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APPARATUS FOR CASTING

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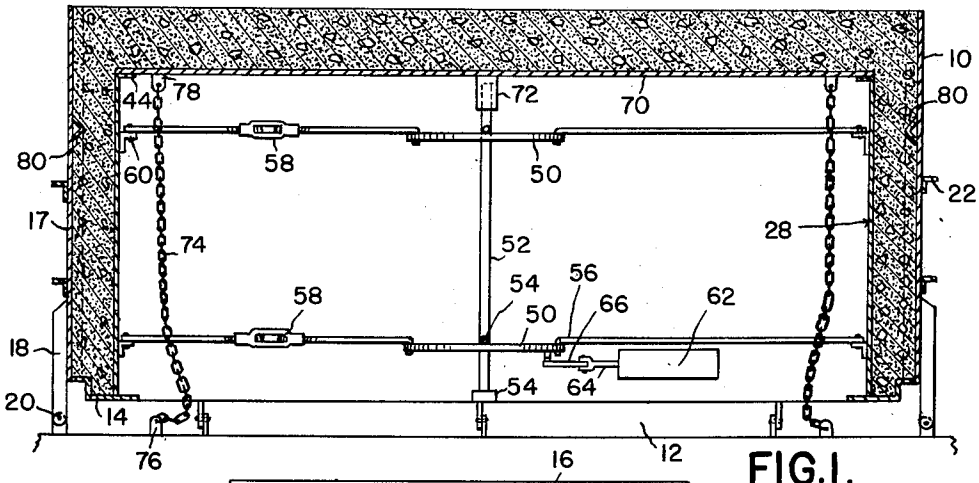



FIG.1.

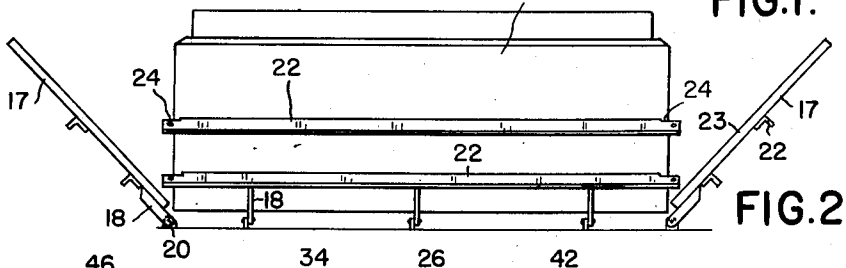



FIG.2.

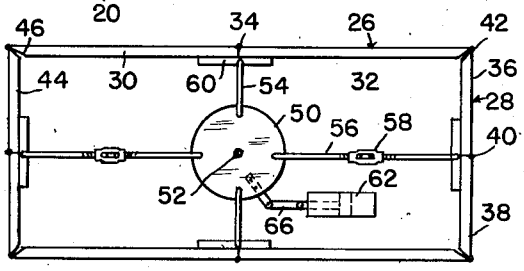



FIG.3.

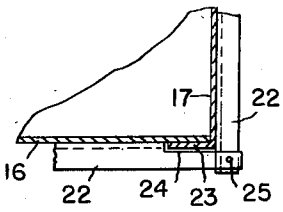



FIG.5.

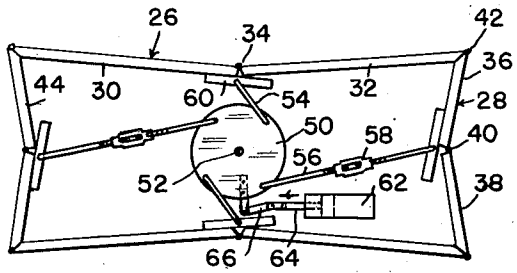



FIG.4.

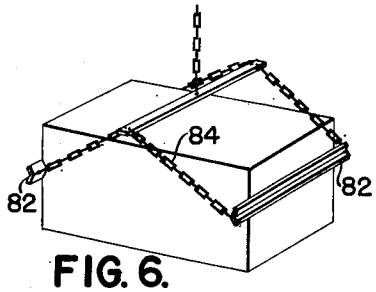



FIG. 6.

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2,807,071

# APPARATUS FOR CASTING

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9 Claims. (Cl. 25—130)

The present invention relates to apparatus for casting.

For the purpose of illustrating the invention apparatus designed particularly for casting concrete septic tanks has been chosen. However, it will be appreciated that the operation for casting is by no means limited to the production of septic tanks or equivalent devices but has a broad application.

It is an object of the present invention to provide apparatus designed to facilitate the production of hollow cast articles such as septic tanks, to reduce the labor involved, to facilitate separation between a casting and the forms used in making the casting, and to expedite the entire casting operation.

More specifically, it is an object of the present invention to provide apparatus for casting which comprises inner and outer forms having parallel side walls, the side walls of the outer form being movable outwardly and the side walls of the inner form being movable inwardly to permit vertical movement of a completed casting out of the forms.

It is a further object of the present invention to provide casting apparatus comprising an inner form including side walls, each of the side walls comprising a plurality of sections hinged together along a vertical axis intermediate the ends thereof, the ends of the side walls being hinged together to permit collapse and expansion of the form.

It is a further object of the present invention to provide casting apparatus comprising an inner form, a cover plate resting upon the inner form with respect to which the upper edges of the inner form are slidable, and means secured to the cover plate providing for limited upward movement thereof to facilitate separation between the cover plate and a completed casting.

It is a further object of the present invention to provide, in casting apparatus, an inner form having collapsible and expansible side walls, toggle mechanism for effecting movement of the side walls and including a vertical shaft, a cover plate resting upon the upper edges of the side walls, and means carried by the cover plate for rotatably engaging the upper end of the shaft.

Other objects and features of the invention will become apparent as the description proceeds, especially when taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a vertical section through the casting apparatus showing a cast article in place therein.

Figure 2 is a side elevation of the casting apparatus illustrating the side walls of the outer form moved outwardly to clearance position.

Figure 3 is a vertical plan view of the inner form showing the side walls thereof in expanded condition.

Figure 4 is a plan view of the inner form showing the side walls thereof in contracted position.

Figure 5 is an enlarged fragmentary sectional view illustrating the manner of interconnecting the side walls of the outer form at the corners thereof.

Figure 6 is a perspective view showing the manner in which the casting is lifted.



The apparatus illustrated herein is designed for the production of cast concrete septic tanks, one of which is illustrated in the casting apparatus at 10. The casting apparatus comprises a suitable support 12 which may be formed of structural elements or the like. Carried by the support 12 are strips 14, four such strips being provided and being disposed to define a rectangle.

The casting apparatus comprises an outer form including side walls 16 and end walls 17, having secured thereto brackets 18 pivoted as indicated at 20 to the supporting structure. The side walls 16 and end walls 17 are preferably formed of sheet metal and are provided with elongated reinforcing angle irons 22. The end walls 17 have inwardly extending flanges 23 adapted to overlie the edges of the side walls 16, as best illustrated in Figure 5. In order to receive the flanges 23 the ends of the angle irons 22 provided on the side walls 16 are cut away as indicated at 24. The end portions of the angle irons 22 extend respectively beyond the edges of the side and end walls and are apertured to receive a pin or similar fastening element as indicated at 25. Thus, when the side and end walls of the outer form are in vertical position and are interconnected by the pins 25 they define a rectangular structure having vertical walls. The lower portions of the side and end walls engage the outer edges of the strip 14.

The inner form comprises vertical side walls 26 and vertical end walls 28. Each of the side walls 26 comprises a pair of sections 30 and 32 hinged together as indicated at 34. Each of the end walls 28 comprises sections 36 and 38 hinged together as indicated at 40. The side walls 26 and end walls 28 are hinged together at their ends as indicated at 42.

Preferably, the wall sections 30, 32, 36 and 38 are formed of sheet metal and have inwardly extending flanges 44 at the top edges thereof. At the corners of the inner form the flanges 44 are cut away as indicated at 46 to permit collapse of the inner form.

The bottom edges of the side walls 26 and 28 of the inner form rest upon portions of the strip 14 and are slidably supported thereon.

In order to effect collapse and expansion of the inner form toggle mechanism is provided which comprises one or more lever devices 50, herein illustrated as comprising circular discs. These discs are secured to a vertical actuating shaft 52 journaled at its lower end in a bearing 54. Connected to the discs 50 are links 54 which connect the discs 50 to the side walls 26, and links 56 which connect the discs 50 to the end walls 28. Preferably the links 54 and 56 are each adjustable as to length and for this purpose suitable means herein illustrated as turnbuckles 58 are provided. In the drawings not all of the links are illustrated as provided with turnbuckles, but turnbuckles may be provided in each link if desired. The turnbuckles provide means for predetermining the precise position of the side and end walls of the inner form when it is in expanded condition. The outer ends of the links are pivoted to angle irons 60 or the like, and as best illustrated in Figures 3 and 4 the elements 60 are secured to one of the sections of each wall and extend beyond the adjacent end of the adjacent section. Thus, the elements 60 are rigidly secured to one wall section and extend beyond the adjacent end of the adjacent wall section to have extended bearing therewith to assist in moving the walls to expanded position.

Suitable power means are provided for rotating the shaft 52 and hence the discs or lever devices 50 so as to effect movement of the wall sections of the inner form into expanded or collapsed condition. This means is herein illustrated as a power cylinder 62 having a piston therein connected to a piston rod 64 which in turn is connected by a link 66 to one of the discs 50. Accordingly,

when the piston is moved to the right or left in the cylinder 62 the discs 50 are given a predetermined rotation. It is contemplated that the piston will be provided with abutment means limiting its movement to the right as seen in Figure 1, so as to predetermine the position of the discs 50 corresponding to expanded condition of the inner form. With the piston in its extreme right hand position the exact position of the walls of the inner form are adjusted by the turnbuckles 58.

Resting upon the upper edge of the wall sections 30, 32, 36 and 38 of the inner form is a cover plate 70 which may be formed of sheet metal suitably reinforced if desired or required. The outer edges of the cover plate 70 are dimensioned to be substantially coincident with the outer surface of the walls of the inner form when the inner form is in expanded condition. This condition is best illustrated in Figure 1. Depending from the inner surface of the cover plate 70 is a socket 72 into which the upper end of the shaft 52 extends when the cover plate 70 rests upon the flanges 44 of the walls of the inner form. This arrangement not only provides for centering of the cover plate 70 with respect to the walls of the inner form, but it also provides a firm bearing for the upper end of the shaft 52 after the casting has been poured and hardened. This is useful in that it provides a definite location of the axis of rotation for the shaft 52 during power movement of the wall section of the inner form inwardly away from the inner surface of the casting.

Means are provided to facilitate separation between the casting 10 and the cover plate 70. This means is herein illustrated as comprising elongated non-extensible elements 74 which are herein illustrated as chains. The lower ends of the chains are secured to brackets 76 and the upper ends of the chains are secured to brackets 78 depending from the under surface of the cover plate 70. The arrangement is such that when the casting is elevated the cover plate 70 is permitted to move upwardly therewith for a short distance. However, as soon as the slack in the chains 74 has been taken up the upward movement of the plate 70 is instantaneously arrested and it is thereby positively separated from the upwardly moving casting. It will be appreciated that the desirability for this arrangement results from the tendency for the cover plate 70 to adhere to the under surface of the casting, and more particularly, from a requirement of breaking a pneumatic seal which exists between the cover plate 70 and the casting. Preferably, the dimension of the chains 74 is related to the dimension of the socket 72 such that upward movement of the plate 70 is arrested by the chains before separation between the socket 72 and the shaft 52.

The end walls of the outer form are provided with transversely extending angle irons 80 which in the completed casting provide transversely extending right angular grooves or indentations extending completely across the ends of the casting. Accordingly, when the end walls 17 of the outer form are moved to the position illustrated in Figure 1, hoisting mechanism may be connected to the casting and may take the form of bars 82 seated in the transverse grooves provided by the angle irons 80 and interconnected by chains 84 or the like, as illustrated in Figure 6, the tension of which holds the bars seated in the grooves during elevation of the casting from the casting apparatus.

From the foregoing detailed description the operation of the apparatus is believed to be evident. However, for completeness the sequence of steps will be set forth in detail. Assume that the inner form is in expanded condition and the outer form is in its closed position illustrated in Figure 1, the cover plate 70 is in place, and a casting 10 has been poured and has set therein. To separate the casting from the mold it is necessary only to remove the pins 25 from the transverse angle irons 22, after which the side walls 16 and the end walls 17 of the outer form may be swung outwardly to the position illustrated in Figure 2. Thereafter air or hydraulic fluid is admitted to the cylinder 62 in a direction to move the piston therein to the left, thus rotating the discs 50 in a clockwise direction to the position illustrated in Figure 4. The links 54 and 56 move the center portions of the side and end walls inwardly and this in turn results in a smaller inward motion of the extreme corners of the inner form. Thus the inner form is collapsed inwardly completely out of contact with the inner surface of the casting. During its movement to collapsed position the walls of the inner form slide upon the strips 14 which form the bottom of the mold form. Thereafter, the hoisting device is connected to the casting after which the casting is elevated. Initial upward movement of the casting carries the cover plate 70 with it but after initial upward movement of the cover plate the slack in the chains 74 is taken up and the cover plate 70 is abruptly pulled away from the upper surface of the casing 10.

In order to condition the apparatus for pouring the next mold it is only necessary to apply air or hydraulic fluid to the piston 62 in the opposite direction, which will again expand the inner form to proper position. The cover plate 70 will be properly centered thereon and its edges may be moved into exact alignment with the outer surfaces of the walls of the inner form. The walls of the outer form are then swung upwardly and are interconnected by insertion of the pins 25 through the overlapping ends of the angle irons 22. The mold is thus in condition for the next pour with a minimum of labor and with the parts precisely positioned.

The drawings and the foregoing specification constitute a description of the improved apparatus for casting in such full, clear, concise and exact terms as to enable any person skilled in the art to practice the invention, the scope of which is indicated by the appended claims.

What we claim as our invention is:

1. In casting apparatus, an inner form having side walls each of which comprises a pair of sections hinged together, hinge means connecting the ends of said side walls, toggle mechanism for expanding and collapsing said form, said mechanism comprising a vertical shaft, a disc carried by said shaft, links connected at their inner ends to said disc and at their outer ends to intermediate points on each of said side walls, a cover plate resting upon the top edges of said side walls with respect to which said side walls are slidable, and bearing means at the underside of said cover plate engaging the upper end of said shaft with provision for rotation and relative axial movement of said shaft with respect to said bearing means.

2. In casting apparatus of the character described, an inner form comprising inwardly and outwardly movable side walls, a mechanism operatively connected to said side walls for effecting inward and outward movement thereof, said mechanism including a vertical operating shaft, a cover plate resting loosely upon the upper edges of said side walls to provide for inward and outward movement of said side walls while said plate is supported thereby, a downwardly directed socket on the underside of said cover plate, the upper end of said shaft being received in said socket to provide lateral support for the upper end of said shaft.

3. Apparatus as defined in claim 2 which comprises means connected to said cover plate providing for limited substantially free upward movement thereof as the casting is raised and adapted to abruptly arrest further upward movement of said cover plate upon continued upward movement of the casting to effect separation between said cover plate and the casting.

4. Apparatus as defined in claim 3, said means comprising a flexible and inextensible element connected at its upper end to said cover plate and having its lower end fixed.

5. Apparatus as defined in claim 3, said means comprising a pair of flexible and inextensible elements con-

nected at their upper ends to said cover plate adjacent its ends and having their lower ends fixed.

6. Apparatus as defined in claim 3 in which the upper end of said shaft is received in said socket for substantial relative vertical movement therein, and said means is constructed to arrest upward movement of said cover plate before said socket is separated from the upper end of said shaft, whereby said shaft and socket guide said cover plate as it falls back upon said inner form.

7. In casting apparatus of the character described, an inner form comprising inwardly and outwardly movable side walls, a continuous, unitary cover plate resting loosely upon the upper edges of said side walls to provide for inward and outward movement of said side walls while said plate is supported thereby, means connected to said cover plate providing for limited substantially free upward movement of said cover plate as the casting is raised and adapted to abruptly arrest further upward movement of said cover plate upon continued upward movement of the casting to effect separation between said cover plate and the casting, said means comprising an inextensible element connected at its upper end to said cover plate, and rigid means engageable therewith upon predetermined upward movement of said cover plate.

8. In casting apparatus of the character described, an inner form comprising inwardly and outwardly movable side walls, a continuous, unitary cover plate resting loosely upon the upper edges of said side walls to provide for inward and outward movement of said side walls while said plate is supported thereby, means connected to said cover plate providing for limited substantially free upward movement of said cover plate as the casting is raised and adapted to abruptly arrest further upward movement of said cover plate upon continued upward movement of the casting to effect separation between said cover plate and the casting, said means comprising a flexible and inextensible element connected at its upper end to said cover plate and having its lower end fixed.



9. In casting apparatus of the character described, an inner form comprising inwardly and outwardly movable side walls, a continuous, unitary cover plate resting loosely upon the upper edges of said side walls to provide for inward and outward movement of said side walls while said plate is supported thereby, means connected to said cover plate providing for limited substantially free upward movement of said cover plate as the casting is raised and adapted to abruptly arrest further upward movement of said cover plate upon continued upward movement of the casting to effect separation between said cover plate and the casting, said means comprising a pair of flexible and inextensible elements connected at their upper ends to said cover plate adjacent its ends and having their lower ends fixed.

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