No. 647,869. Patented Apr. 17, 1900.

P. C. PATTERSON.

FURNACE CHARGING APPARATUS.

(Application filed July 5, 1898.)

(No Model.) 4 Sheets—Sheet 1.

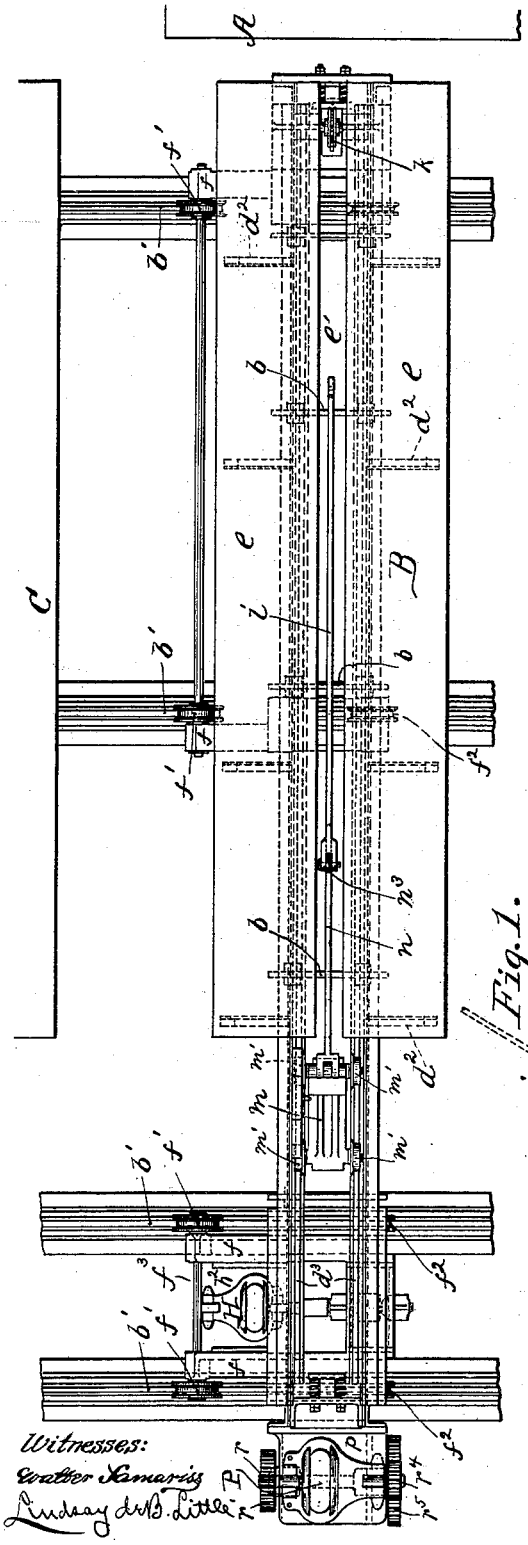

Fig. 1.

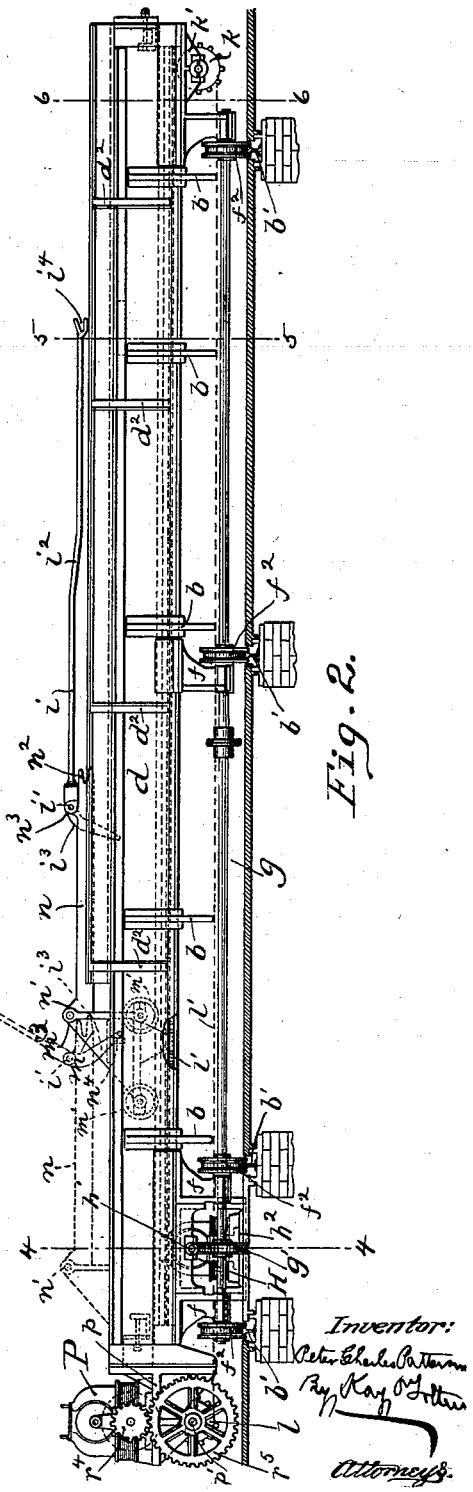

Fig. 2.

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Fig. 3.

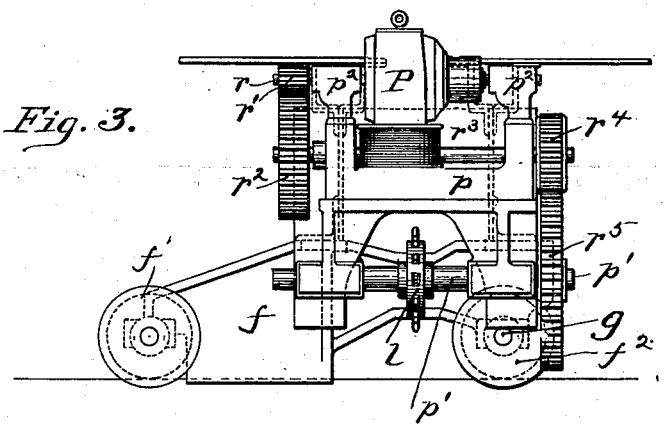
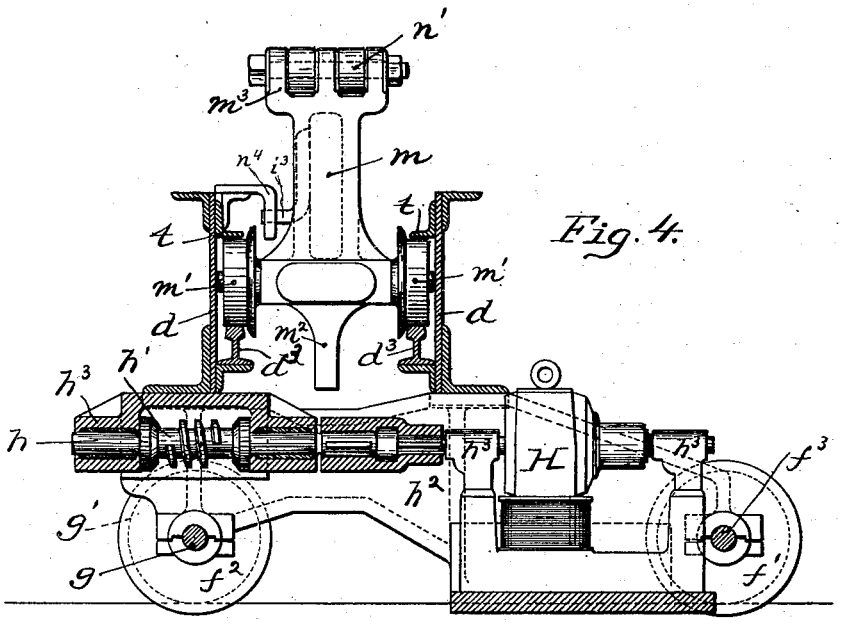


Fig. 4.



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(No Model.) 4 Sheets—Sheet 3.

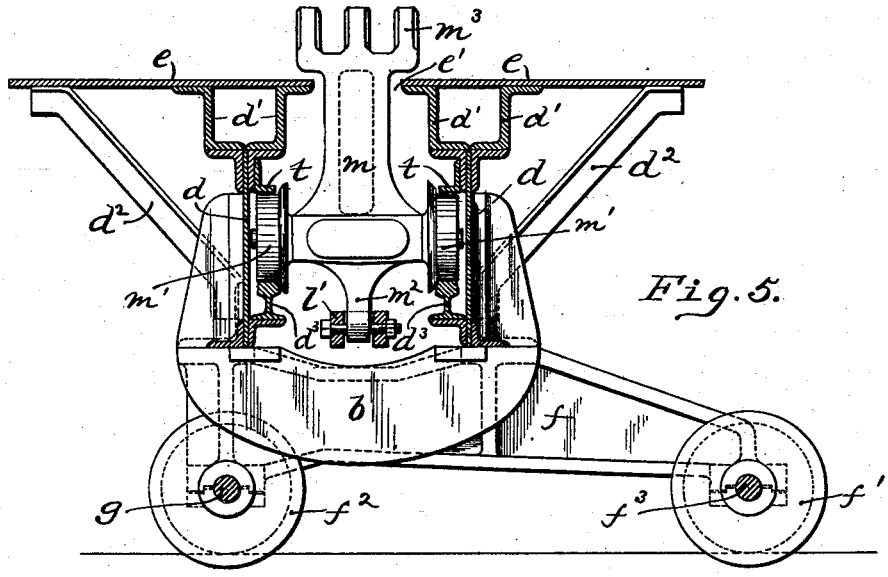

Fig. 5.

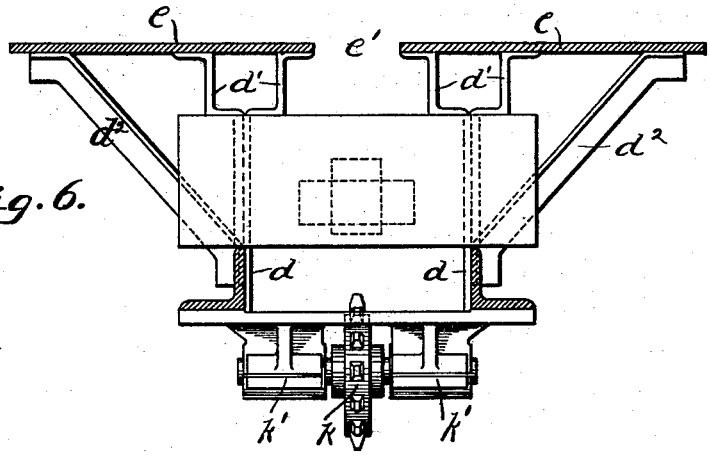

Fig. 6.

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(No Model.) 4 Sheets—Sheet 4.

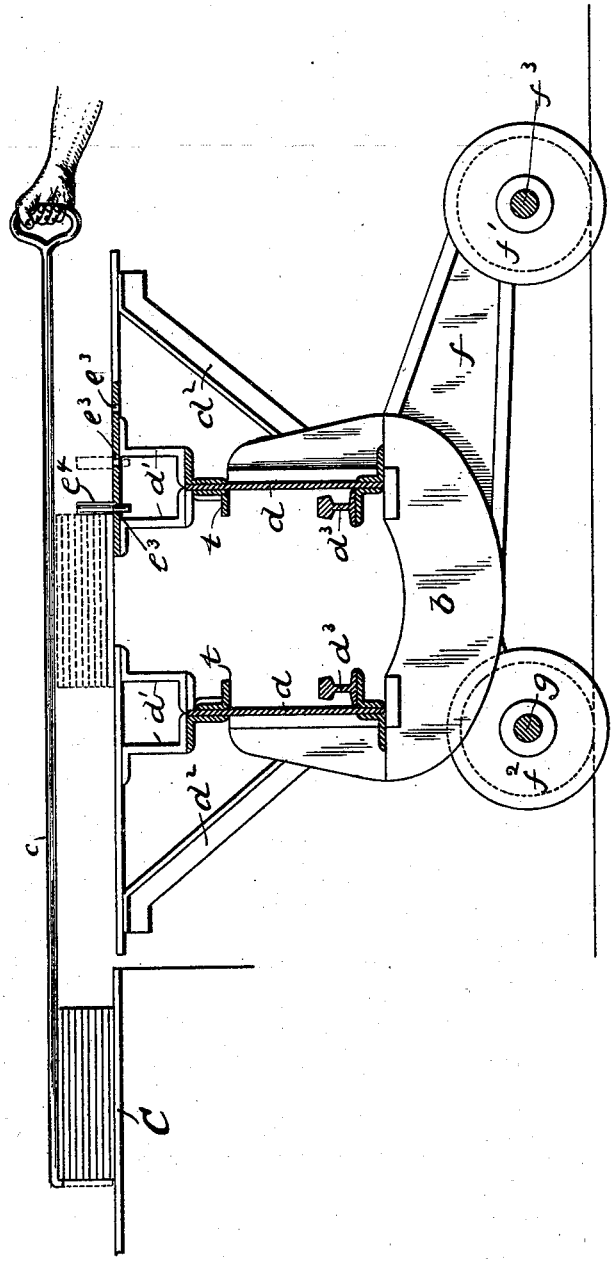

Fig. 7.

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UNITED STATES PATENT OFFICE.

PETER CHARLES PATTERSON, OF McKEESPORT, PENNSYLVANIA, ASSIGNOR TO THE NATIONAL TUBE COMPANY, OF NEW YORK, N. Y., AND PITTSBURG, PENNSYLVANIA.

FURNACE-CHARGING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 647,869, dated April 17, 1900.

Application filed July 5, 1898. Serial No. 685,219. (No model.)

To all whom it may concern:

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

My invention relates to apparatus for charging plates into and pushing them through furnaces, its main object being to provide efficient charging apparatus to handle heavy plates or piles of plates which are to be fed to the heating-furnace in connection with the manufacture of tubing, though the apparatus is efficient for charging plates into such furnaces for any like general purpose.

In the handling of the large plates which are necessary in the making of large welded tubing as the plates are approximately three times the diameter of the tubing and as the thickness of the metal increases as the diameter of the tube increases it is evident that mechanism becomes necessary for handling these plates both for charging them into the furnace and for pushing the plates out of the furnace, such as in feeding them into the rolls for scarfing or beveling their edges or feeding them to skelping-dies, and, further, that provision must be made not only for the efficient and easy handling of the plates, but for the charging of the furnace at different points, so that two or more plates or two or more piles of plates may be within the furnace at one time to be heated for the subsequent operations. The present invention has for its object the provision of efficient means for receiving these plates from a storing-platform and handling them either separately or in piles and the feeding of the same to different parts of the furnace, these matters being all within the control of the operator.

The special points of invention desired to be covered will be hereinafter described and claimed.

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 plan view of the apparatus embodying the invention. Fig. 2 is a side view of the same. Fig. 3 is a rear end view. Fig. 4 is a cross-section on the line 4 4, Fig. 2, looking toward the furnace and showing the motor and some other parts in full lines. Fig. 5 is a cross-section on the line 5 5, Fig. 2, looking toward the rear of the machine. Fig. 6 is a cross-section on the line 6 6, Fig. 2; and Fig. 7 is a diagram showing the method of loading the plates onto the charging-table.

Like letters of reference indicate like parts in each view.

In the accompanying drawings, A is the regular heating-furnace, in which the plates are heated for rolling and skelping purposes, having a brick bottom and the plates raised to a red heat, while for welding purposes the furnace has a gravel bottom and the plates are raised to a welding heat.

B is the charging-machine, which is transversely movable across the furnace, being mounted on the series of wheels running on rails b' b', and C is the storing-platform, located at one side of the charging-machine, the plates being delivered to the platform from cars and piled thereon ready to be transferred to the charging-machine. The machine itself is composed of a series of cross-frames b, which are connected to longitudinal girders or beams d, which support longitudinal angle-beams d', on which rest the tables e e, the outer portions of the tables being embraced by the diagonally-extending brace-bars d^2 and the tables being of sufficient width to support the plates being fed to the furnace. These tables e e extend longitudinally of the frame and have flat tops. Such flat tops are about on a level with the furnace and slightly lower than the platform C at the side of the machine, the plates being transferred either mechanically or by hand to the machine. Secured to the machine-body are also the carriage-frames f, in which are mounted the wheels f' f^2, which travel upon the several tracks b' b', the carriages being secured to the main frame in any suitable way. The wheels f' are idle wheels, while the wheels f^2 are power-driven, being rigidly secured to the shaft g, which extends for the length of the machine and

carries the worm-wheel g', into which meshes the worm h' on the motor-shaft h of the motor H, which is mounted on the machine at the rear part of the carriage and travels therewith. The motor H is a reversing electric motor with suitable automatic brake, so as to give full control to the operator to reverse the shaft g, and thereby provide for giving a reverse movement to the entire charging-machine across the front of the furnace. It will be noted that the motor H is supported on a special motor-frame h^2, extending between the shafts g and f^3 and having the bearings h^3 for the motor-shaft, the motor H being supported in the lower part of the machine-frame, so that its worm h' can act directly upon the worm-gear of the longitudinal shaft g. Simple and direct-acting mechanism is thus provided for moving the entire machine across the feeding end of the furnace, the reversing of the motor causing the reversal of movement of the machine.

As above stated, two tables $e\,e$ are employed, this construction being used to provide space between the tables for the travel of the pushing-carriage, which is operated by mechanism in the lower part of the machine. I will now describe this mechanism: At the forward end of the machine is the sprocket-wheel k, mounted in bearings k', close to the furnace. At the rear end of the machine is the sprocket l, which is mounted in a suitable bearing hereinafter described, and around these two sprockets k and l passes the sprocket-chain l', with which the charging-carriage m engages and by which it is moved forward and back in the longitudinal space e' between the tables $e\,e$. The charging-carriage m travels on rails d^3, supported on the longitudinal beam structure of the main frame, the charging-carriage having four wheels m' on said frame and a depending tongue m^2, extending down into and bolted to the chain l', so that as the chain is moved forward and back it carries the carriage with it, while the carriage runs on the rails d^3. The charging-carriage has the head m^3, which extends above the tables e, in position to be engaged by the pushing-rod n, having a forked end, which I term the "pushing-fork," and for pushing the plates into the furnace I employ the pushing-fork n, which has the bearing n' engaging with the bearing m^3 of the carriage, so forming a pivotal connection therewith, its vertical end face resting against the vertical front face of the carriage, so that the pushing-fork is always held about on a level with the tables e, and any plate resting on the tables would naturally be engaged by the forked end n^2 of the pushing-fork and be carried by the same into the furnace. The fork is of such length as to project into the furnace the proper distance when the carriage reaches the end of its forward movement to push the plate into place on the furnace-hearth.

As shown in Figs. 1 and 2 and also in Fig. 4, in addition to the regular main pushing-fork n I provide a long supplementary pushing-fork i for pushing the heated plates from the furnace through the opposite end into the scarfing-rolls or skelping-dies. It is evident that this supplementary pushing-fork i must be held out of the way in drawing the plates from the platform C onto the charging-table, and in order to have it always in proper position for work and also to hold it out of the way when charging the plates onto the machine it is mounted in the following way: On the main pushing-fork n is a bearing n^3, such bearing being formed near the forward end of the main fork n, and the supplementary fork i is pivoted to this bearing on top of the main fork n and extends out past that fork, its normal position being near the front end of the machine and the supplementary fork being bent, as at i^2, so as to bring it down to proper level for pushing the plates through the furnace. In order to raise this supplementary fork out of the way when the machine is drawn back for feeding the plates from the platform C onto the tables, I provide the fork with the lever i^3, which extends down from its pivot connection i' with the main fork n on one side of the main fork, as indicated by dotted lines in Fig. 2 and more particularly shown in Fig. 4, such lever i^3 extending down below the main fork n to a position slightly above the main body of the carriage m, and secured to the longitudinal beam d and extending down in position to engage with said lever i^3 is the stop-lug n^4, which operates to engage with the lever i^3 when the carriage is drawn back out of the way for charging the table, in which case the said lever i^3, pressing against the stop-lug n^4, raises the supplementary pushing-fork i up into the air, as indicated in dotted lines, out of the way of the workmen at the table, so that they can draw the plate from the platform C onto the table and bring it into the course of the main charging-fork n, and when the carriage m moves forward the supplementary pushing-fork is dropped down onto the plate which has been fed onto the table and rests upon the same as the plate is pushed by the main fork n into the furnace. When the carriage is drawn back after the charging of the plate, the supplementary fork is drawn back with it, and when the plate is to be pushed through the furnace upon the advance of the carriage the forked end of the fork i will engage with the plate on the furnace-hearth and push it out to the rolls or skelping-die. It is to be noted that the weight of the main fork and supplementary fork extending out from the carriage m provides a very considerable leverage upon the carriage, the tendency of which would be to lift the rear wheels of the carriage from the tracks d^3, tilting it, so that the pushing-forks would drop in the space between the two tables. To hold the carriage down in place, I provide the supplementary track-rails or angle-bars t, secured to the longitudinal body structure and ex-

tending out over the wheels m' of the carriage, so that in case the weight of the forks causes such tilting the carriage will be held down by such supplementary track-rails and the pushing-forks will be held in proper normal position.

For the purpose of operating the chain considerable power and a low speed are necessary, and for that I have employed the reversing electric motor P, carried on the motor-frame p, secured at the rear end of the main frame of the charging-machine, which frame p also carries the shaft p', to which the sprocket-wheel l, above referred to, is rigidly secured. The motor-frame p has the bearings p^2, in which the motor-shaft r is mounted, that motor-shaft carrying the pinion r', which meshes with the wheel r^2 on the shaft r^3, said shaft extending through the motor-frame p below the motor-armature and carrying the pinion r^4, which pinion meshes with the large gear-wheel r^5. In this way the speed of the motor is geared down and the power increased, so as to operate the power sprocket-wheel l at a sufficiently-low speed to give the desired movement to the sprocket-chain l'. It will be understood that considerable power and a slow speed are required to charge the plates into the furnace, and by locating this motor at the rear end of the machine and gearing down its speed, as above described, the necessary power is obtained to overcome the friction of the plate on the table and perform the work, while a very compact construction adding but little to the length or weight of the charging-machine itself is obtained, and the further advantage is obtained that all the several shafts from the motor-shaft and the sprocket-shaft are mounted in the same frame, which can be made of a single casting.

In the use of the machine the plates which are to be charged to the furnace are delivered from the cars upon the storing-platform C at one side of the machine, which latter is by means of the motor H moved close to said platform. The plate or plates are then grasped by hooks c, operated by the workmen, and drawn from the top of the pile onto the tables e e, as illustrated in Fig. 7, the table e having a series of holes e^3 therein in which pins e^4 are dropped to form stops for the plates as they are drawn onto the tables by the workmen. If but one plate is charged at a time, that plate is drawn to the center of the machine, resting part on each table, and the entire machine is then moved by the motor H and the mechanism above described into the desired position with relation to the furnace A, whether the plate is to be charged on one side or the other side of the furnace or centrally thereof, as may be desired. During this operation the supplementary fork i is raised up out of the way by contact of its lever i' with the stop i^2 on the machine-frame, being held in that position until the carriage m advances, when it drops onto the plate to be charged, as shown in Fig. 2. When this plate is to be charged into the furnace, the operator by means of the motor P and the gearing above described causes the forward movement of the sprocket-chain l', which carries with it the charging-carriage m, and that carriage moves forward until its fork n strikes against the plate to be charged, when its forked end n^3, which normally travels in line with the flat top faces of the tables e e, engages therewith and pushes the same into the furnace, the fork n traveling over the furnace-hearth a sufficient distance to bring the plate into proper position for heating therein before the carriage reaches the end of its forward movement. In the backward-and-forward movement of the driving-chain the motor P is reversed, so giving all the movement necessary for the operation of the machine. Plate after plate can be charged in this way, and when the plates are brought to the proper heat in the furnace, such as a rolling or bending heat for rolling or for skelping, the carriage moves forward, carrying with it the supplementary fork i, which travels over the furnace-hearth and engages with the plate lying in the furnace and by means of its forked end i^4 pushes the plate out into the rolls or skelping-dies. In case it is desired to charge a number of plates together, as is often the custom in charging skelp-furnaces, a pile of the seplates can be built upon the tables and charged just in the same way as a single plate, the mass being carried upon the bottom plate of the pile. As such pile of plates is heated whenever it is desired to push out the top plate this can be done through the supplementary fork i, its forked end i^4 engaging with the top plate and traveling over the other plates of the pile.

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

1. In a charging-machine, the combination with a furnace, of a main frame, two flat-topped longitudinally-extending tables supported on the main frame leaving a space between them, and a longitudinally-reciprocating charging-carriage traveling in the space between the tables and carrying a forwardly-extending pushing-rod supported with its forked end in line with the table-tops, substantially as set forth.

2. In a charging-machine, the combination with a furnace, of a transversely-reciprocating main frame, two flat-topped longitudinally-extending tables supported on the main frame leaving a space between them, and a longitudinally-reciprocating charging-carriage traveling in the space between the tables and carrying a forwardly-extending pushing-rod supported with its forked end in line with the table-tops, substantially as set forth.

3. In a charging-machine, the combination of a furnace, a transversely-reciprocating main frame in front of said furnace having two flat-topped longitudinally-extending ta-

bles supported on the main frame leaving a space between them, a storage-platform at the side of the frame at about the level of the table-tops, and a longitudinally-reciprocating charging-carriage traveling in the space between the tables and carrying a forwardly-extending pushing-rod supported with its forked end in line with the table-tops, substantially as set forth.

4. In a charging-machine, the combination with the main frame, of a reciprocating charging-carriage, a main charging-fork extending forward therefrom, and a supplementary charging-fork pivoted to the main fork and extending in front of the same, substantially as set forth.

5. In a charging-machine, the combination with the main frame, of a reciprocating charging-carriage, a main charging-fork pivoted to and extending out in front of the same, a supplementary charging-fork pivoted to the main fork and extending out in front of the same and having a downwardly-extending lever, and a stop-lug on the main frame engaging with said lever, substantially as set forth.

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

PETER CHARLES PATTERSON.

Witnesses:

JAMES I. KAY,

ROBT. D. TOTTEN.