June 5, 1934. A. R. ROWE 1,961,529

CASTING INGOTS

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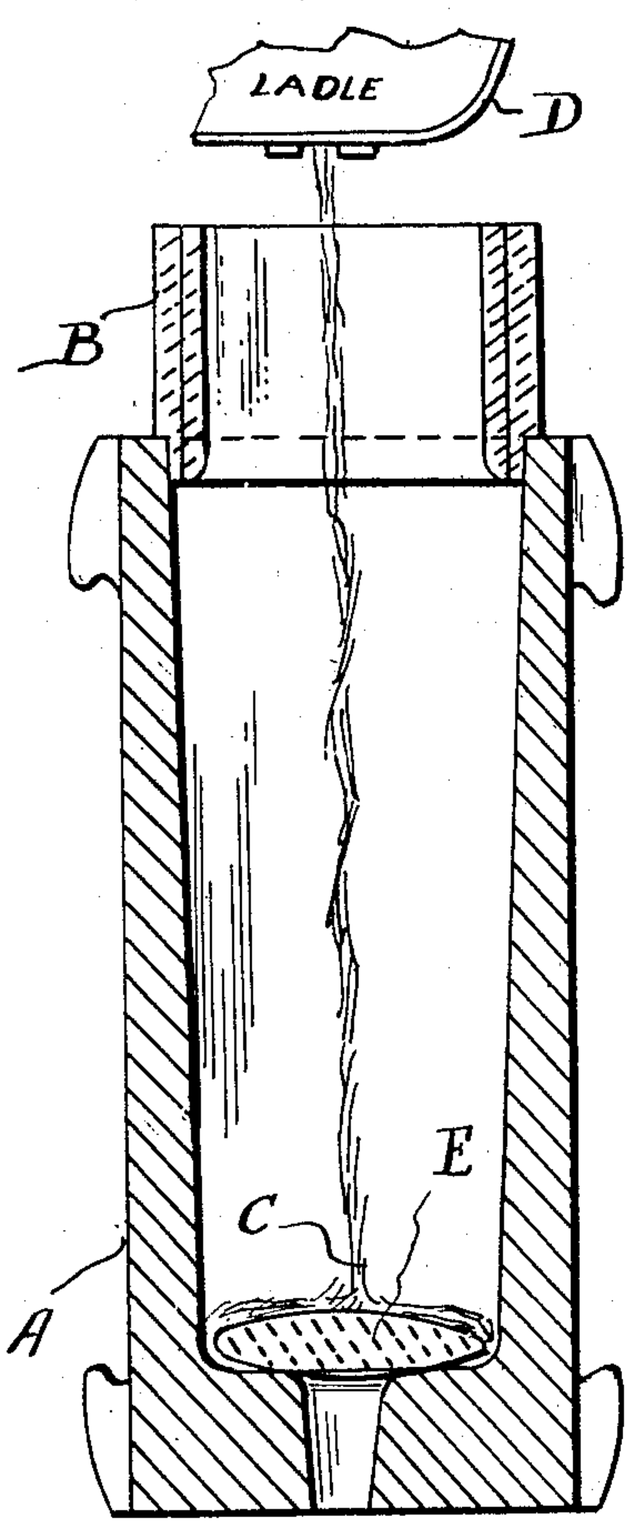


Fig. 1.

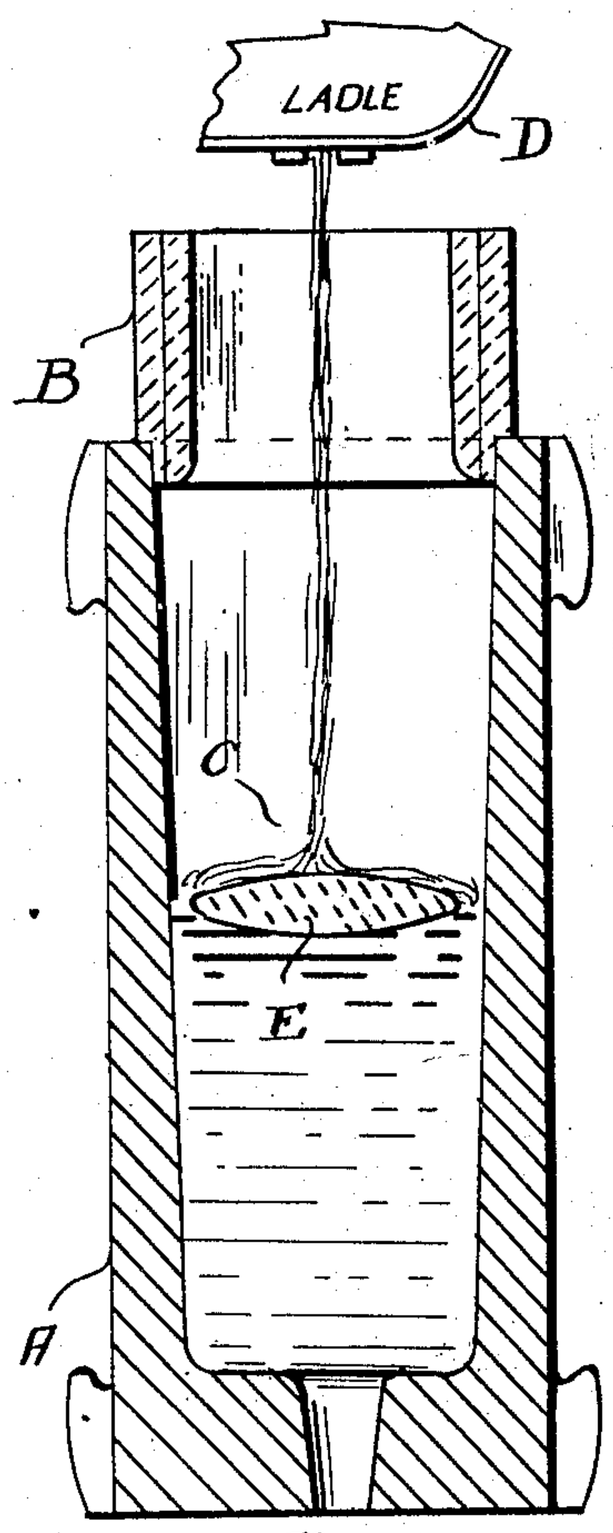


Fig. 2.

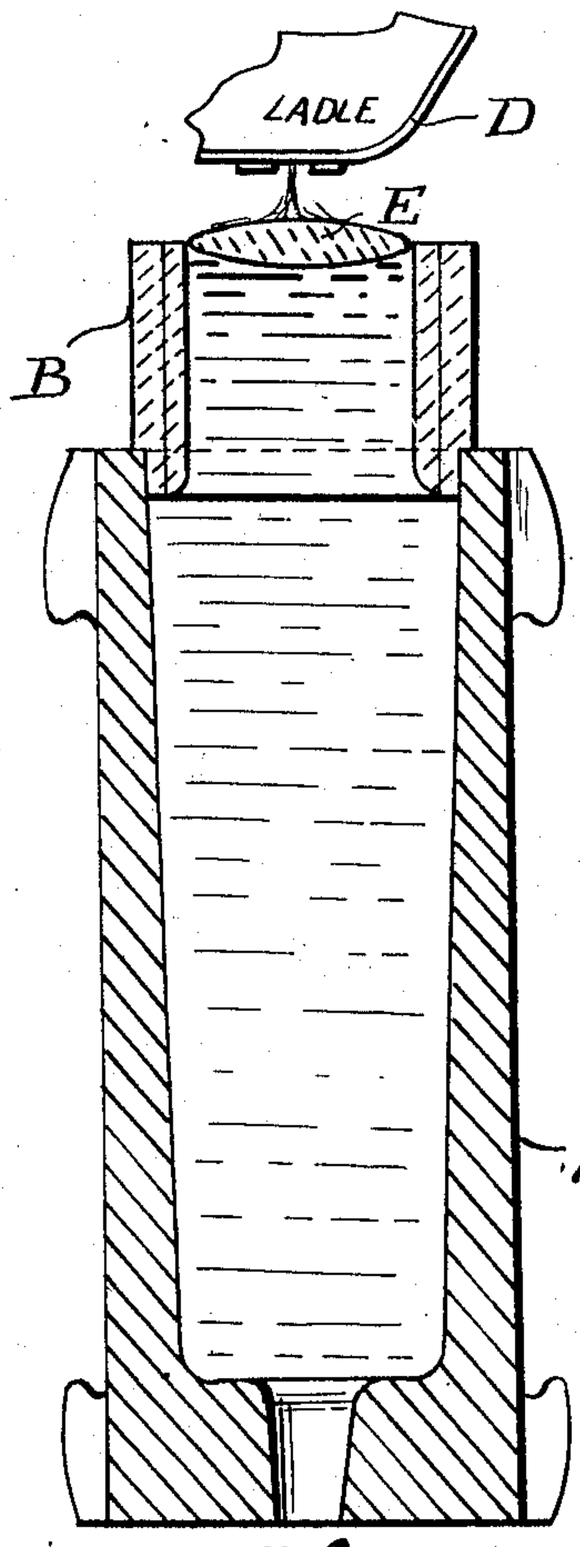
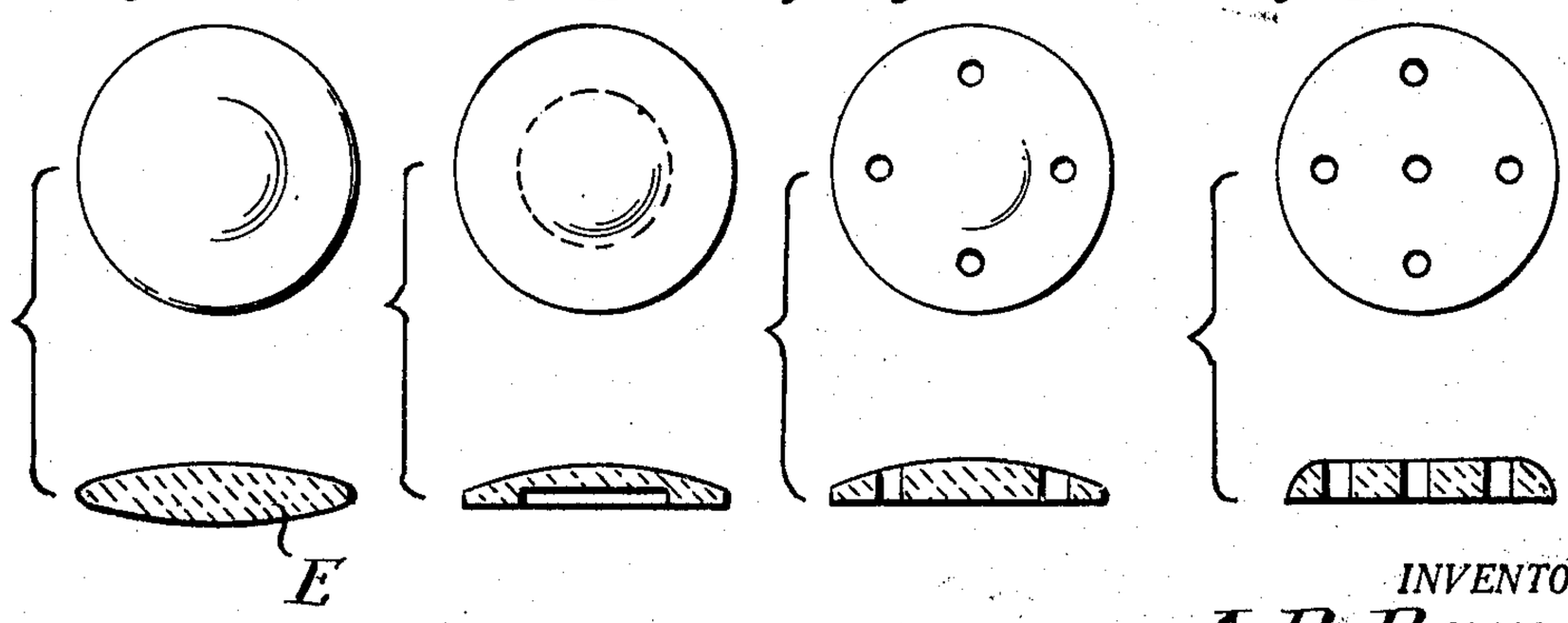


Fig. 3.

Fig. 4. Fig. 5. Fig. 6. Fig. 7.



INVENTOR:
A. R. Rowe
BY: J. T. Newton
ATTORNEYS.

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CASTING INGOTS

Andrew Reed Rowe, Midland, Pa.

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3 Claims. (Cl. 22—139)

This invention relates to improvements in casting steel ingots and other metal products.

One of the objects of the invention is to furnish a device to be used in combination with a mold and a hot-top, and in some cases in combination with an ingot mold, only to prevent the formation of blow holes or other imperfect spots in cast metal.

In the manufacture of iron and steel and other metal products, great difficulties are encountered in casting solid compact ingots, due to the formation of these blow holes and "pipe", which are formed in the process of pouring, and during the period of solidification.

Blow holes or bubbles are mainly caused by trapped gases in the cast metal and it is known that such metal does not readily weld during the rolling of the metal.

When the metal is poured in the mold, while the mold is cold, the metal freezes against the mold, the ingot due to the difference in temperature between the metal constituting the ingot and the mold shrinks away from the center of the ingot toward the sides of the mold. When the pouring of the ingot is finished, the top freezes over quickly, the metal shrinking toward the sides causes a sinkhead or gas pockets, due to the metal freezing rapidly on the top of the ingot and not allowing the metal to feed down to fill the shrinkage cavities, formed during the period of solidification.

The method of pouring ingots, most commonly used is, the metal is discharged from a ladle, the ladle may contain as high as 125 tons of metal, the ladle nozzle usually being from one and one-half inch to three inches in diameter through which the metal is poured into the mold. Due to the quantity of melted metal in the ladle, it is evident that there is a heavy head pressure on the metal issuing from the ladle nozzle, and as the metal rises in the mold, this stream due to the head pressure, forces itself deep into the metal already poured into the mold, and this causes slag and impurities to be forced deep into the metal, and the gases form blow holes or bubbles which are forced deep into the metal and cannot rise to the surface readily until the stream from the ladle is shut off.

Some of the bubbles or gases are forced too deep into the metal to again rise to the surface, and the top freezing over quickly traps the gases within the metal and prevents their escape.

The method and apparatus forming the subject matter of the present invention may be used with very little added expense over the common or ordinary method used in pouring metals and without retarding production.

The invention will be described in detail in connection with the accompanying drawing, in which:

Fig. 1 shows a detail sectional view of a mold and hot-top as ordinarily used. It also shows what I denominate my "Degasifier". In this figure the degasifier is shown on the bottom of the mold before starting to pour.

Fig. 2 shows a view of the degasifier floated part way up the mold.

Fig. 3 shows the mold and hot-top filled with metal with the degasifier, resting on the top of the metal.

Figs. 4, 5, 6 and 7 each show plan and sectional views of different types of degasifiers, some with holes and others without.

A represents an ordinary mold, B a hot-top and C the molten metal poured into the mold A from a ladle D.

The degasifier E is preferably made of some refractory material, such as fire clay, or other insulating material, and the degasifier may be round, square, oblong or of various shapes.

Referring to the operation of the degasifier, the metal is poured from the ladle into the mold, but the stream is intercepted before reaching the bottom of the mold, the surface of the degasifier is convex on its top side and the stream of metal striking the degasifier will follow the convex contour of the degasifier without danger of splashing the mold. The degasifier is designed to be slightly smaller than the inside dimensions of the hot-top, and the hot top at its bottom end is beveled, so that the degasifier's convexed surface may easily pass the bottom end of the hot-top, in case the degasifier floats up slightly off center.

The degasifier by intercepting the stream of metal from the pouring nozzle of the ladle, and all during the pouring of the ingot, rests or rides on top of the metal in the mold, prevents the stream of metal from penetrating or forcing the metal into the body of metal contained in the mold and allowing the metal to follow the contour of the degasifier without any penetrating effect upon the metal as it rises in the mold.

By intercepting the stream of metal from the ladle all during the filling of the mold and hot-top, the stream of metal is broken up, thereby, separating various forms of gases and prevents the formation of blow holes in the metal.

The degasifier is intended to be used in making what are known in the steel art as killed steels and rimming or open steels and may be used in

combination with a mold and a hot-top or in combination with a mold alone. It may be placed in the bottom of the mold before starting to pour in the molten metal or may be dropped in the mold after starting to pour in the metal.

The degasifier intercepts the stream of metal from the ladle and thus prevents the stream from striking the bottom of the mold, thereby, eliminating the stream of metal from burning into the mold, causing the ingot to be welded to the mold, thus eliminating the dangers of ingot or hanger cracks transverse or longitudinal.

From the foregoing, I believe that the operation and advantages of my so-called "Degasifier" may be readily appreciated by those skilled in the art, and I am aware that various changes may be made in the construction illustrated and described, without departing from the spirit of the invention as expressed in the following claims.

What I claim is:

1. An apparatus for molding metal comprising a mold, a device having a convex upper surface and its perimeter conforming to the inner surface of the mold but smaller than said inner surface, said device being lighter than the metal to be molded whereby when said device is placed in the mold and metal poured thereupon it will remain on the top of the metal as it rises in the mold and by reason of its convex top surface will cause the stream of poured metal to spread and run down its convex surface to prevent the formation of bubbles in the metal.

2. An apparatus for molding metal comprising a mold, a device having a convex top surface and a convex bottom surface, said device being smaller than the inner surface of the mold in any position it may occupy in the mold and lighter than the molded metal, whereby as the metal is poured into the mold said device will rise in the mold and rest on the top of the molded metal to prevent the formation of bubbles in the metal.

3. An apparatus for molding metal comprising a mold, a hot top having its lower end projecting into the mold, said lower end having an inwardly bevelled surface, a device having a convex top and a convex bottom surface, the perimeter of said device being smaller than either the inner surface of the mold or the inner surface of the hot top and said device being lighter than the molded metal, whereby as the metal is poured into the mold said device will rise in the mold and pass through the bevelled opening in the hot top and rest on the top of the molded metal at the top of the hot top to prevent the formation of bubbles in the metal.

ANDREW REED ROWE.