May 27, 1930. A. L. BOEGEHOLD 1,759,831

MOLD FOR METALLIC CASTINGS

Filed Aug. 1, 1927

Fig. 1

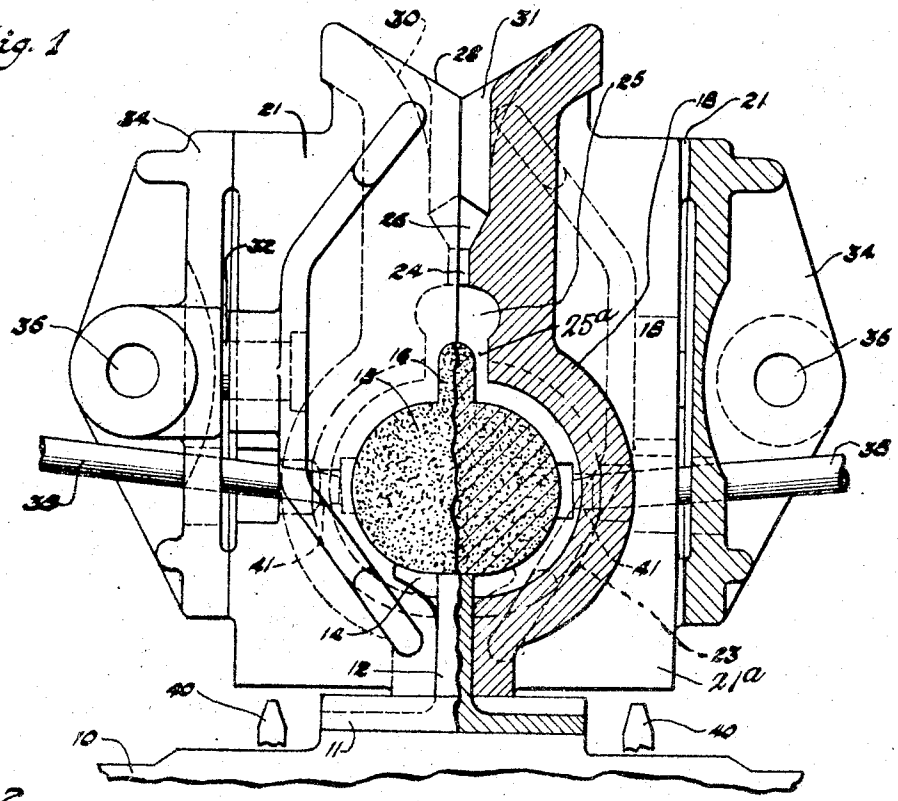


Fig. 2

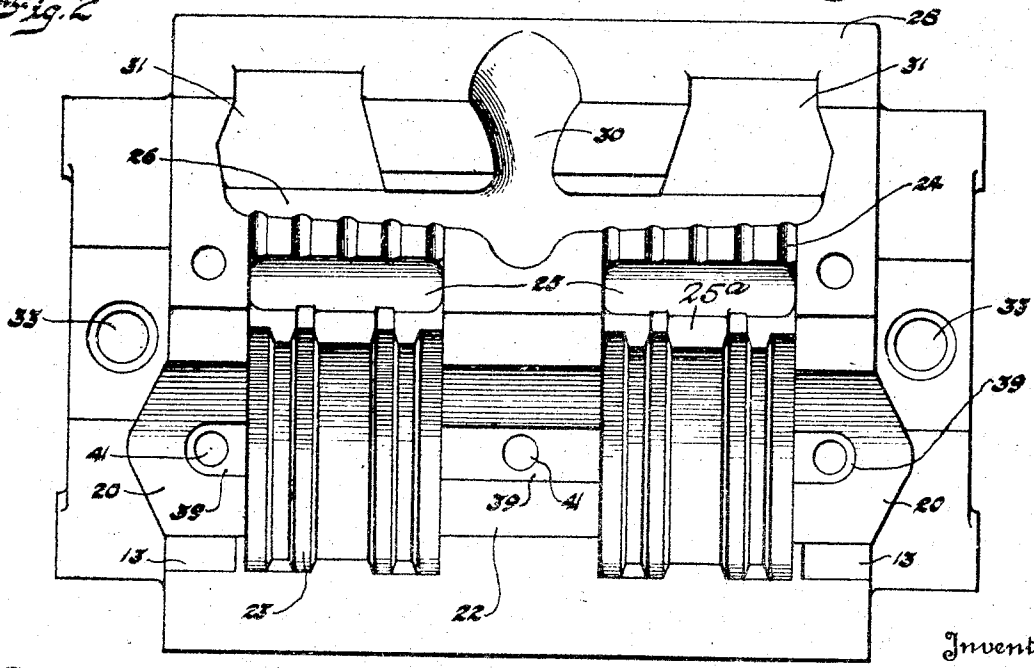
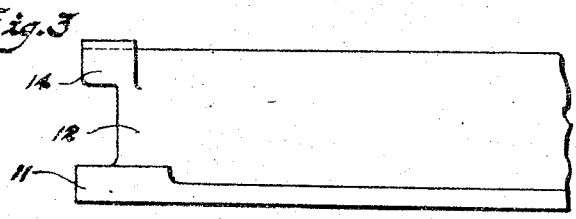


Fig. 3



Inventor

Alfred L. Boegehold

by Blackmore, Spencer & Hall

Attorneys

Patented May 27, 1930 1,759,831

UNITED STATES PATENT OFFICE

ALFRED L. BOEGEHOLD, OF DETROIT, MICHIGAN, ASSIGNOR TO GENERAL MOTORS RESEARCH CORPORATION, OF DETROIT, MICHIGAN, A CORPORATION OF DELAWARE

MOLD FOR METALLIC CASTINGS

Application filed August 1, 1927. Serial No. 209,844.

This invention relates to metal founding. Its object is to enable articles to be cast from metals that shrink materially while solidifying from a molten condition without the formation of pipes and similar imperfections in the cast article.

The nonferrous metals generally, and even steel, when cast in a mold tend to shrink while setting and thus produce a central void or pipe. According to this invention molten metal is poured into a distributing basin from which it flows through a plurality of small and short retarding pencil gates into a reservoir of relatively large section as compared to the thickness of the casting, and from the reservoir flows through an extended gate directly downward into the mold. Thus the molten metal poured into the mold is allowed to solidify progressively from the bottom up and a reserve supply of fluid metal is maintained immediately above the mold and in communication with the mold through an extended opening from which all voids will be filled as they occur. Permanent molds may be used to advantage. Molds of fine copper associated with means for conveying away the heat are preferred.

Further objects and advantages of the invention will appear in the course of the following description, taken in connection with the accompanying drawing and appended claims.

In the drawing:

Figure 1 is an end view partly in section, of a portion of a casting apparatus in accordance with this invention.

Figure 2 is a view of the inside or forming surface of a mold section.

Figure 3 is a side view of the mold core support partly broken away.

In a device of this character the shape of the mold sections must of course depend on the shape of the casting for which the mold is constructed. I have illustrated an apparatus for casting bronze bearings, this particular embodiment being designed to form four half bearings at a time, tho I desire it to be understood that my invention is not limited to any particular shape of casting nor to any particular metal or alloy which it may be desired to cast.

The drawing illustrates an apparatus for casting bearings comprising a machine base 10, separable mold sections and carriers, a separate mold and core support comprising horizontal mold guiding and supporting flanges 11 resting on the base and a central dividing member 12 provided at each end with flanged core rests 14. A sand core 15 is supported on the upper edge of the central dividing member and the rests 14, the upper side of said sand core having a longitudinal dividing ridge 16 which corresponds in thickness to the dividing member 12 and spaces the two parts of the finished bearing castings.

Supported at each side of the dividing member 12 and resting on one flange 11 is a mold section, indicated generally at 18. The mold sections are identical in form but reversed in position so that one fits on the right hand side of the sand core and the other on the left. The lower part of each mold section has an inner face that fits snugly against the upright face of dividing member 12. The walls of the mold or forming cavities of the mold section are spaced from the sand core as illustrated in Figure 1 except at the ends 20 and central part 22. The parts 20 and 22 fit evenly against the sand core, except that they are provided with cavities 39, in which ejecting lugs are cast. The forming portions of the mold sections illustrated as surrounding the core between the parts 20 and 22 are grooved internally as illustrated at 23 in order to form circumferential ribs on the particular castings for which this mold is designed. The flanges 14 on the core support fit in chamfered portions 13 on the inner lower surfaces of the mold sections beyond the mold cavities.

The mold sections are formed with elongated complemental cavities which together constitute a distributing basin extending horizontally substantially the entire length of the forming portions of the mold, and having a depressed central portion; with flaring upper surfaces constituting a trough 28 adapted to prevent slopping of molten metal being poured; with median grooves 30 trans-

verse of the distributing basin constituting a pouring hopper; with other transverse grooves 31 at opposite sides of the pouring hopper constituting risers and inspection orifices; with complemental deep grooves 25 constituting mold feeding reservoirs of considerably greater diameter in all directions than the thickness of the casting to be formed, said reservoirs extending horizontally substantially the full length of the mold cavities and communicating with the distributing basin by means of a plurality of flow retarding pencil gates 24 formed by short grooves in the mold sections, and with the mold cavities by an approximately full length opening 25^a up into which the dividing ridge 16 of the core extend. Vertical end flanges 21 on the rear faces of each mold section contact with the carriers 34 when the molds are in place. Between the flanges 21 said dissipating flanges 21^a may be disposed as shown, for example, in patent to C. L. Lee et al. No. 1,634,152.

A mold carrier 34 is connected to each mold section by means of bolts 32, the heads of which fit in countersunk holes 33. Apertures 36 are provided in the mold carriers for hinging them to a mechanism for opening and closing the mold in any usual or desired manner. The numeral 38 indicates ejector rods for releasing the solidified casting. The ejectors are disposed so as to engage lugs formed in the casting by the cavities 39 on the mold sections. Three of these rods for each mold section may be used as shown in the construction illustrated. They slide through holes 41 registering with the cavities 39.

Dissipation of the heat is made more rapid during pouring of the metal by passing a blast of cool air up between the mold sections 18 and the mold carriers 34 in contact with said heat dissipating flanges. I have illustrated for this purpose nozzles 40 which may be connected with a compressed air tank or pump and which may be operated during the casting operated by any usual or desired means.

The operation of my device will now be described. With the parts disassembled the sand core 15 is placed in the position illustrated in Figure 1. The mold sections are closed to the position illustrated in Figure 1 and molten metal poured into hopper 30 descends to the central depressed portion of the distributing basin 26 whence it flows laterally in opposite directions the full length of the mold cavities. The fluid metal descends from the distributing basin through the flow retarding pencil gates 24 into and through the reservoirs 25 into the forming cavities surrounding the sand core until these cavities are filled. When the metal solidifies the mold sections are separated, the solid mass removed and the operation repeated.

The riser passages 31 allow the metal to back up should it be poured faster than pencil gates 24 allow it to flow into the mold cavity. They also serve as observation ports permitting the foundryman to observe the progress of the pouring operation. Distributing basin 26 with relatively small gates 24 leading from it into the mold cavity retains the meal and causes its distribution evenly to all parts of the mold at a rate of speed that permits progressive setting of the casting as described. The presence of reservoir 25 between gates 24 and the true mold cavity maintains a reserve supply of molten metal in direct communication with the mold cavity and provides a sizable sink head on the casting in which final shrinkage takes place thereby avoiding piping or like defects in the cast object itself.

I claim:

1. A mold having a forming cavity corresponding to the article to be cast; a reservoir immediately above the forming cavity of approximately the same horizontal extent as the forming cavity and communicating with it through an orifice of substantially equal horizontal extent; a distributing basin communicating with said reservoir through a plurality of pencil gates, and a pouring hopper communicating with the distributing basin.

2. A mold having a plurality of forming cavities disposed horizontally; a reservoir immediately above each forming cavity of approximately the same horizontal extent as the forming cavity and communicating with it through an orifice of substantially equal horizontal extent; a distributing basin having two series of relatively short pencil gates communicating with said reservoirs, and a pouring hopper communicating with said basin between said series of pencil gates.

3. A mold having a plurality of forming cavities disposed horizontally; a reservoir immediately above each forming cavity of approximately the same horizontal extent as the forming cavity and communicating with it through an orifice of substantially equal horizontal extent; a distributing basin extending horizontally over said reservoirs and communicating with each reservoir through a series of short pencil gates, said basin having a depressed portion disposed between the series of pencil gates and a pouring hopper above the depressed portion of the basin.

4. A mold having a forming cavity; a reservoir immediately above and of approximately the same horizontal extent as the forming cavity and communicating with it through an orifice of substantially equal horizontal extent; a distributing basin above the reservoir communicating with said reservoir through a series of short pencil gates, said

basin having a depressed portion at one side of the series of pencil gates, and a pouring hopper directly above the depressed portion of the basin.

5. A mold having a forming cavity; a reservoir immediately above and of approximately the same horizontal extent as the forming cavity and communicating with it through an orifice of substantially equal horizontal extent; a distributing basin above the reservoir and communicating therewith through a series of short pencil gates, a pouring hopper communicating with the distributing basin at one side of the series of pencil gates, and a riser passage immediately above the pencil gates.

6. A permanent mold consisting of separable sections having meeting faces, gate grooves, and intermediate spaces to receive a core; a core disposed in said spaces, separated portions of the mold being in contact with the core; said mold sections having a main forming cavity surrounding said core between the portions in contact therewith and lug forming cavities extending from said main forming cavity alongside the core, and ejectors slidable in said sections through said lug forming cavities.

7. A permanent mold composed of separable sections having complemental forming cavities; a core support comprising lateral base flanges upon which the separable sections rest in their closed positions and an upright core supporting member against which the inner faces of the lower portions of the separable sections fit when they are in closed position.

8. A permanent mold composed of separable sections each having at least two complemental forming cavities adapted to receive molten metal to form one-half of a bearing; a core support comprising a longitudinal upright member, said mold sections having flat surfaces beneath the forming cavities adapted to fit against the sides of the core support, a core having a dividing ridge on its upper side supported on said core support; said separable sections fitting against the core at each end and between the mold cavities, the latter being formed around the core.

In testimony whereof I affix my signature.

ALFRED L. BOEGEHOLD.