

July 25, 1950

C. DOBELL
METHOD OF PREFABRICATING PARTS
FOR CONCRETE STRUCTURES

2,516,453

Filed Feb. 14, 1946

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Fig. 1.

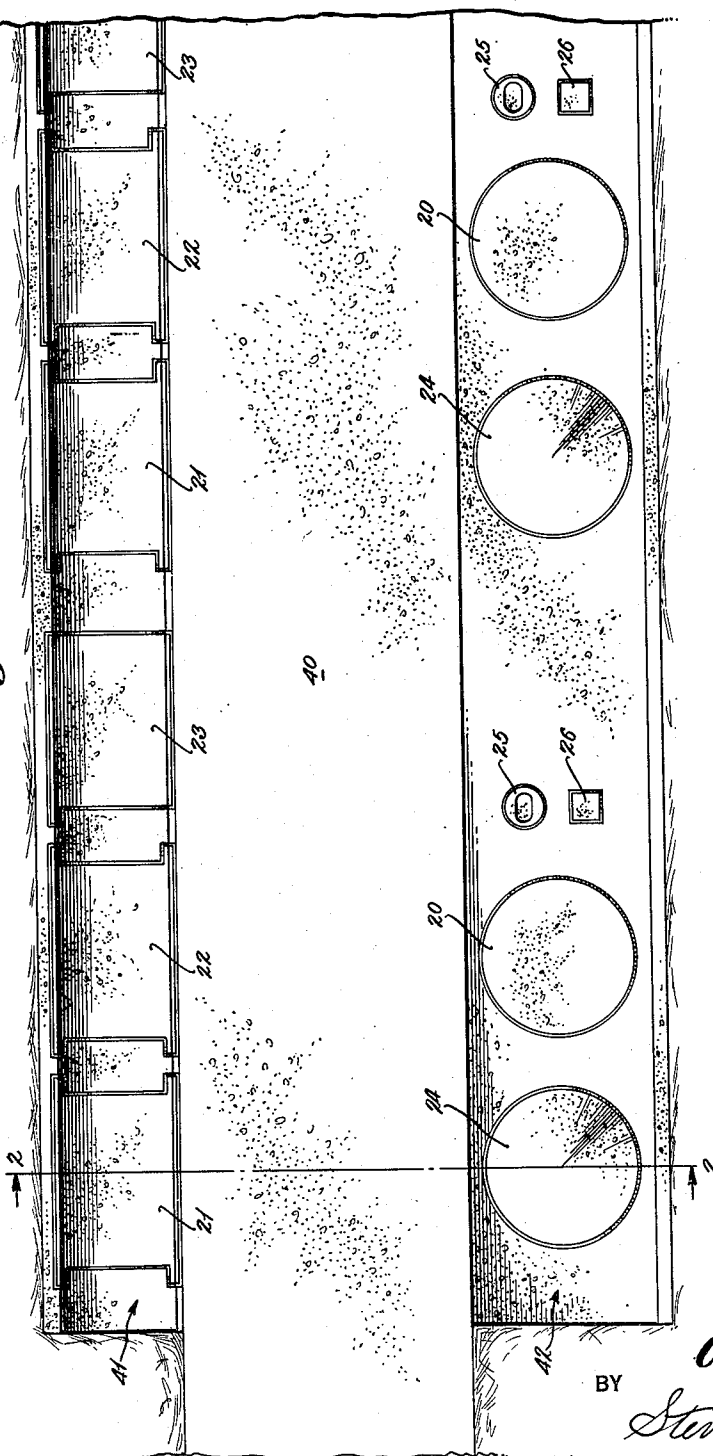
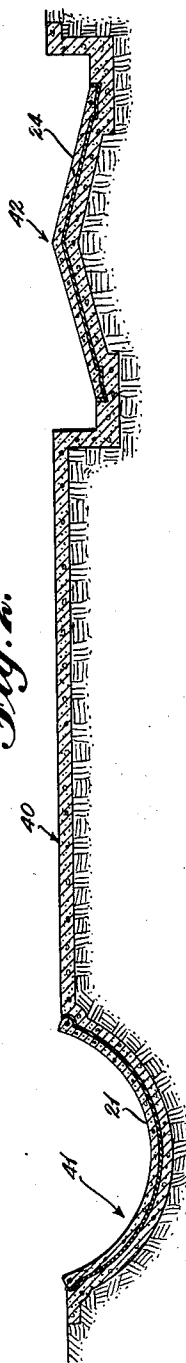


Fig. 2.



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Fig. 3.

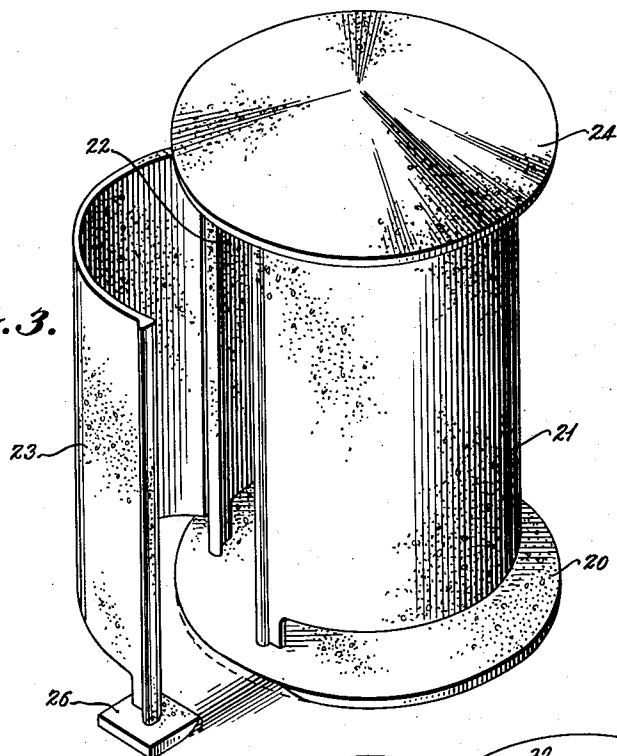


Fig. 4.

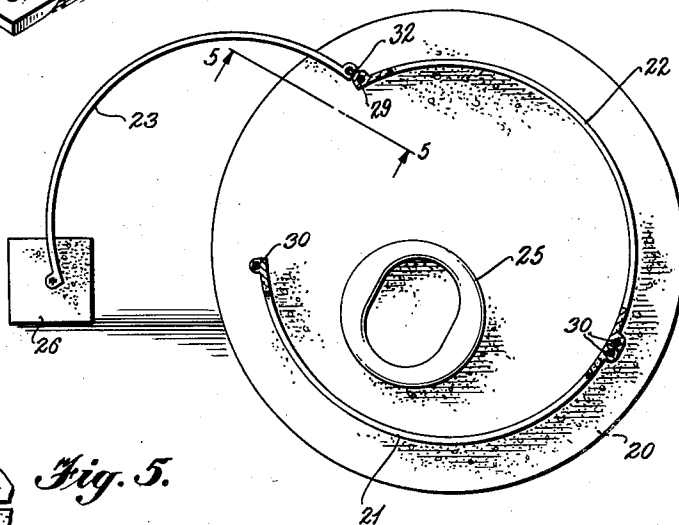
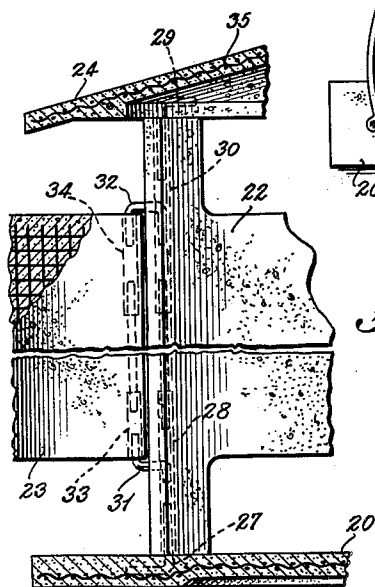


Fig. 5.



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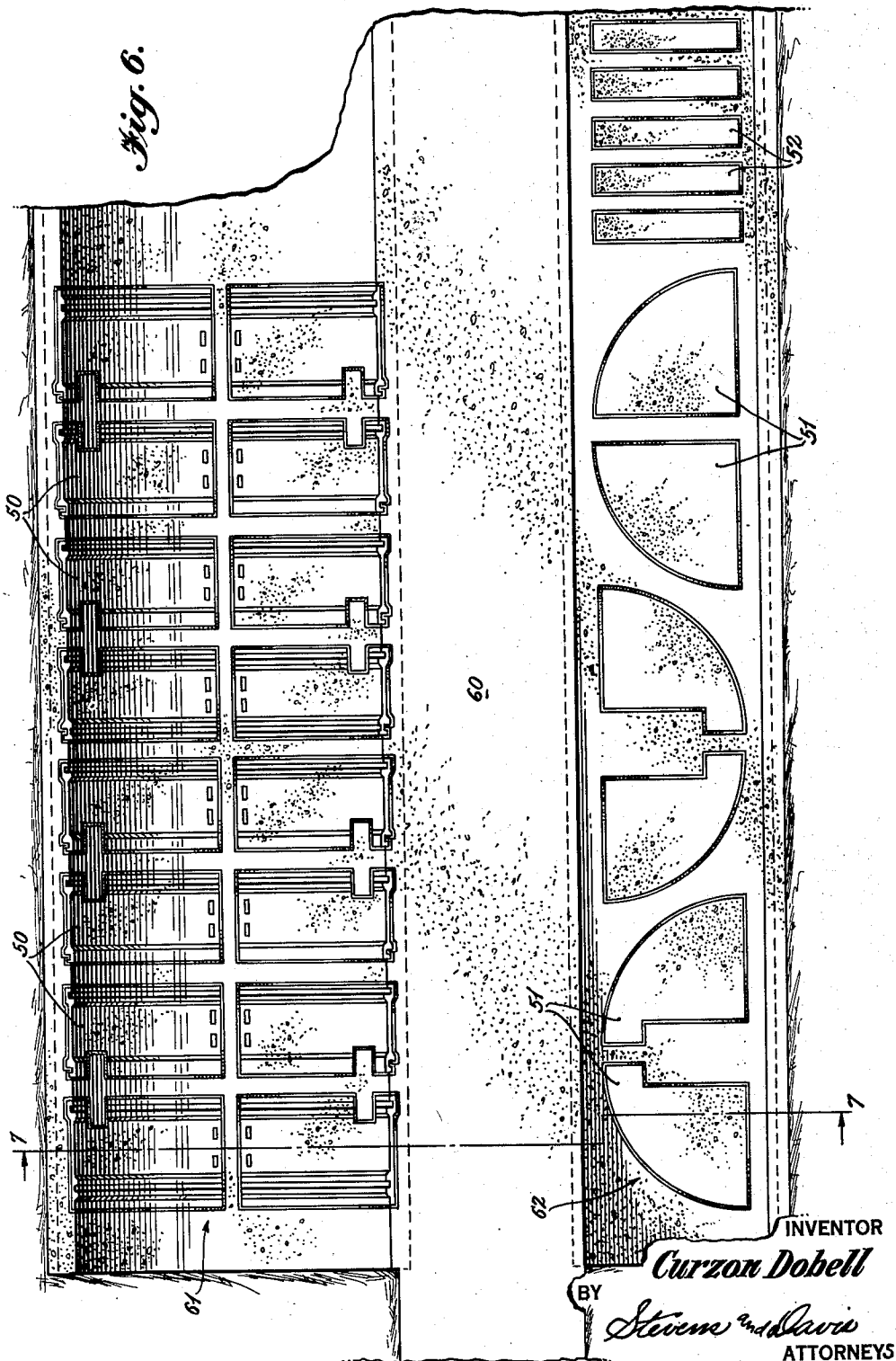
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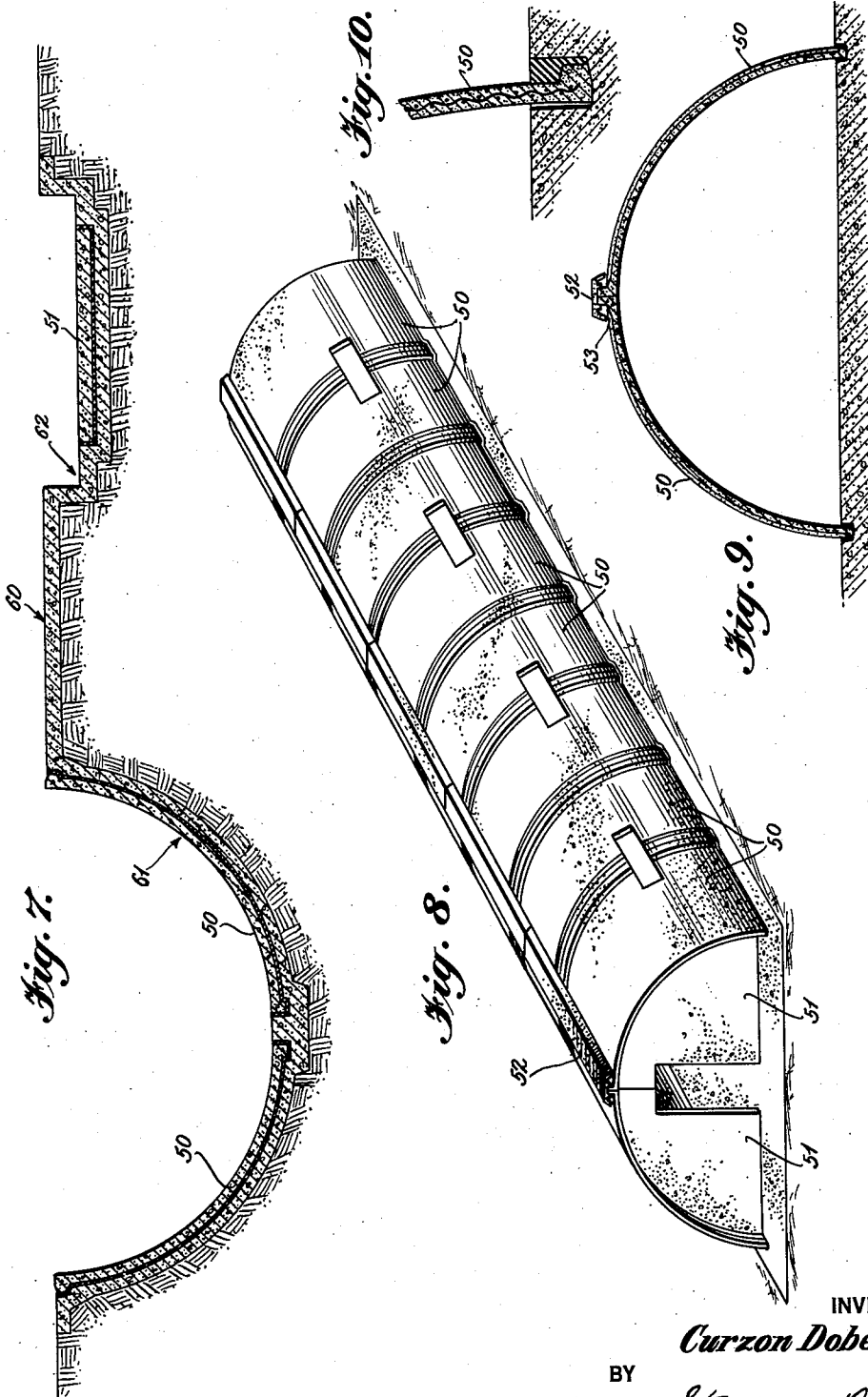
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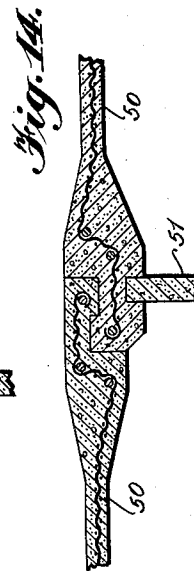
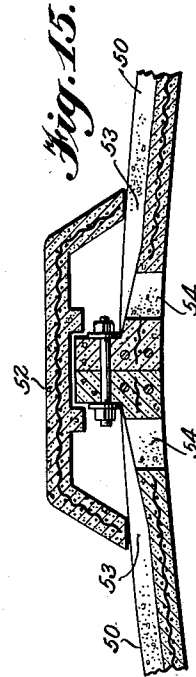
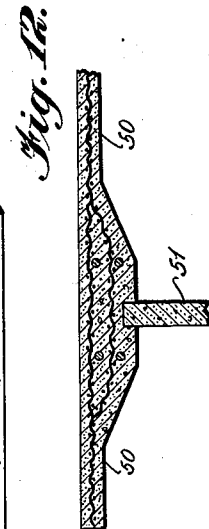
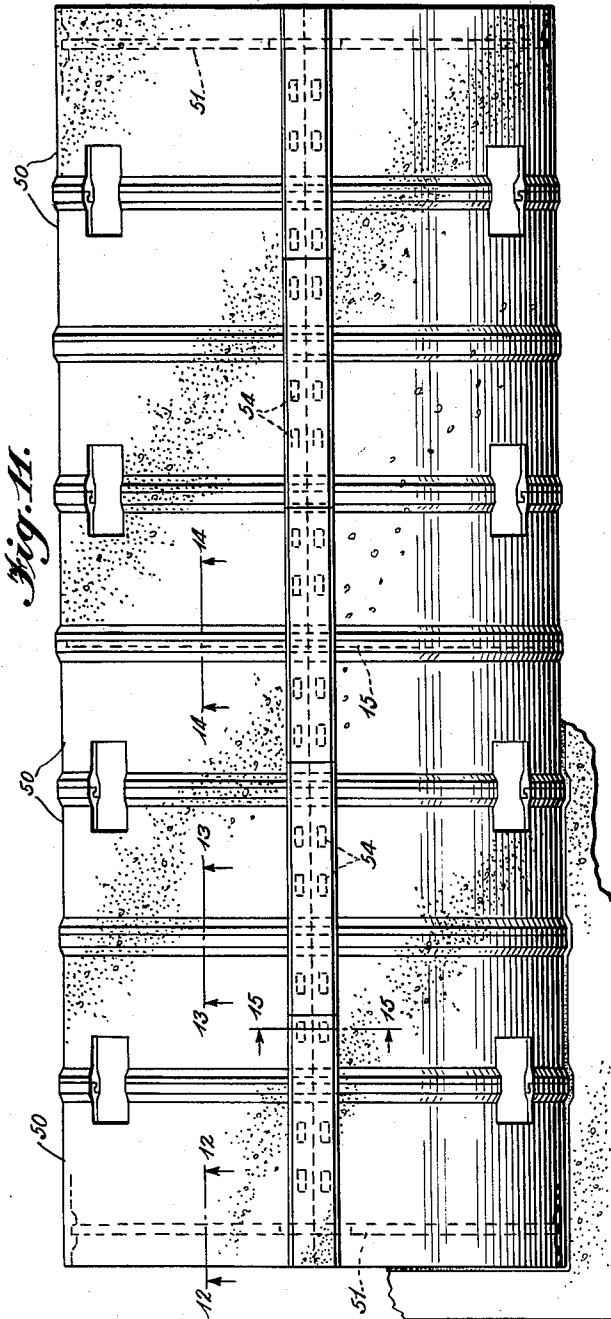
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UNITED STATES PATENT OFFICE

2,516,453

METHOD OF PREFABRICATING PARTS FOR
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Application February 14, 1946, Serial No. 647,486

3 Claims. (Cl. 25—154)

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This invention relates to the prefabrication of concrete structural members, and more particularly to the prefabrication of reinforced concrete structural units adapted to be assembled to form dwellings, barns, outhouses, or other buildings.

The recent trend toward better housing conditions throughout the world has created a demand for an extremely low-cost type of housing that is highly weather resistant and durable. To meet

this demand an attempt has been made to provide this low-cost housing by manufacturing it from concrete. In order to manufacture such concrete structures in-situ, it is necessary to set up forms at each location, pour or otherwise place the concrete, and then remove the forms. This is a slow process as compared with preparing pre-formed concrete parts and assembling them at the location. Consequently, it has been found undesirable to utilize pre-formed concrete parts.

In order to make pre-formed concrete parts, it has heretofore been necessary to first prepare molds, mold the concrete parts, remove the molds, move the concrete parts to some place where they can cure or be cured, and then ship the parts to the place of assembly. The amount of handling necessary and the factory space required are thus major items in the cost of manufacture.

According to the present invention, much of this difficulty and cost may be avoided by forming the original molds in the open in such a way that the parts to be molded can be molded and cured without moving them and the parts can

then be picked up and loaded directly onto a conveyance on which they are to be shipped. Such a process eliminates the necessity for a building in which to carry out the manufacturing process, eliminates a great deal of handling of the molds and the formed but uncured parts, and even makes expedient the picking up and shipping of the final products.

It is preferred, according to the new process, to utilize a section of level, or substantially level earth and to lay out on this section of earth a series of rows of molds set deeply enough in the earth so that they can be flooded with water for curing the molded products, and with the various rows separated by roadways onto which trucks or other means of conveyance may be driven to pick up the final products.

The molds themselves may be prepared by excavating the earth to the approximate shape of the articles to be molded and then lining the earth with concrete to the exact outer dimensions of the articles. This lining can be placed in the earth either by molding or by pneumatically

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projecting concrete onto the surface of the excavated earth, as by the "Guniting" process. Once the mold has been formed it can be cured by flooding the excavations with water and allowing them to remain flooded for a sufficient length of time to effect the curing.

In production, a series of molds will customarily be prepared and will be arranged so as to form one or more long lines or trenches. After formation, the molds will be coated with some material to prevent concrete from adhering to their surfaces and the products to be made by molding will then be formed in the molds either by pouring or by the pneumatic projection of concrete into the molds.

In the course of the manufacture of the final product any required reinforcing material will be placed therein. When the molding is complete, the molds, usually a long series of them, will be flooded with water for curing. At the end of the curing period the water will be removed and the molded products will then be ready to be picked and taken directly to the place where they are to be used.

For the purpose of illustrating the invention, the appended drawings show the manufacture of two types of buildings by the new process. One is an outhouse, of which a very large number are to be constructed, for sanitary purposes, in the tropics; and the second is a curved roof dwelling, especially suitable for the tropics, of which a large number are also expected to be constructed. To manufacture the pre-formed parts for these buildings at the rate at which they are required, quite a number of acres of land will be required. If the work were done in the normal factory style, inside of buildings, it would require very large factories.

In the drawings:

Figure 1 is a plan view of two rows of molds formed according to the present invention;

Figure 2 is a cross-sectional view of the same arrangement taken on the lines 2—2 of Figure 1;

Figure 3 is a view of a small outdoor toilet building constructed from parts prepared in accordance with the principles of this invention;

Figure 4 is a plan view of the building of Figure 3, with the top removed and with certain parts shown in section;

Figure 5 is a cross-sectional view of a part of the building shown in Figure 3, the view being taken on lines 5—5 of Figure 4;

Figure 6 is a plan view of two rows of molds prepared according to this invention for a different type of building;

Figure 7 is a cross-sectional view of the mold arrangement shown in Figure 6 and taken on lines 7—7 of Figure 6;

Figure 8 is a view of an assembled building constructed from the parts molded in the mold arrangement shown in Figures 6 and 7;

Figure 9 is a cross-sectional view of the building shown in Figure 8;

Figure 10 is a detailed view in cross-section of the footing construction of the building of Figure 8;

Figure 11 is a plan view of the building of Figure 8;

Figure 12 is a detailed sectional view taken on lines 12—12 of Figure 11;

Figure 13 is a detailed sectional view taken on lines 13—13 of Figure 11;

Figure 14 is a detailed sectional view taken on lines 14—14 of Figure 11; and

Figure 15 is a detailed sectional view taken on lines 15—15 of Figure 11.

As illustrated in Figures 1 to 5, inclusive, the principles of this invention have been applied to the manufacture of the parts for a small, sturdy, economical, easily cleanable outdoor toilet.

As illustrated in Figures 3, 4 and 5, such a structure consists of a main base member 20, arcuate wall members 21, 22 and 23, a roof member 24, a commode member 25 and a smaller base member 26.

The members are so constructed that the main base member 20 and the smaller base member 26 may be placed in the ground, the wall members 21, 22 and 23 may rest thereon and the roof member 24 may be supported by the wall members. During their formation, each of the parts is provided with means by which it may be interlocked to adjacent parts so that the structure when completed will be securely locked in place. Thus, as shown in Figure 5, angular dowel pins 27 may be embedded in the main base plate 20 and the side members 21, 22 and 23 may be provided with openings in their lower edges to receive these dowel pins and hold them in place relative to the base plate. In order to prevent the dowel pins 27 from breaking the lower edge of the side members 21, 22 and 23, it has been found desirable to form the openings in the lower edges of the side members by embedding therein pipes 28 having an internal diameter of the proper size to receive the dowel pins 27.

In a similar manner, the roof member 24 may have formed therein angular dowel pins 29 which are adapted to be received in openings of the upper edges of the side members, which openings are also formed by embedding pipes 30 in these members. The third side member 23 is so constructed as to act as a screen for the entrance and hence extends outwardly from the main base member 20 and has its outer end mounted on the small base member 26 in the same manner that the other side members are mounted on the main base member. The inner edge of this third side member, instead of being attached to the main base member and the roof, is attached to the adjacent side member by means of an S-shaped dowel member 31 at its lower end and a U-shaped dowel member 32 at its upper end. These dowel members enter openings in the adjacent side member and in the reinforcing pipes 28 and 30 and also enter openings defined by pipe members 33 and 34 embedded in the edge of the third side member 23.

Reinforcing material 35 is molded into any or

all of the members as necessary, and the commode member 25 may be mounted on base member 20 either in the same manner that the side members are mounted on the base member or in any convenient manner.

The formation of the preformed parts for the structure shown in Figures 3, 4, and 5 may be accomplished by use of an arrangement such as illustrated in Figures 1 and 2. In Figure 1, a roadway 40 is flanked by two rows 41 and 42 of molds prepared in accordance with this invention. The roadway will have a width and a surface satisfactory for use by whatever vehicles are to be used for removing the completed preformed elements. Along one side of the road is formed a series of molds 41 for the arcuate side members of the desired structure. These molds, as previously stated, are formed by excavating the earth and lining the excavated portions to the desired dimensions with concrete, either poured or pneumatically projected.

Wood or metal inserts may be used where necessary to produce sharp corners or other unusual configurations and any desired reinforcing can be positioned in the mold prior to or during molding. The mold surfaces themselves will be coated with castor oil or some other material that will prevent the adhesion of concrete to them prior to use, and this treatment will be repeated as often as necessary during use.

When the series of molds in a row have a generally arcuate form, as in the case of the series of molds for the arcuate side members of the particular structure illustrated in Figures 3, 4 and 5, the molding may conveniently be accomplished by the use of a ditch-lining machine such as the machine shown in Patent No. 2,297,099, granted to John M. Crom on September 29, 1942. If preferred, however, the products to be molded may be formed by applying cement by a hand-operated pneumatic projection device or by pouring the cement in place and troweling it into final shape.

As illustrated by the row of molds on the other side of the road in Figure 1, the roof member 24, the main base member 20, the commode member 25 and the small base member 26 may be cast in another row of molds opposite the molds which cast the side members. The molds for these members are prepared in exactly the same manner but since they are not of uniform arcuate shape it is generally more expedient to prepare these members by hand or by a hand-operated pneumatic projection device.

Having formed the products to be molded in the mold, they may be allowed to remain there while the molds are flooded and curing takes place. After curing, the completed parts may be moved directly onto a truck or other vehicle on the roadway 40. The molds drained of water either before or after the prefabricated parts are removed, are thus immediately available for the preparation of additional preformed parts.

As illustrated in Figures 6 to 15, inclusive, the principles of this invention are not limited to the preforming of parts for any particular type of structure but may be applied to the formation of parts for a wide variety of structures. Thus, in Figures 6 and 7 is illustrated an arrangement for preforming the parts for a curved roof structure, such as illustrated in Figures 8 to 15, inclusive.

The structure shown in Figures 8 to 15, inclusive, is of the type that was popularly known during the war as a "Quonset" hut. The present structure, however, is made from preformed

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reinforced concrete sections, instead of from metal.

As illustrated, each building is formed from a series of arcuate members 50, that function as both top and sides, a series of partition members 51 and a ridge pole or cover member 52, that covers the line where the arcuate members are joined. The arcuate members 50 are constructed so as to lock together along their laterally adjoining edges as shown in Figure 13 and to lap over and hold the end partitions in place as shown in Figure 12. They may also be constructed so as to fit over and lock into place the various interior partitions as shown in Figure 14. Since the arcuate members only extend to the center of the top of the building and it takes two members to make a complete building section, each member is provided with a plurality of bolt holes at its top edge, through which it may be bolted to the opposite member. A ridge or a cover plate 52 is so shaped as to fit over the place where the two arcuate members are bolted together, in such a manner as to prevent the entrance of water. This member also may be bolted in place. In order to provide ventilation, it has been found desirable to provide clearance, as shown at 53 in Figure 15, between the edges of the ridge plate and the arcuate members and then to provide openings 54 in the arcuate members under the ridge plate.

In preforming the parts for this construction, a road 60 may be provided with rows of molds 61 and 62 arranged along its opposite sides, in the same manner as was done in preparing the preformed parts for the smaller structure. The molds 61 on one side of the road may comprise the molds for the arcuate members, and the molds on the other side of the road 62 may comprise the molds for the partitions and cover plates. These molds may be formed, treated and used in exactly the same manner as has already been described in connection with Figures 1 and 2.

In some instances it may be desirable to force water under pressure into the molds under the molded products to loosen these products hydraulically from the mold after formation. For this purpose a water pipe or pipes may be connected to an opening or openings in the bottom of the mold.

Numerous modifications in the method of prefabrication described may be made without departing from the spirit of this invention and many types of structures produced by the application of its principles. It is intended therefore that this invention not be limited by the specific details of the disclosure but only as indicated by the appended claims.

What is claimed is:

1. A method of prefabricating parts for concrete structures that comprises forming molds for said parts in a series of elongated rows in the earth, separated by roadways, by excavating portions of the earth to form excavations having approximately the same shape as the parts to be

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molded, lining the excavated portions with concrete and covering the surface of the concrete lining with a material that will prevent the adhesion of concrete thereto, thereafter pneumatically projecting concrete onto the surface of the molds to form the parts to be prefabricated, flooding the molds to cure the parts so formed in situ, and removing the parts so formed from the molds.

2. A method of prefabricating parts for concrete structures that comprises forming molds for said parts in a series of elongated rows in the earth, separated by roadways, by excavating portions of the earth to form excavations having approximately the same shape as the parts to be molded, lining the excavated portions with concrete and covering the surface of the concrete lining with a material that will prevent the adhesion of concrete thereto, thereafter placing reinforcing material in place in the molds and placing concrete around the reinforcing to form the parts to be prefabricated in the molds, flooding the molds to cure the parts so formed in situ, and moving the parts so formed directly onto a conveyance operating on the roadways between the rows of molds.

3. A method of prefabricating parts for concrete structures that comprises forming molds for said parts in a series of elongated rows in the earth, separated by roadways, by excavating portions of the earth to form excavations having approximately the same shape as the parts to be molded, lining the excavated portions with concrete and covering the surface of the concrete lining with a material that will prevent the adhesion of concrete thereto, thereafter placing reinforcing materials in place in the molds and pneumatically projecting concrete into the molds around the reinforcing materials to form the parts to be prefabricated in the molds, flooding the molds to cure the parts so formed in situ, and moving the parts so formed directly onto a conveyance operating on the roadways between the rows of molds.

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