(No Model.) 2 Sheets—Sheet 1.

P. PATTERSON.

APPARATUS FOR CHARGING PLATES AND BARS INTO FURNACES.

No. 376,828. Patented Jan. 24, 1888.

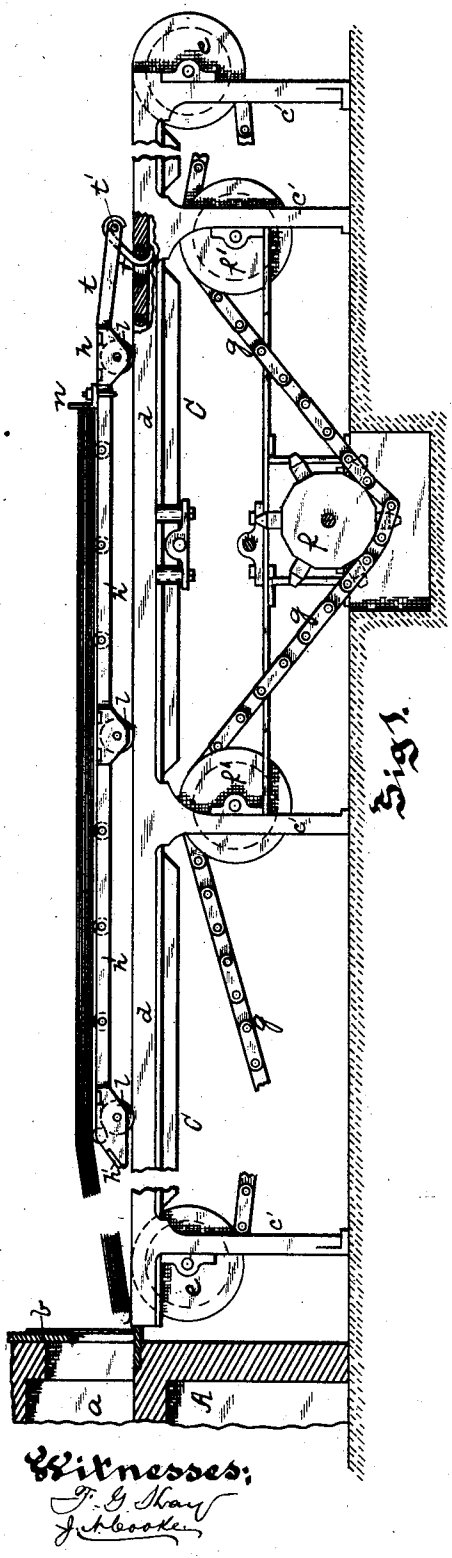


Fig. 1.

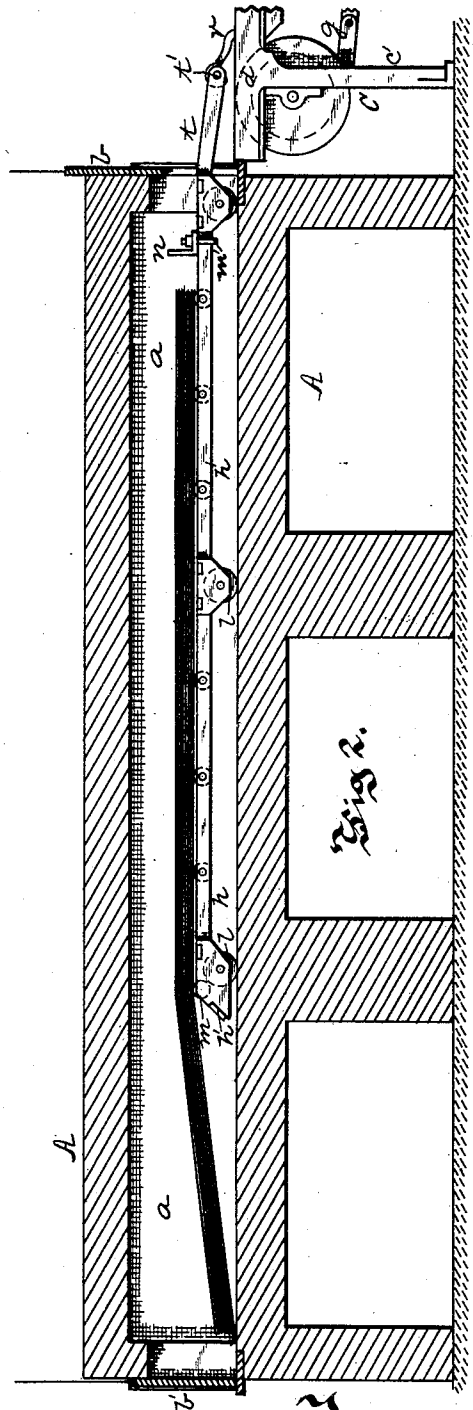


Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

P. PATTERSON.

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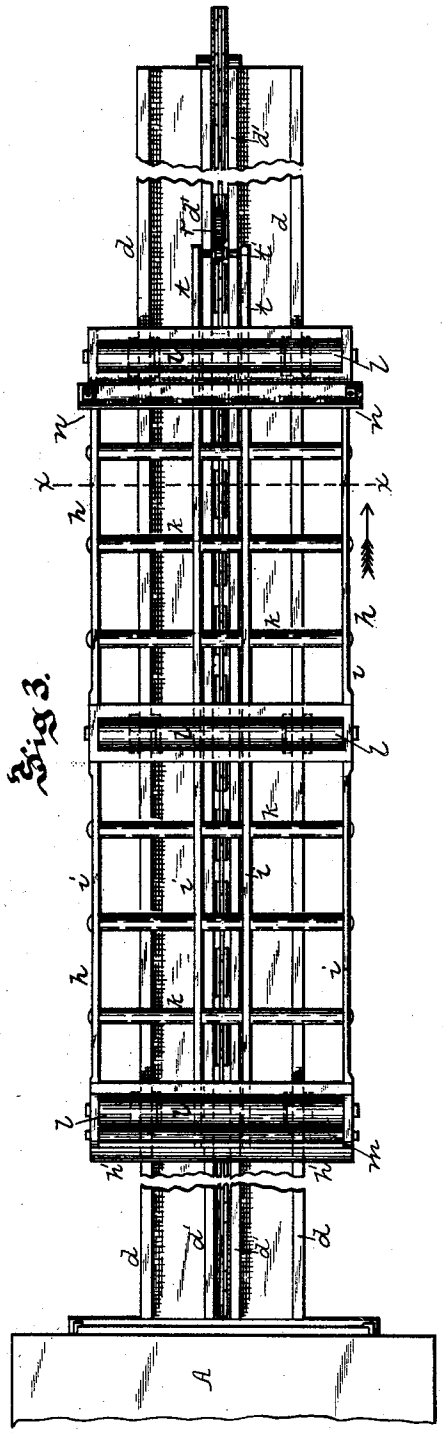


Fig. 3.

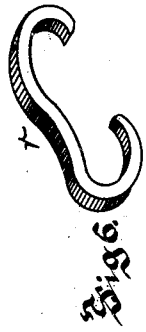


Fig. 6.

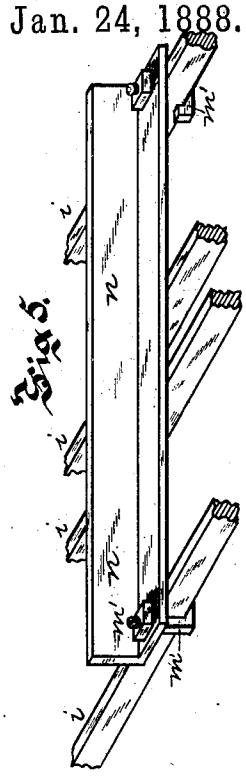


Fig. 5.

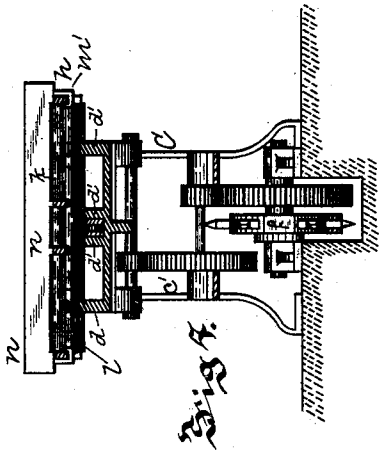


Fig. 4.

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UNITED STATES PATENT OFFICE.

PETER PATTERSON, OF McKEESPORT, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO THE NATIONAL TUBE WORKS COMPANY, OF SAME PLACE.

APPARATUS FOR CHARGING PLATES AND BARS INTO FURNACES.

SPECIFICATION forming part of Letters Patent No. 376,828, dated January 24, 1888.

Application filed March 8, 1886. Serial No. 194,388. (No model.)

To all whom it may concern:

Be it known that I, PETER PATTERSON, of McKeesport, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Charging Plates and Bars into Furnaces; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to apparatus for charging plate metal into furnaces within which it is reheated for the purpose of re-rolling or bending in its subsequent manufacture into different articles, referring especially to the charging of this plate metal prior to its being bent into tube-skelp. The furnaces for heating this skelp are generally open at each end and provided with a flat hearth on which the plates are piled, one or more piles of plates being placed on the hearth for heating, according to the width of the plates. Heretofore the only manner of charging the plates into these furnaces has been by hand, each separate plate being carried to the rear door of the furnace, the door raised, and the plates pushed by hand into the furnace, the plates being gradually piled up in this manner until the furnace was charged, and this operation requiring at least one-half hour. When the furnace was filled or charged in this manner, it is evident that as the door was kept open almost continuously the furnace was necessarily chilled to some extent, and consequently some time was required after the filling of the furnace to bring it up to its normal heat.

The object of my invention is to provide apparatus for charging into the furnace at one operation a sufficient number of plates to fill the same, so saving the time heretofore consumed in charging the furnace, preventing the chilling of the furnace, and also greatly reducing the labor of said operation.

It consists, essentially, in a charging-carriage mounted at the rear of the furnace on a suitable guide-frame and adapted to receive the plates to be charged and push the same into the furnace, the plates being piled thereon so that their forward ends extend out beyond the carriage, and when the furnace is to be charged the door being raised, and this carriage pushed into the furnace until the forward ends of the plates are brought to the forward end of the furnace near the door, from which they are withdrawn, when the carriage is drawn back and the friction of the forward ends of the plates on the hearth of the furnace, as well as their weight, prevents their being drawn back with the carriage, and as soon as it passes out they drop upon the hearth of the furnace.

It also consists in certain improvements in the construction of the apparatus employed and the manner of applying the power to the carriage in forcing it into and withdrawing it from the furnace-chamber.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a side view, partly broken away, illustrating my improved apparatus and showing the rear door of the furnace. Fig. 2 is a longitudinal section of the furnace, showing the plates charged therein and the carriage being withdrawn therefrom. Fig. 3 is a top view of my improved apparatus; Fig. 4, a cross-section on the line *x x*, Fig. 3. Fig. 5 is an enlarged detail view, and Fig. 6 is a view of the double hook.

Like letters of reference indicate like parts in each.

The furnace A is the ordinary plate-heating furnace employed for heating skelp-plate for the manufacture of tubing or other like plate, and having the furnace-chamber *a*, provided with the rear door, *b*, and forward door, *b'*.

Supported at the rear in line with the furnace-chamber is the bed-frame C of my improved charging apparatus, this bed-frame being of any suitable length, according to the size of the plate to be heated, and when employed for heating tube-skelp the bed-plate being generally about twenty-five feet in length. The frame is provided with the standards *c'*, and it has on its upper surface the guide-rails *d d'*, the outer guide-rails, *d*, being employed as guides for the charging-carriage, while the center guide-rails, *d'*, are employed as guides for the endless chain by means of which power is applied to the carriage.

At each end of the bed-frame C is a pulley, *e*, and located under the bed-frame is the sprocket-wheel *f*, to which power is applied

through suitable gearing, and passing between the guide-rails d' and around each pulley e to the sprocket-wheel f is the endless chain g, this endless chain generally passing over pulleys f' on each side of the sprocket-wheel, in order to direct the chain to the sprocket and hold it in proper relative position thereto. The sprocket-wheel f has suitable connections for reversing or stopping the same, so that the endless power-chain g may be caused to move in either direction desired, being caused to travel forward between its guides d' when the furnace is being charged, and its movement being reversed, so as to draw out the carriage, after charging the furnace.

Mounted on the guide-rails d is the charging-carriage h, which carriage is preferably formed of an open iron frame-work, the carriage shown having the longitudinal bars i and cross-bars k, and being provided with rollers l, traveling on the outer guide rails or tracks, d, these rollers having grooves on their faces fitting over said rails, and the movement of the carriage being guided thereby. At the forward end of the carriage is the anti-friction roller m, and below this anti-friction roller the inclined shoe h', which serves to permit the plates to slip gradually off the carriage when the carriage is drawn from under them. Near the rear end of the carriage is the pushing-plate n, this plate extending entirely across the carriage and being formed of an angle-plate, as shown, and secured to the longitudinal bars i by means of hook-bolts m', passing up through the base-plate of the pushing-plate n and under the longitudinal bars i. By means of these hook-bolts or other suitable apparatus the pushing-plate n may be adjusted upon the carriage, so that it can be arranged for any desired length of plate, it being necessary that the forward ends of the plates be forced within reach of the operator through the forward door, b', of the furnace. At the rear of the carriage is the extension or tail-piece t, by means of which power is applied to the carriage, this extension having the cross-bar t', over which a double hook, r, catches, the other end of the double hook catching in the links of the endless chain, and so connecting the carriage to the chain that it can either be pushed into the furnace or withdrawn therefrom.

The operation of my improved charging apparatus is as follows: During the ordinary operations with the furnace, after it has been charged with plates, the workmen pile upon the carriage the plates to be charged into the furnace as soon as it is empty, the plates being piled in one or more piles on the carriage, according to the width of plate to be heated, and the forward ends of the plates extending quite a distance beyond the forward end of the carriage. In its ordinary use the carriage is less than one-half the length of the plates to be charged, and the forward ends of the plates rest upon the bed-frame C of the charging apparatus or on the sill a' of the door b of the furnace. In order to prevent the plates from scraping or scoring the bed or hearth of the furnace, the lower plate of each pile is bent or curved slightly by means of a hammer or wrench, so that the sharp edge of the plate does not come in contact therewith. The charging-carriage is thus loaded during the heating of the other plates within the furnace-chamber, and as soon as it is desired to recharge the furnace the door b is opened, the double hook r connected to the extension t and the chain g, as shown in Fig. 1, and the carriage is pushed forward by means of the endless chain, the chain traveling forward within its guide-rails d', and the plates being thus pushed into the furnace, the forward end of the bottom plate of each pile resting on the hearth, and the carriage being shoved forward and entering the furnace, as shown in Fig. 2, the plates being pushed forward until their forward ends are brought close to the forward end of the furnace. As soon as the plates are pushed far enough forward within the furnace, the apparatus is stopped and the link r is disengaged from the chain and again engaged therewith in the position shown in Fig. 2, and the apparatus is reversed, so that the endless chain travels backward within its guides on the bed-frame, thus drawing back the carriage. As, however, the greater part of the plates extend beyond the forward end of the carriage, it is evident that the friction of the plates and their weight on the hearth will be sufficient to prevent the withdrawal of the plates, and in such case the carriage is drawn back from under the plates, as shown in Fig. 2, the plates remaining in the furnace.

The operation of charging the furnace with the plates is exceedingly rapid, occupying less than two minutes, and as all the labor of piling the plates is accomplished before the charging operation it is evident that the time occupied in piling the plates is entirely saved, the operation of the furnace being almost continuous. When the length of plate to be charged into the furnace varies—as, for instance, where a fourteen-foot plate is employed instead of an eighteen-foot plate—all that is necessary is to change the pushing-plate n on the charging-carriage, advancing it the required distance, and in such case the plates to be charged can be pushed forward to the end of the furnace by my improved apparatus, no matter what their length may be.

It is evident that my improved charging-carriage can be operated by any suitable apparatus, that illustrated being simply the form preferred by me, though even when operated by hand it has great advantages over the old method of charging these furnaces. In charging narrow plates from three to six piles of plates can be arranged on the charging-carriage and all these piles be charged at one operation, the width of the carriage correspond-

ing to the width of the furnace-chamber, so that but one charging apparatus is necessary in filling the chamber.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with a plate-heating furnace, of a charging-carriage supporting one end of the plates to be charged and adapted to push the plates into the furnace-chamber, substantially as and for the purposes set forth.

2. The combination, with a plate-heating furnace, of a track at one end thereof and a charging-carriage for supporting and carrying the materials to be charged, the said carriage adapted to travel on said track and onto the furnace-hearth and leave the charge therein, substantially as and for the purposes set forth.

3. In combination with the plate-heating furnace, the charging-carriage supporting one end of the plates to be charged and mechanism for pushing said carriage into the furnace and withdrawing it therefrom, substantially as and for the purposes set forth.

4. The plate-charging carriage provided with the pushing-plate at or near the rear end of the carriage, substantially as and for the purposes set forth.

5. The plate-charging carriage provided with the pushing-plate adjustable longitudinally thereon, substantially as and for the purposes set forth.

6. The plate-charging carriage provided with the pushing-plate and with the anti-friction roller at the forward end thereof, substantially as and for the purposes set forth.

7. The plate-charging carriage having the inclined shoe at its forward end, substantially as and for the purposes set forth.

8. The combination, with the plate-heating furnace, of the bed-frame carrying an endless power-chain, the traveling charging-carriage, and means for connecting it to the chain, substantially as set forth.

9. The combination of the bed-frame, the charging-carriage having the extension *t* and the double hook *r*, and an endless chain passing under said carriage and with which the hook engages, substantially as and for the purposes set forth.

In testimony whereof I, the said PETER PATTERSON, have hereunto set my hand.

PETER PATTERSON.

Witnesses:
WILLIAM E. WEST,
GEORGE MARS.