Nov. 20, 1934. M. WAGNER 1,981,131

APPARATUS FOR MAKING HOLLOW ARTICLES

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Fig. 1

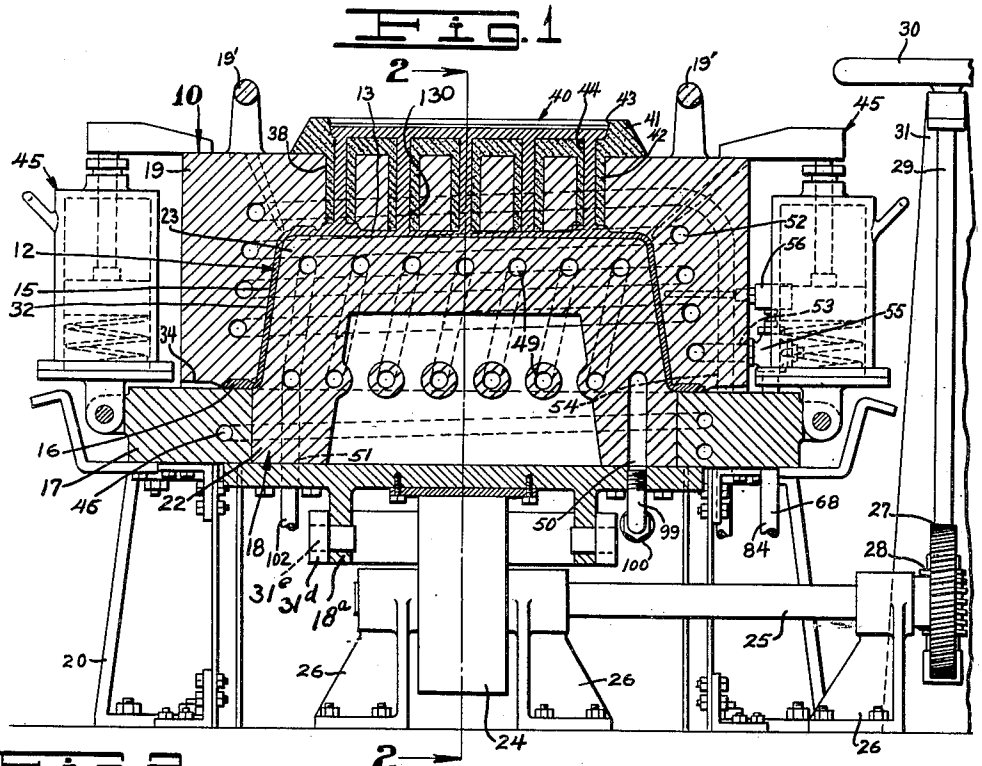


Fig. 2

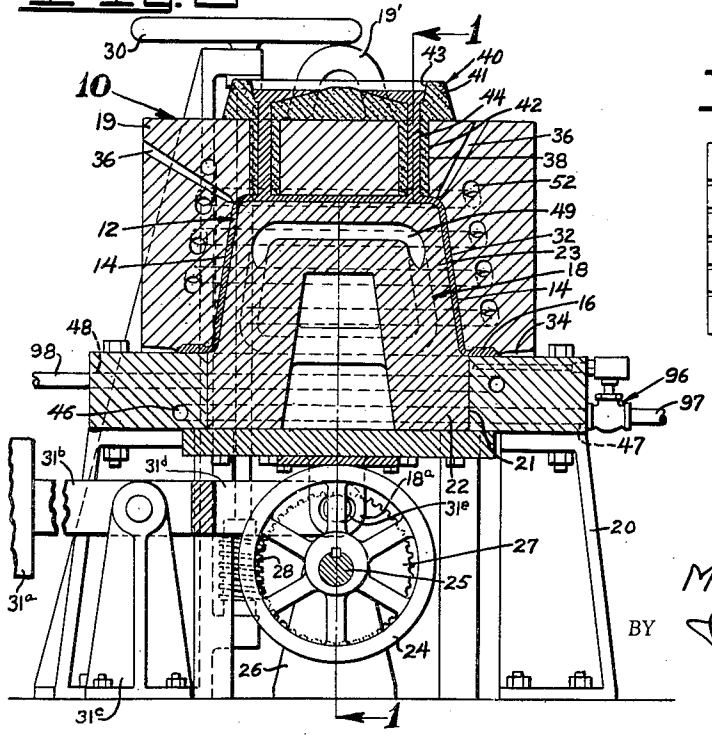
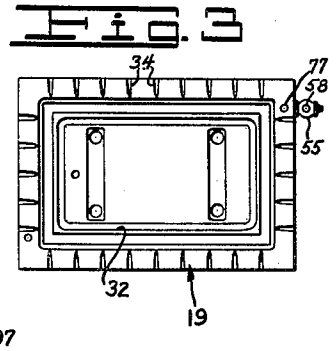


Fig. 3



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Fig. 4

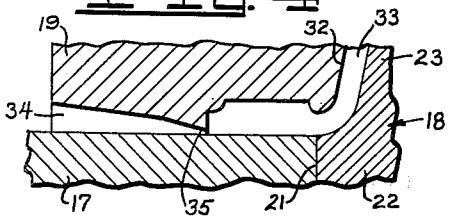


Fig. 5

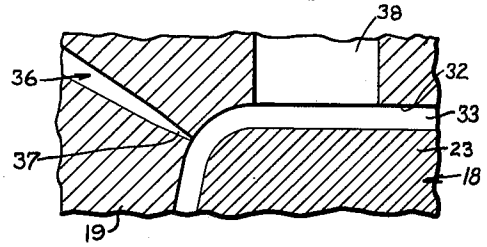


Fig. 6

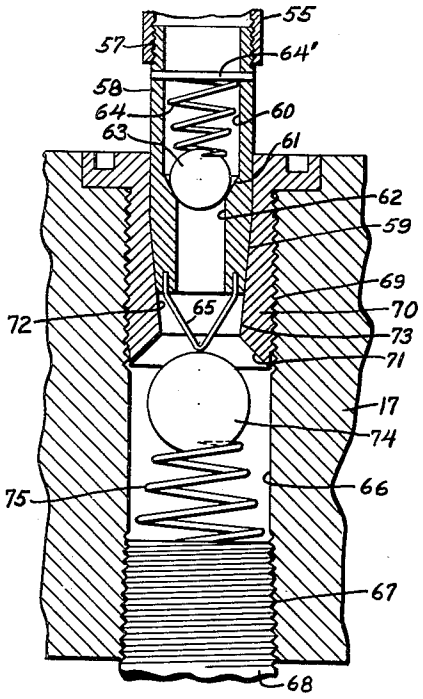


Fig. 7

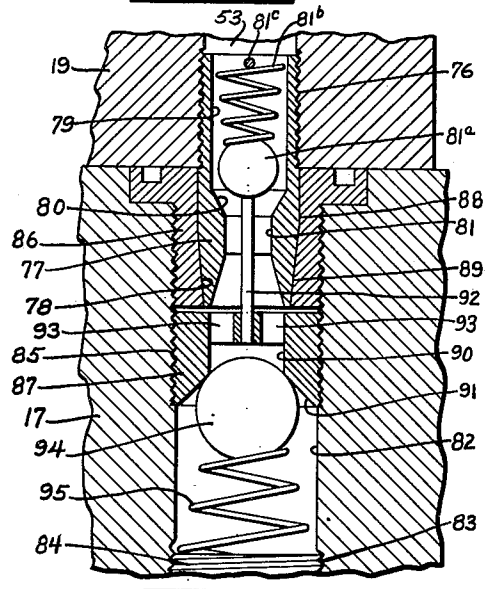


Fig. 8

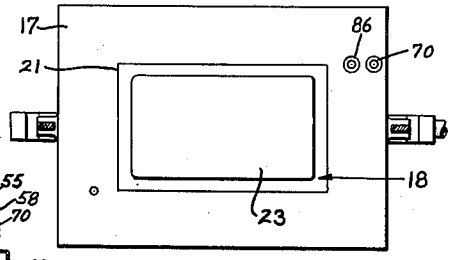
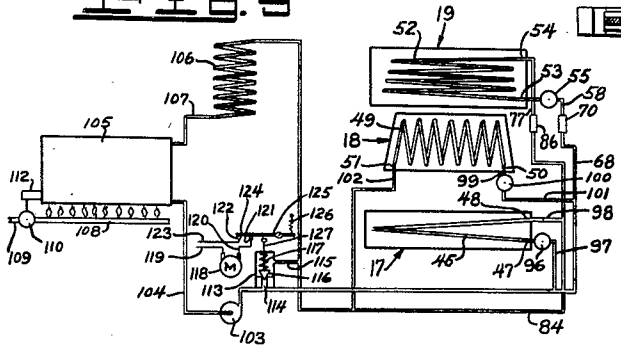


Fig. 9



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UNITED STATES PATENT OFFICE

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APPARATUS FOR MAKING HOLLOW ARTICLES

Matthew Wagner, Los Angeles, Calif.

Application December 8, 1932, Serial No. 646,283

7 Claims. (Cl. 22—153)

This invention relates to improvements in apparatus for and method of making hollow articles.

The general object of the invention is to provide improved apparatus for forming articles such as bath tubs, wash tubs, etc.

Another object of the invention is to provide a permanent mold for forming hollow articles of cast material.

A further object of the invention is to provide a permanent mold for forming hollow articles of cast material including novel means to retain the mold at a predetermined temperature.

An additional object of my invention is to provide a novel core for molding apparatus.

Other objects and the advantages of this invention will be apparent from the following description taken in connection with the accompanying drawings wherein:

Fig. 1 is a vertical section through my improved mold taken on line 1—1 of Fig. 2.

Fig. 2 is a section taken on line 2—2 of Fig. 1.

Fig. 3 is a face view of the top member of the mold on a reduced scale.

Fig. 4 is a greatly enlarged fragmentary sectional detail.

Fig. 5 is another greatly enlarged fragmentary sectional detail.

Fig. 6 is an enlarged vertical section of a portion of the mold showing the oil inlet conduit connection between the top and bottom members of the mold.

Fig. 7 is an enlarged vertical section of a portion of the mold showing the oil outlet conduit connection between the top and bottom members of the mold.

Fig. 8 is a face view of the lower portion of the mold on a reduced scale and

Fig. 9 is a diagrammatic view showing the oil conduit system.

Referring to the drawings by reference characters, I have indicated my improved mold generally at 10. This mold as shown is adapted to form a bath tub 12 which includes a bottom 13, sides 14, ends 15 and an outwardly extending peripheral flange 16.

As shown the mold 10 comprises a metal base member 17, a metal core member 18 and a metal top member 19. To facilitate handling the top member 19 I preferably provide thereon a pair of spaced integral loop members 19'. The base member 17 is preferably mounted on a supporting frame 20 and includes a central polygonally shaped aperture 21 in which the core member 18 is positioned.

The core member 18 includes a base portion 22 which is positioned in the aperture 21 of the base 17 and has extending upwardly therefrom a mold portion 23 which is shaped to form the inner surface of the tub 12. For supporting the core member 18 I provide a wheel 24 which is eccentrically mounted on and secured to a shaft 25 which is shown as mounted in bearing members 26. In one position of the wheel 24 the core member 18 is retained thereby in a raised operating position and when the wheel is rotated a half turn the core member moves downward a slight distance to a lowered inoperative position. I have shown the shaft 25 as adapted to be rotated by a worm gear 27 mounted thereon and which meshes with a worm pinion 28 on a vertical shaft 29 which in turn is adapted to be rotated by a hand wheel 30. The shaft 29 is shown as supported by a bracket member 31. The core member 18 is preferably partly counter weighted by a weight member 31^a mounted on a lever 31^b which is pivoted intermediate its length on a bracket 31^c. The end of the lever 31^b opposite the weight is forked as at 31^d and the fork portions are slackly connected to pins 31^e on lugs 18^a on the core member 18.

The top member 19 includes a recess 32 which is shaped to form the outer surface of the tub 12. The recess 32 is greater in size than the mold portion 23 of the core 18 so that when the top member is in an operative position on the base 17 a space 33 is left between the inner surface of the recess 32 and the outer surface of the core mold portion 23 which space corresponds in thickness to the thickness of the walls of the tub 12 (see Figs. 4 and 5).

For allowing gases to escape from the mold during a pouring operation I have provided a plurality of spaced recesses 34 in the lower face of the top member 19. As shown the recesses 34 extend from the recess 32 outward through the outer face of the top member. The inner ends of the recesses 34 are reduced, as at 35, to form a very small communicating passageway with the recess 32 (see Fig. 4). The top member 19 includes a plurality of other gas escape apertures 36 which extend from adjacent the juncture of the side and bottom walls of the recess 32 outward through the outer surface of the top member. The inner ends of the apertures 36 like the inner ends of the recesses 34 are reduced as at 37 to form a very small

communicating passageway with the recess 32 (see Fig. 5).

Extending upward from the bottom of the recess 32 and opening through the top of the top member 19 I provide a plurality of spaced pouring core apertures 38. For conveying molten metal into the recess 33 I provide a pouring core 40 which is preferably made of core sand. As shown the pouring core 40 includes a body portion 41 having a plurality of downwardly extending leg members 42. The body 41 includes an open tapered recess 43 and each of the legs 42 include an aperture 44 which at the lower end opens through the lower end of the leg and at the upper end communicates with the body recess 43. For retaining the top member 19 in tight engagement with the base 17 during a pouring operation I have shown a plurality of hydraulic latch members 45 although any suitable type of latching means may be used.

In the base member 17 I provide a cored passageway 46 which is disposed around the aperture 21 and includes an entrance end 47 opening out of the base and an exit end 48 opening out of the base.

In the core member 18 I provide a similarly cored passageway 49 which spirals lengthwise of the core mold portion 23 and includes an entrance end 50 opening out of the core member and an exit end 51 opening out of the core member.

Likewise the top member 19 includes a cored passageway 52 which is disposed around the recess 32 and includes an entrance end 53 opening out of the top member and an exit end 54 opening out of the top member.

The entrance end 53 of the passageway 52 of the top member communicates with a shut off valve 55 which is adapted to be operated by a thermostatically controlled mechanism 56. The valve 55 and the thermostatic device 56 may be of any desired standard type which may be adjusted to actuate the valve when the temperature of the top member rises above a predetermined point or falls below a predetermined point.

Secured to the inlet end of the valve 55 as by threaded engagement therewith as indicated at 57 in Fig. 6 I provide a downwardly extending stem 58. The lower end of the stem 58 is preferably tapered as shown at 59 and opening through the upper end of the stem I provide a recess 60 having a conically shaped bottom which forms a valve seat 61. Opening through the bottom of the stem 58 and communicating with the recess 60 I provide a reduced aperture 62. For controlling the passageway from the recess 60 to the aperture 62 I provide a valve ball 63 which is resiliently urged into engagement with the valve seat 62 by a coiled spring 64 which is backed by a pin 64' mounted transversely in the stem. Projecting downward from the lower end of the stem 58 I provide a finger member 65 which is formed of a length of rod bent in V-shape.

In the base 17 I provide a vertical aperture 66 the lower end of which is threaded as at 67 by means of which a conduit 68 is secured to the base. Adjacent the upper end the aperture 66 is threaded as at 69 to receive a socket member 70. As shown the socket member 70 includes a conical recess 71 in its lower end which forms a valve seat and an aperture 72 which communicates with the recess 71. The lower portion of the aperture 72 tapers as at 73. Positioned in the aperture 66 I provide a valve ball 74 which is adapted to be resiliently urged into engagement with the valve seat 71 by a coiled spring 75 which rests on the end of the conduit 68.

As shown in Fig. 7 the exit end 53 of the conduit 52 in the top member 19 is threaded as at 76 to receive a downwardly extending stem 77 which is tapered adjacent the lower end as at 78. Opening through the upper end of the stem 77 I provide a recess 79 having a conically shaped bottom which forms a valve seat 80. Communicating with the recess 70 I provide a reduced aperture 81 which opens through the bottom of the stem. Positioned in the recess 79 I provide a valve ball 81^a which is resilently urged into engagement with the valve seat 80 by a coiled spring 81^b which is backed by a pin 81^c transversely mounted in the stem 77.

In the base 17 I provide a vertical aperture 82, the lower end of which is threaded as at 83 by means of which a conduit 84 is secured to the base. Adjacent the upper end the aperture 82 is threaded as at 85 to receive a socket member 86 and a valve seat member 87 which is positioned below the socket member. The socket member 86 includes a central aperture 88 which is tapered adjacent its lower end as at 89.

Opening through the lower face of the valve seat member 87 I provide a recess 90 having its lower portion flared outwardly to form a valve seat 91. Coaxially mounted on the member 87 I provide an upwardly extending rod 92 and surrounding the rod 92 I provide a plurality of apertures 93 in the member 87 which open through the top thereof and communicates with the recess 90.

Positioned in the base aperture 82 below the member 87 I provide a valve ball 94 which is resiliently urged into engagement with the valve seat 91 by a coiled spring 95 which rests on the end of the conduit 84.

The entrance end 47 of the conduit 45 in the base 17 communicates with a thermostatically controlled shut off valve 96 similar to the valve 55 previously described in connection with the top member 19. One end of a conduit 97 communicates with the valve 96 and one end of a conduit 98 communicates with the exit end 48 of the base conduit 45. One end of conduit 99 communicates with the entrance end 50 of the conduit 49 in the core member 18 and the opposite end of the conduit communicates through a suitable flexible connection with a thermostatically controlled shut off valve 100 which is similar to the previously described valve 55. One end of a conduit 101 communicates with the valve 100 and one end of a conduit 102 communicates through a suitable flexible connection with the exit end 51 of the conduit 49 in the core member 18. As shown in Fig. 9 the end of the conduit 68 opposite the socket member 70 communicates with the discharge end of a pump 103. One end of a conduit 104 communicates with the entrance of the pump 103 and the opposite end communicates with a reservoir 105.

The end of the conduit 84 opposite the socket member 86 communicates with the upper end of a cooling coil 106 and the lower end of the cooling coil communicates with the reservoir 105 through a conduit 107.

The end of the conduit 97 opposite the valve 96 communicates with the conduit 68 and the end of the conduit 98 opposite the exit end 48 of the conduit 45 communicates with the con-

duit 84. The end of the conduit 101 opposite the valve 100 communicates with the conduit 68 and the end of the conduit 102 opposite the exit end 51 of the conduit 49 communicates with the conduit 84.

The reservoir 105 is adapted to be filled with oil and is adapted to be heated by a burner member 108. As shown fuel is supplied to the burner by a conduit 109 having a shut off valve 110 interposed therein which is adapted to be automatically controlled by a thermostatic device 112 for regulating the flow of fuel to the burner. The thermostatic device 112 is adapted to actuate the valve 110 to restrict full passage of fuel to the burner 108 when the temperature of the oil in the reservoir 105 raises above a predetermined degree and to allow more fuel to pass to the burner when the temperature of the oil in the reservoir falls below a predetermined degree.

When the pump 103 is operated oil is drawn into the pump from the reservoir 105 through the conduit 104 and discharged from the pump into the conduit 68. When the valves 55, 96 and 100 are open oil from the conduit 68 will flow through the conduit 46 in the base member 17, through the conduit 49 in the core member 18 and through the conduit 52 in the top member. The discharged oil from the base, core and top members flows through the conduit 84 to the cooling coil 106 thence through the coil and the conduit 107 to the reservoir 105. Adjacent the pump 103 I provide a by pass member 113 which includes a passageway 114 communicating with the conduit 68 and a conduit 115 communicating with the conduit 84. The passageway between the passageway 114 and the conduit 115 is adapted to be controlled by a valve 116 which is normally resiliently urged into engagement with its seat by a spring 117 to restrict passageway between the passage 114 and the conduit 115.

When the valves 55, 96 and 100 are partially or fully closed the pump builds up a pressure in the conduit 68 which when sufficient opens the valve 116 against the action of the spring 117 whereupon the oil flows from the conduit 68 through the by pass device 113 into the conduit 84 and then returns to the reservoir 105 through the coil 106 and the conduit 107.

Any type of means may be used to operate the pump 103 but I have shown the pump as adapted to be operated by an electric motor 118. One side of the motor is connected to one side of a source of electrical energy by a wire 119 and the opposite side of the motor is connected by a wire 120 to a contact 121. A companion contact 122 is connected by a wire 123 to the opposite side of the source of electrical energy.

The contacts 121 and 122 are adapted to be budged by a contact bar 124 which is mounted on a pivoted arm 125. A spring member 126 normally retains the contact bar 124 in engagement with the contacts 121 and 122.

For moving the contact bar 124 out of engagement with the contacts 121 and 122 I provide a stem 127 on the valve 116 of the by pass device 113.

When the valves 55, 96 and 100 are fully closed and the valve 116 is moved to an open position the pressure of the oil raises the valve 116 sufficiently to allow the valve stem 127 to engage the arm 125 and swing it upward against the action of the spring 126 thereby moving the contact bar 124 out of engagement with the contacts 121 and 122 whereupon the circuit to the motor is broken.

In operation the top member 19 is positioned on the base 17 and retains in firm engagement therewith by the hydraulic latch device 45. When the top member 19 is thus operatively positioned on the base 17 the stem 58 associated with the top member is positioned in the aperture 72 of the socket member 70 in the base. As the stem 58 is positioned in the socket member the finger member 65 engages the ball valve 74 and moves it out of engagement with the valve seat 71. Whereupon oil under pressure flows from the conduit 68 into the aperture 62 of the stem 58 where it unseats the valve ball 63 and flows into the valve 55 and thence into the passageway 52 of the top member. Furthermore, when the top member 19 is operatively positioned on the base 17 the stem 77 associated with the top member is positioned in the aperture 88 of the socket device 86 in the base. As the stem 77 is positioned in the socket device 86 the stem 92 enters the apertures 81 of the stem 77 and unseats the valve ball 81^b. Whereupon oil from the passageway 52 of the top member flows out through the stem aperture and through the apertures 93 of the device 87 into the apertures 90 of the device 87 where it unseats the valve ball 94 and then flows into the conduit 83. The wheel 24 is then rotated to raise the core member 18 to an operative position and the pouring core 40 is positioned on the top member 19 with the legs 42 positioned in the apertures 38. Molten metal is then poured in the recess 43 of the device 40 and flows through the apertures 44 of the legs 42 into the space 33 between the core member 18 and the top member 19. Molten metal is poured into the device 40 until the entire space 33 is filled and until the molten metal fills the leg apertures 44 and part of the recess 43 of the device 40. By watching the action of the molten metal in the recess 43 the operator can determine when the metal in the space 33 has cooled sufficiently to form a hard crust on its exposed face. When this crust has formed and while the metal beneath the crust is still somewhat plastic the operator rotates the wheel 24 to allow the weight of the core member 18 to move the core 18 downward to an inoperative position. When the core member 18 is moved to an inoperative position it does not engage the inner surface of the poured tub 12 whereupon as the metal cools and shrinks it is free to move. Thus by moving the core 18 out of engagement with the hot metal no strain is put on the metal as it cools.

The top member 19 is then removed from the base 17 and transported to a desired location. When the top member 19 is removed from the base 17 the stems 58 and 77 are removed from their associated socket members in the base. When the stem 58 is removed from the socket member 70 the spring 75 forces the ball valve 74 into engagement with the valve seat 71 thereby preventing flow of oil from the conduit 68 to the socket aperture 72. When the stem 77 is removed from the socket member 86 the spring 81^b forces the ball valve 81^a into engagement with the valve seat 80 thereby preventing oil from flowing out of the passageway 52 through the stem aperture 81. When the top member 19 is removed from the base the tub 12 remains in the recess 32 of the top member until the operator destroys the pouring core device 40

and breaks off the metal gates 130 in line with the upper surface of the top member. Whereupon if the top member 19 is held suspended the tub 12 drops out of the recess 32 of the top member.

The top member 19 is then replaced in an operative position on the base 17 and another pouring core device is operatively positioned on the top member and the core device is raised to an operative position whereupon the device 10 is ready to receive another pouring of molten metal.

From the foregoing description it will be apparent that I have provided a novel mold device which is simple in construction and highly efficient in use.

Having thus described my invention, I claim:

1. In a mold a base member and a removable top member, a pair of aligned conduits in said base member and said top member, each of said conduits having a valve therein, means to normally maintain said valves in closed position and means to automatically open both of said valves when the top member is placed on the base member.

2. In a mold, a base member and a removable top member, a pair of aligned conduits in said base member and said top member, one of said conduits having a valve therein which valve is located in the base member, the other of said conduits having a valve therein which last valve is located in the top member, means to normally maintain said valves in closed position and means to automatically open both of said valves when the top member is placed on the base member.

3. In a mold for forming hollow articles, a metal base member, said case having an aperture therein, a metal core member for forming the inner surface of said articles, means to movably mount said core member in said base aperture, means to support said core in a raised operative position, means to raise and lower said core from an operative to an inoperative position, a metal top member, said top member having an open bottomed recess therein, the surface of said recess being adapted to form the outer surface of said article, said top member in an operative position being positioned on said base over said core, the surface of said recess being spaced from the outer surface of said core member when said core member is in a raised position, a plurality of spaced pouring core apertures in said top member communicating with said recess and opening through the upper surface of said top member, a pouring core, said pouring core being made of core sand and including a body portion having a plurality of spaced legs extending therefrom, said legs being adapted to be positioned in said top member pouring core apertures, said pouring core body having a recess therein opening through the surface opposite said legs, each of said legs having an aperture therethrough communicating with said recess.

4. In a mold for casting metal receptacles, a base member, a core member adapted to form the inner surface of said receptacle, said core member projecting above said base, a top member, said top member being positioned on said base and having a recess therein adapted to form the outer surface of said receptacle, said core member being positioned in said top member recess, the surfaces of said core member being spaced from the surfaces of said recess, said top member being vertically movable relative to said base and said core member, a passageway in said top member surrounding said top member recess, said top member passageway including an entrance end and an exit end, said entrance end communicating with a hollow stem and said exit end communicating with a hollow stem, a socket member in said base adapted to receive said entrance stem and a second socket member in said base adapted to receive said exit stem, said entrance stem including means to restrict outward passage of fluid from said stem and allow inward passage of fluid under pressure into said stem, said entrance socket communicating with a conduit member, means to prevent flow of fluid from said conduit member to said entrance socket when said entrance stem is removed from said entrance socket and to allow fluid to flow from said conduit member to said entrance socket when said entrance stem is positioned in said entrance socket, said exit socket member communicating with an exit conduit, said exit stem including means to prevent flow of fluid therethrough when said stem is removed from said exit socket and to allow flow of fluid therethrough when said stem is positioned in said exit socket, said exit socket including means to allow flow of fluid under pressure from said exit stem to said exit conduit and to restrict flow of fluid from said exit conduit to said exit stem.

5. In a mold for forming hollow articles, a metal base member, said base having an aperture therein, a metal core member for forming the inner surface of said article, means to movably mount said core member in said base aperture, means to support said core in a raised operative position, means to raise and lower said core from an operative to an inoperative position, a metal top member, said top member having an open bottomed recess therein, the surface of said recess being adapted to form the outer surface of said article, said top member in an operative position being positioned on said base over said core, the surface of said recess being spaced from the outer surface of said core member when said core member is in a raised position, a plurality of spaced pouring core apertures in said top member communicating with said recess and opening through the upper surface of said top member, a pouring core, said pouring core being made of core sand and including a body portion having a plurality of spaced legs extending therefrom, said legs being adapted to be positioned in said top member pouring core apertures, said pouring core body having a recess therein opening through the surface opposite said legs, each of said legs having an aperture therethrough communicating with said recess, said top member including a plurality of spaced gas vents in the lower face thereof, said gas vents communicating with said top member recess and opening through the sides of said top member, the ends of said vents communicating with said top member recess being reduced, a second plurality of spaced gas vents in said top member, said second vents opening through the outer surface of said top member and communicating with said top member recess adjacent the juncture of the bottom and sidewall of said receptacle, the ends of said second vents communicating with said top member recess being reduced.

6. In a mold for casting metal receptacles, a base member, a core member adapted to form the

inner surface of said receptacle, said core member projecting above said base and being vertically movable relative to said base, a top member, said top member being positioned on said base and having a recess therein adapted to form the outer surface of said receptacle, said core member being positioned in said top member recess, the surfaces of said core member being spaced from the surfaces of said recess, said top member being vertically movable relative to said base and said core member, a passageway in said base, means to circulate fluid through said passageway, a passageway in said core member, means to circulate fluid through said core member passageway, a passageway in said top member surrounding said top member recess, said top member passageway including an entrance end and an exit end, said entrance end communicating with a hollow stem and said exit end communicating with a hollow stem, a socket member in said base adapted to receive said entrance stem and a second socket member in said base adapted to receive said exit stem, said entrance stem including means to restrict outward passage of fluid from said stem and allow inward passage of fluid under pressure into said stem, said entrance socket communicating with a conduit member, means to prevent flow of fluid from said conduit member to said entrance socket when said entrance stem is removed from said entrance socket and to allow fluid to flow from said conduit member to said entrance socket when said entrance stem is positioned in said entrance socket, said exit socket member communicating with an exit conduit, said exit stem including means to prevent flow of fluid therethrough when said stem is removed from said exit socket and to allow flow of fluid therethrough when said stem is positioned in said exit socket, said exit socket including means to allow flow of fluid under pressure from said exit stem to said exit conduit and to restrict flow of fluid from said exit conduit to said exit stem.

7. In a permanent mold for casting metal receptacles, a base member, a core member adapted to form the inner surface of said receptacle, said core member projecting above said base, a top member, said top member being positioned on said base and having a recess therein adapted to form the outer surface of said receptacle, said core member being positioned in said top member recess, the surfaces of said core member being spaced from the surfaces of said recess, said top member being vertically movable relative to said base and said core member, a passageway in said top member surrounding said top member recess, said top member passageway including an entrance end and an exit end, said entrance end communicating with a hollow stem and said exit end communicating with a hollow stem, a socket member in said base adapted to receive said entrance stem and a second socket member in said base adapted to receive said exit stem.

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