

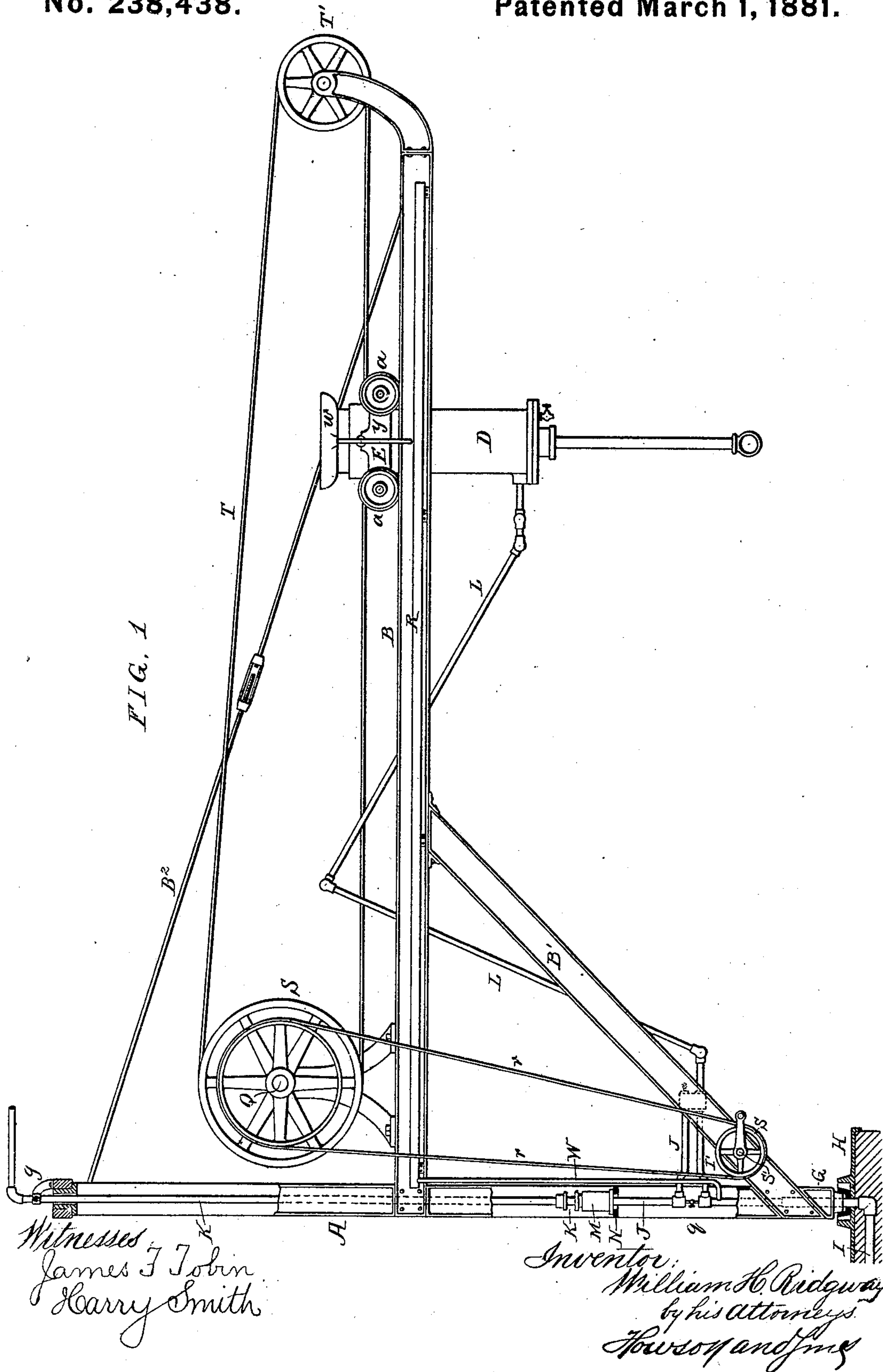
(No Model.)

3 Sheets—Sheet 1.

W. H. RIDGWAY.  
Steam Crane.

No. 238,438.

Patented March 1, 1881.



(No Model.)

3 Sheets—Sheet 2.

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Steam Crane.

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FIG. 2.

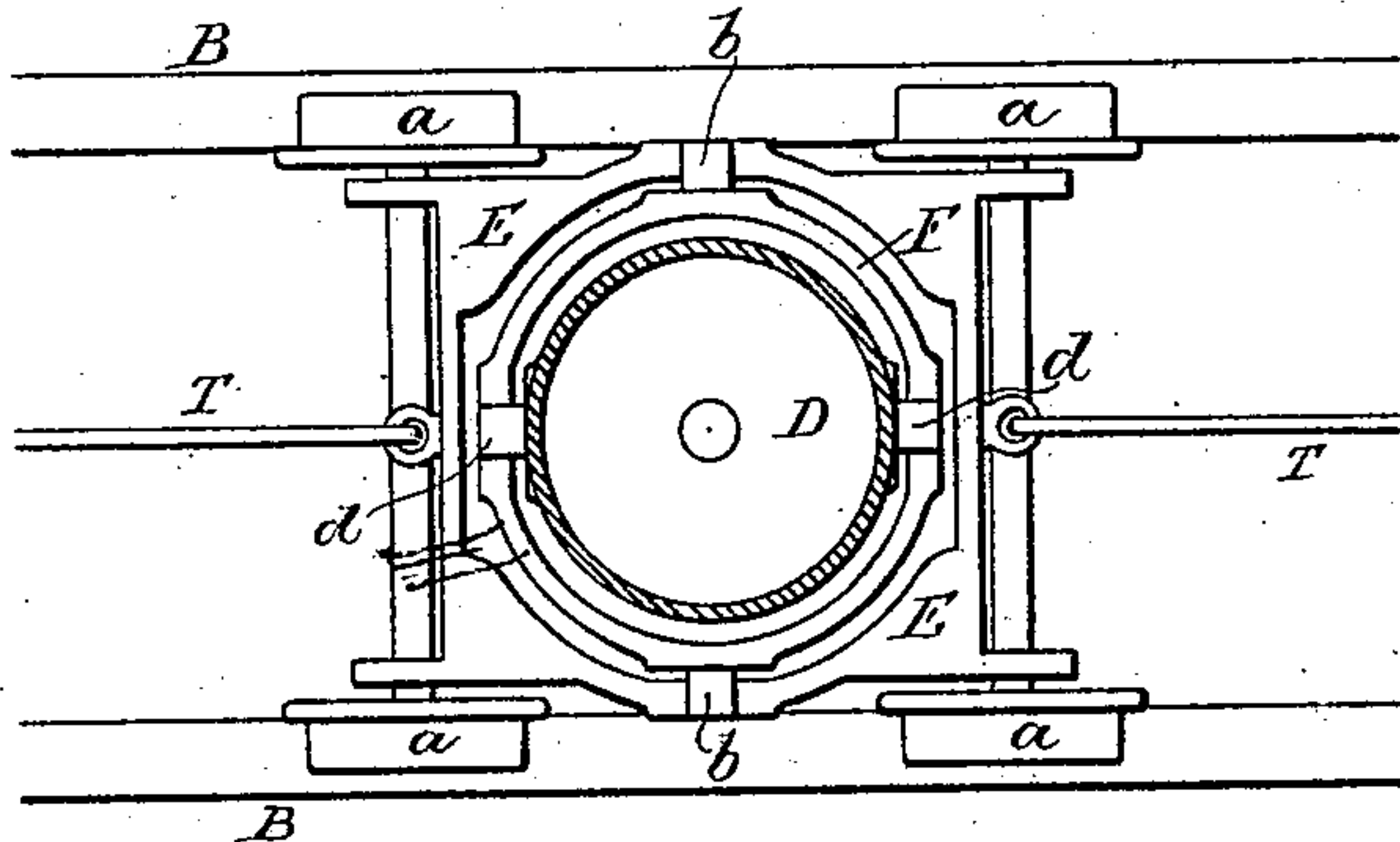


FIG. 3.

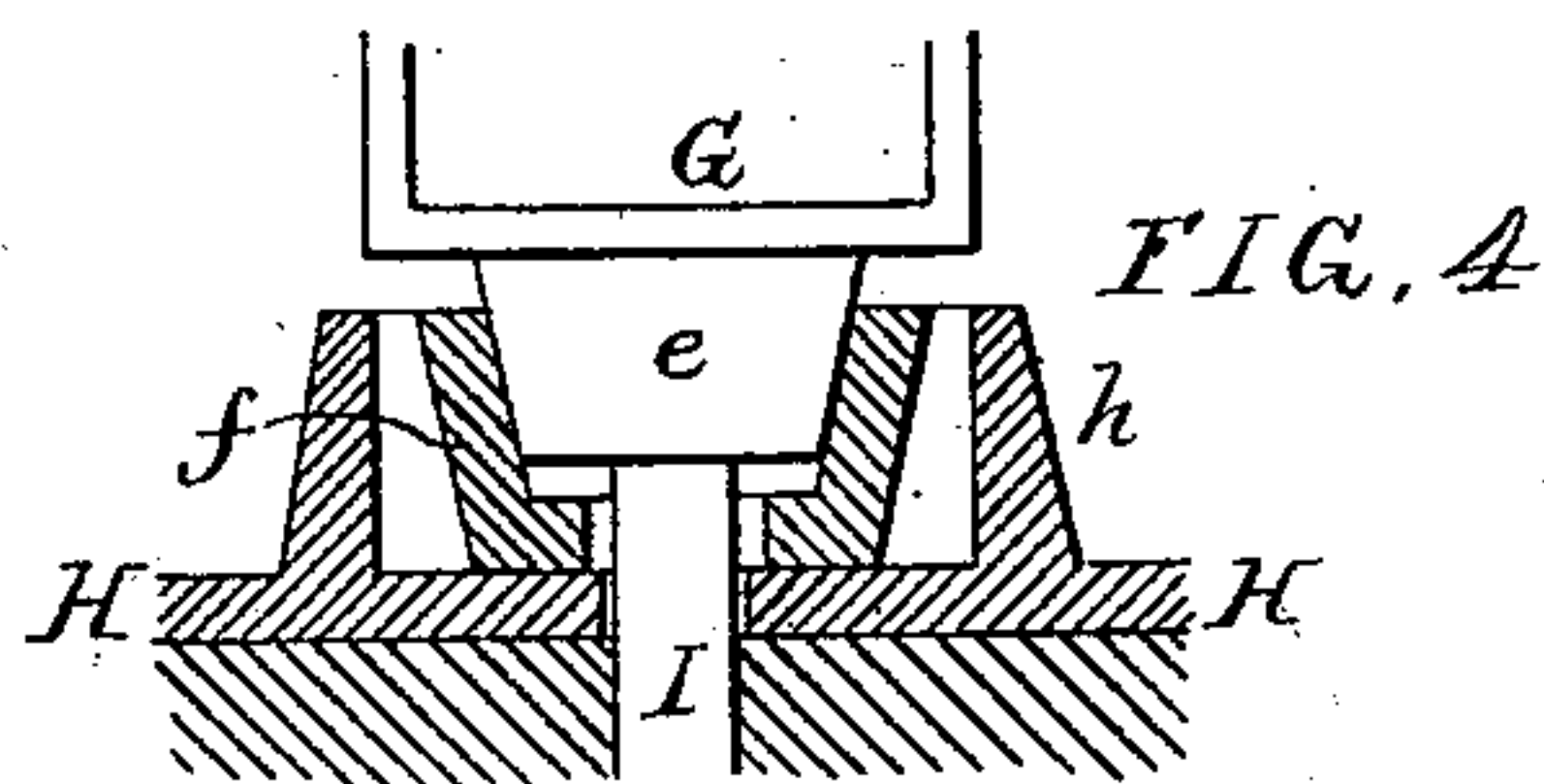
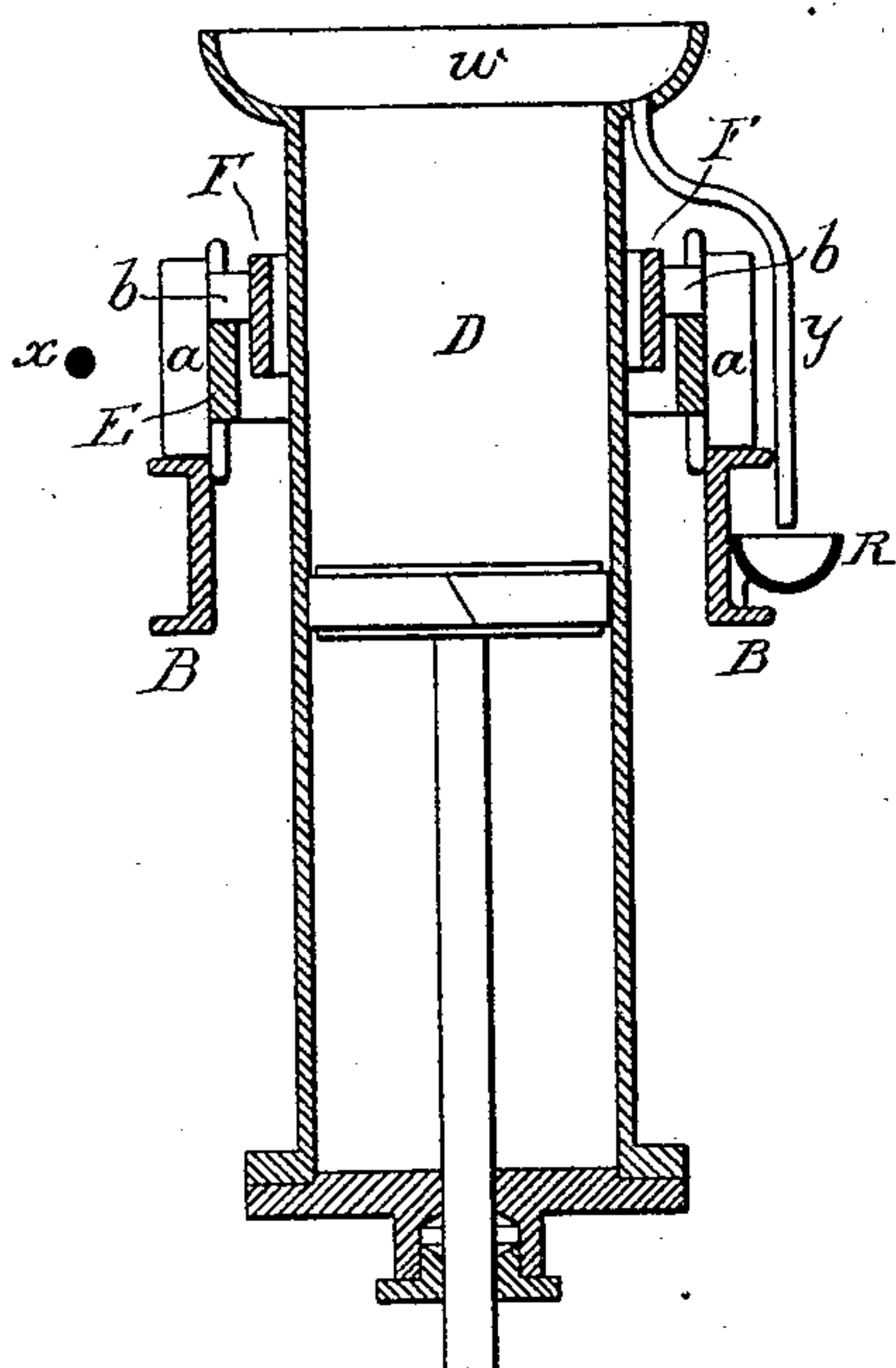


FIG. 5.

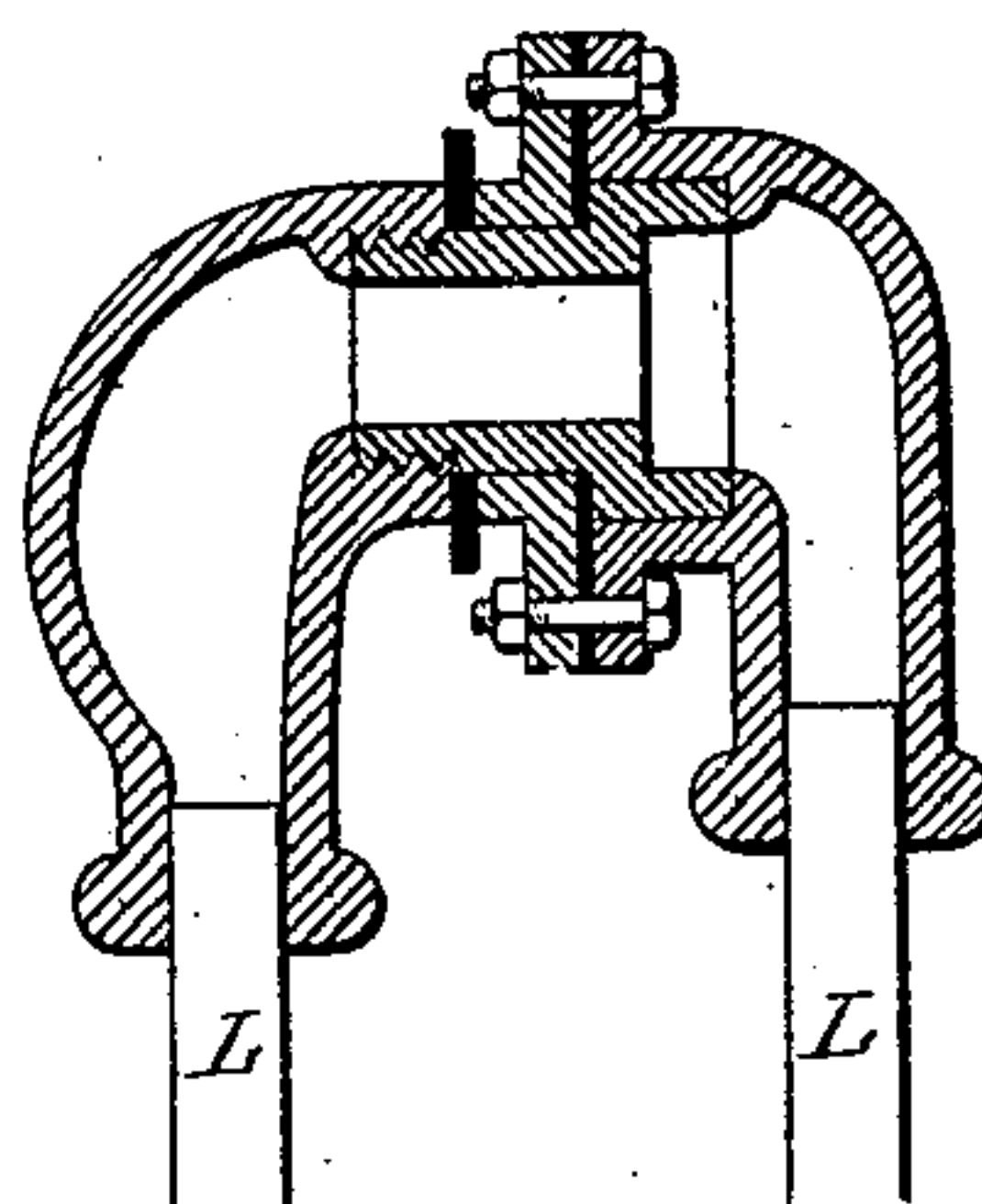


FIG. 6.

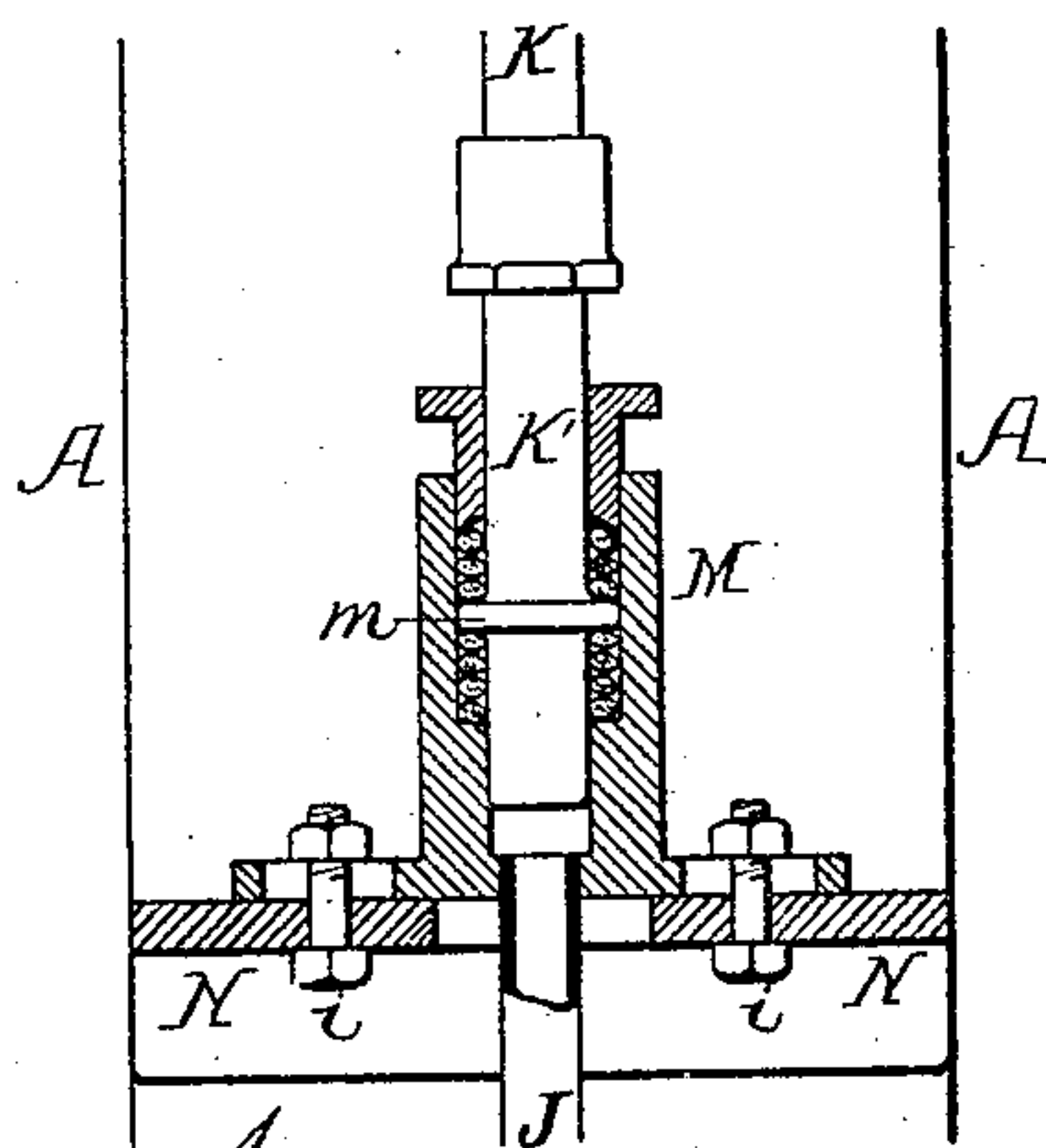
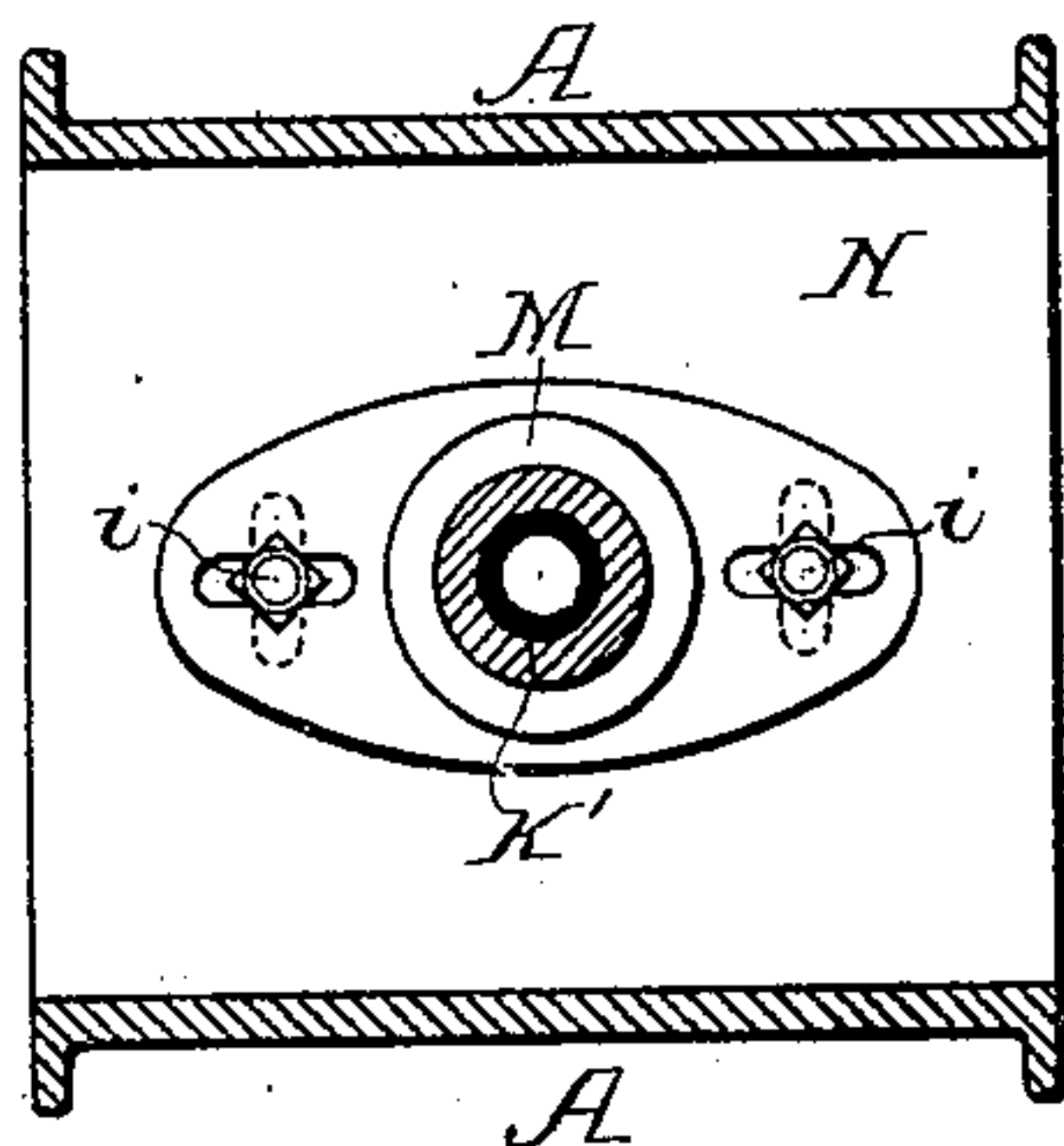


FIG. 7.



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Harry Smith

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William H. Ridgway.  
by his Attorneys,  
Howson and Fox

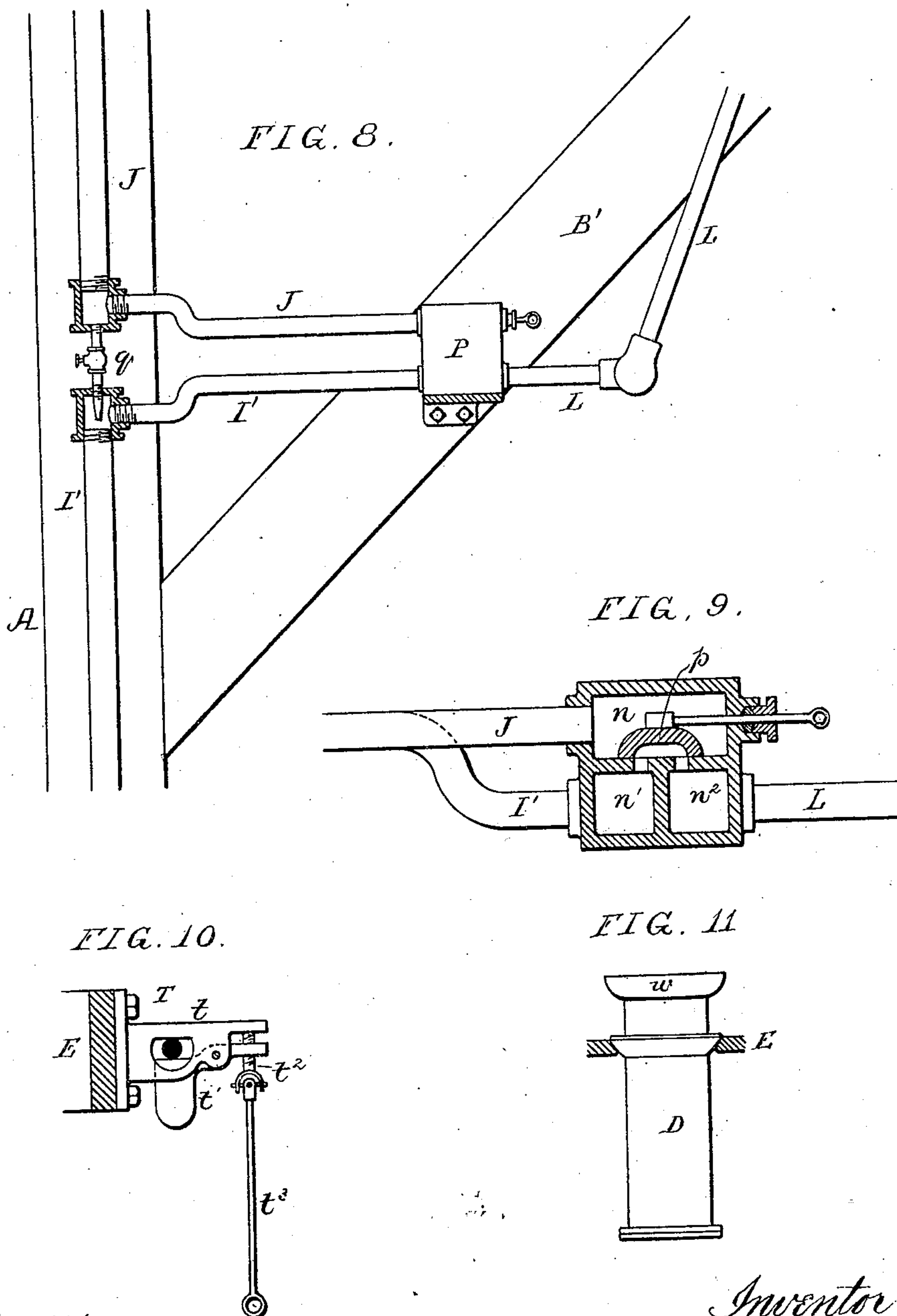
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# UNITED STATES PATENT OFFICE.

WILLIAM H. RIDGWAY, OF COATESVILLE, PENNSYLVANIA.

## STEAM-CRANE.

SPECIFICATION forming part of Letters Patent No. 238,438, dated March 1, 1881.

Application filed January 24, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM H. RIDGWAY, a citizen of the United States, residing in Coatesville, Chester county, Pennsylvania, have invented certain Improvements in Direct-Acting Steam-Cranes, of which the following is a specification.

My invention consists of improvements, fully described hereinafter, in the direct-acting steam-crane for which Letters Patent No. 145,234, December 2, 1873, and No. 151,910, June 9, 1874, were granted to J. L. Pennock, of Coatesville, Pennsylvania, my improvements and the objects attained thereby being too fully explained hereinafter to need preliminary description.

In the accompanying drawings, Figure 1, Sheet 1, is a side view, partly in section, of my improved crane; Fig. 2, Sheet 2, a plan view of part of the crane, drawn to an enlarged scale; Fig. 3, a transverse section of the jib of the crane, steam-cylinder, and appliances connected therewith; Figs. 4 to 10, Sheets 2 and 3, detached views of different parts of the crane; and Fig. 11, a diagram illustrating a modification of one of the features of my invention.

Referring to Fig. 1, A is the post of the crane; B, the jib; B', the diagonal braces; B<sup>2</sup>, the diagonal stays, and D the steam-cylinder.

The jib consists of two parallel bars, preferably of channel-iron, as shown in Fig. 3, and to these bars are adapted the flanged wheels *a a* of a truck; E, recesses in opposite sides of which are the bearings for the trunnions *b b* of a ring, F, and in recesses in this ring bear the trunnions *d d* of the steam-cylinder D, the latter trunnions being at right angles to the trunnions *b b*. The cylinder is thus connected to the truck by a gimbal or universal joint, which permits the said cylinder to vibrate to a limited extent in any direction.

Another method of connecting the steam-cylinder to the truck by a universal joint is shown in the diagram, Fig. 11, in which the cylinder has a flange convex on the under side and forming, with a concave socket in the truck, a ball-and-socket joint, or the concave socket may be replaced by a series of anti-friction rollers properly arranged. The post A of the crane also consists of two bars arranged

at a distance apart, as shown in Fig. 6, and to the lower end of the post is secured the pivot-block G, Fig. 4, the pivot *e* of which is adapted to an adjustable socket contained within a recess formed by a flange or rib, *h*, on the foundation-plate H.

The object of this feature of my invention may be described as follows: In erecting the crane it is very important that the post should be perpendicular, and that the upper edge of the jib-bars should be in a horizontal plane. After the pivots of the post have been adjusted to their bearings the lower bearing or socket, *f*, can be adjusted on the base-plate H until the post and jib are in their proper positions, after which the space between the socket *f* and the flange *h* is packed with any material which will insure the permanent maintenance of the socket in the position to which it has been adjusted. An exhaust-pipe, I, passes through the foundation-plate H upward through the pivot and between the two bars of the post, this pipe being fixed and independent of the said post. Into the upper end of the pipe is loosely inserted the lower end of a pipe, I', which is secured to the post of the crane and turns therewith.

K is the steam-pipe communicating with any steam-generator, and passing downward through the upper pivot of the crane. This pipe is permanently secured, by means of a clamp, *g*, to the bearing of the upper pivot of the crane, and is coupled at the lower end to a section, K', adapted to a stuffing-box, M, secured to a cross-bar, N, attached to the post, as best observed in the enlarged views, Figs. 6 and 7, the section K' of the pipe having a collar, *m*, on both sides of which there is packing contained within the stuffing-box, the upper end of a pipe, J, being tightly screwed into the lower end of the box. On turning the crane on its pivots the pipe J will turn with the crane and the stuffing-box will turn on the fixed pipe K', a tight joint being always maintained by the packing in the box.

In order to avoid any straining of the pipes K K' and J, it is essential that the stuffing-box M shall be in line with the pivots of the post A; hence the bolts *i*, by which the flanged lower end of the stuffing-box is secured to the cross-bar N, are adapted to slots in said



flange and cross-bar, one set of slots being at right angles to the other set, as shown in Fig. 7, so that the stuffing-box may be adjusted on the cross-bar in any direction until it assumes its proper position in respect to the pivots, when it may be secured by tightening the bolts.

The pipes J and I' communicate through suitable branches with a valve-chest, P, secured to the diagonal braces B' of the crane in any convenient position. This valve-chest is shown in Figs. 8 and 9, and has three chambers,  $n$ ,  $n'$ , and  $n^2$ , the chamber  $n$  communicating with the steam-pipe J, the chamber  $n'$  with the exhaust-pipe I', and the chamber  $n^2$  with the lower end of the cylinder D, beneath the piston, the latter communication being effected by means of a pipe, L, which is in sections hinged together by joints, one of which is shown in Fig. 5. As this joint forms no part of my present invention, however, it will be unnecessary to describe it minutely, especially as flexible hose may take the place of the sectional pipe. The partition which separates the chamber  $n$  from the chambers  $n'$  and  $n^2$  forms a seat for a valve,  $p$ , and in this partition are formed ports, so that by a proper adjustment of the valve steam may be directed from the pipe J, through the chambers  $n$  and  $n^2$  and pipe L, to the cylinder, or by shifting the valve steam may be exhausted from the cylinder through the pipe L, chambers  $n^2$  and  $n'$ , and pipe I'.

When a tightly-fitting piston is used difficulty may be experienced in some cases in lowering the piston when the weight has been removed from the lower end of the piston-rod; hence I provide the steam-pipe J with a small valved pipe,  $q$ , which projects into the upper end of the pipe I' and terminates in a nozzle therein, so that on opening the valve in this pipe  $q$  a forcible jet of steam will be projected into said pipe I', this jet serving as an ejector, and inducing a partial vacuum in the pipes I' and L, and in the cylinder beneath the piston, the descent of which is thus facilitated.

The pipe  $q$  also serves as a drip-pipe, whereby the water of condensation which collects in the steam-pipes J, K', and K while the crane is not in use may be allowed to pass off directly into the exhaust-pipe I' without passing through the valve-chest, cylinder, and connecting-pipes.

The piston of the cylinder may be of the usual construction, the piston-rod passing through a stuffing-box in the cylinder-head and terminating at its lower end in a hook or an eye to which the hoisting-tackle may be applied in the usual manner.

To bearings in standards secured to the jib of the crane is adapted a shaft, Q, which is driven through the medium of a belt,  $r$ , the latter passing round a pulley on the said shaft, and round a pulley,  $s$ , on a shaft,  $s'$ , which has its bearings in the diagonal stays B' of the crane, or in any other suitable part of the structure, the shaft being provided with an appropriate handle.

Round a pulley, S, on the shaft Q passes a belt, rope, or chain, T, which also passes round a pulley, T', on the end of the jib, one end of the belt being secured to the rear end, and the other to the front end, of the truck E, so that by turning the pulley  $s$  the truck and cylinder may be traversed on the jib, and adjusted to any position which the locality of the object to be hoisted may suggest. The bearings of the pulley T' may, if desired, be rendered adjustable on the jib of the crane, so as to take up any slack in the rope or chain T.

Instead of the chain or rope T being attached to the opposite ends of the truck, it may be an endless rope the lower portion of which occupies the position shown by the circle  $x$ , Fig. 3, in relation to the truck, the latter in this case carrying a clutching device, whereby the rope may be released from the truck when the latter has to be traversed, with its cylinder, by hand, or gripped to the truck when the latter has to be controlled in the manner described above.

In Fig. 10 I have shown one form of clutching device which may be used in carrying out this feature of my invention, this clutch comprising a fixed jaw,  $t$ , on the truck, and a jaw,  $t'$ , pivoted thereto and adapted to be operated by a screw-stem,  $t^2$ , the handle  $t^3$  of which hangs down within convenient reach of the attendant and is provided with a universal joint to permit it to be moved about without straining the screw-stem.

A cup or reservoir,  $w$ , is formed on the top of the cylinder, and from this reservoir extends a drip-pipe,  $y$ , to a position above a gutter, R, secured to the side of the jib B, a pipe, W, Fig. 1, extending from the end of this gutter to the exhaust-pipe I', so that the water of condensation carried up by the piston will be directed away to the exhaust-pipe, instead of falling onto the object to be hoisted, and onto attendants near that object.

The cup  $w$  and its drip-pipe  $t$  may be used in connection with a fixed hoisting-cylinder, if desired, and in some cases the stroke of the piston may be so limited that a space shall always intervene between said piston and the top of the cylinder, this space serving as a receptacle in place of the cup  $w$ .

By manipulating the valve in the chest P steam is admitted to the cylinder through the pipe L when any object attached to the piston-rod has to be hoisted, and is exhausted through the same pipe when the load has to be lowered.

An important feature of my invention is the connection of the cylinder to the truck by means of a universal joint; for, as the cylinder is at liberty to vibrate in any direction, the piston-rod will be relieved from the lateral strains which, in the absence of the universal joint, would be imparted to it whenever the direction of the pull on the load should not be perpendicular.

I claim as my invention—

1. The combination, in a direct-acting steam-



crane, of a truck having wheels adapted to the jib of the crane, with a steam-cylinder, D, connected to the truck by a universal joint or bearing, substantially as described.

5 2. The combination of the crane and its truck, carrying the steam-cylinder, with the steam-pipe K, fixed independently of the crane, the stuffing-box M, the steam-pipe J, and exhaust-pipe I', the flexible pipe L, and a valve  
10 and valve-chest, whereby steam may be admitted to and exhausted from the cylinder through said pipe L, all substantially as described.

15 3. The combination of the post A of the crane, the steam-pipe K, fixed independently thereof, the pipe J, turning with the post, and the stuffing-box M, secured to the post so as to be laterally adjustable in respect thereto, as specified.

20 4. The combination of the steam-pipe J, the exhaust-pipe I', and the valved ejector-pipe q, extending from the pipe J to and into the pipe I', as set forth.

25 5. The combination of the hoisting-cylinder D, having at the top a receptacle or cup, w, with a pipe or pipes for conveying the water of condensation from said receptacle or cup, as specified.

30 6. The combination of the crane, the gutter R, the truck E, and the cylinder D, having at

the top a receptacle or cup, w, with drip-pipes for directing water of condensation to and from the gutter, substantially as specified.

7. The combination of the pipe K, fixed independently of the crane, and having a section, 35 K', with collar m, with the pipe J and stuffing-box M, attached to the post of the crane, all substantially as described.

8. The combination of the crane, the truck E, carrying the hoisting-cylinder and adapted 40 to the jib of the crane, flexible steam conveying and exhausting pipe or pipes, pulleys S and T', and a traversing rope, T, adapted to said pulleys and connected to the truck, as set forth.

45 9. The combination of the crane, the truck E, carrying the hoisting-cylinder and adapted to the jib of the crane, flexible steam conveying and exhausting pipe or pipes, pulleys S and T', a traversing rope, T, and means where- 50 by said rope may be clutched to or released from the truck, as set forth.

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

WILLIAM H. RIDGWAY.

Witnesses:

JAMES F. TOBIN,  
HARRY SMITH.