J. H. DERBY.

REDUCING VALVE.

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975,838.

Patented Nov. 15, 1910.

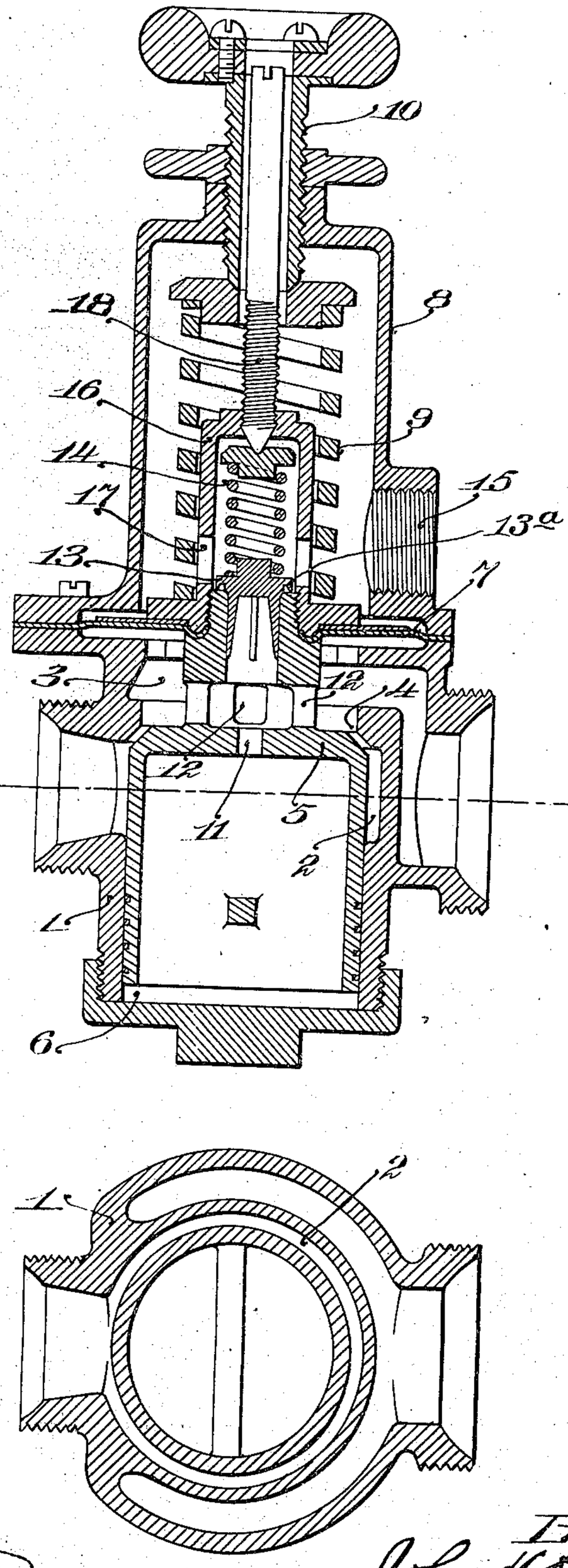

Fig. 1.

Fig. 2.

Witnesses

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UNITED STATES PATENT OFFICE.

JOHN H. DERBY, OF NEW YORK, N. Y., ASSIGNOR TO GENERAL FIRE EXTINGUISHER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

REDUCING-VALVE.

975,838. Specification of Letters Patent. Patented Nov. 15, 1910.

Application filed May 29, 1908. Serial No. 435,719.

To all whom it may concern:

Be it known that I, JOHN H. DERBY, citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Reducing-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 appertains to make and use the same.

The present invention relates to an improvement in reducing valves.

The object of the invention is to improve valves of the class described in several respects hereinafter pointed out, and to this end the invention consists in the improved reducing valve hereinafter described and claimed and shown in the accompanying drawings, in which—

Figure 1 is a vertical section of the valve, and Fig. 2 a horizontal section on line *x*—*x* of Fig. 1.

The illustrated embodiment of the invention has a body 1 containing a high-pressure chamber 2 and a low-pressure chamber 3 connected, respectively, with the high-pressure supply and the low-pressure system to which the fluid is to be delivered at reduced pressure. The chambers are connected by a passage 4 controlled by a valve 5. The part of the valve member subjected to high pressure is cylindrical in form, and its lower end projects into and closely fits a cylindrical chamber 6 extending from the high-pressure chamber. By this arrangement the valve is relieved from all tendency to be moved in either direction bv the fluid in the chamber 2, and its operation is rendered absolutely independent of fluctuations of pressure therein.

The valve is controlled by a diaphragm and a spring acting in opposite directions. The upper part of the low-pressure chamber is closed by a diaphragm 7 of sheet metal. A cap 8 forming the upper part of the body retains the diaphragm in place and forms a relief chamber or chamber for the reception of water flowing from the relief valve described later. A helical spring 9 inclosed within the relief chamber presses downward against the resistance of the diaphragm and tends to open the valve. This opening tendency is opposed by the pressure of the fluid in the chamber 3 against the diaphragm, and when the pressure has risen to a predetermined point the pressure of the spring is overcome and the valve is closed and held closed until the pressure in the chamber 3 again falls below the predetermined point. A hollow adjusting screw 10 fitted with a hand wheel serves to adjust the pressure of the spring 9 and thereby to vary the fluid pressure maintained in the low-pressure system.

A passage 11 and lateral openings 12 connect the space below the valve member with the chamber 3, thereby subjecting the lower part of the valve to pressure which balances the pressure of the fluid in the chamber 2 upon the upper surface of the valve. The passage 11 serves also to permit the escape of fluid which leaks into the chamber 6 from the high-pressure chamber 2.

The upper extremity of the passage 11 communicates with the relief chamber, but is normally closed by a relief valve 13 which is held to its seat by a spring 14. If from any cause the pressure in the low-pressure chamber 3 rises to a substantial extent above the predetermined point the relief valve will be raised from its seat by the pressure, and fluid will escape into the relief chamber, and thence by an opening 15 which may be connected with a waste pipe.

The relief valve is provided with a flange 13^a of greater diameter than the conical valve seat, and this flange causes the valve to operate as a pop valve, that is, to remain open under a lower pressure in the low-pressure chamber than the pressure necessary to first open it, owing to the fact that as soon as the valve is opened the flange 13^a is added to the diameter subjected to the water pressure. The use of this form of relief valve in connection with a reducing valve is an important feature of the invention and conduces in a substantial degree to its successful operation. There is a slight but constant leakage past the cylindrical part of the valve 5 into the chamber 6 and thence to the low-pressure system, which may also be augmented by slight leakage through the valve passage 4, and at times when no water is being drawn from the low-pressure system this leakage escapes from the relief valve. In a relief valve of ordinary form the constant slight flow of water seeps out constantly

from the relief valve without raising it substantially from its seat, and this action results, as is well known to those skilled in the art, in erosion upon the surfaces of the valve and valve seat. In the present device, however, as soon as the pressure rises high enough to start the relief valve the valve opens widely and allows the pressure in the low-pressure system to fall sensibly before the relief valve again seats, and thus the operation of the valve is intermittent and positive. This feature of the invention is particularly of advantage in connection with the construction of the other parts of the valve which results necessarily in a slight but constant leakage into the low-pressure system.

The spring 14 is maintained in position by a hollow stem 16 projecting upward from the valve member. The stem is provided with passages 17 for the free escape of fluid passing through the relief valve, and by locating the relief valve and its spring within the hollow stem, and the latter within the helical spring 9, a very compact arrangement of the valve members is secured.

In order that the spring 14 may be adjusted in accordance with the maximum pressure desired in the low-pressure system, the upper end of the spring is supported by an adjusting screw 18 threaded into the stem 16. The screw 18 projects upward into the hollow adjusting screw 10. By this arrangement the adjusting screw 18 maintains always a proper relation to the seat of the valve 13 so that the pressure of the spring on the valve does not vary with the movement of the diaphragm, while at the same time the adjusting screw 18 is always accessible from the exterior of the valve.

The invention, except in so far as its features of construction are defined in the claims, is not limited to the precise form shown and described as the preferred embodiment, but may be embodied in other forms.

I claim—

1. A reducing valve, having, in combination, a body provided with a high-pressure chamber, a low-pressure chamber, a passage connecting said chambers, a relief chamber, and a cylindrical chamber extending out from the high-pressure chamber, a cylindrical valve closing the passage between the high and low-pressure chambers and fitting closely in the cylindrical chamber, and a diaphragm between the low-pressure chamber and the relief chamber connected to the cylindrical valve, the said valve having a passage therethrough opening at its upper and lower ends into the relief chamber and the cylindrical chamber respectively and connected at an intermediate point with the low-pressure chamber, and a spring-operated relief valve closing the upper end of the passage, substantially as described.

2. A reducing valve, having, in combination, a body provided with a high-pressure chamber, a low-pressure chamber, a passage connecting the chambers, and a relief chamber having an opening therein, a main valve controlling the said passage, a diaphragm between the low-pressure chamber and the relief chamber and connected with the main valve, a cylindrical spring in the relief chamber bearing against the diaphragm to force the main valve open upon a fall of pressure against the diaphragm, a hollow stem projecting from the diaphragm and inclosed within the said spring, a relief valve seated in the upper part of the main valve member and within the hollow stem, and a spring located within the hollow stem and bearing against the relief valve to hold the same closed, the main valve and the hollow stem having passages to permit the passage of fluid through the relief valve, substantially as described.

3. A reducing valve, having, in combination, a body provided with a high-pressure chamber, a low-pressure chamber, a passage connecting the chambers, and a relief chamber having a relief opening therein, a main valve controlling the said passage, a diaphragm separating the low-pressure chamber and the relief chamber and connected with the main valve, a helical spring in the relief chamber bearing against the diaphragm, a hollow stem projecting from the diaphragm and inclosed within the said spring, a relief valve seated in the upper part of the main valve member and within the hollow stem, a spring located in the hollow stem and bearing against the relief valve, a hollow adjusting screw threaded into the body for adjusting the main valve spring, and an adjusting screw projecting into the said hollow screw and threaded into the hollow stem for adjusting the relief valve spring, substantially as described.

4. A reducing valve, having, in combination, a body provided with a high-pressure chamber, a low-pressure chamber, a passage connecting said chambers, a cylindrical chamber extending out from the high-pressure chamber, a valve closing the passage between the high and low-pressure chambers and having a portion extending into and closely fitting the cylindrical chamber, a leak passage connecting the cylindrical chamber with the low-pressure chamber, and a pop relief valve connected with the low-pressure chamber, substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses.

JOHN H. DERBY.

Witnesses:
JOHN P. ASHLEY,
ROLLIN A. WHITTICK.