(No Model.) 3 Sheets—Sheet 1.

F. HERON.

INGOT MANIPULATOR.

No. 368,395. Patented Aug. 16, 1887.

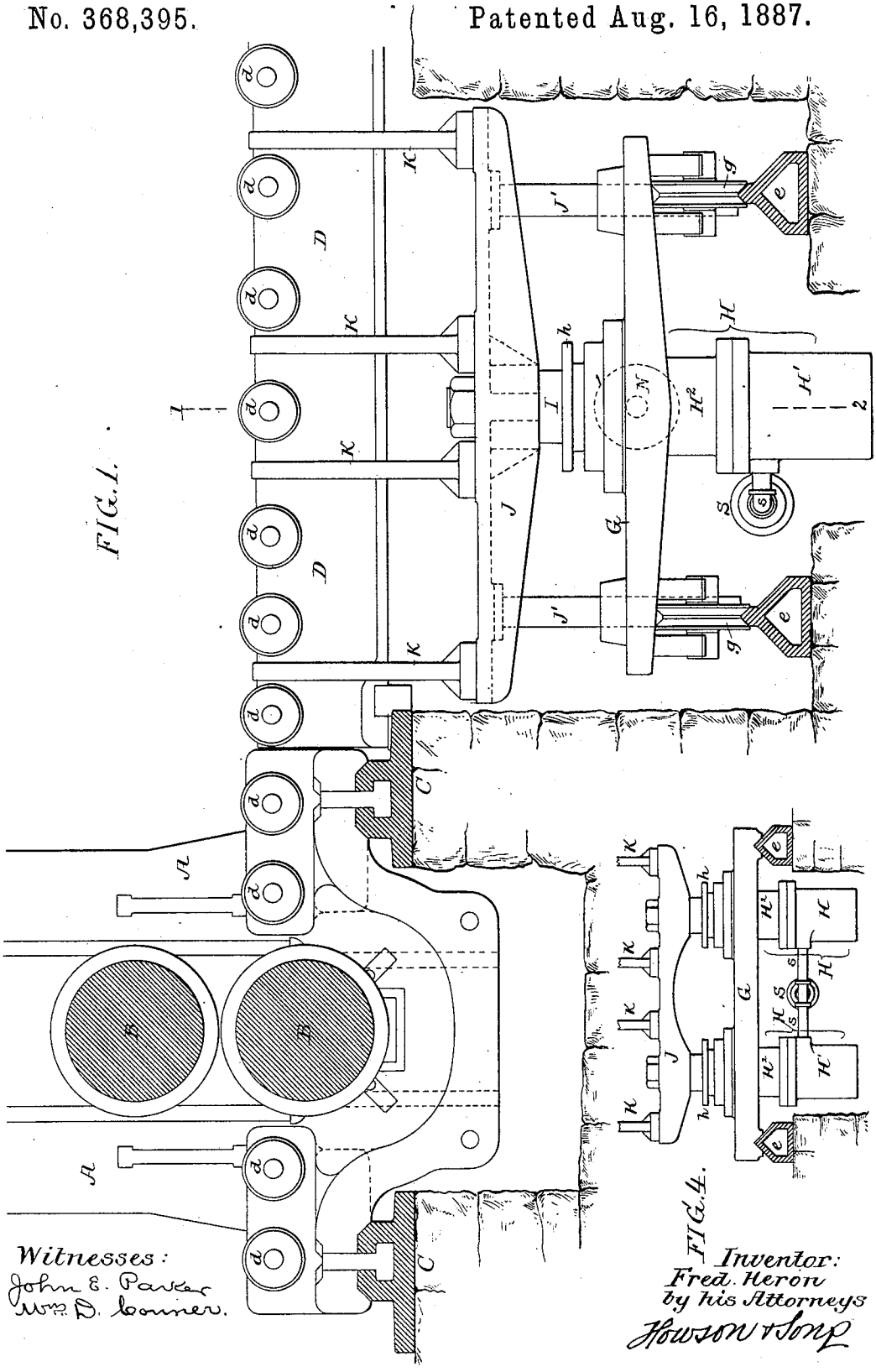


FIG. 1.

FIG. 4.

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(No Model.) 3 Sheets—Sheet 2.

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FIG. 2.

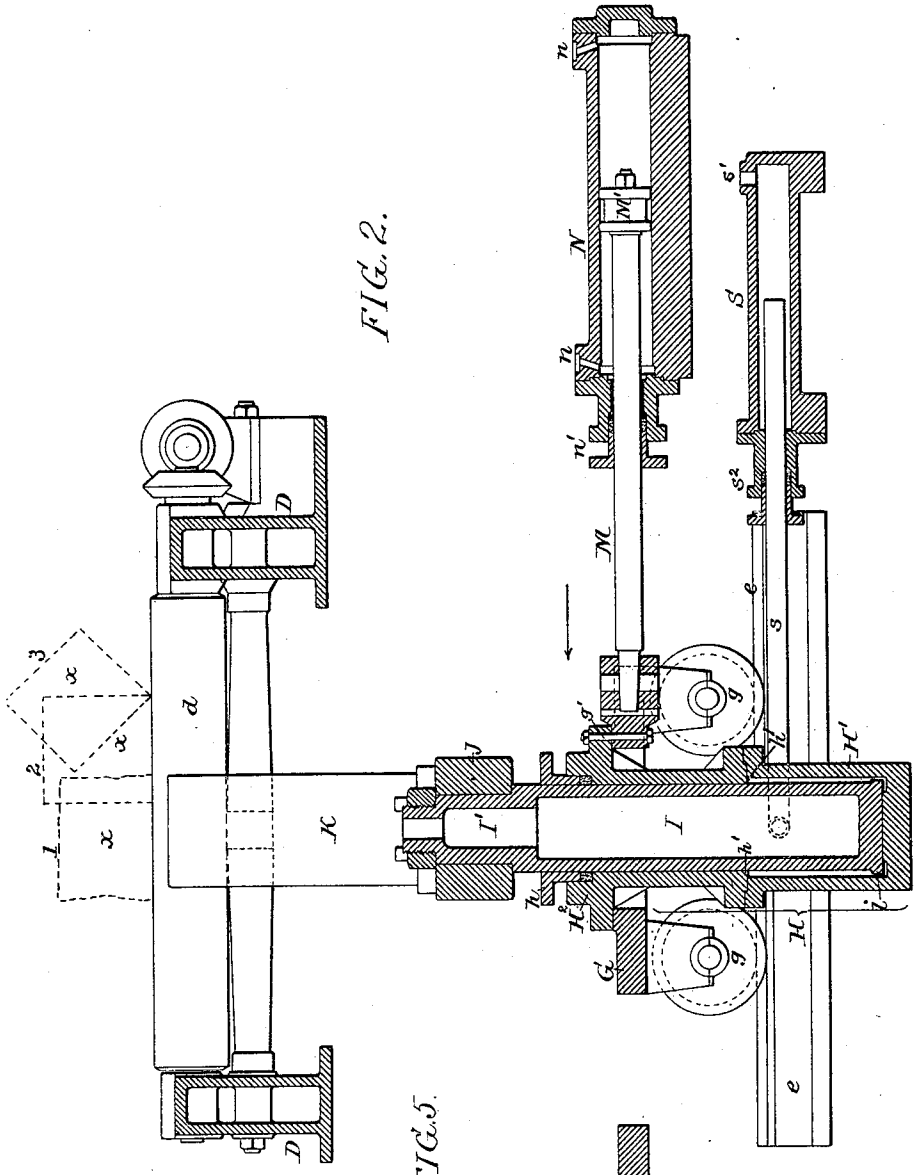
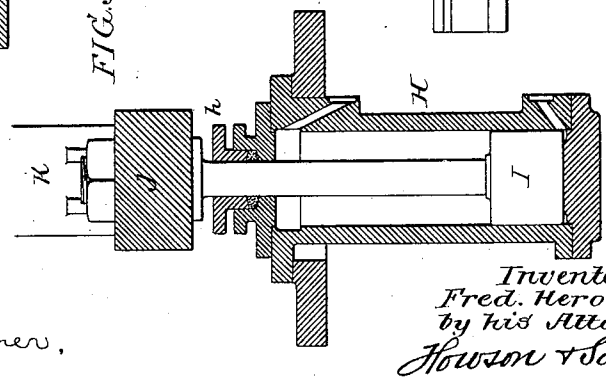


FIG. 5.



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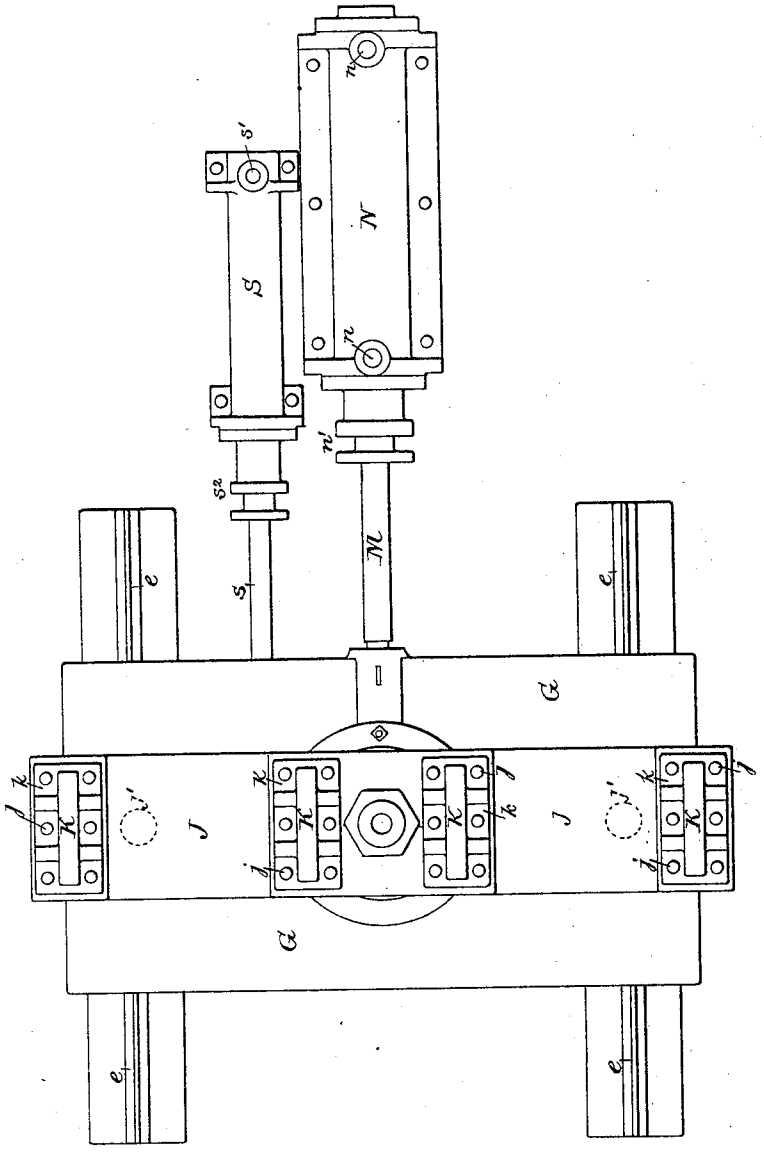
3 Sheets—Sheet 3.

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INGOT MANIPULATOR.

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FIG. 3.



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UNITED STATES PATENT OFFICE.

FRED HERON, OF PHŒNIXVILLE, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO THE PHŒNIX IRON COMPANY, OF SAME PLACE.

INGOT-MANIPULATOR.

SPECIFICATION forming part of Letters Patent No. 368,395, dated August 16, 1887.

Application filed June 3, 1887. Serial No. 240,184. (No model.)

To all whom it may concern:

Be it known that I, FRED HERON, a subject of the Queen of Great Britain and Ireland, residing at Phœnixville, Chester county, Pennsylvania, have invented certain Improvements in Hydraulic Manipulators, of which the following is a specification.

The object of my invention is to construct a hydraulic manipulator for handling ingots in the process of rolling so that it will be simple and powerful in construction and can be readily examined and repaired, as fully described hereinafter.

In the accompanying drawings, Figure 1 is a sectional view of a portion of a rolling-mill, showing in side view my improved manipulator. Fig. 2 is a transverse section on the line 1 2, Fig. 1. Fig. 3 is a plan view with the rolls removed, showing only the manipulator; and Figs. 4 and 5 are views of modifications of parts of the apparatus.

A is the housing of the rolls, B B the upper and lower rolls, and C C the bearing-plate.

D is the frame, on which are the feeding-rollers *d* for carrying the metal to the rolls.

Directly under the frame D is a pit sufficiently deep to contain my improved manipulator, and I provide suitable tracks, *e e*, on which the manipulator can be traversed.

G is a suitable frame or carriage provided with traction-wheels *g g*, adapted to the rails *e e*. These rails are preferably V-shaped and run transversely in respect to the line of feed to the rolls. This carriage G supports the vertical hydraulic cylinder H, which passes through an orifice in the carriage, and is secured thereto by bolts *g'*, passing through a flange on the cylinder and through the carriage, as shown in Fig. 2. The cylinder H is preferably made in two parts, H' H^2, the lower portion, H', being removable for repairs, &c., while the upper portion, H^2, is provided with the usual stuffing-box, *h*. The portion H' of the cylinder is a trifle larger in diameter than the portion H^2, forming a shoulder, h^2. A plunger, I, working in this cylinder has a flange, *i*, at its lower end, which limits the upward movement of the plunger by striking against the shoulder h' on the portion H^2. I prefer to make the plunger hollow, as shown, and secured to it is a cross-head, J, which fits over the reduced portion I', and is held in place by a suitable nut. This cross-head J has two guide-rods, J' J', at each side of the cylinder H. These guide-rods pass through corresponding openings in the carriage G, as shown in Figs. 1 and 3, and guide the cross-head J in its vertical movement.

A number of fingers, K, are secured to the upper surface of the cross-head J. I have shown four in the present instance, and they are secured by suitable bolts, *j*, passing through flanges *k* of the fingers into the cross-head J. These fingers extend up between the small feeding-rolls *d*, so that the top of the fingers may come in contact with the ingot to be manipulated.

The carriage is moved laterally under the frame D by means of a plunger, M, connected at one end to the carriage, and having a piston, M', working in a hydraulic cylinder, N, secured to any permanent fixture on the foundation. This hydraulic cylinder has inlet and outlet ports *n n*, and is also provided with a suitable stuffing-box, *n'*. By forcing water under pressure into this cylinder at the rear of the piston M' the carriage is moved laterally under the frame D in the direction of its arrow, Fig. 2, and when water is forced into the cylinder in front of the piston the movement of the carriage is reversed. The hydraulic cylinder H is connected with a cylinder, S, by a pipe, *s*. The cylinder S is secured to the foundation and provided with an inlet-port, *s'*, and with a stuffing-box s^2. The pipe *s* travels to and fro in this cylinder on the movement of the carriage by the piston-rod M, so that the cylinder H is always in connection with the water-supply, dispensing with the troublesome rubber tubing used in most manipulators. The pipes connecting with the ports *n* and *s'* are provided with suitable valves by which pressure can be supplied to and cut off from the two hydraulic cylinders H and N.

The operation of the device is as follows: Referring to Fig. 2, I have shown the ingot *x* in dotted lines 1 on the feed-rollers directly above the manipulator. When it is required

only to raise the ingot, the water under pressure is turned into the cylinder H, forcing the plunger I up, so the fingers K lift the ingot clear of the feed-rollers. After the ingot is raised clear of the feed-rollers water under pressure is allowed to flow into the cylinder N, and the carriage G can be moved from one side or the other of the frame D, depending upon the position that the ingot is to be placed in, and by allowing the water to escape from the cylinder H the plunger I falls, allowing the ingot to again rest on the rollers in its proper position. When an ingot is to be turned, the fingers are moved to a position in respect to the ingot, as shown by dotted lines 2 in Fig. 2—that is, toward one side of the ingot—so that when the plunger I is raised the fingers will tilt the ingot over, as shown also by dotted lines 3, and turn it over on its side.

By the mechanism above described I place the lifting-cylinder and its plunger directly under the work, and not at one side, as is usual in this class of machinery.

In Fig. 4 I have shown the manipulator provided with two cylinders, dispensing with the guide-rods J'.

In Fig. 5 I have illustrated a cylinder and piston that may be used in place of the cylinder H and plunger I, if preferred.

I claim as my invention—

1. The combination of the table of a rolling-mill with a manipulator mounted on a suitable carriage and composed of a cylinder and a plunger, carrying fingers situated directly under the load to be manipulated, and devices for moving the carriage laterally, all substantially as set forth.

2. The combination of the traversing carriage with a cylinder, H, a cylinder, H', of larger diameter than the cylinder H, and a plunger, I, carrying the operating-fingers K, the said plunger having stops to limit its movement, substantially as set forth.

3. The combination of the traversing carriage with cylinder, the plunger carrying a cross-head, J, provided with suitable fingers, K, substantially as and for the purpose set forth.

4. The combination of the traversing carriage, cylinder H, plunger having cross-head, and fingers K, with guide-rods J' J' for the cross-head, all substantially as specified.

5. The combination of the carriage, the cylinder H, and plunger I, with a stationary cylinder, N, and a piston-rod, M, connected to one side of the carriage to move it transversely, substantially as set forth.

6. The combination of the carriage G, cylinder H, and the plunger carrying operating-fingers, with a stationary cylinder, S, and a feed-pipe, *s*, for the cylinder H, adapted to the said cylinder S, all substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRED HERON.

Witnesses:
HUBERT HOWSON,
HENRY HOWSON.