(No Model.)

J. NAGELDINGER.

PRESSURE REGULATING VALVE.

No. 399,548. Patented Mar. 12, 1889.

Fig. 1.

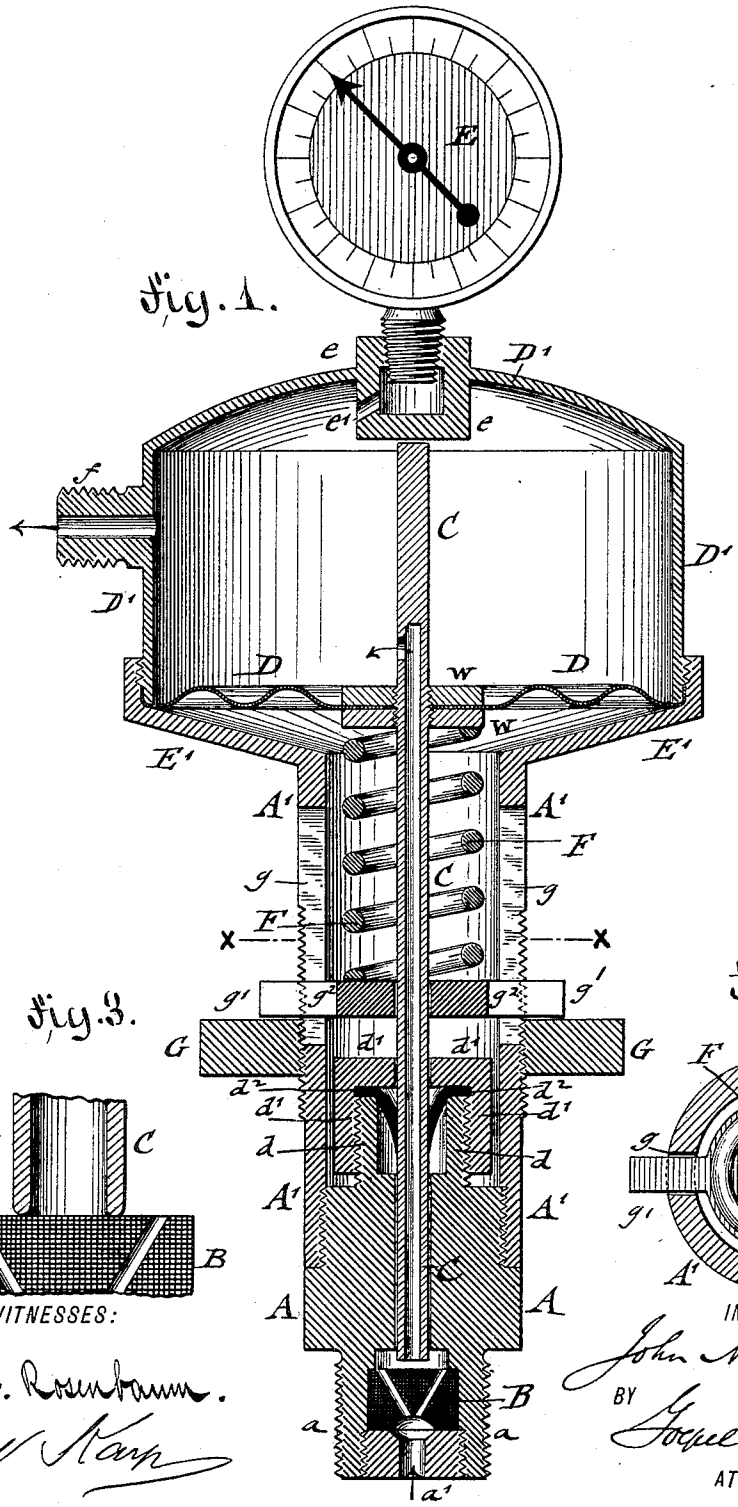
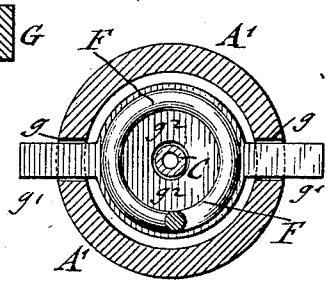


Fig. 3.

Fig. 2.



WITNESSES:

F. W. Rosenbaum.

Carl Kapp

INVENTOR.

John Nageldinger

BY Goepel & Raegener

ATTORNEYS.

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

JOHN NAGELDINGER, OF NEW YORK, N. Y.

PRESSURE-REGULATING VALVE.

SPECIFICATION forming part of Letters Patent No. 399,548, dated March 12, 1889.

Application filed November 28, 1888 Serial No. 292,349. (No model.)

To all whom it may concern:

Be it known that I, JOHN NAGELDINGER, of the city, county, and State of New York, have invented certain new and useful Improvements in Pressure-Regulating Valves, of which the following is a specification.

This invention relates to an improved pressure-reducing valve, which is intended for use with receivers of liquid carbonic acid or with mains of natural or artificial illuminating-gas, so as to reduce the high pressure of the gas and deliver it at lower pressure; and the invention consists of a pressure-reducing valve in which the discharge of the receiver or the gas-main containing gas under high pressure is connected with a diaphragm-chamber by a hollow spindle secured to a flexible diaphragm in said chamber, said spindle and diaphragm being acted upon by a spiral spring interposed between the diaphragm and an adjustable cross-piece that is guided in slots of the supporting-tube of the diaphragm-casing and adjusted by a screw-collar on the same. The lower end of the valve-spindle rests on a hard-rubber block located in the coupling-piece, by which the pressure-reducing valve is connected with the high-pressure receiver or main. The hermetical connection of the spindle with the coupling-piece is produced by a screw-cap, which screws on an exteriorly-threaded bushing of the coupling-piece and holds in connection therewith an elastic washer, the tapering end of which binds tightly on the spindle without interfering with the motion of the same.

In the accompanying drawings, Figure 1 represents a vertical transverse section of my improved pressure-reducing valve. Fig. 2 is a horizontal section on line $x\ x$, Fig. 1; and Fig. 3 a detail vertical transverse section through the lower end of the hollow valve-spindle and the rubber block in the coupling-piece of the valve.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents a coupling-piece, by which my improved pressure-reducing valve is connected with a pressure receiver or main. The coupling-piece A is provided with a threaded shank, a, at the lower end, which is screwed into the high-pressure reservoir or main. In the cavity formed by the threaded shank a is located a hard-rubber block, B, which is retained in said cavity by a perforated screw-plug, a'. The rubber block B is preferably provided with laterally-inclined channels d, by which the high-pressure fluid is conducted to a tubular spindle, C, the lower end of which is made either straight or rounded off, as shown respectively in Figs. 1 and 3. The tubular spindle C passes through the central opening of the coupling-piece A and through a supporting-tube, A', that is screwed onto the upper part of the coupling-piece A. The spindle C is passed through a stuffing-box at the upper end of the coupling-piece A, which stuffing-box is composed of a tubular bushing, d, which is threaded at its outer surface, a screw-cap, d', having an interior screw-thread, and an intermediate leather or other washer, d^2, which is tightly clamped between the screw-nut and the upper edge of the bushing d, and provided with a tapering inner end that is tightly applied to the spindle, so as to prevent the escape of gas from the space formed around the lower part of the spindle, as shown in Fig. 1. The tapered washer d^2 extends conically around the spindle and forms a tight and reliable connection therewith without interfering with the free up-and-down motion of the spindle.

To the upper end of the spindle C is applied a flexible diaphragm, D, which is arranged in a casing, D', that extends around said diaphragm D, and that is provided at the upper part with the usual pressure-gage, E. The gage E is secured into a bushing, e, at the top part of the casing D', said bushing being closed at the bottom part and provided with a lateral opening, e', that communicates with the interior of the casing D'. The casing D' is further provided with a discharge-tube, f, and connected by a screw-joint with the upper flaring part, E', of the supporting-tube A'. The spindle C opens into the chamber of the casing D', formed above the diaphragm D, and is attached to the latter by central disk-shaped washers, W, that are tightly screwed upon the spindle on the diaphragm D. The tubular spindle C connects the chamber above the diaphragm D with the high-pressure reservoir, while the space below the diaphragm is at atmospheric pressure, as the tube A' is provided with vertical guide-slots g at diamet-

rically-opposite sides. The slots g guide the outwardly-extended lugs g' of a cross-piece, g^2, between which and the bottom washer, W, of the diaphragm D is interposed a strong spiral spring, F. The cross-piece g^2 is adjusted higher or lower in the guide-slots g, so as to regulate the tension of the spring by a screw-collar, G, which engages an exterior screw-thread of the supporting-tube A′ of the diaphragm-casing D′. By regulating the tension of the spring F the high pressure at which the gas is discharged is reduced to a lower pressure in the usual manner in pressure-regulating valves.

The play of the diaphragm by the difference of the gas-pressure on the one side and the spring-pressure on the other regulates the supply of gas to the chamber above the diaphragm, and discharges thereby the gas at the required low pressure, which is indicated on the pressure-gage E. The lower end of the spindle offers by its small area very little resistance to the high pressure of the gas acting on the same, and forms a reliable and tightly-closing contact with the hard-rubber block whenever the spindle is pressed by the high pressure of the gas on the block, whereby the reliable functioning of the valve is secured and the effective seating of the lower end of the spindle obtained.

A large number of experiments have shown that hard rubber is the best material for this purpose, as it still retains a certain degree of elasticity sufficient to secure the tight contact of the spindle with the same, so as to shut off entirely the gas when the pressure on the upper side of the diaphragm is greater than the pressure exerted by the spring on the lower side of the same. The facility for adjusting the tension-spring, the tight packing of the spindle in the stuffing-box of the coupling-piece, and the tight seating of the lower end of the valve-spindle on the rubber block located in the coupling-piece form the essential features of the pressure-reducing valve and produce conjointly the reliable and effective functioning of the same.

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

1. The combination of a diaphragm-casing, a diaphragm in the same, a tubular spindle secured to the diaphragm, an adjustable cross-piece guided in slots of the supporting-tube of the diaphragm-casing, a spiral spring interposed between the diaphragm and said adjustable cross-piece, and a screw-collar for adjusting the cross-piece and spring, substantially as set forth.

2. The combination, with a diaphragm-casing, a diaphragm in the same, a supporting-tube for said casing, a centrally-perforated coupling-piece connecting said tube with the high-pressure reservoir, a tubular spindle passing from the valve-chamber and diaphragm to the coupling-piece, and a stuffing-box attached to the coupling-piece and provided with a flexible funnel-shaped washer, the lower edge of which binds on the spindle, substantially as set forth.

3. The combination of a diaphragm-casing, a flexible diaphragm in the same, a tubular spindle applied to said diaphragm, a spiral spring acting on said diaphragm, a supporting-tube for said casing, a centrally-perforated coupling-piece connecting the supporting-tube with the high-pressure reservoir, and a perforated block located in a cavity of said coupling-piece and forming the seat for the lower end of the spindle, substantially as set forth.

4. The combination of a diaphragm-casing, a diaphragm in the same, a tubular spindle connected to said diaphragm, a supporting-tube for said casing, a spiral spring acting on said diaphragm, a centrally-perforated coupling-piece connecting the supporting-tube with the source of pressure, and a perforated block of hard rubber located in a cavity of said coupling-piece, said tubular spindle being provided with a rounded-off lower edge for forming contact with said-block, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

J. NAGELDINGER.

Witnesses:
PAUL GOEPEL,
MARTIN PETRY.