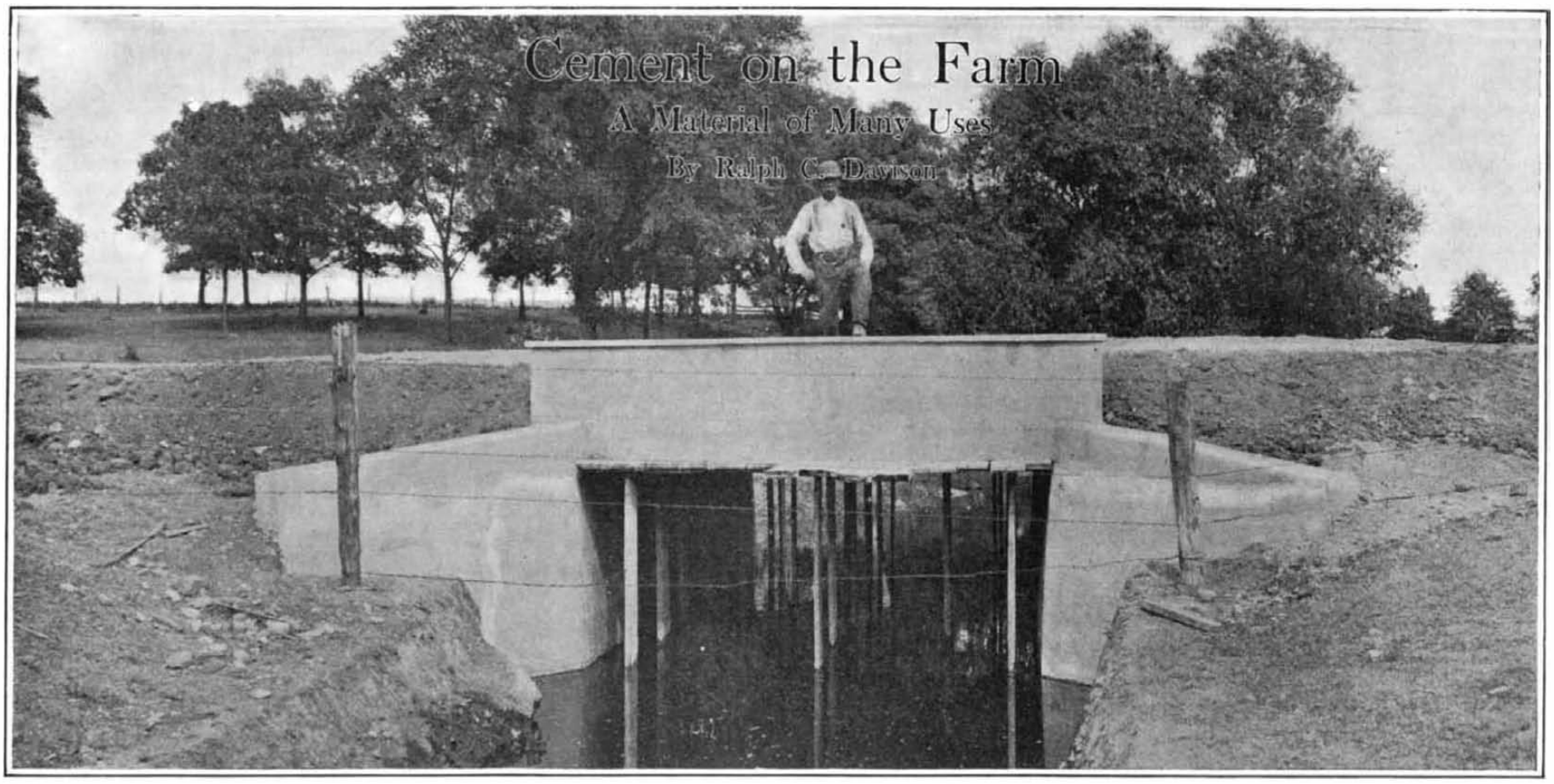


Cement on the Farm

A Material of Many Uses

By Ralph C. Davison

FARM owners and operators are appreciating the economic value of concrete more and more every year. It is not only the large farmer who can use concrete to advantage, but the small farmer can do so as well.

The use of concrete on the farm is practically unlimited, therefore we can only mention a few of the many uses to which it can be put. These, however, may seem many to the uninitiated, or to those who have given but little thought to the subject.

Among the most popular uses are the making of fence posts, walks, barn floors, watering tanks, lawn rollers, drains, foundation posts and floors for corn cribs, windmill foundations, root cellars, retaining walls, culverts and bridges, dams, silos, cow barns, stepping blocks, hot-houses, hot-house benches, hens' nests, poultry houses, smoke houses, granaries, hitching posts, porch columns and foundations, garages, barns, hog troughs, piggeries, dairy houses, and ice houses.

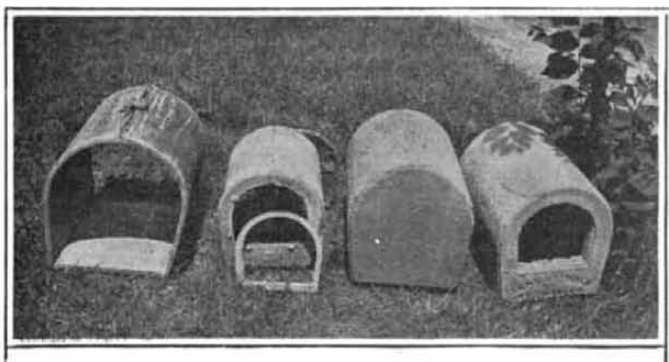
What makes concrete to-day more popular than ever is that it is an excellent substitute for lumber, the cost of which within the past few years has reached almost prohibitive figures. Therefore it is only natural that a material which has as many advantages over lumber should appeal to the farm owner as strongly as it does.

Aside from its moderate cost, concrete is more durable and sanitary than wood, its maintenance cost is practically nothing, and it is absolutely fire-proof. Thus the fire risk, excepting the contents, is entirely eliminated where it is used. Another point in favor of concrete may be found in its ornamental possibilities. Being of a plastic nature, it can be molded into plain or ornate designs as fancy dictates, and if the owners artistic taste runs to color, he may insert, here and there, a colored tile. This will break the monotony of even the plainest design, and will also add individuality to the work. When making hitching posts, horse blocks, retaining walls, gate posts, etc., effective surfaces may be obtained by placing varied-colored field stones near the sides of the mold. Then when the mold is removed these will show plainly on the face of the work. Surprisingly beautiful and attractive results can be obtained in this way with but little skill and ingenuity.

The cost of concrete is trifling, for in most instances sand and stone suitable for the work can be found on one's own farm, or if not, some nearby farm will have a good deposit of sand or gravel which one can get for the hauling. Therefore the only cash outlay required is that for the cement, and this is sold for a remarkably low figure. Just to give the reader some idea of how easy it is to make useful things in concrete, a few general instructions are given below.

For instance, we will take a watering trough. Every farmer knows the necessity of a good watering trough for his stock. It is probably one of the most useful and essential devices about a farm, and when made of concrete it not only presents a pleasing appearance, but is also practically indestructible. Watering troughs can be made with or without reinforcing. If reinforcing is used, the walls of the trough can be made thinner. The forms are simple to make. As a rule, it is best to make the trough where it is to be permanently located; for if not, on account of its weight, one will have trouble in moving it around. The first thing to do is to build a bottomless wooden box, the inside dimensions of which must correspond to the outside dimensions of the finished trough. Locate this on the ground where the trough is desired, and tamp the earth, which now forms the bottom of the box, down good and hard. On the ground thus tamped deposit concrete for a depth of about six inches; this will form the bottom of the box or trough. After tamping the concrete, and while it is still soft and wet, set the inner form on it. This consists of a box, the outside dimensions of which are the same as the desired inside dimensions of the finished trough. Oil or grease the outside of this mold well, and be careful to set it central, so that all four sides of the trough will be uniform in thickness. Then fill molds, and level off flush with the top. Let the forms remain in place for two or three days before removing so as to give the concrete a chance to become hard. The principal precautions to take in building a concrete water tank are to see that a rich mixture is used, that it is poured in a moderately thin consistency, and that the forms are completely filled in one operation.

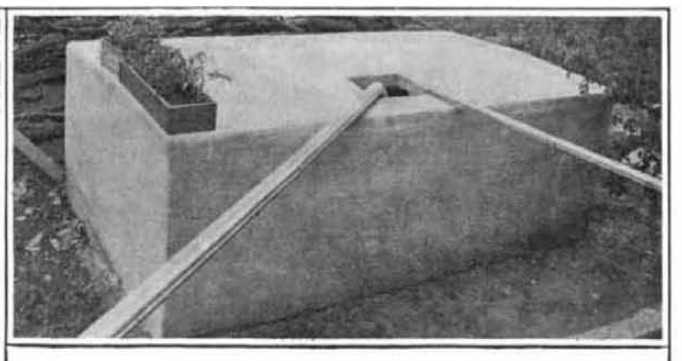
A good heavy roller is always useful about a farm. For a trifling cost an excellent concrete roller can be made. A piece of sheet iron can be used for the outer form. It should be formed into a circle, and held in shape by wrapping it firmly with light-weight wire. In the center of this circular form is placed a gas pipe, through which the shaft can be inserted when the roller is complete. After the form has been set up and the gas pipe properly centered, it



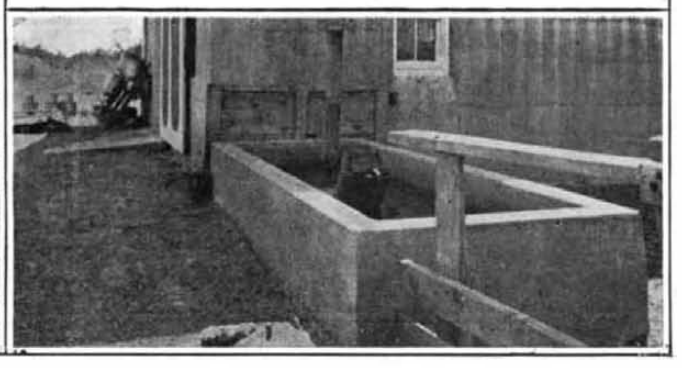
Concrete hens' nests and mold.

Circular trough and wooden sweep with which mold was formed.

A gate post built of concrete.



A covered concrete cistern.



Watering trough fitted with a portable cast-iron stove.

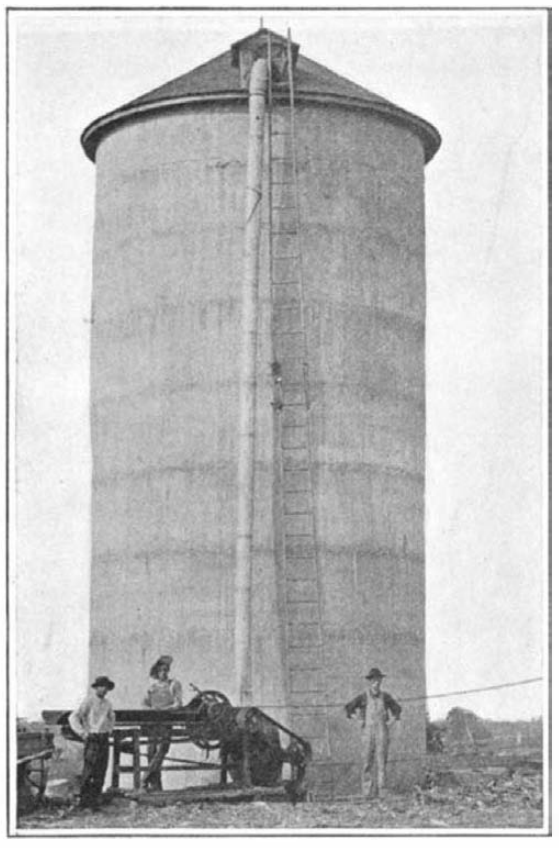
THE VERSATILITY OF CEMENT

should be filled with a good wet mixture of concrete. The inner side of the sheet-iron form should be well greased, so that it will come away easily from the cast and leave a nice smooth surface. It would be well to leave the molds or forms in place for three or four days after the concrete has been poured and then remove them, and wet down the cast every day for at least a week or more, in order to harden it thoroughly.

Good dry paths or walks connecting the various outbuildings around a farm are most convenient, especially in the spring time, when the soil is soft and muddy. These when properly made always look neat, and require no repairing. Weeds do not grow up in them, nor are they washed out with heavy rains as are dirt paths. One of the most essential features of a concrete path is the foundation. This should be made of some porous material, such as cinders. It should be at least six inches deep, and should be tamped down well and leveled off fairly smooth. On top of this should be placed at least three inches of concrete, made up of one part Portland cement to two parts of sand and from four to five parts of gravel or broken stone. Tamp this mixture until the water begins to show on top, and before it has started to dry or set a one-inch-thick top wearing surface should be laid on it. This top layer should be made of one part of cement with one and a half to two parts of good clean sand. It should be allowed to dry until it is fairly stiff, and then it should be smoothed off with a wooden float. Protect the surface from the sun, and keep it well wet down for two or three days, so as to harden it. If the walks are of considerable length, it would be well to put in expansion joints to prevent cracking.

From the above it will be seen that there is nothing very difficult or complicated about working in cement. The use of concrete fence posts is something that is becoming very general. This is due not only to the scarcity and high price of good straight-grained wood posts, but to the almost unlimited life of the concrete posts, their great strength and their neat and pleasing appearance. It is claimed that excellent concrete fence posts, about seven feet in length, can be made on the farm for from twenty to thirty cents apiece. This does not include labor cost, but represents only the cost of material for the concrete and the wire reinforcing for each post.

The Department of Agriculture at Washington, D. C., has just issued a bulletin on "How to Destroy the Rat." Rats devour grain, carry infectious diseases from house to house, and have become such a pest that the Department has made exhaustive investigations looking to their destruction. Obviously, the most direct procedure is to rob them of their nesting place, and with this object in view concrete floors are recommended for barns, poultry houses, corn cribs, and granaries. The experience of many farmers is, that



Filling a monolithic concrete silo.

grain mature enough to be placed in storage will not spoil on concrete floors, nor will corn mold in contact with them if there is good ventilation and the roof is tight.

Another use for concrete is the building of silos or large tanks, in which fodder is placed and preserved in a green state for feeding stock when a natural green pasture is not available. Silos to-day are considered a necessity by the modern farmer. For it is claimed that a crop preserved by the use of a silo is increased about forty per cent in value over that of a crop harvested in the usual way. Concrete lends itself to the construction of silos better than any other material. It is one of best non-conductors of heat and cold. On this account the temperature of the inside of the silo will be fairly uniform, regardless of the prevailing outside temperature. Concrete silos are fireproof and are not subject to rot or rust under the action of the acids formed by the slight fermentation in the silage, or by the alternate wetting and drying out which every silo receives. They are also vermin and rat proof. Concrete silos are generally made circular in form, and from two to three times their diameter in height. They are sometimes built of concrete blocks, but more often are made with monolithic or solid walls. A reinforced concrete silo can be built cheaper than one that is not reinforced, for the reason that thinner walls can be used, and thus the saving in concrete more than offsets the cost of the reinforcing steel required.

Being a poor conductor of heat and cold, as mentioned above, concrete has been used most successfully for the construction of greenhouses and ice houses. A greenhouse built of concrete not only eliminates constant repairs, which are required in a wooden structure, but it also saves fuel, as it retains heat and keeps out cold. The foundations and side walls can be made of solid concrete, as can also the posts and ridge poles; the latter, however, should be reinforced with steel. The tables and benches in the greenhouse should also be made of concrete, for by so doing the large expense and inconvenience of renewing, every few years, the old decayed wooden benches will be saved. There are various designs of greenhouse benches. Some are cast all in one piece, and others are made up in sections of concrete slabs. Whichever form is used, it will be well, in order to facilitate the drainage of the water from the table, to provide drainage holes in the bottom of the benches.

Concrete ice houses, owing to their durability, strength, and insulating qualities, have given considerable satisfaction. Experience has shown that the houses which give the greatest efficiency are those which are built with a double wall. These walls are generally about twelve inches thick and are made up of two three-inch walls placed six inches apart, tied together with galvanized iron rods or straps; thus making a six-inch wide continuous dead air space between the two walls, which adds greatly to the insulating efficiency of the buildings. The roof is also made hollow, to further the insulating qualities of the structure.

Root cellars and mushroom cellars are now commonly made of concrete. The root cellars are usually built half below and half above the level of the ground. The side walls, the partitions for the bins,

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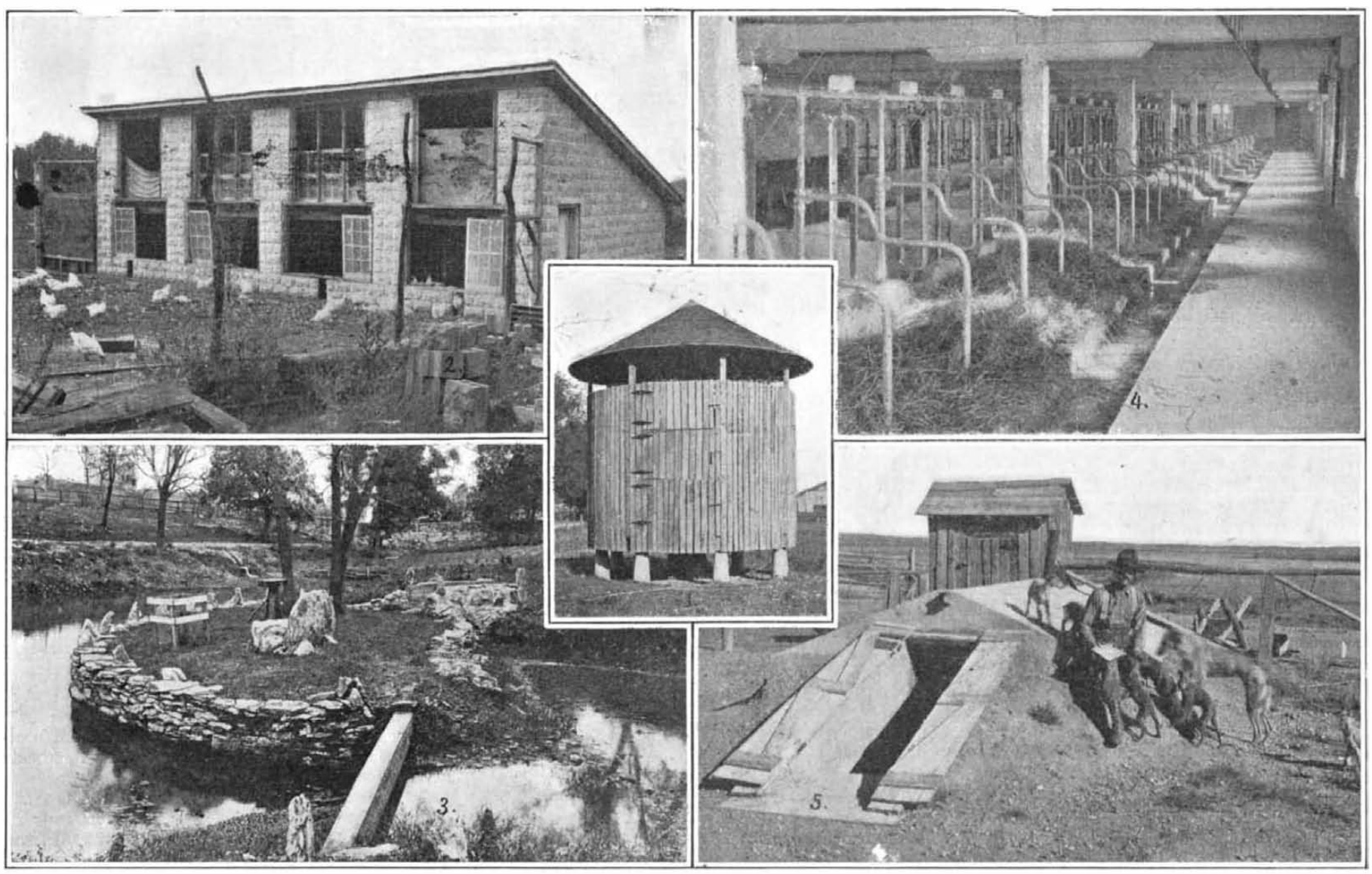

1. Corn crib on a concrete foundation. 2. Chicken house of concrete blocks. 3. Dam of Portland cement. 4. Concrete floors make the stable sanitary. 5. A concrete cyclone cellar useful also as a fruit or a bee cellar.

SOME OF THE VARIED APPLICATIONS OF CEMENT TO AGRICULTURAL STRUCTURES

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and the roof are all made of concrete. In making a mushroom cellar, it should be built at least two-thirds below the level of the ground, in order to give the best results.

From a commercial standpoint, the modern farmer has found that it pays to have an automobile. Owing to the liability of fire, the old wooden barn is a poor place to store it. Concrete suggests itself as the most feasible material of which to build the garage, as aside from its being fireproof, it will not come saturated with gasoline and oil, and it is easily kept clean. The garage can be built of concrete blocks made on the farm with either a block machine or from home-made wooden molds. Built in this way, the initial cost will be low, and the maintenance charges on such a building will practically be nothing.

The floor as well as the side walls and roof should be of concrete, and a good drain should be provided in the center of the floor to carry away the wash water.

Concrete is especially advantageous for the building of structures where perfect cleanliness is desired, such as dairy buildings. Experienced dairymen state that the material of which the barn is made is of vital importance; for as a rule, this is the breeding place of germs. By using concrete this question is to a large measure solved, because a building so constructed offers no lodgment for the breeding of germs.

If the floors, stalls, troughs, etc., are also made of concrete, perfect hygienic conditions can be obtained, and the probability of securing a good germ-proof milk is made much greater. Thus the farmer who is equipped with concrete dairy buildings is far in advance of his neighbor who still holds to his old-fashioned wooden structures.

Concrete is also largely used in tree surgery. Many a good tree has been saved by filling with concrete the large cavities which have developed in its trunk, due to disease and rot. If the cavities are so large that they have weakened the trunk of the tree, steel reinforcing should be incorporated into the patch, so as to hold it better in place and to give it strength. There are numerous other small articles about the farm for which concrete can be used, such as chimney tops or caps, hothouse frames, and well curbs. It is particularly adapted to the latter use, as it prevents the accumulation of surface water and is easily kept clean.

From the instances cited above, one will see that concrete, when properly used, is a most adaptable material. But to obtain the best results, care and judgment must be exercised in its handling.

It might be well to caution the reader on closing that in building any structures, or parts of structures, the failure of which would endanger life, such as floors, roofs, side walls, large tanks, etc., it would be well to consult an engineer for information as to the requisite thickness and the proper size and location of the reinforcing steel.

New Science of the Soil

(*Continued from page 169.*)

of the air, render the nitrogen of the soil more readily available by nitrification, and increase the availability of the insoluble phosphates and potash compounds of the soil. The activities of these organisms may be controlled to a large extent by the methods employed in fertilizing and treating the soil. (See also article on "The Science of Fertilizing the Soil.)

Many years ago it was observed that treatment of vineyard soils with carbon bisulphid to destroy phylloxera, an insect preying upon the roots of the vines, produced beneficial results which could not be wholly attributed to the destruction of the phylloxera. G. E. Stone, of the Massachusetts Experiment Station, and others observed that steaming garden and greenhouse soils apparently increased the actual fertility of the soils, in addition to destroying certain enemies of plants harbored by the soils. Russell and Hutchinson, of the Rothamsted Experiment Station, found that steaming and treatment with volatile antiseptics like carbon bisulphid or toluene only partially sterilized the soil, killing certan protozoa and ameba which feed upon the beneficial ammonia-producing bacteria, but not entirely destroying the latter, which thus freed from the organisms which hold them in check grow rapidly and soon become more numerous than before, increasing the supply of ammonia, and in consequence the fertility of the soil.

As a result of such investigations as these, soil sanitation is coming to have a recognized place in agricultural practice, and various efficient methods of sterilizing, or partially sterilizing, soils are now in use for small scale operations. The Vermont Experiment Station sterilizes the soil of solid greenhouse beds in place by forcing steam under 40 to 60 pounds pressure through 3-inch drain tile placed 10 inches deep and 16 inches apart in the soil. Stone uses 2-inch gas pipe with 3/16 to ¼-inch perforations, made up 7 to 10 inches apart, in frames of any desired width and length. Some of the frames are made in sections, so that they may be extended as desired. (See Fig. 2.) "These frames are provided with headers *h*, placed transversely, which are pipes of larger diameter containing perforations, and nipples *n* are inserted at intervals which readily fit into the extension pipes *p*. In some instances the headers are placed at each end, thus forming with the extension pipes a frame composed of a series of rectangles (Fig. 2A). In this form a complete circulation of the steam can take place. In others the headers are in the middle and the extension pipes lead off into opposite directions (Fig. 2B). In the latter case the ends of the extension pipes are plugged with wood *w*, and a complete circulation of steam does not occur. The material most frequently used is iron pipe. . . .

The method generally adopted by lettuce growers in heating their soils is to place the apparatus on the surface of the bed. If the bed is 2 feet wide, then it will be most convenient to have the heating appliance about 10 feet wide and 20 to 30 feet long. This is placed midway between the edges of the bed, and the soil to the depth of one foot is dug out on either side of the appliance and thrown on top of it. This covers the heating apparatus to a depth of one foot. The steam is now turned on and the soil heated. After sufficient steaming has taken place, the pipes can be pulled out and set up ready for the next treatment. (See Fig. 3.) The soil previously treated should be covered up with some old canvas, if available, or, in fact, with anything that will retain the heat, and allowed to stand some hours, after which the top portion is shoveled back to where it was taken from. Not only is the one foot of top soil heated by this method, but the soil under which the apparatus rests is equally well done, provided too much haste is not made in removing the treated soil.

A uniform temperature of somewhat over 180 deg. F. maintained for one and a half to two hours is considered sufficient.

A soil sterilizer used by the United States Department of Agriculture and the Connecticut State Experiment Station in steaming tobacco plant beds is shown in Fig. 4. It consists essentially of a re-enforced 18-gage galvanized iron pan, 6 × 10 feet square and 6 inches deep, with a steam hose connection with an engine. The pan is inverted over the soil of the bed, pressed down close, and steam under pressure of 75 to 100 pounds