

# HOW TO MAKE CONCRETE POSTS

**M**AKING concrete posts for farm, school or home is an interesting project and one which gives the builder the satisfaction of producing useful, economical and lasting improvements. Concrete posts do not rot, burn or rust, nor are they injured by boring insects or fungus growth. Millions have been used by farmers, railroad companies, and others.

Typical of the performance of concrete posts is the record of several hundred concrete fence posts built and erected in 1914 on the Iowa Agricultural Experiment Station farm at Ames, Iowa. (See photograph on this page.) These posts, after more than 25 years of service, are in excellent condition and will continue to give good service for many years.

## Standard Concrete Fence Posts

When large numbers of posts are to be made, metal molds are most satisfactory. Molds for several different shapes of posts, as shown in Fig. 1, are available from mold manufacturers.

For home or school projects requiring only a moderate number of posts, a simple gang mold, as shown in Fig. 2, may readily be built. And since five standard 7-ft. posts can be made from a one-sack batch of concrete, a gang mold for five posts is especially useful. Shorter posts can be made in the same mold by inserting bulkheads as shown in the drawing. If longer posts are required, longer molds of the required length should be used. Using 2x4's for dividers and side pieces in the mold, standard posts are made 3 $\frac{5}{8}$  in. square at both ends. (A 2x4 actually measures about 1 $\frac{5}{8}$  x 3 $\frac{5}{8}$  in.)

The  $\frac{1}{2}$ -in. triangular-shaped strips used to line the corners of the mold produce posts with beveled edges which are better looking and easier to remove from the molds than square-edged posts. The  $\frac{1}{4}$ -in. triangular-shaped strips are placed on the bottom of the forms to make shallow grooves on one side of the post at the required spacings to receive fence wires or friction wire ties. If more readily obtainable,  $\frac{1}{4}$ x $\frac{1}{4}$ -in. half-rounds may be used in place of the  $\frac{1}{4}$ -in. triangular strips. Standard wire spacings for barbed wire fences of three, four and five wires are shown in Fig. 3. Thus, posts for fences of three wires need grooves only at the three points shown. Groove strips are located in the molds accordingly. Where posts must be adaptable to various wire spacings, however, the groove strips are placed on 9-in. centers from the ground line (2 ft. 6 in. from the lower end) to a point 18 in. above the ground line; then, on 3-in. centers to the top of the post.

Molds should be assembled on a smooth, level



These concrete posts erected in 1914 on the Iowa Experiment Station farm at Ames, Iowa, were 25 years old when this photograph was taken. They will continue to give trouble-free service for many years.

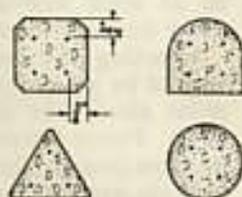


Fig. 1. Common shapes of concrete posts.

surface which has been painted with oil or covered with heavy, waterproofed paper. The entire mold should be thoroughly coated with thin oil. If wood molds are thoroughly cleaned and re-oiled between uses, they will resist warping and last for many fillings. When not in use the molds should be stored flat under a weight.

**Reinforcement of concrete posts** should receive special attention. For a heavy-duty post of extra strength, four  $\frac{1}{4}$ -in. round reinforcing bars are used, one placed near each corner. However, four No. 6 wires placed in the same manner make a post which is more economical and which is strong enough to meet average requirements. Care should be taken to provide a clear distance of  $\frac{3}{4}$  in. between the edge of reinforcing bars or wires and the surface of the concrete. Reinforcement placed nearer the surface often rusts, causing the concrete to spall off and thus shorten the life of the post.

Two of the reinforcing bars for each post should be cut 12 in. shorter than the length of the post, then so placed as to have 6 in. of concrete covering each end of the bar. The other two bars or wires need be only 3 ft. long, placed to extend from a point 18 in. below the ground line to a point 18 in. above it. Bars of equal length should be placed diagonally opposite one another.

The concrete mix recommended for precast posts is 1 sack of portland cement to 2 cu.ft. of sand to 2 $\frac{1}{2}$  cu.ft. of gravel\* with not more than 4 gal. of water added per sack of cement where average damp sand is used. For sand only slightly damp 4 $\frac{1}{2}$  gal. may be used. Amounts of sand and gravel may be varied slightly to get a rather stiff but

\*Crushed stone is sometimes used as gravel and should be similarly graded.

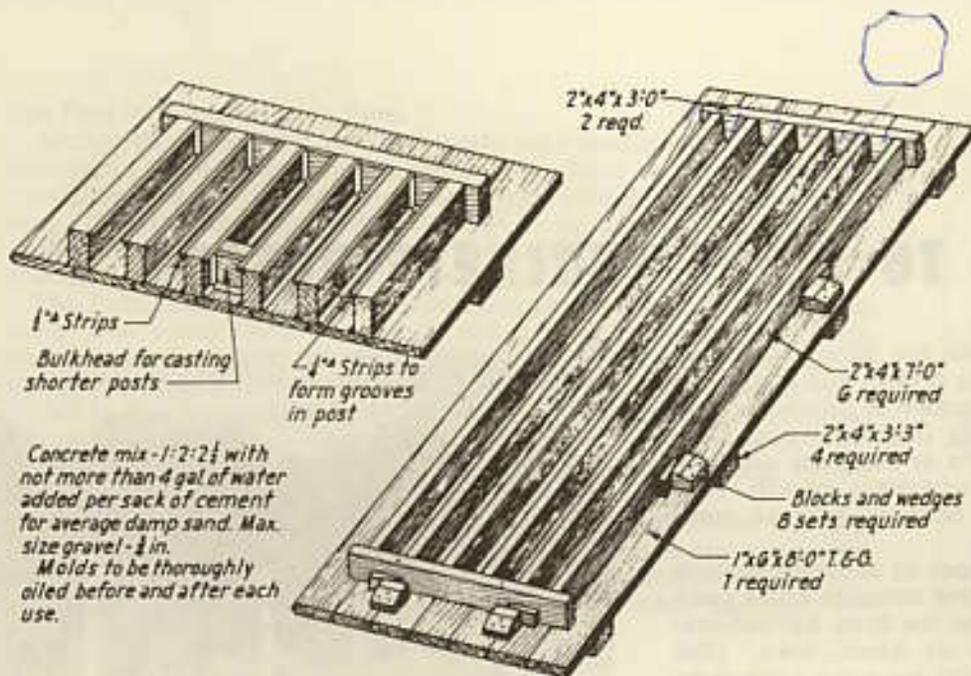


Fig. 2. Details of mold for five standard concrete fence posts.

workable mix. Do not increase the amount of water per sack of cement, however, as this will reduce the strength of the concrete. Maximum size of gravel should be  $\frac{3}{4}$  in.

Although generally less economical, bank-run gravel may be used if it is clean and well-graded, i.e., with a good mixture of sizes from fine to coarse. The mix should be 1 sack of cement to 3 cu.ft. of gravel. For average damp material  $3\frac{1}{2}$  gal. of water is added per sack of cement. Silty gravel from a drainage ditch or road ditch should never be used. Water for the concrete mix should be clean enough to drink.

If molds are to be vibrated a rather stiff mix is required. The stiff mix is somewhat more economical and is obtained by increasing slightly the amounts of sand and gravel used per sack of ce-

ment. The proportion of water to cement should remain the same.

**Placing concrete.** After thorough mixing, the concrete is placed about 1 in. deep in the molds. Two reinforcing bars are then accurately placed, molds filled to within 1 in. of the top and the remaining two reinforcing bars placed. The mold is then filled to the top. As the concrete is placed it is tamped and spaded, especially against the molds to assure smooth surfaces on the finished post. Concrete is then struck off with a straight-edge and troweled lightly to form a smooth top surface.

After hardening for 24 to 48 hours under damp cover, the posts may generally be removed from the molds. In cold weather more time is required. After removing from the molds, the posts should be stored in a shaded place and kept constantly wet by sprinkling for at least 10 days. Posts should be at least one month old before being hauled away and set in place.

**Erecting the fence.** For best results, line posts should be set at least 2 ft. into the ground. Corner posts should be well braced and set  $3\frac{1}{2}$  to 4 ft. deep. Fence wires are fastened to concrete posts by wire ties, as shown in Fig. 4.

Posts are set in two ways: In holes dug to receive them, or if of small diameter, they may be driven with a special driving sleeve made from a piece of pipe of somewhat larger diameter than the post and about 3 ft. long. (See photograph, page 3.) One end of the pipe is capped and cushioned by inserting an oak driving block. This method saves much time and labor, particularly in soft or wet soils. Concrete fence posts are usually spaced one rod ( $16\frac{1}{2}$  ft.) apart.

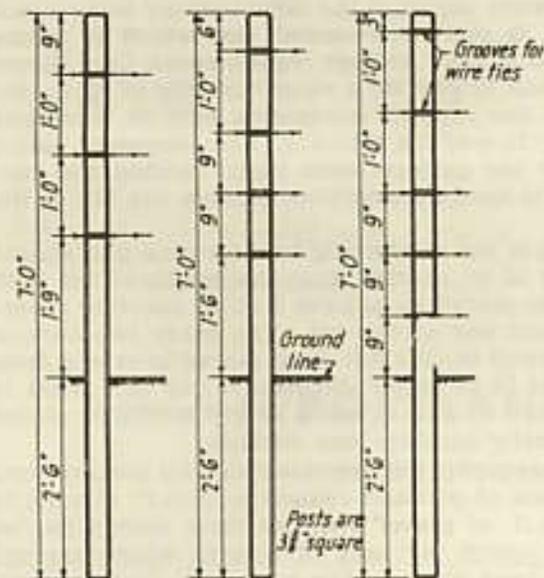


Fig. 3 (left). Details for standard concrete fence posts. Wire spacings are for fences of three, four and five barbed wires.

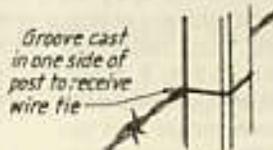


Fig. 4. Wire ties of this kind hold securely.

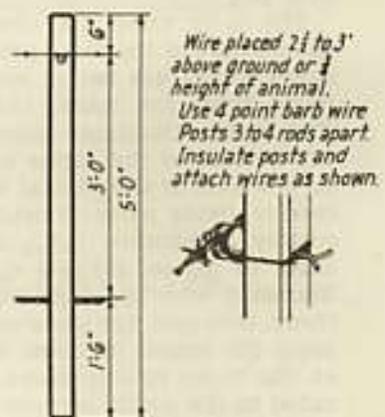
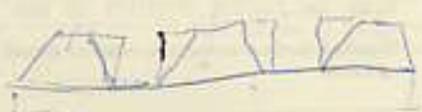


Fig. 5. Electric fence post.



**Materials required.** Using the recommended mix, the following materials are required for 100 standard concrete fence posts 7 ft. long:

| WITH SAND AND GRAVEL     | WITH BANK-RUN GRAVEL       |
|--------------------------|----------------------------|
| 19 sacks portland cement | 24 sacks portland cement   |
| 1½ cu.yd. sand           | 2.6 cu.yd. bank-run gravel |
| 2 cu.yd. gravel          |                            |

Thus, 25 per cent more cement is required if bank-run gravel is used. The amount of reinforcement required for 100 posts is:

- 1,800 lin.ft. (177 b.) of No. 6 wire or
- 1,800 lin.ft. (300 lb.) of ¼-in. round bars

### Electric Fence

Concrete fence posts are well suited for electric fences. As with all other types of posts, the fence wire is insulated from the post. A satisfactory method for fastening an electric fence wire is shown in Fig. 5. Insulators of the type shown are inexpensive and should be used to assure dependable operation of the fence. A single strand of barbed wire of the four-point type has been found most satisfactory. Fence wire is usually placed at a height equal to three-fourths the height of the animal to be fenced in. Posts for electric fences are usually 5 ft. long, set about three to four rods (50 to 65 ft.) apart and about 1½ ft. into the ground. Reinforcement may be of four No. 6 wires, placed as for the standard fence post.

Materials required for 100 posts:

- 14 sacks of cement
- 1½ cu.yd. of sand
- 1½ cu.yd. of gravel
- 1,400 lin.ft. (138 lb.) of No. 6 wire

### Vineyard Posts

The gang molds shown for standard fence posts are also suitable for making concrete posts for vineyards or grape arbors. Length of posts and materials required are the same as for standard fence posts (except end posts). Line posts are pro-

vided with holes through which smooth wires are threaded. The holes are formed at the spacings shown in Fig. 6, by inserting ¼-in. greased dowels or bolts in the fresh concrete when the post is being cast. The line posts may be reinforced with four No. 6 wires although four ¼-in. bars placed near the corners may be used for higher-strength posts. End posts must be well braced and should be reinforced with four ¾-in. round bars. Vineyard posts are commonly set 2 ft. in the ground and 12 ft. to 16 ft. apart.

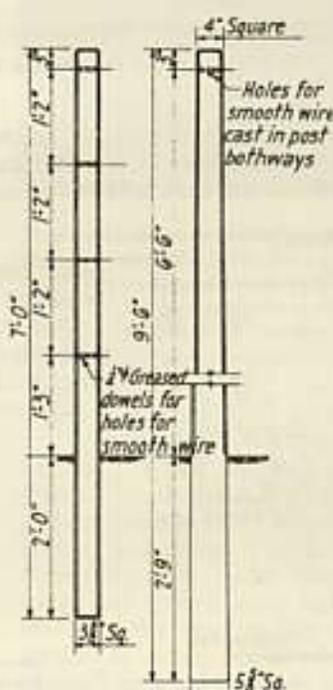


Fig. 6. Vineyard posts.

vided with holes through which smooth wires are threaded. The holes are formed at the spacings shown in Fig. 6, by inserting ¼-in. greased dowels or bolts in the fresh concrete when the post is being cast. The line posts may be reinforced with four No. 6 wires although four ¼-in. bars placed near the corners may be used for higher-strength posts. End posts must be well braced and should be reinforced with four ¾-in. round bars. Vineyard posts are commonly set 2 ft. in the ground and 12 ft. to 16 ft. apart.

Where vines are supported on over-

head wires, as in some cases for scuppernon grapes, posts should be 9 ft. 6 in. long set 33 in. in the ground and spaced about 20 ft. apart, each way. These posts are 4 in. square at the top, 5½ in. square at the base, thus permitting use of tapered 2x6's in the molds. (A 2x6 actually measures about 1½x5½ in.) The line posts may be reinforced with four ¼-in. round bars, all bars being cut 8 ft. 6 in. long. End posts require four ¾-in. round bars placed near the corners. Materials required for 100 line posts:

- 42 sacks portland cement
- 3½ cu.yd. sand
- 4½ cu.yd. gravel
- 3,400 lin.ft. (568 lb.) ¼-in. round reinforcing bars

For end posts add enough reinforcement to provide 36 lin.ft. of ¾-in. round reinforcing bars for each post.



### Sign Posts for Schools, Camps, Farms

Attractive, permanent concrete posts may readily be built to support signs. Sign posts should generally be about 11 ft. 6 in. high to permit setting 3 ft. in the ground and to provide headroom under the sign. The standard sign post shown is 4 in. square at the top; 5½ in. square at the base. Reinforcement should be four ¾-in. round bars, one near each corner, cut 10 ft. 6 in. long.

The horizontal arm is made separately in the standard fence post mold, thus being 3½ in. square. It is 3 ft. 6 in. long reinforced with four ¼-in. round bars. Mortised joints ½ in. deep in the arm and in the post are provided when casting the concrete. The arm is then bolted to the post with a ¾-in. machine bolt. Heavily galvanized or brass bolts are used to prevent rust stains. Holes are provided for bolts by inserting ¾-in. greased dowels or bolts in the mold before placing the concrete.

In some cases it may be satisfactory to hang the sign from the arm with heavy galvanized wire rather than with the bolt and strap iron hanger shown. Then holes are cast in the arm to receive the wires.

Using the mix recommended for fence posts, concrete materials required for one sign post are:

- ¾ sack portland cement
- 1¼ cu.ft. sand
- 1½ cu.ft. gravel
- 54 lin.ft. (20 lb.) ¾-in. round reinforcing bars

### Clothesline Posts

Especially useful are the sturdy, attractive clothesline posts shown in Fig. 8. The 5-ft. cross arm is made in the standard fence post mold and bolted to the post. Hooks are cast into the arm, or ¼-in. diameter

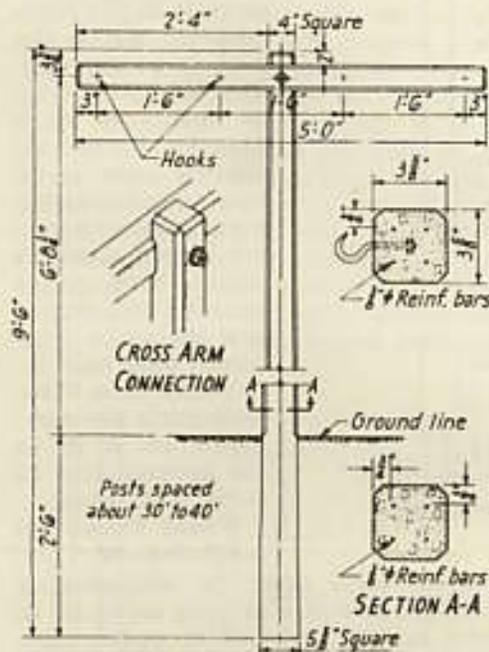


Fig. 8. Clothesline post.

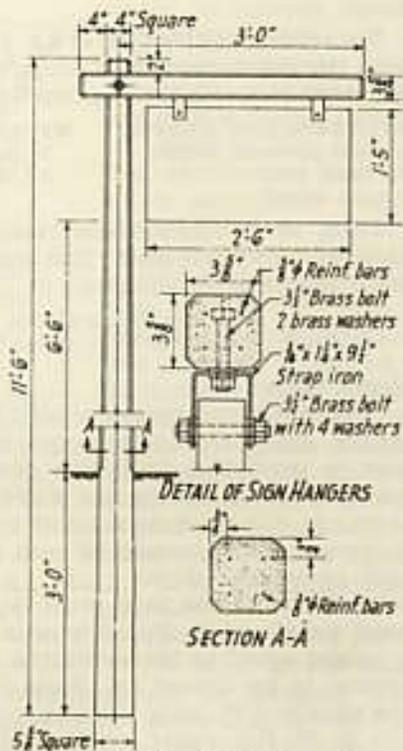


Fig. 7. Post for school or farm sign.

holes may be made to receive the clothesline. Reinforcement required is the same as for the sign post.

Clothesline posts may generally be set 2 ft. 6 in. in the ground and spaced 30 ft. to 40 ft. apart. For loose soils increase the length of post to 10 ft. and set 3 ft. deep.

Concrete materials required for two clothesline posts are:

- 1½ sacks portland cement
- 2½ cu.ft. sand
- 3½ cu.ft. gravel
- 42 lin.ft. (16 lb.) ¾-in. round reinforcing bars

If concrete aggregates are sold in your locality by weight you may assume, for estimating purposes, that a ton contains approximately 22 cu.ft. of sand or crushed stone, or about 20 cu.ft. of gravel. For information on local aggregates consult your building material dealer.

Published by **PORTLAND CEMENT ASSOCIATION**

33 WEST GRAND AVE., CHICAGO 10, ILL.

PRINTED IN U.S.A.

F-105

The activities of the Portland Cement Association, a national organization, are limited to scientific research, the development of new or improved products and methods, technical service, promotion and educational effort (including safety work), and are primarily designed to improve and extend the uses of portland cement and concrete. The menifield program of the Association and its varied services to cement users are made possible by the financial support of over 70 member companies in the United States and Canada, engaged in the manufacture and sale of a very large proportion of all portland cement used in these two countries. A current list of member companies will be furnished on request.