No. 762,274. PATENTED JUNE 14, 1904.

J. B. BOURSEAU.

REDUCING VALVE.

APPLICATION FILED DEC. 1, 1902.

NO MODEL.

Fig. 1.

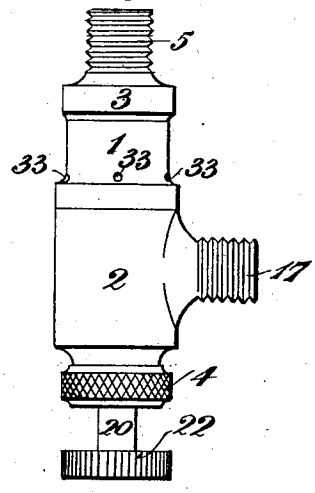


Fig. 4.

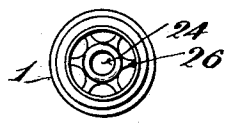


Fig. 5.

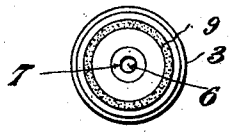


Fig. 7.

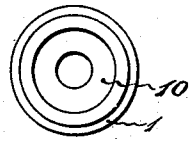


Fig. 2.

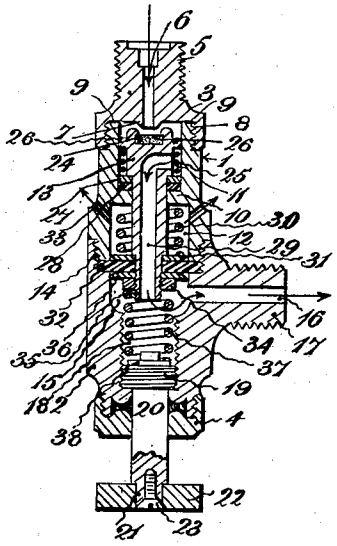


Fig. 6.

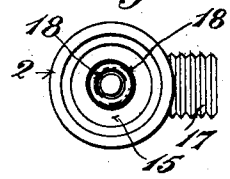


Fig. 3.

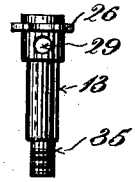
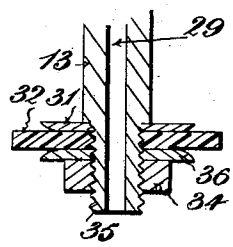


Fig. 8.



Witnesses.

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No. 762,274. Patented June 14, 1904.

UNITED STATES PATENT OFFICE.

JEAN BAPTISTE BOURSEAU, OF PARIS, FRANCE, ASSIGNOR OF ONE-HALF TO MAITLAND LUMLEY, OF LONDON, ENGLAND

REDUCING-VALVE.

SPECIFICATION forming part of Letters Patent No. 762,274, dated June 14, 1904.

Application filed December 1, 1902. Serial No. 133,473. (No model.)

To all whom it may concern:

Be it known that I, JEAN BAPTISTE BOURSEAU, engineer, a citizen of the Republic of France, and a resident of 141 Avenue Parmentier, Paris, France, have invented certain new and useful Improvements in Reducing-Valves, of which the following is a specification.

This invention relates to an improved valve; and it has for its object to provide a simple and efficient means for use either upon gas or air containers or generally for any purpose where such a valve may be employed. With the majority of devices of this class it is found that as at present constructed the more or less complex nature thereof causes them to readily get out of order. Further, the adjustment or regulation of the pressure at which the said devices operate is not easily effected. The device forming the subject of the present application is designed with a view to avoiding or greatly reducing the objections above enumerated.

The valve comprises an outer casing formed in two parts, the upper of which is divided at or near the center of its length by a partition. The lower portion, connected to the upper by means of a suitable screw-thread, carries a perforated neck arranged at right angles to the bore of the valve and which neck serves as a means of attachment to the vessel to which the gas or liquid is to be supplied. The lower portion also carries the means whereby the pressure at which the valve operates is adjusted. The upper end of the casing is provided with a perforated cap with means of attachment for a source of supply. Within the casing is a spring-governed hollow spindle, the upper end of which is provided with a block or disk of vulcanite or other suitable substance, which disk is normally (when no gas is passing through the valve) held against the lower end of a short conical projection formed upon the under side of the cap aforesaid and through which projection passes the perforation aforesaid. The interior of said hollow spindle or piston may be bored out to a cylindrical form, and at one end it communicates with the upper end of the chambers formed by the partition above referred to and at the other with a chamber formed in the lower portion of the valve-casing and from which chamber the gas passes through the discharge-orifice in the neck aforesaid. Disks or washers of rubber are provided to prevent the escape of the gas at the points where the spindle passes through the partition and into the lower chamber, and perforations are formed in the lower portion of the upper parts of the casing to permit of the ready escape of any gas that may have found its way therein to the outer atmosphere.

In order that the invention may be the better understood, drawings are appended, in which—

Figure 1 is a side elevation of the improved valve. Fig. 2 is a longitudinal section of Fig. 1. Fig. 3 is a view of the spindle removed from the casing. Fig. 4 is a plan of the upper end of the spindle, and Fig. 5 is a plan of the under side of the cap. Fig. 6 is a plan of the upper end of the lower portion of the valve-casing. Fig. 7 is a plan of the lower end of the upper portion of the casing. Fig. 8 is an enlarged sectional view of the end of the spindle.

Referring to the drawings, 1 and 2 are respectively the upper and lower portions comprising the casing, 3 is the cap screwed upon the upper end of the part 1, and 4 is a cap screwed upon the lower end of the part 2.

The cap 3 has an exterior thread 5, by which it may be connected to a source of supply, and is bored centrally at 6, and it has upon its under surface a conical projection 7. An interior thread 8 serves as a means whereby the cap is screwed upon the upper end of the part 1. A suitable packing-ring 9 prevents any leakage at the point of junction between the cap and the part 1.

10 is a partition dividing the part 1 into two chambers 11 and 12, bored to permit the passage therethrough of the spindle 13. (Shown separately in Fig. 3.) The lower end of the part 1 is reduced at 14, where it is provided with an external thread serving for the attachment thereto of the part 2, provided with an internal thread.

The part 2 is chambered at 15 and has a discharge-orifice 16 leading therefrom through the screwed projection 17. The projection 17 serves as a means of connection with the receptacle to which the gas is supplied. Leading from the chamber 15 is a central opening 18, provided with a screw-thread with which engages the screwed portion 19 of the plug 20. The plug 20 passes through the cap 4, being suitably packed at this point to prevent any leakage of gas, and has formed upon its lower end a square shank 21, supporting the milled head 22, secured thereto by the screw 23. The spindle 13 is at its upper end provided with a recess in which is secured a disk or block of vulcanite or other suitable substance 24, which block, so long as no gas passes through the valve, is held against the apex of the conical projection 7 by means of the spring 25 encircling that portion of the spindle located in the upper chamber 11, being confined between the under surface of a series of radial projections 26 upon the upper end of the valve-spindle and a washer 27, resting upon a rubber or like washer 28, supported by the partition 10. The projections 26 are arranged as shown in Fig. 4 and are designed to retain the upper end of the spindle in a position centrally of the casing, at the same time offering little or no resistance to the gas which passes thereby and down the central orifice 29 in the spindle 13, from whence it passes into the chamber 15 to the outlet. Encircling the spindle where it passes through the chamber 12 is a spring 30, compressed between the under side of the partition 10, and a metal or other washer 31, resting upon a rubber or other flexible washer 32, clamped at its periphery between the ends of the parts 1 and 2. To facilitate the escape of any gas that may find its way into the chamber 12 upon the upward or return movement of the spindle, a number of holes 33 are formed in the wall thereof through which the gas may pass to the outer atmosphere. The two springs above referred to are opposite in action, the upper tending to close the valve and the lower to open same.

34 is a nut upon the end of spindle 13. Upon the screwed reduced portion 35 thereof a washer 36 is interposed between the nut and the under side of the rubber washer 32. The various washers are preferably rounded, as shown in Fig. 8, upon their under surfaces at the edges in order to offer as little impediment as possible to the flexion of the rubber washers both during the working of the valve and for the adjustment of the working pressure. The working pressure is regulated by means of the spring 37, contained within the orifice 18 and bearing at its ends against the under side of the nut 34, and a washer 38, surrounding a pin or projection formed at the end of the plug 20.

It will be obvious that the amount of compression of the said spring may be varied at will by rotating the plug 20, thereby reducing or increasing the resistance to be overcome by the gas before it can pass through the valve.

In operation the gas enters the valve by the passage 6 and forces down the spindle against the combined resistance of springs 37 and 25. Having entered the chamber 11 it passes down the passage 29, and thence to chamber 15, finally escaping through passage 16.

It will be seen that when the gas-pressure opens the valve it operates merely against the disk 24, and therefore has a comparatively small area against which it can exert its pressure. As soon, however, as the valve opens there is a larger area exposed to the gas-pressure. Consequently the valve will tend to stay open until there has been a material reduction in pressure flowing through the openings 6. If the flow of gas through the passage 16 should be stopped by being turned off, the pressure will back up against the diaphragm 32, and as the diaphragm 32 has a larger area exposed to the pressure than the area exposed to the incoming gas-pressure it will, assisted by the springs, close the valve, consequently preventing undue pressure being exerted on any part to which the passage 16 may be connected. As soon as the valve is closed the area against which the pressure in the passage 6 is exerted is decreased, so that the valve readily remains closed.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a valve, the combination of a hollow valve-piston, a cylindrical valve-casing surrounding the piston, an admission-chamber in the piston, a gas-inlet for the admission-chamber, a valve-disk adapted to close the gas-inlet, two opposing springs located to control the piston, the movement of the springs being produced by differences in pressure, a third spring adjustable from outside the valve to vary the pressure at which the valve operates.

2. A valve-casing divided into two parts on its interior, a partition subdividing the upper chamber into two parts, a spring in each of the chambers formed by the subdivision, a piston operated upon by the springs, a regulating-spring in the lower chamber, an inlet entering into the upper chamber, a valve-disk resting against the inlet to normally close the same, the valve-disk being carried by the piston and a diaphragm connected to the piston.

Signed by me at London, England, this 6th day of November, 1902.

JEAN BAPTISTE BOURSEAU.

Witnesses:

ALFRED FORDHAM,

FREDK. J. NAYLOR.