-pipe). There is a great tendency to submucous effusion, and this, with the formation of mucous on the free surface, is apt to close the opening and cause death by suffocation.

Symptoms.—At first there is a dry cough, difficulty in swallowing, the water, or part of it, returning through the nostrils. The discharge from the nostrils, at first watery, soon becoming thick and purulent. The nose is generally protruded, and there is difficulty in breathing, sometimes slight and sometimes very well marked. The glands of the throat are more or less swollen, and the throat is tender to pressure, which causes coughing; the eyes become prominent, and there is an increase of temperature, and the appetite impaired. The mucous membranes are injected, and often tears flow from the eyes. In many cases there is a coldness and swelling of the legs and an apparent soreness of the joints. The cough become moist and in severe cases painful and distressing. The patient usually stands, and if possible holds his nostrils where fresh air is plentiful. In most respiratory diseases the patient stands the greater part of the time.

Treatment.—In mild cases good care will generally suffice, as mostly all fevers must run their course and one endeavors to assist nature. Make comfortable in a well ventilated, roomy box stall and exclude from draughts. Apply a liniment composed of equal

parts spirits of ammonia, oil of turpentine and raw linseed oil to the throat twice daily for two or three days. Fasten a woollen cloth around the throat to keep it warm. Give two drachm doses of chlorate of potash three times daily by placing it well back on the tongue with a spoon. Do not drench, as the throat is so sore he cannot swallow well and the fluid will pass down the wind-pipe and produce complications. Steam the nostrils. Give soft food. If he will not eat, give milk, eggs and a little whisky. Hold the pail high for him to drink, and feed out of a high manger. If the breathing becomes distressing and there is danger of suffocation, send for a veterinarian at once, as an operation only will save life.

Catarrh or Common Cold.

Ordinary catarrh or common cold in horses is caused by exposure, ill-ventilation and sudden changes of temperature. Animals are very liable during the time of shedding their coats, and young horses when first brought into the the stable in the fall often suffer from it. It is sometimes complicated with laryngitis, and if neglected, is liable to extend and involve the whole respiratory tract.

Symptoms.—The symptoms are sneezing, discharge of watery matter from the nostrils, redness and dryness of the mucous membrane of the nose. The discharge becomes thick, whitish and profuse, there is dulness and debility, impaired appetite, and a slight rise in temperature.

Treatment.—Placed in a comfortable well-bedded and well-ventilated box stall, allow plenty of fresh air. but exclude draughts; clothe according to the weather. Steam the nostrils by holding the head over a pail of hot water, which is being stirred with a wisp of straw. Feed on laxative food, as good clover hay, bran and carrots. Give two or three drachm doses of saltpetre, three times daily in cold water to drink. Do not drench, as there may be soreness of the throat and difficulty in swallowing. Do not purge. If the bowls are costive, give injections of soap and warm water per rectum.

Roaring.

Roaring occurs as a sequel to acute laryngitis. It is usually due either to a chronic thickening of the mucous membrane of the larynx or to a wasting away of the muscles which attach the cartilages of the larynx together, Either of these conditions lessens the calibre of the organ, hence the air forcing its way through this comparatively small opening produces the sound.

Symptoms.—Roaring consists in a wheezing, whistling or coarse sound in the larynx during the inspiration. It is usually dne to the above causes, but anything that obstructs the large air tubes, as a polypus, false membrane, or growth of any kind, mal-

formation, fractures, etc., may cause it, in which case the noise is usually heard both during inspiration and expiration. A roarer seldom makes any abnormal sound when at ease. It usually requires more or less severe exercise to produce the sounds, and of course the nature and volume of the sounds, as well as the extent to which the animal's usefulness is impaired, will depend upon the extent to which the calibre of the tube is reduced.

Treatment.—If due to any obstruction of course it should be removed, but if due to atrophy (decay) of the laryngeal muscles (as is usually the case), practically nothing can be done. In the early stages benefit may be derived from blistering the throat. The sounds may be modified by arranging pads to press upon the nostrils to prevent too great a volume of air entering. In cases where an otherwise valuable horse is practically useless, a tube may be inserted in the wind-pipe. This operation is sometimes performed on race horses.

Pleurisy.

Pleurisy is partial or general inflammation of the pleura (the lining of the chest and covering of the lungs). It may be either double or single and when single it is usually the right side that is affected. The causes are the same as of other chest affections.

Symptoms.—It usually commences with a chill, a staring coat, and coldness of surface of the body and extremities, succeeded by signs of pain often mistaken for those of colic, during which the patient paws, lies down or rolls. This stage soon passes off, and he becomes stiff and soon stands immovable with outstretched legs. If made to move, or if pressed between ribs on affected side, he groans from pain. The respirations are frequent, rapid and incomplete, the ribs are fixed, and respirations mostly abdominal. There is a short, dry, painful cough, and the pulse is hard and frequent. If the progress of the disease is not checked, hydrothorax (water in the chest) is soon present. The pulse becomes small and soft. There is an absence of any sound in the lower part of the chest, or a sound like dropping water. There is an improvement in the symptoms at first, but if the outpouring of serum continues, the difficulty in breathing besomes much increased. Swellings sometimes appear along the abdomen and in the legs.

Treatment—If there is much pain at first give one and a half ounces chloral hydrate in a pint of cold water as a drench. If necessary, repeat the dose in an hour. After pain ceases, if the pulse remains full and strong, give ten to fifteen drops Fleming's tincture of aconite in a little water every two hours until the strength of the pulse is reduced. Apply mustard mixed with turpentine and water to the sides. Clothe warmly. Repeat the mustard application in ten or twelve hours if necessary. Give iodide

of potash in drachm doses four times daily. If the pulse becomes weak, give six to eight ounces of whiskey in a little water every four or five hours. Give good, easily-digested food. If much effusion takes place in the chest, a veterinarian should be sent for at once, as an operation is necessary. When convalescence commences give good food and tonics, as drachm doses of sulphate of iron and gentian three times daily.

Strangles or Distemper.

Strangles or distemper is an eruptive fever peculiar to the horse. It occurs in a regular form called "regular strangles," and an irregular form called "irregular strangles." It usually attacks young horses, but those of any age may be attacked, and while one attack usually renders the horse immune, it is not always so. It is due to a specific virus, hence is contagious.

Symptoms.—Unthriftiness, cough, fever, more or less inability to swallow and soreness of the throat, increased temperature, discharge from the nostrils, at first watery, but soon becoming purulent are indicative of this disease. Swellings or tumors in the region of the throat or between the jaws, which grow quickly, form pus, and usually break in a few days. The irregular strangles may appear as a sequel to the regular, or may appear independently, there being the same systemic symptoms, but the abscesses may form in any place. Abscess after abscess may form in any part of the body, the result varying according to the importance of the organ attacked. If an internal organ be the seat of an abscess, its existence can be only suspected, and it usually proves fatal.

Treatment.—Attend to comfort. Give soft, easily digested food. Steam the nostrils, poultice the throat or apply a liniment composed of equal parts spirits of ammonia, of turpentine and raw linseed oil twice daily until the abscess or abscesses begin to point, then open them and flush the cavity out twice daily with a five per cent. solution of carbolic acid until healed. In the meantime give internally three to four drachms hyposulphite of soda three times daily. Do not drench. If he will not eat the powders in food, place them well back on the tongue with a spoon. If breathing becomes very difficult send for a veterinarian to operate. The irregular form requires the same constitutional treatment, and if the abscesses can be located they should be opened early if possible.

Heaves or Broken Wind.

Heaves can usually be traced to some disorder of digestion or to bad feading. Hay that is damaged or any kind of food that is bulky will predispose to this disease. A dusty atmosphere or a badly ventilated stable are also causes. Horses brought from a high to a low level are liable to be attacked.

Symptoms.—The peculiar movement of the flanks in breathing is very characteristic, as is the accompanying cough. When the animal takes in a breath there is nothing unnatural noticed but in expelling the air from the lungs the muscles in the region of the flank are seen to contract, pause for a moment, then contract again with a bellows like movement. When exerted a wheezing noise accompanies the breathing. There may be a depraved appetite as shown by a desire to eat the soiled bedding in preference to the clean food offered. The abdomen may assume the "potbellied" form and the bowels are often loose. Round-chested horses are said to be particularly liable to the disease.

Treatment.—Once established, there is no cure for this disease thongh proper attention will relieve the distressing symptoms. The animal should invariably be watered before feeding and never directly after a meal. Carrots, potatoes or turnips should enter largely into the ration. Half a pint to a pint of thick dark molasses with each feed is helpful. Fowler's solution of arsenic, three grains in each feed will give some relief.

Congestion of the Lungs.

Congestion of the lungs consists in engorgement of the functional vessels, due to a weakened condition of the heart from overexhaustion, especially when a horse that is not in fit condition is snbjected to excessive or severe exercise. It is occasionally due to exposure or cold.

Symptoms.—The animals stands with outstretched limbs, nose protruded, and seems to fight for hreath. The nostrils dilated, flanks heaving, body tremhling, legs and ears cold. Cold sweats bedew the body, the mucous membranes are injected, the pulse small, indistinct and frequent; the heart's action tumultuous

Treatment.—Place in comfortable box stall with plenty of fresh air. Bleed to relieve the congestion of the vessels; draw four or five quarts of blood, and give stimulants, as six to eight ounces of whiskey, to keep up the action of the heart. This is a case in which sedatives and stimulants are employed at the same time. Rub the body and clothe warmly, but not too heavily. Hand-rub and bandage the legs. Repeat the stimulants every hour or two as long as necessary. If promptly treated, a recovery usually results; otherwise pneumonia or other complications are likely to follow.

Azoturia.

Azoturia is a dietetic disease, though not one of the digestive organs. It affects the kidneys and the organs of locomotion, and and is supposed to be due to a hypernitrogenous condition of the system. It is caused by want of exercise and excess of nitrogenous food, or in other words good feeding and idleness.

Symptoms.—So long as the horse is idle the disease will not occur. Exercise after idleness and good food is necessary. After a varying period of idleness a horse is taken out to drive, ride or work, as a rule, feeling more lively than usual. After going a distance, it may be a few rods or a few miles, he suddenly becomes dull, may go very lame on one or both hind legs, as though he had picked up a nail, sweats profusely, staggers, and sometimes exhibits colicky pains. Sometimes there is complete loss of power, and he falls and struggles, but is not able to rise. There is usually a tense swelling of the muscles over the loins. Rarely the forequarters are effected. If he urinates or the urine be drawn off, it is noticed to to be thick and very dark in color. If on his feet, he will usually try very hard to remain standing.

Treatment.—On the appearance of the first symptoms unhitch him and get him into the nearest stable possible. Keep him on his feet if possible. Apply mustard mixed with water and oil of turpentine over his loins and cover well with blankets. Give two drachms iodide of potash in a pint of warm water as a drench every four hours for three or four doses. If pain be excessive, give two ounces of chloral hydrate in a pint of warm water. If he falls and is unable to rise, he must be removed on a stone boat or lorry to comfortable quarters and given the medical treatment as above. In addition, the urine must be drawn off with a catheter about every eight hours, and injections of warm soapy water given per rectum. It is necessary for an attendant to remain with him to keep him as comfortable as possible by padding up with straw, etc. As soon as he regains partial control of his muscles, assist him to rise. In some cases it is wise to use slings, when he cannot rise. As soon as he can walk, give a little exercise and gradually increase the amount day by day.

Lymphangitis.

Lymphangitis or Weed is a dietetic disease and consists in inflammation of the lymphatic glands. It is sometimes called "Monday Morning Disease," from the fact that it is often noticed on Monday morning in horses that have stood idle since Saturday night at the same time getting their usual amount of food. It usually affects one or both hind legs, but occasionally a fore leg is the seat. It is usually caused by idleness and good food, but is occasionally seen under other circumstances, in animals in poor condition, and in such cases is due to the blood being in a highly fibrinous condition.

Symptoms.—It usually follows a day or two of rest, and is ushered in by a shivering fit (which stage usually passes off during the night and is not observed) and lameness appears in the affected limb. A hot stage succeeds the rigours, the animal blows and sweats, the pulse is hard, full and strong, the visible mucous membrane is inflamed, the bowels constipated, the urine scanty and highly coloured. The local symptoms are lameness, soreness of the inside of the leg affected when pressed by the hand from the body downwards. The parts are very tender, and swelling soon commences which increases until the whole leg becomes involved. As the swelling increases the acute pain and lameness usually subside to some extent. Some horses are predisposed to the disease, and repeated attacks usually terminate in a chronic and incurable enlarged condition of the limb called "Elephantiasis."

Treatment.—Give a purgative of six to ten drachms of aloes and two drachms ginger. Follow up with two drachm doses of saltpetre night and morning. Bathe the affected leg long and often with hot water, exclude draughts, and after bathing apply camphorated liniment. Do not exercise until the acute soreness and lameness have disappeared, then give regular exercise or work. The swelling will reappear at nights for some time. Preventive treatment consists in reducing the grain ration, giving a feed of bran, and giving some exercise when the horse that is predisposed to it is not working.

Simple Ophthalmia.

Simple ophthalmia, or conjunctivitis, is inflammation of the mucous membrane or outer covering of the eye, caused by a blow, bites of insects, common cold, or a foreign substance in the eye.

Symptoms.—There is a swelling of the eyelids, an intolerance of light, partial or complete closure of the lids and increased secretion of tears, which run down the cheek. The eye is more or less retracted within the socket. The lining of the lids and the covering of the eye are congested and covered with red streaks.

The eye is at first dim and blue-looking, but later generally becomes whitish in color. If the disease is due to an injury, the discolouration radiates from the seat of injury to the circumference; if due to cold, from the circumference to the centre.

Treatment.—If there be any foreign body in the eye it must be removed. Place the animal in a comfortable box stall, and exclude from light. Give a laxative of, say, six drachms of aloes and two drachms of ginger, and feed on light, easily digested food. Bathe the eye frequently with warm water, and, after bathing, put a few drops of a saturated solution of boracic acid in distilled water (any druggist will supply this) into the eye with a dropper or a feather. A lotion made of five grains sulphate of zinc and ten drops fluid extract of belladonna to an ounce of distilled water may be used instead. When the inflammation and swelling have disappeared, if a portion of the eye remains whitish and opaque, it is due to a deposit of lymph between the layers of the cornea (the external coat proper to the eyeball), and not to a film or scum as it appears. This can usually be gradually removed by putting a few drops of a lotion composed of five grains nitrate of silver in an ounce of distilled water into the eye twice daily.

Periodic or Specific Ophthalmia.

Periodic or specific opbthalmia, sometimes called moon blindness, is an affection acting primarily on the constitution and secondarily on the eye. The tendency to the disease is undoubtedly hereditary. Its appearance and recurrence cannot be prevented, and after a few attacks, it terminates in opacity of that part of the eye called the crystalline lens, which causes complete blindness, and is called cataract. Stallions or mares with this affection will produce foals a percentage at least of which, will suffer from the disease at an earlier or later period of life.

Symptoms.—The attack is sudden, and without apparent cause, and the eye presents the general appearance of inflammation. The dulness spreads from the margin to the centre. The pupil contracts, and the eye in general is intensely reddened. It is difficult to distinguish between this and simple opbthalmia. The inflammation is not generally so acute as in the simple form, but will not as readily yield to treatment. With or without treatment the eye may regain quite, or almost its natural condition, and remain without active disease for a variable time, or in a few days the inflammation may again appear in either or both eyes. There may be days, week or months between the attacks, which appear suddenly without apparent cause. After several attacks we usually have cataract and complete blindness. Cataract can be detected as a whitish object situated well back in the eye. When it is not complete the animal may be able to see a little.

Treatment.—As stated, the attacks cannot be prevented, bnt treatment as]er simple ophthalmia will hasten recovery from an attack and retard the formation of cataract.

Mange.

Mange, or scahies, is the term appiied to a skin disease caused by minute parasites. It is very contagious, and causes intense irritation, dne not so much to the bites of the parasite as to a poisonons secretion which it introduces into the tissues.

Symptoms.—For reasons not well understood, the symptoms are more severe in cold than in warm weather. There is intense itching, accompanied hy loss of hair. Later there is an effusion, thickening of the skin, and the formation of scabs or crusts. The parts are red, but this can be observed only on white or light-skinned horses. As the disease advancos the thickened skin becomes corrugated in deep folds or ridges, especially where loosely attached to the tissues. The progress of the disease, at first slow, soon becomes rapid, owing to the tremendous rate at which the parasites multiply. According to Gerlach, one pair of acari (mange parasite) are capahle of producing, hy sucessive generations, within three months, not less than 1,500,000 descendants. The perioo reqnired for the eggs to hatch varies from 3 to 10 days according to circumstances.

Treatment.—The patient must be ciipped, the hair burned and premises disinfected. Ruh the body all over with soft soap, to which has been added about 1 per cent. creolin or other insecticide. This should followed after a lapse of a few hours by a thorongh dressing with one of the foliowing preparations: Oil of tar, one part; raw linseed oil, twenty parts, to which should be added as mnch sublimed sulphur as the mixture will carry. The ingredients are to he heated gradually together, hut must be allowed to boil. The mixture should be rubbed into the skin and after several days washed off and the application repeated.

Another preparation which can be used in the same way is: Subiimed sulphur 200 parts; carbonate of potash, 100 parts; iard, 800 parts.

Another effective mixture consists of: Creosote, 10 parts; alcohol, 10 parts; water, 25 parts.

Or: Creosote, 1 part; vegetahie oil, 30 parts.

Or: Crude carbolic acid, 53 ounces; quickiime, 36 ounces; carbonate of soda, 107 ounces; soft soap, 107 ounces. Dissoive in 57 gallons of hot water.

Or: Flower of sulphur, 21 lbs.; unsiacked iime, 16 ibs; water, 100 gallons.

Whatever preparation is used it wiii be fonnd more effective if used at a temperature of from 100 to 110 degrees Fahr. Treatment shonid be repeated in about ten days, and again if necessary.

Eczema.

Most of the skin diseases of horses in the country may be said to be some form of eczema.

Eczema simple is a non-contagious disease due, in most cases, to local irritation or to some alteration in the condition of the blood. It usually appears suddenly, and is manifested by itchiness, the hair and outer layer of the skin become rubbed off, leaving the skin red, raw and inflamed. Successive crops of vesicles develop, dry on the sore skin, or discharge a fluid which appears to cause an extension of the disorder. It is generally called mange, but it differs vastly from mange, in being non-contagious and not being due to a parasite. The head, neck and shoulders are the favourite seats, but it may attack any or all parts.

Treatment.—Give a purgative of six to ten drachms of aloes, and two drachms of ginger. Follow up with one ounce of Fowler's solution of arsenic night and morning every alternate week as long as necessary. Give the body a thorough washing with strong, hot soap suds applied with a scrubbing brush. It is good practice to clip the horse if the season is favourable. Follow up by dressing twice daily with a lotion of 30 grains corrosive sublimate to a quart of water.

Erythema.

Erythema, or inflammation of the outer layer of the true skin, is characterized by uniform redness (not noticeable except in white legged horses) with heat, swelling, irritation and eruptions. Causes are cold and heat operating alternately on the skin, wet, friction, pressure and constitutional causes, as hereditary predisposition, debilitating diseases, an altered condition of the blood, plethora and poverty. When the heels are affected it is called Scratches or Cracked Heels; when the greater part of the hind leg, from the foot to the body, Mud Fever; when the front of the hock, Sallanders; when the back of the knee, Mallanders.

Symptoms.—Pain, heat, tenderness, redness, and more or less swelling, are followed by sores or cracks. In most cases there is more or less lameness, especially when the animal begins to move, but lameness usually disappears on exercise.

Treatment.—Give a purgative of six to ten drachms aloes, and two drachms ginger. Follow up with one ounce doses of Fowler's solution of arsenic night and morning for a week. Local treatment will depend upon the condition of the part. In the early stages the application three times daily of a lotion composed of an ounce each of sulphate of zinc and acetate of lead to a pint of water; or oxide of zinc ointment, with good care, is all that is required. The lotion acts better in hot, dry weather. Do not wash. If the parts become muddy, allow the mud to dry and then rub off; if

they get wet, rub with cloths until dry. If the cracks discharge a foetid material, poultice with linseed meal and powdered charcoal for two or three days and then treat as above. If proud flesh appears dress with butter of antimony applied with a feather once daily until it disappears. Keep the patient as dry and clean as possible.

Surfeit or Nettle Rash.

Surfeit or Nettle Rash, is not of infrequent occurrence. It appears suddenly and is sometimes very alarming.

Symptoms.—Surfeit consists of an eruption of elastic vesicles over a greater or less portion of the body and is accompanied by intense itchiness. It is caused by some derangement of the digestive organs. A sudden change of diet, over-heating or drinking largely of cold water when hot, may cause it. The symptoms appear suddenly, and in some cases disappear nearly as quickly as they came.

Treatment.—Administer a purgative of six to eight drachms of aloes and two drachms of ginger. Wash the body well with warm soft soap suds applied with a scrubbing brush, rub until dry, and then apply a lotion composed of two ounces sulphate of zinc, half an ounce of carbolic and one quart of water.

Poll Evil.

Poll evil is a fistulona sore affecting the bones of the neck at the top of the head. It generally starts from a bruise or long continued irritation of the part. Among the more common causes are the chafing of a heavy halter, striking the top of the head against the ceiling or blows from a whip.

Symptoms.—The animal shows opposition to the application of a brush or to be handled about the head. In the early stages there is a soft fluctuating tumour with some stiffness of the neck. Afterwards it may form a running ulcer.

Treatment.—Open the sore well up so as to get to the bottom and make the incision deep enough at one side to allow the matter to run out. If the swelling is hard, poultice it, then lance and inject carbolic lotion, one part of acid to twenty of water. Put in a seton and dress with iodoform ointment. In obstinate cases a piece of caustic potash an inch or two in length may be introduced into the opening and covered with oakum or cotton. Remove the caustic plug after twenty-fours hours and apply hot fomentations.

Sore Shoulders.

Sore shoulders are usually the result of ill-fitting collars, or carelessnesa on the part of the teamster, hut may occur in cases where the collars fit well and reasonable attention is given by the teamster, especially when young horses, or those that have been

dle for months are put to work in warm weather. In order to prevent sore shouiders the coliar shouid not oniy fit well, but should be kept perfectly ciean on the face. It shouid be taken off the horse during meal times, and the shouiders allowed to become cool and dry. Also give the shouiders a good rubbing before the collar is put ou again, and in cases where a young horse, or one that has been idle for some time is put to work, especially in hot weather, he shonld be allowed to stand for a few minutes frequently and the coilar lifted forward to allow the shouiders to become cool. Treat iu this way for a few days, to allow the shonlders to become gradually hardened and accustomed to the necessary pressnre and friction.

Symptoms.—Ordinary sore shoulders are mereiy an inflammation of the skin in different stages ; they often become raw. In some cases the skin ioses its vitality in a round patch, the onter portions of which are detached, hnt attached in the centre by living tissue. This is called a sitfast.

Treatment.—If possible, give rest. If not, endeavor as far as as possibie to minimize pressure upon the sore spot, by using sweat pads or pounding a hole in an oid collar. If there there be simpiy inflammation and some swelling, bathing the shoulder with coid water containing a little salt will allay the inflammation. If there is a raw surface bathe freqnently with coid water and appiy a iotion composed of one ounce each of suiphate of zinc and acetate of iead, and four drachms of carbolic acid, mixed with a pint of water. Sitfasts must be removed with a knife and the raw surface treated as above.

Enlargements on the Shoulders.

Enlargements on the shoulders are common, especially in farm horses. They are usually the result of hard work, especially jerking with an iil-fitting collar.

Symptoms.—They vary much in character. When they appear suddenly, are soft and fluctuating and not very sore to pressure, they contain a bloody water (serum), and are called serous abscesses. When they appear more slowly, are quite sore to the touch and are hard, with possibly a soft spot in the centre, they contain pus and are called purulent abscesses. In some cases these contain only a small quantity of pus and have such thick walls as to iead one to the conclusion that they are solid tumors. Sometimes the enlargements are without well-defined borders. They are fibrous in character, consist in enlargement of connective tissue, and are called fibrous tumors.

Treatment.—The horse must have rest, and as in all such cases, it is wise to give him a slight purgative and restrict his diet. If the enlargement be a serous abscess, it must be opened at the lowest part. Make an opening sufficiently large to admit the

finger, and remove all detached tissue; then flush out the cavity three times daily with a five per cent solution of carbolic acid or the ordinary white lotion, composed of one ounce each of sulphate of zinc and acetate of lead mixed with a pint of water. Keep the external wound open until the cavity is healed. If it be a purulent abscess, an opening must be made for the escape of pus and treated as above. If the enlargement be hard, explore by cutting through the skin and inserting a probe into the centre of the lump to search for pus. If pus be found, even in small quantities, treat as above, but if no pus be present, it is a tumor and must be carefully dissected out, the wound stitched up, with the exception of a portion at the bottom for the escape of pus, and the wound treated with carbolic or white lotion as for abscess.

Wounds of Horses.

Wounds are classified as incised, punctured, lacerated, contused, gunshot and poisoned.

Incised wounds are those made by a clean cutting instrument. The textures are evenly and smoothly divided, without tearing or bruising of the parts, hence bleeding is greater than in most other wounds. If the wound be parallel to the muscular fibres there will be little gaping, but if transverse the gaping will be considerable.

Treatment.—Arrest bleeding if it be considerable. If the end of the severed vessel can be secured it is well to tie it with a silk thread. In some cases it is necessary to enlarge the wound to do this. If this cannot be done the wound may be plugged with batting soaked in a five per cent. solution of carbolic acid, the plug secured by sutnre or otherwise and left in for eight or ten hours, then removed and the wound cleansed. All foreign bodies must be removed and the wound cleansed with warm water, then dressed with a five per cent solution of carbolic acid and the lips brought together by stitching with silk or catgut sutures. Sutures made of saddler's hemp slightly waxed with beeswax do very well

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where the others cannot be obtained. A curved surgeon's needle is desirable, though it can be done with a straight needle. Every stitch must be tied in order to make it independent of the others. If it is necessary, apply a twitch and tie a fore foot up or better a hind foot forward in order to protect the operator from injury. Put in a stitch about every three-quarters of an inch, enclosing at least half an inch of skin on each side. Leave the bottom of the wound open for drainage. It is good practice to give the patient a slight purgative of aloes or raw oil, and feed lightly. Keep the wound clean by sponging with warm water three times daily, and then dressing with the carbolic lotion already mentioned. If possible tie so that he cannot rub or bite the parts. In about ten days cut the stitches out, but continue the dressing until entirely healed.

Contused Wounds.

Contused wounds are injuries inflicted by some blunt instrument without perforation of the skin, and the consequences vary according to the severity. The effect may be very short, as from a horse interfering, but if constantly repeated structural change will result. This change varies in degree. There may be rupture of a blood vessel, and consequent effusion. A large vessel may be ruptured and considerable blood be extravasated, which will coagulate. There may be the formation of a serous abscess, or a purulent abscess.

Treatment.—If the contusion be slight, rest and bathing with hot water will suffice. If much blood is imprisoned, the sac must be lanced, and the fluid allowed to escape, and the cavity flushed out with a 5 per cent solution of carbolic acid until healed. When an abscess is likely to form, hot poultices should be applied, and when pus is formed the abscess must be opened and treated as above. Constitutional treatment consists in administering a light purgative, as six drachms aloes, or a pint of raw linseed oil, light food, and rest.

Laminitis, or Founder.

Laminitis, or founder, is a very painful disease. It consists of inflammation of the sensitive laminae of the foot, that part that is attached to the insensitive wall. It is caused by inordinate feeding, over-exertion, drinking cold water when over heated, long voyages, or by being forced to stand for a long time in one position.

Symptoms.—Lameness is very marked, and the fore feet are more often affected than the hind. The animal stands with fore feet extended, and puts weight upon the heel, often sways backward, raising the toes from the ground. If forced to back, he drags his heels on the floor. The feet feel hot, the animal breathes hard, the pulse is full, frequent and bounding, the bowels usually con-

stipated. In severe cases, sweats bedew the body. If the hind feet are diseased, he stands with all four feet well under the body, endeavouring to take all possible weight off the diseased members. In some cases all four feet are involved. The local symptoms, of course, are the same which ever feet are affected. In some cases he will lie down and stretch his legs out, which gives great relief, while in others he persists in standing. In all cases the pain is distressing.

Treatment.—If promptly and intelligently treated, a perfect cure will usually result, but if neglected a partial separation takes place between the sensitive and insensitive structures of the feet, and while the symptoms will be relieved he will always be more or less of a cripple. Remove the shoes, rasp the heels and soles well down, and apply hot poultices or stand in a tub of warm water. Administer a purgative of 6 to 10 drachms of aloes and two drachms of ginger. Give 10 to 15 drops of Fleming's tincture of aconite in a little cold water every two hours until the force and frequency of the pulse is reduced. Encourage the animal to lie down by placing him in a well-bedded box stall, In severe cases it is well to cast him, when he will usually remain down, as it gives so much ease. Continue to apply the heat to the feet for a few days until the acute inflammation has subsided; then apply a blister around the coronet, and as soon as the acute lameness has disappeared, get him shod with bar shoes and give gentle exercise or light work on soft ground.

Splint.

Splint is a common cause of lameness in young horses and occasionally in older ones. It is caused by concussion and frequently does not cause lameness. It consists in inflammation being set up between the large and small bones of the cannon, usually the fore cannon; an exudation is thrown out; this becomes converted into bone, and the two bones become united by long union.

Symptoms.—When lameness is present, it is in the early stages, usually before any enlargement can be detected with the eye. The lameness is peculiar in most cases. The animal will stand and walk sound, but when asked to trot, the lameness is very well marked. This is especially the case on hard roads or while going down hill, and the lameness increases on exercise. An examination reveals tenderness upon pressure of the leg between the large and small cannon bones, usually on the inner side of the fore leg, but sometimes on the outer. Rarely the hind leg is affected, in which case the tenderness is more often found on the outer surface. In most cases, while there is no visible enlargement, the finger will detect its presence. After a time there is a visible enlargement,

but in most cases this disappears by absorption in a few months, though the union between the bones remains. Hence a horse that once has a splint will always have it, even though it is not visible.

Treatment.—In most cases a few days' rest and the application of cold water will effect a cure. When this is not the case it is necessary to give a longer rest and apply a blister. An ordinary splint is not considered an unsoundness, but when quite large and close to the joint, or double, that is extending from one side of the leg to the other, involving both splint bones and showing on both sides, it is liable to cause lameness at any time and must be considered an unsoundness.

Swamp Fever.

Swamp fever is the term applied to a disease of horses seen in some of the western provinces. Its nature, or pathology, is not well understood. It occurs in horses grazing on low-lying land, and is doubtless due to a germ peculiar to such localities.

Symptoms.—The patient becomes languid and weak, loses flesh, the hair becomes dry and staring, and the mucous membranes blanched. The gait is unsteady, the temperature increased to 101 or 102, and the pulse frequent and weak. The appetite is more or less impaired, and the horse gradually becomes more and more emaciated and weak, and eventually dies.

Treatment.—Treatment has not been successful. Of course preventive treatment is strongly indicated. This consists in keeping horses off affected pastures. It is possible if a case be treated in the early stages that the disease may be arrested and the animal regain health. The cause must be removed, the patient well cared for and well fed, and given tonics, antiseptics and febrifuges, as drachm doses each of quinine, gentian and nux vomica, three times daily.

Navicular Disease.

Navicular disease, or coffin joint lameness, is one of the most common causes of permanent lameness in the fore feet, and, if well established, is incurable. It is caused by standing too much on dry floors, irregular exercise, travelling on hard roads, leaving the shoes on too long, etc.

Symptoms.—At first the lameness is very irregular, the horse going slightly lame at times, then becoming practically sound. Again the lameness may be better marked, then slightly lame, or not lame at all. After a time the lameness becomes more marked and more constant, the horse points his foot (or if both are affected, first one and then the other) while standing, he stubs his toes and wears his shoes down at the toes, steps short and groggy, and evidently suffers considerably, especially when first taken out. The lameness sometimes disappears

partially or wholly on exercise. The feet become narrow and contracted. If but one is diseased, it will be noticed to be smaller than its fellow, is hot and dry. As in most lamenesses, the horse goes better on soft ground. After a time the bone and tendon become altered in structure, and then a cure cannot he effected.

Treatment.—If taken in the early stage a cure can often be effected. A long rest is necessary. Remove the shoes, stand in a tub of cold water during the day, and apply poultices at night until the inflammation is allayed. Then blister around the coronet as follows :—Take two drachms each of biniodide of mercury and cantharides and two ounces vaseline ; mix. Clip the hair off all around the coronet for two inches in height. Rub the blister well in. Tie so that he cannot bite the part. In twenty-four hours rub well again with the blister, and in twenty-four hours longer wash off and apply sweet oil. Turn him loose in a box stall now, and oil every day until the scale comes off. Repeat the blistering once every month for four or five times, and have bar shoes put on.

Punctures.

Horses often puncture the feet by treading on nails, etc. The symptoms are eminent. He goes suddenly lame, and, upon examination, the nail or the seat of puncture can usually be seen.

Treatment.—Remove the nail if present, and pare the sole at the seat of punctnre well down to the sensitive part. This is necessary, as while the horse may be sound when the nail is removed, there is usually some foreign matter introduced, and, if left alone, pus will form and a serious case result, which might have been prevented by careful treatment. Remove the shoe, and, after paring well down, apply poultices for two or three days. Then, if lameness has disappeared, get the blacksmith to fill the hole with tar and tow, and put a leather sole under the shoe to prevent the entrance of sand, gravel, etc.

Odema, or Swelling of the Legs.

During the fall and winter months horse owners are frequently troubled by their horses swelling in the limbs, generally the hind legs. Some owners become greatly alarmed, while other treat the matter with entire indifference. Whilst the ailment is not a disease of itself, it is a sure symptom of that which may result seriously if neglected. It is indicative of a perverted function of some internal organ of digestion, and may be due to various causes, such as imperfect mastication, generally due to some trouble in the teeth, a faulty action of the stomach, liver, intestines or kidneys. The action of any of those organs may become seriously impaired by bad management, such for instance, as irregular feeding

ill-prepared food, impure drinking water, lack of proper ventilation, insufficient light, dirty, filthy and undrained stables. If animals are overworked for a time and the left idle for two or three days it may give rise to this trouble.

Common sense will suggest ascertaining the true cause before resorting to drugs. To find the true cause proceed in order. First, have the teeth and month properly examined by a competent person. Examine the hay, oats and other food, and see if they are of good quality. Find out if the animal has been over-fed; if he is allowed a change and fed regularly; if he is watered before or after feeding; is the drinking water good and pure; is he allowed regular exercise, and if the stable is in a good sanitary condition? By this time, if one has investigated with care and good judgment, one should have at least a good idea as to what is the cause of the symptoms. If so, act in accordance and the symptoms will surely disappear.

Many horses become subject to odema owing to the fact that the first warning symptoms were treated with indifference. Such cases may require medical treatment and of the best kind. Consult a veterinary surgeon and follow his instructions to the end. Please do not forget this important fact, viz., that odema cannot exist without a cause, neither can it be successfully treated until the cause is removed.

To Physic a Horse.

When a horse is to be given physic, he should always be prepared by feeding for forty-eight hours on bran mashes, no hay or oats being given. On the third day give the physic ball, which is made up as follows:—Powdered Barbadoes aloes, six drachms for a small and seven drachms for a large horse; powdered ginger, two drachms; lard, sufficient to make a ball. The horse should be kept on bran mashes till he physics well, then give him hay and gradually get back to the normal feed. When physicing a horse in cold weather, never give cold water; always give it luke warm water or with the chill off it.

Applying a Blister.

The proper way to apply a blister is as follows:—Clip the hair off the part, and then rub in the blister for twenty minutes. A blister while rising causes much irritation, and the animal will always try to rub or bite the blistered part, and in the case of a horse, his head should always be tied up for twenty-four hours so that he cannot touch it. After four days, lard the blistered part once a day till the scales are loosened, then wash off with hot water into which put a tablespoonful of washing soda has been put. If the scales are not all off, lard again till they are.

Administering a Drench.

Liquid medicines, when tasteless or palatable to the horse, may be administered by mixing in the drinking water When such is not the case they are poured down the throat, and this process is known as drenching. The quantity so administered should not be too great, but most medicines should be diluted before being given. For instance, in the case of a prescriptiou of which it is recommended to give a wineglassful, this quantity should be dilnted to about a pint with water. The ordinary way is to give it out of a glass bottle, but one made of tin, and flattened, is safer. The proper way to administer a drench is as follows: Make a loop on the end of a piece of rope, pass the loop underneath the nose band of the halter and into the mouth, then pnt the other end of the rope over a beam and pull np the horse's head nutil it is level. Insert the neck of the bottle in the horse's mouth between the front and back teeth, keeping it up to the roof of the mouth, aud giving a little of the dreuch at a time. Let him swallow it before yon give any more, and if he shonld cough, let down his head and pull it np again, as he may get some of the mediciue down the wrong way and set up inflammatiou of the lnngs.

COMMON DISEASES OF CATTLE.

Tympanitis or Bloating.

Tympanitis, which is also known as "bloating", "hoven" or "blown," consists in a distended state of the rumeu, dne to the elimination of gases from fermenting food. It is caused by over-eating, sudden changes of food especially to that of a fermentable character, as frozen grass, turnip tops, or fresh clover.

Symptoms.—The animal becomes uneasy, stamps the feet, and whisks the tail. Feeding and rumination are suspended: There is a fulness of the left side, especially marked betweeu the last rib and the point of the hip. This is of a springy nature, and if tapped emits a resonant or tympanic sound; hence its name. Breathing is more or less difficult, according to the exteut of stomach's distention. There is often moaning and belching. The severity of the symptoms and the gravity of the case, of course, depends npon the amount of gas formed. In severe cases the symptoms are distressing, the breathing very difficult, and unless relief be given promptly, the patient will die from suffocation, rupture of the stomach or diaphragm, or from absorption of gases into the circulation.

Treatment.—If bloating be not excessive, give two to four ounces of oil of turpentine in a pint of raw linseed oil Tie a gag or round stick in the mouth to keep it open and encourage the escape of gas through the gullet. If necessary, repeat the dose in an hour. If bloating be excessive, and it is necessary to give immediate relief, the animal must be punctured on the left side, in the space between the point of the hip and the last rib. When the proper instrument—a trocar and canula—cannot be secured, an opening should be made with a pocket-knife or even a butcher's knife, as unless prompt relief be given the animal will perish. There is no time to send for help and the instruments at hand must be used. It is good practice to give an animal a purgative of about two pounds of Epsom salts in two quarts of warm water after an attack.

Impaction of the Rumen.

Impaction of the rumen is that condition in which the rumen or paunch becomes filled with large quantities of food which do not digest properly, nor yet form gases in large quantities. The organ becomes distended with food and its walls become more or less paralyzed and digestion is suspended.

Symptoms are much the same as in tympanitis; there is not much violent distension of the rumen and the breathing not so difficult. If pressed upon, the rumen has a doughy feel and a dull sound if tapped. The appetite is lost, rumination ceases, secretion of milk is checked, the animal is uneasy, and frequently emits a grunt during expiration of breath. In some cases there are periods of apparent ease, in which the patient will eat, but this aggravates the symptoms, hence no solid food should be given.

Treatment.—Give a brisk purgation of two pounds of Epsom salts half an ounce of gamboge, and one ounce of ginger dissolved in two quarts of warm water, and given as a drench. Follow up with two drachm doses of nux vomica three times daily. Allow nothing to eat but a little bran, and give water from which the chill has been removed. If the bowels do not act in 24 to 36 hours, repeat the purgation and continne with nux vomica. Repeat the purgatives if necessary. If bloating appears at any time, give two to four ounces oil of turpentine in a pint of raw linseed oil. If the disease proves stubborn, the patient should be drenched with boiled flaxseed gruel to sustain strength.

Grain-Sick

Grain-sick is simply impaction of the rumen with grain. By some means the animal has had an opportunity to eat large quantities of grain. In many cases little idea can be formed as to the amount she has eaten, and the usual practice is to tie her in the stable and not allow anything to eat or drink, and await develop-

ments. Of course if only a small quantity has been eaten, this practice does very well as the animal will not become sick; hut the probability is that enough has been taken to cause more or less inconvenience, and it is always wise to anticipate digestive trouhle in such cases. Instead of waiting for symptoms of disease before adopting treatment, it is good practice, as soon as one knows that the animal has had an opportunity to eat too much grain, to give her a hrisk purgative of two pounds of Epsom salts, half an ounce of gamboge, and one ounce of ginger, dissolved in warm water and given as a drench. This will usually cause purgation and avoid serious or even painful illness. If treatment is delayed until there are symptoms of illness there may be a paralysis of the stomachic coats, and hence medicines will not act readily. If the animal has eaten very large quantities of grain, symptoms of dulness and an impacted condition of the rumen will be noticed at once. In snch cases the only successful treatment consists in an operation, by which the contents of the rumen are removed hy hand. This can be performed only hy a veterinarian, and must be performed promptly to be successful.

Fardel-Bound or Impaction of the Third Stomach.

Fardel-bonnd (maw-bound) consists in impaction of food between the leaves of the manyplies or the third stomach. It is caused by the animal eating food of a dry, woody nature, as over-ripe hay or dry grass of the previous year, often taken hy cattle in the spring along with fresh grass. Like other diseases of the stomach of the ox, it often occurs without well-marked cause, donbtless due to a non-active condition of the secreting glands. It is difficult to treat and often proves fatal.

Symptoms.—The first symptoms are often diarrhoea of short duration, followed hy obstinate constipation. The appetite is impaired, rumination ceases, and secretion of milk more or less suspended. The muzzle is dry and eyes generally dull, but sometimes wild-looking. A short grunt is generally emitted during expiration, especially when the animal is lying. In some cases more or less delirium is noticed; in others, drowsiness and stupor or partial paralysis. After a while there is sometimes more or less bloating noticed from food fermenting in the rumen.

Treatment.—Give a brisk purgative of two pounds of Epsom salts, one ounce of powdered aloes, and one ounce of ginger, dissolved in two quarts of warm water and given as a drench. Follow np with two-drachm doses of NUX VOMICA three times daily. Give sloppy food and all the water she will drink. Give injections of soapy water per rectum every few hours. In many cases there is a slight passage or two of liquid faeces in a reasonable time after the administration of the purgative, only to be followed by constipation.

Unless there is free action of the bowels in from 24 to 36 hours, a pint of raw linseed oil should be given and a dose of Epsom salts, say, one pound, or a pint of oil should be given daily until the bowels move freely. In the meantime continue the administration of nux vomica, and if the patient will not eat she must be sustained drenching with boiled flaxseed and ale.

Diarrhoea or White Scours in Calves.

Diarrhoea or Indigestion which is frequently called "white scours" in calves, may result from a variety of causes, such as feeding newly born calves on old calved cow's milk or skimmed milk, feeding on soured milk, long intervals between meals, ill-health or improper treatment of the dam, if the calf be sucking. Foreign bodies as hair balls in the stomach may be the cause, or uncomfortable quarters.

Symptoms.—Irregular appetite, swollen, tender abdomen and drawn-up flanks; the calf becomes what is called "pot-bellied." There is a whitish, watery discharge from the rectum, a dry scruffy skin and rapid emaciation.

Treatment.—If possible ascertain the cause and remove it. If not too weak give one to four ounces castor oil, according to size, to remove any foreign body. The addition of about three or four ounces of the milk of lime water will usually affect a cure. Lime water is made by slaking a lump of lime, pouring a considerable quantity of water on it and stirring briskly with a stick; allow the undissolved lime to settle, and the clear liquid remaining on the top is lime water. If the diarrhoea still continues give one to three drachms laudanum, two to four drachms brandy, one to two drachms each of catechu and prepared chalk in a little new milk every two or three hours until the diarrhoea ceases. Then feed on new milk with lime water as stated. If the patient will not partake of nourishment, it should be dreuched with linseed tea, to which has been added a little lime water.

Sporadic or Accidental Abortion.

Abortion may be said to occur when the foetus is expelled from the uterus before it is sufficiently developed to live. Accidental abortion may be caused by kicks, blows, slips, falls, foul odors, violent exertion, excitement, unsanitary surroundings, etc. In some cases it occurs suddenly without any premonitory symptoms. This is especially the case when occuring during the early months of gestation. In other cases the symptoms are similar to those of approaching parturition at full term. The labor pains are usually not so severe, but they differ only in degree.

Treatment.—When the accident occurs suddenly, of course nothing can be done to prevent, but when premonitory symptoms

are shown it can, in many cases, be averted if the foetus is alive. The cow that shows symptoms of abortion should be placed in a comfortable, quiet, and partially darkened box stall, and given a large dose of opium, say two or three onnces of landanum (tincture of opium) in a pint of cold water every two hours nntil the pains have passed off and she becomes tranquil, and she should be kept quiet, and fed on light easily digested food for a week longer. Even when the water bag has become visible, bnt not ruptured, this often averts the accident, bnt if the water bag be ruptured, it is the dnty of the obstetrist to assist delivery. A cow that aborts shonld not be bred again for at least three months, and as a cow readily acqnires the habit, she shonld be kept quiet, fed on light food, and carefully watched at about the period of gestation at which she aborted before.

Infectious Abortion.

Infectious abortion is a very serious and very expensive matter to the breeder whose herd is afflicted. It is due to a specific germ that invades the generative organs, It is transmissible from female to female by contact, from female to male and vice versa by copnlation, and from diseased to healthy animals by pails, blankets, hands or clothes of attendants, or anything that comes in contact with both. Abortion may occur at any period of gestation, and and usually occurs without premonitory symptoms, the cow usually suffering no apparent inconvenience.

Treatment.—The measures taken must be energetic and thorough. Half measures are of no use. All pregnant cows not apparently affected should be removed to non-affected quarters. All aborted foetuses, afterbirths, etc., ahonld be burned and the attendant of the diseased animals should not come near the healthy, withont at least changing his clothing and disinfecting his hands. No intercourse whatever shonld exist between them. If an aborted cow does not expel the after-birth it should be removed. Some good disinfectant should be used in large quantities. Probably none have given better results than a solution of corrosive

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sublimate (bi-chloride of mercury) about forty grains to a gallon of of water. It is well to make a barrelful of this solution, which should always be heated to about 100 degrees before using. A veterinarian's injection pump and a four ounce syringe is needed. The wombs of all abortive cows should be flushed out once daily with abont two gallons of the solution introduced with the pump until the neck closes so that the nozzle of the pump will not enter, and after that a little injected into the vagina with the syringe until all discharge ceases. The external surfaces of the vulva and the tail and hind quarters should be bathed with the solution once daily. It is good practice to adopt this latter treatment for all pregnant animals in order to destroy any germs that may be present and about to enter the genitals The bull that has been bred to any of the diseased cows should not be bred for at least months, and in the meantime his sheath should be flushed out with the solution twice weekly, and when he is again bred he should be flushed both before and after service, All pregnant cows should be given forty to sixty drops carbolic acid in their feed twice daily. An aborted cow should not be bred for at least six months after abortion. When the disease appears to be stamped out, all pails, halters, clothings, etc.. that may be contaminated should be burned, and the stables thoroughly disinfected, by thoroughly sweeping, then closing all openings, and burning sulphur until the premises become filled with the fumes. Afterwards give a thorough washing, or spraying with a five per cent. solution of crude carbolic acid, and after a few days give a thorough coat of hot lime wash with five per cent. carbolic acid applied with a brush, or better with a spray pump. If this disinfection has been thoronghly done it will be safe to introduce healthy stock as soon as the premises are dry.

Parturient Apoplexy.

Parturient apoplexy, commonly but wrongly called "milk fever," is a disease peculiar to cows during the parturient stage. Its nature is not well understood. It usually attacks a cow from six hours to three days after parturition, but has been known to appear several days later, and it is possible it may occur during or shortly preceding the act.

Symptoms.—The cow becomes restless, stamps, switches her tail, is indifferent to her calf and surrounding objects. The eyes look glassy, the secretion of milk more or less suspended, pulse somewhat snppressed, and temperature below normal. She staggers, lies or falls down after a while, may or may not be able to rise, and if she is, she soon goes down again and cannot rise. She may lie naturally for a time, but usually lies flat with legs stretched out, or on the sternum, with head turned round and nose resting on flank. If the head be lifted it resumes its former position as soon as

relieved. In most cases a comatose (unconscious) condition supervenes; she becomes unconscious to pain or surroundings, and if it were not for respiration, which is often sonorous, one would think she were dead.

Treatment.—As the power of swallowing becomes impaired in the early stages, even while still on her feet, medicines must not be given in the ordinary way by the month. Many cases have been killed in this way, by suffocation, when they die quickly. The smaller quantities of the fluid may pass down the windpipe to the lungs and excite inflammation, in which case death may not take place for a few days, often after the symptoms of the primary disease have passed. The most modern and most successful treatment consists in giving no medicines by the mouth at all. If any are given they should introduced directly into the stomach through a rubber tube passed down the gullet. Inflating the udder with pure oxygen gas gives very quick and satisfactory results in most cases. For this treatment a tank of oxygen and a rubber tube five or six feet long. with a teat syphon attached to one end, is necessary. The udder must be thoroughly washed with a good antiseptic, as a five per cent. solution of creolin; a rubber or other sheet placed between it and the floor; the udder must then be milked dry, the syphon disinfected and inserted into a teat, the other end attached to the tank and the cock turned, when the gas is forced into the quarters. Each quarter must be filled to its fullest capacity. The cow usually revives and sits up on her sternum before the last quarter is filled. The udder should be well massaged every half hour until she regains her feet, which in most cases is from one to six hours. If not on her feet in six hours, repeat the treatment. Feed on sloppy food for two days. Do not milk at all for 24 hours after inflation, and do not milk dry for 24 hours longer; after which treat as if nothing had happened. Oxygen gas is certainly the proper ingredient for inflation, but air sterilized by a special instrument, by which the air is forced through aseptic cotton saturated with a five per cent. carbolic acid, gives good results. The immediate results of air introduced with a bicycle pump are about the same, but the danger of udder trouble following this treatment is so great that it is unwise to use it where it is possible to secure the services of a man with the proper apparatus,

Retention of the Placenta.

Retention of the placenta, or afterbirth, is quite a frequent occurence in cows. It occurs under all conditions and in all classes and conditions of cows. A satisfactory explanation of its occurence cannot be given. Medicines have practically no action, either in preventing its occurence or hastening its expulsion. Comfortable quarters during and after parturition and warm drinks after the act

favor its expulsion. Cows have a fondness for eating the membrane, and this should if possible be prevented, as untoward and sometimes fatal results follow.

Symptoms.—There is usually a greater or less portion of the membranes observed hanging from the vulva, but in some cases it is all invisible. There may or may not be noticed an uneasiness and efforts to expel them.

Treatment.—If in at most 24 hours, in warm weather, and 48 in cold weather, after parturition, a cow is not known to have expelled the membranes, they should be carefully removed by hand. If not visible there may be a possibility that she has expelled and eaten them, and in such cases, in order to overcome the doubt; an examination with the hand should be made. The hand and arm must be thoroughly oiled with sweet, raw linseed or other non-irritating oil, the hand introduced into the vulva and passed forward to the womb. If present, the membranes must be carefully separated from the lumps with which the inner surface of the womb is covered. Care should be taken to not tear off from the womb any of these lumps (called cotyledons). After all the membranes are removed, the womb should be flushed out with a warm two per cent. solution of creolin, and about thirty drops of carbolic acid given in soft food twice daily until all discharge ceases.

Inversion of the Uterus.

Inversion or expulsion of the uterus (womb) in cows occurs shortly after calving from relaxation of the ligaments that hold it in position.

Symptoms.—There is noticed a greater or less mass of tissues protruding from the vulva. The size of the mass greatly depends upon whether the inversion be partial or complete. The surface will be studded with many lumps (cotyledons), with surfaces from the size of half a dollar to that of the palm of a man's hand. The afterbirth may or may not be adhering to the cotyledons.

Treatment should be prompt. Remove all afterbirth that may be present, bathe the ulcers well with hot water containing about 5 per cent. laudanum. If she will rise, get two assistants to suspend the organ with a sheet, but if she will not rise it must be returned while she is down. Return promptly, but carefully, without lacerating, puncturing or tearing off any of the cotyledons. Arrange in as natural a position as possible, put three stitches in the vulva, and arrange a truss to prevent reinversion. Tie in a narrow stall, and build up the hind parts a foot higher than the fore, so that while either standing or lying, she is low in front. Give laudanum in two-ounce doses to check straining. Leave truss on until straining ceases, say, two days or longer

Mammitis.

Mammitis or inflammation of the udder, occurs in all stages of lactation. It is more common in freshly calved cows, but may appear at any time from various causes, as irregular milking, direct injury, wading through cold water, draughts, etc.

Symptoms.—There is usually a shivering fit (often not noticed), followed by an increase of temperature, more or less loss of appetite, and uneasiness. One or more quarters of the udder become swollen, hot and tender, and the milk of the affected quarters is altered in character, in many cases practically consisting of curds and whey. Sometimes blood is mixed with the milk.

Treatment—Give brisk purgative of two pounds Epsom salts, half an ounce of gamboge, and three onnces ginger dissolved in two quarts of warm water. and given as a drench. Follow up with three drachm doses of saltpetre three times daily, and feed on soft, light diet. Local treatment is very important. In consists in drawing the fluid out of the teats every few hours. Apply heat to the affected parts. If this heat be constant all the better; but care must be taken that heat and cold do not operate alternately. Hot poultices are the best, but if these cannot be applied the udder can be bathed long and often with hot water, and the gland well rubbed with camphorated oil after each bathing, and great care taken to exclude cold and draughts. Continue treatment until the inflammation subsides.

Mammitis does not always result in resolution (a complete cure). After inflammatory action ceases, we frequently notice some of the following conditions:

1—Atrophy, or lessening of the gland. In this case the udder is small, flabby and more or less inactive. All that can be done is to feed the cow well on milk-producing food, massage the udder frequently, and milk at regular intervals. It is probable she will not milk well until after the next calving.

2—Induration, or enlargement and hardening of a portion of the udder. This is also hard to treat. Give the cow one drachm iodide of potash three times daily. It is probable she will be able to stand this, but if appetite fails, she slavers from the mouth and tears run from the eyes, reduce the dose to forty grains. Rub the hardened parts well daily with compound iodine ointment.

3—Suppuration, or the formation of abscesses, is not uncommon. One or more circumbscribed portions of the gland will be noticed to become sore and hot and soon a soft spot appears near the centre of the enlargement. It must be lanced here, the pus allowed to escape, and the cavity flushed out three times daily with a five per cent. solution of carbolic acid. Treat each abscess this way. In the meantime give thirty drops carbolic acid in her mash twice daily until abscesses cease to form.

4—Gangrene, mortification, or death of one or more quarters may occur. The affected portion becomes cold to the touch, ceases to secrete milk, and becomes darkened in color. Practically nothing can be done except give tonics as drachm doses each of sulphate of iron and gentian, and antiseptics, as thirty drops carbolic acid three times daily. The quarter or quarters affected will become detached from the healthy portions and drop off. The removal of such with the knife or breaking down with the finger is advisable. There is danger of this condition causing death.

Fistula of the Teat.

Fistula of a teat occurs when a cow that is giving milk receives a wound on the teat that cuts the substance through to the milk duct, and the milk escapes through the wound. This accident frequently occurs by contact with barbed wire.

Treatment.—In cases where the introduction into the teat of a self-retaining teat syphon will carry off the milk without any oozing through the wound, this should be done, the wound carefully stitched with silk sutures, and dressed with a five per cent. solution of carbolic acid three times daily, and the syphon left in until it heals. In many cases the escape of milk through the wound cannot be prevented, and a fistula, or pipe, remains. In such cases nothing can be done until the cow goes dry. Then she should be cast and secured, and the edges of the fistula scarified, then stitched with silk, the cow allowed to rise, and the wound dressed regularly with carbolic lotion until healed. It will be found to be all right after next calving.

Obstruction of the Milk Duct.

Obstruction of the milk duct from the growth of a small tumor in the duct is not an infrequent occurrence in cows. Treatment for it is often asked by readers of the Family Herald. There appears to be a hereditary tendency in some families. A cow that has one or more teats affected will probably produce heifers that will suffer from the same condition. These tumors appear without apparent cause, and sometimes year after year, one teat and then another will become affected. On this account it is not wise to keep an affected cow for either milking or breeding purposes.

Symptoms.—In some cases there is an entire stoppage at once, usually detected when milking the cow just after calving, but it sometimes occurs during the period of lactation. In other cases it appears more gradually, the teat becoming harder to milk until no milk can be drawn. Upon careful manipulation between the thumb and finger a lump the size of a grain of wheat or larger, can be felt. It may be near the point of the teat or higher up, in some cases just at the junction of the teat to the udder.

Treatment.—The success of treatment depends greatly upon the location of the tumour. The nearer the point of the teat the greater the prospects of successful treatment. Many instruments have been especially designed for this purpose. Some remove a portion of the tumour, others pierce it and fimbriate the edges of the opening. Either method gives good results if the growth be not too high, provided the operation is skilfully performed, without injuring healthy tissue and drawing blood. Instruments, such as knitting or darning needles, should not be used, as they do no good and are very liable to set up serious inflammation. Unless a competent man with a proper instrument can be secured to operate, it is better to carefully introduce a teat syphon to draw off the milk occasionally and allow the quarter to become inactive.

Sore Teats.

Sore teats are caused in various ways, as by roughness or carelessness, a disregard for cleanliness, forcible traction by the calf, heat and cold operating alternately, scratches, etc. In some cases there are abrasions or raw surfaces at first, while in others the local inflammation aggravated by irrational usage causes abrasions, the teats are sore and tender to the touch, hence there is difficulty in milking, the scales fall or are torn off, and fresh ones form.

Treatment—Keep as clean as possible, but do not wash, especially in cold weather, as the reaction from warm water to cold air aggravates the trouble. If there is much difficulty in milking, use a teat syphon. Dress the sores three times daily with a soothing and softening application, as three per cent. carbolic acid in sweet oil, or the oxide of zinc ointment. Use the syphon only until the cow will allow you to milk by hand. The syphon should be well washed in boiling water and disinfected in a solution of carbolic or creolin between milkings.

Ringworm.

Ringworm is due to a vegetable parasite, hence is contagious. It appears in round, bald spots, usually about the eyes, face and neck. These patches, however, are liable to appear in any place; they are itchy, covered with whitish scales and surrounded by a ring of bristly, broken hairs with scales around the roots. If a scale be removed and its bottom surface examined with a lens, the parasites can be seen. The spots multiply rapidly in most cases.

Treatment.—Remove all diseased animals, and allow no intercourse between them and the healthy, as the parasite is very easily carried. Soften the scales with sweet oil and remove them, then dress the parts with a dressing that will destroy the parasite. The tincture of iodine, an ointment made of one part of white hellebore to four parts vaseline. A five per cent. solution of carbolic acid or

creolin, one part corrosive sublimate to 250 parts water, or any other good insecticide, applied daily for a few days will effect a cure. As the parasite is very tenacious of life, and will get on mangers or stall posts, and is liable to affect animals coming in contact, the premises should be well disinfected by washing thoroughly with a five per cent. solution of carbolic acid, and afterwards giving a thorough coating of hot lime wash, with five per cent. carbolic acid, before introducing fresh stock.

Foul in the Feet.

Foul in the feet consists in inflammation, followed by suppuration in the interdigital space. In extreme cases the coronet becomes seriously diseased, and it is possible the inflammation may extend and involve the joint. It may be caused by a foreign substance between the clouts, overgrowth of horn, injuries, etc.; but the most fruitful cause is standing in or walking through irritating substances, as liquid manure, rushes or low, marshy ground.

Symptoms.—The animal becomes lame, usually on the hind feet. An examination reveals inflammation and tenderness, possibly suppuration and rawness, between the hoofs. The coronets may or may not be swollen and sore.

Treatment.—Remove the cause, place the animal in a dry, clean stall, wash out between the hoofs and apply a poultice of warm linseed meal, change the poultice every eight hours until the soreness begins to subside, then dress with a cooling lotion, as one ounce sulphate of zinc to a pint of water. If the disease has been of long standing and sores with proud flesh are present, apply a little of equal parts butter of antimony and tincture of myrrh with a feather once daily for three days when changing poultices. Then dress three times daily with carbolic acid, one part: sweet oil, twenty parts.

Warts.

Warts are called epithelial excrescences. They appear without apparent cause. Some animals are particularly predisposed to them. In form warts may be flat or have constricted necks. They may appear any place and are of various sizes. In some cases crops of small ones appear suddenly, especially about the lips, and they may disappear in a short time without treatment.

Treatment.—When the warts are small and numerous, the daily application of castor oil appears to hasten their disappearance, but those with constricted necks should be removed by the knife and the raw surfaces dressed with butter of antimony once daily with a feather for three or four applications. Those with flat or broad bases should be dressed daily with butter of antimony or other caustic, and the corroded parts picked off occasionally until they disappear.

Bloody Milk.

In some cases of mammitis we observe blood in the milk. This is due to the disease and will cease to flow when inflammation subsides. We occasionally notice a cow giving bloody milk from one or more quarters without apparent cause and without apparent alteration or irritation of the udder. It is not infrequent to notice this occur freqnently in the same animal. In such cases it is due to a congenital weakness of the blood vessels of the mammae, and while it may be successfully treated, we cannot prevent its recurrence; hence an animal subjected to this condition is not valuable as a milker and should be fitted for the block. Neither is she valuable as a breeder of milkers, as she will probably transmit to her progeny her own weakness.

Treatment.—Feed lightly on dry food to check the secretion of milk. Bathe the affected quarter or quarters long and often with cold water, and give one ounce of tincture of iron in a pint of cold water as a drench three times daily until blood ceases to flow. Milk regularly.

Choking.

Choking in the ox is usually caused by the lodgment in the gullet of a piece of turnip, carrot, or other root, an apple, etc. It is seldom an ox chokes on soft food, and one has never been knowu to choke on pulped roots.

Symptoms.—The animal suddenly ceases eating and makes vain attempts to complete his imperfect swallow, champs his jaws, saliva flows freely from the month, and he is very uneasy. In many cases he bloats, coughs, and there is often noticed a forcible expulsion of faeces from the rectum.

Treatment.—There is probably no ailment or condition in which irrational treatment causes death in so many cases as in choking. It is not seldom that the owner or attendant passes a whip stalk, broom handle, rake handle or other like instrument down the animal's throat with the idea of dislodging the obstruction and forcing it to the stomach. In some cases the operation

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succeeds, but in many the instrument passes alongside the obstruction and ruptures the gullet. The operator think he has anceeeded in dislodging the obstruction, bnt the neck and throat of the patient soon begin to swell, he cannot eat or drink, and in a few days dies. A post-morterm reveals a ruptured gullet, and in most cases the presence of the obstruction still in it.

The first thing to do is to locate the obstruction if possible. This can be done if it be in the throat or region of the neck, but if in the thoracic portion of the gullet it cannot be felt. The cartilagenous box at the eommencement of the wind-pipe must not be mistaken for the foreigu body. If in the throat it may be reached with the hand (by placing a elevis or other contrivance in the mouth to keep it open) and removed. If in the region of the neck endeavor to remove it by mancipulation, and if this cannot be done, a little oil may be poured down the gullet, which will cause eoughing, and probably dislodgement of the obstruction. In many cases it is necessary to force the object dowu. For this purpose, a probang, which is a flexible tube with a eup-shaped disk on the end, that will grasp the object in the eavity, instead of slipping alongside of it, is the proper instrument. A piece of wood, called a gag, abont 2½ inch wide, with a hole in the eentre for the probang to pass through, must be kept in the mouth. Where a probang cannot be procured a piece of ordinary ¾ or inch garden hose answers the purpose. If this be not strong enongh it can be strengthened by using a green switch or sharp end be passed. Apply steady, bnt, if necessary, eonsiderable force. If the bloating be excessive, it is sometimes necessary to puncture the rumen and allow the gas to escape, before the probang ean be passed, as otherwise the resistance of the gas forcing npwards on the object in the gullet, combined with the resistance of the object itself, is greater than can be overcome. If it cannot be dislodged in this way a veterinarian should be sent for, and he will ent down on the obstruction and remove it.

Actinomycosis or Lump-Jaw.

Lump-jaw is an affection of the soft tissnes and bone caused by the entrance into the circulatiou (through an abrasion) of a specific fungus. This causes the formation of a tumor, nsually in the region of the face, jaws or throat, but freqnently invades other tissnes. In a large percentage of cases the bones of the jaw are invaded, and they increase largely in size. In many cases a dirty looking pus is formed, the skin breaks and there is a discharge for a variable time. The eruption may take place several times or there may be no eruption. The general health of the animal is seldom interfered with in the early stages, but if the tumors become large enough to interfere with the functions of any vital

organ, or the bone becomes sufficiently diseased to cause a loosening of the teeth the animal's thriftiness will be impaired. Neither the meat nor the milk of a diseased animal is considered healthy, and any person is liable to prosecution who offers either for sale.

Treatment.—In cases where the soft tissues only are involved, the tumor can be carefully dissected out, the wound stitched and dressed with a 5 per cent. solution of carbolic acid until healed. The "Iodide of Potassium Treatment," frequently described in the Family Herald, has given good satisfaction, and when resorted to in a reasonably early stage, usually effects a cure. If the bone is greatly enlarged this will not entirely remove the tumor, hut arrests the disease. This treatment consists in giving the animal iodide of potassium three times daily until what is called "Iodism" (poisoning by iodine), is produced. Commence hy giving drachm doses and increase the size of the dose daily, say, give 70 grain doses the second day, 80 the third, 90 the fourth, until appetite fails, the animal drinks little, tears run from the eyes and saliva from the mouth. These symptoms indicate iodism, and as soon as they appear the administration of the drug must be ceased. If necessary the animal may be treated again in six to eight weeks.

Note.—In some cases the tongue is the seat of disease, when it is called "Wooden Tongue." The organ become enlarged and hardened, the animal salivates a great deal, cannot prehend as usual with the tongue, and fails in condition. Treatment, same as above.

Ointment for Sore Teats.

An ointment of which all owners of dairy cows should keep a snpply on hand during the spring and summer months, is made by hlending :—

1 drachm of oxide of zinc with
1 ounce of vaseline.

This makes an excellent dressiug for cracked or sore teats in cows, and a small quantity of it should always be kept within reach for application to the teats whenever there is an ocasion therefor. Another useful dressing for the same purpose consists of :—

Tincture of myrrh..... 1 ounce.
Solution of alum ..... 1 ounce.
Water . ..... 6 ounce.

Cow Pox.

Cow pox is due to a specific germ, hence is contagious, and readily commnnicated from a diseased to a healthy animal hy the milker or hy any means of contact and great care is needed to prevent its spread.

Symptoms.—Usually constitutional symptoms are slight. The first local symptoms are slight swellings on teats or ndder, or both,

with redness at first diffused, but becoming more circumscribed. Small nodules appear; this is called the papular stage. Next comes the vesicular stage, when little blisters, usually compressed in the centre and assuming a bluish tinge, appears. Then pus is formed, called the pustular stage, the pus either escapes by rupture or becomes absorbed and a brown scab forms; this remains for some time, and if removed will re-appear.

Treatments.—Milk regularly (the milk is not considered fit for use). If necessary use a teat syphon, as for "sore teats." Dress the parts three times daily with an ointment made of four drachms boracic acid, 20 drops carbolic acid, and 2 ounces vaseline, until cured.

Methods of Drenching Cattle.

The popular method of drenching is with a bottle. The use of a drenching tube is, however, far more satisfactory. A drenching tube may be made by taking an ordinary tin funnel, and inserting the narrow end into one end of a rubber tube or hose, say three feet long and three-eights or one-half inch in diameter; into the other end of the rubber tube is inserted a piece of three-eights-inch brass or iron tubing, about four to six inches long.

The metal tube is placed between the animals back teeth, and the sheep or calf is allowed to bite upon it The water or drench is poured into the funnel, which may be held by an assistant or fastened to a post at a convenient height. The man who holds the metal tube between the animal's teeth can control the animal's head with the left hand, and by holding the tube in the right hand, near the point of union of the rubber and metal tubes, he can easily control the flow of the fluid by pinching the rubber hose. Care must be taken not to hold the patient's nostrils closed, otherwise the dose will enter the lungs.

COMMON DISEASES OF SHEEP.

Tympanitis or Blosting.

Sheep suffer from almost the same stomachic troubles as cattle, the most common perhaps being tympanitis. This is caused by the animal eating freely of food that ferments easily, as green clover rape or turnip tops. It may arise, however, from any change of food, from overloading the stomach, or from a non-active condition of the secreting glands of the stomach. The most fruitful cause probably is eating rape early in the morning when it is slightly frosted or damp with dew. After the sheep have been on rape for a few days, this danger is practically passed, but if turned on it for the first time under said conditions the danger is great.

Symptoms.—The animal ceases eating, and usually wanders away from the flock. The breathing is distressed in proportion to the extent of the bloating. A fullness of the abdomen, more or less marked, is noticed, especially on the left side. If the bloating be excessive and prompt relief is not given, death results very quickly either from suffocation or rupture of the rumen or diaphragm,

Treatment.—If bloating be excessive, and the symptoms distressing, puncture on the left side just in front of the point of the hip. If a trocar and canula (the proper instrument) cannot be had, use a pocket knife. The gas must be allowed to escape. If the bloating is not excessive, give half an ounce of oil of turpentine in four ounces of raw linseed oil. Repeat in an hour if necessary. It is good practice to give a purgative of six to eight ounces of raw oil or Epsom salts in a solution after an attack, and feed lightly for a few days. Good care must be exercised in drenching sheep in order to avoid complications through some of the fluid pasing down the windpipe. The sheep should be held on her rump by an assistant and the fluid poured very slowly into the mouth out of a narrow-necked bottle, not allowing more than an ounce into the mouth until she swallows.

Grubs in the Head.

Grubs in the head cause the death of many sheep every year. They are caused by the sheep gad fly (Oestrus ovis) depositing its larvae in the nostrils of the sheep. These larvae make their way up the nostrils and through the little openings into the sinuses (cavities that contain air) of the head, attach themselves to the mucous membrane, and remain there and develop.

Symptoms.—During the early spring months, and especially on a nice warm, bright day, the sheep affected are noticed to be uneasy, shaking their heads and sneezing. There is usually a discharge from the nostrils, at first watery, but soon becoming purulent. As time goes on the symptoms increase in severity, the patients lose appetite, cough or sneeze a great deal, and become emaciated. In some cases the violent sneezing dislodges the grubs when the patient gets better. In others the grubs die and remain in the sinuses, when the sypmtoms become mitigated, but on account of the foreign bodies in the sinuses, the sheep do not thrive well, although continuing to live.

Treatment has seldom been successful. Trephining (boring a hole into the sinus from the outside) and removing the grubs has sometimes been successful, but it is impossible to locate the grubs definitely, and it may be necessary to trephine into each sinus. This operation can be performed only by a veterinarian, and its success has been so slight it is not often performed.

Preventive treatment is strongly indicated. It consists in preventing the deposits of the fly. This can be done by smearing the lips and nostrils of the sheep with tar twice weekly, and mixing tar with salt, during the months in which the flies prevail—July and August and the first half of September.

Catarrh.

Catarrh occurs in sheep that have been exposed to wet and cold, especially wet, as sheep can stand considerable cold if kept dry. Catarrh sometimes occurs as an epizootic.

Symptoms—There is depression and more or less marked loss of appetite. The lining membrane of the nostrils is red and inflamed, and there is at first a thin watery discharge, which, as the disease advances, becomes thick and purulent and sometimes tinged with blood. The eyes are half closed and the lids often gummed together with a yellow secretion. Prostration and emaciation are rapid; the pulse becomes very frequent and weak; respiration difficult, appetite lost, and the animal soon dies.

Treatment.—Remove the sheep to dry, comfortable and well ventilated quarters. If the bowels are costive, give four to six ounces of raw linseed oil. Give her anything she will eat, and if she will not eat anything drench her carefully every three or four hours with boiled linseed or new milk and eggs, to which has been added one to two onnces of whiskey. Give saltpetre four times daily by placing one drachm well back on the tongue with a spoon. Steam the nostrils occasionally, say twice daily, by holding her head over a pot of boiling water, to which has been added a teaspoonful of carbolic acid.

Wool Balls in the Stomachs of Lambs.

Many lambs, especially early ones die snddenly every year, and the owner is often at a loss to find out the cause. A careful post mortem will often reveal one or more balls of wool in the fourth stomach. One of the balls may be more or less firmly impacted in the pylorus (the opening from the stomach to the small intestine. In other cases the balls are loose in the stomach. When a ball becomes impacted in the orifice it stops all passage from the stomach, and death may follow quickly. In other cases when the ball stops the passage there is more or less struggling, and during the struggles the obstruction is shifted, after which the animal becomes easy. This may go on for months, the lamb being unthrifty and eventually dying. The trouble is caused by the ewes not having sufficient milk to satisfy the lamb or lambs. The little fellows nibble and suck the wool, swallow a few fibres, which generally reach the fourth stomach, and remain there, where they gradually accumulate, and form into a ball or balls, which act as stated.

Treat.—Curative treatment is of no avail. Simply nothing can be done, hence prevention is strongly indicated. This consists in seeing that the lambs get sufficient nourishment. If the ewe has has not sufficient milk, cow's milk should be substituted. As soon as the lambs will eat they should be supplied with finely pulped roots placed in a corner and so arranged that the ewes cannot reach them. Shearing the wool of the udder and surrounding parts acts as a partial preventive.

Apoplexy.

Cerebral apoplexy is not uncommon in sheep that are highly fed, kept in warm quarters and get little exercise.

Symptoms.—The sheep appears dull and partially unconscious of surroundings. The nostrils are dilated, the breathing difficult and noisy, the pupils dilated. In some cases the animal will leap into the air fall, and, unless promptly relieved die in a few minutes.

Treatment.—As soon as the first symptoms are noticed, purge with four to eight ounces raw linseed oil. Repeat in six hours if purgation is not established. Place in cool, dry and well ventilated quarters. Feed lightly and see that she gets regular exercise. If the symptoms are alarming she must be bled from the jugular vein, one or two pints of blood being drawn to relieve at once the congestion of the brain.

Tape Worm.

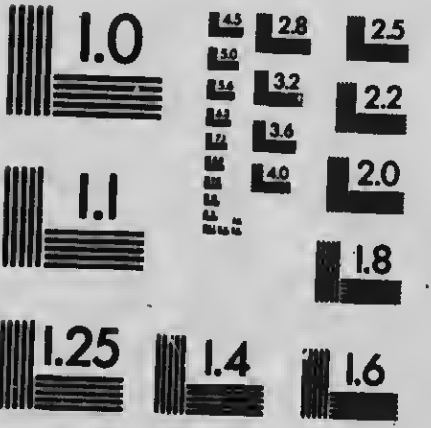
Tape worm (Taenia fimbriata) is quite common in sheep. Sheep become affected with the parasite while pasturing or drinking where dogs have scattered the eggs. The presence of the parasite is particularly noticed in sheep that have pastured on low-lying, swampy land, where dogs frequently run after hares, etc., during the hunting season. Tape worm is not common in sheep that pasture on high land.

Symptoms.—The parasites may be present in the intestines for a considerable time and no well marked symptoms be shown, but when they are present in large numbers the animal—lamb, yearling or two-year-old (it is not common for mature sheep to suffer much) becomes unthrifty. In some cases sections of the worm will be noticed in the droppings. The animal eventually dies from emaciation, and a post-mortem reveals the parasites present in the intestines in almost incredible numbers and lengths.

Treatment.—Prevention consists in keeping sheep off affected pastures. Curative treatment, unless carefully given, is disappointing. A decoction of pumpkin seeds made by breaking the seeds, adding water, placing in a pot on the stove, and bringing to a boil, then allowing to simmer for five or six hours, and pouring off the liquid, has given fair satisfaction. The sheep must be fasted for twelve to fourteen hours, and then the product of two to four

MICROCOPY RESOLUTION TEST CHART

(ANSI and ISO TEST CHART No. 2)



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ounces of the seeds, according to size of patient, is given to each. They should be kept in an enclosure and nothing given to eat for for three or four hours after dosing. The droppings for the next fourteen to eighteen hours, which will generally contain considerable numbers of the parasites should be gathered and burned. The flock should be treated this way once every two weeks until rid of the pest, A mixture of 14 parts new milk and one part oil of turpentine well shaken together, acts nearly as well as the pumpkin seed, and is much more easily prepared. The same doses are given and the same mode of treatment adopted.

Scab.

Scab is produced by a parasite that burrows into the skin. There is extreme irritation, and a serum is seen to exude. This, in drying, forms the scab which brings the wool away with it in larger or smaller patches. The disease is very contagious, and the insect is very tenacious of life. It is said to have remained in a pasture for two years and then spread the disease.

Symptoms.—The sheep are unthifty, restless and irritable. They rub themselves against fences or buildings, bite themselves and scratch with their hoofs. Scabs form, the fleece becomes ragged, and drops off. If a scab be picked off and the under side examined with a lens the parasites can be seen in numbers.

Treatment.—The Government demands that the Veterinary Department be at once notified when any suspicion of scab exists, and a Government inspector is sent to take charge of the cases and quarantine the district. All affected sheep, and those that have been exposed to the contagion, must be isolated and treated every ten days with some of the commercial sheep dips until the disease is stamped out.

Foot Rot.

Foot rot is a contagious disease due to a specific virus. The discharge from an affected animal adheres to the grass, etc., and infects other sheep grazing on the same pasture.

Symptoms.—The sheep become lame. The skin around the coronet becomes red moist, warm and rough. Soon there is a discharge, ulcers form, the walls of the hoof become disorganized, and the disease penetrates into the interior parts of the foot, separating the sensitive and unsensitive portions. The sheep will often be noticed walking on their knees while grazing.

Treatment.—Isolate all affected and remove the others to non-affected pastures. Cut away all partially detached horn and dress the ulcerated parts with equal parts of butter of antimony and tincture of myrrh applied with a feather once daily until all proud flesh has disappeared. Then dress three times daily with carbolic acid, one part, sweet oil, twenty parts. Keep in dry, clean quar-

tons. If large numbers are diseased, a trough containing a solution of sulphate of copper, about one grain to a quart of water, can be arranged through which they can be driven every few days instead of dressing each with a feather, as stated.

COMMON DISEASES OF SWINE.

Crippling.

Crippling, like many of the non-contagious diseases of swine, is caused by high-feeding and want of exercise. It is seldom that any trouble of this nature is seen in the warm months when pigs are allowed to run at large, or even if confined in small quarters, if fed liberally on green food.

Symptoms.—The pigs are noticed to go stiff or lame in one or more limbs. The hind limbs are more often affected than the fore. The animal lies most of the time, except when feeding, The lameness daily becomes more and more marked; he will sometimes drag his hind quarters when going to the trough for food, and as soon as he is through eating makes his way back to his bed and lies there until next meal time. The bowels are costive. and while the appetite is usually good, the pig does not thrive. At last he becomes a perfect cripple, and is unable even to drag himself around. his appetite becomes impaired, bowels obstinately constipated, and he either dies, or if nursed and fed, continues to live for a greater or less time. In many cases one after another in the same pen or under similar conditions show like symptoms, and the owner often thinks it is a contagious disease, but the same causes are operating in all.

Treatment.—Preventive treatment consists in, if possible, allowing, or, if necessary. forcing. regular exercise, giving liberal allowances of green food, or in winter time substituting raw roots for such. Where the quarters are small, and exercise not possible in cold weather, the bowels should be kept loose by feeding daily a little of equal parts sulphur, Epsom salts and charcoal. Curative treatment consists in purging with two to six ounces Epsom salts on the appearance of the first symptoms. If the dose does not act in twelve to eighteen hours repeat it. Feed lightly, and give some of the above mixture in food every day. Give plenty of raw roots, or grass if it is in season, and force the patients to take exercise. Great care must be taken in drenching a pig, as there is danger of causing choking. The safest way is to put the solution into a bottle; get about six to eight inches of rubber hose, force one end over the neck of the bottle; get a rope in the patient's mouth

behind the tusks; tie it or get an assistant to hold it high enough to slightly elevate the pig's head; put the hose into the side of his mouth and elevate the bottle. The pig will chew the rubber, and at the same time extract the fluid from the bottle and swallow it without danger. Other systems that act upon the same principle will answer the purpose, but it is very unsafe to pour liquid into the mouth, especially when the animal is squealing.

Thumps.

Thumps is another abnormal condition caused by high feeding and want of exercise.

Symptoms.—The bowels are constipated, the patient is dull and does not care to move. The appetite is more or less impaired, and there is difficulty in breathing. The animal lies a good deal, breathes short and frequent, and makes a peculiar thumping noise, hence the name.

Treatment.—Give two or six ounces Epsom salts, according to size. Especial care must be taken in drenching him. It is good practice to give injections of soapy water per rectum. Feed on small quantities of easily digested food, and give enough of equal parts sulphur, charcoal and Epsom salts daily to keep the bowels loose. If necessary, force him to take daily exercise.

Bronchitis.

A form of bronchitis that in many cases appears to be of a contagious nature frequently appears in a herd without appreciable cause. It usually appears in hogs that are housed in more or less confined quarters, or in pens that are damp, poorly drained or not kept clean. When once it has appeared in a herd, it is very hard to check, even though the quarters be changed.

Symptoms.—Those attacked cough or sneeze occasionally. At first, appetite or thriftiness are not materially interfered with, but after a time the coughing becomes more frequent, especially if the patients be exercised or excited, and the appetite becomes impaired. The symptoms increase in severity, and the patient gradually fails and eventually dies. In the meantime others are showing symptoms. Sometimes we see a chronic case, the symptoms of which remain about the same. The bowels are irregular. The general symptoms strongly simulate those of swine plague.

Treatment.—All that show acute symptoms should be destroyed, and the carcases deeply buried and covered with quick-lime before earth is thrown on. All openings of the building should then be closed and sulphur burned as long as the attendant can stand the fumes. This fills the compartment with the fumes and forces the swine to inhale them. When the attendant cannot stand it any longer, the doors, etc., should be opened and fresh air admitted.

This treatment should be repeated every ten days as long as necessary. When the disease has been stamped out or the herd disposed of, the premises should be thoroughly disinfected and allowed to stand empty a few weeks before introducing fresh stock. To disinfect, sweep thoroughly, then apply a five per cent, solution of crude carbolic acid to all parts with a brush or spray pump, the latter preferred. In a week give a thorough coat of hot lime wash, with five per cent. crude carbolic acid, and it will be all the safer if this is repeated in a week.

Diarrhœa in Young Pigs.

Young pigs freqnently suffer from diarrhœa. It is usually dne to some abnormal condition of the sow's milk, and treatment must be directed towards rectifying this. The sow should be given good, nourishing food, of which grain forms the largest part. A mixture of equal parts of powdered charcoal and salt should be placed where both the sow and pigs can take it at will. The sow should also be given a tonic. Take one pound each of powdered aniseed, chalk and gentian and four ounces of bicarbonate of soda. Mix and give a tablespoonful in each feed.

Inversion of the Rectum.

Inversion of the rectum is not uncommon in swine. It is caused by opposite conditions, that is, either constipation or diarrhœa. In the former case the intestine protrudes as the result of excessive straining, as the animals endeavor to expel the contents of the impacted bowels, and in the latter from excessive straining due to irritation of the intestines.

Treatment is often unsatisfactory, hence preventive measures are strongly indicated. They consist in keeping the bowels in a

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normal condition by proper feeding and environment. When the condition is dne to constipation, curative treatment consists in removing all the faeces that can be reached with the finger and by injections of raw linseed oil. Wash the protruded intestine well with warm water, and then apply strong alum water (as much powdered alum as warm water will dissolve), and then carefully forcing back into position. Give the patient a laxative of two to six ounces of raw li· eed oil, according to size, and feed on easily-digested, laxative fo.d. Remove the contents of the rectum with the finger every few hours, and then inject a little of the alum water. If diarrhoea be the cause of the trouble, the local treatment to the protruded intestine should be the same as the above, and the constitutional treatment should consist in feeding on dry chopped grain and giving one to four drachms each of laudanum and powdered catechu in a little cold water as a drench every three or four honrs until diarrhoea ceases.

Lice.

Like all classes of farm stock, pigs are liable to suffer from lice. Any of the ordinary insecticides, such as carbolic acid, creolin, Jeyes' fluid, phenyle, zenoleum, etc., in a solution of one part to twenty parts of water, applied once every three or four days, will destroy them. A favourite and effective application is equal parts coal oil or crude petroleum and fish oil. The principal objection to this, as to all oily applications, is that it collects dust and dirt and soils everything the animal comes in contact with. It is necessary to give the premises a thorough washing with a five per cent. solution of carbolic acid (the crude carbolic acid will do), and follow up with a thorough coat of hot lime wash with five per cent. carbolic acid, in order to prevent the swine again becoming lousy.

Quinsy.

Quinsy is not an uncommon disease in swine. It consists in inflammation of the glands of the throat, and is caused by cold, draughts, dampness, etc.

Symptoms.—The animal has difficulty in swallowing, His tongue usually protrudes from the mouth, and saliva flows freely. There is usually a swelling of the lower jaw and neck.

Treatment is difficult, and not often successful. The animal must be cast, his mouth held open with some contrivance, as a small clevice, and the swollen glands scarified with a sharp knife until they bleed freely. As soon as blood flows let him up for fear of suffocation. Apply cloths wrung out of hot water to the neck, or rub well with mustard mixed with oil of turpentine, and tie flannel cloths around the throat. Swab the tonsils frequently with equal parts of oil of turpentine and sweet oil.

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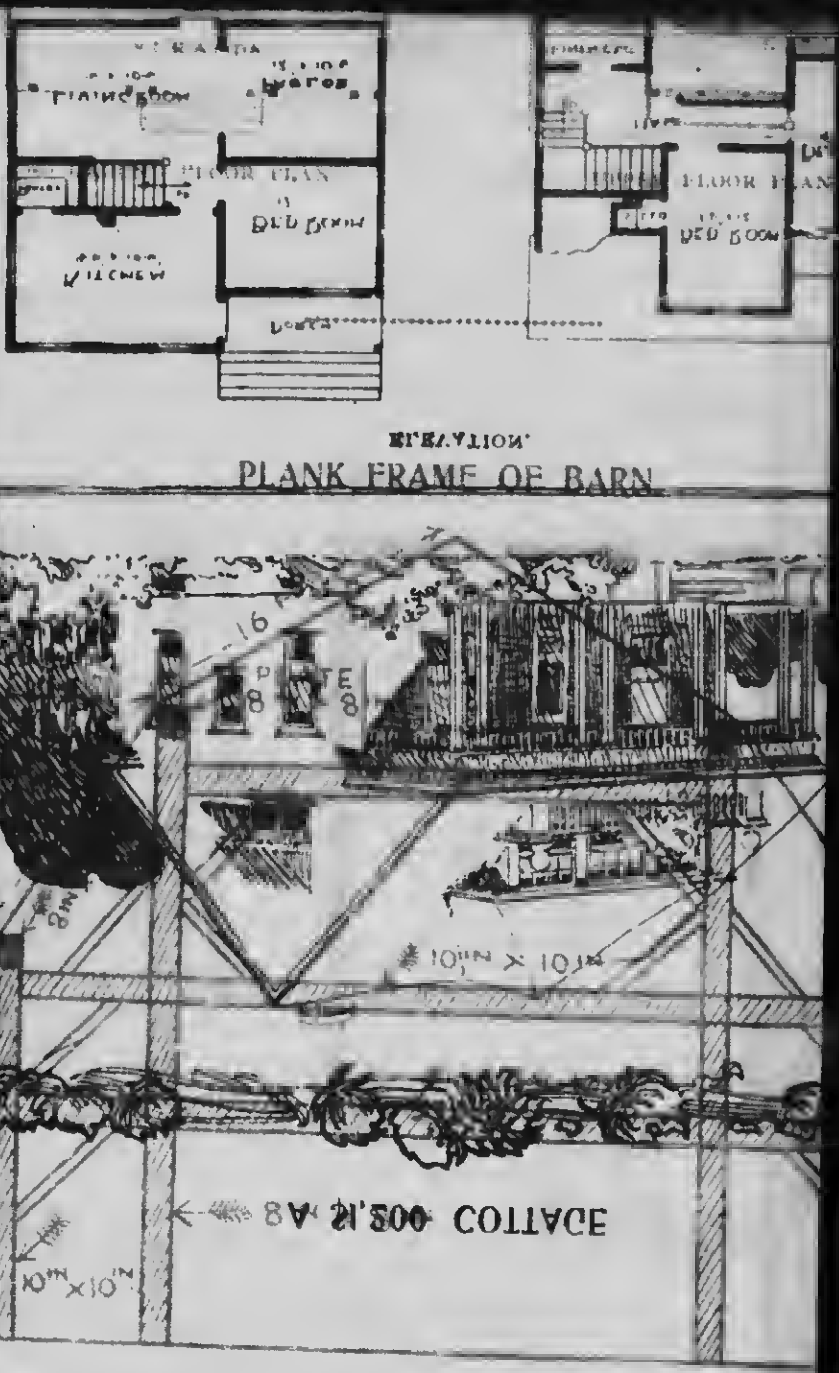
Sheet to go in pocket

2652X10 *EVERYBODY READS*

The FAMILY HERALD & WEEKLY STAR

OF MONTREAL



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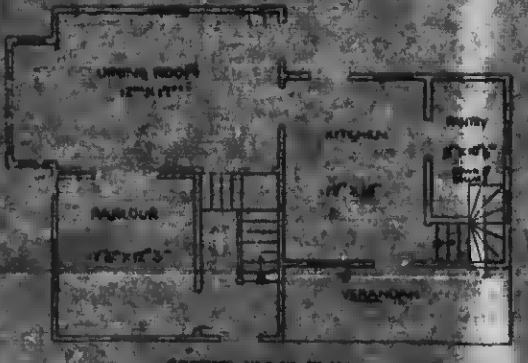
A $1,200 COTTAGE

ELEVATION.

GROUND FLOOR PLAN. UPPER FLOOR PLAN.

A COMFORTABLE FARM HOUSE.

ELEVATION.

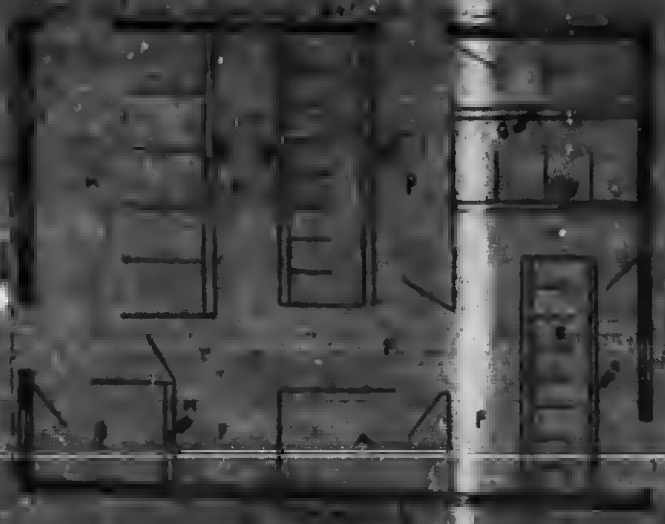


GROUND FLOOR PLAN

PLANK FRAME OF BARN

TWO BENTS IN A PLANK FRAME BARN SHOWING ARRANGEMENT OF PLANK

A WELL ARRANGED STABLE.



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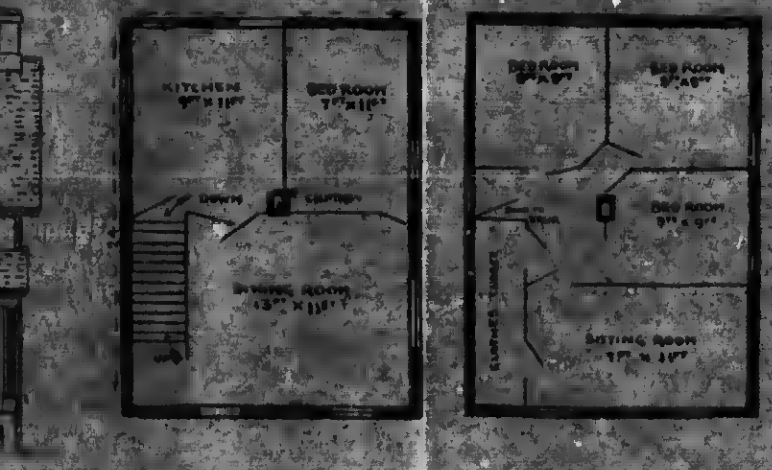

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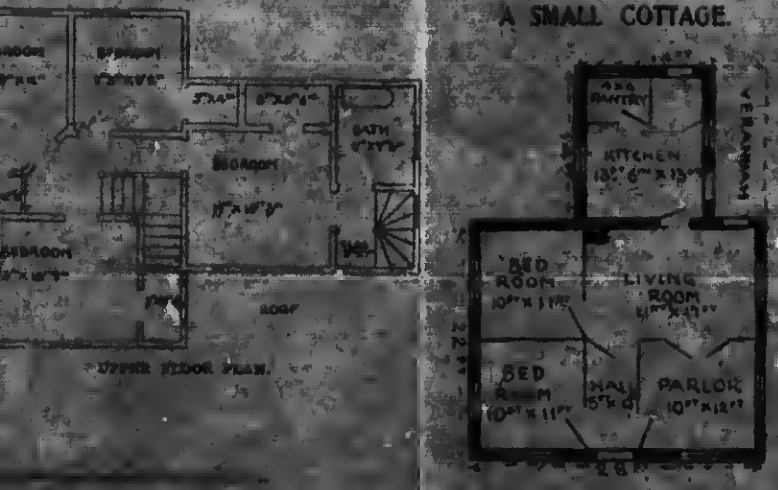

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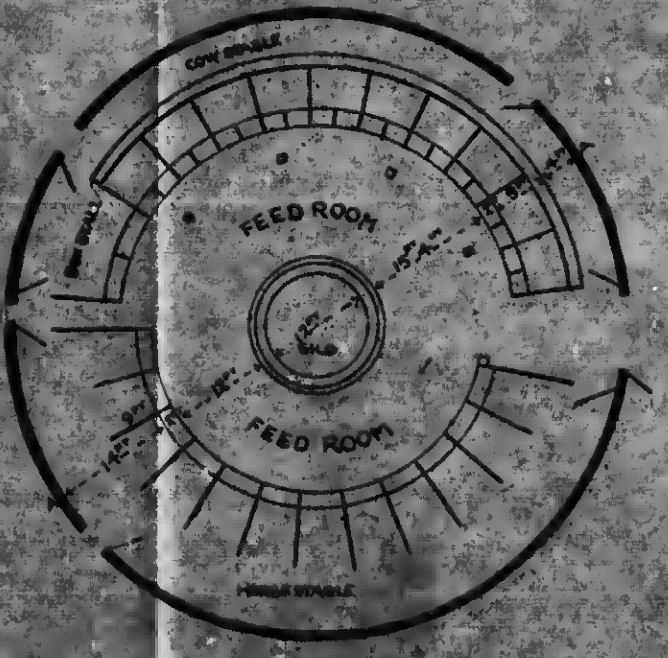

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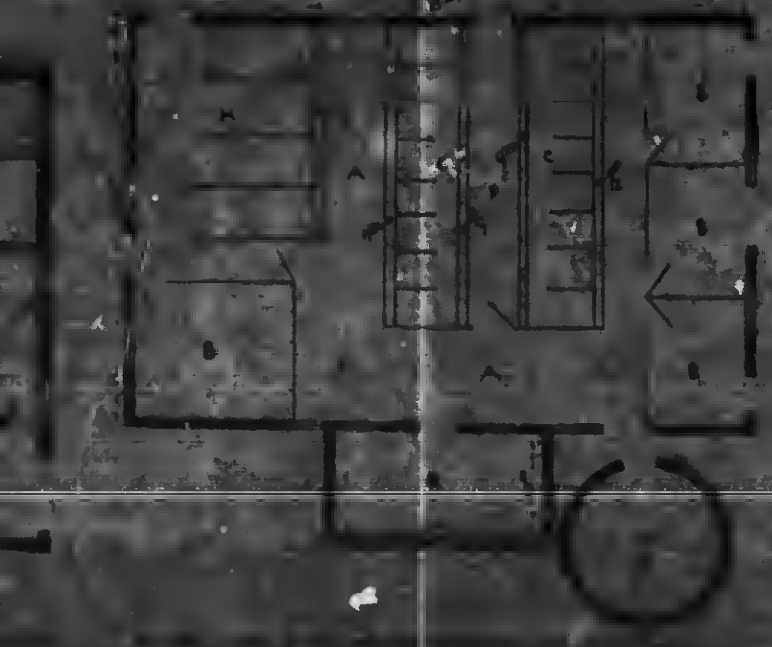

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