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MOLD AND LINER FOR CASTINGS

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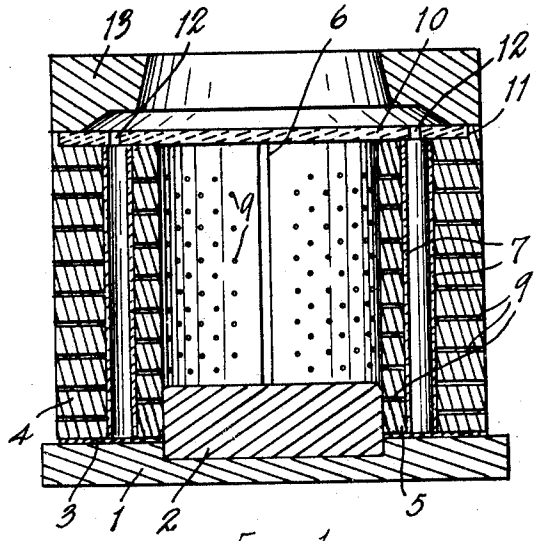


FIG. 1

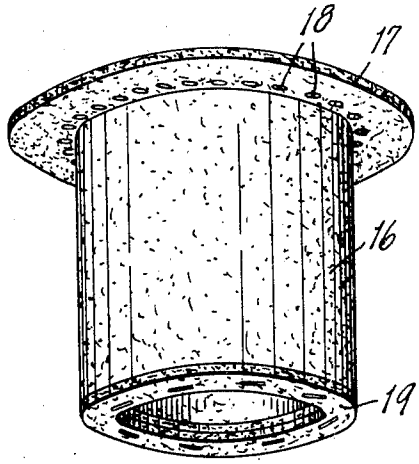


FIG. 4

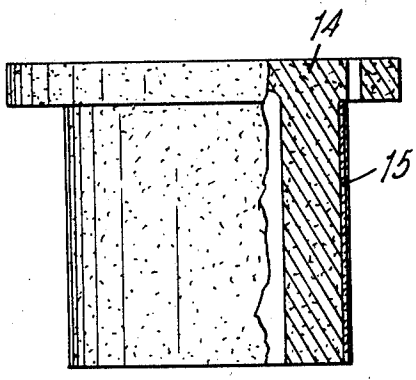


FIG. 5

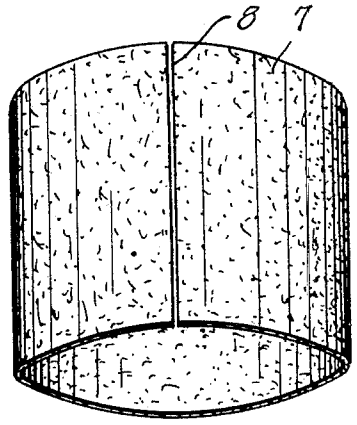


FIG. 2



FIG. 3

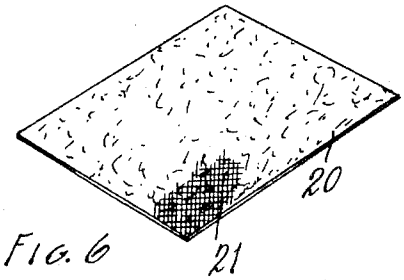


FIG. 6

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MOLD AND LINER FOR CASTINGS

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3 Claims. (Cl. 22—113.5)

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This invention relates to improvements in molds and liner for castings.

The main objects of this invention are:

First, to provide a mold apparatus which permits the production of castings in permanent or metallic molds without hard or undesirable surfaces.

Second, to provide a mold apparatus which greatly facilitates the making of castings of substantial size and length—for example, tubular castings such as valve cylinder sleeves, piston ring castings, and the like of great uniformity and readily machinable without heat treatment.

Third, to provide a mold apparatus or structure in which the resulting castings have relatively smooth uniform surfaces.

Fourth, to provide a mold in which sand cores or mold elements may be employed, and re-used if desired, the casting being protected from the sand in that particles of sand are not permitted to enter the casting.

Fifth, to provide a mold apparatus in which the molds are protected from the molten metal and the molten metal is protected from the mold material.

Sixth, to provide a mold apparatus in which the mold can be quickly prepared for casting and the casting easily removed from the mold.

Objects relating to details and economies of the invention will appear from the description to follow. The invention is defined and pointed out in the claims.

Preferred embodiments of the invention are illustrated in the accompanying drawing, in which:

Fig. 1 is a vertical section of a mold apparatus embodying our invention, certain of the parts being shown conventionally.

Fig. 2 is a perspective view of one of the mold liner elements.

Fig. 3 is a perspective view of the base mold member liner element.

Fig. 4 is a perspective view of a mold element embodying our invention assembled as a unit.

Fig. 5 is a fragmentary view partially in longitudinal section of a sand mold member or unit embodying our invention.

Fig. 6 is a fragmentary perspective view of a sheet of asbestos or other refractory sheet material from which the liner elements may be formed.

In the accompanying drawing we have illustrated in Fig. 1 a complete mold apparatus embodying our invention as adapted for the production of tubular castings. This embodiment

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of our invention comprises a base member 1 having a centering block 2 set therein. The annular base liner 3 is arranged on the base member to embrace the centering block and is positioned and centered thereby.

The outer tubular mold member 4 is desirably a permanent member formed of metal and is superimposed upon the base liner 3. The inner mold member 5 is also desirably a permanent mold member and is of tubular form. This member is superimposed on the base liner and is longitudinally split at 6 to facilitate removal from the casting. Each mold member is provided with a tubular liner 7 preferably formed of sheet asbestos, these liners being longitudinally split at 8 to facilitate their introduction into the mold and the fitting of them firmly to the mold members. The edges of these liner members are preferably spaced slightly as illustrated in Fig. 2 when they are applied to the mold members.

As stated, these linings are formed of sheet asbestos as distinguished from a plastic mass of asbestos. This greatly facilitates the adaptation thereof to the particular mold and also insures a substantially uniform thickness and density.

The walls of the mold members have a plurality of substantially uniform spaced bore-like vent holes 9 extending substantially from top to bottom of the mold members and preferably quite uniformly distributed. This prevents the forming of gas pockets beyond the liner elements and permits the liner elements to fit firmly against the mold members of which they constitute the mold cavity facings.

In the embodiment shown in Fig. 1, we provide a non-metallic gate plate 10 which is superimposed on the mold members 4 and 5, the upper end of the outer mold member being shouldered at 11 to receive the gate plate. The gate plate has sprue holes 12 communicating with the mold cavity. In this embodiment, a pouring basin 13 is superimposed upon the gate plate. With the mold parts thus arranged, the molten metal is poured into the mold, the mold cavity of which is completely lined with a protective insulating medium providing a surface against which the molten metal contacts to form the final casting.

In ordinary practice, the liner material is of sufficient thickness to prevent the formation of chilled hard or unmachineable surfaces commonly resulting when permanent molds are used in forming gray iron castings. This also results in the forming of a surface very accurate to size and shape. When used to face a sand core or

inner mold member 14 as shown in Fig. 5 the liner 15 prevents the sand from being dislodged and carried into the metal.

The molds are very desirable for use in centrifugal or pressure castings, the venting feature being particularly desirable in such relation. The sleeve-like liner members or elements 7 can be formed to fit the mold member walls so that the molding operation is very greatly facilitated. These liner elements are not in any wise attached to the mold and slip from the molds with the casting. They can be readily peeled off from the castings, leaving a highly desirable smooth surface and one which can be machined without previous heat treatment.

In the embodiment shown in Fig. 4, the assembled element comprises the tubular wall or body portion 16 with a top flange-like gate plate 17 having sprue holes 18 therein. This wall member has a sheet of asbestos fixed thereto, the annular gate plate 17 constituting a retaining means for the liner sheet. The bottom rings 19 are formed of asbestos or refractory materials, these being adapted to receive the centering block.

In Fig. 6 we illustrate a fragment of a sheet of asbestos 20. In this case the surface is shown as knurled as at 21, that is, it is passed through the rollers of suitable surface configuration to give a knurled effect.

The sheet liner is desirably of a single ply material as plies of multiple material may separate under the action of heat to which the liners are subjected in use. While we prefer to use asbestos sheets, the invention comprehends the use of heat resistant sheet material, and we use the term heat resistant in the sense that the liners are not consumed by the heat of the molten metal, but are removable therewith. It is rather common practice to apply a graphite paste or other coating to the mold walls to facilitate the freeing of the casting. It is not necessary to use such a coating material in our molding apparatus but if it is desired to use it, it is applied to the liner sheet, and therefore it is not necessary to clean the mold walls when the coating becomes burned thereon or adhered thereto.

Another advantage is that the life of the mold is greatly prolonged, as the inner surface of the mold is protected by the liners and cracking and checking, which is common in permanent metal material, is minimized. This results in very great economy. There is also great economy in the fact that it is not necessary to heat treat the castings before machining. Chilling is effectively prevented or reduced to a minimum. With certain sheet liners it may be desirable to coat them with graphite or other coating material to prevent reaction of the material of the sheet to the molten metal. However, that is not commonly required but if desired, as stated the walls of the permanent mold would not become fouled with the coating material.

While we prefer to employ a mold ventilated by a plurality of small holes uniformly distributed, the mold walls may be formed of a character that permits the passage of gases therethrough and ventilation secured in that manner. The liner should be firmly seated against the supporting wall of the mold, and in practice we have found that this may be desirably accomplished by means of air pressure. The molds are of a wide variety of forms depending on the purpose for which the casting is particularly designed. We have not attempted to illustrate various adaptations of the invention, as it is believed that this disclosure will enable those skilled in the art to embody or adapt the invention as may be desired.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. A mold for ferrous metals comprising a ventilated tubular mold member of metal, and a bendable resilient liner of preformed sheet asbestos for the mold cavity wall thereof loosely arranged in rolled position therein and radially supported against unrolling by the wall thereof with the adjacent edges of the sheet in closely adjacent non-attached relation, the liner being unconnected with the mold wall and being removable from the mold with the casting formed therein.

2. A tubular metal mold member for ferrous metals having an approximately cylindrical mold cavity wall of uniform cross section from end to end thereof and having a multiplicity of ventilating passages opening to its mold cavity surface, and a liner of preformed bendable resilient heat resisting sheet material disposed in said mold cavity in radially supported relation to said ventilated mold cavity wall surface and constituting a facing therefor, the edges of the liner which extend longitudinally of said mold being unconnected and disposed in adjacent relation, the liner and casting therein being removable endwise from the mold cavity as a unit.

3. A mold member for ferrous metals defining an approximately circular mold cavity wall of uniform cross section from end to end and having ventilating passages opening to its mold cavity surface, and a bendable resilient liner of preformed sheet asbestos disposed in rolled position within said mold cavity in radially supported relation to the wall thereof and constituting a substantially complete facing therefor, the liner being free to expand radially by unrolling into close supported contact with the mold cavity wall but being otherwise entirely unconnected to said mold member.

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