W. D. BRADFORD.

INGOT MOLD.

APPLICATION FILED MAY 8, 1912.

1,048,030. Patented Dec. 24, 1912.

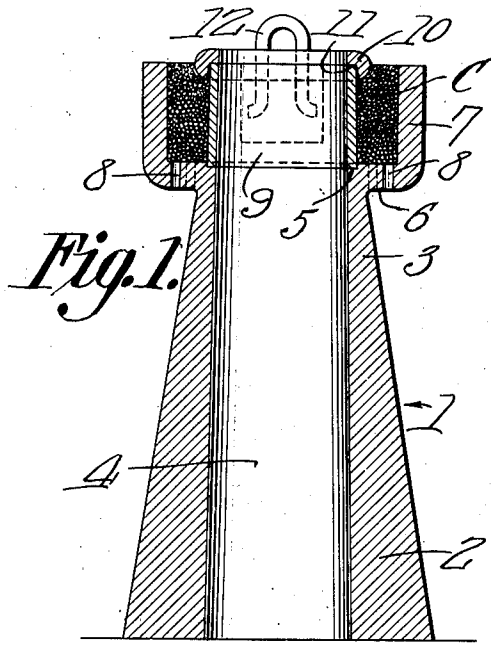

Fig. 1.

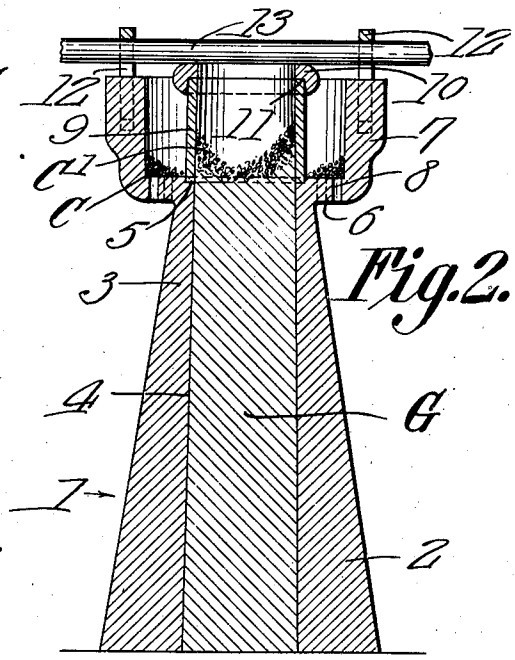

Fig. 2.

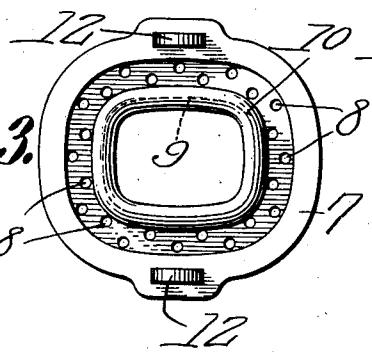

Fig. 3.

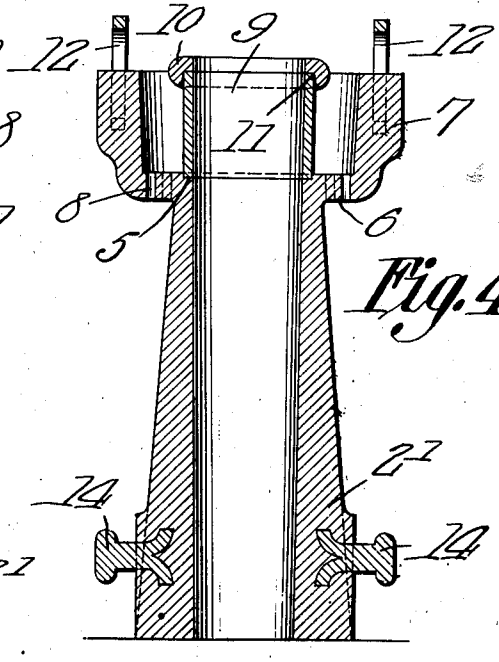

Fig. 4.

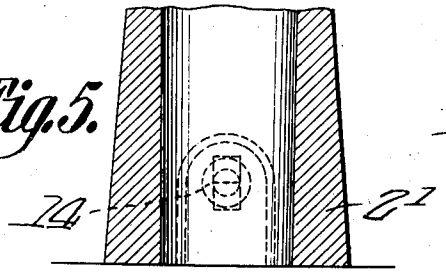

Fig. 5.

Witnesses

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UNITED STATES PATENT OFFICE.

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INGOT-MOLD.

1,048,030. Specification of Letters Patent. Patented Dec. 24, 1912.

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To all whom it may concern:

Be it known that I, WILLIAM D. BRADFORD, a citizen of the United States, residing at Crafton, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Ingot-Mold, of which the following is a specification.

The present invention relates to improvements in an ingot mold the primary object of the invention being the provision of a mold for casting ingots that will prevent or reduce the formation of blow-holes, pipes and cavities in the upper portion of the ingot, the metal in the upper portion thereof being surrounded by and covered with an inflammable material to retain the upper portion of the metal in a liquid condition necessary to enable it to flow and compensate for the sinking of the ingot on cooling and in consequence to reduce the formation of the blow-hole cavity and the loss resulting therefrom.

A further object of the present invention is the provision of a novel mold, the lower portion or base of which has relatively thick walls with a relatively thin reduced portion intermediate of its ends, the same finally terminating in an enlarged end, which with a non-fusible wall provides an annular or surrounding chamber in the upper end of the mold for the reception of an inflammable material, such as charcoal.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings—Figure 1 is a longitudinal sectional view through the complete mold, the same being in a position for receiving the molten metal. Fig. 2 is a similar section taken at right angles to that in Fig. 1, showing the position of the ingot within the mold. Fig. 3 is a top plan view of the device as shown in Fig. 1. Fig. 4 is a view similar to Fig. 1 with the upper end and illustrating a modified form of mold. Fig. 5 is a section taken at right angles to that shown in Fig. 4 of the lower end of the mold.

Referring to the drawings, the numeral 1 designates the mold proper which is provided with the thickened walled portion 2 near the lower end, which tapers upwardly, terminating in the reduced walled portion at 3, the bore 4 constituting the receptacle for the ingot G.

A recess 5 is provided at the upper edge of the bore 4, as clearly shown in Figs. 1, 2 and 4, while formed integral with the upper end of the reduced portion 3 and extending outwardly therefrom, is the shouldered portion 6 terminating in the upstanding rim 7 which constitutes an enlarged chambered end at the upper end of the mold. The portion 4 adjacent to the body 3 of the mold is perforated as at 8 to provide draft apertures for the inflammable material C, which is preferably charcoal or any other carbonaceous material that will burn freely and provide the desired temperature about the non-fusible and removable sleeve or ring 9. This non-fusible ring or sleeve 9 is seated within the recess 5 and terminates at a point substantially in line with the upper edge of the upstanding rim 7, while the open portion thereof forms a continuation of the bore 4 of the mold to permit of the proper introduction of the molten metal within the bore 4 of the mold. Removably mounted upon the upper end of the sleeve or ring 9 is a cast iron ring 10 provided with the annular shoulder 11, which seats upon the upper edge of the ring or sleeve 9, and with the metal loops or eyes 12, which are cast in the rim 7, constitute a means for the reception of a bar 13 for retaining the ring or sleeve 9 in its proper relative position to the recessed portion 5 and also provides a means whereby the mold may be bodily lifted when desired.

In the form of mold shown in Figs. 1 and 2, the ingot G is cast with the large end down, while in the mold as shown in Figs. 4 and 5, the ingot is cast with the large end up simply necessitating the reduction in the thickness in the wall at 2′ and providing two knobs 14 which are cast in the body of the mold, as clearly shown in Fig. 4.

From the foregoing description, taken in connection with the drawings, the method of casting employed with the mold, as described, is as follows:—The sleeve 9 is placed in position and the space surrounding the same between it and the wall 7 is

filled with an inflammable material, such as charcoal, and the same is ignited to receive draft through the apertures 8. By this means the ring or sleeve 9, which is made of non-fusible material such as brick clay, is heated to a degree approximately to that of the liquid steel, that is poured into the bore 4, as shown in Fig. 2, to form the ingot G. By doing this, the sleeve 9 does not absorb any of the heat of the steel but reflects it. The molten steel is now poured into the bore 4 up to and above the recess 5 in the lower end of the brick clay sleeve 9. Loam or other similar substance is now placed on top and in direct contact with the molten metal as at C'. Charcoal is then placed on top of the loam and is ignited by the heat of the ingot to assist the inflammable material C in the annular chamber about the ring 9 in retaining the upper end of the ingot properly heated so that the interstices and blow-holes formed in the lower portion adjacent to the enlarged thickened walls 2 of the mold will be properly filled with the fluid steel held in such fluid state by means of the inflammable material C and the charcoal above the loam C'. By this means the upper end of the ingot will be the last to freeze and by being retained heated or in the desired liquid or fluid state, the consequent blow-holes due to the shrinkage of the metal are avoided.

It has been found that by placing charcoal in direct contact with the molten metal that the carbon will penetrate the metal to some extent, and that therefore to prevent this, the loam is placed upon the metal, and will partially fuse on its lower surface to form slag, that serves to retain the heat below the slag, and to also prevent the carbon from entering the ingot.

What is claimed is:

1. An ingot mold, having an ingot receiving chamber terminating at its upper end in an enlarged mouth, a removable ring of a refractory material, the aperture of which is of the same size as the bore of the chamber, said ring being seated within the enlarged mouth of the chamber to provide a surrounding chamber for inflammable material, the outwardly flared portion constituting the bottom of the surrounding chamber being provided with a plurality of draft perforations therethrough, and means for engaging the upper end of the refractory material ring to retain the same downwardly and in proper position.

2. An ingot mold, having an ingot receiving chamber terminating at its upper end in an enlarged mouth, a removable ring of a refractory material, the aperture of which is of the same size as the bore of the chamber, said ring being seated within the enlarged mouth of the chamber to provide a surrounding chamber for inflammable material, a metal ring fitting upon the upper edge of the ring of refractory material, and means for engaging said metal ring to retain the refractory material ring in position.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

WILLIAM D. BRADFORD.

Witnesses:
MILTON W. ARMSTRONG,
FRANK B. MCKEE.