

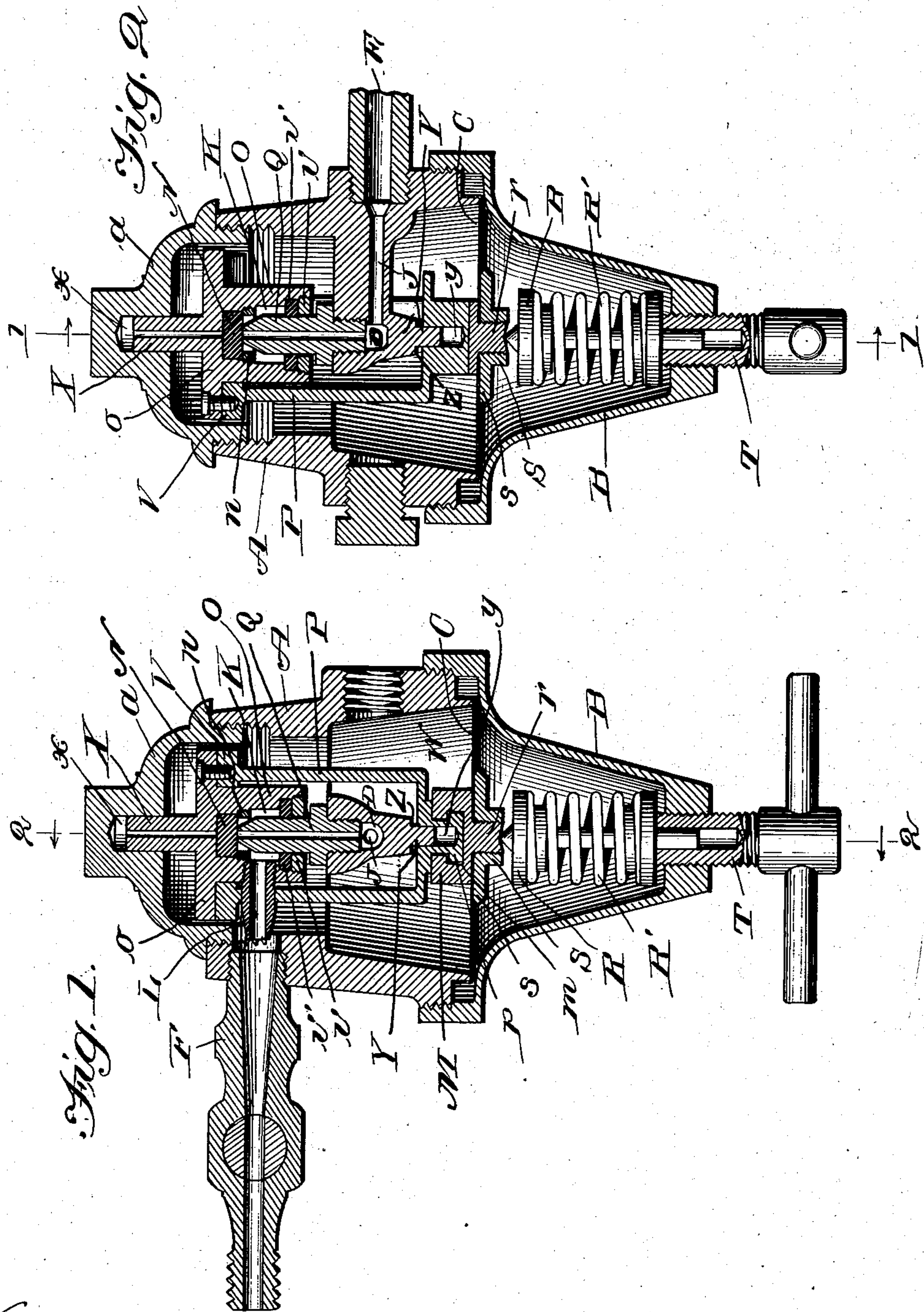
No. 737,057.

**PATENTED AUG. 25, 1903.**

C. L. BASTIAN.  
PRESSURE REGULATING VALVE.

APPLICATION FILED MAY 16, 1902.

NO MODEL.





# UNITED STATES PATENT OFFICE.

CHARLES L. BASTIAN, OF CHICAGO, ILLINOIS.

## PRESSURE-REGULATING VALVE.

SPECIFICATION forming part of Letters Patent No. 737,057, dated August 25, 1903.

Application filed May 16, 1902. Serial No. 107,618. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES L. BASTIAN, a citizen of the United States, residing at 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.

My present invention relates to improvements on the pressure-regulating valve for which Letters Patent No. 669,194 were granted to me on March 5, 1901; and its primary object is to improve and perfect the construction of a valve of this character so as to produce a greater flow of gas at low or high pressure.

Further objects of the invention are to provide a top and bottom guide for the valve to insure its proper operation, to prevent the escape of gas from the nozzle-chamber to the diaphragm-chamber, to limit the movement of the valve and provide a loose connection between the valve and the diaphragm, so as to overcome inaccuracies of fit of the parts and prevent binding thereof and avoid injury to the diaphragm.

The invention has other objects in view which will appear hereinafter in the detailed description.

In the accompanying drawings, Figure 1 is a sectional view on the line 1 1 of Fig. 2, and Fig. 2 is a sectional view on the line 2 2 of Fig. 1.

My improved valve as illustrated in the drawings embodies substantially the same principle and general construction as described in my former patent, but involves improvements in the details of construction which make its action more perfect and sensitive.

Referring to the drawings, in which like letters of reference designate corresponding parts in the several figures, the valve-casing comprises an upper section A, a cap *a*, and a lower section B, these parts having screw-threaded connections. The diaphragm C is soldered to the upper section or otherwise securely held in place between the upper and lower sections of the valve-casing, and the space above the diaphragm within the upper section of the valve-casing constitutes a pressure-chamber W, out of which leads the discharge-duct F. The inlet-nozzle E is con-

nected with a suitable source of supply and has a contracted duct J, which opens into a small chamber D. A valve - nozzle Q is screwed into the upper end of this chamber and has its upper end arranged within the valve-chamber K, formed by the box O, which is supported on the diaphragm-frame P and carries the valve N, which is securely held in place by the screw-threaded collar *n*. The lower end of the diaphragm-frame is provided with a T-shaped projection *p*, which is arranged in a mortise *m* in the plug M, thus forming a T-shaped mortise-and-tenon connection between the plug and the diaphragm-frame, these parts being fitted together loosely to permit a freedom of movement and prevent binding. The diaphragm is preferably soldered to the plug, which is provided with a threaded stud *r*, projecting through an opening at the center of the diaphragm to receive a collar S, provided with a flange *s*, which clamps the diaphragm tightly against the plug. A swivel-plate R has a pointed bearing against the plug and is pressed by a spring R', which is provided with an adjusting-screw device T, extending through the lower end of the valve-casing.

The box O is provided with an outwardly-extending flange *o*, which rests upon and is fastened securely to the flange V surrounding the upper end of the diaphragm-frame, and this box extends down within the frame and is provided with a screw-threaded collar *v*, which holds in place a packing-ring *v'*, surrounding the valve-nozzle Q, to make a tight connection between the box and valve-nozzle and prevent the escape of gas from the valve-chamber K to the diaphragm-chamber except through the injector-pipe L, which has screw-threaded connection with the box and discharges the gas from the valve-chamber K into the discharge-duct F. The valve is guided in its movement by a stem X on the upper end of the box O, which works in a socket *x* in the cap *a* of the valve-casing, and also by a stem Y on the inlet-nozzle E and fitting in a socket *y* in the plug *p* on the lower end of the diaphragm-frame, whereby the valve, the box inclosing the valve-chamber, and the diaphragm-frame will be guided at both the top and bottom, and in this way a proper operation of the valve and valve-cham-



ber on the valve-nozzle will be more certainly secured. The inlet-nozzle is provided with a shoulder Z, which forms a fixed stop at the bottom of the diaphragm-frame for limiting its movement, and thus limits the action of the diaphragm and protects it against injury.

A pressure-regulating valve constructed as herein shown and described will greatly increase the flow of gas at low or high pressure, and this result is effected without freezing at high pressure and without causing the diaphragm to vibrate in a manner common in other pressure-regulating valves of the prior art. The gas admitted through the inlet-nozzle and valve-nozzle will pass from the valve-chamber through the injector-pipe into the discharge-duct. As the injector-pipe leads directly from the valve-chamber to the discharge-duct, it is apparent that the gas will travel at the speed due to the pressure in the chamber and not at the speed due to the pressure on the diaphragm, as has been customary with other valves, and as the pressure in this valve-chamber is greater than the pressure in the diaphragm-chamber a much greater quantity of gas will flow through the discharge-duct and at greater speed. At high pressure the same result is accomplished and freezing is avoided by reason of the fact that the pressure of the gas is partly reduced by expansion in the valve-chamber before reaching the carbonating machine or fountain, and this preliminary expansion will thus avoid the extreme reduction of pressure at the discharge, which ordinarily produces more or less freezing in the regulating-valve. The diaphragm is extremely sensitive and made to operate with great delicacy of movement by reason of the fact that the gas is prevented from escaping to the diaphragm-chamber from the valve-chamber, and the connection between the valve and the diaphragm is of such a character that binding or imperfect operation of the parts is entirely avoided. When the valve is opened and the gas rushes forward through the injector-pipe into the discharge-duct, it will create a siphon action and reduce the pressure within the diaphragm-chamber, thereby permitting the spring to expand and holding the valve steadily at the extreme limit of its upward movement and without vibrating. By thus opening the valve to its full extent and holding it steadily in this position a much greater quantity of gas is permitted to flow than is possible with those valves of the prior art which depend entirely upon the pressure of the gas directly thereon for opening them and which constantly vibrate. This steady action of the valve also prevents injury to the diaphragm from vibration, and the loose connection between the diaphragm-frame and the plug and the swivel connection between the plug and the actuating-spring prevent injury to the diaphragm from any imperfect fit of the parts or imperfections in construction and enable the diaphragm to work

freely and easily in a proper manner. The leather packing on the valve-nozzle effectually prevents the escape of gas from the valve-chamber to the diaphragm-chamber and also insures a proper movement of the box O on this nozzle.

Heretofore the movement of the diaphragm and valve has generally been limited by a stop on the cap of the casing or some other removable part, and it has been found that the adjustment is constantly changing by reason of the fact that the threaded connection between the cap and casing will wear and permit a different adjustment of the cap almost every time it is removed. Besides, with such construction it is always necessary to release the spring R' before removing the cap to avoid bending and injuring the diaphragm, and as this precaution is frequently neglected through ignorance or carelessness many valves have been rendered useless by thus injuring the diaphragm. My improved regulating-valve effectually overcomes the defects heretofore noted as existing in valves of the prior art and provides a fixed stop which never changes for limiting the movement of the diaphragm, and this fixed stop is not at all affected by removing the cap or other parts of the casing and is not changed by wearing of the threaded connections or other imperfections in fit. It will also be observed that it is not necessary to loosen the spring R' before removing the cap a, because the stop at all times limits the movement of the diaphragm and will prevent injury thereto.

I prefer to use both a top and bottom guide for the valve, but the bottom guide may be dispensed with, if desired, and only the top guide employed.

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

1. In a pressure-regulating valve, the combination with a casing having an inlet-nozzle and an outlet-duct, of a spring-controlled diaphragm, a frame connected with the diaphragm and carrying a valve for said inlet-nozzle, the upper end of said frame being guided in the casing and the lower end thereof being guided on the inlet-nozzle.

2. In a pressure-regulating valve, the combination with a casing having an inlet-nozzle and an outlet-duct, of a spring-controlled diaphragm, a frame connected with the diaphragm and carrying a valve for said inlet-nozzle, a stem at the top of the frame guided in a socket in the cap of the casing, and a socket at the bottom of the frame to receive a stem on the inlet-nozzle.

3. In a pressure-regulating valve, the combination with a casing having an inlet-nozzle and an outlet-duct, of a valve-nozzle connected with the inlet-nozzle, a spring-controlled diaphragm, a frame carrying a valve for said valve-nozzle and connected with said diaphragm, a fixed stop on the inlet-nozzle,



said frame being guided in its movement on the valve-nozzle and limited in its upward movement by said fixed stop.

4. In a pressure-regulating valve, the combination with a casing having an inlet-nozzle and an outlet-duct, of a valve-nozzle connected with the inlet-nozzle; a spring-controlled diaphragm, a frame carrying a valve for said valve-nozzle and loosely connected with said diaphragm, said frame being guided in its movement on the valve-nozzle, in the top of the casing and on the inlet-nozzle.

5. In a pressure-regulating valve, the combination with a casing having an inlet-nozzle and an outlet-duct, of a valve-nozzle connected with the inlet-nozzle, a spring-controlled diaphragm, a frame carrying a valve for said valve-nozzle, and a plug fastened to the diaphragm and loosely connected with said frame.

6. In a pressure-regulating valve, the combination with a casing having an inlet-nozzle and an outlet-duct, of a valve-nozzle connected with the inlet-nozzle, a spring-controlled diaphragm, a frame carrying a valve for said valve-nozzle, and a plug having a mortise-and-tenon connection with said frame.

7. In a pressure-regulating valve, the combination with a casing having an inlet-nozzle

and an outlet-duct, of a valve-nozzle connected with the inlet-nozzle, a diaphragm, a frame carrying a valve for said valve-nozzle, a plug fastened to the diaphragm and extending on both sides thereof, a loose connection between said frame and said plug on the upper side of the diaphragm, and a spring for acting on the diaphragm and having a swivel connection with the plug on the lower side thereof.

8. In a pressure-regulating valve, the combination with a casing having an inlet-nozzle and an outlet-duct, of a valve-nozzle connected with the inlet-nozzle, a spring-controlled diaphragm, a frame loosely connected with said diaphragm and guided at the bottom on the inlet-nozzle, a box connected with the upper end of said frame and guided in the cap of the casing, said box carrying a valve for the valve-nozzle and inclosing a valve-chamber and having a discharge from said chamber, a packing-ring around the valve-nozzle and a collar carried by the box around the valve-nozzle and securing the packing in place.

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Witnesses:

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