

J. A. HOLMES.
Casting Steel Ingots.

No. 141,506.

Patented August 5, 1873.

FIG.1.

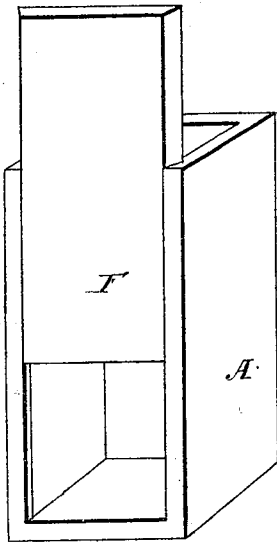


FIG.3.

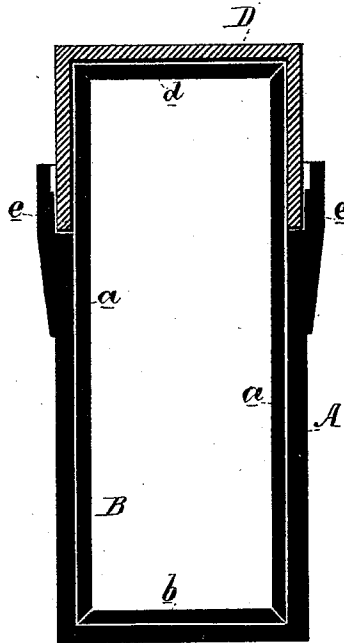


FIG.2.

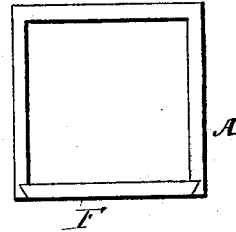
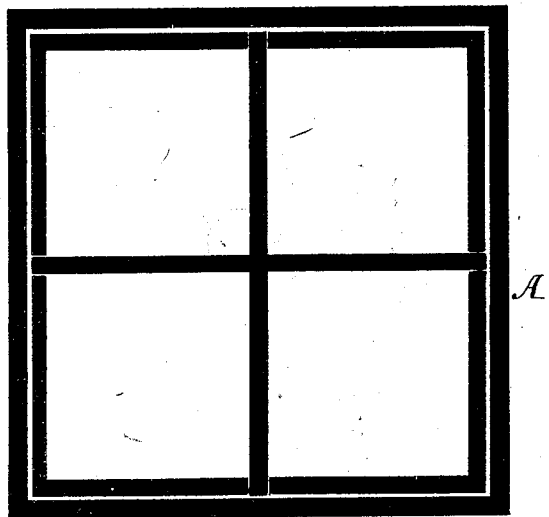


FIG.4.



WITNESSES. *Thomas Milwain*
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UNITED STATES PATENT OFFICE.

JAMES A. HOLMES, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN CASTING STEEL INGOTS.

Specification forming part of Letters Patent No. **141,506**, dated August 5, 1873; application filed December 10, 1872.

To all whom it may concern:

Be it known that I, JAMES A. HOLMES, of Philadelphia, Pennsylvania, have invented an Improvement in the Manufacture of Cast-Steel, of which the following is a specification:

The object of my invention is to produce cast-steel ingots, which are free from the crevices and other imperfections common to ingots cast in molds in the usual manner.

I attain this object by permitting the steel to become cool in a hermetically-sealed crucible, in which it is melted, the crucible A being made with one side, F, detachable, as shown in the perspective view, Figure 1, of the accompanying drawing, or being provided with a detachable lining, B, as shown in the sectional view, Fig. 3, so that the ingot may be removed without injury to the crucible.

In casting ingots of steel in molds in the usual manner, a crevice is formed in the metal during the cooling of the same, this crevice penetrating the ingot to a greater or less extent, and rendering a great portion of it unfit for use in the manufacture of objects of steel. The ingot is also liable to become oxidized and full of small cavities or "honey-combs," as they are sometimes termed.

I have ascertained that if the steel be permitted to cool in the crucible in which it is melted the formation of this crevice and of the smaller cavities will be obviated; but as it would be a difficult matter to remove the cooled ingot from an ordinary crucible without fracturing the latter, I make a special crucible wherewith to carry out my invention.

In the perspective view, Fig. 1, and plan view, Fig. 2, of the accompanying drawing, which illustrate the simplest form of this special crucible, the latter is made with one side, F, detachable, it having in the present instance beveled edges adapted to corresponding grooves in the adjacent sides of the crucible, through which it can be caused to slide. This crucible, after having been filled and closed by a suitable cap, and the joints packed with clay or other refractory material, is placed in the usual furnace, and there remains until

its contents are melted, when it is removed and permitted to become cool, after which the cap is detached and the slide F withdrawn, when the ingot may be readily removed without injury to the crucible, which can be at once prepared for the casting of another ingot.

Another form of special crucible which may be used in carrying out my invention is illustrated in Figs. 3 and 4, where A represents the exterior casing, or, as it may be termed, the crucible proper, made square in the present instance, and of the usual material. This casing or crucible contains a detachable lining composed of four vertical slabs, *a*, a base-piece, *b*, and a cap, *d*. Over the upper end of the lining fits a flanged cover, D, between which and the sides of a socket, *c*, formed at the top of the crucible intervenes a space to be packed with clay or other refracting material.

After the melting and cooling of the contents of the lined crucible the cover D is removed, when the metal with its lining slabs may be withdrawn and the crucible used again. After withdrawing the cooled ingot from the crucible the lining slabs may be readily detached from the same without fracturing, and are ready to be used again.

I prefer to make these slabs of one determined size and interchangeable, so that they can be readily replaced when broken.

The interior of the crucible may be separated into any desired number of compartments by detachable lining slabs—in Fig. 4, for instance, the crucible contains four compartments.

It is most important that the crucible be hermetically sealed, inasmuch as thereby the gases are prevented from coming in contact with and deteriorating the metal, while the latter, being preserved from contact with the air, is cooled so gradually that the formation of external crusts and internal cavities is effectually prevented.

I claim as my invention—

1. The production of ingots of cast-steel by the process described, namely, melting the steel in a crucible which is hermetically sealed,

and then permitting the steel to cool in the crucible, from which the ingot is removed as set forth.

2. A crucible made with one side detachable, substantially as and for the purpose set forth.

3. A crucible made with detachable linings, substantially as and for the purpose specified.

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

JAMES A. HOLMES.

Witnesses:

WM. A. STEEL,
HUBERT HOWSON.