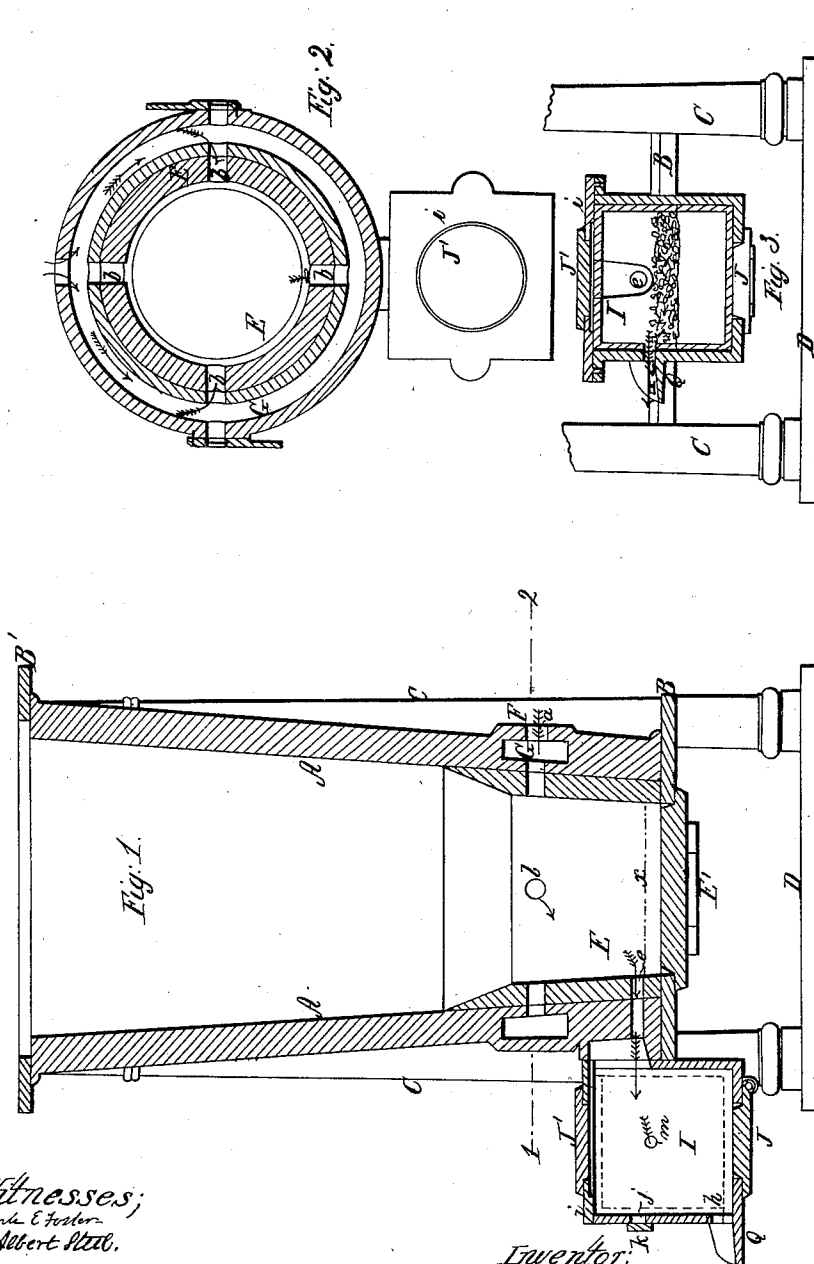


No. 38,513.

PATENTED MAY 12, 1863.

J. F. STILEMAN & Z. ELLIS.
MELTING AND SMELTING FURNACE.



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UNITED STATES PATENT OFFICE.

JAMES F. STILEMAN AND ZABINA ELLIS, OF PHILADELPHIA, PA.

IMPROVED MELTING AND SMELTING FURNACE.

Specification forming part of Letters Patent No. 38,513, dated May 12, 1863.

To all whom it may concern:

Be it known that we, J. F. STILEMAN and Z. ELLIS, both of Philadelphia, Pennsylvania, have invented an Improvement in Melting and Smelting Furnaces; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Our invention consists in applying to a foundry cupola or other furnace, substantially in the manner described hereinafter, a box of any suitable form, having an opening through which may be discharged the slag or scoria which flows into the box from the furnace, and another opening through which the molten metal, which also passes from the furnace into the box, may flow from the latter.

The object of our invention is to obviate the difficulties which arise from an accumulation of undue quantities of slag or scoria in melting and smelting furnaces, as explained hereinafter.

In order to enable others skilled in the art to make and apply our invention, we will now proceed to describe its construction and operation.

On reference to the accompanying drawings, which form a part of this specification, Figure 1 is a vertical section of an ordinary cupola or foundry furnace with our improvement; Fig. 2, a sectional plan on the line 1 2, Fig. 1; and Fig. 3, a vertical section on the line 3 4, Fig. 1.

Similar letters refer to similar parts throughout the several views.

A represents the brick-work body of an ordinary cupola or blast furnace such as is commonly used in foundries, this brick-work resting on a plate, B, which is secured to the pillars C, the latter resting on the foundation-plate D, and supporting the upper plate, B', of the furnace. Into the lower end of the furnace is fitted the usual clay cylinder, E, beneath which, in the plate B, is an opening closed by a door or doors, E', hinged to the said plate. At a suitable distance above the base of the furnace is an enlargement, F, and within the latter is an annular chamber, G, into which the blast is introduced from the tuyere at a, to be discharged through openings b into the furnace.

The above-mentioned parts are too similar to those of ordinary foundry furnaces or cupolas to need a more elaborate description.

In front of the furnace, and near the base of the same, is a box, I, at the rear of which is an opening forming a continuation of the opening e in the furnace, the latter opening corresponding in position with what is known as the "tapping-hole" in an ordinary cupola. The box I, which is lined with fire-brick or fire-clay, extends some distance below this opening e, as best observed on reference to Fig. 1. It should be understood that the bottom of the furnace is represented by the line x, and that this line is on a level with the bottom of the opening e, the said line x representing the upper surface of a fire-brick or fire-clay lining resting on the door or doors E'. A cover, z, is secured to the box by bolts and nuts or other suitable fastenings, and in the bottom of the box is an opening closed by the hinged door J. In front of the box, and opposite the opening e of the furnace, is an orifice, j, having a slide or movable cover, k, for a purpose described hereinafter. In one side of the box, a short distance from the top of the same and at a point below the orifice e, is an opening, m, and in front of the box, near the bottom of the same, is a similar opening, h, a spout, Q, projecting from the box below each opening.

It is well known that great difficulty is experienced in melting, in ordinary foundry-furnaces, scrap-iron which has been exposed for a length of time or which has been subjected to great heat. In melting old gas-retorts, for instance, so great is the difficulty that it is rarely attempted in ordinary foundry-furnaces, these retorts being usually sold at a very low cost, to be forwarded to large smelting-furnaces, where they are fused in conjunction with ores. The difficulty of melting old gas-retorts and other scrap-iron arises from the fact that an excessive quantity of slag or scoria is given out and accumulates so rapidly as to rise above the level of the tuyeres, causing a stoppage of the blast and interfering with the proper fusing of the metal, at the same time clogging up the fuel.

Our invention, the operation of which we will now proceed to describe, has been especially designed with the view of obviating the above-mentioned difficulty.

The fuel in the furnace having been properly ignited, the door J and cover J' of the box I securely closed, the opening j covered by the door or slide k, and the opening h tempo-

rarily plugged up with clay, and the blast introduced into the furnace, the old gas-retorts or other articles of scrap-iron are thrown into the furnace and gradually fused, both the metal and scoria or slag finding their way through the fuel to the bottom, and thence through the opening *e* into the box I. The molten metal being heavier than the slag, the latter will float on the top of the former, as represented in Fig. 3. When the box I has been so far filled that the slag reaches the opening *m*, it will flow through the same, the blast, which has constant admission to the box through the opening *e*, assisting to discharge the slag clear of the box, in which a constant supply of pure metal is thus maintained, to be drawn off as it is required through the opening *h*, after removing the clay plug from the latter. As both the molten metal and slag leave the furnace at once and find their way to the box I, it will be evident that no undue accumulation of slag can take place in the furnace, and consequently that no obstruction of the blast and no inconvenient clogging of the fuel can take place, no matter what amount of slag may be given out in fusing the scrap-iron. Should the opening *e* be obstructed, the obstruction can be readily removed by passing a suitable instrument through the opening *j* into the said opening *e*.

Although we have described our invention

as applied to an ordinary foundry furnace or cupola, it will be evident that it is equally well adapted to ordinary blast-furnaces for smelting ores, or to any furnaces in which an accumulation of slag or scoria is apt to collect to an inconvenient extent.

We are aware that it has been a common practice for many years to use boxes or reservoirs secured in a position adjacent to and so as to communicate with furnaces or cupolas for the purpose of collecting the molten metal prior to the same being used for casting. We therefore do not claim, broadly, such a device.

We claim as our invention and desire to secure by Letters Patent—

A box, I, of any convenient form, with its opening *m*, through which the slag is forced by the aid of the blast, and tapping-hole *h*, the whole being applied to a foundry cupola or other furnace, substantially as and for the purpose herein set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JAMES F. STILEMAN.
ZABINA ELLIS.

Witnesses:

A. H. SHOEMAKER,
JOHN MCKEE.