

(No Model.)

2 Sheets—Sheet 1.

L. H. HAWLEY.

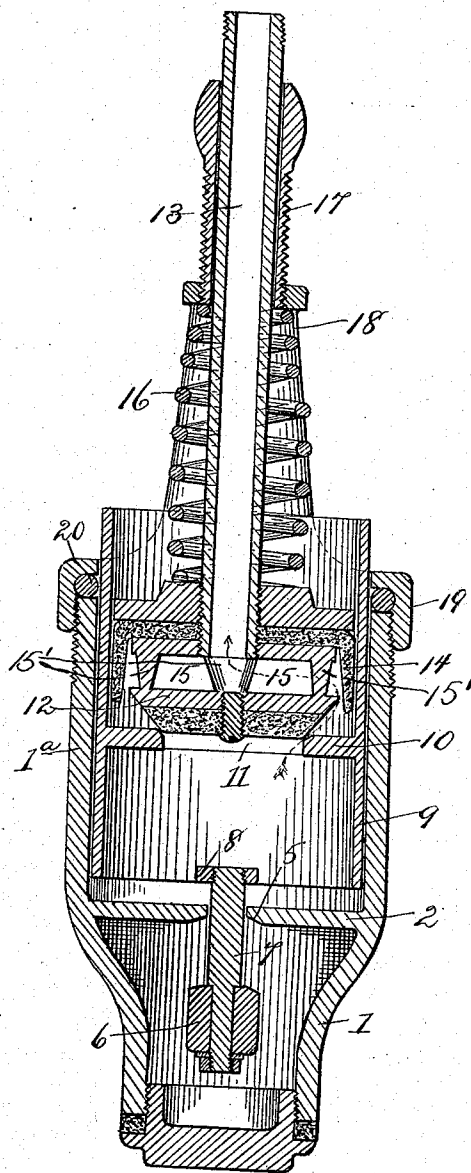
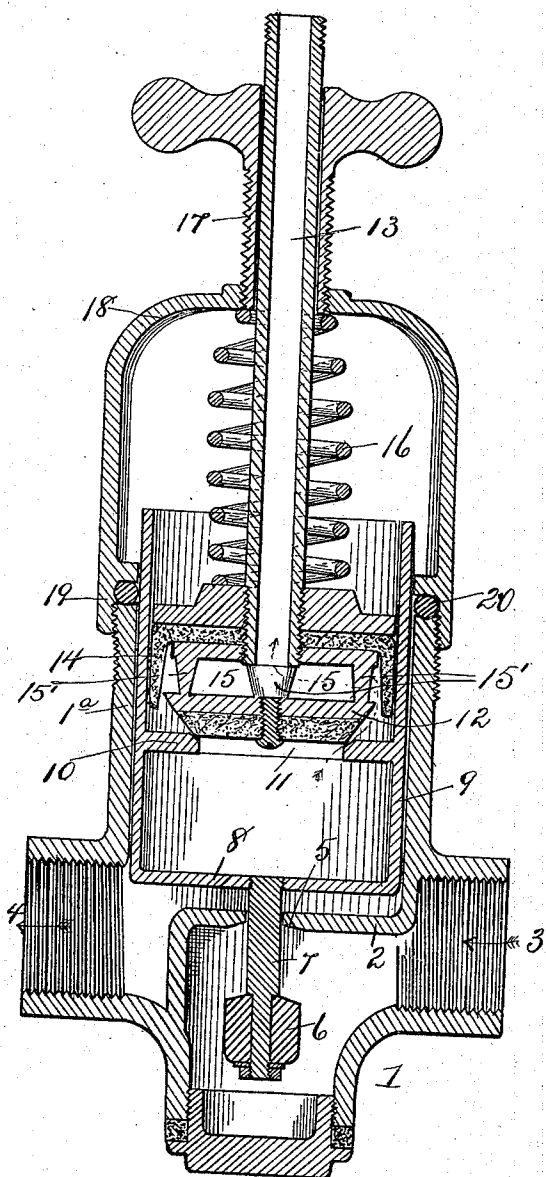
PRESSURE REDUCING AND REGULATING VALVE.

No. 573,462.

Patented Dec. 22, 1896.

Fig. 1.

Fig. 2.



WITNESSES.

Albert Popkins.
T. J. Peating.

INVENTOR

Lincoln H. Hawley
by
Wm. R. Baelin

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2 Sheets—Sheet 2.

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Fig. 3.

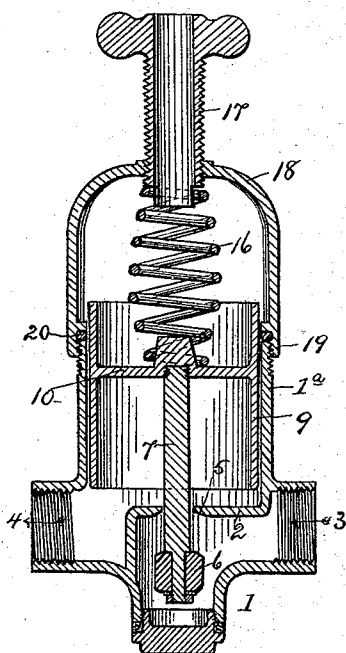
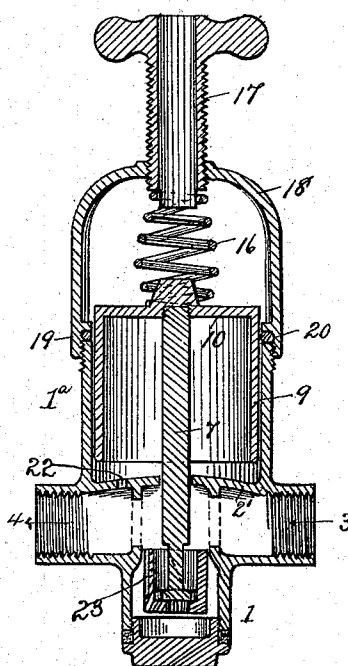


Fig. 4.



WITNESSES.

Albert Popkins.
T. J. Keating.

INVENTOR

Lincoln H. Hawley
by
Wm. R. Cardine

UNITED STATES PATENT OFFICE.

LINCOLN H. HAWLEY, OF CANANDAIGUA, NEW YORK.

PRESSURE REDUCING AND REGULATING VALVE.

SPECIFICATION forming part of Letters Patent No. 573,462, dated December 22, 1896.

Application filed January 8, 1896. Serial No. 574,736. (No model.)

To all whom it may concern:

Be it known that I, LINCOLN H. HAWLEY, a resident of Canandaigua, in the county of Ontario and State of New York, have invented certain new and useful Improvements in Pressure Reducing and Regulating Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

The invention relates to pressure-regulating and pressure-reducing valves, and has for its object to increase certainty and efficiency of action, to obviate hammering, and also to prevent a blocking of the valve by an accumulation of water in a connected chamber or chambers, and to secure these several objects in a structure of comparative simplicity; and the invention consists in the construction hereinafter described and particularly pointed out.

In the accompanying drawings, Figure 1 is a vertical central section of the device. Fig. 2 is a similar view taken transversely. Figs. 3 and 4 are vertical central sections of modified forms.

Numeral 1 denotes a valve casing or body divided by a fixed diaphragm 2 of usual construction. A diaphragm 2' of different form to adapt the improvement to the use of a slide-valve is shown in Fig. 4.

3 and 4 denote, respectively, inlet and outlet pipe connections.

5 is a valve-seat, and 6 is a valve. The latter has a stem 7, fixed to a cross-bar 8, as shown in Figs. 1 and 2, or to a diaphragm or end wall, as indicated in Figs. 3 and 4, respectively.

9 denotes a tubular plunger or piston.

10 is a diaphragm fixed in the tubular plunger intermediate its open ends, which may have an opening 11, as shown in Fig. 1. If such opening is provided, it is suitably fashioned to act as a seat for a valve 12. Said valve has a tubular stem 13.

14 denotes a packing of cup form fitting the plunger to prevent the upward passage of the fluids.

15 are conduits for fluids communicating with the space immediately above the valve and below the packing 14 to permit a safety

overflow. In Figs. 1 and 2 arrows indicate the path of the fluid, and 15' indicates parts joining the metal disk of valve 12 to a packing-disk. 16 is a spring tending to hold valve 12 closed and valve 6 open. The tension of the spring is so adjusted that the valve 6 will be opened by the spring at any given or predetermined pressure, such as may exist under the diaphragm 10 when a faucet or faucets in the outlet-pipe are open, the spring being compressed and the upper valve opened if the pressure exceeds that predetermined and the lower valve closed, said spring normally holding valve 6 open and valve 12 closed. The spring 16 will have its force or tension so regulated as to be overcome by a rise of pressure on the inlet side above that predetermined and permit a safety overflow through the tube 13.

17 is a tension-regulating screw bearing on the spring and working through a suitable screw-threaded opening in the bail or yoke 18 of the packing-nut 19, which screws onto the upper end of an extension 1^a of the valve-body, as shown.

The plunger 9 is made sufficiently long to reach the extension of the valve-body and above the packing-nut, and a packing 20 tightly closes the joints between these parts. This packing also produces sufficient friction upon the plunger to prevent the pounding of the valve. The amount of friction and the closeness of the packing can be regulated by means of the packing-nuts. The long bearing of the plunger in the valve-body extension and the bearing of the stem 13 cooperate to guide the parts in a true line and aid in a smooth and noiseless action. The plunger below the diaphragm 10 has an air-compression chamber which also cooperates to obviate hammering. Liquid that may leak upwardly past the plunger is not confined, and an accumulation of the same sufficient to block the movements of the plunger is obviated. As above indicated, a dangerous rise of pressure on the low-pressure side opens valve 12 and affords relief.

The several details of the device shown are known to those skilled in the art, and I do not make claim to them. My improvement is characterized by the combination of a plunger packed substantially as specified with a valve and valve-seat, all situated in one valve-body

having a suitable extension, and all adapted to obviate hammering, and further adapted to permit a free exit to leakage. It further provides simple and compact means for an overflow to relieve a dangerous pressure.

In Fig. 3 the device is shown without the relief-valve. 17 denotes a set-screw for varying the tension of a spring 16, which spring is regulated to open the valve 6 whenever the pressure under the diaphragm 10 falls below a predetermined pressure, as, for example, when a cock on the lower pressure side is opened.

In Fig. 4 is represented a slide-valve combined with a cylindrical plunger having a compression-chamber and a packing. The valve is opened by the spring and closed by back pressure from the low-pressure side acting through a port. In this form of the device substantially the same advantages of free escape of leakage, avoidance of concussion, and smoothness and certainty of action are secured as in the others above described. In the construction shown in said Fig. 4 the main current does not flow above the diaphragm 2, and to afford the fluid on the low-pressure side free access to and escape from under the plunger 9 a special port 22 is provided, and preferably the face of the gate-valve adjacent said port is hollowed out, as shown at 23, so that fluids may pass freely through said hollow and port.

The different forms of the device are each adapted for automatically closing the main valve by pressure whenever free escape from the low-pressure or delivery side is cut off, as by closing faucets or cocks. Fluids entering on the high-pressure side and having no other outlet raise the plunger 9 and close the valve carried by it. The reopening of said cocks or faucets permits the spring to open the main valve and a current is established through the valve-opening until the discharge-outlets are again closed. The tension of the spring can be varied to insure that the valve shall be kept open as long as the current continues and closed as soon as it ceases.

It is characteristic of my improvement that the piston or plunger which supports the valve extends above the open top of the valve-body extension and that a compressible ring-packing, situated below the top of the piston and on the upper edge of the said extension to close the joint between the piston and extension and also to prevent return to the interior of overflow leakage outside the piston is combined with a packing-ring, and, further, that said ring constitutes a support or base of a bail or yoke to hold spring-regulating devices for a spring bearing on the piston.

I am aware that a flexible diaphragm provided with a relief-valve and combined with a spring, all situated in a valve-body extension, said body having a fixed diaphragm and

valve-seat and a valve, and such device is not broadly claimed. By my improvement the use of a flexible diaphragm is avoided, such diaphragm involving considerable initial expense and requiring to be frequently renewed, and, further, my plunger, with its attachments, moves always in a direct line, requiring no pivoted valve-stem, the whole operating with great certainty, while permitting the omission of a valve-stem below the main valve. My construction is further simplified by using the stem of the relief-valve as an escape-conduit, all as hereinafter pointed out.

Having thus described my invention, what I claim is—

1. The combination of the valve-body having an inlet 3 and outlet 4 and inclosing a diaphragm with a valve-opening therein and provided with an extension situated outside the exterior lines of said inlet and outlet and in free communication with the outlet, a valve adapted to close said opening in the diaphragm, a plunger extending above and movable in the valve-body extension and supporting the said valve, a spring tending to open the valve, a packing bearing on the outside of the plunger and on the top of the extension and closing the joint between the plunger and said extension, and a packing-nut bearing upon the packing and provided with a bail adapted for use in manipulating the nut and retaining said spring, substantially as described.

2. In combination the valve-body having an inlet an outlet and a valve-seat, a valve provided with a stem, a hollow plunger comprising a diaphragm, an opening in said diaphragm, a valve to close the opening, said valve having a tubular stem, a packing on the stem above the valve, inlets to the tubular stem below the packing and above the valve, means to close the valve, the first-named valve being adapted to be opened upon a fall of pressure on the delivery side and the other valve adapted to be opened by a rise of pressure, substantially as described.

3. In combination the valve-body having an inlet, an outlet and a valve-seat, a valve provided with a stem, a plunger or piston fixed to said stem and having an opening, a valve fitting said opening, a spring adapted to open one valve and close the other and a screw to vary the tension of the spring whereby the same spring and screw can be made to regulate both the supply and the overflow valves, substantially as described.

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

LINCOLN H. HAWLEY.

Witnesses:

BENJ. R. CATLIN,
FRANK D. BLACKISTONE.