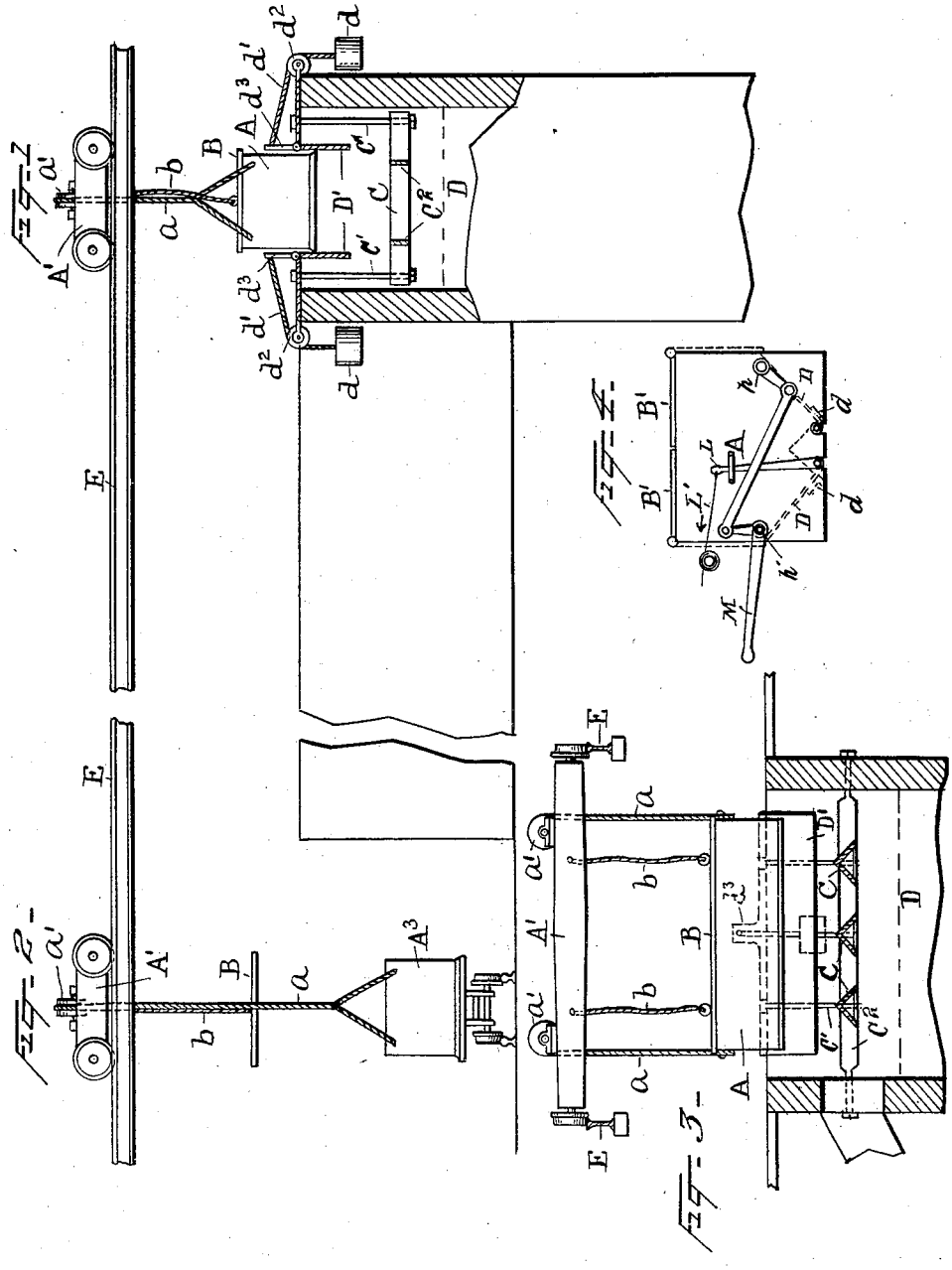
No. 705,246. Patented July 22, 1902.

W. H. HOWARD.

FURNACE FEEDING APPARATUS.

(Application filed Aug. 7, 1901.)

(No Model.)



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UNITED STATES PATENT OFFICE.

WILLIAM H. HOWARD, OF PUEBLO, COLORADO.

FURNACE-FEEDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 705,246, dated July 22, 1902.

Application filed August 7, 1901. Serial No. 71,212. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. HOWARD, a citizen of the United States, residing at Pueblo, in the county of Pueblo and State of Colorado, have invented certain new and useful Improvements in Furnace-Feeding Apparatus; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in furnace-feeding apparatus, and more particularly to apparatus for feeding blast-furnaces. In apparatus of this nature as heretofore constructed the feed-box (usually a car) has been run upon tracks into position over the top of the furnace and the box has then been emptied into such furnace. In such structures, however, it has been necessary to support the car a considerable distance above the furnace-top in order to permit proper opening of the car-bottom. This has resulted in an undesirably long drop for the ore, by reason of which the fine material has been scattered and carried away by the blast, desirable coarse material has been broken into undesirable fines, and an injurious amount of gas has been permitted to escape.

My object is to feed the material at a line considerably nearer the top of the material in the furnace than has heretofore been possible and to avoid the escape of gas.

To these ends and also to improve generally upon devices of the nature indicated my invention consists in the various matters hereinafter described and claimed.

In the accompanying drawings, Figure 1 is an elevation, partly in section, showing my present apparatus. Fig. 2 is an elevation showing the feed-box at the ore-bed level. Fig. 3 is an elevation at right angles to Fig. 1, and Fig. 4 is a detail end elevation of the feed-box.

Referring now more particularly to the drawings, D represents a furnace of the usual type, said furnace having near its upper end and extending across the same a series of ore-distributers C, suspended from the top of the furnace by hangers C′ and stayed by braces C^2, fastened to the furnace-walls. At a suitable distance above the furnace are arranged the usual tracks E for the feed-box A. In the present apparatus, however, the feed-box does not travel directly upon said tracks, but is suspended by ropes or other suitable supports *a* from a traveling crane A′, which moves along the before-mentioned tracks, the feed-box being capable of being raised and lowered, as by having its supporting-ropes connected to drums *a′* upon the crane-beam. The feed-box A can conveniently be the body of a car, the bottom of the box being of the well-known dumping type.

The box A^3 is provided with any suitable dumping mechanism, preferably that shown in the drawings, and consisting of two hinged doors D^2, closing upwardly against a central stationary A-shaped piece, where they are held by connected dogs. A lever L, attached to one of said dogs, can be thrown to the position L′ when it is desired to release the doors. This can be effected from a distant point, if preferred, by a cord attached to the lever and running over a pulley. On the shaft of each door is an arm, the two arms being connected by a link, so that they can be closed simultaneously by a removable lever M.

The top of the furnace is provided with inwardly-opening doors D′, which are normally yieldingly held in closed position by means of weights *d*. These weights are attached to the outer ends of ropes *d′*, which run over sheaves d^2, journaled upon the furnace and have their inner ends attached to levers d^3 upon the doors, these levers being conveniently extensions of the hinges. It will now be apparent that the feed-box being filled at the ore-bed level it is elevated and run into position over the furnace-doors and is then lowered against said doors, whereby they are caused to open and the box can be lowered to any desired level relative to that of the ore-level in the furnace. The box is then emptied in the usual manner—that is, by opening its bottom—and is raised to clear the furnace, the doors [automatically closing af-

ter the box. In this manner the long drop for the ore heretofore necessary is materially decreased and the escape of gas is guarded against.

In order to prevent any escape of gas through the feed-box when the doors are open, I provide a cover to fit over and close the box during the time it is discharging. In the form illustrated in Figs. 1, 2, and 3 this cover is a plate B, suspended by ropes *b* from the beam A′ in the path of vertical movement of the feed-box, the ropes *b* being of such length that, as shown in Figs. 1 and 3, they are not taut when the box is in discharging position; but when the box is on the ore-bed level to be filled, as shown in Fig. 2, the ropes support the cover a considerable distance above it, and said cover therefore does not interfere with the filling of the box. As the box is raised from the feed-floor level, however, it engages the cover and is closed thereby, the cover being then supported by the box and moved with it and remaining in closing position thereon until the box is again dropped to the ore-bed level after having discharged its load into the furnace. A modified form of cover is shown in Fig. 4. Here the cover consists of two doors B′, hinged to the box and adapted to close the same, as illustrated in full lines in said figure, or open the box, as illustrated in dotted lines. The present apparatus thus makes it possible to drop the feed-ore from any desired height and effectually prevents the escape of gas during the operation of feeding.

It will be understood that a perfectly tight fit between the feed-box and the sides of the furnace is not essential, since there is sufficient draft in the furnace to prevent an escape of fumes through a small crack or opening. With my apparatus when the cover is on the feed-box there exist only mere cracks between the sides of the furnace and the box, through which smoke and fume cannot escape on account of the indraft to the furnace.

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

1. The combination with a furnace having doors yieldingly held in closed position, of a feed-box, and means for lowering said box against said doors to open the same and enter said furnace when feeding the same, substantially as described.

2. The combination with a furnace having at each side of its top a downwardly-opening door, of a feed-box adapted to fit easily into the opening normally closed by said doors, and means for lowering said feed-box upon said doors.

3. The combination with a furnace having at each side of its top a downwardly-opening door, of a feed-box adapted to fit easily into the opening normally closed by said doors, means for lowering said feed-box upon said doors, and counterweights for holding said doors normally closed.

4. The combination with a furnace, of a feed-box therefor, means for moving said box to and away from said furnace, a cover for said box supported independently thereof, means for bringing said box against said cover after filling, and means for moving both box and cover into the feeding position.

5. The combination with a furnace, of a traveling crane, a feed-box supported and adapted to be raised into feeding position thereby, and a cover for said feed-box also supported by said crane and in the path of vertical movement of said box, the supports for said box being longer than those for the cover so that when the box is lowered to the filling position the cover will be arrested and held suspended before the box reaches its lowest point, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM H. HOWARD.

Witnesses:
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