J. T. BAKER

METHOD OF CASTING IN A SHELL MOLDING

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Inventor:
James T. Baker

By

Spencer S. Styles
METHOD OF CASTING IN A SHELL MOLDING

James T. Baker, Munster, Ind., assignor to Amsted Industries Incorporated, Chicago, Ill., a corporation of New Jersey

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ABSTRACT OF THE DISCLOSURE

In order to prevent separation of the external surface of a casting which is just beginning to harden and the casting surface of the shell mold in which the casting has been poured the shell mold is provided with longitudinal ribs on the external surfaces of the mold and extending parallel to the parting line, and the mold is completely surrounded by water or sand prior to pouring of the molten metal into the mold.

This invention relates generally to shell molding and more particularly to the elimination of surface defects in steel castings produced in conventional shell molds. Shell molds, as well known in the art, are generally formed of a mixture of zircon or silica sand and a thermostable phenolic resin either in powder form or in a solvent. The mixture of sand and resin is packed around a heated pattern to set the resin to bind the sand particles into a shell mold with a cavity of the configuration of the pattern.

As molten steel is poured into such a mold, an atmosphere is created therein which is carburizing in its effect on the molten steel and causes carburization of the surface of the casting. The surface which is in contact with the mold wall freezes to define a skin around the casting. Carburization of this skin reduces its melting temperature. As the casting begins to cool, it contracts and/or the mold begins to expand thereby creating very slight gaps between the skin and the mold.

During an interval of time which is believed to be very short, the temperature of the molten steel inside the skin of the casting is apparently hotter than the melting point of the carburized skin. This causes the skin to remelt and flow into the gaps between the casting and the mold walls. This creates an undesirable external surface condition on the solidified casting which is ultimately formed in the mold.

It is therefore an object of this invention to provide a method of shell molding steel castings wherein the tendency to the skin of the casting to remelt during cooling is substantially, if not completely, eliminated.

Another object of this invention is to provide a method of casting steel in shell molds wherein undesirable surface defects on the skin of the casting are substantially, if not completely, prevented.

These and other objects and advantages of this invention will become apparent from a reading of the following detailed description when taken in conjunction with the accompanying drawings wherein:

FIGURE 1 is an elevational view of a shell mold half; FIGURE 2 is a cross-sectional view taken along the plane of line 2—2 of FIGURE 1; and FIGURE 3 is a cross-sectional view of the shell mold in position for casting.

Referring now to the drawings, reference numeral 10 denotes a conventional steel mold formed of two halves which when placed together form a cavity 16. One half 12 of mold 10 is shown in FIGURE 1 and the second half 14 along with half 12 is shown in FIGURE 3. The cavity 16 is illustrated schematically in the drawings because the contour of the casting is immaterial to the successful operation of this invention. The two mold halves 12 and 14 are positioned in a box 18 (FIGURE 3) or other similar receptacle. Sand 20 which has been thoroughly wet with water is placed around the two mold halves and is vibrated or otherwise tightly packed into place around the mold 10 in order to support the mold in its upright position as is more clearly shown in FIGURE 3. Care should be taken to insure that the sand 20 is tightly packed around the mold 10.

The mold halves 12 and 14 are provided with recesses 22 and 24, respectively, which are filled with a sand core during the casting operation. These are formed in the mold by attaching an appropriately shaped rod to the mold pattern. These recesses are parallel to the parting line of the mold 10 and by their presence create ribs 26 and 28, respectively, on the exterior surface of the mold halves 12 and 14. These ribs 26 and 28 are also parallel to the parting line of the mold 10 and normal to its axis.

It has been found that surface defects can be virtually eliminated by the utilization of the ribs 26 and 28 and/or the use of the tightly packed wet sand 20 around the mold 10.

Molten metal is then poured into the mold 10 through a gate 30 (FIGURE 1) in the conventional manner. The mold 10 is provided with a conventional riser cavity 32 and two gas vents 34.

It should be apparent from a reading of the foregoing description that various modifications may be made without departing from the spirit and scope of this invention as defined in the following claim.

1. A method of casting comprising the steps of forming a parabolic shell mold with each mold half having a longitudinal rib on the external surface thereof and extending parallel to the mold parting line, packing water wet sand tightly around the external surface of the mold, and pouring molten metal into the mold.

References Cited

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J. SPENCER OVERHOLSER, Primary Examiner.
E. MAR, Assistant Examiner.