

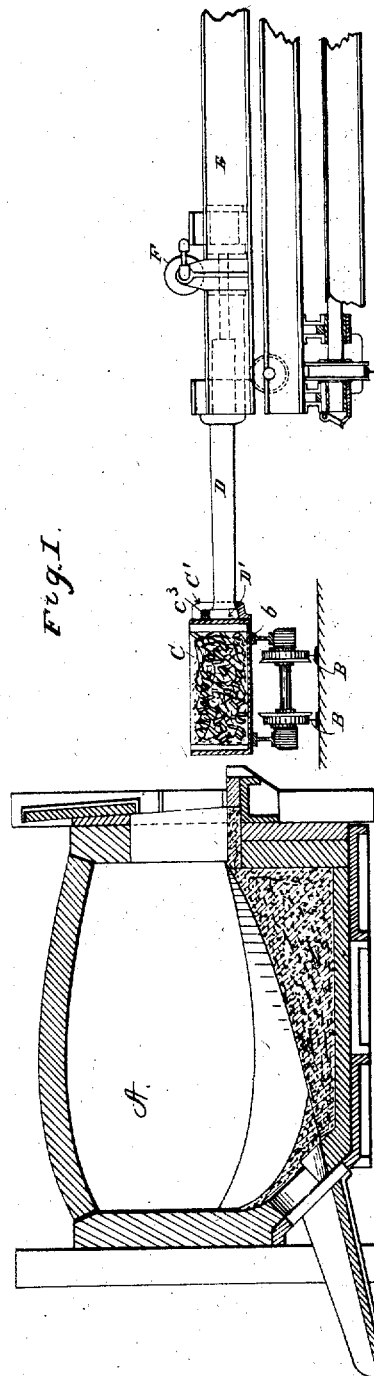
(No Model.)

2 Sheets—Sheet 1.

S. T. WELLMAN.
METHOD OF CHARGING FURNACES.

No. 421,797.

Patented Feb. 18, 1890.



Witnesses:
W. R. Edlin.
Geo. W. King

Inventor.
Samuel T. Wellman
By Leggett & Leggett
Attys.

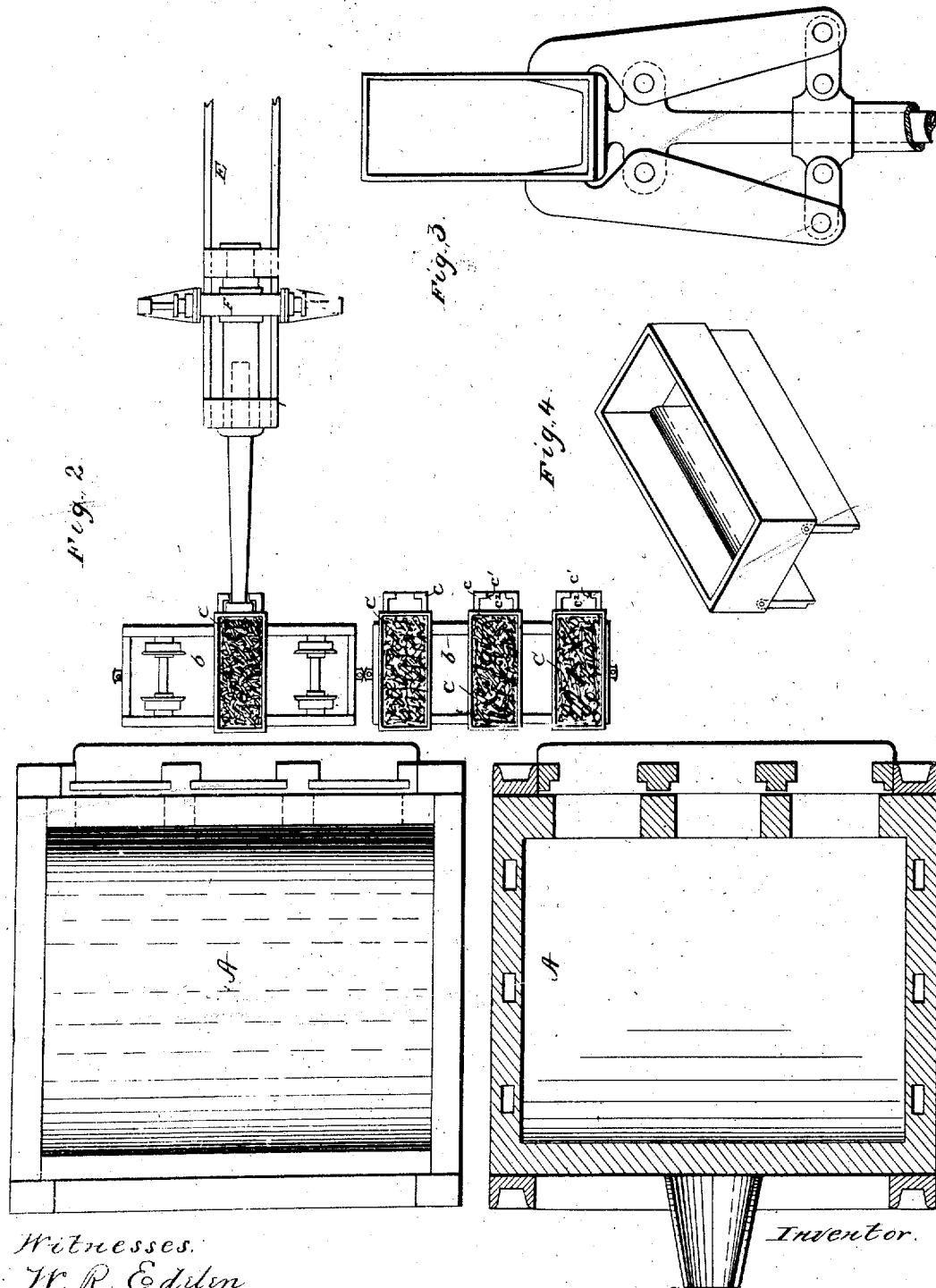
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UNITED STATES PATENT OFFICE.

SAMUEL T. WELLMAN, OF CLEVELAND, OHIO

METHOD OF CHARGING FURNACES.

SPECIFICATION forming part of Letters Patent No. 421,797, dated February 18, 1890.

Application filed March 23, 1889. Serial No. 304,419. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL T. WELLMAN, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improved Method of Charging Furnaces; and I do hereby 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 pertains to make and use the same.

My invention relates to an improved method of charging furnaces; and it consists in the steps hereinafter described and claimed. My improved method is adapted to charge, for instance, the Siemens, Martin, or open-hearth furnace for manufacturing steel, or for charging any melting-furnace that is charged through doors or openings in the side of the furnace, in contradistinction to blast-furnaces, or such as are charged from the top.

Heretofore in charging, for instance, open-hearth steel-furnaces the practice has been to pile by hand the coarser materials—such as broken pig-iron, &c.—on the broad flat end of a long charging-bar, known as a “peel,” such charging-bar resting on a roller located at the front of the furnace-door, this bar having a handle at the rear end thereof for the operator in manipulating the charging-bar. Other and similar charging-bars were provided having a larger spoon at the forward end thereof for receiving the finer material. By such primitive means the material in comparatively small quantities was run into the furnace and dumped. This method of charging was slow, whereby the operations of the furnace were greatly delayed, and on account of manual labor required the charging was expensive. For instance, with from three to four men, the one for operating the charging-bar and the others for placing the material on the charging-bar, a ton of material was charged usually in about from six to ten minutes, and at such rate it required about from two and a half to three hours to charge a furnace of thirty tons capacity. With my improved method the charging-bars aforesaid and the men for operating the same are dispensed with, and in place thereof dumping-boxes are employed. The furnaces, in case there are more than one, are set in line, with track-rails extending in front of the furnaces

and leading from thence to the yard or place where the material is stored or received, with cars operating on the tracks for bringing the material alongside of the furnaces. The dumping-boxes may be of any desired size, the capacity of those that I have thus far used being about one and a half tons of material each. These dumping-boxes are placed upon the cars and filled with the material, it requiring no more labor to fill the boxes thus placed than it would require to load the same amount of material directly onto the cars without the boxes. Enough dumping-boxes and cars should be provided for carrying the material necessary in charging at least one furnace, and assorting of material in the way of selecting the proportions of different ingredients is done in filling the different dumping-boxes, so that the latter contain in the aggregate a charge for a furnace, and may be dumped indiscriminately into the furnace.

Suitable mechanism operated by power is provided for lifting successively the loaded dumping-boxes from the car, conveying the same into the furnace, dumping the load, and withdrawing the empty boxes and returning them to the cars. It requires usually but the fraction of a minute to thus handle each dumping-box, and a thirty-ton furnace may be charged in from twelve to fifteen minutes. The mechanism for thus handling the dumping-boxes in charging may be varied indefinitely, according to circumstances.

Suitable mechanism for carrying out my method, more especially where a series of furnaces are set in line, is outlined in the accompanying drawings.

Figure 1 is a side elevation, partly in section. Fig. 2 is a plan, partly in section. Figs. 3 and 4 are modifications showing, respectively, tongs for handling the dumping-box and a box with a dumping-bottom.

A A are melting-furnaces of the open-hearth variety, and B B are tracks extending along in front of the furnaces and leading from thence to the yard or wherever the material for supplying the furnaces is stored or received, and *b b* are cars adapted to travel on the tracks in transporting the material alongside the furnaces.

C C are the dumping-boxes, shown resting on the cars, the boxes being laden with ma-

terial ready for dumping. The body of each dumping-box C is in the main usually of heavy plate metal with cast-metal head or end C', the latter having flanges c of the variety shown in Fig. 2, these flanges being upright and located some little distance apart and projecting outward and along the outer edge thereof, being offset toward each other, as shown at c', the flanges partially inclosing a recess c², and the flanges near the upper ends thereof having transverse holes for receiving a pin or key c³.

D is the lifting-bar, having a broad head D', adapted to fit in recess c² of the dumping-box. In attaching the lifting-bar to the dumping-box, pin c³ having been withdrawn, the pin is returned to its place after head D' is in position in the recess, the pin when in place extending across above head D', thus locking the parts, whereby the dumping-box is held rigid with the lifting-bar. Bar D is mounted on and journaled in suitable boxes connected with tilting frame E, with hydraulic ram or other suitable means for raising and lowering the frame and lifting-bar, in lifting the dumping-boxes from the car, and returning the boxes to the car. Frame E has a reciprocating movement endwise, whereby the lifting-bar and dumping-boxes are thrust into the furnace and withdrawn therefrom. Bar D is rotated on its axis by means, for instance, of ram F or other suitable appliance in dumping the boxes in the furnace. The mechanism for supporting and operating the lifting-bar is mounted on car G, the latter by means of suitable tracks traveling along in front of the different furnaces, and the car may be stopped whenever bar D is opposite any furnace of the series or opposite any door of the respective furnaces.

It is not considered necessary to further describe the mechanism for operating the lifting-bar, for the reason that analogous mechanism is shown and described in United States Letters Patent Nos. 394,419 and 394,421, granted to me December 11, 1888, and similar mechanism having a rotating lifting-bar having been made the subject of Letters Patent now pending. In place of the tongs shown in such application head D' is substituted, and the ram and mechanism for opening and closing the tongs is dispensed with. The tongs might be retained and made to grasp the dumping-boxes, (see Fig. 3,) but would

be more expensive in construction than head D' aforesaid. It is preferable, but not essential, to reverse the boxes in dumping, as the dumping-boxes might be provided with hinged or dumping bottoms. (See Fig. 4.) With a dumping-bottom the material would not be so well distributed in the furnace as is done by reversing the box in opposite directions with successive loads.

I do not wish to limit myself to any particular construction of mechanism for operating the lifting-bar, as this may be varied indefinitely according to circumstances. Sometimes it might be more convenient to attach such mechanism to a traveling crane or other variety of crane; or in case, for instance, of but one furnace the mechanism could be greatly reduced or simplified.

What I claim is—

1. The means herein described for charging a furnace from the side thereof, consisting, essentially, of dumping-boxes, cars for conveying the dumping-boxes to a point opposite the charging-door, and a lifting-bar adapted to engage the dumping-boxes on a time, convey them into the furnace, and discharge the load and return the boxes to the outside of the furnace, substantially as set forth.

2. The means herein described of charging furnaces from the side thereof, consisting, essentially, in dumping-boxes for carrying the material, cars for transporting the loaded dumping-boxes to a position adjacent the furnace, and a lifting-bar conveying the loaded dumping-boxes into the furnace, dumping the load, and returning the dumping-boxes outside the furnace, substantially as set forth.

3. The mechanism herein described of charging furnaces from the side thereof, consisting, essentially, in dumping-boxes for carrying the material, cars for transporting the dumping-boxes and load to positions adjacent the furnace, and a lifting-bar for conveying the loaded dumping-boxes from the cars into the furnace, dumping the load, and returning the empty dumping-boxes from thence to the cars, substantially as set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 6th day of February, 1889.

SAMUEL T. WELLMAN.

Witnesses:

CHAS. H. DORER,
GEO. W. KING.