

er's steel trowel if a smooth surface is wanted, but a wooden float or trowel for a rougher finish, which is now preferred for cattle. If a second or finishing coat is used, it should follow right after the first, so that they will knit together. Two inches of good concrete, one of cement to five of gravel, on a hard bottom, is sufficient for stall floor, and one and a half inches is plenty for feed alleys. Straightedges, spirit-levels and lines are used in getting the proper grade. If any small stones are in the finishing coat, they should be tapped down out of sight, or the surface is liable to break up. From end to end of stable, the gutter bottom should be level, so that manure liquids will mix readily with solids and not run into an overflowing pool at the end. Don't make any holes or drains for the liquids to run away. They are worth their weight in gold, more or less. Some experts begin by laying the gutter bottom first, then the stall floor, next the driveway, and last the feed alley.

WALKS.

Walks, carriage steps, etc., out of doors, are laid on much the same plan as floors, except that it is advisable to have a foundation of coarse concrete, say, 1 cement to 12 gravel, with broken stones well tamped in, and the finishing coat 1 to 2. The finished surface should usually have a slight incline outwardly, to let water run off, and the walk should be so graded up that water will not gather about the foundation, to heave the walk out of position.

SILOES.

Though costing more at the outset, experience has demonstrated that the cement-concrete silo surpasses those made of wood in durability and in uniform keeping quality of the ensilage. Writing to "The Farmer's Advocate" in August, 1902, Fred H. A. Sharon, of Elgin Co., Ont., claimed to have built the first concrete-cement siloes in Canada in the spring of 1894, using Queenston cement. He was assisted in laying out the work by Isaac Usher, Sr., whose pioneer work was largely instrumental in the introduction of cement-concrete in farm structures and culverts throughout Canada, as our readers are well aware. Since then, more cement siloes have been erected every year. Various styles have been used, such as square or oblong, with inside corners rounded off by means of bent heavy sheet-iron; octagonal and round, the latter being preferred, and can be most expeditiously built by the use of sets of steel or wood rings $2\frac{1}{2}$ ft. high each. The walls should be plumb inside, and battered on the outside, from 1 foot in thickness at bottom to 8 inches at top, for a silo 30 feet high, and, say, 12 feet in diameter inside, the capacity of which is about 80 tons, which it is estimated is sufficient to feed 20 cows 200 days, and should be filled from five or six acres of corn. In estimating the capacity of a silo of average dimensions, say 10 feet in diameter, by 24 feet in height, allow 50 cubic feet for a ton of ensilage. In a shallow silo it would take more than fifty feet to weigh a ton; in a large, deep silo, considerably less. One part Portland cement to from 8 to 12 of gravel and stone, according to the quality of the latter, are the usual proportions, the average being about 1 to 10; but it is safer to err on the strong side. Strength is given the walls by bedding in 5-16-inch round iron every $2\frac{1}{2}$ feet, and the outside walls should be cement-washed, to give them a hard, smooth finish. The silo should have a two-inch concrete floor, and is better with a roof. Cement blocks are also used for silo walls, special machine patterns being devised by manufacturers for the purpose, and the hollow space relieves the trouble from frost. Good materials, plenty of water and thorough workmanship, from the foundation up, are especially necessary in silo construction, whether of blocks or solid wall. There should be several doors in silo wall, say $1\frac{1}{2}$ x $2\frac{1}{2}$ ft., on side next feed-room or passage, and, to preserve strength, there should be several feet of wall between these openings. The silo should be smoothly plastered inside.

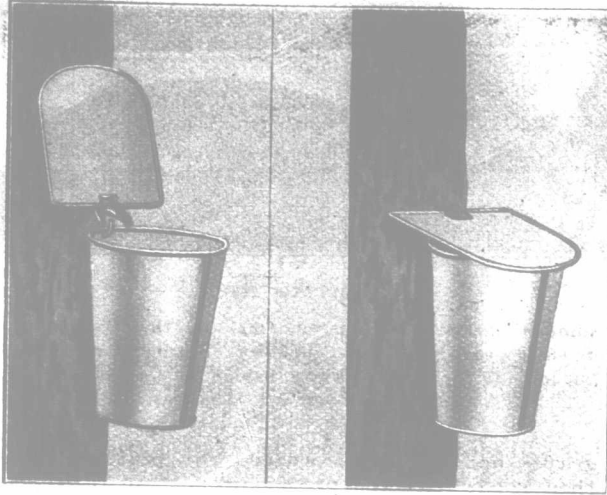
CISTERNS AND TANKS.

Fig. 3 illustrates one plan of making a cement-concrete cistern, with conical-shaped cover and manhole. In making the excavation, allow for the plank curbing, and, say, two or three inches concrete wall. When the concrete is thoroughly rammed in up to top of curbing, then lay on a plank platform with hole in center a couple of feet across, and boxed up to above ground. A barrel will answer the same purpose. Then, on the platform, and around the hole, build a cone-shaped mound of fine, wet sand, and over this put on the layer of concrete so that the bottom edge will rest on the perpendicular wall of the cistern. (The tops of wells should be similarly protected.) In about a week, the boxing and sand may be removed, and the bottom cemented. Plaster inside.

APPROACHES, CULVERTS AND BRIDGES.

Cement-concrete is rapidly displacing wood in the construction of culverts and bridges, the arched form giving great strength. Up to a couple of feet span, a flat top can be used alone, but over that, reinforcement with wire, rods or

metal in other forms is advised. For small streams crossing roads, cement tile are very generally used, but for larger creeks, regular cement culverts are built in. For wide culverts or bridges, the work should be done by experts, according to proper specifications, in order to secure the proper strength necessary to carry traction engines and safeguard the municipalities. To provide a waterway at the farm gateway, a very simple method is to make a semicircular curbing of the necessary length and diameter, lay over it say five or six inches of cement-concrete, one part Portland cement to five of gravel, and, when set, knock out the end supports of board and pull out the narrow planks forming the curb. Cover the cement arch with clay, and you have a permanent job.



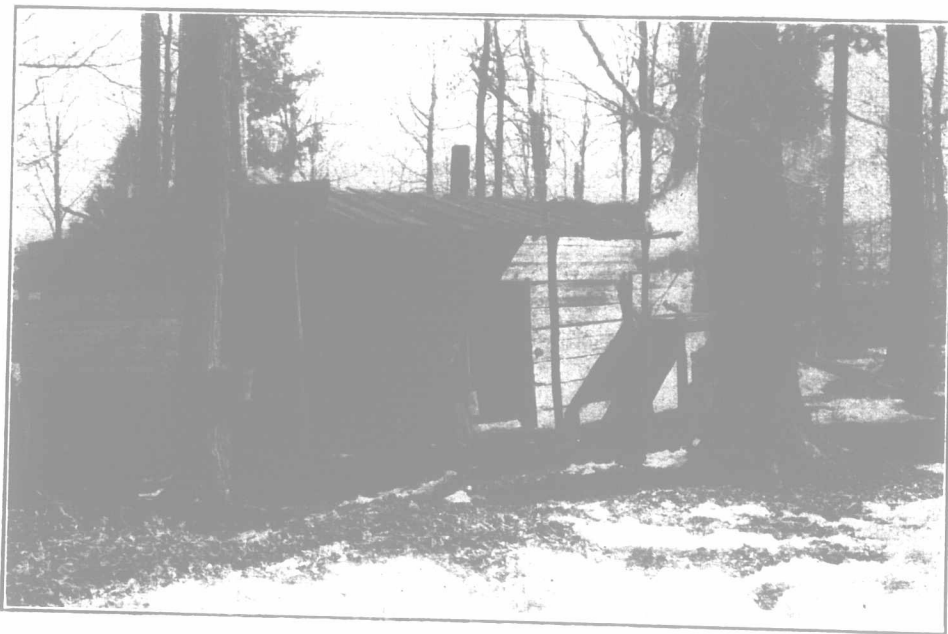
Modern Tin Sap Buckets.

FENCE POSTS.

Various styles of cement-concrete fence posts have been made, tapering from a 6 x 6-in. or a 4 x 4-in. bottom up to a 3 x 3-in. top, reinforced with iron bars or wires. For fastening the fence wires, staples or loops of wire are bedded in on the side, and in some cases a strip of pine board, through which bolts (heads in) are passed into the post. The moulds are dressed pine, $1\frac{1}{2}$ in. thick, made in sets of five or six. Good cement concrete, 1 to 5, and quite moist, is recommended. When taken from the moulds, they should be kept damp for a week or ten days, and not used for a month. Two estimates before us represent the cost at from 25 to 30 cents per post.

WATER TANKS.

For use either inside or out of doors, where



"Sap's Running."

they need to be so built and protected as to prevent bursting by frost, nothing equals tanks or troughs of concrete. They may be made round, square or oblong. For the walls, a minimum thickness of 4 inches for a round 5 x 5-ft. tank, up to 15 inches for a 15-ft. tank, is suggested, and the proportions of cement to gravel about 1 to 5, finishing with a coat of cement wash inside and out. Reinforcing with barbed wire or iron rods will add strength to the walls, and walls flaring out at the top are less liable to burst with frost than if plumb.

HOLLOW BUILDING BLOCKS.

Hollow cement blocks are rapidly displacing bricks or cut stone for public buildings and structures for business purposes, and particularly as foundation walls for private residences, because of their solidity, handsome appearance, air space, and the ease with which they can be manufactured wherever coarse sand is available. They are

made in great variety of sizes and styles, in machines, several of which have been advertised in "The Farmer's Advocate." In all cases, full directions for use are given by the manufacturers. Good Portland cement and gravel, preferably from $\frac{1}{4}$ to $\frac{3}{4}$ inches in diameter, containing sufficient clear, sharp sand to fill all the voids, mixed with water, are the materials required. For the facing, fine material, one part cement to two of sand, is advised, and for the body of the block, one to about four, is sometimes used, but the proportions vary with the quality of material. However, it is a great mistake to try to make a "cheap" block by stinting the cement. Thorough and accurate mixing are essential, a bottomless box, with handles on the end, being convenient for gravel, containing exactly enough for a bag of cement. It should be made sufficiently wet to pack well in the hand, using as much water as possible without causing the material to stick to the moulds. The facing cannot be made as wet as the body of the block. Pack the material thoroughly in the mould, putting in small quantities at a time. When taken from the moulds, leave the blocks on the pallets for at least 24 hours. They must be kept out of the sun, where they will not dry out too quickly, or the hardening will not be perfect. When removed from the pallets and piled, they should be sprinkled and kept moist in the shade for, say, eight days, and be made a month before using. In laying blocks, it is recommended that the blocks and course below be kept wet by sprinkling, and the standard specifications for block manufacturers require a soft mortar, one-half cement mortar and one-half lime mortar, made of fine sand, spread evenly and buttered on the ends.

QUANTITIES OF MATERIAL.

Hundreds of inquiries have reached "The Farmer's Advocate" asking how much materials will be required for a given wall or floor. In the first place, a barrel of cement contains about four cubic feet. The inexperienced might suppose that one barrel cement, three barrels of gravel and six barrels of broken stone would make ten barrels of concrete, but it will not, for the gravel fills up the open spaces between the stones, and the cement fills in the still finer spaces between the particles of gravel, so that the quantity of concrete would not greatly exceed that of the original broken stone. A leading Portland-cement authority gives this rule for a medium mixture, suitable for foundation walls, building walls, arches, floors, sidewalks, sewers, etc.: 1:2 $\frac{1}{2}$:5; that is, 1 barrel or four bags (about 4 cubic ft.) cement, to 2 $\frac{1}{2}$ barrels (9 $\frac{1}{2}$ cubic feet) loose sand, to 5 barrels (19 cubic ft.) broken stone or coarse gravel. In Canada, experience indicates that 1 barrel of Portland cement will approximately build 35 cubic feet of wall, mixed in the proportions of 1

of cement to 10 of gravel and stone. Divide the cubic contents of the proposed wall by 35, and you will have the number of barrels of cement required. A barrel of Portland cement will lay approximately 80 square feet of floor, three inches thick, in the proportions of 1 of cement to 5 of gravel, or 120 square feet 2 inches thick. Then, to get the number of barrels of cement required for a floor, divide the number of square feet by 80, or 120, as the case may be. The cubic contents of wall or floor, divided by 128, will give the total number of cords of concrete required.

We shall be pleased to receive from readers descriptions of plans which differ from those described in the foregoing, and which, by actual experience, they would consider commendable.

THE BEST PREMIUM YET.

I beg to acknowledge, with very many thanks, the receipt of the premium knife, which I prize more highly than anything I have ever received as a premium. I have been a life-long subscriber to "The Farmer's Advocate," and like it very much. To say that the knife is a good one, is simply putting it very mild. R. B. MILLS, Elgin Co., Ont.

Permanent pasture for the rough, watered portions of the farm; alfalfa for the less steep, clay hillsides, and short rotation for the rest of the farm.