

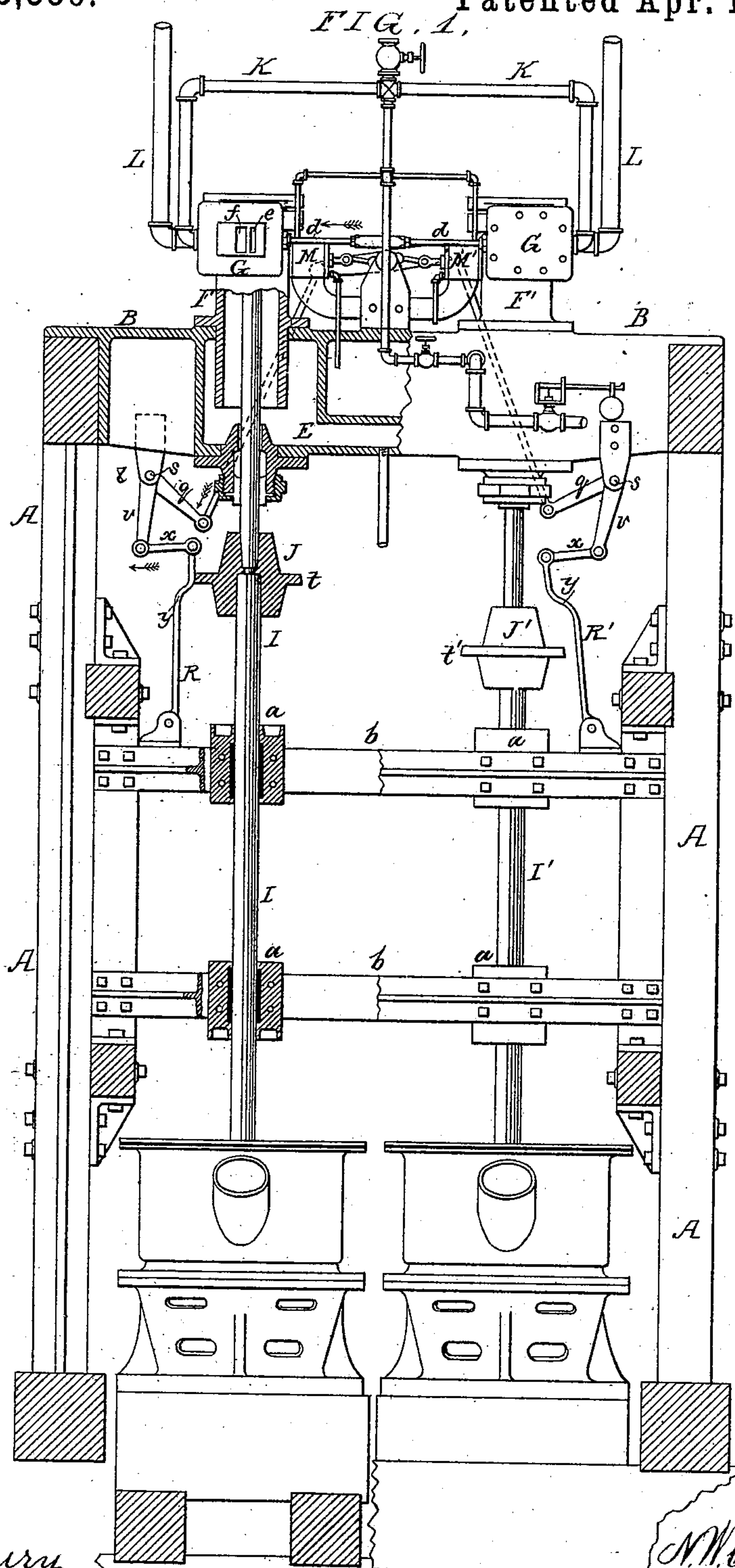
(No Model.)

4 Sheets—Sheet 1.

N. W. CONDUCT, Jr.
STEAM STAMP OR HAMMER.

No. 275,359.

Patented Apr. 10, 1883.



Witnesses:

Harry Drury

Jas F Tobin

Inventor:

Inventor:
N. W. Condict Jr
by his Attorneys

Howson and Sons

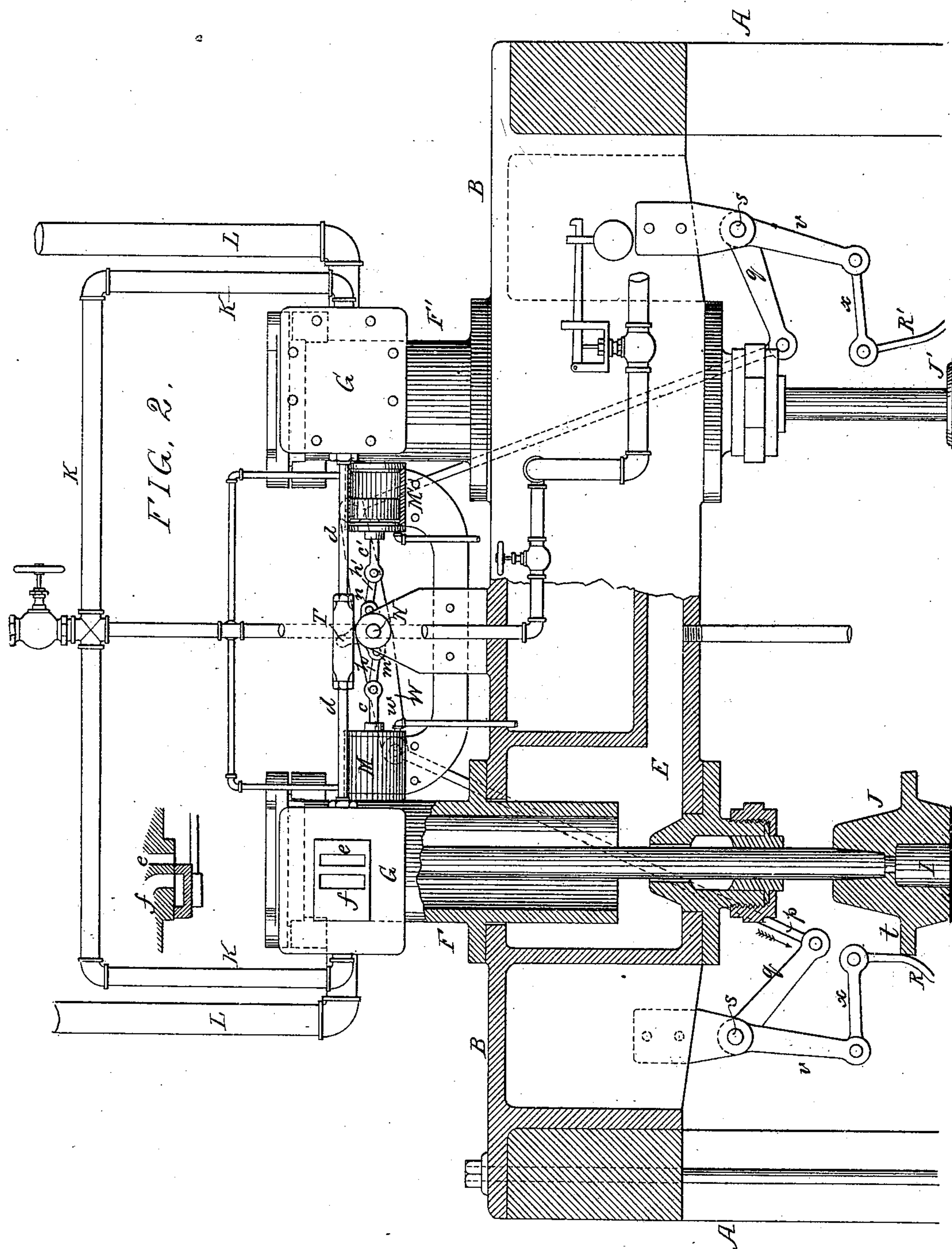
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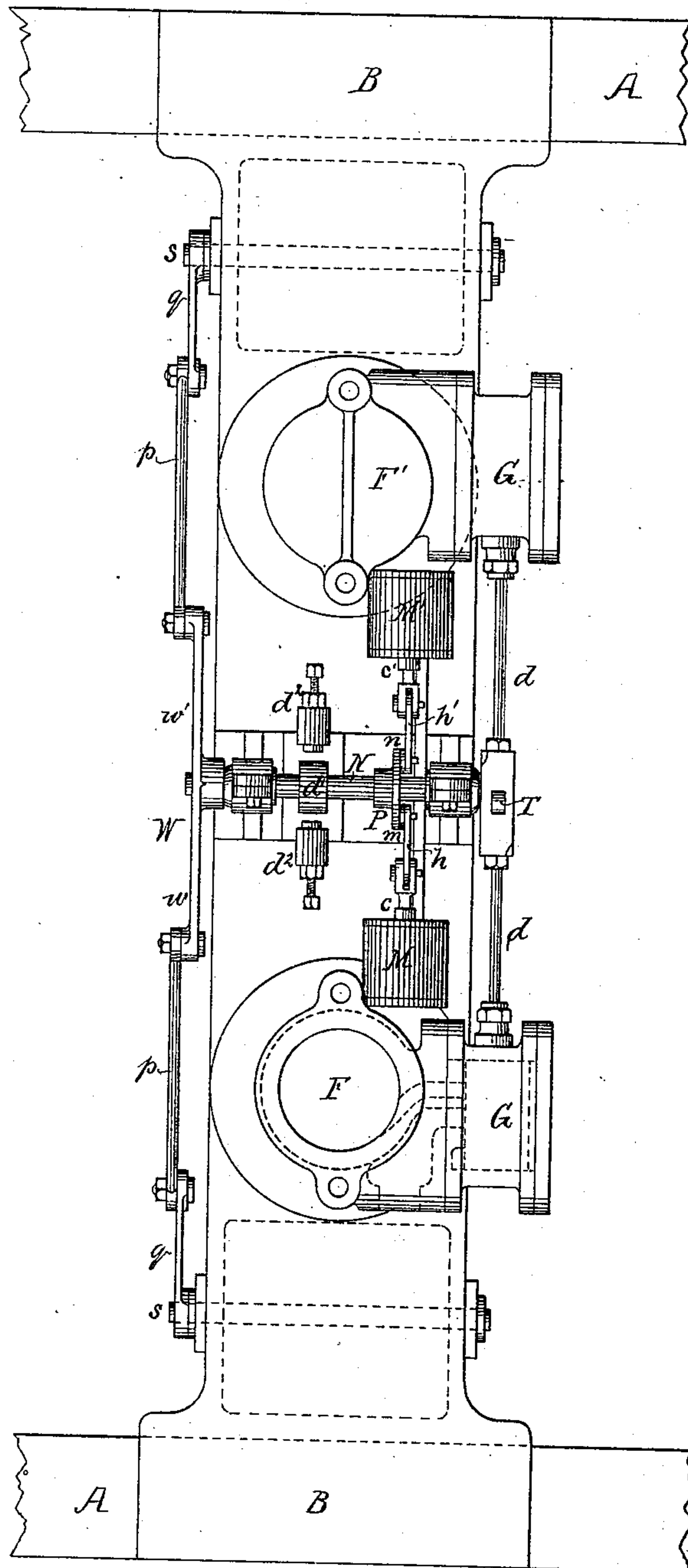
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FIG. 3



Witnesses:

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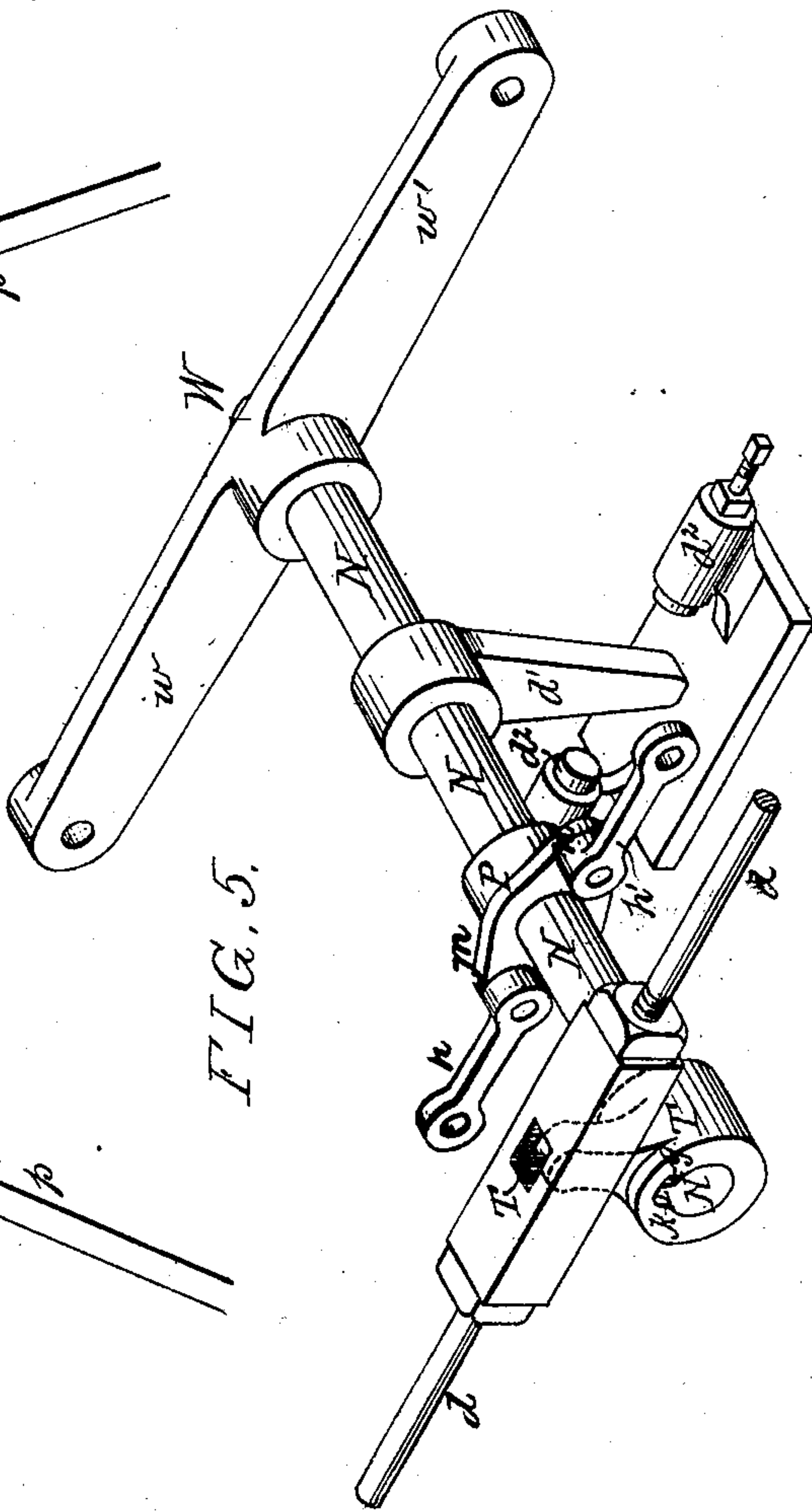
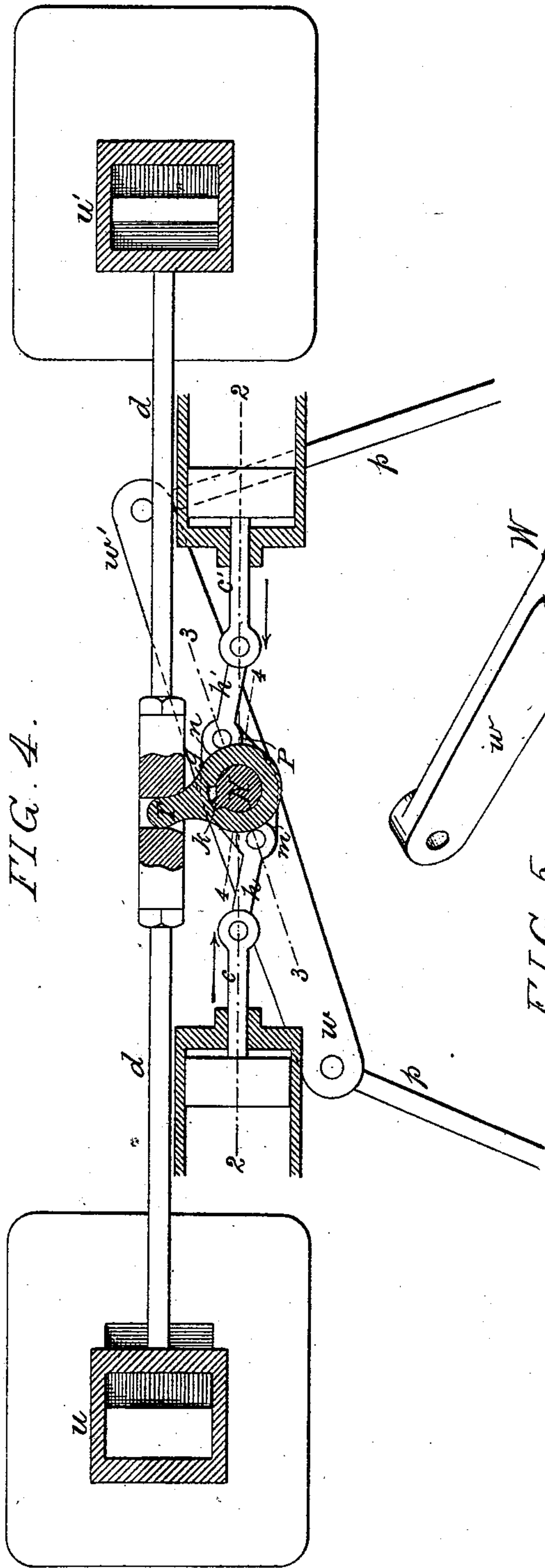
(No Model.)

4 Sheets—Sheet 4.

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Witnesses:
David S. Williams
James I. Tobin.

Inventor:
N. W. Conduct, Jr.
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Howson and Ford

UNITED STATES PATENT OFFICE.

NATHAN W. CONDUCT, JR., OF JERSEY CITY, NEW JERSEY.

STEAM STAMP OR HAMMER.

SPECIFICATION forming part of Letters Patent No. 275,359, dated April 10, 1883.

Application filed November 23, 1881. Renewed September 11, 1882. (No model.)

To all whom it may concern:

Be it known that I, NATHAN W. CONDUCT, Jr., a citizen of the United States, residing in Jersey City, New Jersey, have invented certain Improvements in Steam Stamps or Hammers, of which the following is a specification.

My invention consists of certain mechanism, fully described hereinafter, for operating the valves of that class of duplex steam-stamps in which the descent of the stamp-rods is due to the pressure of steam on the piston of each cylinder, and their ascent to the constant pressure of steam at a lower pressure on the under side of the pistons, as described in the reissued Letters Patent granted to C. R. James and myself, January 15, 1867, (original patent June 19, 1866.)

The object of my invention is to cause the valve of the cylinders to be operated by the direct pressure of steam, in obedience to the action of the stamp-rods.

In the accompanying drawings, Figure 1, Sheet 1, is a front view, partly in section, of a duplex steam-stamp with my improvements; Fig. 2, Sheet 2, an enlarged view of part of Fig. 1; Fig. 3, Sheet 3, a top view; Fig. 4, Sheet 4, a diagram illustrating the action of the valve-operating mechanism; and Fig. 5, a perspective view of part of the valve-operating devices.

The frame of the machine consists of posts A, suitably connected together, and to the top of the frame, and constituting a part thereof, is secured a hollow casting, B, within which is formed a chamber, E, and into the latter extend portions of the two cylinders F F', each of which is provided with a piston-rod connected to a stamp-rod, the two stamp-rods I I' being arranged to slide in guides a a, secured to the cross-bars b b of the frame. The lower portions of the stamp-rods operate in mortars containing the minerals or other materials to be crushed; but as these mortars form no part of my present invention, further reference to them will be unnecessary. Steam at a low pressure, just sufficient to raise with the required rapidity the stamp-rods, pistons, and piston-rods, is always maintained within the chamber E when the machine is in operation, for which purpose I generally use a small

steam-pipe provided with a valve weighted to blow off at the desired pressure, and communicating with the said chamber. (See Fig. 1.)

Each cylinder is provided with a steam-chest, G, and a valve (preferably an ordinary slide-valve) attached to the valve-spindle d, which is common to the valves of both cylinders, the seat of the valve of each cylinder having two ports, e and f, the former affording, when the valve permits it, a communication between the interior of the cylinder above the piston and the valve-chest, to which steam from the boiler is directed through a pipe, K. The exhaust-port f forms a communication between the cylinder above the piston through the port e, the recess of the valve and an exhaust-passage communicating with the exhaust-pipe L when the valve is open to the exhaust.

Between the two main cylinders, and secured to the frame, or to the cylinders themselves, are two small cylinders, M M', each provided with a piston and piston-rod, steam being admitted to each cylinder at the rear of the piston from branches of the main steam-pipe, so that while the machine is in operation there is a constant tendency of the steam to force the pistons of the two cylinders toward each other.

A transverse rock-shaft, N, has its bearings on suitable attachments to the frame of the machine, and on this shaft is a lever, P, having two short arms, m and n, in line with each other, the former being connected by a link, h, to the piston-rod c of the cylinder M, and the arm n by a link, h', to the piston-rod c' of the other cylinder, M'. On the same shaft N is a larger lever, W, one arm, w, of which is connected by a rod, p, to an arm, q, on a shaft, s, which has its bearings in an attachment to the frame, and which carries an arm, v, connected by a link, x, to an arm, R, pivoted to a cross-bar, b, of the frame. This arm R is bent at y, so as to be struck by a flange, t, on a coupling, J, which connects the piston-rod of the cylinder F to one stamp-rod; or, in place of this, any suitable projection on the piston-rod or stamp-rod may be used. The other arm, w', of the lever W is connected by devices similar to those described above to the arm R', which has also a bent portion, y, the latter be-

ing struck during the operation of the machine by the flange or projection t' on the piston-rod or stamp-rod I' of the cylinder F' .

The rock-shaft N carries an arm, T , the end of which is contained in a slot in the valve-rod d ; or the arm may be otherwise connected to the said valve-rod, which, as before remarked, is common to the valves of both cylinders.

When the piston of the cylinder F approaches the limit of its upward movement, its projection t strikes the bent portion y of the arm R , and, owing to the connections described, depresses the arm w of the lever W , and this causes the pistons of the small cylinders, operating through the medium of the devices and in the manner described hereinafter, to so move the valve-rod d that the valve of the cylinder F will be open to the steam, and the valve of the cylinder F' to the exhaust, and the consequence of this will be the instant descent of the piston of the cylinder F and its stamp-rod, owing to the high-pressure steam in the said cylinder above the piston, and simultaneously with this descent of the stamp-rod I the ascent of the stamp-rod I' , due to the low-pressure steam in the chamber E , which acts on the under side of the piston of the cylinder F' in the absence of pressure above the piston.

When the piston of the cylinder F' approaches the limit of its upward movement, its projection t' strikes the bent portion y of the rod R' , and this causes the pistons of the small cylinders to effect a change in the position of the valves of both cylinders, the valve of the cylinder F' being open to the steam and that of the cylinder F to the exhaust; and this will result in the instant ascent of the stamp-rod I and descent of the stamp-rod I' , and this alternating movement of the stamp-rods will continue as long as steam from the boiler is admitted to the valve-chests of the two cylinders. Steam at a lower pressure is maintained in the chamber E , with which both cylinders communicate, and steam is admitted to the small cylinders at the back of their pistons.

The movement of the valves is effected by the pressure of steam on the pistons of the small cylinders, in obedience to the action of the projections of the stamp-rods or piston-rods on the arms R R' , in a manner which can be best explained by reference to the diagram, Fig. 4, Sheet 4, of the drawings.

It must be remembered that there is a constant pressure of steam in the two small cylinders, tending to force the pistons and the two piston-rods c c' toward each other, as indicated by the arrows.

If the lever P is in a horizontal position and its central line, 3, coincides with the line 2, drawn through the centers of the two piston-rods and through the center of the shaft N , the pressure of the steam on the pistons of the small cylinders can have no tendency to turn the said shaft N ; but if the latter should be first turned to a limited extent in either direction, so that the central line, 3, of the lever P will be at an

angle in respect to the central line, 2, the pressure of steam in the small cylinders will move the shaft N and the valve-rod and valves to the extent determined by certain stops, referred to hereinafter. The shaft N can turn to a limited extent in and independently of the arm T , owing to a recess, g , in the eye of the arm for receiving a projection or key, k , on the shaft, the difference in size between the recess and key being such as to permit the lever P to be turned in either direction independently of the arm T , and without disturbing the valves, to permit the pressure of steam in the small cylinders to complete the movement of the shaft and operate the valves. The several parts have reached the position shown in Fig. 4 through the two influences referred to, namely: first, the depression of the arm w of the lever W , and the raising of the arm w' by the action of the projection of the stamp-rod I ; and, second, by the pressure of steam on the pistons of the two small cylinders, the valve u having been opened to the steam and the valve u' to the exhaust, and the result having been the prompt descent of the stamp-rod I simultaneously with the ascent of the stamp-rod I' ; and as the latter approaches the limit of its upward movement its projection strikes the arm R' , and this causes the lever P to assume the position indicated by the dotted line 4, and at the same time turns the shaft N until its key k reaches the opposite end to that shown of the recess g in the eye of the arm T , when the steam in the small cylinders will turn the lever P to a further extent, and with it the shaft N , and this further movement of the shaft will cause the arm T to impart the desired movement to the valves, so that the valve u' will be open to the steam and the valve u to the exhaust, when the stamp-rod I' will descend simultaneously with the ascent of the rod I .

In the above description I have assumed that the central line, 3, of the lever P coincides with the central line, 2; but it will be understood that when the machine is in operation the lever P never remains in this position, but passes at once, under the influence of the projections of the stamp-rods, from one inclined position to another.

It will be seen without further description that a very slight exercise of power is required to cause the projections of the stamp-rods to impart the preliminary movement to the lever P , as the shaft to which the lever is attached can turn to a limited extent without disturbing the valves, the power to move the latter being exerted by the pressure of steam in the small cylinders.

It is true that in changing the position of the lever P there must be a slight movement of the pistons of the two cylinders from each other and against the pressure of steam; but this slight movement is effected through such a leverage that the power required to effect it is but trifling.

An arm, d' , is secured to the rock-shaft, and

the limit of its vibrations is determined by adjustable stops d^2 , and this, of course, restricts the movements of the valves.

I claim as my invention—

5 1. The combination, in a duplex steam-stamp in which the descent of the stamp-rods is due to the pressure of steam on the pistons of cylinders, and their ascent to steam at a lower pressure, of the following elements, namely:
10 first, the connected valves of the two cylinders, the said valves being adapted to steam and exhaust ports of the said cylinders, substantially as described; second, a rock-shaft
15 mechanism whereby the stamp-rods or piston-rods are caused to impart a limited preliminary movement to the said shaft without disturbing the valves; and, third, two cylinders, the two pistons of which are connected to the
20 rock-shaft for completing the movement of the same, and operating the valves by the pressure of steam, in obedience to the action of the stamp-rods, all substantially as specified.

2. The combination of a valve-rod, d , com-

mon to the valves of both cylinders of a duplex steam-stamp, the rock-shaft N, mechanism for causing the stamp-rods to impart a limited movement to the said shaft, the arm T, connected to the valve-spindle, adapted to the shaft, and having a limited play thereon, 30 with two steam-cylinders, the pistons of which are connected to arms on the shaft, all substantially as set forth.

3. The combination of the rock-shaft N and its lever W, the arms R R', the former connected to one arm of the said lever W, and the latter to the other arm thereof, with projections on the stamp-rods or piston-rods of the two steam-cylinders, substantially as described. 40

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

N. W. CONDUCT, JR.

Witnesses:

HARRY DRURY,
HARRY SMITH