F. HACHMANN.

CASTING MOLD.

APPLICATION FILED JUNE 19, 1917. RENEWED MAY 13, 1920.

1,356,714.

Patented Oct. 26, 1920.

2 SHEETS—SHEET 1.

Fig. 1.

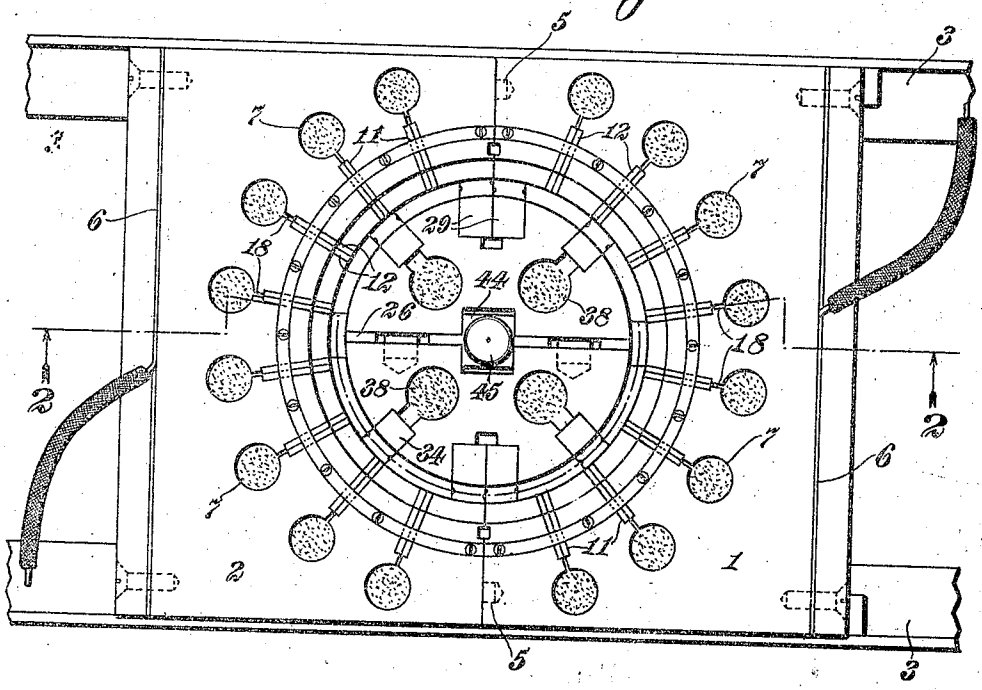
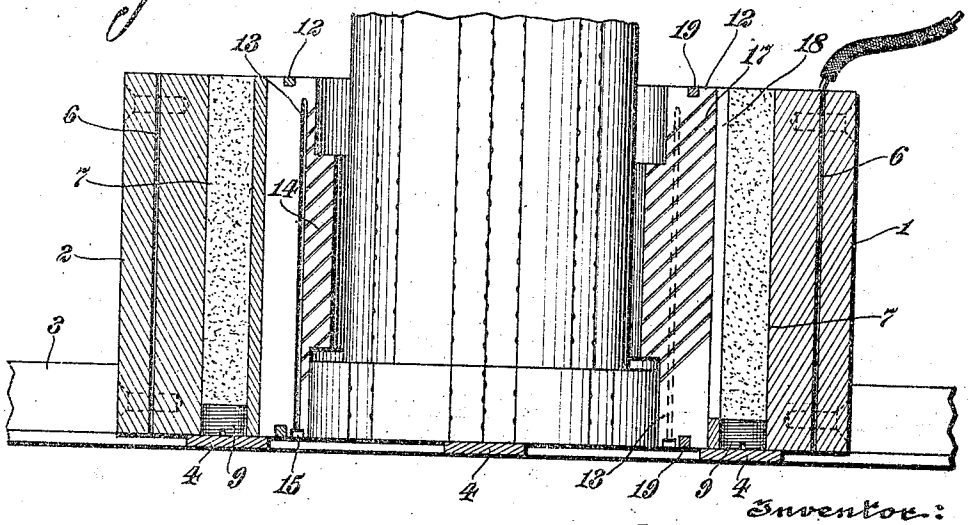


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

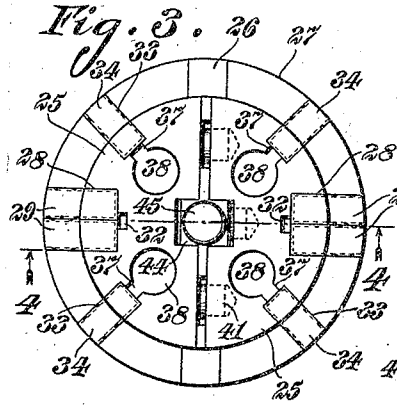


Fig. 7.

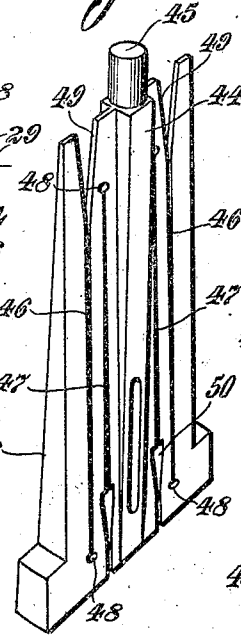


Fig. 6.

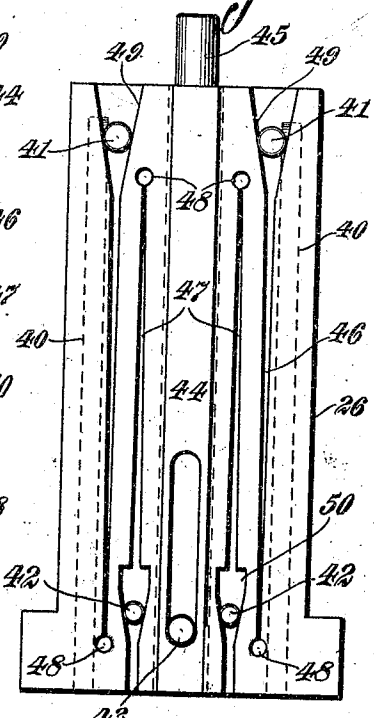


Fig. 4.

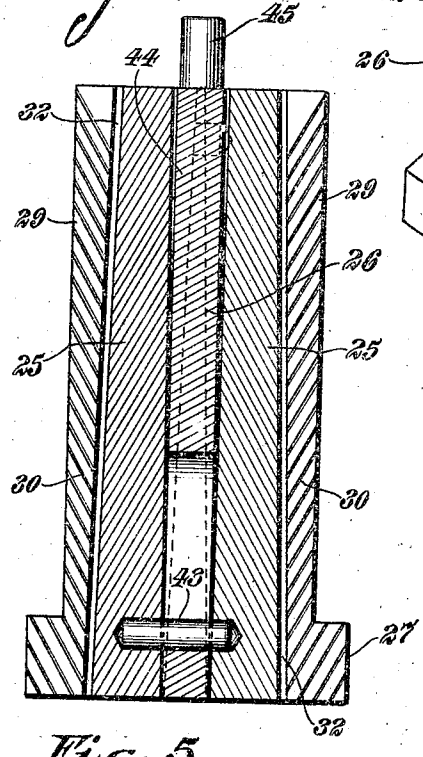


Fig. 8.

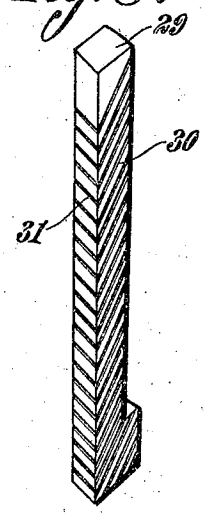


Fig. 9.

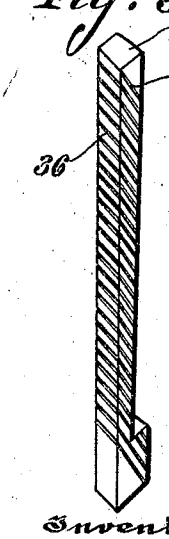
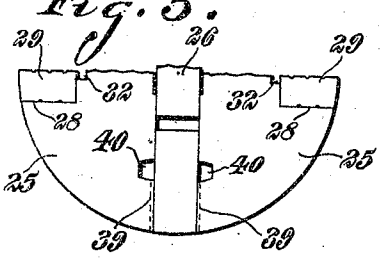


Fig. 5.



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UNITED STATES PATENT OFFICE.

FREDERICK HACHMANN, OF ST. LOUIS, MISSOURI, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NATIONAL METAL DIE MOLD COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

CASTING-MOLD.

1,356,714. Specification of Letters Patent. Patented Oct. 26, 1920.

Application filed June 19, 1917, Serial No. 175,663. Renewed May 13, 1920. Serial No. 381,193.

To all whom it may concern:

Be it known that I, FREDERICK HACHMANN, a citizen of the United States, and residing at St. Louis, Missouri, have invented the new and useful Improvement in Casting-Molds, of which the following is a specification.

This invention relates to casting molds, and more particularly to metallic casting molds for casting metals. In applications Serial Numbers 159,236 and 159,237, both filed April 2, 1917, there is described a casting method and apparatus in which the mold is provided with venting passages adapted to insure withdrawal of the gases from the mold cavity, and provided with lubricant conducting passages adapted to supply to and maintain on the walls of the mold cavity, a lubricant, so as to prevent adhesion of the metal to the mold. In the molds described in the above applications, the casting to be made is a simple casting requiring no core.

Where a cored casting is required, the construction involves difficulties of construction and operation. Since this type of mold is more especially designed for casting such alloys of copper, as brass and bronze, difficulty is experienced not only in gassing, but also adhesion or soldering of the metal to the mold. Moreover, such alloys have high coefficients of expansion, so that contraction of the metal during the cooling on an unyielding core, will frequently cause the casting to break, thus producing defective castings.

One of the objects of this invention, therefore, is to provide a casting mold employing a core, in which the withdrawal of the air and other gases from the mold cavity and at the face of the core, is insured, and in which the face of the core is treated in such a manner as to prevent adhesion of the metal to the core.

Another object is to provide a casting mold employing a core which has provisions for contracting the same, so that the shrinkage of the metal can be counteracted, and the core readily removed from the casting.

In the accompanying drawing,

Figure 1 is a plan of a mold embodying this invention;

Fig. 2 is a section on the line 2—2, Fig. 1;

Fig. 3 is a plan of the core;

Fig. 4 is a section on the line 4—4, Fig. 3;

Fig. 5 is a detail bottom view of the core;

Fig. 6 is a detail of the expanding element;

Fig. 7 is a perspective view of the same; and,

Figs. 8 and 9 are detail perspective views of the core elements.

In accordance with this invention the mold is provided with venting passages which vent the mold cavity at numerous points along the core face. Lubricant conducting passages also lead from a source of lubricant supply in the core to the faces of the core. Both the venting and lubricating passages are capillary passages, so as to avoid flowing of the cast metal therein, and the venting passages are arranged adjacent the lubricant conducting passages, so as to carry off any gases which may be formed. The core comprises sections separated by a contracting member which is itself contractible, and means are provided whereby upon movement of this member, the sections may be contracted, and the member itself may be contracted, so as to contract the core along a plurality of transverse axes.

Referring to the accompanying drawings, 1 and 2 designate mold sections which are formed to provide a mold cavity of the shape of the casting to be produced, this casting being in this case a complete bearing. The mold sections are supported on a suitable frame, comprising side members 3, and cross-members 4, and dowels 5 are provided for holding these sections in cooperative relation. Each section is provided with an electric heating element 6, of any suitable construction, so that the mold may be heated and maintained at a uniform temperature.

Formed in each mold section and spaced around the mold cavity, so as to follow the contour thereof, is a series of pockets 7, adapted to receive the lubricant, such as a high flash point mineral lubricating oil, and a lubricant carrying vehicle adapted to absorb and retain the lubricant. A vehicle material which is found to satisfactorily answer this purpose is a granular porous

carbon, free from graphite, and in pieces about the size of a match head. The pockets 7 are open at their lower ends and are closed by plugs 9, so as to permit the bottoms to be opened, in order to facilitate removal of the lubricant and its vehicle. Formed in each mold section is a series of slots 11, adapted to receive plates 12. Each of these plates have formed on the outside surface thereof, a vertical channel 13, and a series of downwardly directed capillary grooves 14, leading from the mold cavity to the channels 13. The channels 13 in the different plates, discharge into a semi-circular channel 15, so as to be in free communication with the outside air. The inside or engaging faces of the plates 12, have formed therein, upwardly extending grooves 17, the grooves in a pair of plates, forming capillary lubricant conducting channels extending downwardly from the pockets 7, to the mold cavity. Formed in each mold section is a series of slits 18, leading from the junction of the plates 12, to the pockets 7, so as to form continuations of the channel 17. There is thus formed a series of downwardly directed lubricant conducting channels between the pockets and the mold cavity, as clearly shown in Fig. 2. In order to retain the plates 12 in place in the mold, the upper and lower faces of a mold section, and the ends of the plates, are grooved to receive rings 19, which are set into the grooves.

The parts so far described may be substantially as shown in the application referred to, to which reference is had for details of construction.

Referring now more particularly to Figs. 3 to 9 inclusive, mounted within the mold cavity is a core comprising movable sections 25, and an expanding section 26, which are adapted to form together, the complete core. The lower ends of these core sections are enlarged, as shown at 27, and this end is arranged to fit within an enlarged end of the mold sections, as shown in Fig. 2, and rest on one of the cross-pieces 4. Formed in each core section 25, is a channel 28, adapted to receive a pair of plates 29, shown in detail in Fig. 8. Each of these plates is provided on its faces with downwardly extending grooves 30, communicating with lateral grooves 31, on the back face. Formed in each core section is a groove 32, extending from end to end of the core section. The grooves 30 constitute a series of downwardly directed capillary venting passages, connecting the outside surface of the core with the outside air, through the grooves 31 and 32. Set into slots 33, in each mold section, is a plate 34, shown in detail in Fig. 9, and this plate has upwardly directed grooves 35, cut in its side faces, and lateral grooves 36, cut in its back face, and connecting with the grooves 35. Slits or grooves 37, connect the slots 33 with pockets 38, which are filled with a lubricant and a lubricant carrying vehicle, as is the case of the pocket 7. There is thus formed a series of lubricant conducting passages, leading downwardly from the pockets to the outside face of the core.

The engaging faces of the core sections 25 also have grooves 39, inclining downwardly from the outside surface of the core to grooves 40, cut in the engaging faces, and open at both ends. The grooves 39, therefore, form additional venting passages leading from the surface of the core.

The core sections 25 are connected by dowels 41, 42 and 43, which pass through slots in the expanding section 26. This expanding section is of wedge form, as shown in Fig. 7, and has ribs 44, coöperating with corresponding recesses in the core sections 25. This wedge section is also provided with a projecting head 45, to permit manipulation thereof. The wedge section, by movement with respect to the core sections, spreads these core sections apart, and thus permits expansion or contraction of the core. In order to permit expansion and contraction of the expanding member or wedge, this member is slotted, as shown at 46 and 47. Each slot starts from a transverse perforation 48, and terminates in a wedge-shaped recess 49 or 50, coöperating with either of the dowels 41 or 42.

When the wedge 26 is moved into alinement with the core section, as shown in Fig. 4, the wedging action of the recesses 49 and 50, on the dowels 41 and 42, will act to spread the sides of the wedge outwardly, and aline these sides with the core section, so as to form continuations thereof. When, however, the wedge is moved downwardly from the position shown in Fig. 4, the slots 46 and 47, will merely close on account of the resiliency of the metal, so as to contract the wedge laterally. It will, of course, be understood that the core is, when assembled and machined to true diameter, in a position where the wedge is in normal position, as shown in Fig. 4, so that the metal of the wedge is, at this time, under tension.

The operation and utility of the mold in casting will be obvious from the application referred to. The pockets containing the lubricant retaining vehicle, are filled with a lubricant, such as a high flash point mineral oil, and this lubricant is also preliminarily applied to the inside faces of the mold in any suitable manner. The mold being placed in the position, as shown in Figs. 1 and 2, with the core expanded, the metal is poured in, and during this pouring operation, the lubricant being maintained on the core and mold surface, will prevent sticking of the metal to the core

and mold, while the venting passages will carry off the air and other gases which may be formed or be present. Upon the completion of the pouring operation, the mold is moved to the left, Fig. 1, so as to remove the wedge 26 from over the cross-piece 4; the top 45 of the wedge is then tapped with a hammer, so as to move it downwardly, thereby causing instant contraction of the core, and relieving the tension of the metal during its contraction. The mold sections are then separated and the casting is removed.

It is obvious that various changes may be made in the details without departing from the spirit of this invention. It is, therefore, to be understood that this invention is not to be limited to the specific construction shown and described.

Having thus described the invention, what is claimed is:

1. In a casting mold having a cavity adapted to form a casting, a core having venting passages adapted and arranged to vent the mold cavity at numerous points between the core face and the casting so as to permit escape of the gases from below the level of the material being cast during the casting operation, and a series of lubricating passages in the core for supplying lubricant to the face of the core.

2. In a casting mold having a mold cavity adapted to form a casting, a core having a venting channel and venting passages leading from the core face to said channel adapted and arranged to vent the mold cavity at numerous points between the core face and the casting so as to permit escape of the gases from below the level of the material being cast during the casting operation, and a series of lubricating passages in the core for supplying lubricant to the face of the core.

3. In a casting mold having a mold cavity adapted to form a casting, a core having means for applying a lubricant to the face of the core.

4. In a casting mold having a mold cavity adapted to form a casting, a core having means for applying a lubricant to the face of the core characterized by the feature that said means is adapted to apply the lubricant at numerous points on the face of the core.

5. In a casting mold having a mold cavity adapted to form a casting, a core having means for applying a lubricant to the face of the core characterized by the feature that said means is adapted to maintain the lubricant on the face of the core.

6. In a mold having a mold cavity adapted to form a casting, a core having means for applying a lubricant to the face of the core characterized by the provision of a lubricant supply and channels for conducting the lubricant from said supply to the face of the core.

7. In a casting mold having a mold cavity adapted to form a casting, a core having means for applying a lubricant to the face of the core comprising a lubricant supply and channels for conducting the lubricant from said supply to the face of the core characterized by the feature that said lubricant supply contains a vehicle adapted to carry the lubricant.

8. In a casting mold having a mold cavity adapted to form a casting, a core having means for applying a lubricant to the face of the core and having means for withdrawing the gases at the face of the core from the mold cavity.

9. In a casting mold having a mold cavity adapted to form a casting, a core having means for applying a lubricant to the face of the core, and having means for withdrawing the gases at the face of the core from the mold cavity characterized by the feature that said means comprise passages opening at numerous points on the face of the core.

10. In a casting mold having a mold cavity adapted to form a casting, a core comprising a plurality of separate adjacently supported sections, said core being adapted for contraction along a plurality of transverse axes by movement of said sections toward each other, and passages through the core wall for applying a lubricant to the face of the core.

11. In a casting mold having a mold cavity adapted to form a casting, a core comprising a plurality of separate adjacently supported sections, said core being adapted for contraction along a plurality of transverse axes by movement of said sections toward each other, means for causing contraction of said sections, and passages for conducting a lubricant to the face of the core.

12. In a casting mold having a mold cavity adapted to form a casting, a core comprising a plurality of separate adjacently supported sections adapted for movement toward each other to contract the core along a plurality of transverse axes, a contractible member removably supported between said sections, and means for applying a lubricant to the face of the core formed by said sections.

13. In a casting mold having a mold cavity adapted to form a casting, a core comprising a plurality of separate adjacently supported sections adapted for movement toward each other to contract the core along a plurality of transverse axes, and a contractible member removably supported between said sections characterized by the

provision of means operating upon movement of said member adapted to expand and contract the core.

14. In a casting mold having a mold cavity adapted to form a casting, a core comprising a plurality of separate adjacently supported sections adated for movement toward each other to contract the core along a plurality of transverse axes, and a contractible member removably supported between said sections characterized by the provision of means operating upon movement of said member to contract said sections and said member.

In testimony whereof I affix my signature this 25th day of May, 1917.

FREDERICK HACHMANN.