E. V. ANDERSON.

REDUCING VALVE.

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1,235,541.

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FIG. 1.

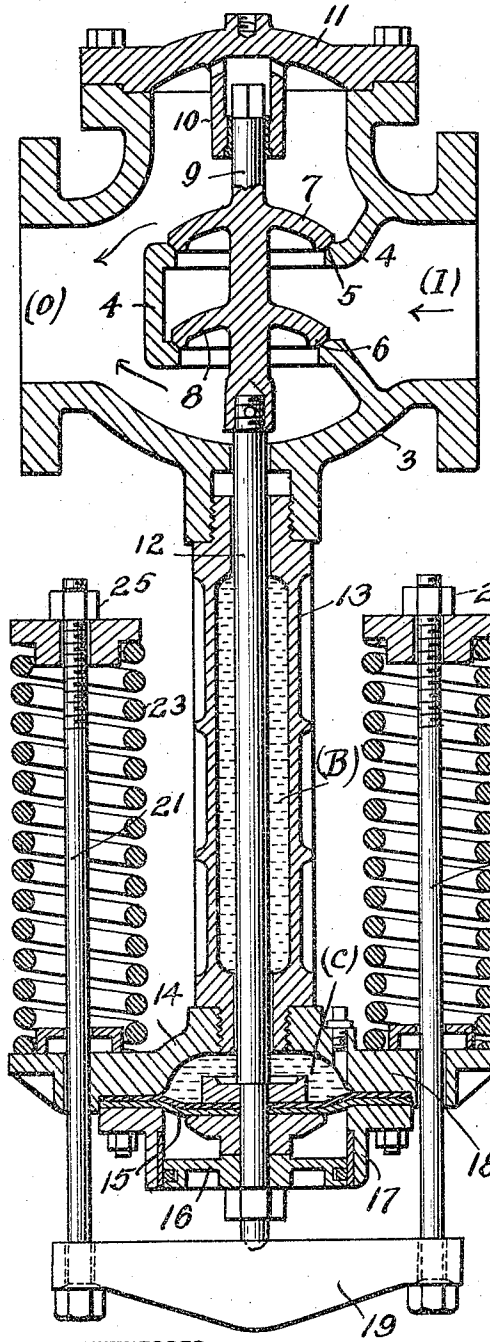
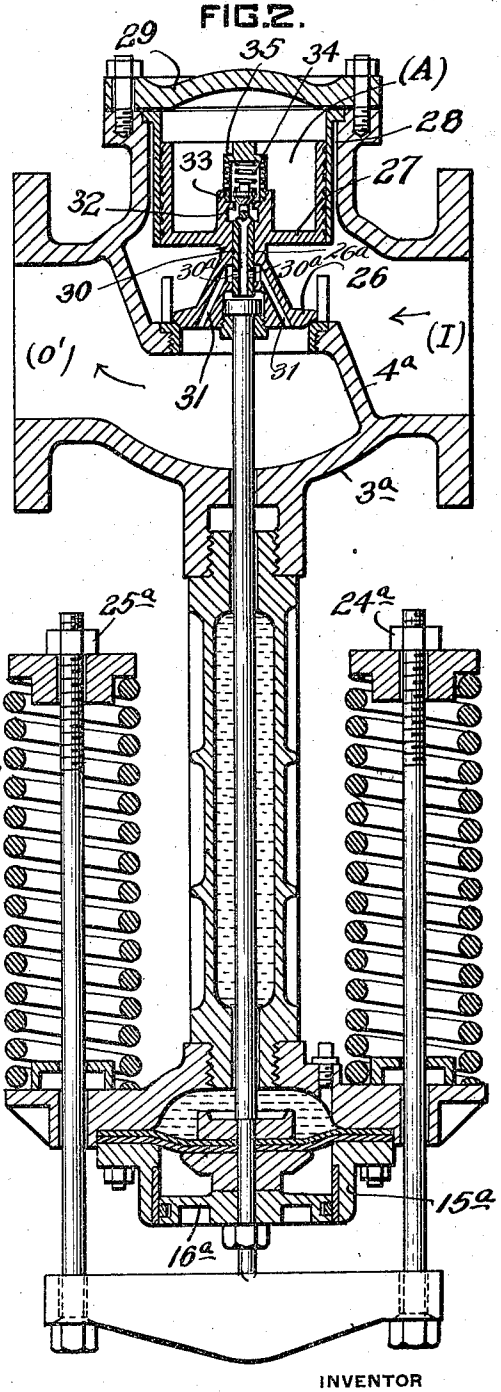


FIG. 2.



WITNESSES

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REDUCING-VALVE.

1,235,541. Specification of Letters Patent. Patented Aug. 7, 1917.

Application filed June 8, 1916. Serial No. 102,394.

To all whom it may concern:

Be it known that I, EDWARD V. ANDERSON, a citizen of the United States, residing at Monessen, in the State of Pennsylvania, have invented certain new and useful Improvements in Reducing-Valves, of which the following is a specification.

My invention relates to valves for steam, water, and the like, and particularly to valves balanced in a position to maintain automatically a predetermined but regulable pressure on the outlet side. Its primary objects are to render the valve more sensitive and certain, to prevent water hammer, to prevent accidents in case of breakage or leakage, to render an inspection and adjustment of the parts more easy, and generally to improve the construction and operation of such valves. The invention is illustrated in the accompanying drawing in which Figure 1 is a vertical central section of a double-seated valve according to my invention, and Fig. 2 shows a similar section of a modified form in which the valve operates a little differently.

Probably the most satisfactory pressure reducing valve employs a diaphragm under pressure of the line on the outlet side of the main valve, but heretofore such valves have had the danger that in case the diaphragm became perforated in any way the reducing valve would fly open and allow high pressure to enter the low pressure service line. This I avoid by placing the dashpot under the diaphragm, and I incidentally render the valve very sensitive and secure other advantages by such arrangement.

Thus in the drawing, Fig. 1, it will be seen that there is a valve casing 3 provided with a double perforated partition 4 forming valve seats 5 and 6 (of which the latter is preferably smaller in diameter than the former.) On these is seated the double disk valve 7, 8, having its upper stem 9 guided in a socket 10 made part of a cap 11 of the main casing 3. The bottom stem is provided with an extension rod 12 which passes downward through a supplemental casing 13 and through a diaphragm casing 14 containing a diaphragm 15, and at the bottom is supplied with a packed piston 16 which works within the cylindrical casing extension 17 being secured to the hollow disk 18 screwed on the bottom of the supplemental casing 13. Bearing against the bottom of the rod 12 is a yoke 19 normally urged upward by two rods 20 and 21 inside the coil springs 22 and 23 adjusted by means of followers and nuts 24, 25, as shown. It will be understood that there is leakage between rod 12 and the openings in the casing 3 and 13, so that the fluid from the outlet side of the valve marked (O) will occupy the space (B) in casing 13 and the space (C) in the casing 18, thus resting on the diaphragm 15 and acting contrary to the springs 22 and 23. The strength of these springs being adjusted by the nuts 24 and 25, the valve disks 7 and 8 will be held upward partly by this and partly by the pressure from the inlet marked (I), and operating against the pressure of the outlet side on the diaphragm 15. Obviously if the pressure at (O) falls, the springs will open the valve wider, and if it rises the pressure on the diaphragm 15 will partly close the valve against the springs. There is thus maintained a very nicely balanced condition and pressure at the outlet side depending entirely upon the tension of springs 22 and 23.

The bottom dashpot piston 16 is packed in the cylinder 17, and of course will retard and regulate the movements of the valve in both opening and closing. Moreover, in case the diaphragm 15 should become broken or perforated, this will not result, as has heretofore been the result, in relieving the effect of the low pressure in maintaining the valve in a balanced condition, but said pressure will simply take effect on the disk 16, which is of the same diameter as the diaphragm 15, and while there will be a slight leakage the valve will continue to operate as before until repairs are made.

In Fig. 2, the arrangement is as before described except that the casing 3^a has a single perforated partition 4^a and a single valve seat 25 accommodating a single valve 26 which is provided with a more refined form of dashpot, in addition to the dashpot 16^a at the bottom. That is, the valve 26 has fixed to its stem a hollow piston 27 packed in a liner 28 in the upper cylindrical part of the casing 3^a and covered by the hood 29. The central spindle 26^a of the valve 26 is bored out to form passages 31 and carries a slidable cylinder 30 which by means of perforations 30^a in it and passages 31 in the valve body, permits the entry of pressure from the outlet side of the main valve into the

interior of cylinder 30. This cylinder 30 carries integral with it a small puppet valve 32 held down upon the seat 33 by a coil spring 34 maintained in a perforated cap 35. By this means the pressure from the outlet side is permitted to enter the space marked (A) but not to escape therefrom, with the result that the pressure in the chamber (A) is never less than the pressure at the outlet side marked (O′) and the valve in opening always operates against the pressure actually existing on the outlet side of the main valve. This, it will be seen, is the same as the pressure on the diaphragm 15^a and assists in the nicety of the balance attained by adjusting the nuts 24^a, 25^a on the coil springs.

Having thus described my invention and illustrated its use, what I claim is the following:

1. A pressure reducing valve comprising the combination with a main valve casing and valve therein, of two supplemental pressure chambers and pistons therein subjected to the pressure on the outlet side of the main valve and tending to hold the valve closed, one of said chambers being provided with an inlet port having a non-return valve, and an adjustable spring device to balance the fluid pressure in said supplemental chambers.

2. A pressure reducing valve comprising a main valve casing having a perforated partition, a valve seated therein, a piston attached to the stem of the valve and forming in conjunction with the casing, a dashpot, ports and a supplemental valve adapted to maintain in said dashpot always the pressure on the outlet side of the main valve, a supplemental stem to the main valve carrying another piston and a flexible diaphragm inside the same, a supplemental casing containing a space limited by said diaphragm, and adjustable springs adapted to exert pressure on the supplemental valve stem in opposition to the outlet pressure on said diaphragm.

In testimony whereof I have hereunder signed my name.

EDWARD V. ANDERSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."