(No Model.)

C. W. CANTZ.

INGOT CASTING MOLD.

No. 512,005. Patented Jan. 2, 1894.

FIG. 1.

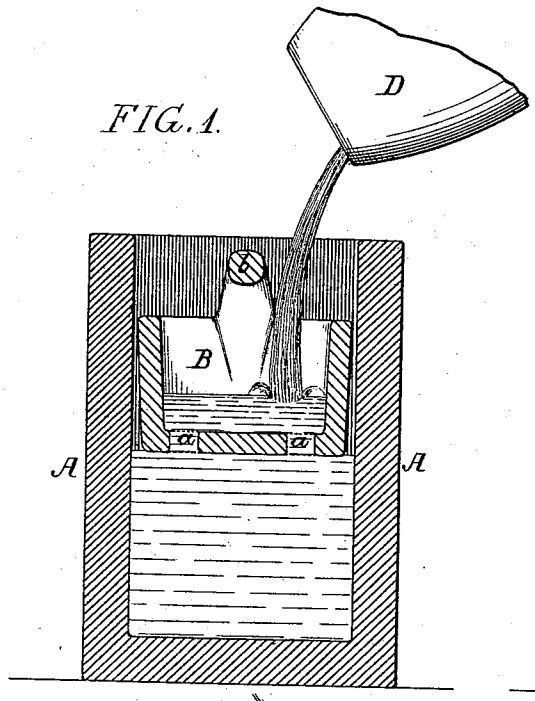


FIG. 2.

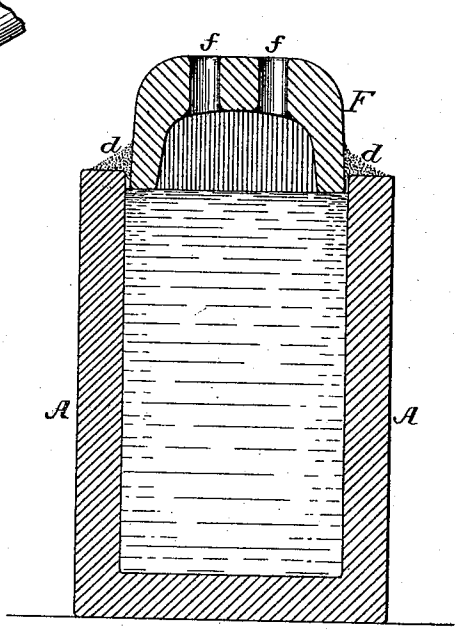


FIG. 3.

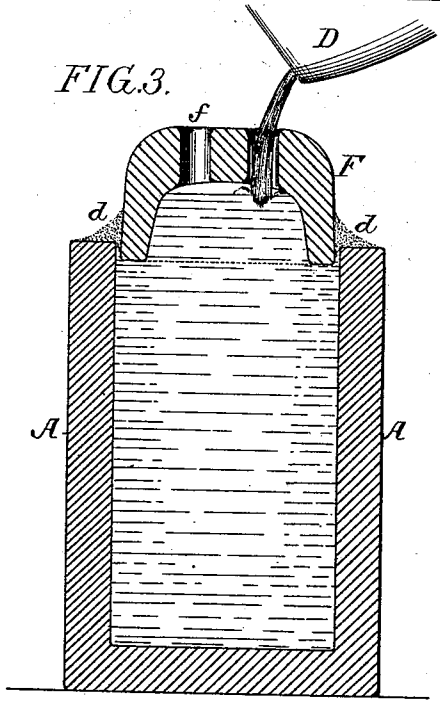
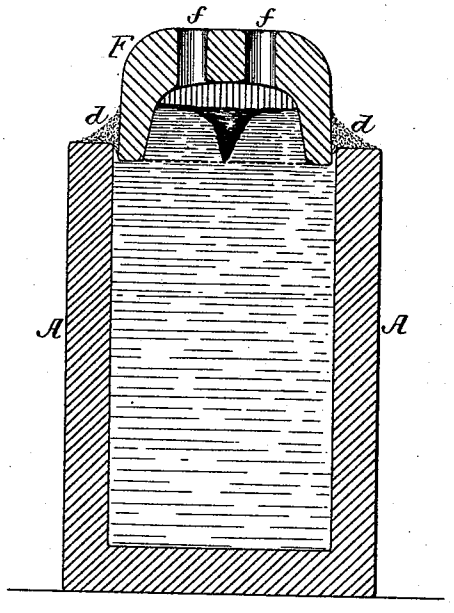


FIG. 4.



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INGOT-CASTING MOLD.

SPECIFICATION forming part of Letters Patent No. 512,005, dated January 2, 1894.

Application filed October 12, 1891. Serial No. 408,421. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. CANTZ, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Ingot-Casting Molds, of which the following is a specification.

The object of my invention is to provide for the casting of steel ingots free from blow-holes and impurities and without cracks or fissures, or as they are technically termed "pipes," and this object I attain by the use of a special form of mold cap in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figures 1, 2, 3 and 4 represent the successive stages in the formation of an ingot in accordance with my invention.

Before proceeding to pour the molten steel into the ingot mold A, I place in the bottom of the mold a bucket B of refractory material, which has a handle *b* whereby it may be readily lifted from or lowered into the mold, the bucket also having, in the bottom, one or more openings *a*. The molten steel is poured from the crucible D into this bucket, which, it should be understood, has been heated to a white heat before being placed in the mold, and the metal passes through the opening or openings in the bottom of the bucket and gradually fills the mold, the bucket floating on the top of the metal as the latter rises. This serves to prevent the blow-holes in the ingot, such as are caused by the splashing of the molten metal when poured directly into the mold, the metal passing through each opening in the bottom of the bucket in the form of a solid stream, so that the mold is filled without any disturbance of the metal, the bucket also serving to retain any impurities which might otherwise be caught and held by the metal in the mold. The use of the bucket also prevents the rapid destruction of the mold which is caused by the pouring of the molten steel directly into the same. It should be stated, however, that the use of this bucket forms no part of my present invention, its use having been described only as incident to the production of a perfect mass of metal in the body of the ingot, my invention relating to a special form of cap for the mold whereby a reserve supply of molten metal is provided for the purpose of preventing fissures in the ingot. After the ingot mold has been almost filled with the molten metal, the bucket B is removed and a hollow cap F, also of refractory material and heated to a white heat, is placed upon the top of the molten metal as shown in Fig. 2, sand or other luting material *d* being thrown onto the top of the mold to close the space between the same and the sides of the cap. In the top of the hollow cap F is a series of openings *f*, preferably two openings arranged as shown, and through one of these openings the molten metal is now poured, as shown for instance in Fig. 3, so that the metal partially or completely fills said hollow cap the air escaping through the other opening. The formation of cracks or fissures, or as they are technically termed "pipes" in steel ingots is caused by the fact that the ingot cools and hardens first at the sides and bottom, the center of the ingot being the last to become hard. Hence the fissures due to the shrinking of the metal are in the center of the ingot and extend from the top of the same downward into the body of the ingot to a greater or less extent. The metal in the hollow cap F, however, provides a reserve supply which will compensate for any shrinkage in the body of the ingot, that is to say, this reserve supply of metal being inclosed in the highly heated cap F is the last to cool. Hence any "piping" due to the shrinkage of the metal will be formed in the metal in the cap, as shown in Fig. 4, and not in the ingot itself. In order that this result may be effected, however, it is necessary that the metal should be at liberty to flow with perfect freedom from the cap into the mold, any restriction of the area of the passage such as would be caused by the partial closing of the bottom of the cap being fatal to the proper attainment of the object of the invention. The use of at least two openings in the top of the cap is also necessary in order to insure the proper flow of the metal into and its rise in the cap, one opening providing for the inflow of the metal, and the other for the escape of the air. Each of the openings can thus be of contracted area, thus insuring the comparatively slow pouring of the metal into the cap which is advisable, while at the same time the aggregate area of both openings is

not such as to lead to the rapid chilling of the metal in the upper portion of the cap.

In order to maintain the upper and central portions of the mass of steel in the cap in a molten condition as long as possible, the top of the cap is much thicker than the sides, so that said top will retain the heat longest.

Having thus described my invention, I claim and desire to secure by Letters Patent—

The combination of an ingot mold with a hollow cap having two or more contracted openings in the top and an uncontracted opening in the bottom for the flow of the molten metal from the cap into the mold, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES W. CANTZ.

Witnesses:
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