March 11, 1941. E. L. RAMSEY ET AL 2,234,634

MOLD PLUG

Filed Jan. 13, 1940

FIG. 1

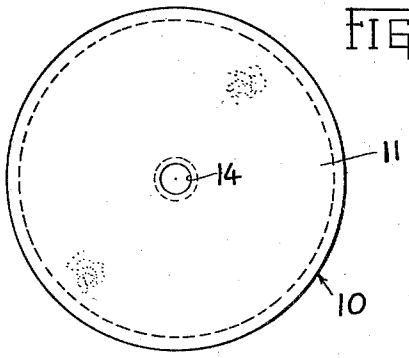


FIG. 3

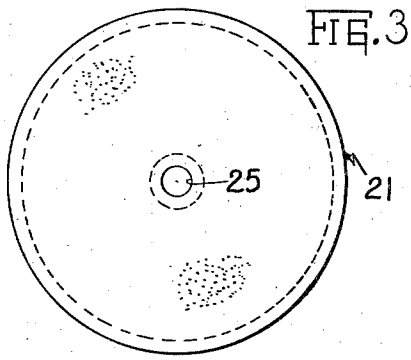


FIG. 2

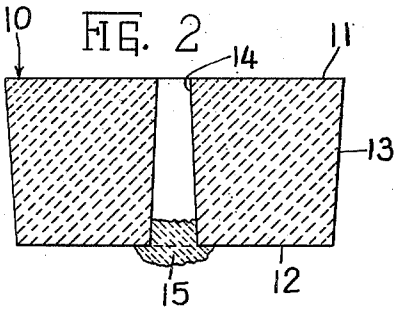


FIG. 4

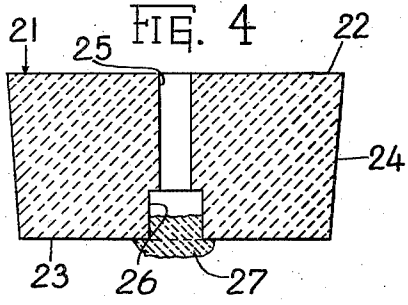


FIG. 5

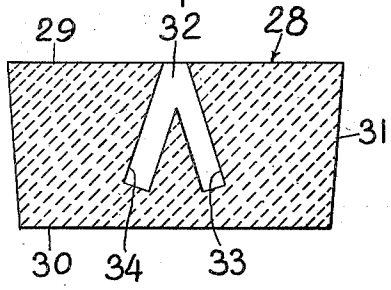
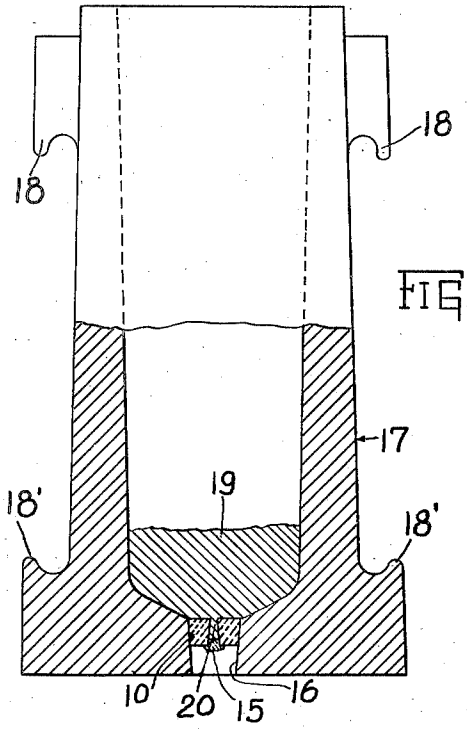


FIG. 6



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MOLD PLUG

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Chicago, Ill.

Application January 13, 1940, Serial No. 313,762

2 Claims. (Cl. 22—148)

This invention relates to a mold plug. More specifically, it relates to a plug for an ingot mold which is removable with the ingot.

An ingot mold normally has a plug of refractory material in an opening at its base relatively small in cross section compared to the mold upon which is poured the first portion of the molten metal. These plugs are normally removed from the mold by a separate manual operation after removal of the ingots.

An object of the present invention is to provide an improved mold plug. A further object is the provision of a plug for an ingot mold provided with a portion engageable with the solidified material of the ingot whereby the plug is automatically removed upon removal of the ingot.

According to the present invention, the mold plug is provided with an irregular or offset portion terminating at its upper end. In a preferred construction, the plug is formed with a conduit increasing in cross-section away from the ingot end at the plug. When the metal is poured in the mold, it fills the conduit in the plug as well as the mold itself. The ingot is then removed from the mold. The metal in the opening in the plug pulls the plug out of the mold.

In the drawing:

Figure 1 is a plan view of a preferred form of mold plug;

Figure 2 is a vertical section through the plug;

Figure 3 is a plan view of a modified form of plug;

Figure 4 is a vertical section through the modified form;

Figure 5 is a vertical section through another modified form of plug; and,

Figure 6 is an elevational view, partly in section, showing a mold in which the preferred type of plug is embodied.

Figures 1 and 2 show a preferred type of plug 10 formed of refractory material which has generally parallel upper and lower surfaces 11 and 12 and a frusto-conical peripheral surface 13, larger at the end surface 11 than at the end surface 12. A bore or conduit 14 is formed in the plug from the end surface 12. The closure 15 closes off the communication of the bore with the lower end surface 12. The bore 14, which may be of any shape in cross section, is frusto-conical with its smallest diameter at the end surface 11 increasing in diameter away from the end surface 12. Figure 6 shows the plug 10 positioned in an opening 16 in the base of an ingot mold 17.

The mold 17 is supported by ears 18 in the position shown in Figure 6, and molten metal is poured into the mold, forming an ingot 19. The molten metal fills the conduit or bore 14 forming a projection 20 extending down into the plug 10. When the metal has solidified and cooled sufficiently, the ingot is removed, and, due to interengagement of the ingot with the plug, pulls out the plug. It is quite obvious that this must happen, since the part 20 of the metal which has solidified within the bore in the plug cannot be pulled out through the top of the plug and, consequently, pulls the plug out with the ingot.

Figures 3 and 4 show a modified form of plug 21 formed of refractory material, which has upper and lower end surfaces 22 and 23 and a frusto-conical peripheral side surface 24 which is to fit the correspondingly shaped surface of the opening 16 in the mold 17. The plug 21 has a bore 25 of uniform cross-sectional area extending from the ingot end and another bore 26 of a larger cross-sectional area formed from the lower end 23. A closure plug 27 fills the lower end of the bore 26 and closes off the bores from the end surface 23. The conduit provided by the bores 25 and 26 in the plug 21 function during the pouring of the metal into the mold to provide means for securing the plug to the ingot, a portion of the molten metal flowing down into the bores 25 and 26 and solidifying. When the ingot is removed, it pulls the plug 21 along with it, since the part of the solidified metal extending into the bores 25 and 26 cannot be removed from the ingot end of the plug.

Figure 5 shows another form of plug 28 formed of refractory material, which has upper and lower surfaces 29 and 30 and a frusto-conical peripheral surface 31. A branched conduit 32 extends from the upper end 29 of the plug and comprises two bores 33 and 34 formed at a slight angle to one another. When the plug 28 is used, a portion of the molten metal flows into and solidifies in the bores 33 and 34. It is obvious that this portion of the metal cannot be pulled out from the plug, and, consequently, removal of the ingot from the mold will effect removal of the plug. The advantage of this type of plug with its bores 33 and 34 is that the bores may be formed from the end 29 from which the opening 32 is finally to extend. Consequently, no extra closures, such as 15 and 27 in Figures 2 and 4, are required.

The various plugs function alike in that for each plug the metal receiving bore or conduit is so shaped that the metal solidified therewithin

cannot be removed from the end from which the opening extends forming thereby an interlocking means between the plug and the ingot. This condition obtains because the bore or conduit in the plug either increases in cross-sectional area or is offset below the upper surface of the plug.

It will be apparent from the foregoing description that a new and novel plug for an ingot mold has been provided. The novelty in this plug is the formation of a portion of the plug of such a shape that molten metal solidified in engagement with said portion secures the plug to the ingot. The intention is to limit the invention only within the scope of the appended claims.

What is claimed is:

1. In an ingot mold having an open top from which the ingots are removed and inwardly sloping inside walls terminated at their converging ends in a substantially closed end having a bore therethrough decreasing in cross-section from the inside end towards the outside end, and in combination therewith a mold plug fitted in said bore, said plug being provided with a conduit for receiving molten metal when the ingot is poured, said conduit having a portion of larger cross-sectional area than its inlet end whereby the solidification of the metal secures the plug to the ingot for removal therewith.

2. In an ingot mold having an open top from which the ingots are removed and inwardly sloping inside walls terminated at their converging ends in a substantially closed end having a bore therethrough decreasing in cross-section from the inside end towards the outside end, and in combination therewith a mold plug fitted in said bore, said plug being provided with a conduit therein for receiving molten metal when the ingot is poured, said conduit having a portion offset from the inlet end whereby when the metal solidifies the plug is secured to the ingot for removal therewith.

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