(No Model.)

T. JAMES.

FURNACE DRAWING AND CHARGING APPARATUS.

No. 479,883. Patented Aug. 2, 1892.

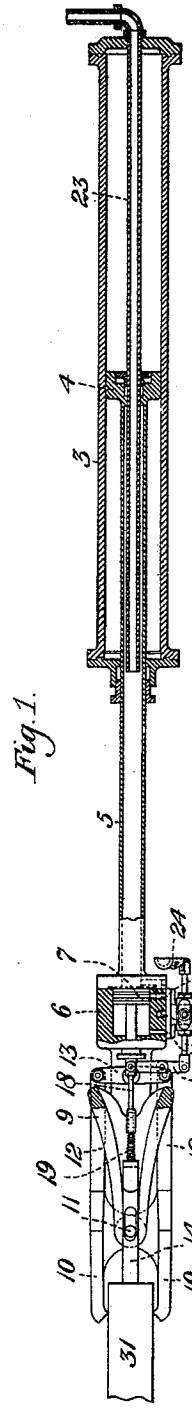

Fig. 1.

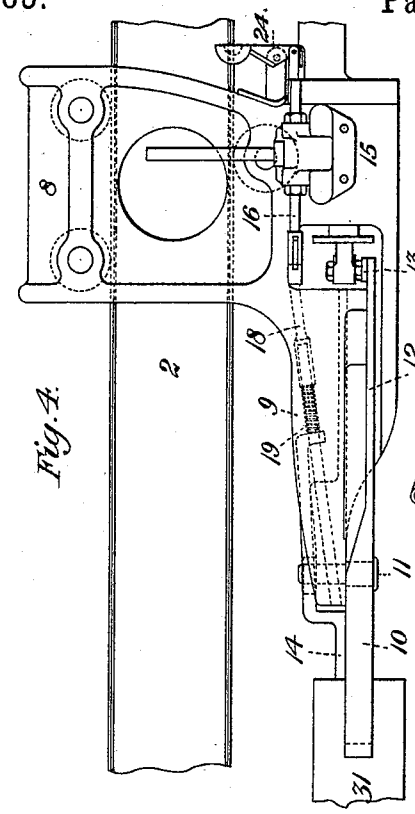

Fig. 4.

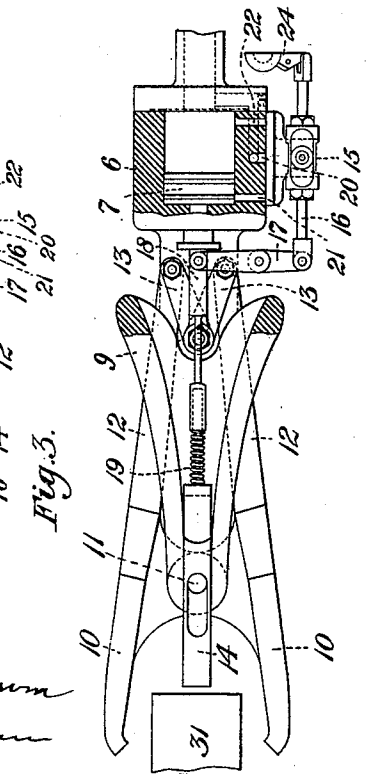

Fig. 3.

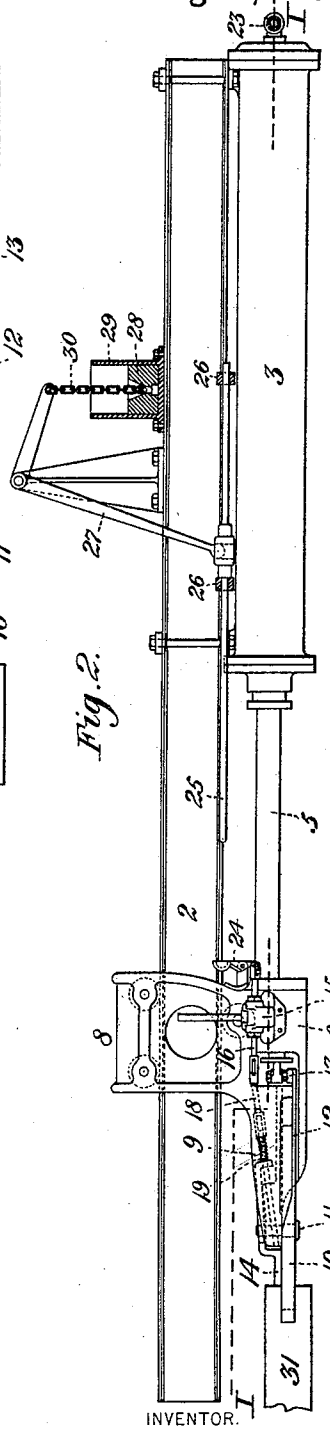

Fig. 2.

WITNESSES.

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UNITED STATES PATENT OFFICE.

THOMAS JAMES, OF BRADDOCK, PENNSYLVANIA.

FURNACE DRAWING AND CHARGING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 479,883, dated August 2, 1892.

Application filed October 20, 1891. Serial No. 409,285. (No model.)

To all whom it may concern:

Be it known that I, THOMAS JAMES, of Braddock, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Furnace Drawing and Charging Apparatus, of which the following is a full, clear, and exact description.

The object of my invention is to provide tongs for furnace charging and drawing apparatus which shall be simple and rapid in action and not apt to get out of order. It is illustrated in the accompanying drawings, forming part of this specification, in which—

Figure 1 shows the tongs in plan view, the operating mechanism being in horizontal longitudinal section on the line I I of Fig. 2. Fig. 2 is a side elevation of the tongs and their operating mechanism. Fig. 3 is a view similar to Fig. 1, showing, on an enlarged scale, the tongs when open. Fig. 4 is an enlarged side elevation of the tongs and trolley.

In the drawings, 2 represents a beam or carrier by which the tongs are supported and by which they are carried to and from the furnace. This carrier may form part of an ordinary charging-crane, whose construction should be such as to suit the requirements of the particular use to which it is put.

3 is a cylinder, which is fixed to the carrier and is carried thereby. The piston 4 of this cylinder has a hollow projecting piston-rod 5, the forward end of which is fixed to and communicates with a small tongs-operating cylinder 6, having a piston 7 and forwardly-projecting piston-rod. The latter cylinder and the frame 9 of the tongs are supported by a trolley 8 from the carrier 2 and are capable of longitudinal motion thereon by operation of the piston of the cylinder 3. The tongs comprise two jaws 10, which are pivotally connected by a pin 11 and have rearwardly-projecting arms 12, which at their extremities are connected by toggle links or levers 13, the middle joint of which is pivotally connected to the piston-rod of the tongs-operating cylinder 6.

14 is a rod, which projects longitudinally between the jaws of the tongs and is provided with a slot, which fits around the pin 11 and permits longitudinal motion of the rod. This rod may be removed when the apparatus is employed in charging the furnace.

15 is a valve, which controls the admission and exhaust of motive fluid to the cylinder 6 and is adapted to be reciprocated to control the action of the cylinder by means of a stem 16, lever 17, and rod 18, which latter is connected with the rod 14 by an interposed compressible spring 19. The valve 15 controls three ports 20, 21, and 22, of which the port 20 leads to the valve-chest from the hollow piston-rod 5. The ports 21 and 22 lead from the valve-chest to the front and back ends of the cylinder, respectively. The exhaust-port leads from the valve-chest outside the path of the slide-valve and is not shown. The motive fluid (preferably steam) for the cylinder 6 is supplied by a pipe 23, which extends axially through the cylinder 3 and through the piston 4 telescopically into the piston-rod 5, so that communication between the cylinder 6 and the supply-pipe 23 is maintained in every position of the apparatus. The valve-stem 16 has a rearward projection and is provided with a tappet-lever 24, the end of which is so situate as to be adapted to engage a stop-rod 25 on backward motion of the tongs-frame. To cushion the action of the rod 25, I prefer to set it in slide-bearings 26, in which it is capable of longitudinal movement, and to connect it by a bell-crank lever 27 and chain 30 with a weighted piston 28, set in a dash-pot 29.

The operation of the apparatus is as follows: Suppose that it be desired to use the tongs to grasp and withdraw an ingot or bloom 31, lying on the hearth of a furnace. The carrier is first brought into position opposite to the door of the furnace, and then by admitting motive fluid to the rear end of the cylinder 3 the trolley 8, carrying the tongs and the cylinder 6, is projected on the carrier. The tongs enter the furnace-door, and their jaws being then open, as indicated by dotted lines in Fig. 1, pass on opposite sides of the end portion of the ingot or bloom. As the tongs continue to advance, the end of the rod 14 engages the end of the ingot or bloom and is pushed back thereby, transmitting through the spring 19, rod 18, and lever 17 motion to the valve-stem 16, shifting the valve so as to connect the steam-admission port with the forward end of the cylinder 6. The effect of this is to retract the piston 7, thus straight-

ening the toggle-links 13, spreading the arms 12 of the tongs, and closing their jaws upon the interposed ingot or bloom, which they grasp firmly, as shown in Fig. 1. The piston of the cylinder 3 may then be reversed, so as to retract the tongs and to draw the ingot or bloom from the furnace. When they have reached a predetermined point, the end of the tappet-lever 24 engages the end of the rod 25, and is thereby moved, so as to shift the valve-stem and to move the valve sufficiently to connect the rear end of the cylinder 6 with the fluid-supply port. The piston 7 is thereupon projected, and, acting on the middle joint of the toggle-links 13, moves them into inclined position, thus drawing together the arms 12, spreading the jaws 10, and releasing the ingot or bloom, (see Fig. 3,) which then should be in position over a car or other convenient receiving support.

It will be understood that my improved device may be modified in construction in divers ways without departing from the principles of my invention as stated in the following claims. Thus, instead of employing the ingot or bloom as the stop which operates the valve on the forward motion of the apparatus, I may use some other stop fixed to the furnace or otherwise and designed to perform a like function.

I claim—

1. In furnace charging or drawing apparatus, the combination of tongs adapted to grasp an ingot or bloom, a power-cylinder connected with the tongs and adapted to operate the same, a valve controlling said cylinder, and a stop whereby on motion of the apparatus the valve is engaged and shifted to operate the cylinder, substantially as and for the purposes described.

2. In furnace charging or drawing apparatus, the combination of tongs adapted to grasp an ingot or bloom, a power-cylinder connected with the tongs and adapted to operate the same, a valve controlling said cylinder, a stop whereby on forward motion of the apparatus the valve is engaged and shifted, and a second stop whereby the valve is engaged on rearward motion of the apparatus, substantially as and for the purposes described.

3. In furnace charging or drawing apparatus, the combination of tongs adapted to grasp an ingot or bloom, a power-cylinder connected with the tongs and adapted to operate the same, a valve controlling said cylinder, and a rod connected with the valve and adapted to engage the ingot or bloom to be seized, substantially as and for the purposes described.

4. In furnace charging or drawing apparatus, the combination of tongs adapted to grasp an ingot or bloom, a power-cylinder connected with the tongs and adapted to operate the same, a valve controlling said cylinder, a rod connected with the valve and adapted to engage the ingot to be seized, and an interposed spring, substantially as and for the purposes described.

5. In furnace charging or drawing apparatus, the combination of tongs adapted to grasp an ingot or bloom, a power-cylinder connected with the tongs and adapted to operate the same, a valve controlling said cylinder, a stop whereby on forward motion of the apparatus the valve is engaged and shifted, a second stop whereby the valve is engaged on rearward motion of the apparatus, and a cushion for the second stop, substantially as and for the purposes described.

6. In furnace charging or drawing apparatus, the combination of tongs adapted to grasp an ingot or bloom, a power-cylinder connected with the tongs and adapted to operate them, a cylinder connected with the tongs and adapted to project them, a hollow piston-rod for the last-named cylinder, and a motive-fluid-supply pipe extending telescopically into the piston-rod and connected by the latter with the tongs-operating cylinder, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 17th day of October, A. D. 1891.

THOMAS JAMES.

Witnesses:
H. M. CORWIN,
W. B. CORWIN.