

No. 669,194.

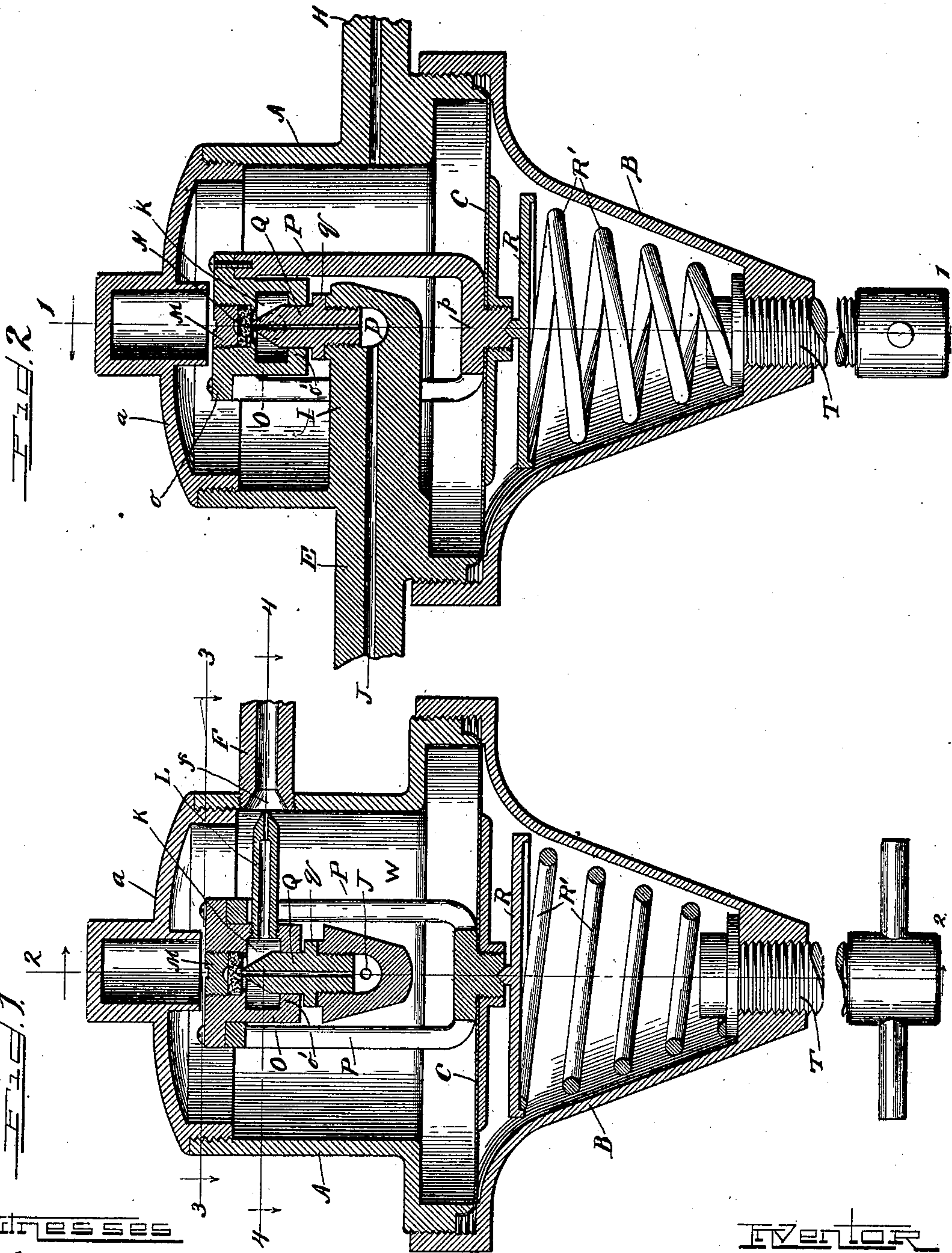
Patented Mar. 5, 1901.

C. L. BASTIAN.
PRESSURE REGULATING VALVE.

(Application filed Mar. 22, 1900.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES

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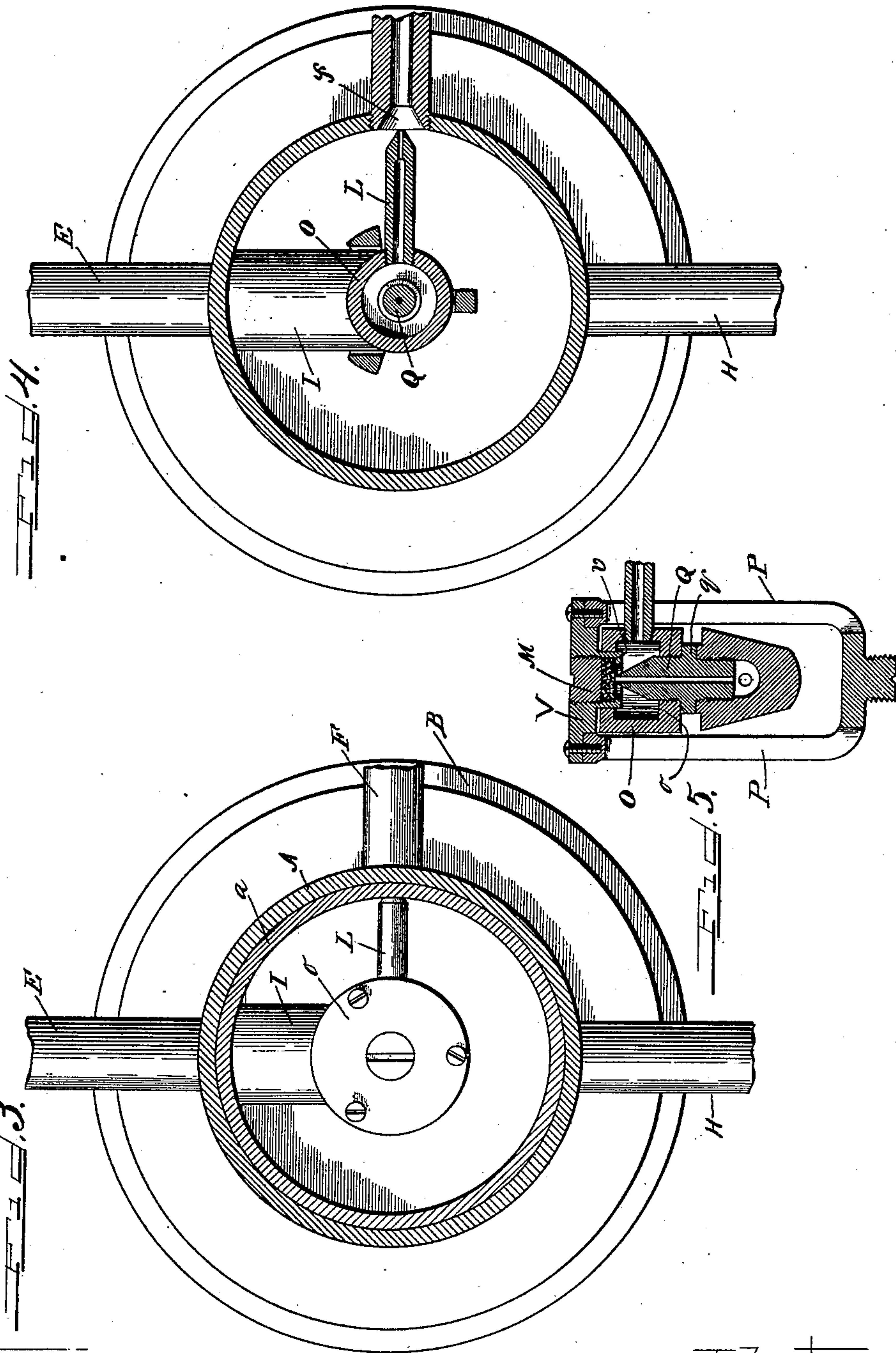
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UNITED STATES PATENT OFFICE.

CHARLES L. BASTIAN, OF CHICAGO, ILLINOIS.

PRESSURE-REGULATING VALVE.

SPECIFICATION forming part of Letters Patent No. 669,194, dated March 5, 1901.

Application filed March 22, 1900. Serial No. 9,738. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. BASTIAN, a citizen of the United States, residing at 76 Illinois street, Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pressure-Regulating Valves, of which the following is a specification.

The present invention relates to certain new and useful improvements in pressure-regulating valves of the general type referred to in my former patent, No. 548,172, and designed to regulate the pressure of carbonic-acid gas and other fluids to be delivered under high pressure to a soda-water fountain or other receptacles for charging and expelling liquids.

Prior to this invention it has been customary to guide the valve in its automatic movement in the casing and provide a direct return connection between the valve and the fountain or an indirect connection by means of a by-pass leading from the charging-pipe to the return-nozzle. Owing to the extreme delicacy of operation of a valve of this nature it has been found that a very slight wear or displacement of the parts will interfere with and practically prevent the correct operation of the device, which is entirely controlled by the pressure of the gas within the casing upon the diaphragm. Furthermore, it is desirable to keep the valve-casing as free from gas as possible while the fountain is being charged to relieve the diaphragm of all pressure, and thereby render the same extremely sensitive and adapted to be quickly acted upon by the pressure of the gas returning through the discharge-nozzle.

One object of my invention is to provide an improved pressure-regulating valve which is free from the objections noted and which is so constructed and arranged that the valve will be entirely disconnected from the casing and guided in its movement upon the valve-nozzle, so that it will be completely protected within the casing and not be affected by any slight variation in the fitting of the parts of the casing.

Another important object of the invention is to dispense with the usual independent return connection from the fountain and permit the gas to return to the valve through

the charging connection, an injector-pipe being arranged to carry the gas from the valve-chamber to the charging-nozzle and terminated within the diaphragm-chamber slightly removed from the end of the charging-nozzle, so that the gas may return to the diaphragm-chamber through this nozzle.

With these and other important ends in view my invention consists in the peculiar construction and arrangement of parts hereinafter described, and shown in the accompanying drawings, in which—

Figure 1 represents a vertical central sectional view through a pressure-regulating valve embodying my invention and taken on the line 1 1 of Fig. 2. Fig. 2 is also a central sectional view on the line 2 2 of Fig. 1. Fig. 3 is a horizontal sectional view on the line 3 3 of Fig. 1. Fig. 4 is a horizontal view on the line 4 4 of Fig. 1, and Fig. 5 is a detailed vertical sectional view showing a modified construction of the control-valve-guiding devices.

Referring to the drawings, in which like letters of reference indicate similar parts in all figures, A designates the upper and B the lower section of the valve-casing, being provided with a screw-threaded connection and arranged to hold a diaphragm C securely in place. The space above the diaphragm C and within the upper section of the valve-casing constitutes a pressure-chamber, out of which opens the discharge-duct F. The inlet-nozzle E is connected with a suitable source of supply, and it has an internal extension I and a contracted duct J, which opens into a small chamber D in the inner end of the extension, which is located centrally of the upper casing-section A. A valve-nozzle Q is screwed into the upper end of this chamber and provided with an annular collar *q*, which is arranged to engage the inlet-nozzle extension. The upper end of this valve-nozzle is arranged within the valve-chamber K, formed by the box O, which is supported on the diaphragm-frame P and carries the valve N. The construction of these parts is such that they may be removed and repaired or replaced easily and quickly.

The upper section of the casing comprises a cap *a*, which has a screw-threaded connection with the body of said section and can be

removed to disclose the parts of my improved valve. The frame comprises three arms joined together at their lower ends at *p* and secured to the diaphragm C, below which is located a
 5 swivel-plate R, resting on a spring R', provided with an adjusting screw device T. The box O is provided with an outwardly-extending flange *o*, which rests upon and is fastened
 10 securely to the upper ends of the three arms which constitute the frame P, and this box extends down within said frame and is provided with an inwardly-extending flange *o'* and is adapted to slide vertically on the valve-nozzle Q. This box carries the valve N, which
 15 is arranged in position directly above the discharge end of the valve-nozzle and is held in place by a block M, which is screwed into a socket in the box and down upon the valve. It will therefore be observed that the valve
 20 of my improved pressure-regulator is guided entirely upon the nozzle Q and controlled by the movement of the diaphragm, being entirely independent of the casing. Owing to the extreme sensitiveness of these pressure-
 25 regulators and the desirability of having them operate with perfect accuracy it becomes necessary frequently to renew the valve, and with my improved construction, herein shown and described, this step can be accomplished
 30 quickly and easily by simply unscrewing the cap *a* and plug M. The arrangement is also such that the guiding devices are compact in construction and arrangement, so as to avoid any possible displacement and consequent
 35 imperfect action of the parts.

Instead of making the box O in the manner shown in Figs. 1 and 2 I may make the box as shown in Fig. 5, the differences being simply in the details and not in the generic
 40 construction of the valve, guided upon a fixed stationary valve-nozzle. In the construction shown in Fig. 5 I make the box in two parts, comprising a top plate V, which is secured to the frame P and having a boss *v*, which serves
 45 as a guide in the box O, which in this case has a screw-threaded connection with the valve-nozzle and is fixed, while the valve carried by the plate V and the frame P is guided in this fixed box on the stationary valve in
 50 precisely the same manner as the valve shown in Figs. 1 and 2 is guided on the fixed stationary valve-nozzle.

The facility with which the different parts of my improved pressure-regulator may be removed and repaired or replaced is a matter
 55 of considerable importance in a device of this character, which depends for its effectiveness entirely upon the accurate and delicate operation of its parts.

Any of the parts of this valve may be removed and cleaned or replaced without requiring a great amount of time or labor in doing so, and in addition to this it is of prime importance
 60 that the gas-pressure should act freely upon the diaphragm to accomplish the proper operation of the valve. I provide an injector-pipe L, which leads from the valve-chamber K and

discharges into the flared inner end *f* of the charging nozzle or pipe F. The discharge
 70 end of the injector is located just within the wall of the casing, and it is arranged to discharge the gas in a jet into the flared end of the charging-nozzle, and by this action it thereby tends to create a vacuum in the diaphragm-chamber W, so that whenever the
 75 pressure in the fountain or other receptacle has reached the desired maximum the gas returning through the charging-nozzle and into the diaphragm-chamber will operate quickly upon the diaphragm, overcome the tension
 80 of the spring R, and cause the valve N to be seated on the valve-nozzle, thereby shutting off the supply of gas through the inlet-nozzle. When the pressure in the fountain and in the diaphragm-chamber is reduced
 85 sufficiently to permit the spring to raise the diaphragm again, the valve will be unseated and more gas admitted to the valve-chamber and conducted through the injector-pipe to the charging-nozzle and fountain. As before
 90 stated, the passage of gas from the injector-pipe into the charging-nozzle tends to carry with it whatever gas remains in the diaphragm-chamber to create a vacuum therein until the back pressure from the fountain de-
 95 presses the diaphragm to shut off the supply of gas. The automatic opening and closing of the valve as herein described is accomplished much more certainly and with greater sensitiveness than has been possible with such
 100 valves heretofore, and for this reason the efficiency of this pressure-regulator is materially increased. The valve-chamber is constructed so that there will be no material expansion of the gas therein, and the valve itself is
 105 guided in its movements upon a part which remains fixed and stationary under all conditions. A pressure-gage may be connected with the nozzle H, or this nozzle may be entirely omitted.

I am aware that changes in the form and proportion of parts and in the details of construction of my invention may be made without departing from the spirit or sacrificing
 110 the advantages thereof, and I therefore reserve the right to make all such changes as fairly fall within the spirit and scope of the invention.

Having thus fully described my invention, what I claim, and desire to secure by Letters
 120 Patent, is—

1. In a pressure-regulating valve, the combination with a casing having an inlet-nozzle and an outlet-duct, of a valve-nozzle supported by the inlet-nozzle, a spring-controlled
 125 diaphragm arranged within the casing, and a box connected with said diaphragm which box incloses a valve-chamber into which said valve-nozzle discharges, carries a valve and is guided in its vertical movement on the
 130 valve-nozzle, substantially as described.

2. In a pressure-regulating valve, the combination with a casing having an inlet-nozzle and an outlet-duct of a valve-nozzle support-

ed on the inlet-nozzle centrally within the casing, a spring-controlled diaphragm arranged beneath the valve-nozzle, a frame connected with said diaphragm and supporting a valve above the valve-nozzle, and a box inclosing the valve-chamber and guided in its movement upon the valve-nozzle, substantially as described.

3. In a pressure-regulating valve, the combination with a casing having an inlet-nozzle and an outlet-duct, of a valve-nozzle supported by the inlet-nozzle, a spring-controlled diaphragm located below the inlet-nozzle, a box guided upon the valve-nozzle and inclosing a valve-chamber in which the valve-nozzle discharges, a frame connected with the diaphragm, and a valve carried by said box and guided with the box upon the valve-nozzle, substantially as described.

4. In a pressure-regulating valve, the combination with a casing having a pressure-chamber containing an inlet-nozzle and having an outlet-duct, of a spring-controlled diaphragm arranged within said pressure-chamber, a valve connected with and operated by said diaphragm, a valve-chamber into which the inlet-nozzle discharges, and an injector-pipe leading from said valve-chamber opening into said pressure-chamber and discharging into the outlet-duct, substantially as described.

5. In a pressure-regulating valve, the combination with a casing having a pressure-

chamber containing an inlet-nozzle and having an outlet-duct, of a spring-controlled diaphragm arranged within said pressure-chamber, a valve operated by said diaphragm and guided on a fixed part independent of the casing, a valve-chamber, and an injector-pipe leading from said valve-chamber opening into said pressure-chamber and discharging into the end of the outlet-duct, substantially as described.

6. In a pressure-regulating valve, the combination with a casing having an inlet-nozzle, of a valve-nozzle supported by said inlet-nozzle, a spring-controlled diaphragm located beneath the valve-nozzle, a frame supported on said diaphragm, a valve carried by said frame and guided in its movement on the valve-nozzle, a valve-chamber into which the valve-nozzle discharges, a charging-pipe connected with the casing and having a flared inner end opening within the casing, and a pipe leading from the valve-chamber and terminating adjacent to the flared end of the charging-pipe so as to discharge a jet of gas into said charging-pipe and also permit the gas returning through the charging-pipe into the diaphragm-chamber within the casing, substantially as described.

CHARLES L. BASTIAN.

Witnesses:

C. L. WOOD,
M. E. SHIELDS.