

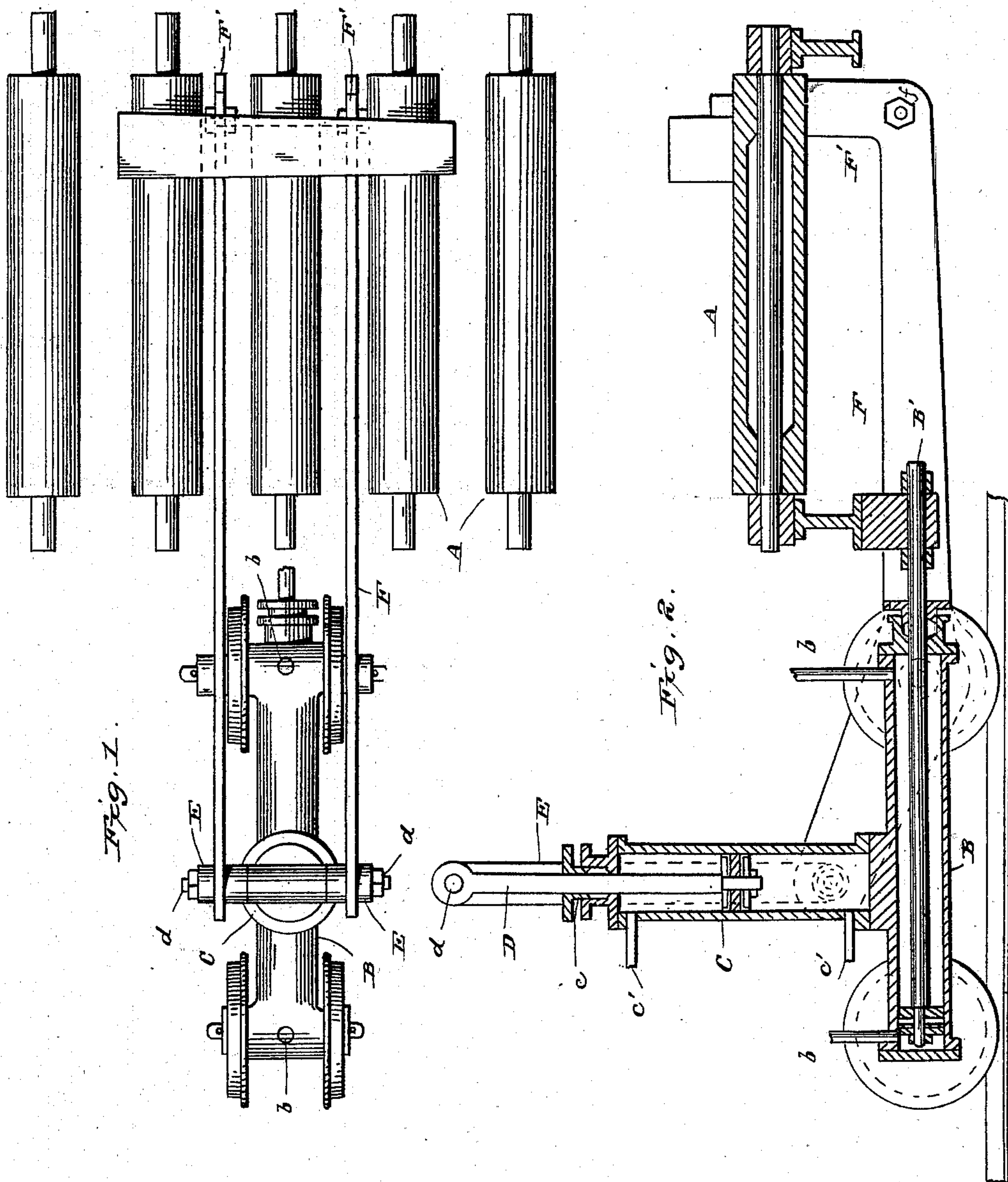
(No Model.)

2 Sheets—Sheet 1.

T. CRITCHLOW.
INGOT MANIPULATOR.

No. 278,511.

Patented May 29, 1883.



Witnesses.
Edwin L. Jewell.
H. A. Paulman.

Inventor.
Thomas Critchlow
C. M. Alexander.
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(No Model.)

2 Sheets—Sheet 2.

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Fig. 4.

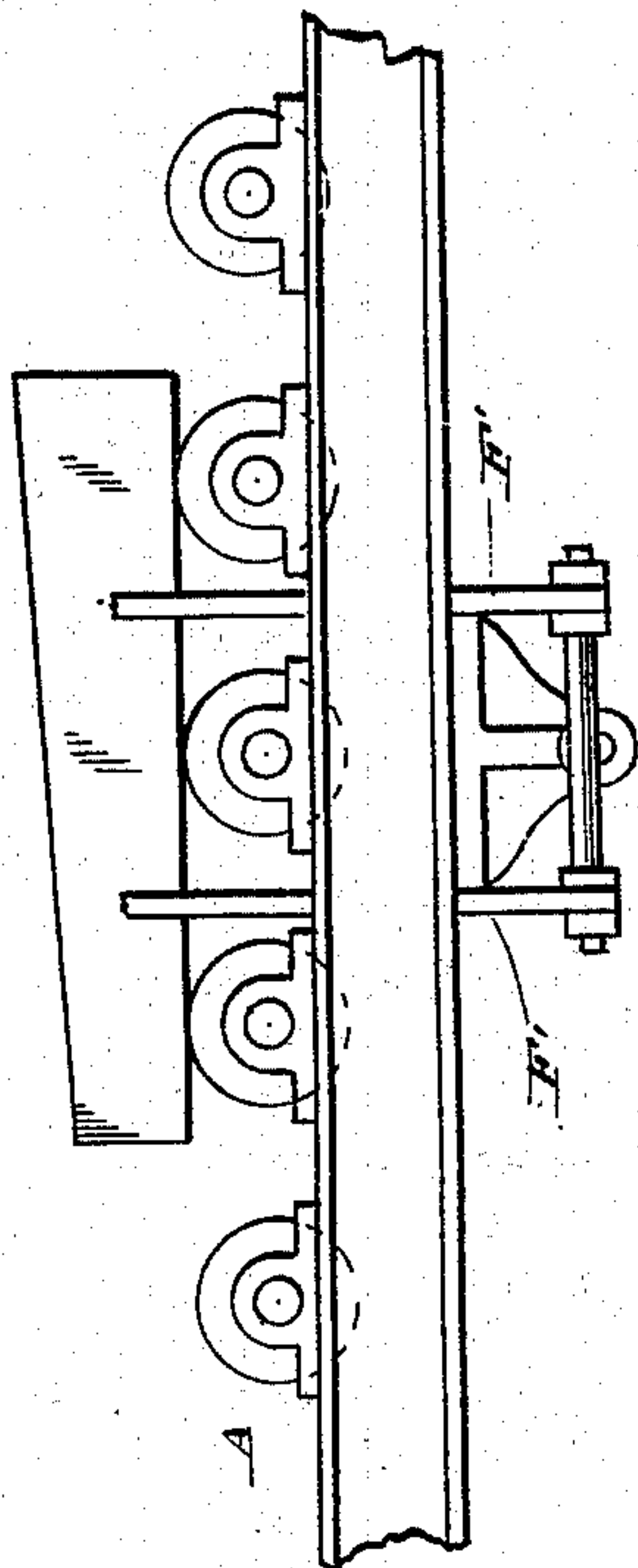


Fig. 5.

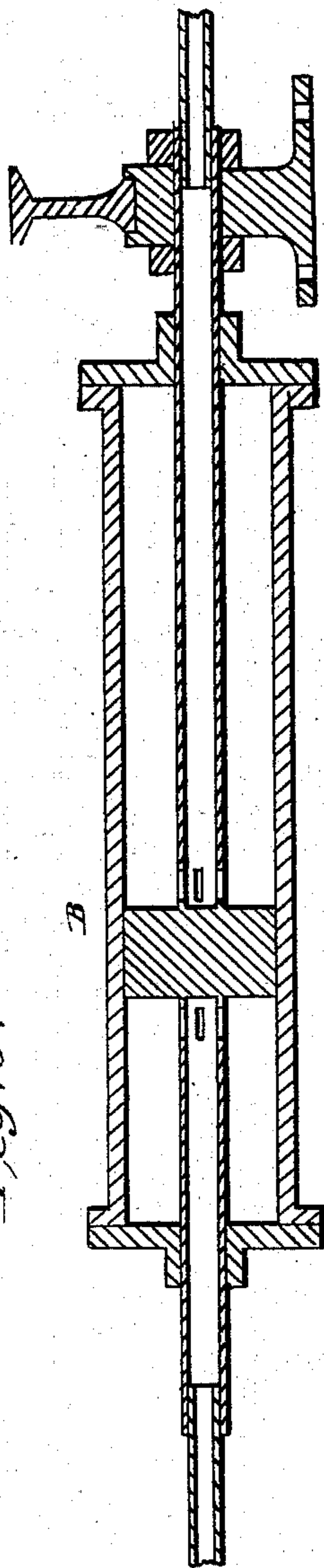
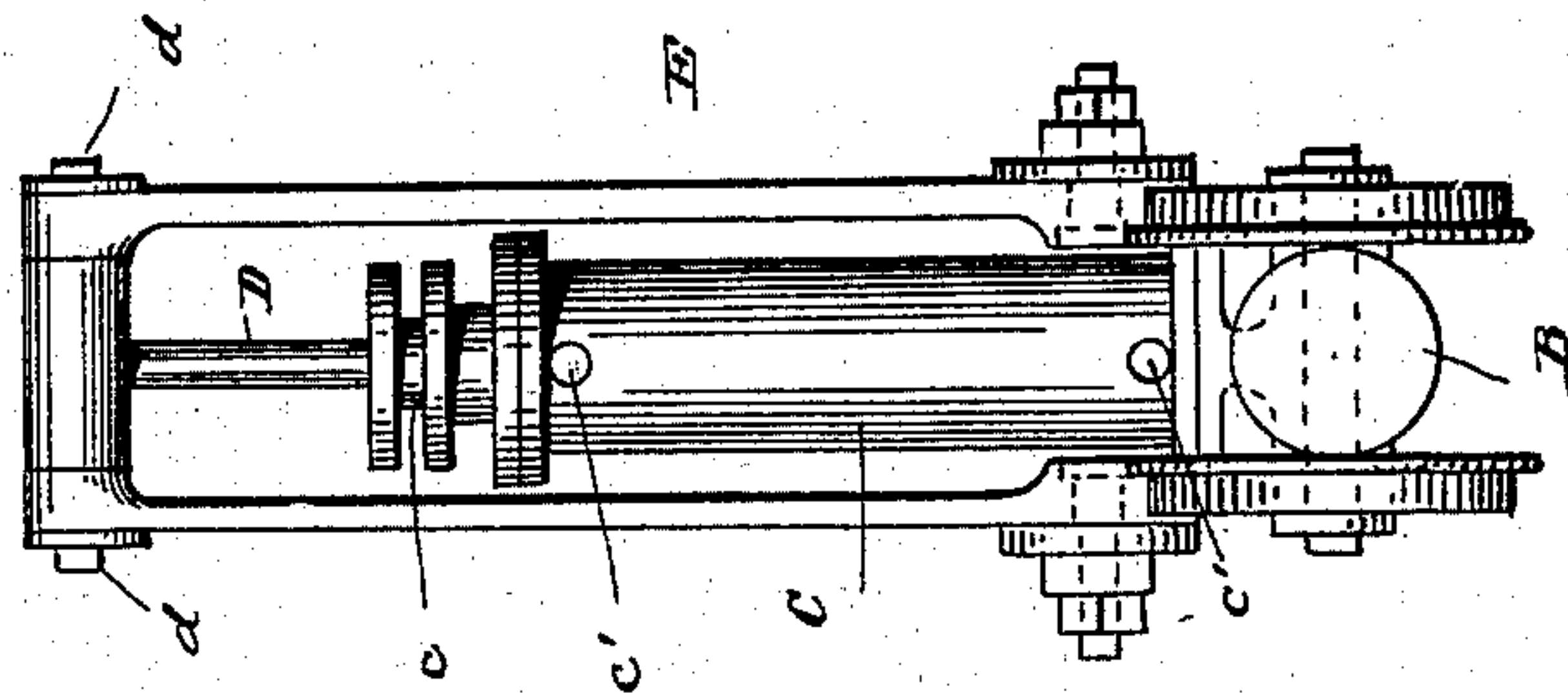


Fig. 3.



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UNITED STATES PATENT OFFICE

THOMAS CRITCHLOW, OF PITTSBURG, PENNSYLVANIA.

INGOT-MANIPULATOR.

SPECIFICATION forming part of Letters Patent No. 278,511, dated May 29, 1883.

Application filed February 23, 1883. (No model.)

To all whom it may concern:

Be it known that I, THOMAS CRITCHLOW, a subject of Great Britain, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Ingot-Manipulators, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in machinery for the manufacture of iron and steel, and it has special reference to mechanism for operating the ingot during the operation of reducing it to a marketable shape, the object being to provide for reducing the cost of manufacture by furnishing a machine which shall perform the work of a number of men, and thereby effect a large and valuable saving of manual labor.

It consists in the employment of hydraulic or other cylinders (preferably mounted) located in close proximity to the feeding tables or rolls of a mill-plant, and in providing such cylinders with means for manipulating or operating the ingot when in a highly-heated state and while upon the feeding-rolls, either laterally, in order to bring it opposite to the respective passes in the forming-rolls, or vertically, in order to give it a partial rotation around its own axis, whereby its several sides are presented to the peripheries of the passes, the several peculiarities of which will hereinafter more fully appear.

In the accompanying drawings, forming a part of this specification, and on which like reference-letters indicate corresponding features, Figure 1 is a plan view of my improved apparatus, and of a train of feeding-rolls having an ingot placed thereon, and showing the relative position of the apparatus to said rolls. Fig. 2 is a longitudinal vertical sectional view taken through the center of the apparatus, and axially through one of the feeding-rolls. Fig. 3 represents an end elevation of the machine, looking from the rear thereof; Fig. 4, a side elevation of a train of feeding-rolls having an ingot placed thereon, showing the relative position of the operating-levers, the remainder of the machine being in this instance removed; and Fig. 5, a longitudinal sectional view of a modified form of cylinder and piston.

The letter A indicates a train or series of

feeding-rolls, the same being of the ordinary or of any approved construction and adapted to be supported and journaled in the usual frame-work.

The letter B indicates a cylinder, constructed of iron or other suitable material, and provided at its forward end with a suitable stuffing-box, and on its opposite sides, at both ends, with lateral trunnions or studs or other equivalent devices. Each of said trunnions is provided with a supporting-wheel, and said wheels are adapted to travel upon a suitable track located in close proximity to the feeding-rolls, hereinbefore referred to. Said cylinder B is furnished with a piston-rod, B', having the usual piston-head, which is adapted to fit therein and to operate in the manner which shall be presently pointed out. Said piston-rod at its forward end is connected, by means of nuts or otherwise, with a suitable fixed or stationary object—in the present instance with the bed-piece of the feeding-train frame—the purpose of which is to secure the piston against longitudinal movement. At each end the cylinder is supplied with pressure-pipes *b b*, for the purpose of introducing and allowing the escape of the steam or other operating agent, the said pipes having suitable devices for controlling the induction and eduction of the pressure agent. At a suitable point, and located upon said cylinder B, or other proper support, is a vertical cylinder, (indicated by the letter C,) the same being of ordinary construction and of any suitable material, and the upper end of which is provided with a stuffing-box, *c*. It is also provided with pressure-pipes *c'*, similar to those above referred to. Fitting within said vertical cylinder is a piston-head provided with a piston-rod, D. Extending laterally from said piston-rod, preferably at its upper end, project trunnions or lugs *d*. Flexibly connected to and depending from said trunnions are connecting-rods E, the ends of which are also flexibly connected to the shorter arms of the manipulating-levers F, the said levers and connecting-rods being suitably bored, and provided with bolts and nuts, or other equivalent devices, by which the connection is effected.

The trunnions hereinbefore mentioned as extending from the forward end of the cylinder B are somewhat longer than those from the rear of the said cylinder, and are adapted to

act as fulcrums for the manipulating-levers, which are suitably bored and fitted thereon, as indicated in Fig. 1 of the drawings. The longer arms of said manipulating-levers extend
 5 between the feeding-rolls A, and are formed or provided with vertical extensions F', the termini of which are preferably shouldered, or otherwise provided with means for engaging the under side of the ingot, as hereinafter
 10 pointed out. These levers are preferably braced together at one or more points, as indicated, by means of a connecting-bolt, f, or other equivalent device.

The operation of my invention will be readily understood when taken in connection with the above, and is as follows: In order to move the ingot laterally on the rolls and bring it opposite the several passes, the controlling-cocks or pressure-regulating devices are properly ad-
 20 justed and hydraulic or other pressure is admitted to the cylinder B, which causes the same to approach or recede from the feeding-rolls, (its piston being fixed,) traveling as it does so upon its supporting-wheels, and push-
 25 ing before it or carrying with it the manipulating-levers F, the extensions of which engage with the ingot from either side; and in order to tip or rotate the ingot the pressure-pipes of the vertical cylinder C are properly
 30 adjusted to admit pressure of the character above alluded to, whereby its piston is operated, and through the medium of the connecting-rods F oscillation is imparted to the manipulating-levers about their fulcrums, their
 35 longer arms engaging with the lower side of the ingot, and during a vertical or approximately vertical movement effect its rotation or turning.

It is obvious that the cylinder B may in
 40 some instances be provided with other supporting appliances than those shown—such as slides—and that the other several detail features of my invention may be modified, both as to form and relative arrangement, without
 45 departing from the spirit of my invention, among which modifications are the cylinder and hollow piston shown in Fig. 5 of the drawings, the object of which is to avoid the use of flexible pipe-connections, which is necessary
 50 to compensate for the movement of the cylinders. In said figure the hollow piston is extended beyond the piston-head in both directions, and is provided on either side of the head with port-holes. Either end of the pis-
 55 ton is fixed or anchored—in the present instance that end nearer the feeding-rolls—the said end being provided with screw-threads and binding-nuts, by which it is secured to the anchor-bracket. Fittings snugly within or over
 60 (preferably the former) each end of this hollow

piston are pressure-pipes, which serve to conduct the pressure agent to the cylinder through the medium of the said piston. The cylinder may be provided with suitable exhaust or dis-
 65 charge cocks or valves.

Having described my invention, what I claim is—

1. In machinery for the manufacture of iron and steel, the combination, with the feeding-rolls, of a traveling cylinder provided with a
 70 fixed piston-rod and manipulating-levers, and means for operating the same, whereby the ingot is shifted upon the rolls, substantially as shown and described.

2. In machinery for the manufacture of iron
 75 and steel, the combination, with the feeding-rolls, of one or more traveling cylinders provided, respectively, with a fixed and movable piston, and manipulating-levers adapted to be
 80 operated by said pistons, whereby the ingot may be manipulated in the manner substantially as specified.

3. In machinery for the manufacture of iron and steel, the combination, with the feeding-rolls, of one or more traveling cylinders pro-
 85 vided, respectively, with a fixed and movable piston and pivoted manipulating-levers, one of said pistons being adapted to move the levers axially to the feeding-rolls and the other to oscillate them, whereby a compound movement
 90 or manipulation of the ingot is effected, substantially as and for the purpose specified.

4. In machinery for the manufacture of iron and steel, the combination, with the feeding-rolls, of a traveling cylinder provided with a
 95 movable piston and manipulating-levers, and means for operating the same, whereby the ingot is turned upon the rolls, substantially as shown and described.

5. In a machine for manipulating ingots
 100 during the process of marketable reduction, a traveling reciprocating cylinder having a fixed piston and pivoted manipulating-levers, in combination with a cylinder having a movable piston connecting with said levers, where-
 105 by the latter are given a compound movement for the purpose set forth.

6. In a machine for manipulating ingots during the process of marketable reduction, a traveling reciprocating cylinder provided with
 110 a hollow fixed piston-rod having suitable port-holes and pressure-agent-conducting pipes, substantially as described and shown.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS CRITCHLOW.

Witnesses:

J. J. MCCARTHY,

W. D. ALEXANDER.