No. 746,755. PATENTED DEC. 15, 1903.

I. H. SPENCER.

PRESSURE REGULATOR.

APPLICATION FILED NOV. 22, 1902.

NO MODEL.

Fig. 1

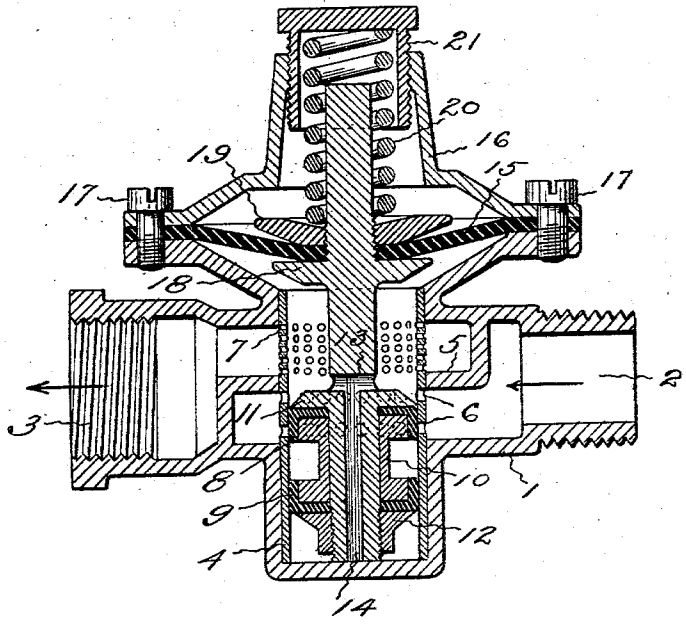
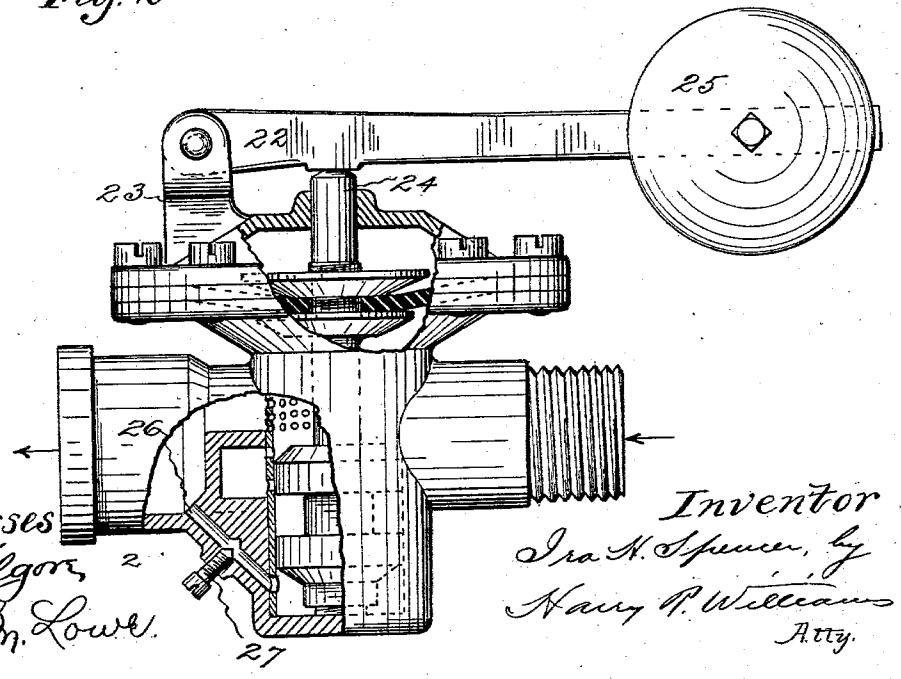


Fig. 2



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No. 746,755. Patented December 15, 1903.

UNITED STATES PATENT OFFICE.

IRA H. SPENCER, OF HARTFORD, CONNECTICUT.

PRESSURE-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 746,755, dated December 15, 1903.

Application filed November 22, 1902. Serial No. 132,412. (No model.)

To all whom it may concern:

Be it known that I, IRA H. SPENCER, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Pressure-Regulators, of which the following is a specification.

This invention relates to one of those devices which are used in fluid systems for reducing and regulating the pressure.

The object of this invention is to provide a simple and efficient device which can be closely regulated and which will operate easily and surely without chattering or hammering.

The embodiment of the invention that is illustrated has a body with an inlet, outlet, and valve chamber between the inlet and outlet, with a piston-valve in the valve-chamber, the spindle of which is connected with a diaphragm that is normally forced down by a spring or weight arranged above the diaphragm, as more particularly hereinafter described.

Figure 1 of the accompanying drawings shows a central vertical section of a regulator that embodies the invention. Fig. 2 shows a side view of a regulator of modified construction that embodies the invention, with parts broken away so as to show the interior.

The body 1 is cast to shape, of ordinary valve metal, with an inlet 2 and an outlet 3, adapted to be connected with the pipes of the system in which the device is to be used. Between the inlet and the outlet is a cylindrical valve-chamber in which a valve-tube 4 is fitted. The inlet-chamber is divided from the outlet-chamber by the web 5, that is integral with the body. Perforations 6 are made through the tube to provide ports from the inlet-chamber, and perforations 7 are made through the tube to provide ports to the outlet-chamber.

The piston-valve which works in the valve-tube has a downwardly-facing cup packing 8 and an upwardly-facing cup packing 9, of equal area, separated by a spool 10 and held in place between the flange 11, fixed to the spindle, and nut 12, screwed on the spindle. An opening 13 is made transversely through the spindle above the fixed flange, and an opening 14 is made longitudinally of the spindle from the lower end to the transverse opening.

A diaphragm 15, of rubber or other suitable flexible material, is held between the flanged upper end of the body and the flanged lower end of the cover 16. The cover is secured to the body, with the diaphragm between, by screws 17 or other means. The spindle passes through the diaphragm and has a fixed flange 18 below the diaphragm, a removable flange 19 above the diaphragm. A spring 20 is placed about the spindle, so as to thrust between the flange 19 and the adjustable cap 21, that is screwed into the top of the cover. The downward pressure of this spring is regulated by the position of the cap.

When there is no pressure on the outlet side of the regulator, the spring pushes the spindle and diaphragm downwardly, so that the piston-valve will occupy the lower part of the valve-chamber. With the valve in this position fluid will flow from the inlet through the perforations 6 into the tube and through the perforations 7 from the tube to the outlet. When the pressure on the outlet side of the regulator rises to the maximum limit, the diaphragm is lifted against the spring. This moves the valve upwardly and closes the upper perforations 6, so that no fluid can pass from the inlet to the outlet. Thus the pressure on the outlet side of the regulator will never be higher than the desired maximum, for the reason that the passages from the inlet are closed when the maximum is reached. The maximum pressure is easily determined by adjusting the cap and varying the tension of the spring.

The pressures above and below the piston-valve are always equal and in opposite directions, and the pressures between the packings of the piston-valve are always equal and in opposite directions, so that the piston-valve is at all times perfectly balanced, and thus offers no resistance to movement when it is forced down by the spring or raised by the diaphragm. By reason of this the limit of the pressure can be closely regulated and the parts will move easily and smoothly. As the pressures on the opposite sides of the piston-valve are equal and counterbalance each other, there can be no sudden movement which will cause hammering on account of

the cushioning action of the fluid, nor can there be any chattering of the parts. The parts are simple to form, are readily put together, and when assembled occupy but a small space. With this construction the fluid is screened as it passes through the regulator, so that foreign matter will not flow from the main to the apparatus in the system inside of the regulator.

If desired, instead of a spring for forcing the spindle downwardly a lever 22 may be pivoted to a lug 23, projecting from one side of the cover, so as to rest upon the upper end of the spindle 24. This lever may have an adjustable weight 25 for varying its downward pressure.

Instead of perforating the spindle for the purpose of equalizing the pressure upon the top and bottom of the piston-valve a by-pass passage 26 may be made from the outlet side of the regulator to the valve-chamber below the valve. A screw 27 may be arranged to turn into this by-pass passage for regulating its capacity.

I claim as my invention—

1. A pressure-regulator having a body with an inlet-chamber and outlet-chamber and a web dividing the inlet-chamber from the outlet-chamber, a tube extending through the web at right angles to the inlet and outlet chambers and having perforations through its walls opposite the inlet-chamber and perforations through its walls opposite the outlet-chamber, a piston-valve with oppositely-facing packings movable in the tube and with passages through its spindle whereby the pressure above and below and also between the packings is equal and in opposite directions, a diaphragm in a chamber above the tube and secured to the valve-spindle, and a counterbalance above the diaphragm tending to force the spindle and valve downwardly and open the perforations through the tube above the packings, substantially as specified.

2. A pressure-regulator having a body with an inlet-chamber and outlet-chamber and a web dividing the inlet-chamber from the outlet-chamber, a tube extending through the web at right angles to the inlet and outlet chambers and having perforations through its walls opposite the inlet-chamber and perforations through its walls opposite the outlet-chamber, a piston-valve with oppositely-facing packings movable in the tube and with passages through its spindle whereby the pressure above and below and also between the packings is equal and in opposite directions, a diaphragm in a valve-chamber above the tube and secured to the valve-spindle, a cover above the diaphragm, a cap screwed on to the upper end of the cover, and a spring located under the cover about the valve-spindle and thrusting between a flange on the spindle and the cap, substantially as specified.

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