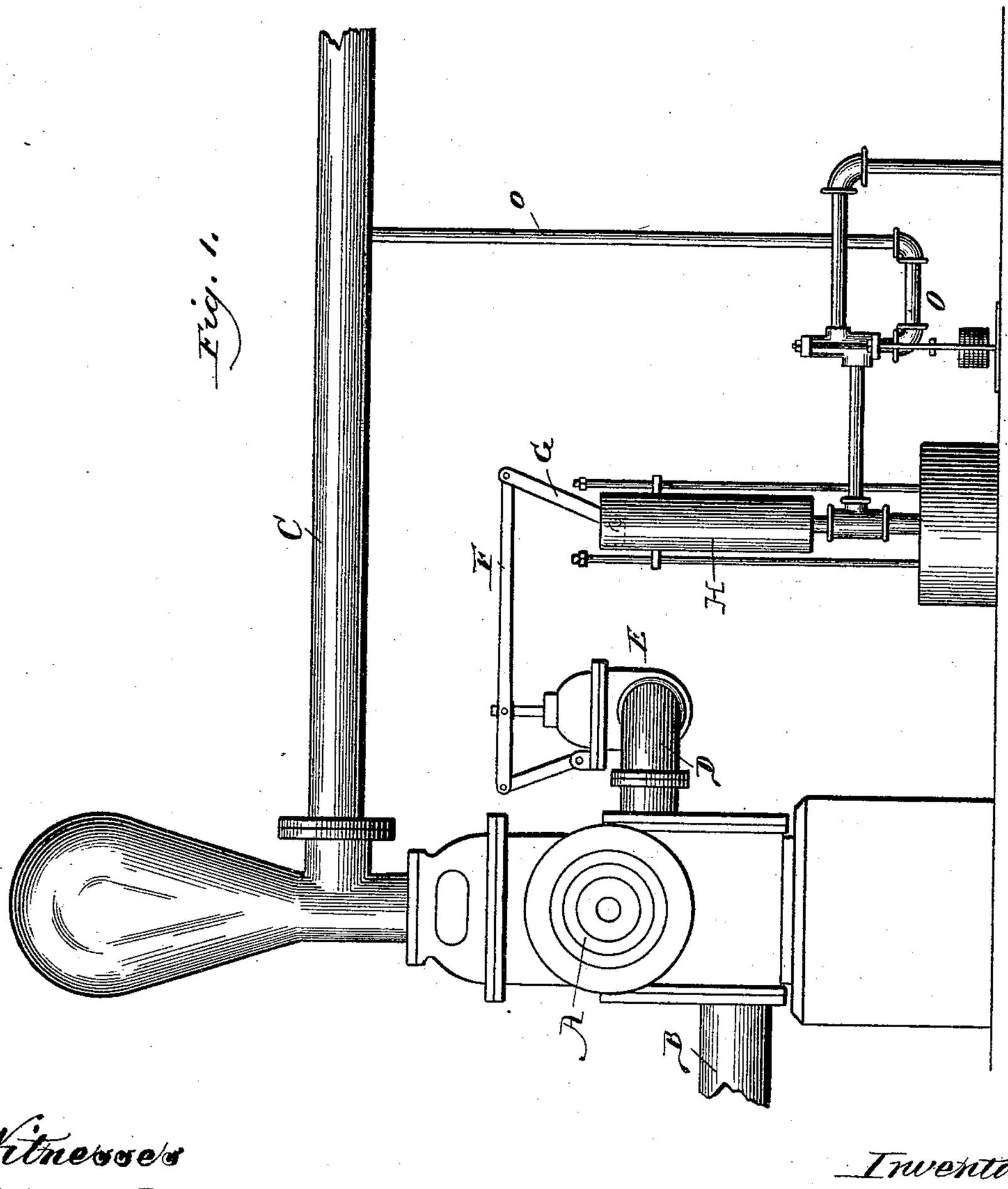
(No Model.) 2 Sheets—Sheet 1.

T. W. HEERMANS.

PRESSURE REGULATOR FOR PUMPS.

No. 459,384. Patented Sept. 8, 1891.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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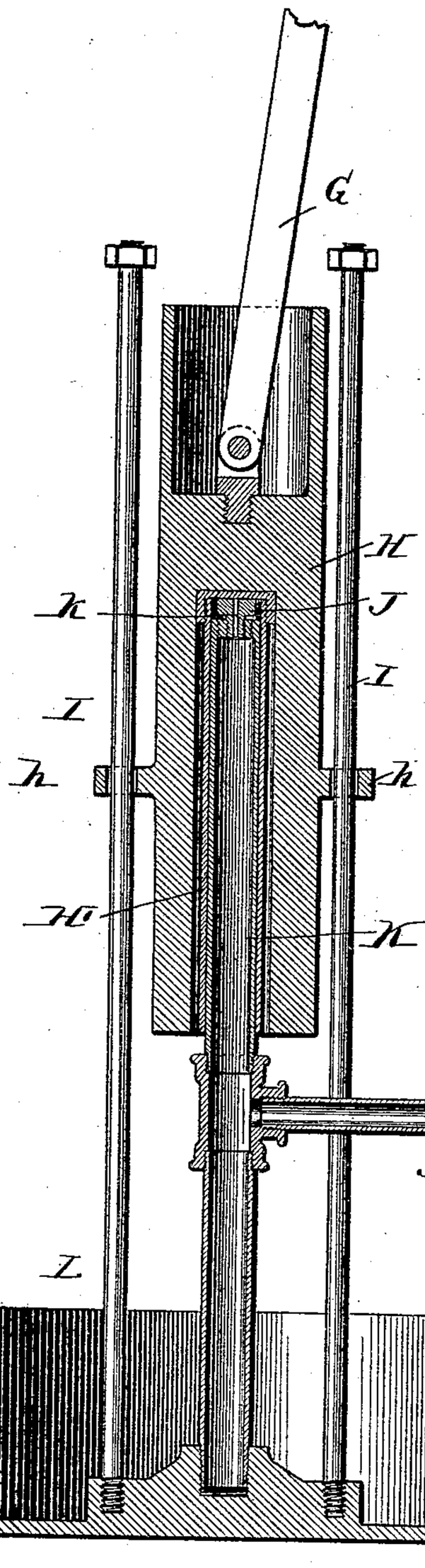

Fig. 2.

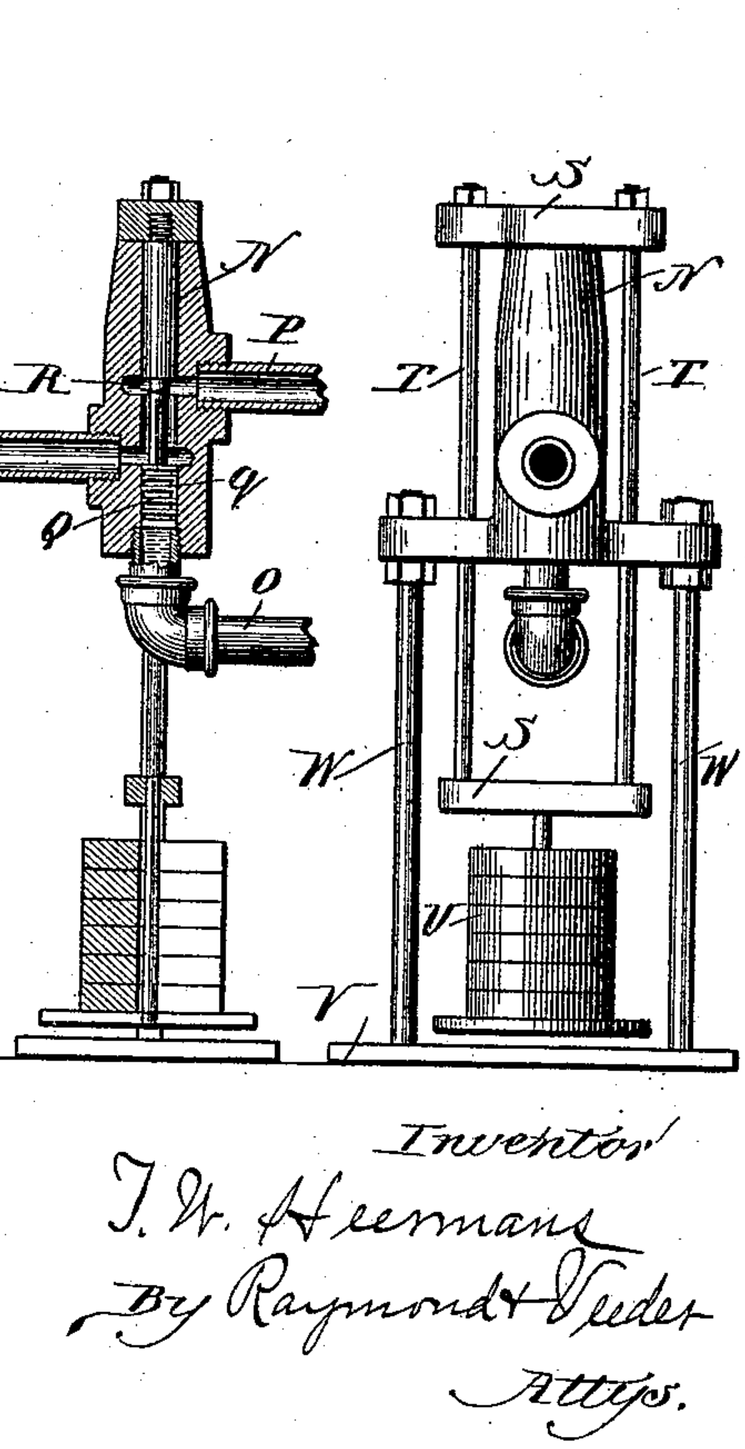

Fig. 3.

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UNITED STATES PATENT OFFICE.

THADDEUS W. HEERMANS, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE NATIONAL COMPANY, OF ILLINOIS.

PRESSURE-REGULATOR FOR PUMPS.

SPECIFICATION forming part of Letters Patent No. 459,384, dated September 8, 1891.

Application filed August 19, 1890. Serial No. 362,424. (No model.)

To all whom it may concern:

Be it known that I, THADDEUS W. HEERMANS, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pressure-Regulators for Pumps, of which the following is a specification.

The object of my invention is to control the pressure and amount of water delivered by the pump independently of the apparatus which controls its movement, so that the pump can, if desired, be kept running continuously, this being in some cases desirable, irrespective of the fluctuations in the demand. In the use of ordinary steam-pumps where the demand is varying—as, for example, in supplying water to hydraulic elevators—it is desirable not to stop the operation of the pump entirely when the demand for water ceases, as, if stopped, the steam-cylinders and pipes become cooled and filled with water, and the pump is not in condition for immediate starting. In other pumps connected and driven by continuously-running machinery it is convenient to regulate the delivery of water by the pump otherwise than by the disconnection of the pump from the driving mechanism. I have therefore contrived the apparatus hereinafter described for the purpose of controlling the delivery of water from the pump independently of the devices which control or regulate its movement.

In the accompanying drawings, Figure 1 is a side view of a portion of the pump sufficient to illustrate my invention and the apparatus connected therewith. Fig. 2 is a vertical section of the upper portion of the regulating mechanism. Fig. 3 is a view of a portion of the apparatus shown in Fig. 2, seen from the direction of the arrow.

A, Fig. 1, is the water-cylinder of the pump, B is the suction-pipe, and C is the delivery-pipe.

D is the pipe leading from one end of the water-cylinder A to the opposite end thereof, a valve E being inserted therein. The valve E is operated by the lever F, the raising of the lever opening the valve and its lowering shutting the valve. Connected to the end of the lever F by a link G is a weighted movable cylinder H. Said cylinder is shown in section in Fig. 2. It is guided in its movements by lugs *h h* working on rods I I and by the piston J within the cylinder at the end of the tubular rod K, both said piston-rod K and the rods I I being attached to a base L.

To economize in the construction of the apparatus, and also to provide against the sticking of the parts from rust, the cylinder H is lined with a brass tube H′, said brass tube being secured within the cavity of the cylinder H by pouring Babbitt or other soft metal between the tube and the cylinder. All machine-work upon the cylinder H is thus avoided. The base L is formed with an outer lip or flange *l*, so as to make a cup for catching any leakage that may occur in the cylinder H. From the tubular piston-rod K a pipe M leads to a valve-case N.

The case N is provided with a pipe O, through which water is taken from the delivery-pipe C of the pump (*vide* Fig. 1) and also with an exhaust or drainage pipe P. The pipe O leads into the bottom of the valve-case, a piston-valve Q occupying the chamber into which it leads. The stem R of the valve Q is reduced for a portion of its length to a less diameter than that of the chamber in which the valve is fitted, and the pipes M and P communicate with the portion of the chamber occupied by the reduced portion R of the valve-stem. The upper portion of the valve-stem is made to fit the chamber in the valve-casing and extends outside the valve-casing, being connected by yokes and rods S S T T to the weights U. The valve-casing N is supported in any convenient manner, as by base V and rods W W. The piston-valve Q is fitted to move with the utmost freedom, the means for preventing leakage being a number of grooves turned on its circumference.

The operation of the apparatus is as follows: When the pressure in the delivery-pipe of the pump does not exceed that which the pump is intended to furnish, the apparatus is in the position shown in Fig. 1, the valve E being closed and the pump operating in the ordinary manner. If the desired working pressure is exceeded, the pressure beneath the piston-valve Q will rise correspondingly and lift the valve until communication is open between the pipe O and the pipe M, the piston-

valve Q at the same time closing the communication between pipes M and P. Water being thus admitted to the tubular piston-rod K, it is conveyed through the small opening *k* in the piston J to the interior of the cylinder H. Said cylinder is thereby moved upward until the limit of its movement is reached, thereby opening wide the valve E. When the valve E is so opened, the water instead of passing out of the delivery-pipe simply passes to and fro through the pipe D, the delivery of water from the pump being thereby wholly stopped for the time being. Whenever the consumption of water from the pump is sufficient to lower the pressure below the working-point again, the weight attached to the piston-valve Q lowers the same and communication is open between the pipes M and P. The water in the cylinder H is thus drained away and the fall of the cylinder H closes the valve E, the pump then resuming its normal functions.

It will be seen that by the construction just described the pump either is furnishing a full delivery of water or else is running free without delivering at all, for the reason that the by-pass valve E is either fully open or entirely shut, any deficiency in pressure causing the piston-valve Q to occupy its lowest position, in which the water is completely drained from the cylinder H, and any excess of pressure sufficient to lift the valve, keeping it raised so as to admit water-pressure to the cylinder H so long as the excess of pressure lasts. The pump thus works as economically, except for the overcoming of the comparatively slight friction of the pump itself, as it would if steam were shut off and it were completely stopped when the working-pressure of the water rose above the desired limit, while at the same time it is ready to at once resume full work when required, and greater economy is secured than would be obtained by working the pump continuously but slowly at times.

What I regard as new, and desire to secure by Letters Patent, is—

1. The combination, with the water-cylinder of a pump, of a by-pass passage connecting the two ends of the water-cylinder, a valve in said by-pass connected to and operated by a piston and cylinder, and a valve operated by the pressure of the water delivered from the pump and controlling the admission and exhaust of water from said piston and cylinder, said valve consisting of a casing having a cylindrical chamber in which is fitted a piston-valve having a series of grooves in its circumference, and said valve being connected by a pipe leading into the lower part of said chamber with the delivery side of the pump, said chamber having an exhaust-opening at its upper end and a passage at an intermediate point leading to said by-pass-controlling cylinder, substantially as described.

2. The combination, with the water-cylinder of a pump, of a by-pass passage connecting the ends of the water-cylinder, a valve in said passage connected to and operated by a movable weighted cylinder, said cylinder being provided with a fixed piston mounted upon a fixed tubular piston-rod, a valve-casing containing a cylindrical-chamber within which is fitted a piston-valve, a pipe or passage leading from the delivery of the pump to the chamber of said valve-casing beneath said piston-valve, a pipe connecting the chamber of said valve-casing with the tubular piston-rod, and a drainage-pipe likewise leading into said chamber, whereby the piston-valve Q, when raised, permits communication between the delivery of said pump and movable cylinder controlling the by-pass valve, and said piston-valve when lowered permits communication between the drainage-pipe and said movable cylinder, substantially as described.

3. The combination, with the water-cylinder of a pump, of a by-pass passage connecting the ends of the cylinder, a valve in said passage connected to and operated by a movable weighted cylinder H, said cylinder being provided with a piston J upon a fixed tubular piston-rod K, and having lugs *h h* working on guide-rods I I, said piston-rod K and rods I I being mounted on a base L, valve-case N, provided with inlet-pipe O, drain-pipe P, and with pipe M connecting it to the tubular piston-rod K, valve Q, fitted within said valve-case N, adapted to be operated by fluid-pressure transmitted through the pipe O and to open communication between the pipes M and P or M and O, respectively, substantially as descibed.

THADDEUS W. HEERMANS.

Witnesses:
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