(No Model.)

# W. R. HINSDALE.

## PROTECTIVE TIP FOR INGOTS.

No. 456,953. Patented Aug. 4, 1891.

FIG. 1.

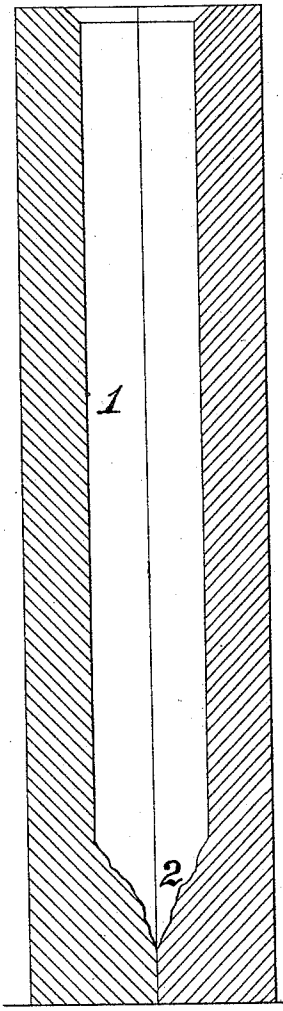



FIG. 2.

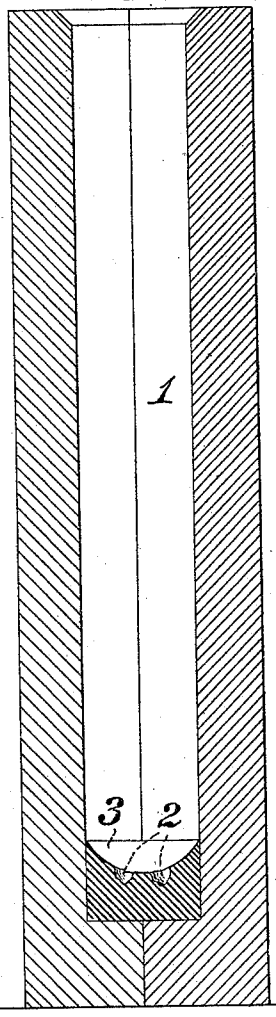



FIG. 4.

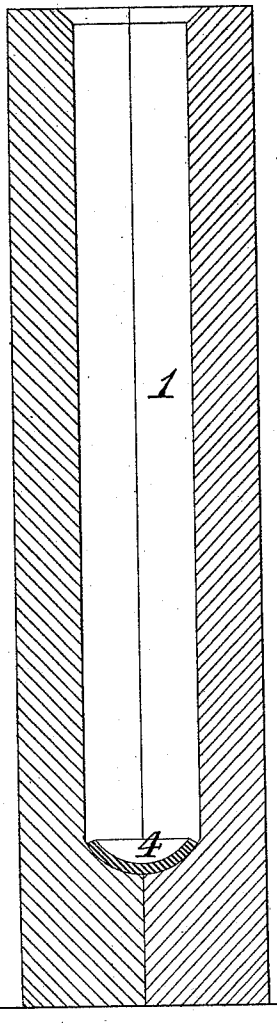



FIG. 5.

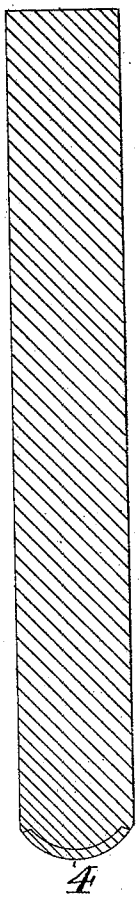



FIG. 3.

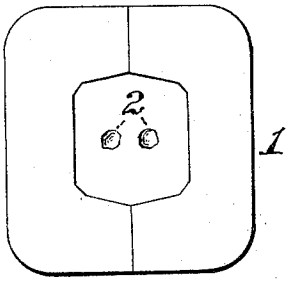
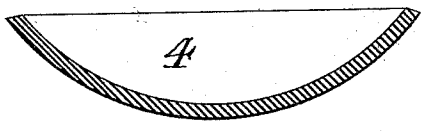



FIG. 6.




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# UNITED STATES PATENT OFFICE.

WILLIAM R. HINSDALE, OF NEWARK, NEW JERSEY.

## PROTECTIVE TIP FOR INGOTS.

SPECIFICATION forming part of Letters Patent No. 456,953, dated August 4, 1891.

Application filed April 27, 1891. Serial No. 390,678. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM R. HINSDALE, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented or discovered a certain new and useful Improvement in Protective Tips for Ingots, of which improvement the following is a specification.

The invention described herein relates to certain improvements in the art of casting ingots, having for their object the production of sound ingots; and the invention consists, generally stated, in providing a cup or shield at the lower end of the ingot-mold for the reception of the molten metal, the shield or cup being preferably of such character as to become welded to and incorporated with the ingot, thereby interposing a firm wall or surface between the plastic metal and the bottom of the mold, thus permitting of the free movements of the ingot and mold in contracting and expanding independent of each other.

In the accompanying drawings, forming a part of this specification, Figure 1 is a sectional elevation of the ordinary ingot-mold, showing the manner in which it is cut by the molten metal. Figs. 2 and 3 are sectional elevation and plan views of an ingot-mold provided with a false or supplemental bottom, showing the manner of pitting or cutting of the latter by the molten metal. Fig. 4 is a sectional elevation of an ingot-mold, showing my improved ingot-shield in position in the mold. Fig. 5 is a sectional elevation of an ingot, showing the shield welded thereto; and Fig. 6 is an enlarged sectional view of one of the shields.

As is well known, the hot steel in being teemed into the ingot-molds pits or cuts the bottom of the mold. After two or three ingots have been cast a number of pits or holes 2 are formed, or one large hole having a rough ragged surface is cut in the bottom of the mold. In all subsequent casts the molten steel enters these pits or holes, and, quickly hardening therein, the ingot is anchored, as it were, at two or more points to the bottom of the mold 1. As the molten steel contracts during solidification and the mold expands as it becomes heated by the steel, the points of anchorage or attachment of the ingot to the mold are moved apart, thus rupturing the partially-hardened shell of ingot adjacent thereto. The walls or surfaces of these cracks or ruptures, whose extent is dependent upon the degree of solidification occuring during opposite movements of the metal and the mold above referred to, become oxidized when the ingot is exposed to the air. These oxidized surfaces will not weld together during the subsequent treatment of the ingot, and hence it is necessary to cut off a portion of the bloom, billet, bar, or other merchantable form to which the ingot is reduced.

Attempts have been made to prevent the pitting or cutting of the mold by the employment of false bottoms 3, as shown in Figs. 2 and 3, formed of cast metal; but as these false bottoms are pitted and cut as rapidly as the mold itself and as the molten steel adjacent thereto hardens to a greater or less degree before the false bottom has attained its maximum expansion the shell of the ingot will be cracked or ruptured, as heretofore described.

In the practice of my invention I form in dies or in any other suitable manner thin disks 4, of a metal preferably of a character capable of becoming welded to or incorporated in the lower end of the ingot during the casting thereof, and which will not have any injurious effect upon the metal of the ingot. These disks have their outer walls made of a contour corresponding to the contour of the bottom of the mold, and are preferably made of such dimensions as to fit closely to the bottom of the mold, as shown in Fig. 4.

In casting crucible steel it is preferred to form the shields of wrought iron or steel disks and to shape, by stamping or otherwise, them up into a concavo-convex form, as shown in Fig. 6. These shields, which are made of such a thickness as to be capable of being raised to a welding heat on their inner faces at least by contact with the molten steel, are placed in the bottom of the molds and the molten steel poured in upon them. As the molten steel comes in contact with the shields their inner surfaces are raised to a welding heat and the shields may become firmly adherent to or incorporated with the ends of the ingots, as shown in Fig. 6, and prevent the hot steel from adhering to the bottom of the mold. Hence the transverse movement of the metal of the ingot during solidification will not be

hindered or any way limited by the contrary movements of the mold during expansion, the non-plastic end surface of the ingot moving freely over the surface of the mold in contact therewith.

My improved shield, in addition to its capability of being welded to or incorporated with the ingot, differs from the false bottom heretofore employed in that it will attain its maximum expansion prior to any appreciable solidification of the steel adjacent thereto, and hence there will not be any tendency to rupturing the steel due to contrary movements of the shield and metal of the ingot.

I claim herein as my invention—

1. As a shield or protector for the ends of ingots, a metal plate constructed to be placed in the bottom of an ingot-mold and of such thinness as to attain its maximum expansion when heated by contact with the metal to be cast prior to the solidification of the adjacent portion of such metal, substantially as set forth.

2. As a shield or protector for the ends of ingots, a metal plate having a concave upper surface adapted to be placed in the bottom of the mold prior to teeming the metal therein and of such thinness as to attain its maximum expansion when heated by contact with the metal to be cast prior to the solidification of the adjacent portion of such metal, substantially as set forth.

In testimony whereof I have hereunto set my hand.

WILLIAM R. HINSDALE.

Witnesses:

R. H. WHITTLESEY,

DARWIN S. WOLCOTT.