No. 762,767. PATENTED JUNE 14, 1904.

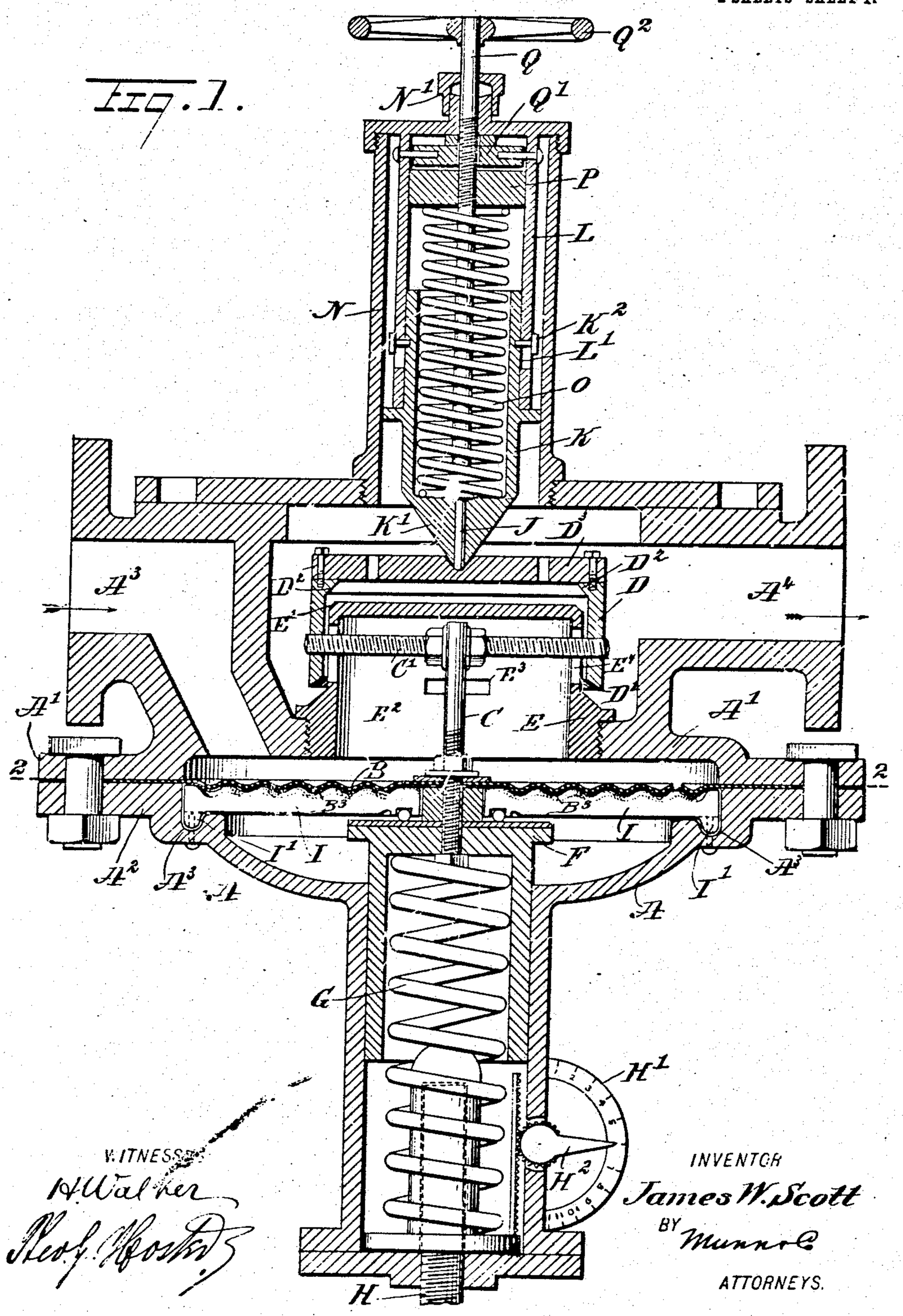
J. W. SCOTT.

FLUID PRESSURE REGULATOR.

APPLICATION FILED JULY 28, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

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NO MODEL. 2 SHEETS—SHEET 2.

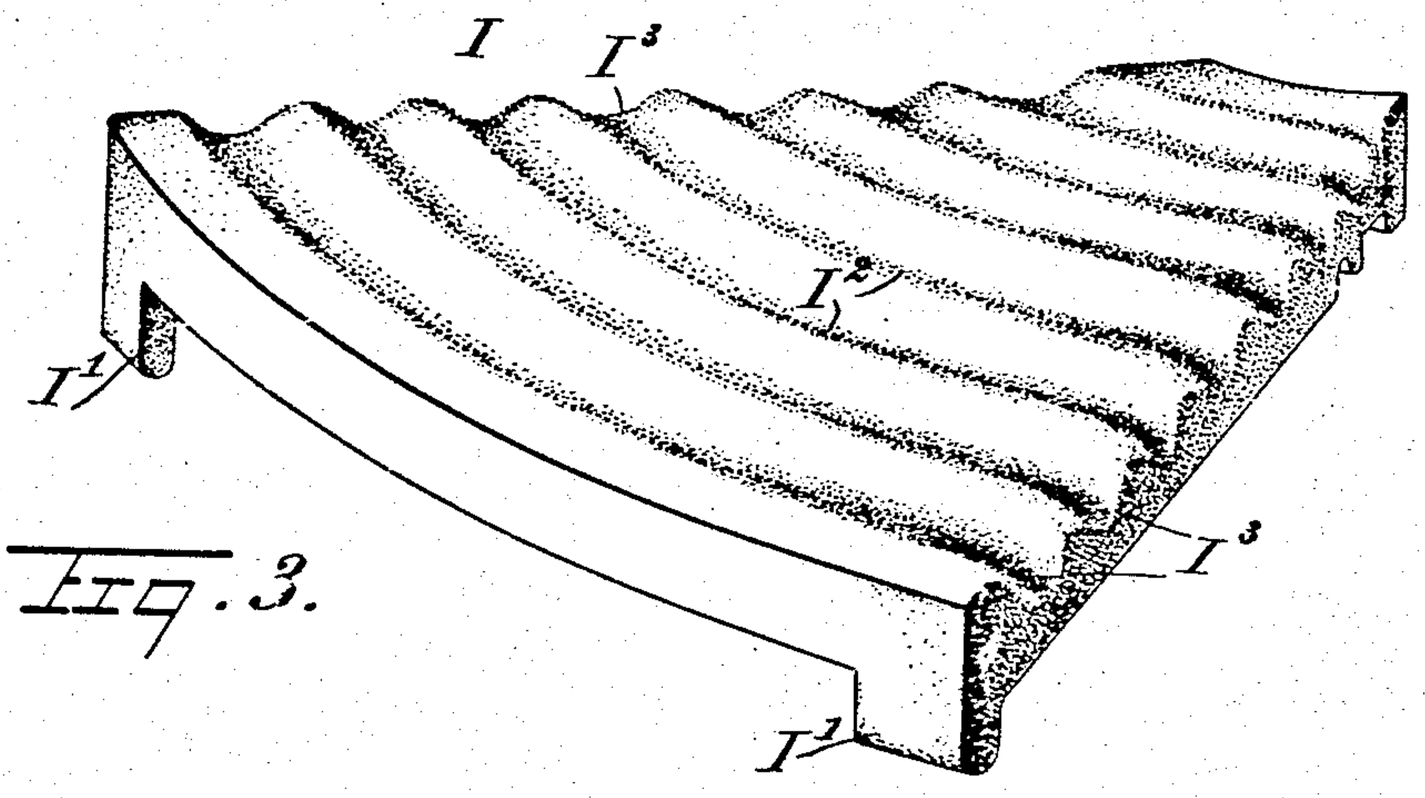

Fig. 3.

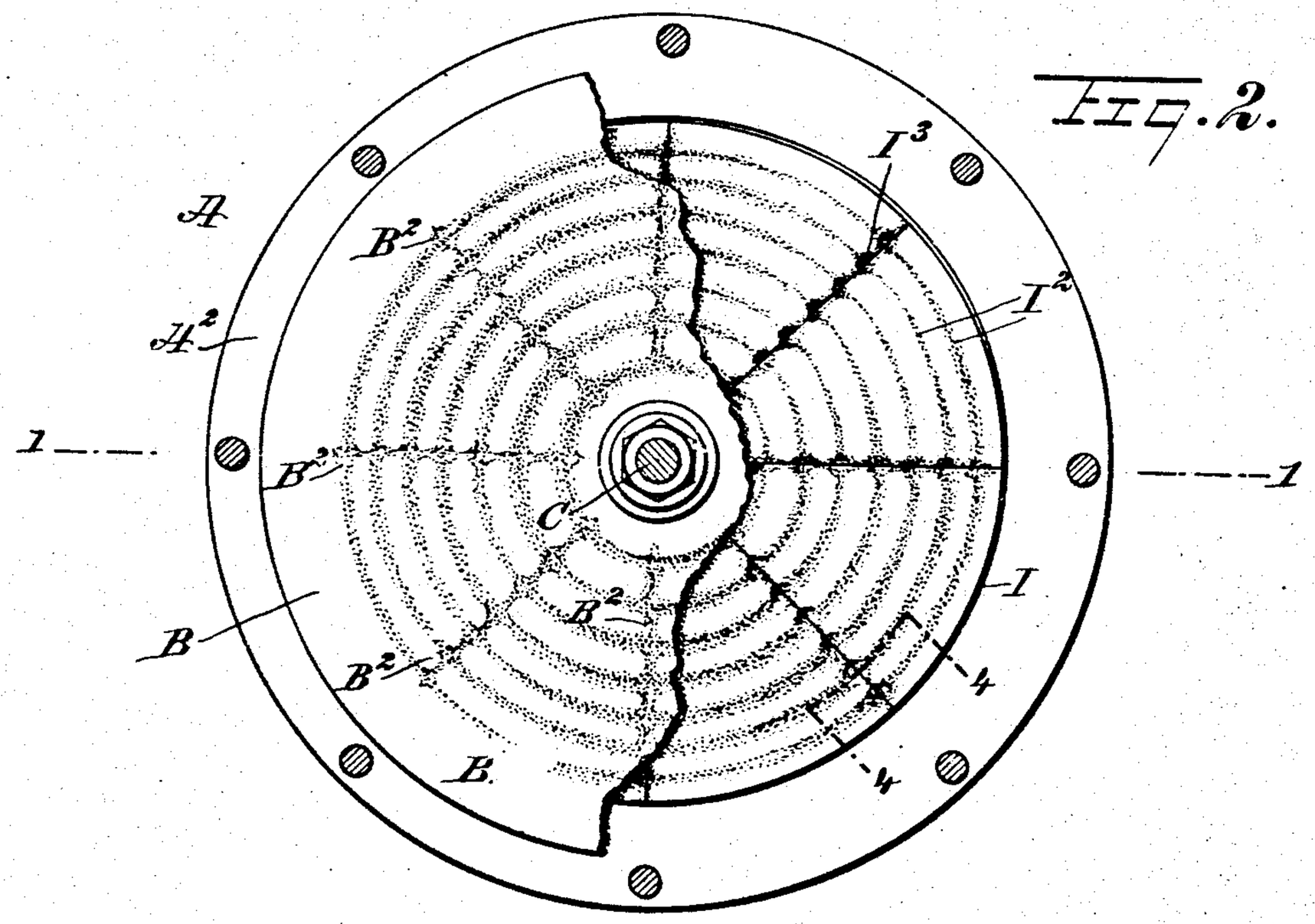

Fig. 2.

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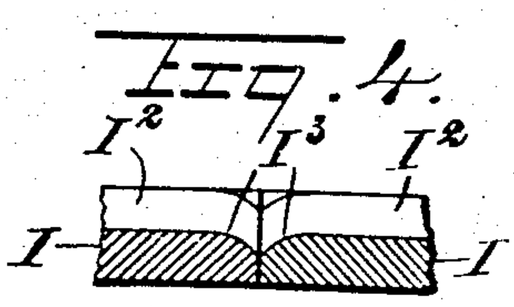

Fig. 4.

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UNITED STATES PATENT OFFICE.

JAMES W. SCOTT, OF COLORADO SPRINGS, COLORADO.

FLUID-PRESSURE REGULATOR.

SPECIFICATION forming part of Letters Patent No. 762,767, dated June 14, 1904.

Application filed July 28, 1903. Serial No. 167,323. (No model.)

To all whom it may concern:

Be it known that I, JAMES W. SCOTT, a citizen of the United States, and a resident of Colorado Springs, in the county of El Paso and State of Colorado, have invented a new and Improved Fluid-Pressure Regulator, of which the following is a full, clear, and exact description.

The invention relates to fluid-pressure regulators such as shown and described in the Letters Patent of the United States No. 552,202, granted to me December 31, 1895.

The object of my present invention is to provide a new and improved fluid-pressure regulator which is simple and durable in construction, exceedingly sensitive in the working of its diaphragm, and arranged to permit the diaphragm to expand and contract in both circular and diametrical directions to prevent buckling of the diaphragm and to allow up-and-down movement without danger of the diaphragm bending unduly.

The invention consists of novel features and parts and combinations of the same, as will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a sectional side elevation of the improvement on the line 1 1 of Fig. 2. Fig. 2 is a reduced sectional plan view of the same on the line 2 2 of Fig. 1. Fig. 3 is a perspective view of one of the sectors of the diaphragm-supporting disk; and Fig. 4 is a sectional side elevation of the joint of adjacent sectors, the section being on the line 4 4 of Fig. 2.

Between the sections A′ and A² of a diaphragm-casing A is held in the usual manner a diaphragm B, connected by a stem C and cross-bar C′ with a valve D, adapted to be seated at its lower end D′ on a valve-seat E, interposed between a fluid-pressure inlet A³ and an outlet A⁴ in the section A′ of the diaphragm-casing A. The valve D is also adapted to be seated with its inner upper portion D² on a valve-seat E′, formed on the cylindrical extension E² of the valve-seat E, the said extension having ports E³ for the passage of the fluid and elongated apertures E⁴ for the free passage of the cross-bar C′.

The stem C extends into the section A² of the diaphragm-casing A and connects with a carrier F, pressed on by a pressure-regulating spring G, adapted to be set to any desired tension by a manually-controlled setting device H of any approved construction, the pressure being indicated on a segment H′ by a pointer H², controlled by the device H, as more fully described in the Letters Patent above referred to.

The non-fluid pressure face of the diaphragm B engages a support I, arranged within the section A², and this support is in the form of a disk made in sectors, each having its outer end provided at the under side with rounded-off lugs I′, engaging bearings A³, formed on the casing-section A², to allow the sectors to swing up and down, the free or inner ends of the sectors resting on ball-bearings J, supported on the spring-supported carrier F.

The diaphragm B is provided with annular concentric corrugations B′ and with radial corrugations B², and the face of the support I adjacent to the diaphragm is similarly corrugated—that is, provided with annular concentric corrugations I² and radial corrugations I³—of which the latter are at the joints of the sectors, as plainly indicated in Fig. 2, it being understood that the corrugations of the diaphragm and those of the support I are in register with each other.

Now by the construction described the diaphragm B is free to expand and contract, both in a circular as well as in a radial direction, thereby eliminating all tendency of the diaphragm to buckle or warp, at the same time increasing the life of the diaphragm. Furthermore, by having the supporting-sectors hinged at their outer ends and their free ends supported on ball-bearings held on a yieldingly-mounted carrier, all undue friction is prevented and the support is exceedingly sensitively mounted to insure a perfect flexing of the diaphragm under varying pressure.

In order to prevent undue wear on the diaphragm, a cushion B³ is preferably arranged

between the diaphragm and the corrugated support, as shown in Fig. 1, and this cushion is formed of leather, felt, asbestos, or like elastic material.

In order to allow using the valve D as a stop-valve, the following device is provided. A bolt or rivet J connects the apertured top D^3 of the valve D with the conical end K′ of a stem K, seated with its apex in a corresponding recess in the said valve-top, and the said stem K is mounted to slide in a sleeve L, fixed within a casing N, secured to the section A′ of the diaphragm-casing A. The upper portion of the stem K is made hollow to receive one end of a spring O, serving to move the valve D to its seats E and E′ and abutting with its other end on a block P, engaged by a screw-rod Q, screwing in the nut Q′, held in the sleeve L, the screw-rod Q extending through a stuffing-box N′ to the outside of the casing and carrying at its outer end a hand-wheel Q^2 for turning the screw-rod to move the lower end thereof in engagement with the stem K to press the latter downward, and with it the valve D, until the latter is seated on the seats E and E′, and is hence in a closed position and locked therein by the screw-rod Q. When the latter is out of engagement at its lower end with the stem K, as shown in Fig. 1, then the valve is free to move upward against the spring-pressed stem K, and when the tension of the spring exceeds the maximum pressure of the fluid-pressure in the section A′ then the stem K is pressed downward by the spring O, and thereby forces the valve D to its seats E and E′ to close the connection between the inlet A^3 and the outlet A^4. Normally the screw-rod Q is held in an uppermost position to allow the valve D to yield to the pressure in the section A′. The sliding motion of the stem K is limited by stop-pins K^2, secured on the stem K and extending through elongated slots L′ in the sleeve L, as plainly shown in Fig. 1.

Now from the foregoing it will be seen that by the operator screwing the screw-rod Q downward the valve D can be positively moved to its seat and locked thereon, and hence it will be seen that by the arrangement described the device can be readily converted from a fluid-pressure-regulating valve into a combined stop-valve and fluid-pressure regulator.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A fluid-pressure regulator having a diaphragm-casing, a diaphragm therein, a diaphragm-support for engagement by one side of the diaphragm, the outer end of the support being fulcrumed, and a ball-bearing for the inner end of the support, as set forth.

2. A fluid-pressure regulator having a diaphragm-casing, a diaphragm therein, a diaphragm-support for engagement by one side of the diaphragm, the outer end of the support being fulcrumed, a ball-bearing for the inner end of the support, and a yieldingly-mounted carrier for the said ball-bearing, as set forth.

3. A fluid-pressure regulator provided with a diaphragm having a concentric corrugation and a radial corrugation, to allow the diaphragm to expand in both a circular and a diametrical direction, as set forth.

4. A fluid-pressure regulator provided with a diaphragm-support having concentric corrugations and radial corrugations, as set forth.

5. A fluid-pressure regulator provided with a diaphragm-support, consisting of a disk made in a plurality of sectors, having concentric corrugations and radial corrugations at their joints, as set forth.

6. A fluid-pressure regulator provided with a diaphragm-casing containing a diaphragm, a support for the diaphragm, in the form of a disk made in a plurality of sectors, each mounted to swing at its outer end, and a yieldingly-mounted carrier for the inner ends of the sectors, as set forth.

7. A fluid-pressure regulator provided with a diaphragm-casing containing a diaphragm, a support for the diaphragm, in the form of a disk made in a plurality of sectors, each mounted to swing at its outer end, a yieldingly-mounted carrier for the inner ends of the sectors, and a ball-bearing interposed between the inner ends of the sectors and the said carrier, as set forth.

8. A fluid-pressure regulator comprising a diaphragm-casing containing a diaphragm, a valve moving with the said diaphragm and adapted to be seated on seats in the said casing, and manually-controlled means, connected with the valve, for allowing movement of the valve and for locking the valve to its seats, the said means comprising a hollow stem connected with the valve, a sleeve in which the said stem is mounted to slide, a spring one end of which extends within the hollow stem, a block engaged by the other end of the spring, and a screw-rod engaging said block, the end of the screw-rod being adapted to engage the stem to cause the latter to force the valve to its seats, as set forth.

9. A fluid-pressure regulator comprising a diaphragm-casing containing a diaphragm, a valve moving with the said diaphragm and adapted to be seated on seats in the said casing, manually-controlled means, connected with the valve, for allowing movement of the valve and for locking the valve to its seats, the said means comprising a spring-pressed stem engaging the valve, and a screw device, under the control of the operator, for compressing the spring, to cause the stem to force the valve to its seats, as set forth.

10. A fluid-pressure regulator comprising a diaphragm-casing containing a diaphragm, a valve moving with the said diaphragm and

adapted to be seated on seats in the said casing, manually-controlled means, connected with the valve, for allowing movement of the valve and for locking the valve to its seats, the said means comprising a spring-pressed stem engaging the valve, a screw device, under the control of the operator, for engaging the stem, to cause the latter to force the valve to its seats, and means for limiting the movement of the said stem, as set forth.

11. A fluid-pressure regulator having a diaphragm, a movable support for the same, and a flexible cushion interposed between the diaphragm and the support, as set forth.

12. A fluid-pressure regulator provided with a diaphragm having concentric corrugations and radial corrugations, a movable support for the diaphragm having similar corrugations, and a cushion interposed between the diaphragm and the support, as set forth.

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

JAMES W. SCOTT.

Witnesses:
JNO. SMITH,
JESSE LEWIS HUFMAN.