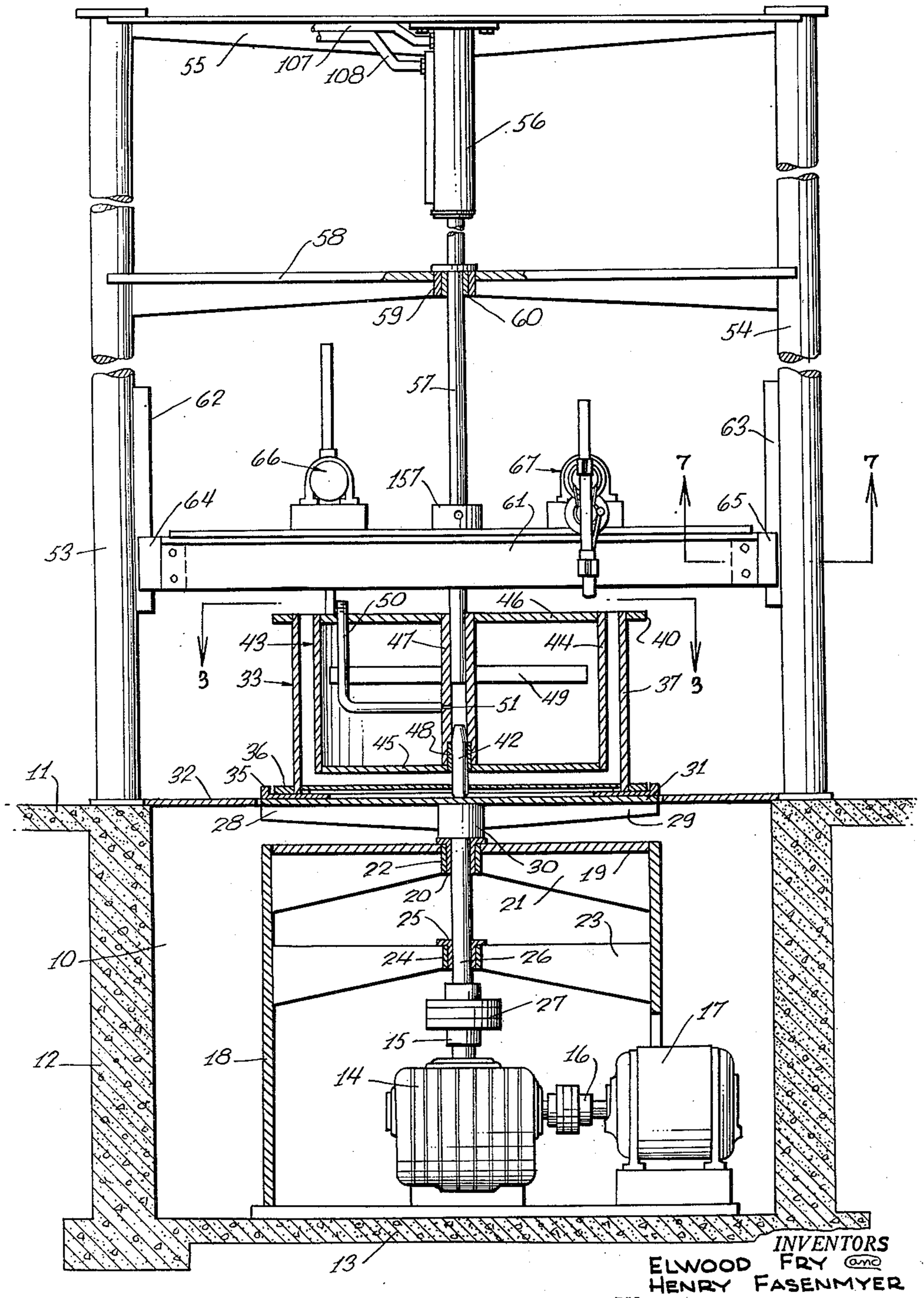
Oct. 31, 1950 E. FRY ET AL 2,527,717

APPARATUS FOR MOLDING CONCRETE SEPTIC TANKS

Filed Sept. 6, 1949 3 Sheets-Sheet 1



FIG—1

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Filed Sept. 6, 1949 3 Sheets-Sheet 2

FIG 2

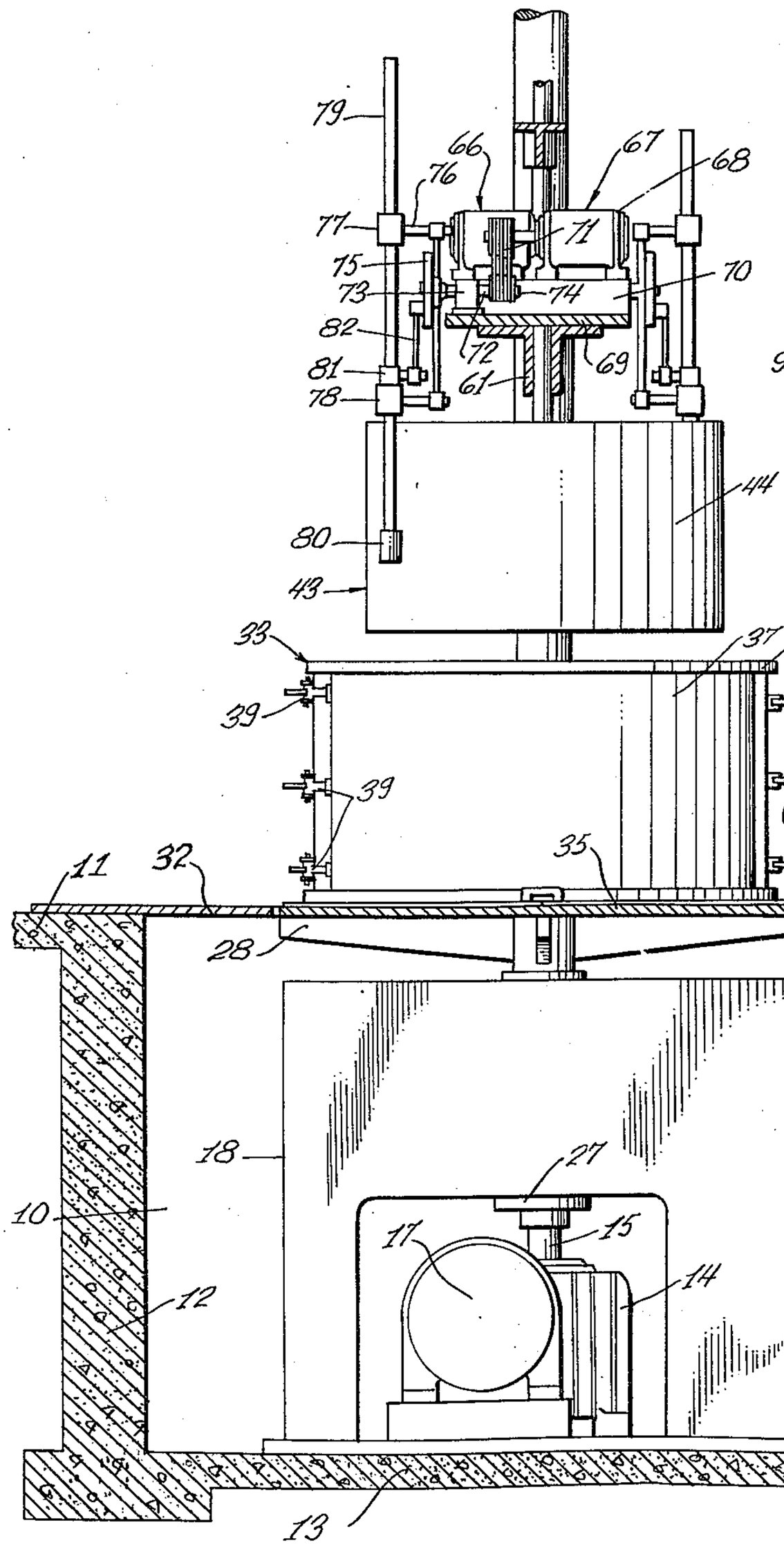

FIG 8

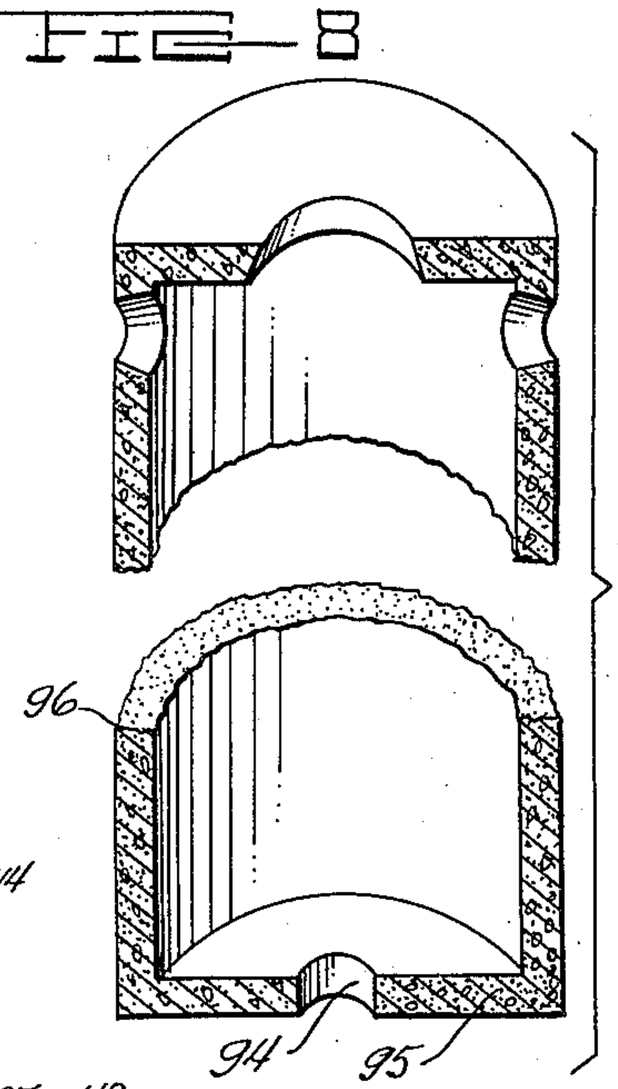

FIG 7

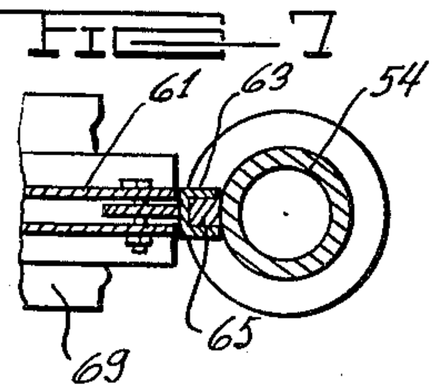

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FIG 3

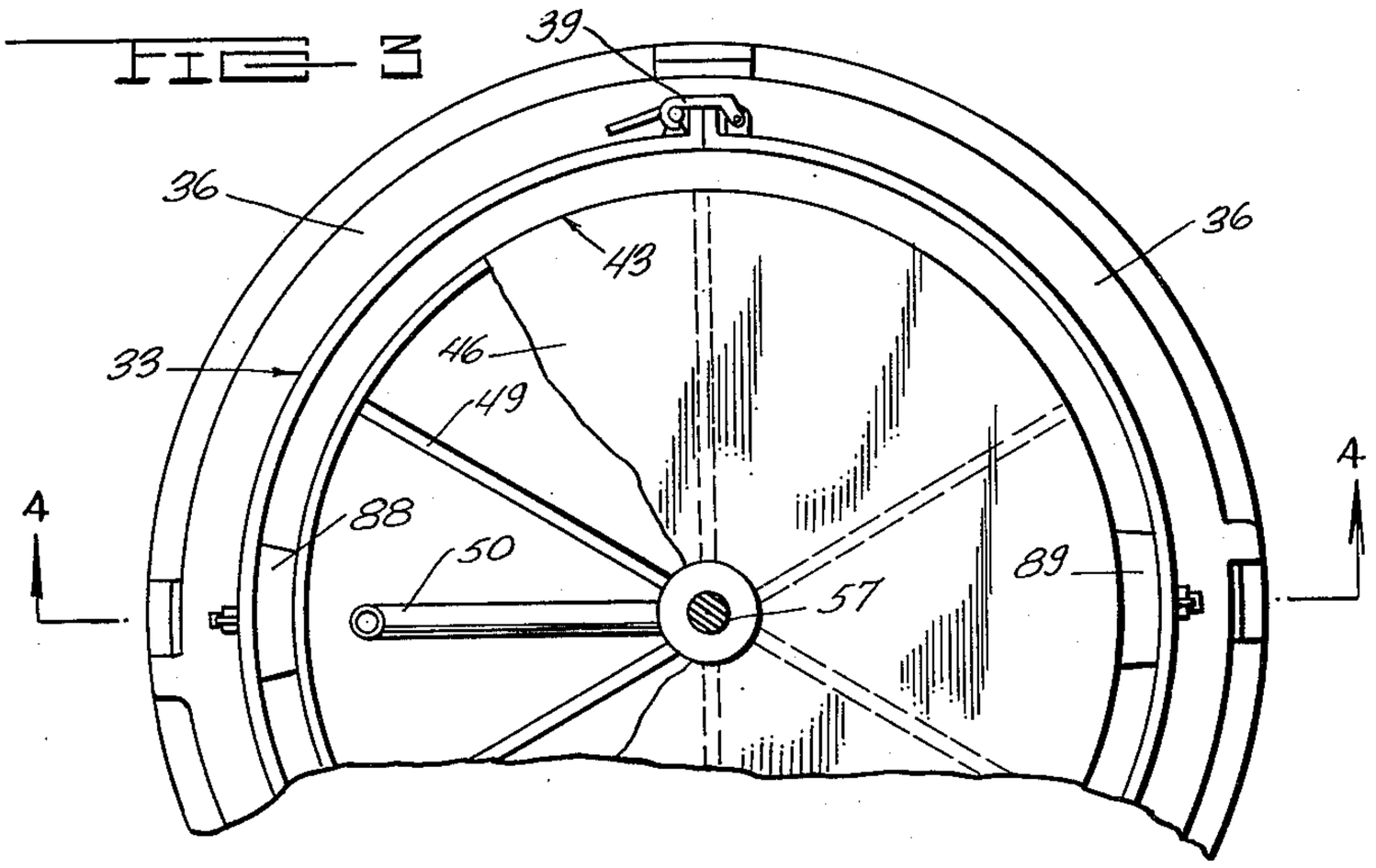


FIG 4

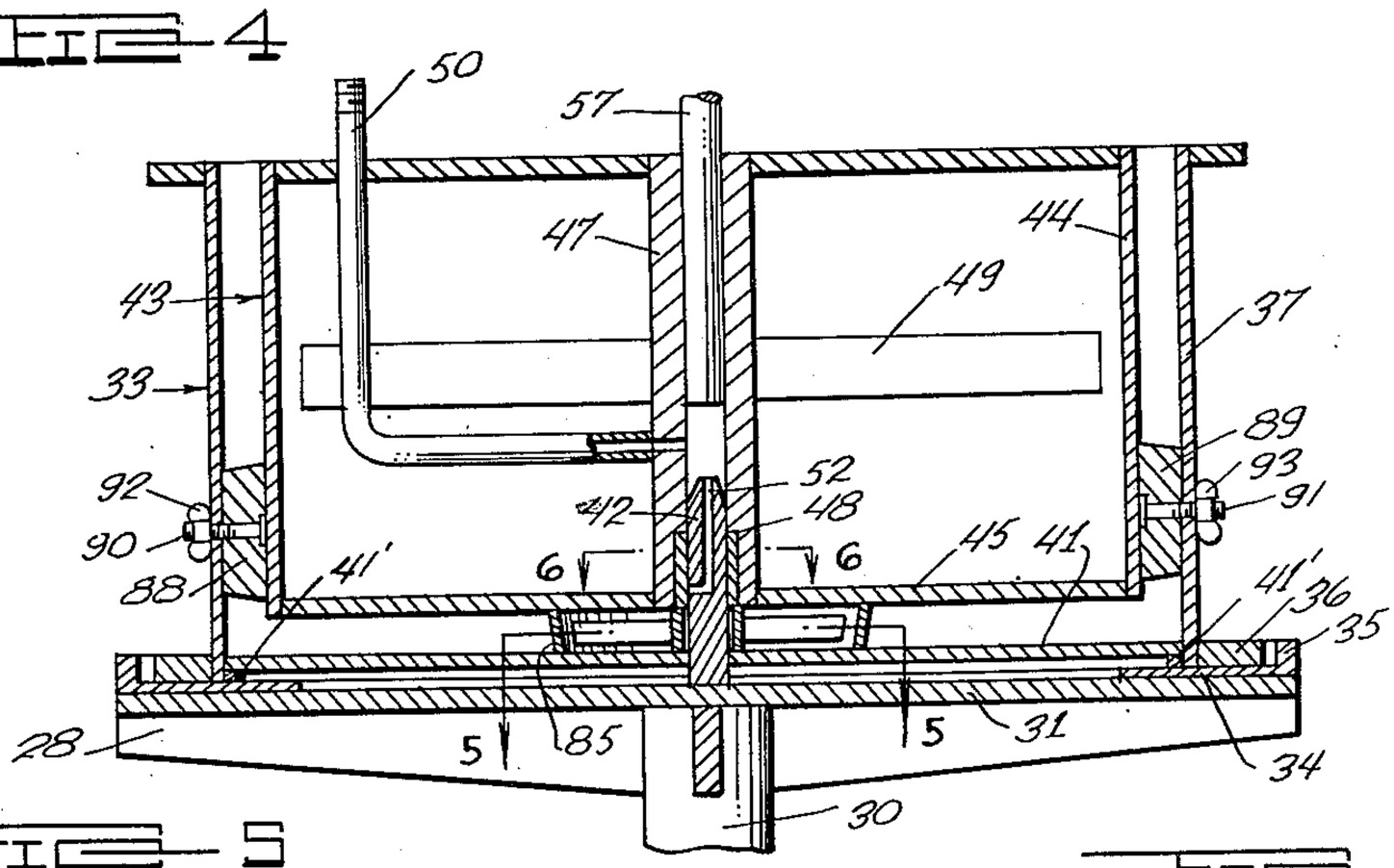


FIG 5

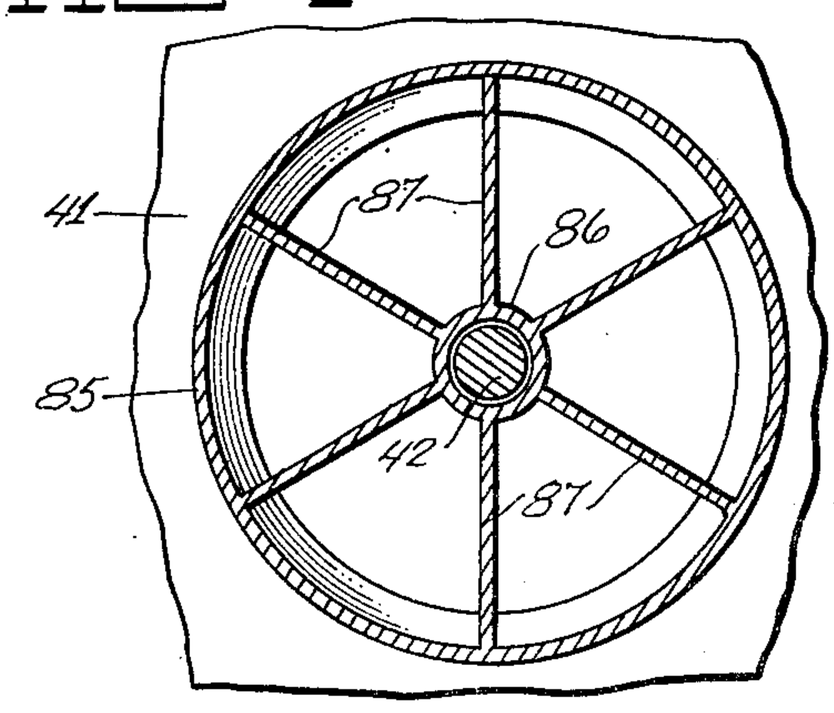
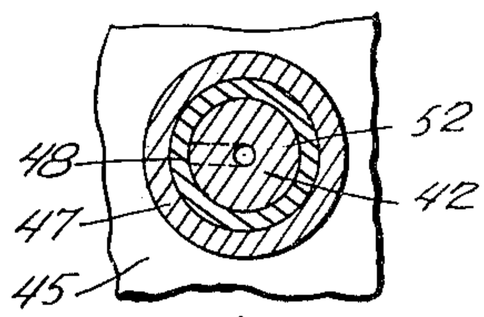


FIG 6



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APPARATUS FOR MOLDING CONCRETE SEPTIC TANKS

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Application September 6, 1949, Serial No. 114,148

2 Claims. (Cl. 25—41)

1

This invention relates to apparatus for manufacturing concrete tanks, and more particularly for manufacturing tanks of large size, such as septic tanks.

It is among the objects of the invention to provide improved apparatus for rapidly and efficiently manufacturing the tank parts, which apparatus is effective to cast one end wall and substantially one-half of the side wall of a cylindrical tank integrally in one operation, and to tamp the concrete material of the tank walls to a firm and strong condition, which produces tanks of uniform size, shape and strength without voids or holes in the walls thereof, and which is simple and durable in construction, economical to manufacture and operate, and easy to separate from the tank parts manufactured thereby.

Other objects and advantages will become apparent from a consideration of the following description and the appended claims in conjunction with the accompanying drawings, wherein:

Figure 1 is a front elevation of tank-forming apparatus illustrative of the invention, certain parts being broken away and shown in cross-section to better illustrate the construction thereof;

Figure 2 is a side elevation of the tank-forming apparatus illustrated in Figure 1, certain parts being broken away and shown in cross-section to better illustrate the construction thereof;

Figure 3 is a transverse cross-section on the line 3—3 of Figure 1, certain parts being broken away to better illustrate the construction of the apparatus;

Figure 4 is a cross-sectional view on the line 4—4 of Figure 3;

Figure 5 is a cross-sectional view on the line 5—5 of Figure 4;

Figure 6 is a cross-sectional view on the line 6—6 of Figure 4;

Figure 7 is a cross-sectional view on the line 7—7 of Figure 1; and

Figure 8 is a somewhat diagrammatic view of two tank parts formed by the apparatus of the invention, these tank parts being shown as perspective views of two half parts sectioned on a longitudinal, medial plane.

With continued reference to the drawings, the numeral 10 indicates a pit provided below a floor 11 and surrounded by a wall 12 and having a bottom wall 13.

A reduction gear unit 14 is mounted on the bottom wall of the pit and has one shaft 15 directed vertically upward, and a second shaft 16

2

directed horizontally. A suitable power unit, such as an electric motor 17, is connected to the horizontal shaft 16 to drive the vertical shaft 15 at a reduced speed.

A cylindrical housing 18 rests on the bottom wall 13 of the pit and encloses the reduction gear unit 14 and partly encloses the motor 17. This housing has a top cover 19 provided with a central aperture in which is mounted a bearing bushing 20. Radial ribs 21 are provided at the lower side of the cover 19, and converge toward the center of the housing to a cylindrical sleeve 22 which also receives the bushing 20. A spider structure is disposed below the cover 19 and includes radial ribs 23 which converge from the cylindrical wall of the housing to a bearing sleeve 24 which receives a second bearing bushing 25 in vertical alignment with the bushing 20. A shaft 26 is journaled in the bushings 20 and 25, and is connected at its bottom end to the vertical shaft 15 of the reduction gear unit 14 by a flexible coupling 27 of any wellknown construction.

A spider structure 28 is disposed above the housing top 19, and comprises a plurality of radially-disposed ribs 29 which converge to a central sleeve 30 which receives and is rigidly secured to the shaft 26 at the upper end of the shaft projecting above the top cover 19 of the housing 18. A circular table 31 is mounted on the spider structure 28 for rotation by the shaft 26, and the table is also supported by this shaft. An annular cover 32 overlies the upper end of the pit 10 around the table 31, and extends from the edge of the floor 11 substantially to the periphery of the table.

A cylindrical outer form, generally indicated at 33, is mounted on the table 31 concentrically therewith. A plurality of angularly spaced-apart pads 34 are mounted on the table plate 31 and provided respectively with upstanding lugs 35 positioned at the outer circumference of the table for engaging and rotating the outer form 33. The two semi-circular parts of a diametrically-split circular ring 36 are secured to the two semi-cylindrical parts of the cylindrical wall 37 of the outer form 33 respectively to constitute a reinforcing flange for the bottom end of the outer form. The two parts of the wall 37 are secured together at opposite sides of the form by a plurality of manually-releasable locks 38 and 39, so that the two halves of the form side wall can be separated to strip the form from a tank cast therein. After a tank half is cast, the outer form with the cast tank half therein is lifted from the table and placed on the floor with the

bottom plate 41 resting on floor supports. The locks 38 and 39 are then released and the halves of the outer form separated and removed from the casting, the bottom plate remaining under the casting as a pallet. The two parts of the outer form are then returned to the table and re-assembled with a new bottom plate. At its upper end, the outer form 33 is surrounded by an external flange 40 in the form of a diametrically-split ring which reinforces the side wall parts at their upper edges.

The bottom plate 41 of the outer form is marginally supported in the outer form by lugs 41' and is provided with a central aperture which receives a guide pin 42 welded at its lower end to table plate 31 at the center of the latter.

The inner form 43 is a cylindrical drum having a side wall 44 of an external radius less than the internal radius of the side wall of the outer form by the thickness of the tank to be cast in the apparatus. This inner form has a bottom wall or plate 45 marginally secured to the side wall 44 at the bottom edge of the latter, and a top wall or plate 46 marginally secured to the side wall 44 at the top edge of the latter. A tubular post 47 is concentrically disposed within the cylindrical inner form, and extends at its upper end through a central aperture provided in the top plate 46 of this form. At its lower end the post 47 is secured to the bottom plate 45 surrounding the aperture through which the guide pin 42 extends, and a bearing bushing 48 is mounted in a counterbore provided in the post 47 at its lower end, the pin 42 being journaled in this bushing.

A spider structure is disposed within the inner form, and comprises legs or ribs 49 which extend radially from the side wall 44 of the inner form to the center post 47 intermediate the height of the inner form to internally reinforce this inner form.

An air conduit 50 extends through the top wall 46 of the inner form and has within the inner form a right-angle formation, so that its opposite end abuts and is secured to the center post 47. An aperture 51 in the center post leads from the conduit 50 to the interior of the center post, and a bore 52 in the guide pin 42 extends from the top of the guide pin to the side of the guide pin at a location adjacent the bottom end of the bearing bushing 48, so that air will be admitted under the bottom wall 45 of the inner form when the inner form is lifted out of a tank part cast between the inner and outer forms, to prevent the creation of a vacuum between the bottom of the inner form and the tank end wall.

Two elongated, vertically-disposed posts 53 and 54 are mounted, with their bottom ends on the top of the pit wall 12, and are respectively disposed at diametrically-opposite sides of the pit.

A top beam 55 extends between the posts 53 and 54 and is secured at its opposite ends respectively to these posts at the upper ends thereof. A hydraulic cylinder 56 is secured at one end to the beam 55 at the mid-length location of the latter, and suitable hydraulic conduits 107 and 108 are connected to this cylinder to supply hydraulic fluid under pressure to the cylinder and provide a return line therefor. A piston, not illustrated, is reciprocable in the cylinder 56, and a piston rod 57 extends from the bottom end of the cylinder and is received at its lower end in the upper end of the center post 47 of the inner form 43. This piston rod 57 is rigidly secured in the center post 47, so that the inner form can be

raised to a position in which it is entirely above the outer form 33 by the application of hydraulic fluid under pressure to the lower end of the hydraulic cylinder 56.

An intermediate beam 58 extends between the posts 53 and 54 and is secured at its opposite ends to the posts 53 and 54, respectively, intermediate the length of the latter. At its mid-length location this intermediate beam carries a sleeve 59 within which is mounted a bearing bushing 60 in which the piston rod or shaft 57 is slidably received.

A guide beam 61 is secured, at its mid-length location, to the piston rod 57 immediately above the top of the inner form 43, and extends between the two posts 53 and 54. The post 53 is provided, on its inner side, with an elongated guide rib 62, and the post 54 is provided with a similar rib 63. The beam 61 is provided, at its opposite ends, with channel-shaped guide shoes 64 and 65 which slidablly engage the guide ribs 62 and 63, respectively, to guide the beam 61 in its vertical movements incident to the vertical movements of the piston rod 51 by the hydraulic device 56.

Two tamping devices, as generally indicated at 66 and 67, are mounted on the beam 61 at respectively opposite sides of the piston rod 51, and are effective to tamp concrete deposited between the side walls of the inner and outer forms 33 and 43.

As both of these tamping devices are similar in construction and operation, and as they are of a construction already known to the art, a brief description of only one is considered sufficient for the purposes of the present disclosure.

The tamping device 67 has been selected for detailed description, and comprises an electric motor 68 mounted on the top plate 69 of the guide beam 61 by a base structure 70. The motor shaft extends from one end of the motor 68 and carries a series of V-belt pulleys 71. A shaft 72 is journaled in a bearing block 73 mounted on the top plate 69 and carries, on one end, a series of V-belt pulleys 74, one of which is connected by a V-belt to a corresponding pulley of the group 71. A disc 75 is concentrically mounted on the opposite end of the shaft 72, and is disposed beyond the longitudinal edge of the top plate 69. A U-shaped guide structure 76 is journaled adjacent its mid-length location on the shaft 72 at the inner side of the disc 75 and carries, at its respectively opposite ends, two guide sleeves 77 and 78 in which a plunger rod 79 is reciprocably mounted. The plunger shaft or bar 79 carries a pestle 80 on its lower end, which pestle operates in the space between the side walls of the inner and outer forms to tamp the concrete mix deposited into this space. A clamp 81 surrounds the plunger 79 between the guide sleeves 77 and 78, and is connected by a link rod 82 to the disc 75 eccentrically of the disc, so that the tamp rod or plunger will be reciprocated vertically when the disc rotates. The clamp 81 has a frictional connection only with the plunger rod 79, so that as the concrete is gradually filled into the space between the inner and outer forms, the pestle 80 will be permitted to rise automatically and continue its tamping operation.

In the operation of the device and in the manufacture of a bottom part of a septic tank, with the inner form elevated above the outer form, a quantity of relatively dry concrete mix is deposited in the outer form sufficient to form the bottom wall of the tank. The inner form is then

lowered into the outer form until stop 57 on rod 57 contacts the top of beam 61, thereby properly positioning the inner form in the outer form. The motor 17 is then placed in operation to rotate the table 41 and the outer form 33, the inner form 43 remaining stationary. Dry concrete mix is then deposited into the space between the side walls of the inner and outer forms by means of a suitable chute or chutes, not illustrated, and this mix is firmly tamped as it is rotated by the outer form. This rotation of the outer form relative to the inner form imposes a certain amount of centrifugal force on the concrete mix on the bottom plate of the outer form, and also works this mix in a manner to eliminate all voids and holes except the hole through which the guide pin 42 extends, and the tamping action also highly compresses the mix in the space between the bottom walls of the outer and inner forms. The rotation of the outer form and the operation of the tamping devices is continued until the space between the side walls of the outer and inner forms is completely filled with tamped concrete mix, the tamp pestle rising in this space as the concrete mix is tamped to a substantially solid condition.

As soon as the space between the side walls of the inner and outer forms has been filled, the operation of the tamping devices is discontinued and the top edge of the concrete body is dressed off and then roughened with a wire brush or other suitable means. The operation of motor 17 is then discontinued and the hydraulic device 56 placed in operation to move the inner form out of the cast tank part and to a position entirely above the outer form. The outer form with the tank casting therein is then removed from the table 28 and placed on the floor, after which the two halves of the side wall of the outer form are separated by releasing the locks 38 and 39 and pulling the two parts of the form side wall apart. After the outer form has been removed, it is returned to the table for further use, the bottom plate 41 being used as a pallet for supporting the cast body.

In manufacturing the top halves of septic tanks, the process is exactly the same as that described above, except that certain plugs or spacers are placed between the inner and outer forms to provide the manhole opening at the center of the top wall of the tank, and the pipe-connection openings in the side wall of the tank near the top end thereof.

As particularly illustrated in Figure 4, a flat ring 85 of somewhat truncated, conical shape is placed between the bottom plates of the inner and outer forms. This ring has, at its center, a sleeve 86 which receives the guide pin 42, and is secured to the ring by a plurality of angularly spaced-apart spokes 87. This ring 85 is placed on the bottom plate 41 of the outer form before the concrete to provide the top end wall of the tank is placed on this bottom plate with its sleeve 86 receiving the guide pin 42 to center the ring relative to the outer and inner forms.

Two circular plugs 88 and 89 which are also preferably of somewhat truncated, conical shape, are secured to the side wall of the outer form at the inner side of the latter, and at a location slightly spaced from the bottom plate 41. These plugs are detachably secured to the side wall of the outer form by suitable means, such as the bolts 90 and 91, and the wing nuts 92 and 93, and have a thickness substantially equal to the distance between the side walls of the inner and

outer forms. The top half of the tank is cast in the same manner as is described above in connection with the bottom half, the tamp pestles being able to ride up over the plugs 88 and 89 by reason of the frictional connection between the plunger rods and the operating clamps. It will be noted that before the outer form can be stripped from the cast tank part, the nuts 92 and 93 will have to be removed from the bolts 90 and 91, and that after the form has been stripped, the plugs 88 and 89 and the ring 85 can be knocked out of the cast tank part and replaced between the forms in the manner indicated above.

The bottom and top halves of the tanks can be formed at different times on the same machine, or can be formed on two different machines, if desired. When a sufficient number of tank parts have been formed, they are then assembled to provide the complete tanks. First, the hole 94 in the bottom wall 95 of the bottom half 96 of the tank, provided by the guide pin 42, is filled with concrete by hand, and any small voids or cracks in the inner surfaces of the two tank parts are also filled by hand, and smoothed out. Semi-cylindrical baffles, not illustrated, are then installed over the side openings in the top part of the tank by cementing them in place with a concrete mortar, and a layer of mortar is then placed on the top edge of the lower tank part. The upper part of the tank is then placed in position on the lower tank part, and the motar placed between the roughened, adjacent edges of the two parts allowed to set up to firmly secure the two parts of the tank together in operative assembly. The tank is then ready for installation.

It will be noted that the entire tank is cast without the use of reinforcement of any kind and that the end walls are cast integrally with the side walls of the two parts, providing an extremely strong and rigid construction. By casting the tank in two separate halves, a large tank can be provided without using such quantities of concrete as would render the castings difficult to handle, or unduly heavy.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is, therefore, to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are, therefore, intended to be embraced therein.

What is claimed is:

1. Apparatus for manufacturing cylindrical concrete tanks comprising a rotatable table supported at floor level, means below said table supporting and rotating the same, a cylindrical outer form mounted on said table, a fixed structure extending above said outer form, an inner cylindrical form movable into and out of said outer form, and means carried by said fixed structure and connected to said inner form for moving the latter between a position in which it is operatively disposed within said outer form and a position in which it is disposed entirely above said outer form, said inner form comprising a cylindrical side wall having a radius less than the radius of the side wall of said outer form by the wall thickness of a tank part to be cast between said forms, a top plate and a bottom plate se-

cured to said cylindrical side wall at respectively opposite ends thereof, and a tubular center post extending concentrically through the space between said top and bottom walls, a guide pin secured to and projecting upwardly from said table rotatably received in said center post, said guide pin having a bore extending from its upper end to the side thereof adjacent said bottom wall, said center post having an aperture therein communicating with the bore in said guide pin, and a tubular air conduit extending from said aperture through said top wall.

2. Apparatus for manufacturing cylindrical concrete tanks comprising a rotatable table supported at floor level, means below said table supporting and rotating the same, a cylindrical outer form mounted on said table, a fixed structure extending above said outer form, an inner cylindrical form movable into and out of said outer form, and means carried by said fixed structure and connected to said inner form for moving the latter between a position in which it is operatively disposed within said outer form and a position in which it is disposed entirely above said outer form, said inner form comprising a cylindrical side wall having a radius less than the radius of the side wall of said outer form by the wall thickness of a tank part to be cast between said forms, a top plate and a bottom plate secured to said cylindrical side wall at respectively opposite ends thereof, a tubular center post extending concentrically through the space between said top and bottom walls, a guide pin secured to and projecting upwardly from said table rotatably received in said center post, said guide pin having a bore extending from its upper end to the side thereof adjacent said bottom wall, said center post having an aperture therein communicating with the bore in said guide pin, and a tubular air conduit extending from said aperture through said top wall, and a lift rod for said inner form secured at its lower end to said center post at the upper end of the latter and extending above said forms.

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