

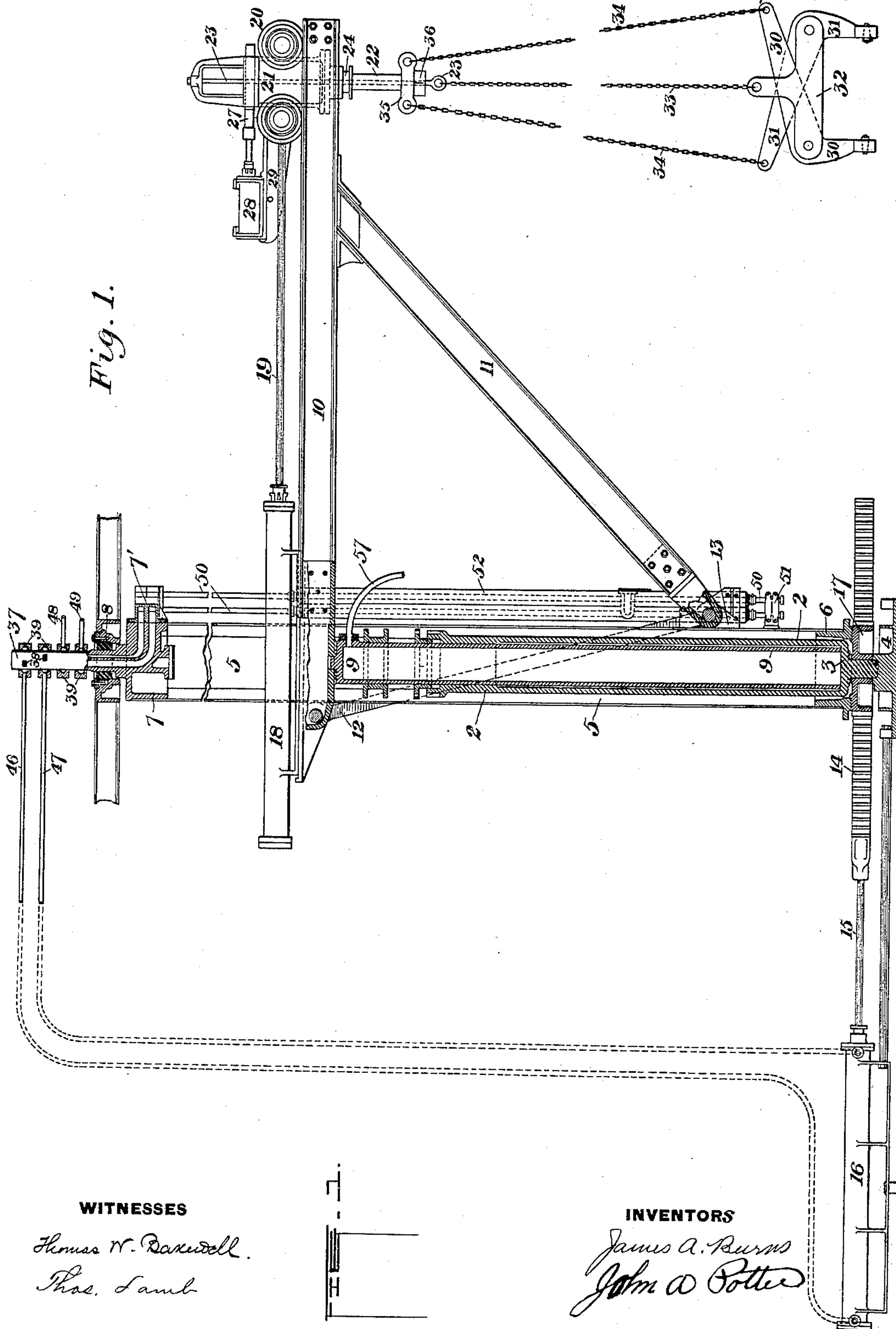
(No Model.)

5 Sheets—Sheet 1.

J. A. POTTER & J. A. BURNS.
CRANE.

No. 461,874.

Patented Oct. 27, 1891.



WITNESSES

Thomas W. Baxendell.
Thos. Lamb

INVENTORS

James A. Burns
John A. Potter

(No Model.)

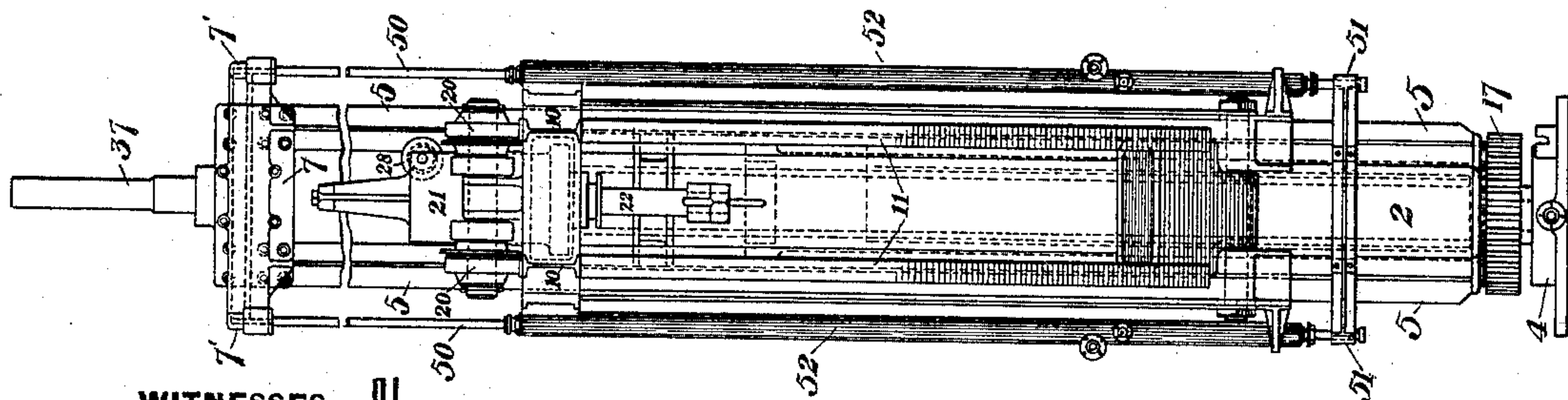
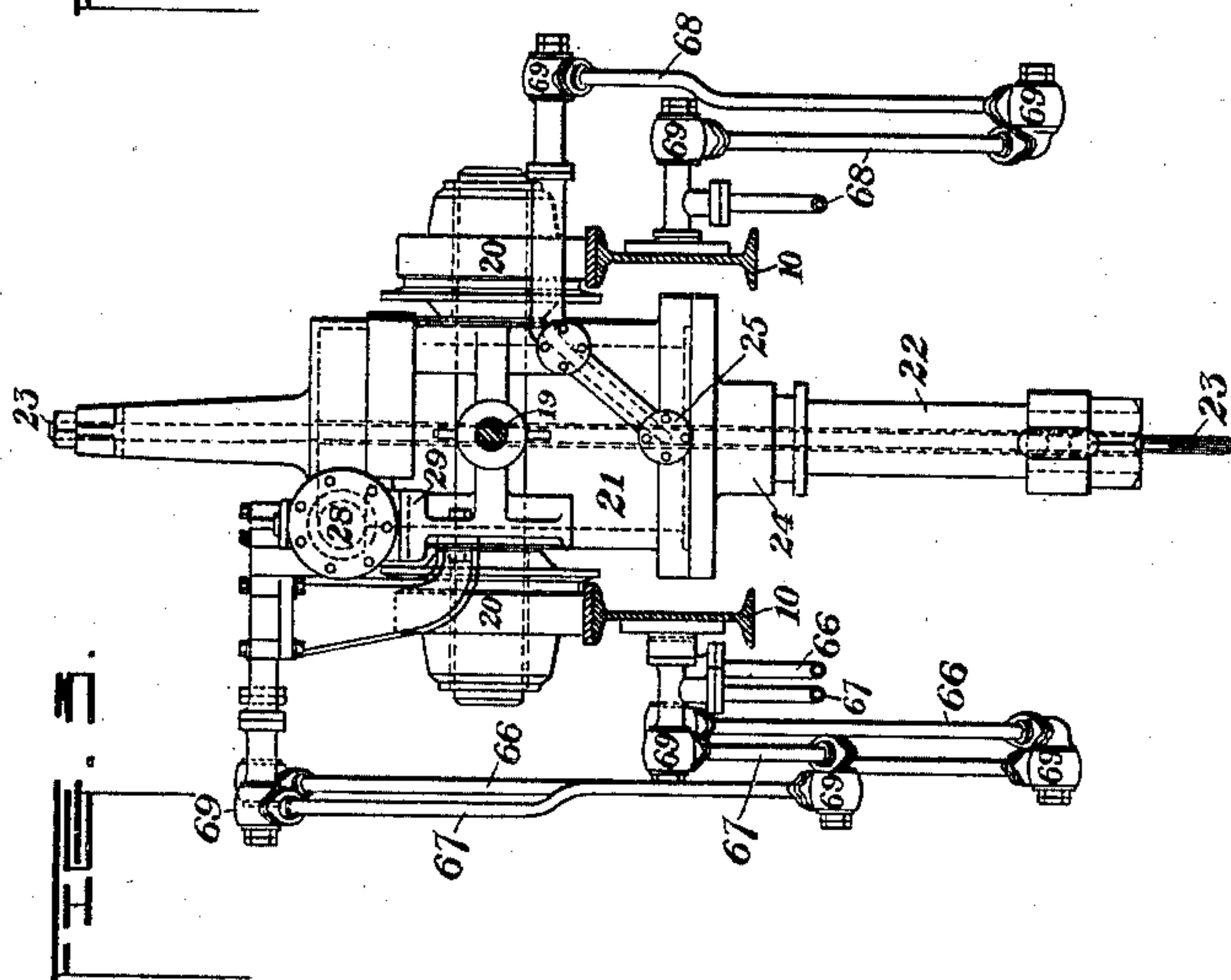
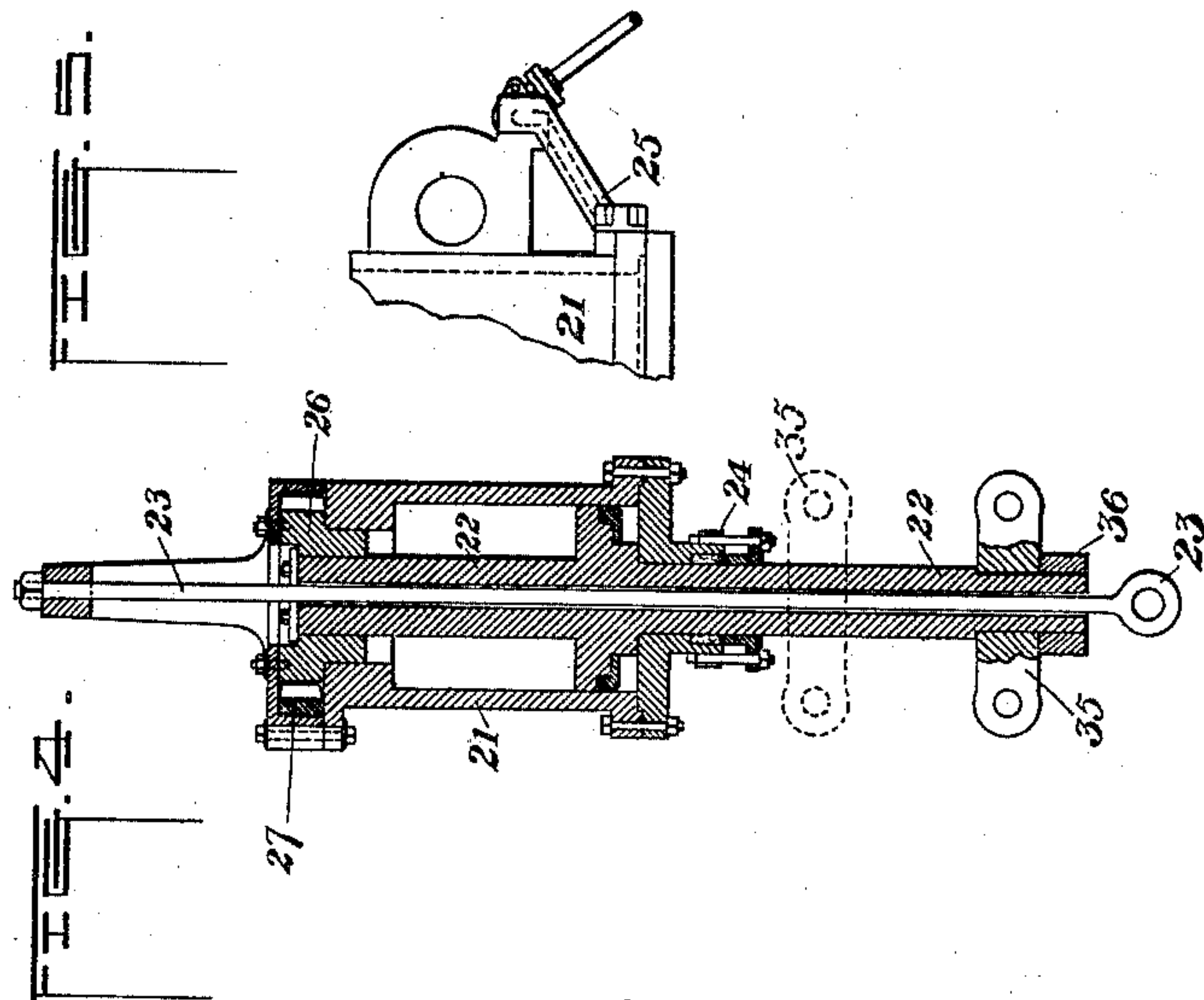
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WITNESSES

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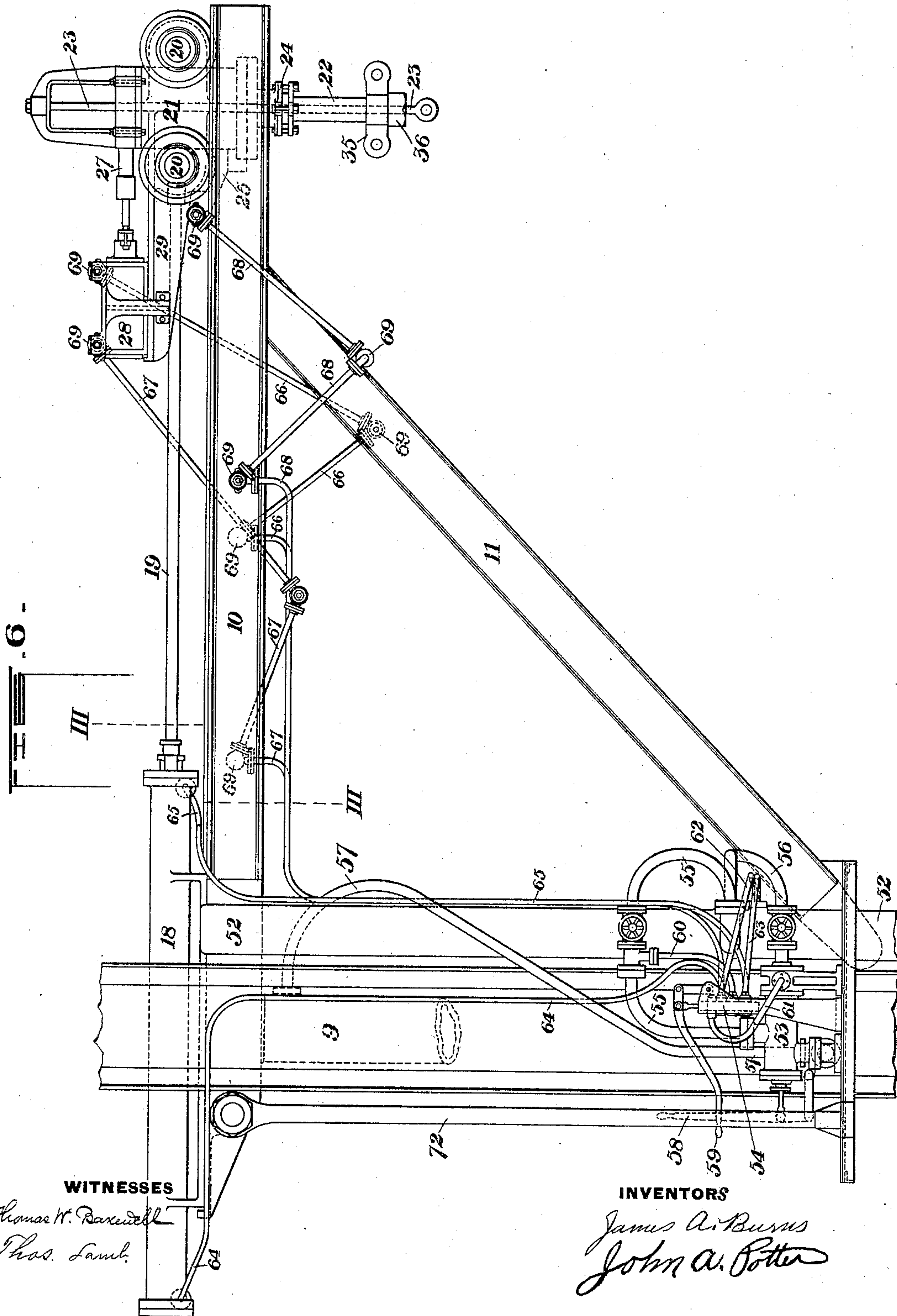
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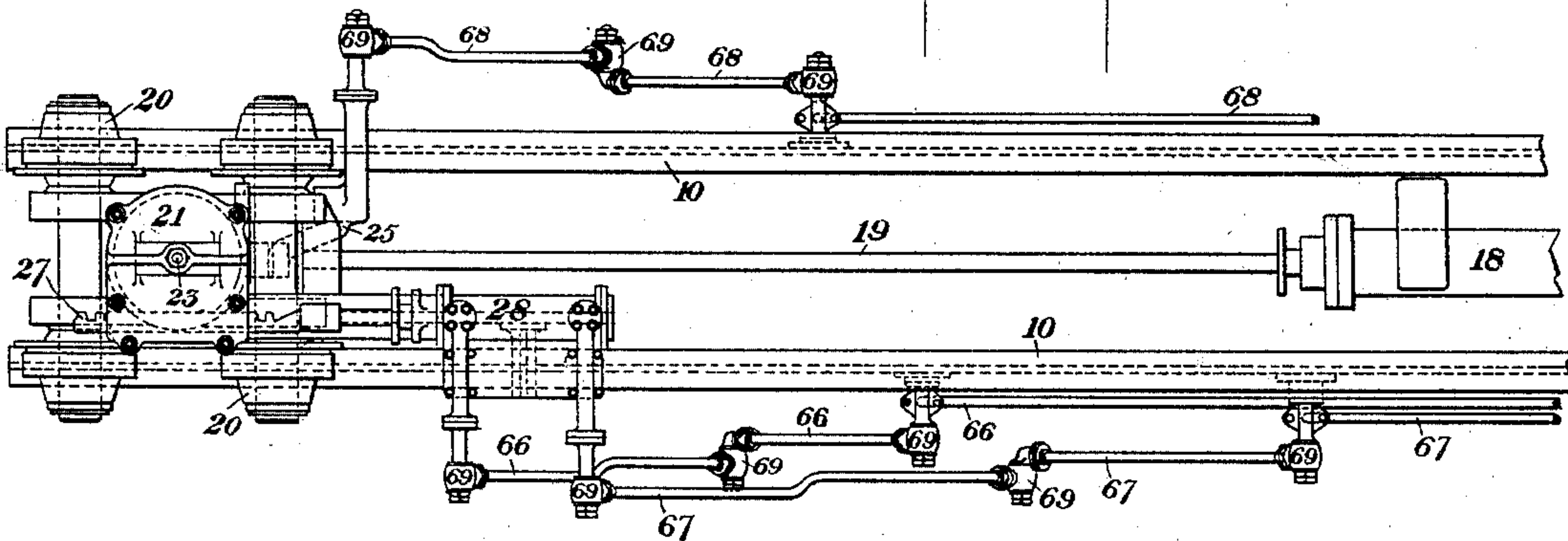
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J. A. POTTER & J. A. BURNS.
CRANE.

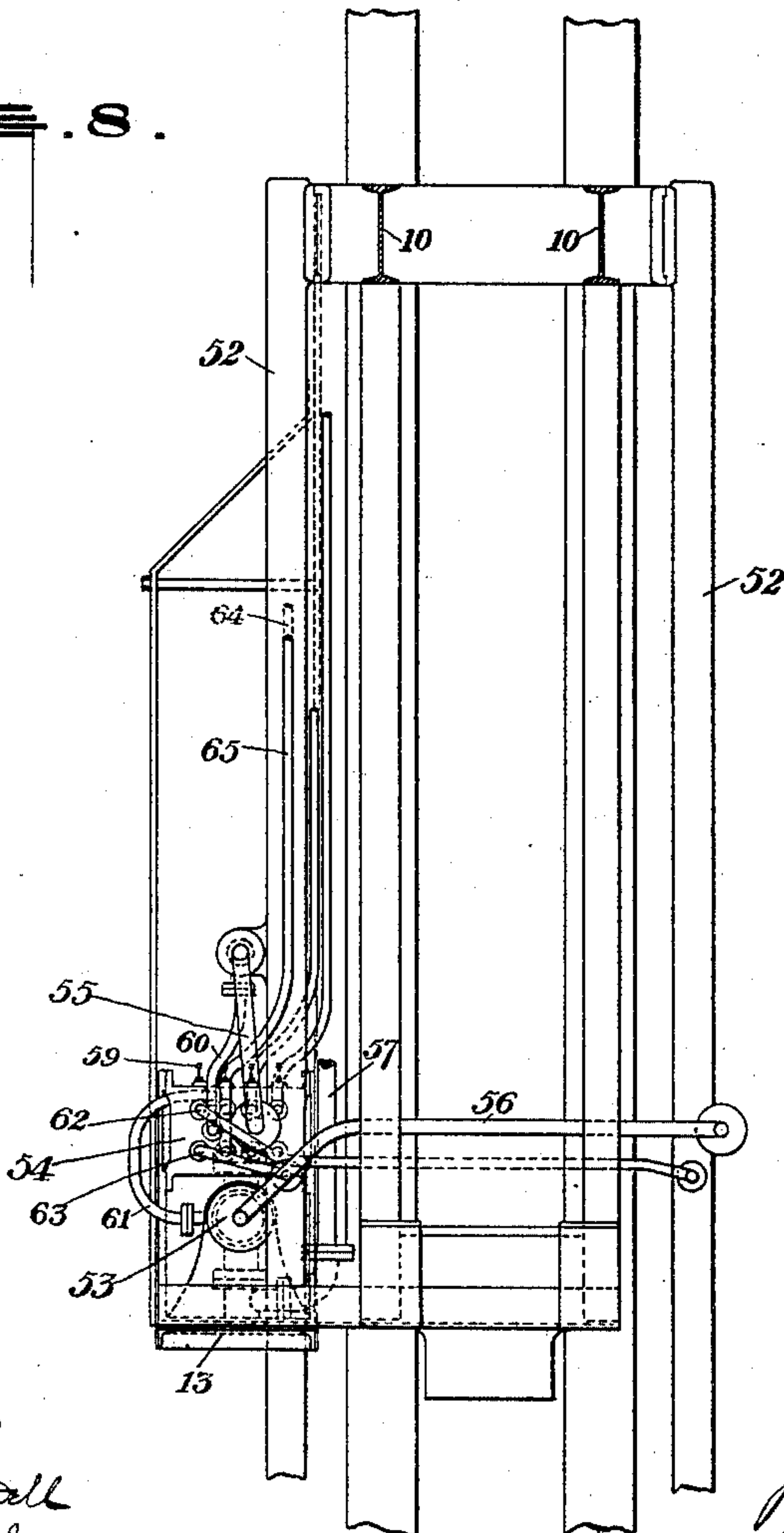
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WITNESSES

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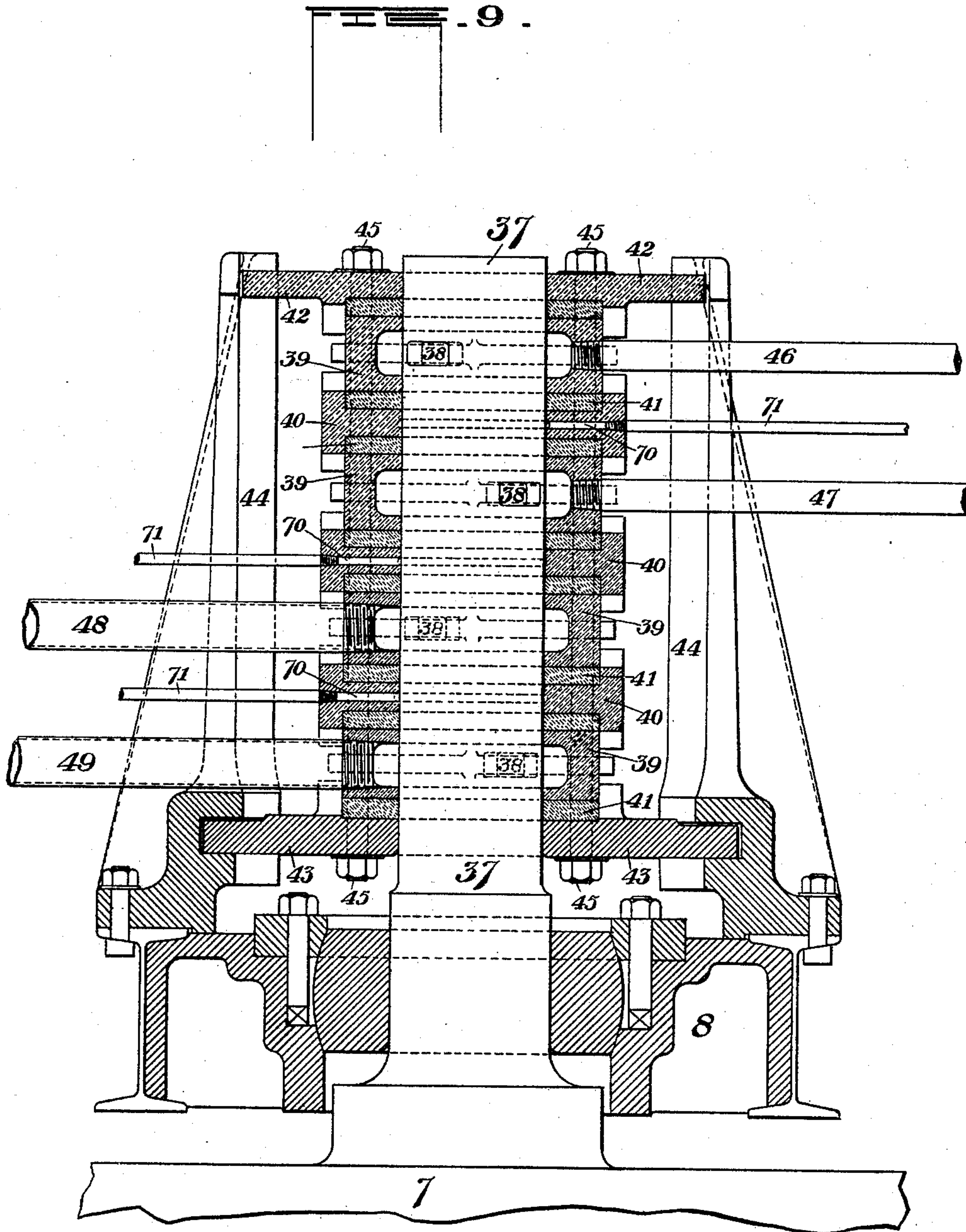
(No Model.)

5 Sheets—Sheet 5.

J. A. POTTER & J. A. BURNS.
CRANE.

No. 461,874.

Patented Oct. 27, 1891.



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UNITED STATES PATENT OFFICE.

JOHN A. POTTER, OF MUNHALL, AND JAMES A. BURNS, OF HOMESTEAD,
PENNSYLVANIA.

CRANE.

SPECIFICATION forming part of Letters Patent No. 461,874, dated October 27, 1891.

Application filed September 19, 1890. Serial No. 365,541. (No model.)

To all whom it may concern:

Be it known that we, JOHN A. POTTER, of Munhall, Allegheny county, Pennsylvania, and JAMES A. BURNS, of Homestead, Allegheny county, Pennsylvania, have invented a new and useful Improvement in Cranes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of our improved crane, showing the crane-cylinder and plunger and its top water connections in vertical section, some of the water connections being omitted for clearness of illustration. Fig. 2 is a front elevation of the crane. Fig. 3 *et seq.* are on a larger scale. Fig. 3 is a vertical section on the line III III of Fig. 6. Fig. 4 is a vertical section of the cylinder for operating the ingot-tongs. Fig. 5 is a detail view. Fig. 6 is a side elevation, on an enlarged scale, of the jib and the hydraulic mechanism thereon. Fig. 7 is a partial plan view of the jib and the mechanism thereon. Fig. 8 is a front elevation of part of the mast. Fig. 9 is an enlarged vertical section of the water connections at the top of the crane-cylinder.

Like symbols of reference indicate like parts in each.

In Fig. 1, 2 represents the upright crane-cylinder, having a foot 3 stepped on a base-plate or socket 4. 5 is the crane-mast, consisting of upright parallel beams set on opposite sides of the cylinder, secured at the base to a foot 6 and at the top secured to a casting 7, whose contracted neck has its bearing in a top steadiment 8. 9 is the plunger, which is set in an upright position within the cylinder, and 10 is the horizontal jib, which has a bearing on the top of the plunger and may be provided with a knee-brace 11 and struts 12, connecting it with a bracket or shoe 13, which moves vertically on the mast. The crane may be rotated by any suitable means—for example, by a rack 14, fixed to the plunger 15 of a double-acting hydraulic cylinder 16 and in gear with a pinion 17, encircling the foot of the crane-cylinder and bolted to the foot 6 of the mast.

The parts of the crane as above described are not of our invention and are not claimed

herein. They may be substituted by other known crane mechanism adapted to produce like results.

18 is a double-acting racking-cylinder set horizontally on the jib and having a plunger 19, which extends along the jib and is connected to a trolley 20, whose wheels ride on the beams of which the jib is composed. This trolley carries a vertical cylinder 21, (preferably single-acting,) whose plunger 22, Figs. 1, 3, 4, and 6, projects at both ends, and at the lower end the cylinder is provided with a suitable stuffing-box 24. A rod 23 extends vertically through this plunger and at its upper end is attached to a part of the trolley-frame.

25 is the water-supply pipe, which enters the cylinder below the head of the plunger.

26 is a pinion fixed to the plunger at the upper end of the cylinder, and 27 is a rack in gear with the pinion and adapted to rotate it and thereby to turn the plunger within the cylinder. This rack is operated by a small double-acting cylinder 28, which is supported by a bracket 29 on the trolley-frame.

The plunger 22 and rod 23 are adapted to operate tongs for grasping and upholding metal ingots, &c., and may be constructed in the following manner: 30 and 31 are the arms of the tongs, shaped like elbow-levers and pivoted to a bar or frame 32. A chain or other suspending device 33 connects this bar to the rod 23, and other chains or suspending devices 34 connect the arms 30 and 31 with the plunger 22, being preferably attached to a collar 35, which encircles the plunger and is upheld by a nut 36 at the end of the latter. The tongs shown in the drawings are not new, and their construction we do not claim, and within the scope of this part of our invention other forms of tongs having separate suspending devices connecting its arms and fulcrum with the rod 23 and the plunger may be substituted.

The operation of the apparatus as above described is as follows: To pick up an ingot from the floor of the mill or other place in which the apparatus is situated, the crane-mast is rotated so as to bring the jib above the ingot, and by means of the racking-cylinder 18 the trolley is moved on the jib, so as

to bring the tongs in vertical line with the ingot. The jaws of the tongs, being open, as shown in Fig. 1, are fitted to opposite sides of the ingot, and then water is admitted to the cylinder at the lower side of the head of the plunger 22, so as to raise the plunger on the rod 23, as shown by dotted lines in Fig. 4, while the rod itself remains stationary. The effect of this is to lift the arms 30 and 31, and thereby to cause the jaws of the tongs to close firmly against and to grasp the sides of the ingot. Then by lifting and swinging the crane-jib and, if necessary, racking the trolley on the jib the ingot may be conveyed to any place within the sweep of the crane. To release the ingot, the jib is lowered to deposit the ingot on the ground and the water is exhausted from the cylinder 21, thereby causing its plunger to descend on the rod 23, and, by releasing the arms of the tongs from upward pressure, causing them to be disengaged from the ingot. If in picking up the ingot it be necessary to turn the tongs to bring them into proper position to seize the ingot, or if after the ingot is picked up it is desired to turn it on its vertical axis, these results may be effected by projecting the rack 27 by means of the hydraulic cylinder 28, thereby rotating the pinion 26, the plunger 22, the collar 35, which is carried by the plunger, and the tongs, which are suspended from the collar. The great advantages in saving of labor which this apparatus affords in the automatic manner of picking up and handling the burden make the crane of very great utility. As soon as the plunger 22 is raised by the admission of water into the cylinder 21 there is formed a water-step under the plunger, which, supporting it without affording frictional resistance to its turning, enables it to be rotated with great ease. This water-step is necessarily constituted whenever the burden of the crane is supported by the tongs, and the result is that whereas severe manual labor has been required to turn the ingot when suspended from the crane our mechanism enables it to be done with great ease. The lifting-cylinder having a plunger rotatory in a water-step is of material advantage, even if employed without the turning-cylinder 28, since it enables the burden of the crane to be turned by hand much more freely than has been possible heretofore. We therefore desire to claim this part of our invention, broadly. It is of great utility and is the occasion of economy in the labor required for operation of the crane.

We shall now describe the water connections by which the several parts of the crane mechanism are actuated.

The water is taken to the crane through the top casting 7, the details of whose construction are illustrated in Figs. 1 and 9. The casting is divided into four longitudinal channels or water-passages, and above the top steadiment extends in a neck 37, of cylindrical form. In this neck are lateral holes 38,

communicating with the respective channels, and around the neck, inclosing each hole, is a box or collar 39, having an annular water-passage, and between each collar is a ring 40, having annular packing 41 on both sides, which fits against the adjacent collar. The whole series of collars and packing is held by two plates 42 and 43, one at the top and one at the bottom, situate between uprights 44 and connected by vertical bolts 45. Pipes 46, 47, 48, and 49 lead from the water-passages of the collars 39. The pipes 48 and 49 are the exhaust and supply pipes for the motors on the crane, and the pipes 46 and 47 lead to the ends of the cylinder 16 and supply water for operating the same. In order to detect the occurrence of any leaks from the collars 39 past the packing, I provide the rings 40 with annular grooves 70 and with tell-tale pipes 71 leading therefrom. As before stated, the casting 7 has four longitudinal water-passages, which, by means of the annular boxes 39, are in communication with the pipes 46, 47, 48, and 49, respectively. The casting terminates in a horizontal foot 7', and at said foot each of the water-passages is connected to a vertical pipe 50, which pipes 50 extend to and are fixed to a bracket 51, attached to the mast of the crane. Around each of the pipes 50 is a vertical pipe 52. Each of these pipes 52 is fixed at one end to the jib and at the other end to a bracket on the sliding shoe 13, (which moves with the jib,) so that the pipes are adapted to move vertically and telescopically over the inner pipes 50 as the jib rises or descends. At a middle point each of the pipes 50 has a lateral opening, (not shown,) and it is thereby in free communication with its exterior pipe 52 in every position of the latter. The pipes 52 thus form parts of the water-channels, and it is from them that water is supplied to the crane-cylinder and to the hydraulic motors on the jib. 53 and 54 are valves mounted on a pulpit or platform on the shoe or bracket 13, supported by the knee-brace and by a rod 12, which extends to the jib. There are four of the valves 54, which may be contained in a single nest or casting, as shown in Fig. 8, though each has its own actuating lever or handle 59. The special construction of the valves 53 and 54 has nothing to do with our present invention and it is unnecessary to illustrate them in detail. The valve 53 is connected by pipes 55 and 56 with those of the pipes 52 which serve, respectively, as the supply from the accumulator or pumps and as the exhaust, and is also connected with the side of the upper part of the hollow crane-plunger 9 by a pipe 57, which serves for supplying water to the crane-cylinder and for exhausting it therefrom. By moving the lever 58 of this valve it may be set so as to connect the pipe 57 either with the water supply or exhaust and to raise or lower the crane-jib accordingly. The inlet-ports of the valves 54 are connected by a pipe 60 with the supply-pipe 52 (or with the pipe

55, connected with the latter,) and by a pipe 61 with the exhaust-pipe 52, (or with the pipe 56, connected therewith.) The ports of one of the four valves 54 are connected by pipes 5 62 63 with those of the pipes 52, which, by means of the pipes 46 and 47 at the top of the mast, are connected with the ends of the crane-turning cylinder 16. The ports of another of said valves are connected by pipes 10 64 and 65 with the ends of the racking-cylinder 18. The ports of a third are connected by pipes 66 and 67 with the ends of the cylinder 28, while the fourth is connected by a pipe 68 with the port of the single-acting 15 tongs-lifting cylinder 21. It will thus be evident that by proper manipulation of the valve-levers 59 any of the several cylinders 16, 18, 21, and 28 may be actuated in its proper manner, and as this arrangement enables all the 20 motors of the crane to be controlled by one man, who rides on the crane, the work is greatly facilitated and cheapened.

In order to accommodate the water connections and permit the motion of the trolley 20 as it is racked back and forth on the jib, we 25 joint the pipes 66, 67, and 68, as at 69, Fig. 6, thus constituting what are known in the art as "walking-pipes."

It will be perceived by those skilled in the 30 art that changes may be made in divers ways in the construction and arrangement of the parts of the crane without departure from the scope of our invention, as stated in the following claims.

35 We do not claim, broadly, the use of the upright water connection or pipe 37, having water-passages within it, and lateral openings with the encircling water-collars, nor, broadly, the telescoping of the pipes 50 and 52, nor 40 the actuation of the crane-rotating cylinder by water connections leading from a point off the crane to a valve or valves on the crane and from the valve or valves to the rotating cylinder. Of these items we are not the first 45 inventors; but

We do claim herein as our invention—

1. In a crane having a rotatory mast and jib and an upright crane-lifting motor comprising a cylinder and plunger, one of which 50 is rotatory and vertically movable, the combination of a valve and operating-levers carried by and movable with the moving part of the crane, a water-supply pipe leading to said valve from a point off the crane, a pipe leading 55 from said valve to the movable element of the motor, and an exhaust-pipe also leading from said valve, substantially as and for the purposes described.

2. In a crane having an upright crane-lifting motor comprising a cylinder and plunger, one of which is vertically movable, the combination, with such movable part, of a valve 60 carried thereby and a water-supply pipe extending from the valve to said movable part of the motor and entering the same laterally, 65 substantially as and for the purposes described.

3. In a crane, the combination, with the jib, of a lifting-motor on the jib, having an upright cylinder and plunger, one of which is rotatory 70 on its vertical axis on a water-step, and a burden-supporting device suspended from the rotatory part of the motor, substantially as and for the purposes described.

4. In a crane, the combination, with the jib, 75 of a lifting-motor on the jib, having an upright cylinder and plunger, one of which is rotatory on its vertical axis on a water-step, and tongs having pivoted arms suspended from the rotatory part of the motor, substantially 80 as and for the purposes described.

5. In a crane, the combination, with a water-supply, of a trolley, a support suspended from the trolley, upholding the burden of the crane, and a turning-motor comprising a cyl- 85 inder and plunger carried by the trolley, the movable element of the motor being connected with said support, substantially as and for the purposes described.

6. In a crane, the combination, with a water- 90 supply, of a trolley, a support suspended from the trolley, adapted to uphold the burden of the crane, a turning-motor connected with said support, and a lifting-motor also acting on the support, substantially as and for the 95 purposes described.

7. The combination of a cylinder 21, having an inlet for supply of water, a plunger which is longitudinally movable and rotatory in the cylinder, and a stationary rod 23, which 100 extends through the plunger, said plunger and rod being adapted to be connected with mechanism to be operated thereby, substantially as and for the purposes described.

8. The combination of a cylinder 21, hav- 105 ing an inlet for supply of water, a plunger which is longitudinally movable and rotatory in the cylinder, a stationary rod 23, which extends through the plunger, said plunger 110 and rod being adapted to be connected with mechanism to be operated thereby, and a motor connected with the plunger and adapted to rotate the same, substantially as and for the purposes described.

9. The combination, with the jib, of a cyl- 115 inder 21 and a rotatory plunger, a rod 23, extending through the plunger, and tongs having two sets of suspending devices, one extending from the plunger and the other from the rod, substantially as and for the purposes 120 described.

10. In a crane, the combination, with a water-supply, of a trolley, a support suspended from the trolley, upholding the burden of the crane, a turning-motor comprising a cylinder and 125 plunger carried by the trolley, the movable element of the motor being connected with said support, and traveling water connections extending to the trolley and coupled with said motors, substantially as and for the purposes 130 described.

11. In a crane, the combination, with the jib, of a lifting-motor on the jib, having an upright cylinder and plunger, one of which is rotatory

on its vertical axis on a water-step, tongs having pivoted arms suspended from the rotatory part of the motor, and a motor connected with the rotatory part of the lifting-motor and adapted to rotate the same, substantially as
5 and for the purposes described.

12. In a crane, the combination of a water-supply pipe 37, arranged axially with the crane-journal and divided into a plurality of
10 water-passages, encircling collars having water-spaces connected with said water-passages, substantially as described, intermediate

packing-rings, and tell-tale pipes leading therefrom, substantially as and for the purposes described.

In testimony whereof we have hereunto set our hands this 15th day of September, A. D. 1890.

JOHN A. POTTER.
JAMES A. BURNS.

Witnesses:

THOMAS W. BAKEWELL,
THOS. LAMB.