Feb. 18, 1941. H. E. McWANE 2,232,126

MOLD CONSTRUCTION

Original Filed Jan. 17, 1936

FIG. 1.

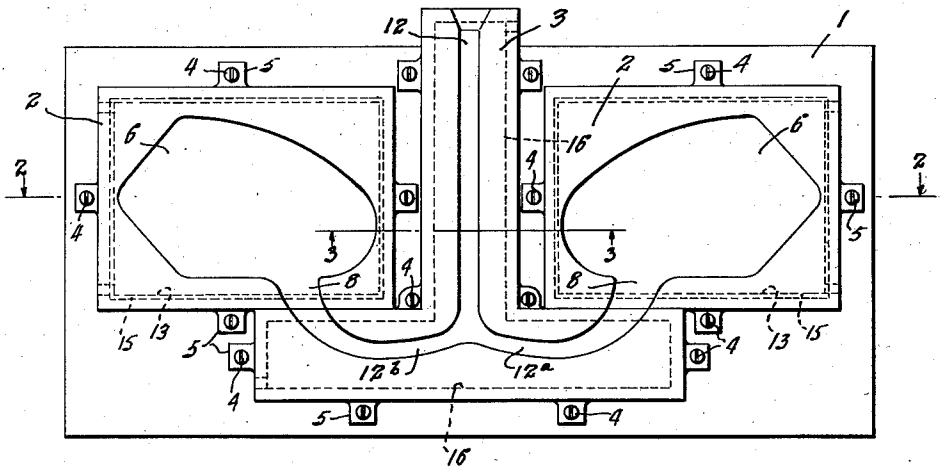


FIG. 2.

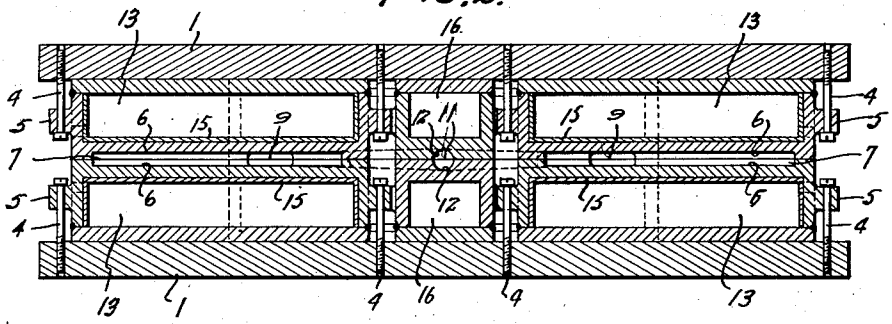
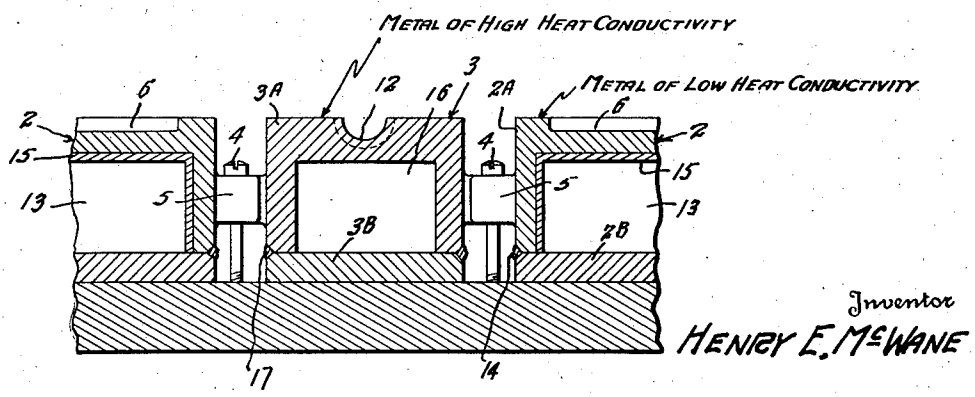


FIG. 3.



Inventor
HENRY E. McWANE

By Semmes & Semmes
Attorneys

Patented Feb. 18, 1941 2,232,126

UNITED STATES PATENT OFFICE

2,232,126

MOLD CONSTRUCTION

Henry E. McWane, Lynchburg, Va.

Application January 17, 1936, Serial No. 59,607
Renewed June 26, 1939

11 Claims. (Cl. 22—136)

This invention relates to molds, and more particularly has reference to a construction for use in molds of the permanent type.

Permanent molds heretofore have presented certain objections. Such molds have generally been of relatively slight longevity, principally in view of the fact that the gates for conducting the molten metal to the mold cavities are damaged by the hot metal through erosion. This has been due to the fact that heretofore the molds and gates have usually been made of the same material, and in order to insure a retention of the metal in the molten state until all parts of the cavity were filled, it has been necessary to make the molds and their gates of a metal having a relatively low heat conductivity. While this is obviously desirable insofar as the mold per se is concerned, the use of a metal of low heat conductivity for the formation of the gate results in the erosion above-mentioned.

On the other hand, if the mold and gate are made of a metal of high heat conductivity in order to prevent erosion of the gate, then there is a tendency for the molten metal to solidify before all parts of the mold cavity are filled with the molten metal.

To overcome the above disadvantages is one of the objects of my invention.

Another object of my invention is to provide a mold in which the castings will be fully formed, and without commercial imperfections, and which will have a long life.

A further object of my invention is to provide a mold construction which, at the point where damage is most likely to occur, will be highly resistant to erosion by the hot metal, yet which is simple to construct and easy to repair or replace.

A still further object of my invention is to provide a mold construction in which the gate is formed of a metal having a relatively high heat conductivity, and in which the mold cavity is formed of metal having low heat conductivity.

With these and other objects in view, which may be incident to my improvements, the invention consists in the parts and combinations to be hereinafter set forth and claimed, with the understanding that the several necessary elements comprising my invention may be varied in construction, proportions and arrangement, without departing from the spirit and scope of the appended claims.

In order to make my invention more clearly understood, I have shown in the accompanying drawing means for carrying the same into practical effect without limiting the improvements in their useful applications to the particular constructions, which for the purpose of explanation, have been made the subject of illustration.

In the drawing,

Figure 1 is a plan view of one half of a mold constructed in accordance with my invention;

Figure 2 is a sectional view of an assembled mold along the line 2—2 of Figure 1, looking in the direction of the arrows;

Figure 3 is a view along the line 3—3 of Figure 1, looking in the direction of the arrows.

Referring more particularly to Figure 1, in which is disclosed one of the halves of a mold, there is depicted the usual base member 1 on which are mounted the mold block 2 and gate block 3. As best shown in Figure 2, the blocks 2 and 3 are secured to the base by means of bolts 4 which pass through lugs 5 upon the blocks and which are screw threaded into the base member 1.

The mold disclosed in Figure 1 is for the formation of a mold board, and for this purpose the block 2 is provided with a depression 6 of the necessary shape. This depression, together with a corresponding depression in the opposed block 2, forms a cavity 7, as best shown in Figure 2. A channel depression 8 extends from the depression 6 to the edge of the block, likewise forming, with a similar depression in the opposed block, a channel 9. The molten metal is introduced to the cavity 7 through the channel 9.

The gate 11 (Figure 2) is formed by corresponding channels 12 in the gate block 3, and the gate 12 is branched to form branch gates 12—A and 12—B extending to the respective channels 9. It is of course obvious that if the base member carries but a single mold, the branching of the gate 11 is dispensed with.

As above-mentioned, it is desirable that the molten metal be maintained in a molten condition until the entire cavity 7 is filled, and to accomplish this I employ as the material of mold block 2, a metal having a relatively low heat conductivity in order to prevent any loss of heat from the molten metal. While various metals may be employed for this purpose, I prefer cast iron. It will be appreciated that cast iron is rigid and inflexible and therefore is not subject to any appreciable warpage during the heating and cooling phases of a casting operation.

However, in order to avoid excessive heating of the block 2, a water jacket 13 may be employed.

As best shown in Figure 3, the water jacket 13

may be formed by making the block 2 of two pieces 2—A and 2—B, and suitably welding the same, as at 14. A suitable lining 15 may be employed in the water jacket, in order to prevent the possibility of water coming in contact with the molten metal in the event of a crack in the mold.

The water jacket, by virtue of its cooling effect, prevents undue wear of the mold by excessive heat. It is of particular value where the mold is being used for successive casting operations, in that it serves to lower the temperature of the mold between each pouring. This feature has been more fully described in my copending application Serial No. 52,248. The above serves to retain the heat of the molten metal, and at the same time prevents undue wear of the mold by excessive heat.

While it is desirable to prevent the loss of heat of the metal in the mold cavity, I do nevertheless prefer to use a metal which can be maintained at a relatively low temperature in rapid production, in view of the fact that the greatest damage from heat appears in the gate. To prevent such damage, I make the gate block 3 of metal having a relatively high heat conductivity, such, for instance, as electrolytic copper. In actual practice, I have found electrolytic copper to be particularly efficacious, and it may be that this is accounted for by certain properties other than its heat conductivity. However, I believe that its principal value resides in its property of dissipating the heat of the molten metal, and that therefore other metals of relatively high heat conductivity may be used in lieu of electrolytic copper.

I find it preferable to provide a water jacket 16 for the gate block 3 also. This water jacket may be formed in the same way as the jacket for the mold block, namely, by making the gate block from two pieces of metal 3—A and 3—B and welding the same together as at 17. It will be appreciated that suitable inlets and outlets may be provided for both water jackets 13 and 16.

The advantages of my invention are believed to be apparent from the foregoing. There is a decided increase in the effective life of molds constructed in accordance with my invention with no sacrifice in the castings that are produced therein. By making the gate block of metal having a high heat conductivity, erosion of the gate by the molten metal passing therethrough is prevented. At the same time, the metal is not so reduced in temperature as to result in solidification thereof, and by making mold block 2 of metal having relatively low heat conductivity, the metal is retained in a molten state until all portions of the mold cavity are filled with the metal.

The exact balance between the heat dissipation properties of the gate block and the heat dissipation properties of the mold block may be adjusted to various types of operation, kinds of metal cast, and the shape, volume and other factors of the cast article. In general, however, the heat dissipation properties of the gate block should be greater than those of the mold block in order to prolong the effective life of the gate and at the same time permit penetration of the metal to all parts of the mold cavity.

While I have shown and described the preferred embodiment of my invention, I wish it to be understood that I do not confine myself to the precise details of construction herein set forth by way of illustration, as it is apparent that many changes and variations may be made therein, by those skilled in the art, without departing from the spirit of the invention, or exceeding the scope of the appended claims.

I claim:

1. A mold construction comprising a mold block formed from a metal of relatively low heat conductivity, and a gate block in association therewith formed from a metal of high heat conductivity.

2. A mold construction, and in combination, a mold block formed from a metal of relatively low heat conductivity, with a gate block formed from a metal of high heat conductivity, and means for increasing the rate of cooling of the gate.

3. A mold construction comprising a cast iron mold block and a gate block of a metal of high heat conductivity.

4. A mold construction comprising a cast iron mold block, a gate of a metal of higher heat conductivity than the mold block, and water-jacketed means in connection with the gate to increase the rate of heat dissipation thereof.

5. In combination in a mold construction, an electrolytic copper water-jacketed gate, a mold in association therewith of cast iron, and water-jacketed means for cooling said cast iron mold parts.

6. In combination in a mold construction, a copper gate, a mold in association therewith of cast iron and water jacketed means for cooling said cast iron mold parts.

7. A mold construction comprising a cast iron mold block and a gate block of copper.

8. A mold construction comprising a gate of copper, and a mold which has a lower rate of cooling than the gate.

9. A mold construction comprising a gate of electrolytic copper, and a mold which has a lower rate of cooling than the gate.

10. A mold construction comprising a gate of electrolytic copper, a water jacket for the gate to increase its rate of cooling, and a mold of a lower rate of cooling than the gate.

11. A mold construction comprising a gate of electrolytic copper, a water-jacket for the gate to increase its rate of cooling, a mold, a water-jacket for the mold, said mold with the water-jacket having a lower rate of cooling than the electrolytic copper gate and the water-jacket combination.

HENRY E. McWANE.