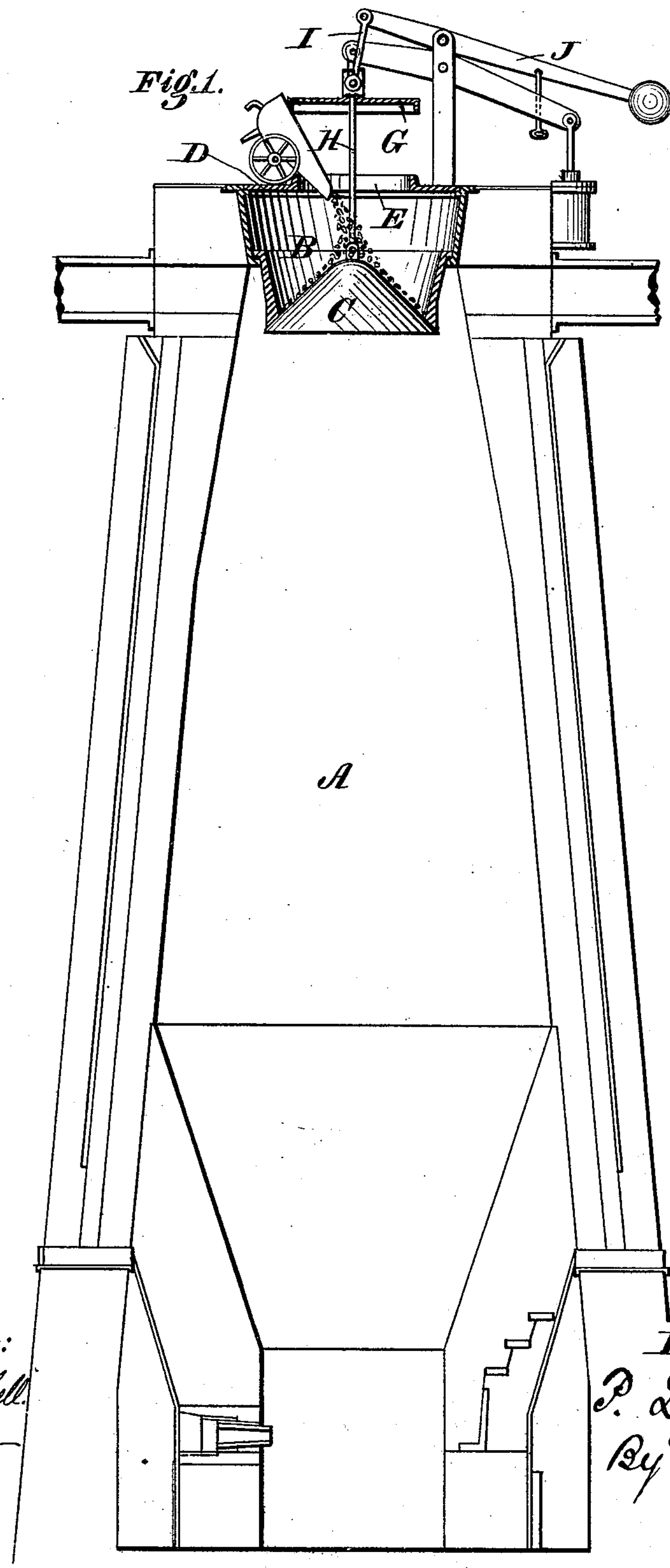
2 Sheets—Sheet 1.

P. L. WEIMER.

Iron-Smelting Furnace.

No. 212,415. Patented Feb. 18, 1879.

Fig. 1.



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2 Sheets—Sheet 2.

P. L. WEIMER.

Iron-Smelting Furnace.

No. 212,415. Patented Feb. 18, 1879.

Fig. 2.

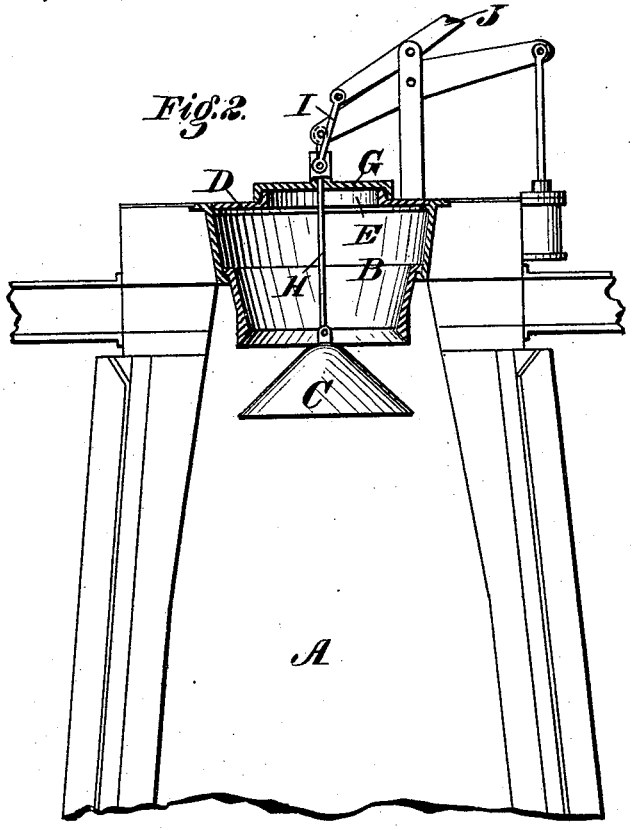
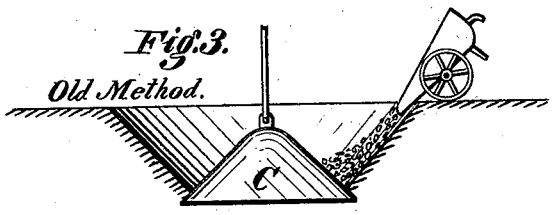


Fig. 3.

Old Method.



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UNITED STATES PATENT OFFICE.

PETER L. WEIMER, OF LEBANON, PENNSYLVANIA.

IMPROVEMENT IN IRON-SMELTING FURNACES.

Specification forming part of Letters Patent No. **212,415**, dated February 18, 1879; application filed April 16, 1878.

To all whom it may concern:

Be it known that I, PETER L. WEIMER, of Lebanon, in the county of Lebanon and State of Pennsylvania, have invented certain Improvements in Smelting-Furnaces, of which the following is a specification:

My invention relates to improvements in the bell and hopper feeding apparatus ordinarily used in connection with iron-smelting furnaces, the objects of the invention being, first, to insure an even distribution and thorough commingling of the stock or material introduced, and, second, to prevent the escape of gases during the operation of charging the furnace. In the ordinary bell and hopper used on iron smelting-furnaces, the material or stock is dumped into the hopper around the circumference, and, as at times from three to six or more different kinds of ore are used, it is evident that the ore must lie around the outer edge or circumference of the hopper in masses as it is delivered from the barrows. It is very desirable that the different kinds of ore, flux, and fuel charged into the tunnel-head of the smelting-furnace be so deposited that a thorough mixture or incorporation shall take place. When the ores are dumped into an ordinary bell and hopper, and then dumped into the furnace in the ordinary way, by dropping the bell, they pass into the furnace in approximately the same form of mass as that in which they were deposited in the hopper, and pass down through the furnace in the same manner.

To overcome this difficulty and insure a uniform distribution of each barrow-load of stock throughout the hopper, and consequently throughout the furnace, I so construct my furnace that the barrows may discharge their contents directly upon the center or apex of the bell, from which point the material flows down evenly in all directions. This method of distributing the charge and the construction of the furnace to that end constitute the first feature of my invention.

The furnace may be constructed in different ways for the purpose mentioned; but it is preferred to arrange above the hopper an annular plate or platform to support the barrows and admit of their being run inward over the center of the hopper, so as to discharge upon the apex of the bell, a central opening being made in the plate or platform for the admission of the charge.

During the time of lowering the contents of the hopper into the furnace by dropping the bell in furnaces of ordinary construction, a large volume of gas is permitted to escape. In order to save this gas I provide a cover sufficiently large to cover the central feed-opening in the annular platform or plate hereinbefore alluded to. This cover I arrange to slide on the rod which sustains the bell, and operate it by means of an independent beam provided with a counter-weight, or by any other suitable arrangement of mechanism which will admit of its being readily raised and lowered independently of the movement of the bell. In charging the furnace the covering-plate is first raised, the bell elevated to close the mouth of the furnace, and the charge then dumped through the central opening into the hopper, the bell meantime preventing the escape of the gases. The covering-plate is then lowered over the feed-opening, and the bell depressed in order to discharge the stock into the furnace, the covering-plate preventing the escape of gas during the latter operation.

Referring to the accompanying drawings, Figure 1 represents a vertical central cross-section of a smelting-furnace provided with my improved feed apparatus, the bell and cover being raised and the parts in position to admit of the hopper being filled; Fig. 2, a similar view, illustrating the position of the parts during the discharge of the stock from the hopper into the furnace. Fig. 3 is a sectional view, illustrating the ordinary bell and hopper and the manner in which the stock is deposited therein.

A represents the furnace, which may be of any ordinary or suitable form and construction; B, the hopper, in its mouth or top, and C the bell, suspended below and within the mouth of the hopper for the purpose of closing the same when elevated.

In their construction and arrangement and mode of operation the hopper and bell are essentially the same as those now in common use. Instead, however, of the hopper being made with an open top, as usual, and as shown

in Fig. 3, requiring the material to be dumped into it on one side, my hopper is provided, as shown in Figs. 1 and 2, with an annular plate or platform, D, extending inward from the outer edge. This plate serves to cover and close the hopper, excepting at the center, where an opening, E, is formed of sufficient size to admit of the barrows discharging their contents through the same into the hopper.

As shown in Fig. 2, the plate or platform D serves as a support or bridge upon which the barrows may be run inward over the hopper in such position as to discharge their contents directly at the center upon the point or apex of the bell. When thus deposited it is obvious that the material will flow down evenly in all directions from the center of the bell and be deposited regularly and uniformly around or in all sides of the hopper, and that consequently as the successive loads or charges are introduced they will be distributed evenly and regularly, one upon another, around the entire interior of the hopper, and subsequently distributed evenly and uniformly in the furnace instead of being deposited, as in the ordinary furnace, in different masses or groups.

For the purpose of closing the feed-opening I employ a plate or cap, G, as shown in Figs. 1 and 2, made of suitable size to fit upon and cover the opening E, and provided with a peripheral flange to fit tightly over a corresponding flange formed around the edge of the opening in order to insure a tight joint between them.

As shown in the drawings, the covering or sealing-plate G is mounted loosely upon the central rod H, which supports the bell in the ordinary manner, the plate being arranged to slide freely upon the rod, and being connected by a link, I, to a pivoted weighted beam, J, by means of which the operator may readily raise the plate in order to admit of the barrows being run thereunder to discharge into the feed-opening. The rod by which the bell is suspended is connected to the operating-beam, as usual, which may be modified, as shown, by a cylinder and piston, or in any other ordinary manner. The manner of supporting and operating the closing-plate may be modified or changed as desired, provided it is arranged so that it may be lifted from and applied to the feed-opening at will.

Having thus described my invention, what I claim is—

1. The herein-described method of feeding a blast-furnace, consisting in depositing the component parts of the charge in successive masses upon the apex of a cone closing the mouth of the furnace, whereby the stock is thoroughly intermingled before being discharged into the furnace.

2. The combination, in a smelting-furnace, of a hopper, a conical bell in the mouth of the hopper to close the same, and an annular platform above the hopper adapted to support a barrow and permit the dumping of its contents at the center upon the apex of the bell, substantially as shown.

3. The combination of the bell C and its sustaining-rod, connected with a beam or lever, and the plate G, sliding on the bell-rod and connected with an independent operating-beam.

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