No. 740,494. PATENTED OCT. 6, 1903.

J. B. WARING.

VALVE.

APPLICATION FILED JULY 1, 1901. RENEWED MAR. 10, 1903.

NO MODEL.

Fig. 1,

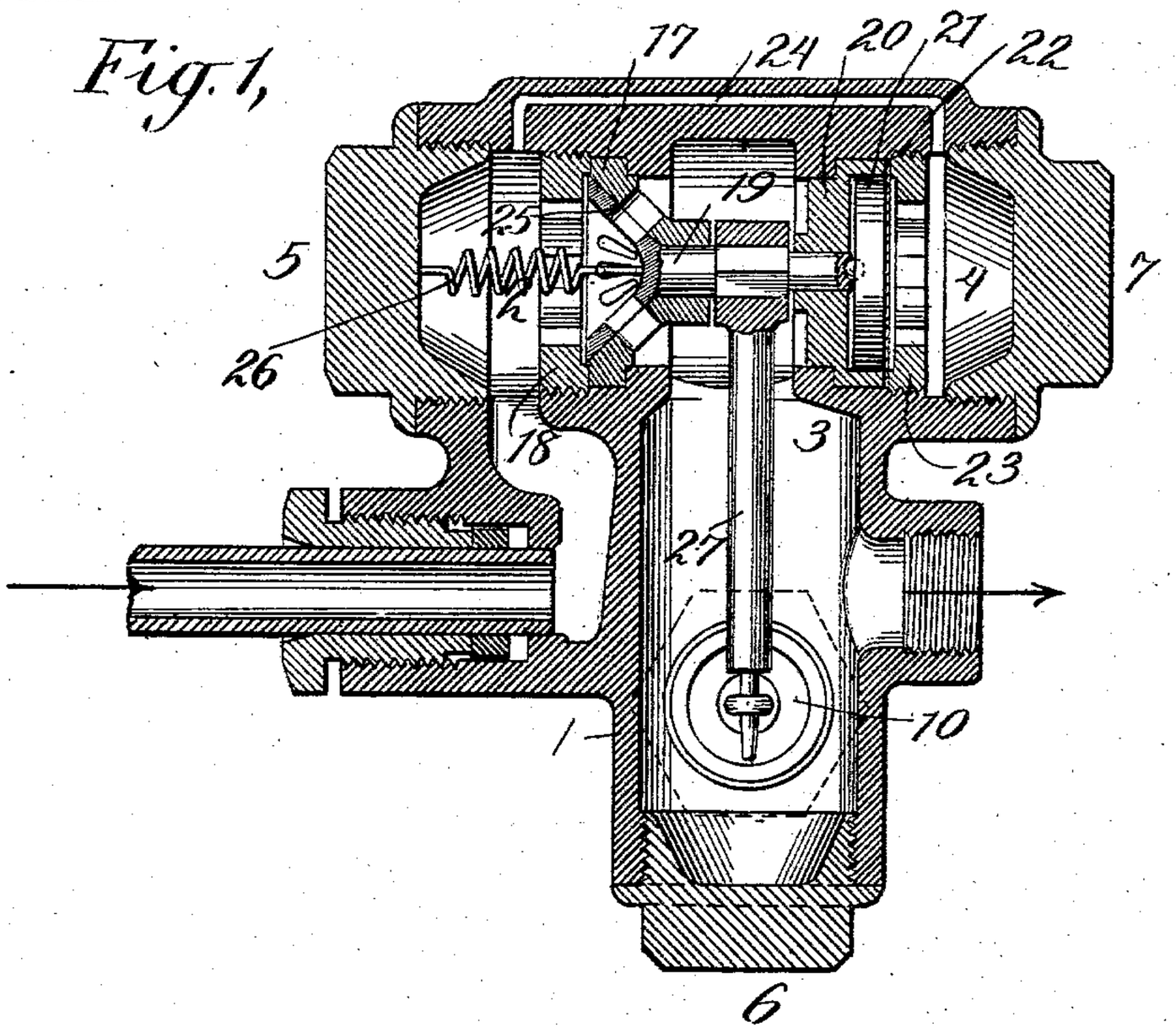

Fig. 2.

WITNESSES:

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No. 740,494. Patented October 6, 1903.

UNITED STATES PATENT OFFICE.

JOHN B. WARING, OF EAST ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO WARING PATENTS COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

VALVE.

SPECIFICATION forming part of Letters Patent No. 740,494, dated October 6, 1903.

Application filed July 1, 1901. Renewed March 10, 1903. Serial No. 147,150. (No model.)

To all whom it may concern:

Be it known that I, JOHN B. WARING, a citizen of the United States, and a resident of East Orange, Essex county, State of New Jersey, have invented new and useful Improvements in Valves, of which the following is a specification, reference being had to the accompanying drawings, forming part thereof.

This invention relates to valves adapted for the regulation or reduction of pressures and for controlling the flow of a fluid from a high pressure to a low pressure, and so regulating the flow of the fluid as to produce a uniform predetermined low pressure or pressure beyond the valve.

My invention consists in the provision of an axially-pivoted conical ported valve for such purpose controlled by the pressure produced by the restrictive and regulating action of the valve, and, further, in the provision of improved means whereby the high pressure tends to press the valve against its seat and also actuates a compensating device tending to press the valve away from its seat; and my invention further consists in the combination, with means for opposing or equalizing the fluid-pressures upon the valve, of additional pressure means whereby a predetermined pressure is exerted to make the valve tight upon its seat.

My invention further consists in improved means whereby a very delicate controlling action is had and in various improvements in connection and combinations of parts.

I will now describe the pressure-reducing valve embodying my invention illustrated in the accompanying drawings and will thereafter point out my invention in claims.

Figure 1 is a longitudinal vertical section of a reducing-valve embodying my invention. Fig. 2 is a transverse vertical section of the same.

The casing in the embodiment of my invention shown is a body part formed of a single casting 1 and provided with a high-pressure chamber 2, a low-pressure chamber 3, and a compensating chamber 4, wherein the high pressure against the valve is balanced. The end of each of these chambers is covered by a removable cap—the cap 5 of the high-pressure chamber, the cap 6 of the low-pressure chamber, and the cap 7 of the compensating chamber. The low-pressure chamber has lateral branches 8 9, the pressure-piston 10 being located in the branch 8, shown as a removable cylinder, for greater convenience in construction, and the compensating spring 11 being located in the branch 9 and the ends of these branches being covered by removable caps 12 and 13, respectively. A rod 14 from the piston extends loosely through the cap 12, so that the piston receives freely the pressure of the atmosphere at its outer face, and an adjusting-screw 15 is provided for the compensating spring 11, this screw 15 having a head seated in the cap 13 against a packing-ring and having a nut 16 engaging the outer end of the compensating spring 11.

The valve-seat 17 is shown as of conical form and seated in an opening between the high-pressure chamber 2 and the low-pressure chamber 3 and clamped against a shoulder by the externally-threaded annular nut 18. The valve-seat also has a bearing therein for the valve-stem 19, and this stem also has a bearing in the ring 20, which is clamped against a shoulder in an opening between the low-pressure chamber 3 and the compensating chamber 4, and has a recess formed therein within which is located a pressure block or piston 21, shown as having a ball-and-socket connection with the rear end of the valve-stem 19, and a diaphragm 22, the outer periphery of which is clamped against the face of the ring 20 by the annular externally-threaded nut 23, bears against the face of the pressure-block 21 and transmits to the valve-stem and valve the pressure in the compensating chamber 4, and as this compensating chamber is connected by a duct 24 with the high-pressure chamber 2 this pressure is that of the high-pressure chamber.

The valve 25 is shown as of conical form and fitting against the valve-seat 17 and movable rotatively relatively thereto and having a plurality of ports which when the valve is wide open correspond with similar ports in the valve-seat 17. The conical form of the rotary or oscillating valve permits a very much larger area of ports for a given diame-

ter of valve than a flat valve, while retaining the important feature that the valve is self-adjusting to compensate for wear and embodying the many well-known advantages of a conical valve and seat.

It is designed to balance the valve exactly by the pressure from the compensating chamber transmitted by the diaphragm and pressure-block. With such balancing of pressures there would be no tendency to move the valve in either direction, and therefore no pressure of the valve against its seat. As some pressure of the valve against its seat will be necessary to insure tightness of the valve, I propose to provide this pressure by a pressure-spring 26 between the valve 25 and cap 5 and to provide for each valve a pressure-spring adapted for the pressures under which the valve is to be worked. This pressure-spring provides a predetermined pressure altogether independent of the variations of the high pressure and just such a pressure as is required to insure tightness of the valve, while the diaphragm compensating device insures a balancing of the fluid-pressures under all variations of the high pressure.

The valve is actuated by a controlling mechanism comprising the pressure-piston 10, above described, receiving the low pressure against its inner face and the atmospheric pressure against its outer face and having an inner rod 28 engaged by an operating-arm 27 on the valve-stem 19, and the compensating spring 11, above described, engaging a loop at the inner end of the inner piston-rod 28. The construction permits of the employment of an operating-arm 27 of considerable length, whereby a considerable leverage is gained upon the valve and a delicate controlling action assured.

It will be noted that the construction permits ready access to and the insertion and removal of all parts of the valve.

It is obvious that various modifications may be made in the construction shown in the drawings and above particularly described within the spirit and scope of my invention.

What I claim, and desire to secure by Letters Patent, is—

1. The combination, with a casing having a high-pressure chamber and a low-pressure chamber and a ported valve-seat between said chambers, of a ported axially-pivoted valve and means for actuating the same rotatively, the valve being arranged so that the high pressure tends to press the valve against its seat, and compensating means engaging the valve-stem but permitting rotation thereof independently of the compensating means, whereby the high pressure is also exerted in opposition to the tendency to press the valve against its seat.

2. The combination, with a casing having a high-pressure chamber and a low-pressure chamber and a ported conical valve-seat therein, of a ported axially-pivoted conical valve and means for actuating the same rotatively, the valve being arranged so that the high pressure tends to press the valve against its seat, and compensating means engaging the valve-stem but permitting rotation thereof independently of the compensating means, whereby the high pressure is also exerted in opposition to the tendency to press the valve against its seat.

3. The combination, with a casing having a high-pressure chamber and a low-pressure chamber and a valve-seat therein, the low-pressure chamber having lateral branches located at a distance from the valve-seat, of an axially-pivoted valve and stem and an actuating-arm on the valve-stem, the actuating-arm being located in such low-pressure chamber extending to a point between the lateral branches of the low-pressure chamber, a controlling-piston fitted to reciprocate in one of the lateral chambers and a compensating spring located in the other lateral chamber, the piston and compensating spring being joined together and engaging the actuating-arm of the valve in proximity to the end thereof.

4. The combination, with a casing having a high-pressure chamber and a low-pressure chamber and a valve-seat between said chambers, of an axially-pivoted valve arranged so that the high pressure tends to press the valve against its seat, a valve-stem extending into the low-pressure chamber, an actuating-arm on the valve-stem and in the low-pressure chamber, and compensating means working against the valve-stem but permitting rotation thereof independently of the compensating means, whereby the high pressure is also exerted in opposition to the tendency to press the valve against its seat, and a controlling device actuated by the low pressure and actuating the valve-arm.

5. The combination, with a casing having a high-pressure chamber and a low-pressure chamber and a ported valve-seat between said chambers, of an axially-pivoted ported valve arranged so that the fluid-pressure tends to press the valve against its seat, a valve-stem extending into the low-pressure chamber, an actuating-arm on the valve-stem and in the low-pressure chamber, the casing having a compensating chamber receiving the high pressure and having a diaphragm transmitting such pressure to the valve-stem in opposition to the tendency to force the valve against its seat, but permitting the valve to rotate independently of the diaphragm, and a controlling device actuated by the low pressure and actuating the valve-arm.

6. The combination, with a casing having a high-pressure chamber and a low-pressure chamber and a ported valve-seat between said chambers, of a ported axially-pivoted valve arranged so that the fluid-pressure tends to press the valve against its seat, the valve-stem extending into the low-pressure chamber, an actuating-arm on the valve-stem and in the low-pressure chamber, the casing having

a compensating chamber and a diaphragm receiving the high pressure, a thrust-plate between the diaphragm and the valve-stem transmitting the high pressure to the valve-stem in opposition to the tendency to force the valve against its seat, but permitting the valve to rotate independently of the diaphragm and a controlling device actuated by the low pressure and actuating the valve-arm.

7. The combination, with a casing having a high-pressure chamber and a low-pressure chamber, of a valve controlling the flow of fluid from one chamber to the other and means for actuating such valve rotatively, a seat for the valve, the valve being arranged so that the fluid-pressure tends to press the valve against its seat, and compensating means controlled by the fluid-pressure in opposition to the tendency to force the valve against its seat whereby the fluid-pressures upon the valve are balanced, and an additional pressure device exerting its pressure independently of the fluid-pressures for pressing the valve against its seat with a predetermined pressure.

8. The combination, with a casing having a high-pressure chamber and a low-pressure chamber and a ported valve-seat between said chambers, of a ported axially-pivoted valve and means for actuating the same rotatively, the valve being arranged so that the fluid-pressure tends to press the valve against its seat, and compensating means controlled by the fluid-pressure in opposition to the tendency to force the valve against its seat, whereby the fluid-pressures upon the valve are balanced, and an additional pressure device exerting its pressure independently of the fluid-pressures for pressing the valve against its seat with a predetermined pressure.

9. The combination, with a casing having a high-pressure chamber and a low-pressure chamber and a ported conical valve-seat therein, of a ported axially-pivoted conical valve and means for actuating the same rotatively, the valve being arranged so that the fluid-pressure tends to press the valve against its seat, and compensating means controlled by the fluid-pressure in opposition to the tendency to force the valve against its seat whereby the fluid-pressures upon the valve are balanced, and an additional pressure device exerting its pressure independently of the fluid-pressures, for pressing the valve against its seat with a predetermined pressure.

10. A valve mechanism having a high-pressure chamber and a low-pressure chamber and a conical ported valve and valve-seat for controlling the passage of fluid between such chambers, fluid-actuated means for compensating the pressure between the valve and its seat, and fluid-actuated means for adjusting the said valve on its seat, substantially as set forth.

11. A valve mechanism having a high-pressure chamber and a low-pressure chamber and a conical ported valve and valve-seat for controlling the passage of fluid between such chambers, fluid-actuated means for compensating the pressure between the valve and its seat, fluid-actuated means for adjusting the said valve on its seat, and resilient means for exerting determinate pressure between the valve and its seat independently of the fluid-pressure.

Signed at New York, N. Y., this 29th day of June, 1901.

JOHN B. WARING.

Witnesses:
HERBERT H. GIBBS,
HENRY D. WILLIAMS.