

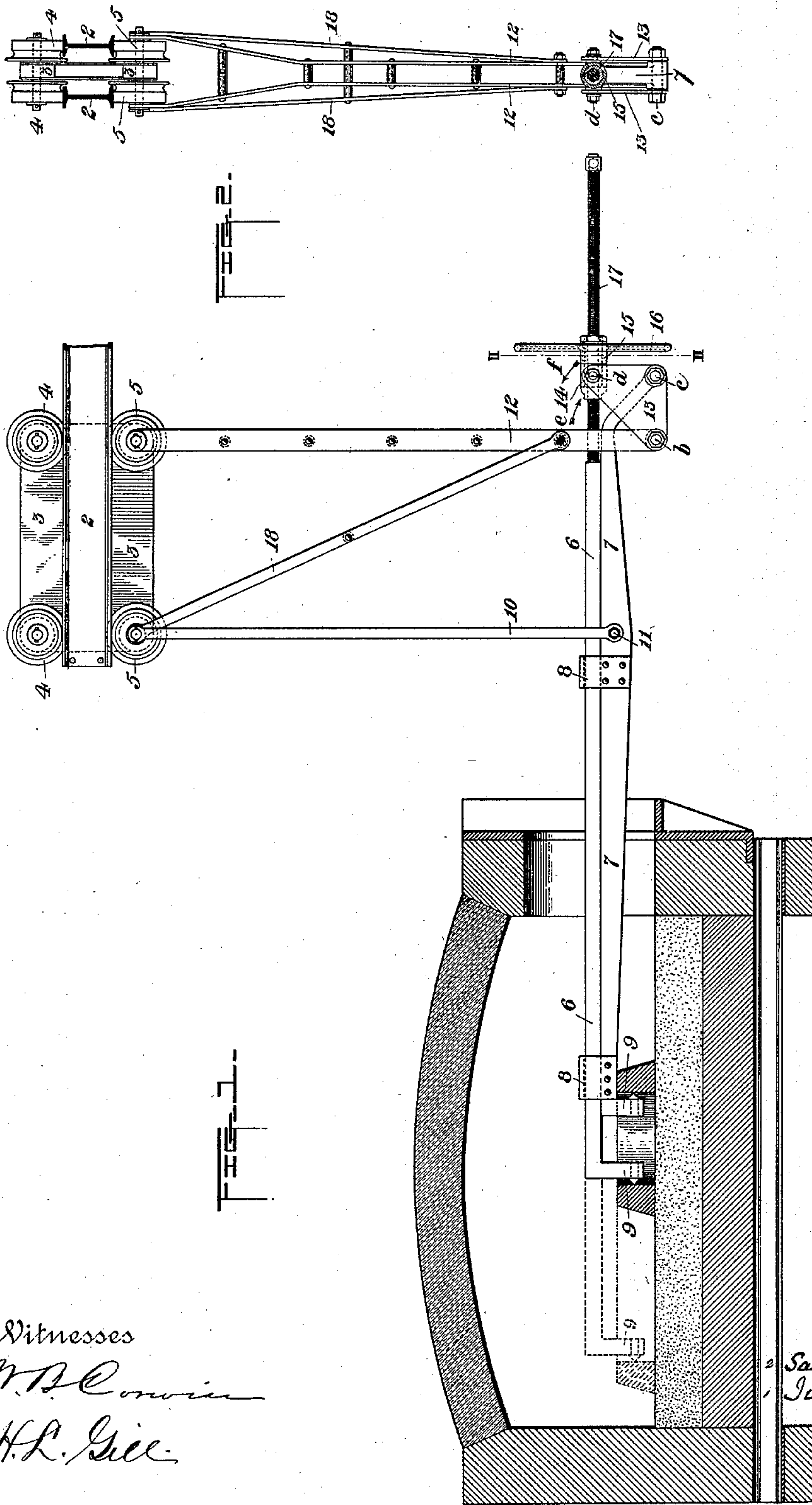
(No Model.)

5 Sheets—Sheet 1.

J. KENNEDY & S. FORTER.
MILL APPLIANCE.

No. 410,108.

Patented Aug. 27 1889.



Witnesses

W. A. Conner

H. L. Gill

Inventor

Samuel Forter

Julian Kennedy

by

W. B. Baxwell & Sons

Attorneys

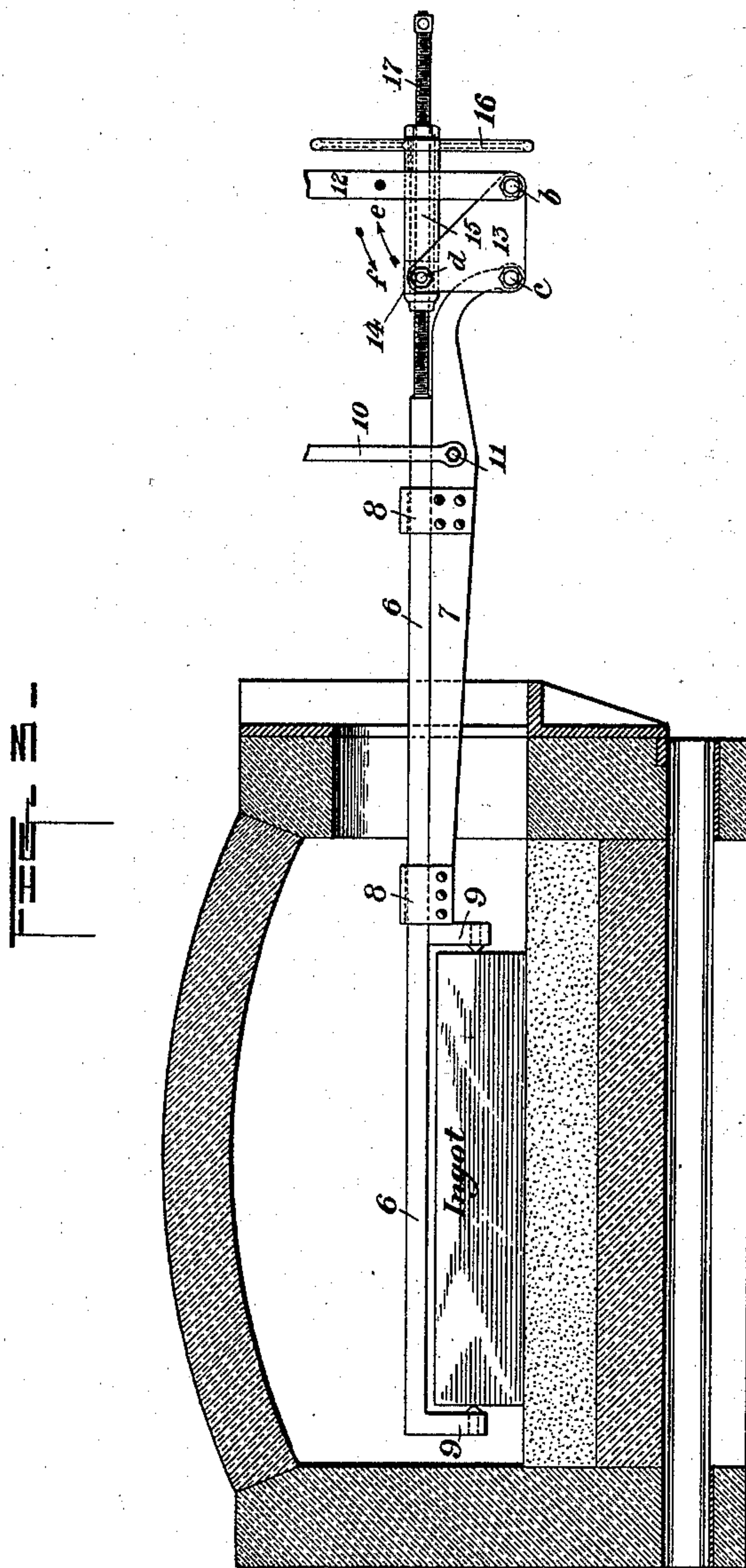
(No Model.)

5 Sheets—Sheet 2.

J. KENNEDY & S. FORTER.
MILL APPLIANCE.

No. 410,108.

Patented Aug. 27 1889.



Witnesses

W. B. Corwin
H. L. Gill

Inventors.

Samuel Forter
Julian Kennedy
by W. B. Bakewell & Sons

Attorneys.

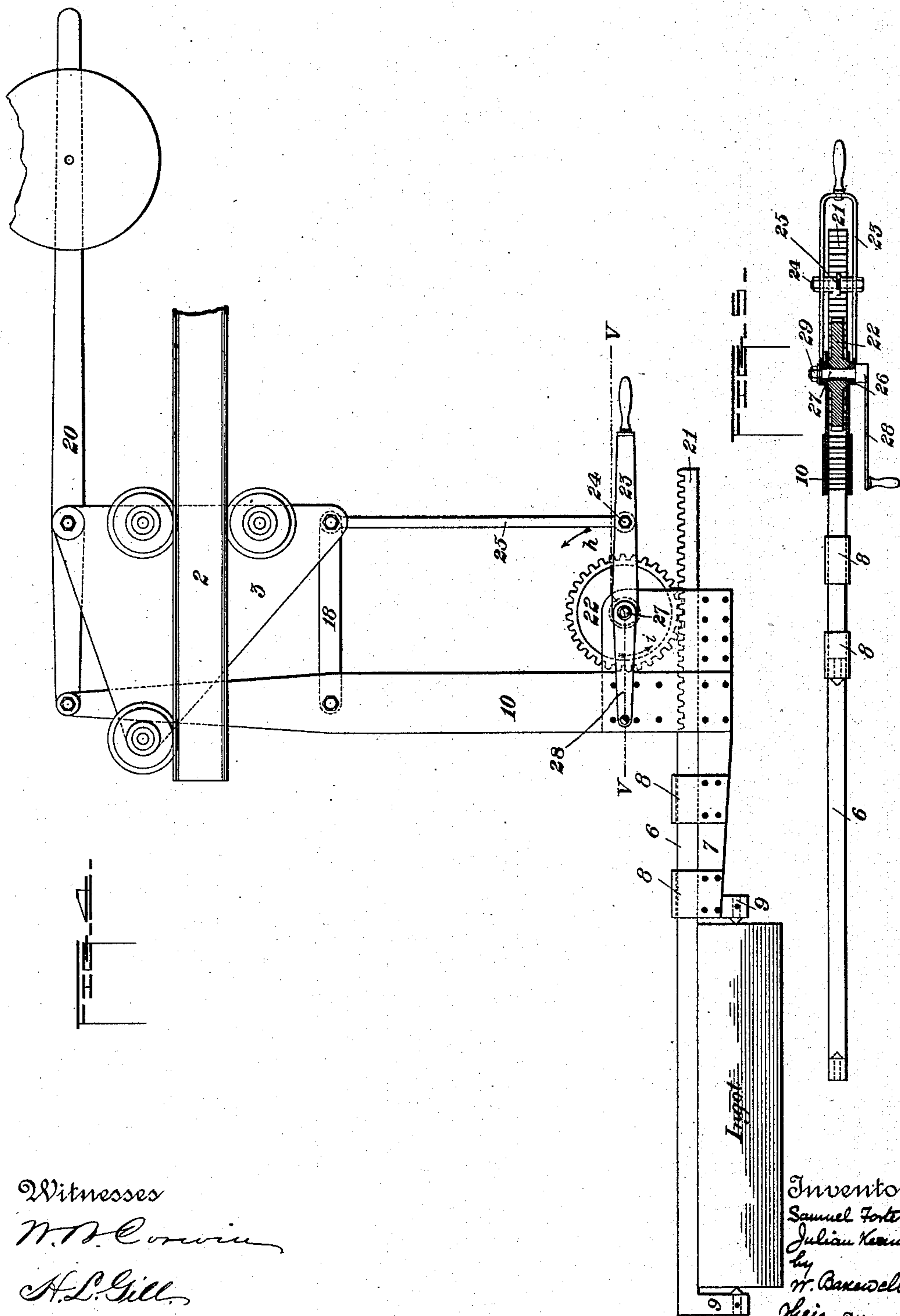
(No Model.)

5 Sheets—Sheet 3.

J. KENNEDY & S. FORTER.
MILL APPLIANCE.

No. 410,108.

Patented Aug. 27 1889.



Witnesses

W. D. Corwin

A. L. Gill

Inventors

Samuel Forter

Julian Kennedy

by

W. B. Russell & Sons

Their Attorneys

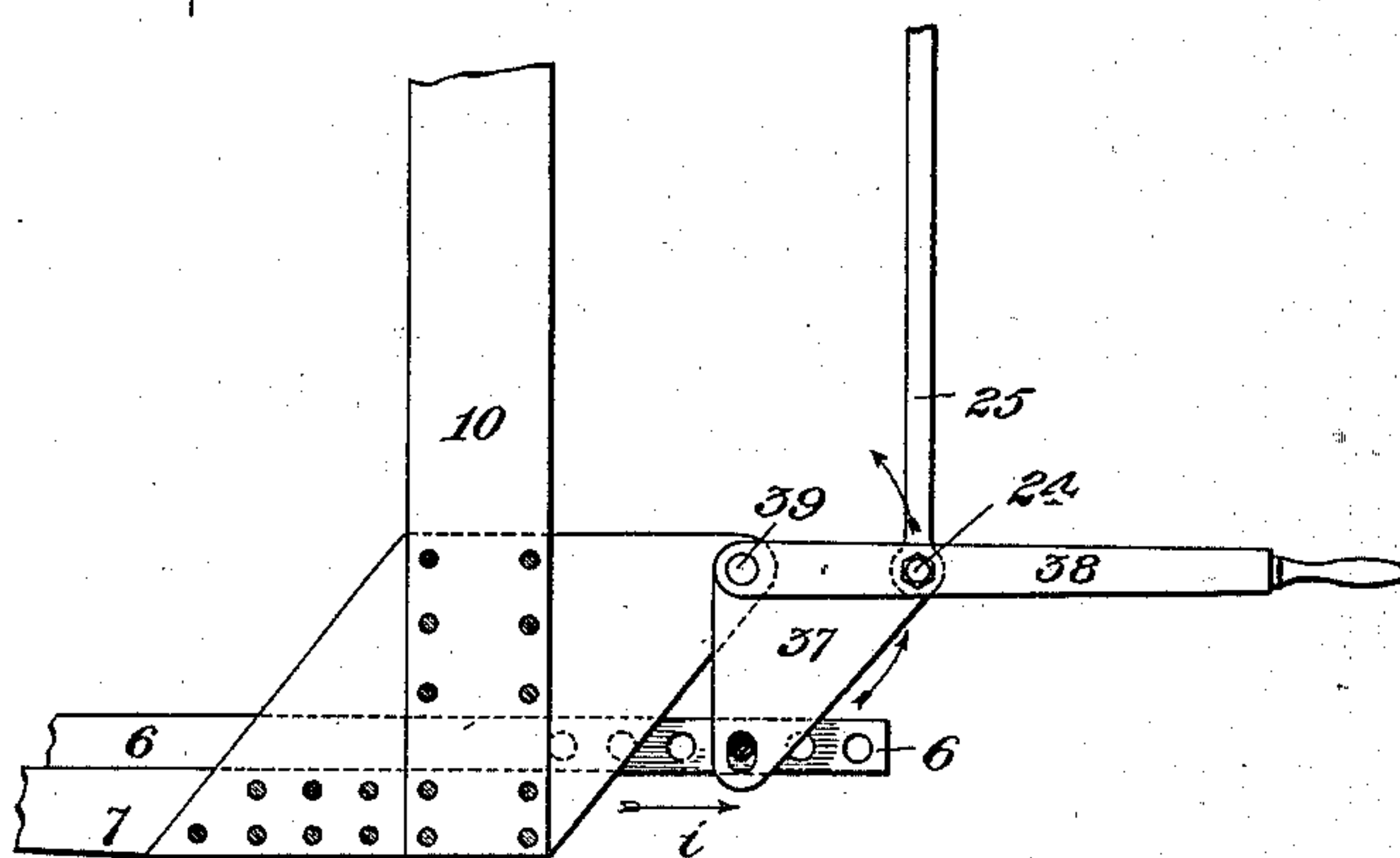
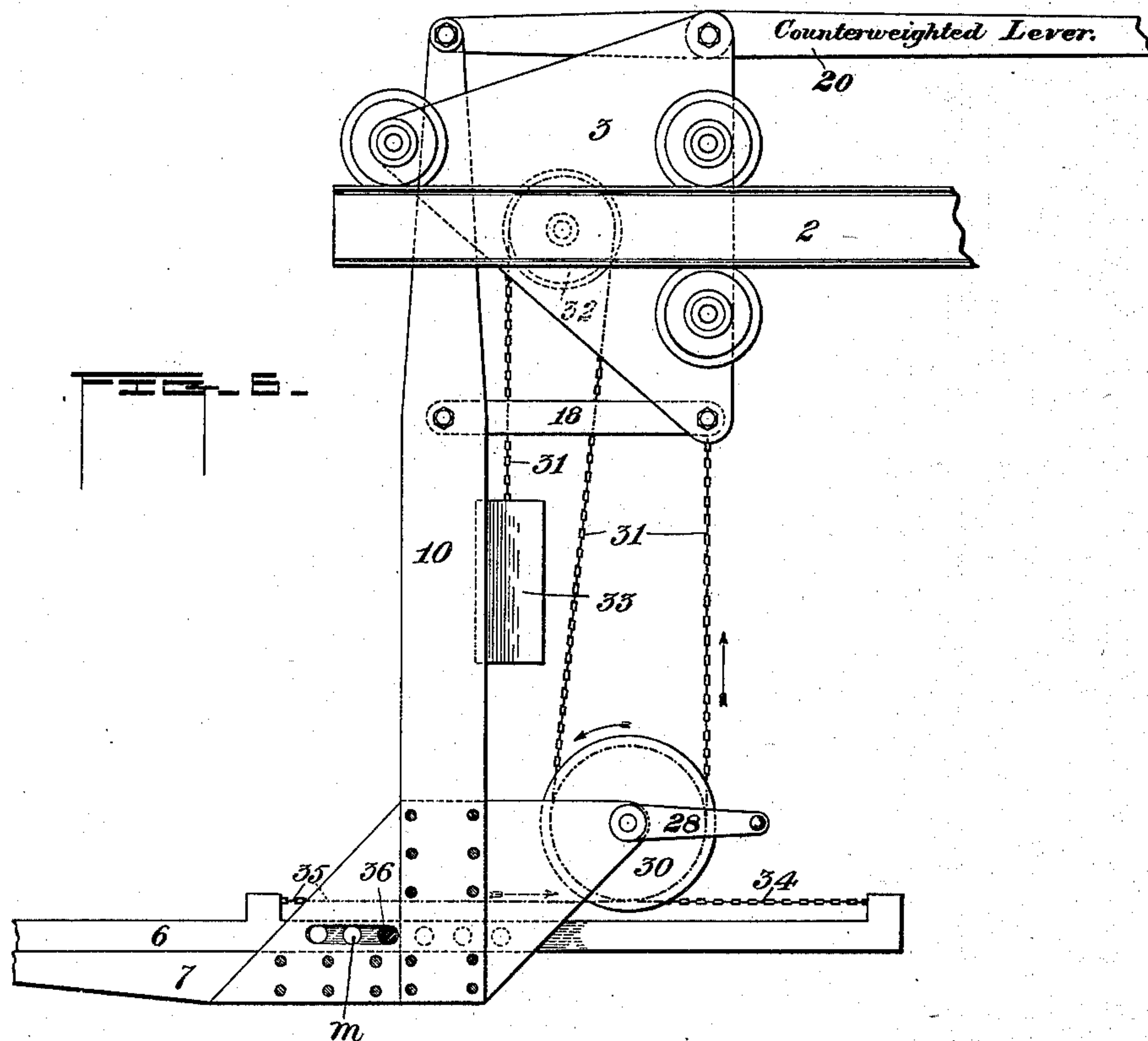
(No Model.)

5 Sheets—Sheet 4.

J. KENNEDY & S. FORTER.
MILL APPLIANCE.

No. 410,108.

Patented Aug. 27 1889.



Witnesses

N. B. Cronin

H. L. Gill.

Inventors

Samuel Foster

Julian Kennedy

by W. B. Caldwell & Sons
Their Attorneys

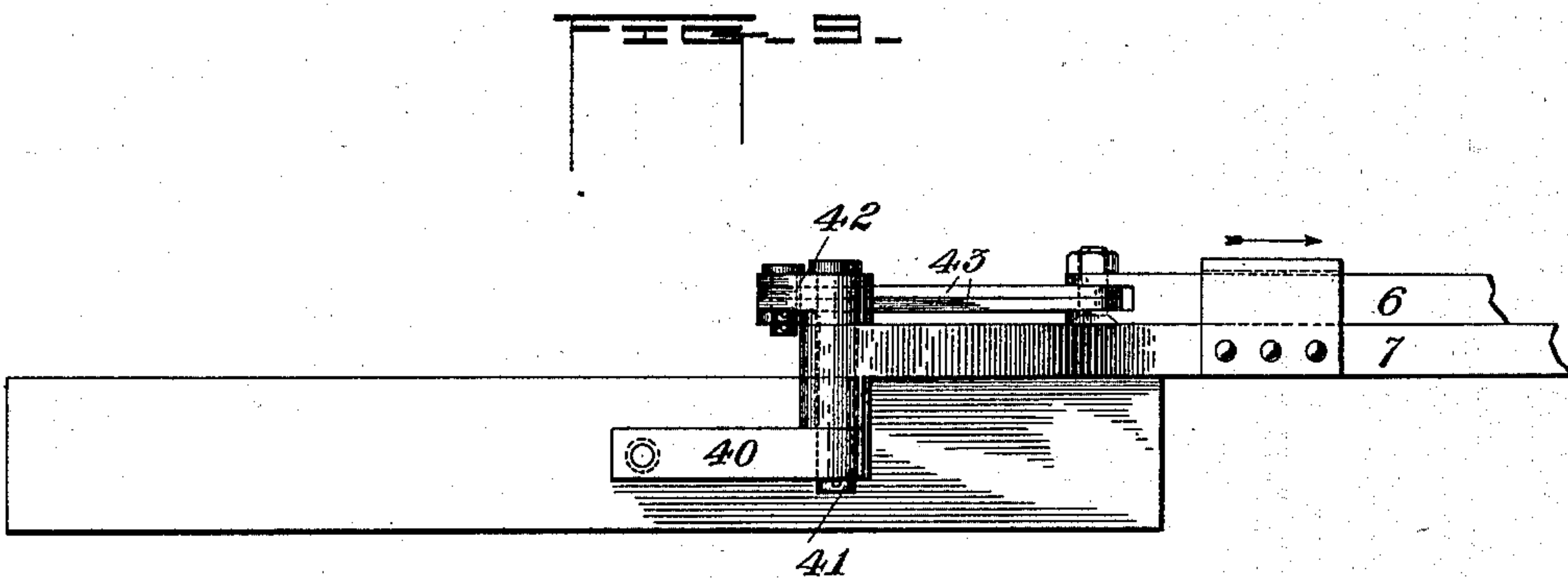
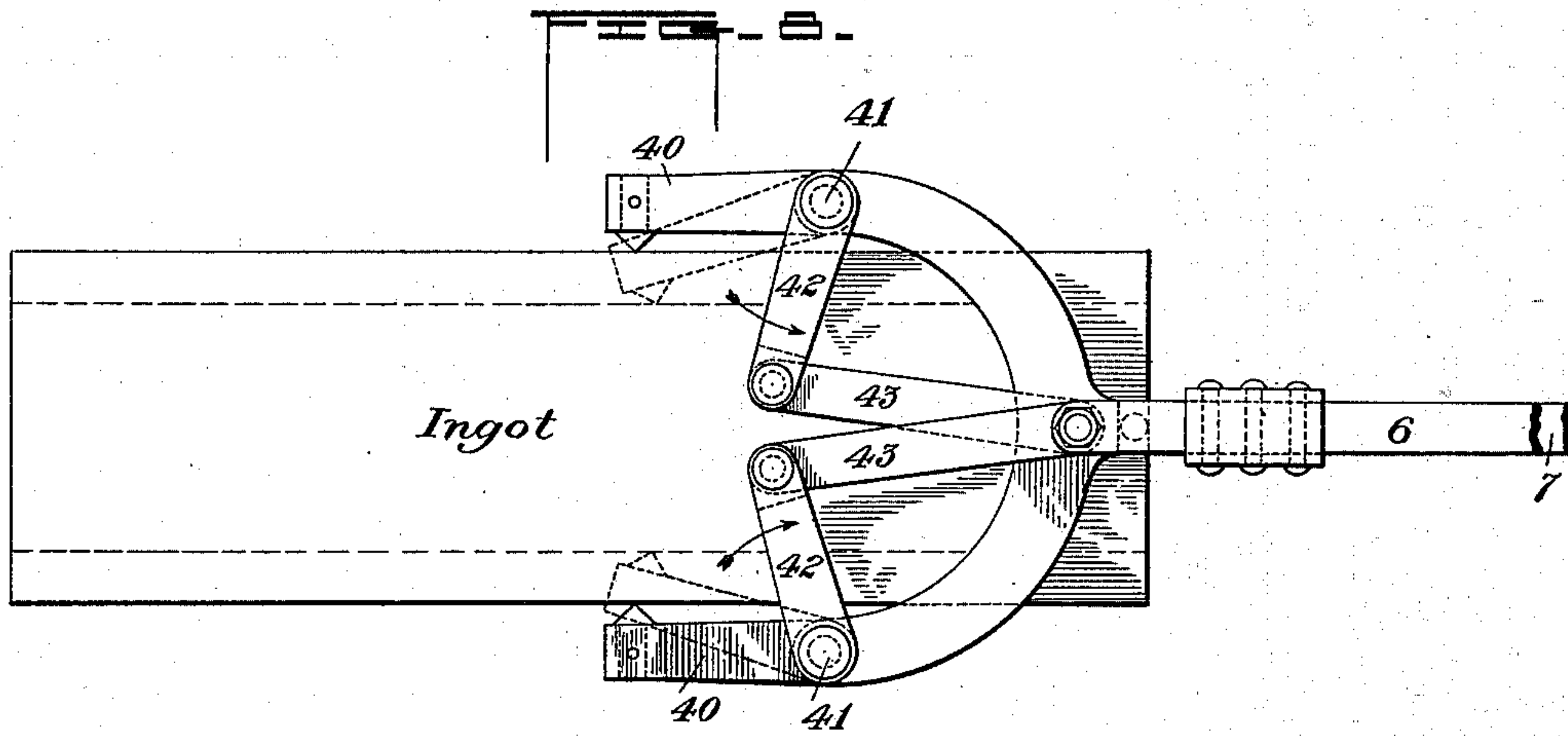
(No Model.)

5 Sheets—Sheet 5.

J. KENNEDY & S. FORTER.
MILL APPLIANCE.

No. 410,108.

Patented Aug. 27 1889.



Witnesses

N. D. Corwin

A. L. Gill

Inventors

Samuel Forter

Julian Kennedy

by W. Baxwell & Sons
their Attorneys

UNITED STATES PATENT OFFICE.

JULIAN KENNEDY AND SAMUEL FORTER, OF LATROBE, PENNSYLVANIA.

MILL APPLIANCE.

SPECIFICATION forming part of Letters Patent No. 410,108, dated August 27, 1889.

Application filed April 16, 1889. Serial No. 307,403. (No model.)

To all whom it may concern:

Be it known that we, JULIAN KENNEDY and SAMUEL FORTER, of Latrobe, in the county of Westmoreland and State of Pennsylvania, have invented a new and useful Improvement in Mill Appliances, of which the following is a full, clear, and exact description.

The object of our invention is to provide simple and efficient apparatus intended for use principally in charging and removing ingots into or from furnaces, and it is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the charging and discharging apparatus shown in connection with a heating-furnace, the latter being in vertical section. Fig. 2 is a sectional end elevation of the apparatus, the section being on the line II II of Fig. 1. Fig. 3 is a view of a modified form of the apparatus. Fig. 4 is a side elevation of another modified form. Fig. 5 is a horizontal section on the line V V of Fig. 4. Fig. 6 is a side elevation of another modified form. Fig. 7 is a side elevation of a modified form of parts of the apparatus. Fig. 8 is a plan view of a modified form of gripping-jaws, shown in connection with an ingot. Fig. 9 is a side elevation thereof.

Like symbols of reference indicate like parts in each.

In Fig. 1 we show our improved apparatus adapted to use in moving the hollow or annular blooms used in the manufacture of car-wheel tires. For this purpose the gripping mechanism is preferably constructed to engage the inner periphery of the bloom at diametrically-opposite points. In Fig. 3 we show the gripping mechanism adapted in construction to grasp an oblong ingot of the ordinary form, and in Figs. 4 to 9 we show other forms of application of our invention. These modifications are illustrated for the purpose of indicating that the invention covered by this patent, and as stated in the broad claims thereof, is not limited to the precise construction of mechanism herein described, but may be varied in many ways by the skilled mechanic.

Referring now to Figs. 1 and 2 of the drawings, 2 is a horizontal jib, by which the charging apparatus is supported, and 3 is a trolley or truck frame, provided with wheels

4 and 5, which enable the trolley to be moved back and forth on the jib by hand or by special machinery, such as a racking-cylinder. The jib forms part of a crane, and is vertically movable in the usual manner.

The gripping mechanism consists of a gripping-arm 6 and a gripping lever or frame 7, of which the arm 6, preferably arranged above and on the lever 7, is adapted to be longitudinally movable thereon, being for that purpose arranged in suitable boxes 8. At their outer ends the gripping-arm and gripping-lever are provided with suitable spiked jaws or projections 9, adapted to engage the inner periphery of an annular bloom, as shown in the drawings.

10 are vertical rods extending from the trolley 3 to the lever or frame 7, near the outer end thereof, where they are pivotally connected to said lever by a pin or bolt 11, which thus constitutes the fulcrum of the lever, and the parts of the apparatus are so related in weight that the lever shall be about equally balanced on this fulcrum.

12 are vertical rods, also extending from the trolley to the end *b* of a bell-crank lever, which is preferably constituted of two triangular metal plates 13. This bell-crank lever is also connected at *c* with the end of the lever or frame 7, and at *d* it is pivotally connected with a tubular sleeve or collar 14, loosely encircling a nut 15, which fits on a threaded portion 17 of the movable arm 6 at the rear end of the latter. This nut is provided with a hand wheel or lever 16, by which it may be rotated on the threaded portion 17 of the arm.

18 are struts or diagonal braces, which extend from the trolley to the rods 12 and impart strength to the apparatus.

The operation of the apparatus is as follows: If it be desired to remove the annular bloom from a heating-furnace, the arm 6 is moved by means of the hand-wheel 16, so as to make the distance between the spikes of the projecting arms 9 a little less than the internal diameter of the bloom. The crane of which the jib 2 forms a part and the trolley on the jib are then moved so as to bring the jaws 9 directly above the annular tire within the furnace, and the jib is then lowered, so as to cause these arms to descend within the tire and

the lever 7 to rest upon the edge of the latter. The effect of the resting of the lever 7 upon the tire or on any other support is to cause the arm 6 and lever 7 to tilt on the pivot 11, and by thus moving down the end *c* of the lever 7 the bell-crank lever 13 is caused to turn on the pivot *b*, thereby moving the end *d* thereof in the direction of the arrow *e* and pulling back the arm 6, so as to lessen the distance between the spikes of the jaws 9. The arm 6 may then be projected by means of the hand-wheel 16, so as to bring the spikes of the jaws 9 into contact with the inner side of the bloom. If now the jib 2 be raised so as to elevate the arm 6 and lever 7, the effect is to cause the latter to tilt forward on the pivot 11, elevating the end *c* of the lever 7, and thereby causing the bell-crank lever 13 to move on the pivot *b* in the direction of the arrow *f*, and to project the arm 6, so as to cause the spikes on the ends of the jaws 9 to firmly grasp the bloom and to lift the latter as the jib is lifted. The bloom may then be withdrawn from the furnace by moving the trolley and the jib in the usual way, and when it is brought to the place on which it is to be deposited the mere act of resting the bloom upon the ground or other support will cause the rear ends of the arm 6 and lever 7 to tilt downward on the pivot 11, thereby drawing back the arm 6 to a slight extent and releasing the gripping-jaws 9 from the bloom. The gripping device is therefore entirely automatic in its action—that is to say, the act of raising the grippers by the crane causes them to grasp the metal bloom, and the depositing of the burden on a supporting-surface releases the grasp of the grippers, as will be readily understood from the foregoing description. By means of the hand-wheel 16 we are enabled, by projecting or retracting the arm 6 on the lever 7, to adjust the gripping-arms to suit ingots of any size. We have clearly illustrated this feature of adjustment by the dotted lines in Fig. 1.

In the modification shown in Fig. 3 the apparatus is modified structurally, so as to be adapted to grasp the usual oblong ingot, and the arm 6, instead of moving outwardly to engage the ingot, is adapted for this purpose to move inwardly. To this end we arrange the bell-crank lever 13, so that its elbow or fulcrum *b* shall be on the outer side of the pivot *c*, instead of on the inner side, as shown in Fig. 1. The construction and arrangement of the other parts of the apparatus are substantially as hereinbefore described, the gripping-jaws, however, being modified so as to grasp the exterior and not the interior of the article. With this form of the apparatus the elevation of the jib, causing the outer ends of the arm 6 and lever 7 to drop on the pivot 11, and elevating the end *c* of the lever 7, will cause the end *d* of the bell-crank lever to move back in the direction of the arrow *e*, and will cause the grippers to grasp

the tire, while the lowering of the jib and the supporting of the outer ends of the arm 6 and lever 7 will cause the reverse movement of the parts, so as to separate the gripping-arms and to disengage them from the article.

In Figs. 4, 5, 6, and 7 we show modified forms of the automatic mechanism for operating the gripping devices, and in Figs. 8 and 9 we show a modified form of the gripping devices themselves.

Referring to Figs. 4 and 5, the arm or frame 7, constituting a part of the gripping-jaws, and constructed substantially as shown in Fig. 1, is connected rigidly to the suspending-rod 10, which is pivotally connected by a transverse bar 18 to the carriage 3, and is also pivotally connected to the end of a counterweighted lever 20, the weight on which is of sufficient gravity and is properly placed to balance and to sustain the gripping apparatus when not carrying an ingot or other burden.

The rear end of the gripper-arm 6 is provided on its surface with a series of rack-teeth 21, and a gear-wheel 22, pivoted between brackets extending from the arm 7, is in gear with the said rack-teeth. A lever-yoke 23 is pivoted at 24 to the lower end of a hanger 25, suspended from the carriage 3, and is provided at its ends with conical projections 26, fitting in correspondingly-shaped seats in the opposite sides of the gear-wheel 22. A bolt 27, which passes through the gear-wheel and through the conical ends of the lever 23, is keyed to said gear-wheel, and is provided with a crank-lever 28. A nut 29, set on the end of the bolt 27, affords means by which the conical projections on the lever 23 may be forced into their normal positions against the sides of the gear-wheel, so as to connect the latter rigidly with the lever.

The operation of this form of our improvement is as follows: Fig. 4 shows the parts as they are when the grippers are in position over an ingot. To bring the gripper-jaws into gripping contact with the ingot, the operator raises the outer end of the lever 23, and by means of the usual lifting mechanism of the crane raises the jib, whereupon the weight of the ingot, acting on the gripper-arm 6, arm 7, and hanger 10, will pull this hanger down, and because the hanger 25 is attached to the carriage 3 there is produced a relative motion of the lever 23 in the direction of the arrow *h*, thus rotating the gear-wheel 22 in the direction of the arrow *i*, and through it moving the rack, so as to draw back the gripper-bar 6, and to cause the gripping-jaws to bite very firmly on the ingot and to lift the same with the jib, and as the force exerted by the gripping-jaws on the ingot is proportioned to the weight of the burden lifted by the crane the load is held and carried with great security. When the ingot is deposited upon the ground or other support, the consequent elevation of the gripper-arms 6 and 7 will raise the hanger 10, and will thereby effect motions of the lever

23 and gear-wheel 22 in reverse directions to those above described, so as to loosen the gripper-jaws from the ingot.

If it be desired to vary the distance between the jaws 9, so as to adjust the grippers to the work of lifting ingots of different sizes, the nut 29 on the bolt 27 is loosened, thereby disengaging the gear-wheel 22 from the lever 23 and leaving the said gear-wheel free to rotate independently. Now by turning the crank 28, and thus rotating the gear-wheel, the rack 21 may be moved in either direction to the desired position and the parts fixed in their proper adjustment by tightening the nut 29.

In the modification shown in Fig. 6, instead of the gear-wheel 22, there is employed a chain-wheel 30, and a chain 31 extends from the carriage 3 around the chain-wheel and over a sheave 32 on the carriage, and is provided at its end with a counter-weight 33. The wheel 30 is also provided with two other chains 34 and 35, attached to the periphery of the wheel and connected with the gripper-arm 6 at points on opposite sides of the wheel. The extent of motion of the gripper-arm 6 on the part 7 is limited by a pin 36, which passes through slots formed in a bracket attached to the part 7 and through one of several holes *m* formed in the gripper-arm 6.

The operation of this form of the apparatus is as follows: The arm 6 is first retracted by rotating the chain-wheel 30 by the crank 28, as hereinafter explained, so as to cause the gripping-jaws to engage the ingot. Then in raising the crane the weight of the parts 6, 7, and 10 and of the burden causes the descent of the hanger 10, and also of the chain-wheel 30, which, drawing on the counterweighted chain 31, will revolve in the direction of the arrow *i*, and by means of the chain 35 will draw back the gripper-arm 6 and cause it to grasp the ingot. When the ingot is again deposited upon a supporting-surface, the consequent elevation of the gripper-arm 6 will permit the counter-weight 33 to reverse the rotation of the wheel 30 and to loosen the grasp of the grippers. The extent of motion of the gripper-arm 6 is limited by the length of the slot formed in the brackets through which the pin 36 passes, and the grippers can be adjusted for the purpose of grasping ingots of various sizes by removing the pin 36 from the hole in the gripper-arm 6, then by turning the wheel 30 projecting or retracting the gripper-arm to the desired degree, and then reinserting the pin in that one of the holes in the gripper-arm which is opposite to the slot. For the purpose of thus turning the wheel 30 to secure adjustment of the gripping device, and to cause the gripping-jaws to bite upon the ingot, as above stated, we provide this chain-wheel with a crank-arm 28.

In the modification shown in Fig. 7 the end of the sliding gripper-arm 6 is connected to a bell-crank lever 37, which is also pivotally connected with the hanger 25 and with a bracket formed on the hanger 10 and arm 7.

In this case the weight of the ingot, causing the descent of the gripping device and the hanger 10, will effect a relative upward motion of the pivotal connection 24 at the end of the hanger 25, and will thereby rotate the bell-crank in the direction of the arrow *i*, and will effect a horizontal back motion of the gripper-arm, causing it to grasp the ingot, as before explained. In this modification the gripping device is adjustable to suit ingots of various sizes by shifting the connections between the bell-crank lever and the gripper-arm 6. This is done by connecting these parts by a detachable pin passing through a vertical slot in the bell-crank and forming a number of pin-holes in the gripper-arm. By means of a hand-lever 38, which is pivotally connected at the points 24 and 39, as shown in the drawings, the gripper-bar 6 may be moved in either direction to bring the slot into register with any of the pin-holes, and by the same lever the gripper-arm is moved to bring the jaws into contact with the ingot before raising the jib of the crane.

In Figs. 8 and 9 we show a modified form of gripping-jaws, which may be applied to any of the forms of our invention above described. In this form of the apparatus the jaws 40 are keyed to the ends of pins 41, which extend through the ends of a forked extension of the gripper-arm 7, and at their upper ends are keyed to inwardly-projecting levers 42, the extremities of which are connected by links 43 with the end of the longitudinally-movable gripper-arm 6. In the use of this form of the apparatus longitudinal movement of the gripper-arm 6, produced in the manner above described, will cause the jaws 40 to move on their pivots 41 inwardly or outwardly, accordingly as the gripper-bar is moved forward or backward. The gripping-jaws shown in the figures last described may be modified in various ways, as may also the other parts of the apparatus.

The preferable form of our improved apparatus is that which we have shown in Figs. 1, 2, and 3, and these are the forms which we intend to embody particularly in the specific claims of this patent. The other figures of the drawings are illustrated mainly for the purpose of indicating the changes which, within the scope of the broad claim, may be made in the apparatus.

The advantages of our invention will be appreciated by those skilled in the art, and the apparatus may be modified greatly in form and proportions without involving a departure from the principles of our invention.

We claim—

1. A gripper-arm and gripper-lever, said lever being pivotally connected with and suspended from the supporting-frame by which the gripping device is raised and lowered, and a lever having pivotal connections—namely, with the gripper-arm and gripper-lever and with the supporting-frame—so that the motion of the gripper-lever on its fulcrum

shall cause a relative motion of the gripper-arm and gripper-lever, substantially as and for the purposes described.

2. The combination of the gripper-lever 7 and longitudinally-movable gripper-arm 6, with a screw-extension from the outer end of the arm 6, and a nut and lever or wheel working thereon, the lever 7 being connected with a collar on such nut for the purpose of adjusting the bite of the gripping devices, substantially as and for the purposes described.

3. In a gripping device for handling heavy articles—such as ingots—the combination, with a gripper-lever 7, pivoted to the suspending-frame 10 12, of a gripper-arm 6, operating with such gripper-lever 7 to engage the article to be lifted, a lever 13, connected at or near the outer end of the gripper lever and arm by pivotal connections, one with the gripper-lever 7, another with the suspending-frame 12, and a third with a collar 14 on a rotary sleeve-nut 15, working on a screw 17 at the outer end of the gripper-arm 6, arranged and operating substantially as and for the purposes set forth.

4. The combination, with gripping-jaws, of a projecting lever or frame which carries the

same, said lever or frame being movable independently of its support, and being mechanically connected with said gripping-jaws, whereby elevation of the lever or frame with its burden will through gravity effect a gripping action of the jaws, substantially as described.

5. A gripping device capable of projection under the roof of a furnace, connected with the suspending-frame by a lever or combination of levers, or their equivalent, in such manner that the raising of the suspending-frame will cause the gripping device to grasp a heavy article—such as an ingot, slab, or bloom—with a force proportional to the weight of said article, and the lowering of the suspending-frame and the resting of the article on a support will release the gripping device, substantially as and for the purposes described.

In testimony whereof we have hereunto set our hands this 13th day of April, A. D. 1889.

JULIAN KENNEDY.

SAMUEL FORTER.

Witnesses:

JOHN P. SEYMOUR,

ROBERT W. GRACE.