
METHOD OF CASTING METAL BARS.

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CARL G. HEIBY, JOHN BURKAM, DAVID E. LINDQUIST, EBENEZER W. ALLEN, FRED L. RIGGIN, AND RICHARD LAU, OF SARNIA, CANADA, ASSIGNS, BY MESSRS. ASSIGNMENTS, TO MUELLER METALS COMPANY, OF PORT HURON, MICHIGAN, A CORPORATION OF MICHIGAN.

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To all whom it may concern:

Be it known that we, CARL G. HEIBY, JOHN BURKAM, DAVID E. LINDQUIST, EBENEZER W. ALLEN, FRED L. RIGGIN, and RICHARD LAU, all citizens of the United States, except ALLEN, a subject of Great Britain, residing at Sarnia, in the county of Lambton and Dominion of Canada, have invented new and useful Improvements in Methods of Casting Metal Bars, of which the following is a specification.

The present invention relates to new and improved methods of an apparatus for casting, more particularly the casting of stock for use in drop forging.

Stock for forging must be free from defects, such as blow holes, pipes, and dross fillings, for the reason that not only will such defects appear under the action of the press, but also where such forgings are afterward machined sub-surface faults may be developed. Such defects result in much stock that cannot be used, and many of the forgings, both before and after machining are so faulty as to be rejected, with the consequent loss of material and labor. Furthermore, faults not apparent after forging or machining may develop in use, necessitating the removal of the defective article and its replacement by a sound one.

This has been so serious a difficulty that much of the stock is produced by the expensive method of rolling, so as to eliminate the objectionable porosities which, as stated, are common in castings made under present methods.

By practising the method and using the apparatus herein disclosed it is possible to produce stock free from the faults named, and equal to the rolled stock, expeditiously and cheaply, so that finished articles may be turned out in large numbers and at a relatively low cost, with practically no loss from rejected stock or finished goods.

While the stock produced may, of course, be utilized for any purpose, the present embodiment of the invention discloses the manufacture of stock designed more particularly for the rapid and economical production of fuse bodies for shells, which must, first, be of high grade material to insure efficiency and safety, and, second, must be produced economically and expeditiously.

In the drawings herewith is shown one physical embodiment of the apparatus and by which the method may be practised, and in said drawings:

Figure 1 is a longitudinal sectional view of the molding apparatus made in accordance with this invention;

Fig. 2 is a top plan view of the apparatus shown in Fig. 1;

Fig. 3 is a section transversely of the apparatus on substantially the line 3-3 of Fig. 1 looking in the direction of the arrow; and

Fig. 4 is a view similar to that shown in Fig. 3 with the mold or chill open.

Referring to the drawings by numbers, like numbers indicating parts in the several views, 10 indicates the lower half of a mold or chill, which is channeled or grooved to the particular shape in cross section of the stock to be produced. The chill member 10 is mounted on any suitable support, as for example blocks 11, and may, if desired, be inclined, as shown, from its receiving end upwardly, such inclination of the chill and consequent hill run of the metal tending to give greater density to the resulting product.

Seated upon said chill member 10 and for convenience hinged thereto, is a complementary upper chill member 12, grooved to coincide with the groove in the member 10, so that when the parts are closed a proper mold cavity is formed.

The two members 10 and 12 may be suitably clamped together by U-clamps 13 and wedges 14, as shown, or by any usual and readily removable device.

The member 10 is preferably extended as at 15 and somewhat thickened, a chamber 16 being formed in such extension, the bottom of which is below the bottom of the groove in the lower member 10, while the upper surface of the extension 15, which forms a seat for a sprue block 17 is in a plane below the top of the groove in member 12. Mounted upon the extension 15 is the sprue block 17, which is preferably made in two half-portions, as shown, so as to form a vertical channel delivering to the chamber 16 heretofore described.

The chamber 16 is preferably provided with a curved bottom which slopes easily to the bottom of the mold cavity in the chill.

The said sprue block members are held to-
gether by any suitable means, as a screw clamp 18, and are clamped tightly to the seat formed by the extension 15 by a clamp 19 which may be tightened by wedge blocks 20.

Preferably the sprue hole formed by the vertical members of the block 17 which constitutes a mold supplying container is coned or tapered from the bottom upwardly, so as to give freedom of flow to the chamber 16 and a substantial supply of metal, while giving a minimum surface of metal exposed to oxidation at the top of the sprue hole.

With the parts disposed as shown and described, it will be seen that a chill is provided in which a closed molding cavity is formed to which the metal is delivered from a pool collected in an enlarged chamber at the receiving end of the chill cavity. Flow from the chamber to the mold cavity is through the somewhat restricted passage formed by the lower end of the vertical sprue block, which lower end serves to dam and hold back draft and floating impurities and prevent their passing into the mold cavity. As the molten metal is poured into the sprue it will, of course, fall to the bottom of the chill supplying chamber and the flow will be from the bottom of the pool along the sloping surface leading into the mold cavity, so that pure metal only will be delivered. By maintaining an excess of metal in the container so that the height of the poured metal in the chamber and sprue hole will be above the level of the passage leading to the chill cavity, all dross or other impurities are skimmed back and held in the vertical sprue hole so that their passage to the mold is impossible.

If desired the end of the chill may be stopped by a plug 21 which is placed at any desired point longitudinally of the mold cavity and will be securely held when the chill members are clamped together.

When the run has been made and the metal has set and cooled and chill parts will be unclamped and separated and the casting removed. It will be of the form shown as filling and mold cavity in Fig. 1, with a body portion of pure dense metal free from faults, at the sprue end of which will be the vertical portion formed by the sprue block. The relatively small vertical portion will contain those impurities which have been skimmed back and prevented from entering the mold, and may be readily separated at the relatively thin section by which it is joined to the main casting.

We claim:

1. The method of casting which consists in pouring molten metal into a container having a relatively small orifice delivering to an enlarged receiving chamber with a curved bottom surface, and passing the metal from said chamber into a chill through a restricted horizontally disposed passage communicating with said chamber and below the surface of the liquid therein.

2. A mold comprising chill members, one of which has a chambered extension with a curved base surface, a sprue block mounted on said extension and in communication with said chamber, said sprue block member forming therewith a restricted passage from said chamber to the chill.

3. A mold comprising a plurality of separable chill members, one of which has a chambered extension with a curved floor surface, a sprue block formed of a plurality of members mounted on such extension and in communication with said chamber, said sprue block members forming therewith a restricted passage from said chamber to said chill.

4. The method of casting which consists in inclining the chill member upwardly from the receiving end thereof and maintaining a supply of molten metal at the mouth of said inclined mold in excess of the receiving capacity of said mouth.

5. A mold comprising a chill member having a chambered extension at one end thereof, an independent sprue block mounted on said extension in communication with said chamber, and forming together therewith a restricted passage from said chamber to said chill.

6. A mold comprising a plurality of separable chill members, one of which has a chambered extension, a sprue block formed of a plurality of members mounted on said extension and in communication with said chamber, said sprue block forming therewith a restricted passage from said chamber to said mold.

7. A mold comprising a plurality of horizontally separable chill members, the lower one of which has a chambered extension, a sprue block formed of a plurality of vertically separable members mounted on said extension and in communication with the said chamber, said sprue block member forming therewith a restricted passage from said chamber to said mold.

8. A mold comprising a plurality of horizontally separable chill members, the lower one of which has a chambered extension, a sprue block formed of a plurality of vertically separable members loosely mounted on said extension and in communication with said chamber, means for clamping said sprue block members together, and means for securing said clamp members to said extension.

9. A mold comprising a plurality of horizontally separable chill members, the lower one of which has a chambered extension with a sprue block seat on its upper surface, a sprue block mounted on said seat with
its lower end extending below the mold bore and the chill to form a restricted passage from the chamber to the said mold.

10. A mold comprising a plurality of horizontally separated chill members, the lower one of which has a chambered extension provided with a seat on its upper surface, a sprue block formed of a plurality of vertically separable, loosely mounted members mounted on said seat and extending below the top of the mold bore, and a chill to form a restricted passage from said chambered extension to said mold, means for clamping the loose sprue members together, and means for securing such clamped sprue block to its seat on the extension.

11. In a mold, a plurality of chill members, means for clamping said members together, an extension on one of said chill members having a chamber extending below the bottom of the mold, a sprue block formed of a plurality of members seated on said extension and forming therewith a restricted passage from said chamber to said mold, means for clamping said sprue block members together, and means for clamping said members to the chill extension.

12. In a mold, a lower chill member, an upper chill member hinged thereto, an extension on the lower chill member having a chamber extending below the bottom of the mold, means for clamping said hinged members together, a sprue block formed of a plurality of members mounted on said extension and forming with said extension a restricted passage to said mold, means for clamping said block members together, and means for clamping said sprue block to its seat.

In testimony whereof we have hereunto set our hands.

CARL G. HEIBY.
JOHN BURKAM.
DAVID E. LINDQUIST.
EBENEZER W. ALLEN
FRED L. RIGGIN.
RICHARD LAU.