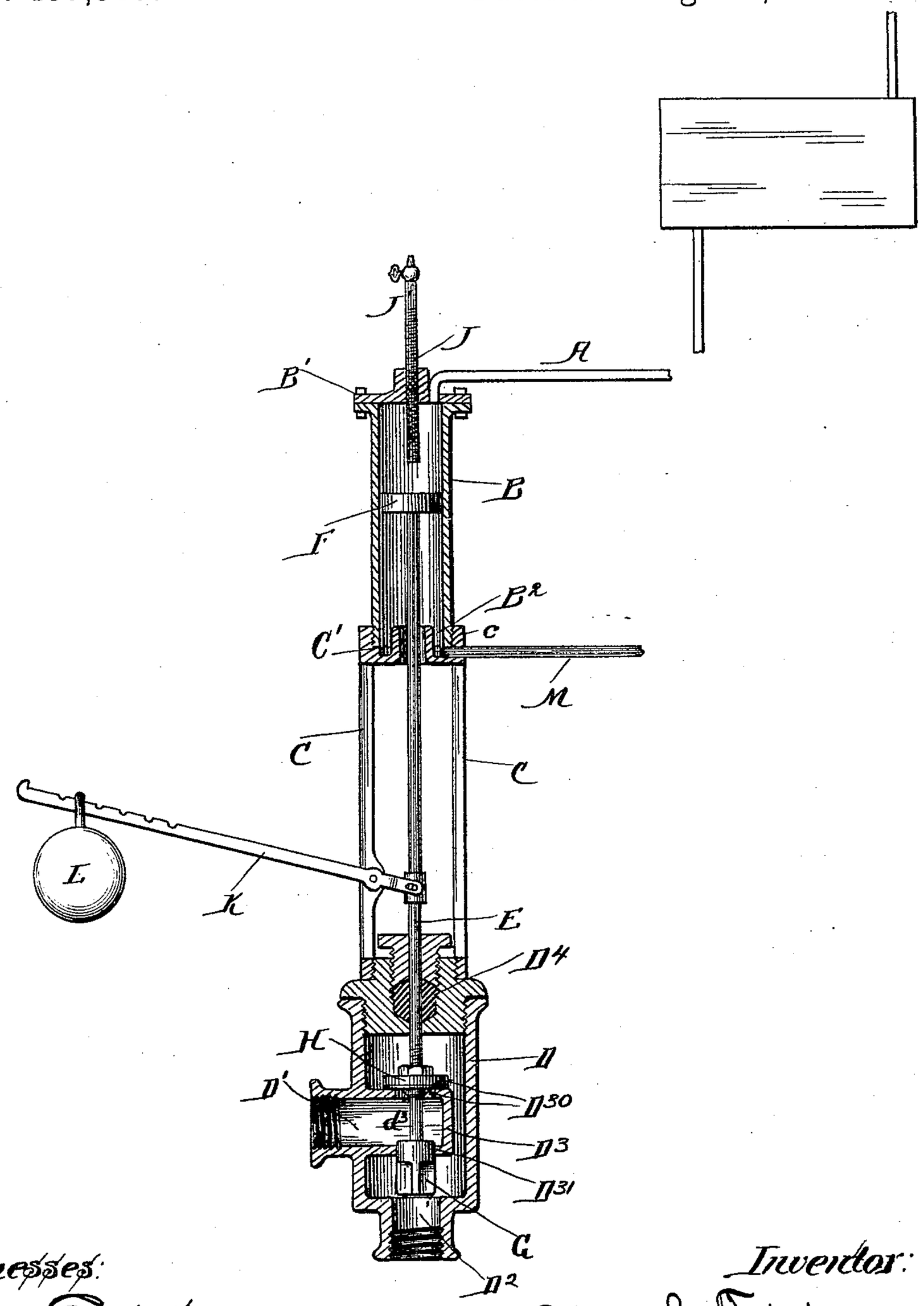
(No Model.)

W. L. FITCH.

AUTOMATIC PUMP REGULATOR.

No. 457,987. Patented Aug. 18, 1891.



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UNITED STATES PATENT OFFICE.

WILLIAM L. FITCH, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO ANDREW METZ, OF SAME PLACE.

AUTOMATIC PUMP-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 457,987, dated August 18, 1891.

Application filed January 17, 1891. Serial No. 378,067. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. FITCH, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in an Automatic Pump-Regulator, which are fully set forth in the following specification, reference being had to the accompanying drawing, forming a part hereof.

This invention is designed to be applied to pumps which are used to force water into tanks, either elevated or connected to a standpipe or completely inclosed, so that the water forced thereinto produces compression of the confined air, such tanks in either of the three forms or circumstances being employed to operate elevators by water-pressure. As the water is exhausted in operating the elevator, it should be supplied to the tank to keep the pressure approximately constant, and for this purpose the operation of the pumps should be dependent upon the exhaustion of the water and automatically controlled by the water according to the degree of pressure from time to time.

This invention consists in specific devices for this purpose, as hereinafter set forth and claimed.

The drawing is an axial section through the regulating device which I employ.

A is the water-pipe leading from the pressure-tank. The pipe A leads into a cylinder B at one end of the latter. Said cylinder is connected at the other end by means of an open frame C to a cylinder D, which constitutes the body of a balanced valve comprising the two valves and stem hereinafter described. The valve-body D has two steam-ports D′, through which the steam is admitted from the boiler, and D^2, through which the steam is emitted to the pump to operate the latter. A partition D^3 within the body D, except for the ports which are hereinafter mentioned which are formed through it, separates a portion of the space from the remainder, said separated portion d^3 communicating with the port D′. Through this partition are formed two ports D^{30} and D^{31} transverse to the axis of the valve-body and axially in line. The upper end of the valve-body is provided with a stuffing-box D^4, through which the valve and piston rod E passes. Said rod carries at its upper end the piston-head F, which plays in the cylinder B, and at its lower end the piston-valve G, which seats in the port D^{31}. Said stem E also carries the valve H, adapted to seat upon the upper side of the port D^{30}. The distance between the two valves H and G is such that the former is seated outside the port D^{30} when the latter is seated in the port D^{31}; but the length of the piston-valve G is such that it enters and seats in its port and moves a little distance therein before the valve H comes to its seat, and might move still farther a short distance if not stopped by the valve H without passing out of its seat. The length of the piston-valve G thus allows for contraction and expansion of the stem E without preventing its valves from being both seated whenever the valve H is seated.

The piston-valve G has guide-extensions G′, conveniently in the form illustrated—that is, two intersectings wings whose edges are slightly tapered, so that they enter the valve-seat readily and guide the valve into its seat without danger of engagement of its lower edge at the margin of the seat, as might otherwise happen.

The upper end of the cylinder B is closed by the cap B′, (and it is convenient, but not essential, that the pipe A should enter the cylinder through the cap, as illustrated,) and through the cap there is inserted from above the pipe J. This pipe is preferably screwed through the cap, the thread being made water-tight or otherwise packed, and the pipe protrudes down into the cylinder below the cap, being preferably in line with the stem E, and constitutes a stop for the piston F, which may be adjusted to limit the play of the piston in the cylinder. Above the cap the pipe J is provided with a valve or vent-cock J′ for the purpose hereinafter specified.

To the frame G there is pivoted the lever K, which is loosely connected at one end to the stem E, intermediate between the valve-body D and the cylinder B, and on said lever, which protrudes horizontally from the frame C, the weight L is adjustably suspended,

tending to force upward the stem E and its valves and piston.

Other details of this construction will be described after the description of the operation, which is as follows: The weight L is adjusted on the lever K at such a point as to counterbalance the downward pressure on the piston F when the stage of water in the tank is less than the desired maximum, but to be overbalanced by such pressure on the piston when the stage of water reaches the desired maximum. When the water is drawn from the tank, reducing it below the maximum, the diminution of pressure on the piston permits the weight L to force the piston upward, the stem E thereby carrying upward the valves G and H and admitting steam to the pump to operate it and cause it to supply water to the tank to restore the pressure. The pressure on the valves H and G being balanced and the ports which they close, respectively, being large, the valve will respond very promptly to the action of the weight L, when the pressure above the piston F falls below the maximum, and the pump will be brought into action at its full capacity promptly and will continue to act so long as there is deficiency of pressure, and the steam will be shut off promptly and the pump stopped when the maximum pressure of water is obtained. The distance to which the valves can open may be adjusted as desired by means of the stop-pipe J, said pipe being screwed down into the cylinder B to diminish the opening of the valve, and screwed up to increase the opening, operating, as will be obvious, by stopping the upward—that is, the valve-opening—movement of the stem and piston.

If any leakage should occur around the piston F, it will follow down along the cylinder B, and an annular pocket C′ is provided at the lower end of said cylinder, which receives such leakage, and a drain-pipe M is provided, which is inserted into said annular pocket and conducts the leakage out from the pocket C′ to any desired point.

A convenient way to form the pocket C′ is that illustrated, wherein it is formed in the upper end of the head of the frame C, the outer wall *c′* of the said pocket being threaded to afford means for connecting the cylinder B, which is screwed down only part way into the pocket, leaving room below its end for the pipe M to be inserted through the said threaded wall of the pocket to drain the latter.

Air is liable to enter above the piston F in the cylinder B both by passing the piston in the cylinder and by entering with the water, the water being often charged with air in the process of pumping. The effect of air above the piston in the cylinder is to act as a cushion and prevent the positive action of the valve, causing it to "dance" or react repeatedly against the cushion when the weight would lift it or when the water-pressure would seat it. It is desirable, therefore, to provide means for permitting the escape of the air whenever the action of the valve, as described, indicates its presence in the cylinder. For this purpose the portion of the pipe J which protrudes into the cylinder is perforated, such perforations extending as far up on the pipe as the pipe will ever be protruded for the purpose of stopping the piston, and through such perforations the air can always escape at the top of the cylinder, and a valve or convenient cock J′ at the upper end of the pipe may be opened to allow the escape of the air whenever its presence is detected. Of course the momentary opening of the valve J′ is all that will be necessary, the valve being closed as soon as solid water begins to be discharged.

I claim—

1. In a pump-regulator, the cylinder B and the piston therein, and the valve which controls the access of steam to operate the pump connected to said piston, said cylinder communicating with the water elevated by the pump, whereby the piston therein is exposed to water-pressure in a direction which tends to seat the steam-controlling valve, combined with an air-vent from the water-chamber of the cylinder B, and a valve to control said vent, whereby any air which enters the cylinder with the water may at will be allowed to escape, substantially as set forth.

2. In a pump-regulator, in combination with the valve that controls the admission of steam to the pump, a cylinder rigid with the body of such valve, a piston in said cylinder carried by the valve-stem, and the pipe J, inserted through the head of the cylinder to stop the piston, said pipe being perforated at its interiorly-protruding part and provided with a vent-valve at its exteriorly-protruding part, whereby it serves both to stop the piston and to permit the escape of air from the cylinder at the top, substantially as set forth.

In testimony whereof I have hereunto set my hand, at Chicago, Illinois, in the presence of two witnesses, this 15th day of January, 1891.

WM. L. FITCH.

Witnesses:
CHAS. S. BURTON,
JEAN ELLIOTT.