MEANS FOR PREVENTING UNWANTED SAND, DIRT OR OTHER IMPURITIES FROM ENTERING MOLD CAVITIES PRIOR TO THE POURING OF THE CASTING MATERIAL

Filed May 23, 1969

INVENTOR
ROY C. LANDER

INVENTOR

Frederick H. Hook ATTY
MEANS FOR PREVENTING UNWANTED SAND, DIRT OR OTHER IMPURITIES FROM ENTERING MOLD CAVITIES PRIOR TO THE POURING OF THE CASTING MATERIAL

Roy C. Land, Indianapolis, Ind., assignor to International Harvester Company, Chicago, III. Filed May 23, 1969, Ser. No. 827,208

U.S. Cl. 164—374

ABSTRACT OF THE DISCLOSURE

A stopper positionable within an open riser of a casting mold during the mold-forming operation which is capable of preventing loose sand, dirt or other impurities from entering the mold cavity prior to the pouring operation. The stopper is made of material consumable upon subjection to heat of the material being poured as it rises in the mold cavity.

This invention relates to means for preventing loose unwanted sand, dirt or other impurities from entering the mold cavity through the normally open riser during the interim between the time the mold is made and the pouring operation and, more particularly, to a stopper positionable within the open riser when the mold is being made which is effective to prevent loose material such as sand from entering the mold cavity through the open riser and which is consumable by the heat of the molten material being poured as it rises in the mold cavity.

Heretofore, means such as the cellophane covers described on page 167 of the February 1945 issue of “Foundry” magazine, were utilized to prevent the admission of sand and other impurities to the mold cavity through the normally open casting risers. However, such cellophane covers of necessity had to be individually positioned and fastened to the mold by means of wooden toothpicks, or the like after the mold had been made. Obviously, the placement and securing of the cellophane covers over the riser openings involved an additional operation and was time-consuming. Furthermore, the corners only of the cellophane covers were fastened and thus the possibility existed that dirt, loose sand or other impurities could still enter the mold cavity. The present invention contemplates the provision of an imperforated stopper or closure member which is disposed within the mold riser intermediate the length of the riser for preventing the entrance of loose sand or the like from entering the mold cavity prior to the pouring operation. The stopper is positioned within the riser during the mold-forming operation and is provided with an annular flange which forms a lock with the mold sand as it is packed around the flange during the mold-forming operation to thereby secure the stopper within the riser. Thus, unlike the cellophane covers described above, utilization of the stoppers or closure members of the present invention will not entail the additional time-consuming steps of placement and securing of the stopper to the mold.

The primary objective of the present invention is to provide stoppers or closure members in the form of inverted cup caps having outwardly flaring, generally annular peripheral flanges. The concavity of the stopper is of a size to receive and be positioned atop the usual pattern riser pin. Thereafter, the pull-out vent pins are placed over the stopper to prevent dislodgement of the same from the pattern riser pin as the flask or mold box is being filled and rammed full of sand. The stopper flange is imbedded in the mold sand and when the pattern riser pin and pull-out vent pins are removed from the mold, the stopper is anchored firmly within the riser and is in a position to exclude loose sand and other foreign materials from entering the mold cavity through the mold riser. The material of the stopper is chosen so as to be consumable by the heat of the molten metal or other material being poured as it rises in the mold cavity, and any loose sand or the like which has fallen into the open riser is carried up away from the mold cavity by the molten material rising in the riser.

The foregoing and other important objects and desirable features inherent in and encompassed by the invention, together with many of the purposes and uses thereof, will become readily apparent from a reading of the ensuing description in conjunction with the annexed drawings, in which:

FIG. 1 is a somewhat schematic elevational view, partially in section, of the relationship of the mold-forming equipment with respect to the stoppers during one operational step of the mold-forming operation;

FIG. 2 is a vertical sectional view wherein the arrows indicate the flow of heat accompanying the introduction of molten material into the mold cavity;

FIG. 3 is a side elevational view of the pattern including riser pins and downsprue;

FIG. 4 is a fragmentary vertical sectional view of a stopper positioned within a mold prior to the withdrawal of the pattern riser pin and pull-out rake vent pin; and

FIG. 5 is a side elevational view of the vent-forming and stopper holder tool usable in conjunction with stoppers of the present invention.

Referring to the drawings in detail, wherein like reference characters represent like elements throughout the various views, equipment 11 for forming sand molds and casting objects of metal or other materials is illustrated and includes an open-ended cope flask 12, which is adapted to be positioned and supported on a flange-like base 13 of a pattern 15. Pattern 15 includes a plurality of vertically extending, generally frusto-conically shaped pattern riser pins 16 and an elongated downsprue 17 extending from the top surface of the base 13 to the level of the uppermost edge of the cope flask 12. The pattern 15 also includes an elongated, generally rectangularly shaped, runner 19 which has one end abutting the lowest part of the downsprue 17 and a plurality of in-gates 20 extending between the runner 19 and the mold pattern 15. The equipment described thus far is conventional and, per se, forms no part of the present invention. As in conventional operations, the flask 12 is rammed full of sand with the mold pattern 15 and pattern base 13 in place, as illustrated in FIG. 1, and thereafter upon removal of the base 13, mold pattern 15, pattern riser pins 16, downsprue 17, runner 19 and in-gates 20 from the flask 12, the removed mold pattern 15 forms the cavity 18 of the object to be cast and the removed riser pins 16 each form a section of a respective elongated riser which opens into the top of the mold cavity 18 as well as the top surface of the sand mold. In a similar fashion, the downsprue 17, when withdrawn from the sand mold forms a vertically extending passageway which connects with a horizontal extending runner passageway 19' formed in the molding sand by a runner 19. In the same manner, the in-gates 20 form a plurality of passageways 20' extending from the runner passageway 19' and opening into the wall of the cavity 18. The cavity 18, of course, has the desired internal configuration corresponding to external configuration of the object or product to be cast. The uppermost end portions of the riser pins 16 are preferably generally hemispherical in shape, as best illustrated in FIG. 4. Before the flask 12 is filled and compacted with molding sand, a stopper or closure member 25 is placed upon the free end portion of
3,614,980

The stoppers or closure members 25 have an inverted, generally cup-shape with the concave surface thereof generally conforming in size and shape to the hemispherical tip or uppermost end portion of a pattern riser pin 16. It is to be understood that the contour or shape of the uppermost end portion of a riser pin 16 and the corresponding internal shape of the stopper 25 could be something other than hemispherical without departing from the spirit and scope of the invention. As an example, the terminal end of the riser pin 16 could be frusto-conically shaped with the internal surface of the stopper 25 also being frusto-conically shaped. The stoppers 25 are held in place on the uppermost ends of the pattern riser pins 16 while the flask 12 is being rammed full of molding by means of pull-out rakes 31. The normally lowermost end portion of each of the pull-out rake vents 31 is provided with a recess 31r arranged to receive the cup-shaped portion of the caps 25, as best shown in FIG. 4. The caps 25 are also provided with outwardly extending annular peripheral flanges 26. Each peripheral flange 26 extends outwardly beyond the outer surface of the stopper 25 in which it is inserted. The pull-out rake vents 31 in addition to performing their usual function in the molding operation also serve to anchor the stoppers 25 in position upon the pattern riser pins 16 in the mold making operation.

The composition, configuration, and dimensions of the stoppers 25 will vary with the working conditions of given work projects. It is a requisite of such an operation that the stopper material, which may be of plastic or light metal or fabric, will withstand operational pressures and the forces thereby exerted upward into the riser. As a result of the introduction of molten material into the mold cavity 18 during the casting operation. Any loose sand, dirt or other foreign elements which has dropped into the open risers in the interim between the time the mold was made and the pouring operation is carried up and away from the mold cavity 18 by the metal rising in the risers.

In use the stoppers 25 are first positioned atop the risers 16 and are anchored thereon as shown in FIG. 1 by the pull-out rake vents 31 as the flask 12 is being filled with molding sand and subsequently when such molding sand is being compacted or rammed. Upon removal of the pattern riser pin 16 and the pull-out rake vents 31, the stoppers 25 remain within the riser passageways and are, in effect, anchored or locked in the molding sand inasmuch as the annular flanges 26 of such stoppers 25 are actually imbeded in the molding sand, as shown in FIG. 4. Thereafter, upon the pouring of molten metal or other material into the downsprue 17, which follows the course indicated by arrows in FIG. 2, the material will first pass through runner passageway 19' and in-gate passageways 20' into the cavity 18 and eventually rise in the riser passageways. As the molten metal and accompanying hot gases enter the riser passageways, the stoppers 25 will burn out or be consumed, the products of combustion passing outwardly as the arrows point. Any loose sand or other foreign elements which are dropped into the open riser passageways prior to the pouring operation and trapped by the stoppers 25 are carried up and away from the mold cavity 18 by the molten metal as it rises in the riser passageways.

It is to be understood that the size, shape, thickness and the material of the stoppers 25 may vary without departing from the spirit and scope of the invention and such physical and dimensional characteristics of the stoppers 25 are dependent upon the type of the metal being poured and the temperature of the metal during the pouring operation.

What is claimed is:

1. An apparatus including a flask for making a mold of compacted molding sand and having a passageway extending between and opening into a mold cavity and an outer surface of the mold; passageway forming means positionable in said flask, said passageway forming means being removable subsequent to filling said flask with molding sand and compacting the same to form said passageway; a stopper associated with said passageway for closing the same; means for supporting said stopper preliminary to and during filling said flask with molding sand and compacting the same; and means on said stopper and operatively engageable with said compacted molding sand for anchoring said stopper in closing relation with said passageway upon removal of said passageway forming means from said compacted molding sand.

2. An apparatus as set forth in claim 1, wherein said means for supporting said stopper preliminary to and during filling said flask with molding sand and compacting the same includes said passageway forming means.

3. An apparatus as set forth in claim 2, wherein said passageway forming means includes an elongated first member and an elongated second member arranged end-to-end when positioned within said flask, and said stopper being positioned between and operatively engaged by the adjacent end surface of said first and second members during the filling of said flask with molding sand and compacting the same.

4. An apparatus as set forth in claim 3, wherein said stopper is consumable upon subjection to heat incident to use of the mold in a founding operation.

5. An apparatus as set forth in claim 4, wherein said stopper is imperforate and has a generally inverted cup-shaped, relatively thin portion engageable on respective opposite sides thereof by said adjacent end surfaces of said first and second members.

6. An apparatus as set forth in claim 4, wherein said means on said stopper and operatively engageable with said compacted molding sand for anchoring said stopper in closing relation with said passageway upon removal of said passageway forming means from said compacted molding sand includes an annular flange extending radially outwardly from said inverted cup-shaped portion, said flange extending radially outwardly beyond the surface defining said passageway and being embedded in the compacted sand of the sand mold.

References Cited

UNITED STATES PATENTS
2,275,806 3/1942 Perao 164--162
3,163,879 1/1965 Sylvester 164--337 X
3,256,571 6/1966 Lund 164--244 X
J. SPENCER OVERHOLSER, Primary Examiner
J. S. BROWN, Assistant Examiner
U.S. Cl. X.R.
164--169, 244, 358