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MOLD SHUT-OFF ARRANGEMENT

Filed July 24, 1961

Fig. 1.

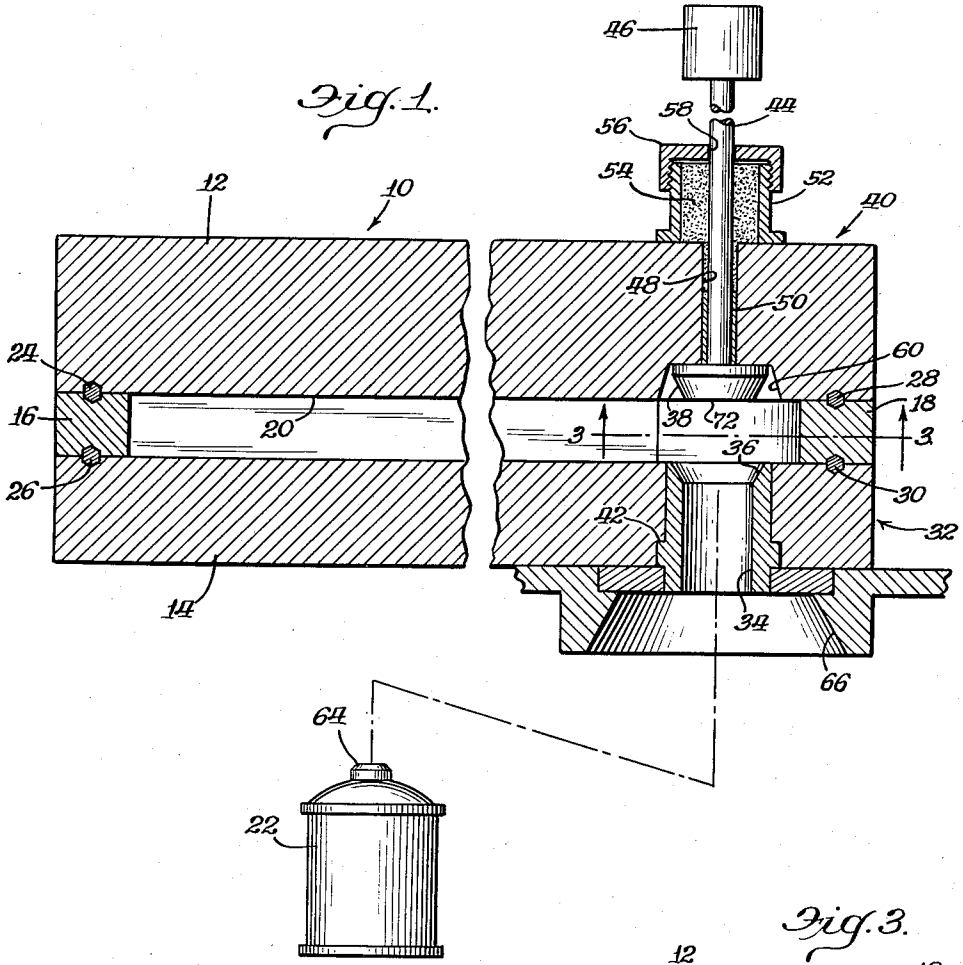
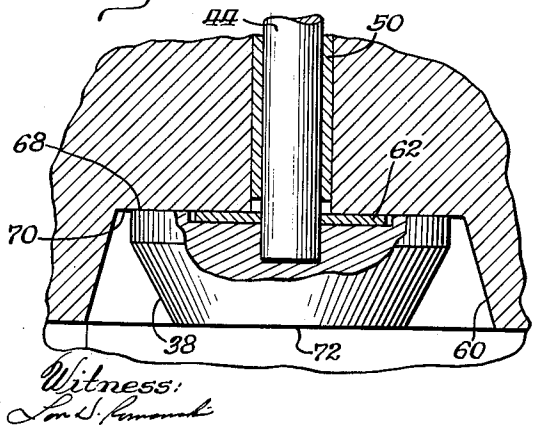
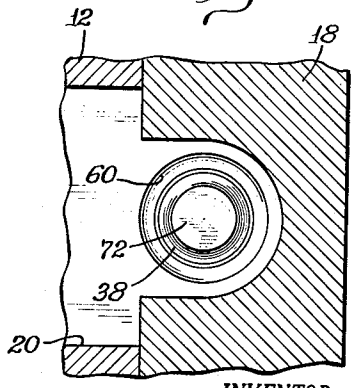



Fig. 2.




Witness:

Fig. 3.




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# MOLD SHUT-OFF ARRANGEMENT

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This invention relates generally to molds for the casting of metals and more specifically to stopper or gate assemblies employed in conjunction with such molds.

Presently, as for example in the pressure casting of molten metals, it is conventional practice to provide, in a mold assembly, a gating arrangement comprised of a refractory filling conduit having a seat formed thereon which is to coact with a generally conical stopper, supported by a tubular member, in terminating the flow of molten metal to the mold cavity when said cavity is filled.

One of the disadvantages of such a general arrangement is that the conical stopper and its cooperating support member are, while in their withdrawn position, held in the stream of incoming molten metal. This in turn usually causes the support member to become warped and further results in erosion of the conical sealing surface of the stopper. Both of these conditions result in misalignment of the stopper and its coacting seat which prevents the complete termination of flow of molten metal upon subsequent closure of the seat by the stopper.

Accordingly, an object of this invention is to provide a novel gating assembly wherein the above undesirable conditions do not exist.

Another more specific object of this invention is to provide in a gating assembly a stopper assembly which, when in its withdrawn or open position, is subjected neither to erosion of its sealing surface nor warpage due to excessive exposure to heat.

Other objects and advantages of this invention will become apparent when reference is made to the following description and drawings wherein:

FIGURE 1 is a cross-sectional view of a mold assembly having a gating assembly constructed in accordance with the teachings of this invention;

FIGURE 2 is an enlarged fragmentary view in cross-section of a portion of the gating assembly illustrated in FIGURE 1; and

FIGURE 3 is a fragmentary cross-sectional view taken substantially on line 3—3 of FIGURE 1.

Referring now in greater detail to the drawings, FIGURE 1 illustrates a mold assembly 10 comprised of cope and drag sections 12 and 14 with end or side members 16 and 18. Cavity 20 is adapted to be at times placed in communication with a suitable pressure pouring ladle schematically illustrated at 22. Provision may also be made as by machining for the insertion of steel cross-members, such as hex stock bars 24, 26, 28 and 30, for use as key members between the various members defining the mold cavity. Any well known clamping devices may, of course, be employed for maintaining the mold in assembled form.

A novel gating assembly 32 is provided at one end of the mold 10 and is comprised of an inlet conduit 34 having formed therein a conical seat portion 36 adapted to coact with stopper portion 38 of a stopper assembly 40. Conduit 34, which may be made of a clay-graphite mixture, may also be formed to provide a shoulder portion 42 which acts as the means for locking the conduit 34 into position.

Referring now in greater detail to both FIGURES 1 and 2, the stopper assembly 40 is preferably comprised of a solid cylindrical shaft 44 which has its one end suitably cemented to a generally conically formed ceramic stopper member 38 and has its other end projecting outwardly from the mold assembly for connection to a suitable stopper actuating device 46.



A passageway 48 adapted for the reception of shaft 44 is slightly enlarged in diameter in order to provide space for a cylindrical paper liner 50 between the surface of passageway 48 and shaft 44. The paper liner, of course, remains in place due to the greater friction between its outer diameter and the surface of passageway 48.

A cylindrical member 52, which may be provided atop cope 12, is adapted to contain sand 54 which also fills the upper portion of the existing space between passageway 48 and shaft 44 above the paper liner 50. A cover member 56 having an aperture 58 therein for the reception of shaft 44, may be threadably secured to member 52.

Referring to FIGURE 2, it can be seen that a recess or cavity 60 is formed in what may be called generally the cope section of the mold, above the stopper portion 38. Recess 60 is preferably deep enough to accommodate at least the entire length of the stopper member 38. The cylindrical surface of recess 60 may, of course, be formed slightly conical if desired. A backing plate 62 may also be provided as shown and suitably secured to shaft 44 as by welding in order to better distribute the force over the stopper 38 whenever it is moved to closed position against seat 36.

Let it now be assumed that ladle 22 has been brought into pouring position as by placing pouring tube 64 in fluid sealing engagement with adapter member 66. At this time the actuating mechanism 46 would lift the stopper member 38 upwardly, as by means of shaft 44, to the position illustrated. Subsequently, pressure would be applied to ladle 22 causing the molten metal to flow up through conduit 34 and into mold cavity 20. When cavity 20 is filled, stopper 38 is once more caused to move downwardly into sealing engagement with seat 36 thereby preventing reverse flow of the metal in cavity 20. The pressure in ladle 22 is then terminated and the mold 10 disengaged from the pouring tube 64.

One of the important advantages, which is apparent from the disclosure, is the provision of recess 60 which serves to shield both the stopper 38 and shaft 44 from the distorting effects caused by the pressurized flow and heat of the molten metal as it fountains through conduit 34. All warping of the shaft 44 is prevented by having the shaft fully withdrawn into a restraining passageway 48. Additionally, stopper member 38 is prevented from being distorted angularly with respect to the centerline of shaft 44 and seat 36 because the top surface 68 of stopper 38 is held against the bottom surface 70 of recess 60. A further distinct advantage of the invention is the protective enclosure formed by recess 60 which for all practical purposes completely prevents the erosion of the conical sealing surface of stopper 38. That is, since the conical surface of stopper 38 is surrounded by the generally cylindrical wall of recess 60, substantially all of the turbulent flow of metal in the vicinity of the stopper, as experienced by the prior art stoppers, is eliminated. Accordingly, if any erosion takes place, it will be limited to generally the bottom surface 72 of the stopper. However, such erosion, if it actually does occur, is of no consequence since the sealing characteristics of the stopper are in no way effected.

Although only one embodiment of the invention has been disclosed and described, it is apparent that other modifications are possible within the scope of the appended claims.

I claim:

1. A gate assembly for a mold comprising a body portion including cope and drag sections and having a casting cavity therein, an inlet conduit formed in said drag section, a seat formed on said inlet conduit, a stop per assembly axially aligned with said inlet conduit, said

stopper assembly comprising a shaft slidably received within said cope section of said body portion, a conical stopper member secured to one end of said shaft internally of said body portion, actuating means externally of said body portion for moving said stopper member and shaft to a closed position against said seat, and a recess in said cope section axially aligned with said inlet conduit and forming an extension of said casting cavity, said recess accommodating, when said stopper and shaft are moved into an open position, withdrawal of said stopper member out of said casting cavity and into said recess.

2. A gate assembly for a mold comprising a body, an adapter secured to said body for attachment to a source of molten metal, a cylindrical inlet conduit axially aligned with said adapter and retained within said body by said adapter, a conical seat formed in said inlet conduit inwardly from the end thereof opposite said adapter, a first chamber for receiving molten metal from said inlet conduit and for directing said molten metal to a cavity within said mold, a cylindrical passageway formed in said body axially aligned with said inlet conduit and on the opposite side of said first chamber with respect to said inlet conduit, a hollow paper tube frictionally received within said passageway, a solid shaft frictionally received within said paper tube, a stopper member suitably secured to one end of said shaft so as to be generally within said body, a generally cylindrical chamber formed atop said body in a manner so as to generally enclose a portion of said shaft, sand filling the space between said cylindrical chamber and said shaft and also between said shaft and said passageway above said paper tube; a cover member secured to said cylindrical chamber, an aperture formed in said cover member to provide for the free passage of said shaft therethrough, and a second chamber formed in one of the walls defining said first chamber for closely receiving therein said stopper member when said stopper member is held in an open position.

3. A gate assembly for a mold comprising a body, an adapter secured to said body for attachment to a source of molten metal, a cylindrical inlet conduit axially aligned with said adapter and retained within said body by said adapter, a conical seat formed in said inlet conduit inwardly from the end thereof opposite said adapter, a first chamber for receiving molten metal from said inlet conduit and for directing said molten metal to a cavity within said mold, a cylindrical passageway formed in said body axially aligned with said inlet conduit and on the opposite side of said first chamber with respect to said inlet conduit, a hollow paper tube frictionally received within said passageway, a solid shaft frictionally received within said paper tube, a stopper member suitably secured to one end of said shaft so as to be generally within said body, a generally cylindrical chamber formed atop said body in a manner so as to generally enclose a portion of said shaft, sand filling the space between said cylindrical chamber and said shaft and also between said shaft and said passageway above said paper tube; a cover member



secured to said cylindrical chamber, an aperture formed in said cover member to provide for the free passage of said shaft therethrough, a second chamber formed in one of the walls defining said first chamber for closely receiving therein said stopper member when said stopper member is held in an open position, and a backing plate secured to said shaft and connected to said stopper for distributing the closing force of said shaft throughout said stopper.

4. A gate assembly for a mold comprising a body, an adapter secured to said body for attachment to a source of molten metal, a cylindrical inlet conduit axially aligned with said adapter and retained within said body by said adapter, a conical seat formed in said inlet conduit inwardly from the end thereof opposite said adapter, a first chamber for receiving molten metal from said inlet conduit and for directing said molten metal to a cavity within said mold, a cylindrical passageway formed in said body axially aligned with said inlet conduit and on the opposite side of said first chamber with respect to said inlet conduit, a shaft slidably received within said passageway, a stopper member suitably secured to one end of said shaft so as to be generally within said body, a second chamber formed atop said body in a manner so as to generally enclose a portion of said shaft, sand filling the space between said second chamber and said shaft, a cover member secured to said second chamber, an aperture formed in said cover member to provide for the free passage of said shaft therethrough, and a third chamber formed in one of the walls defining said first chamber for closely receiving therein said stopper member when said stopper member is held in an open position.

5. A gate assembly for a mold comprising a body portion defining a casting cavity, an inlet conduit communicating with said casting cavity, a seat formed in said inlet conduit, a stopper assembly axially aligned with said inlet conduit, said stopper assembly comprising a shaft slidably received within said body portion, a stopper member secured to one end of said shaft internally of said body portion, the other end of said shaft being disposed externally of said body portion for moving said stopper member to a closed position against said seat, a recess axially aligned with said inlet conduit and forming an extension of said casting cavity, said recess accommodating, when said stopper member and shaft are moved into an open position, removal of said stopper member out of said casting cavity and into said recess, and a backing plate secured to said shaft and connected to said stopper member for distributing the closing force of said shaft throughout said stopper member.

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