No. 637,980. Patented Nov. 28, 1899.

E. H. WEATHERHEAD.

FLUID PRESSURE REGULATING MECHANISM.

(Application filed Oct. 22, 1898.)

(No Model.)

Fig. 1.

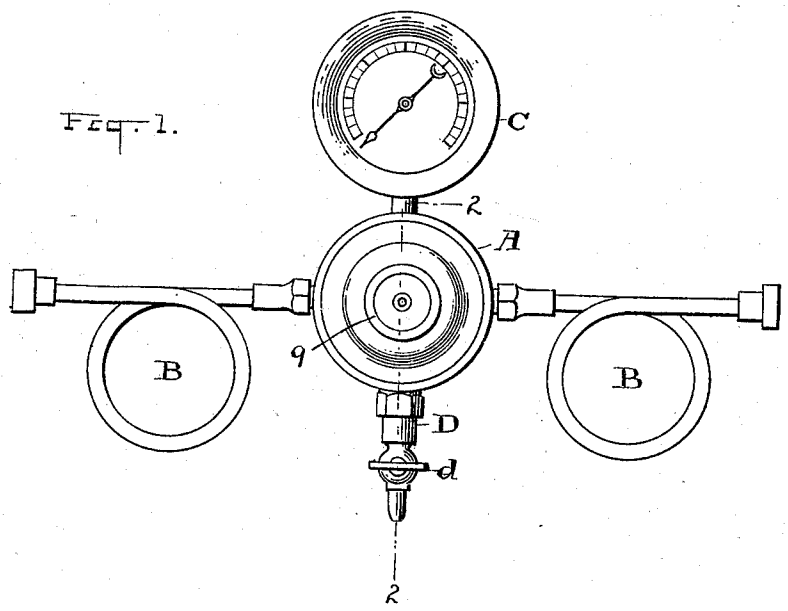


Fig. 2.

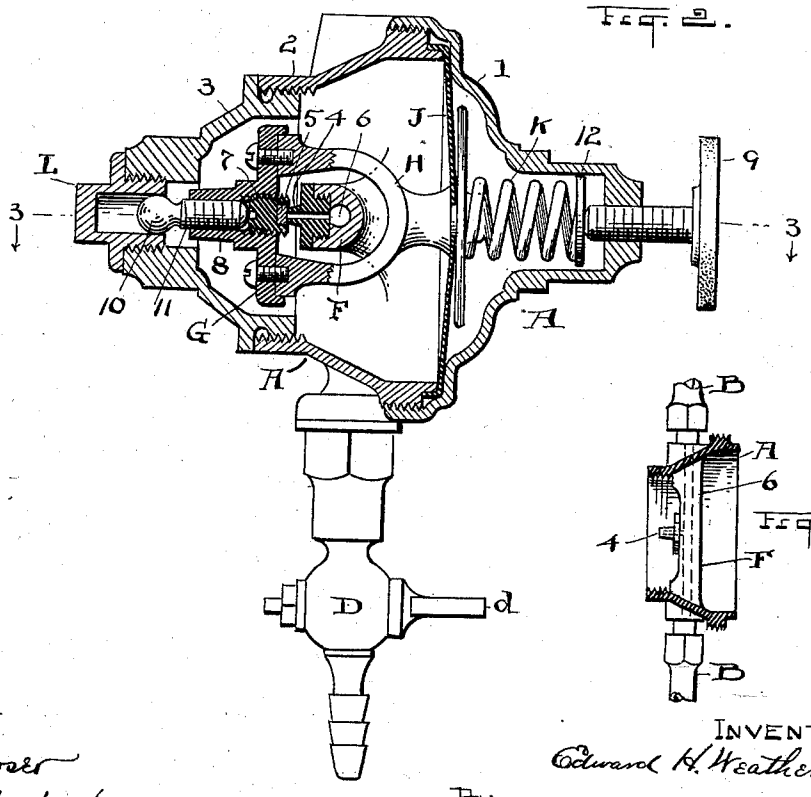


Fig. 3.

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FLUID-PRESSURE-REGULATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 637,980, dated November 28, 1899.

Application filed October 22, 1898. Serial No. 694,265. (No model.)

To all whom it may concern:

Be it known that I, EDWARD H. WEATHERHEAD, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Fluid-Pressure-Regulating Mechanism; and I do declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to fluid-pressure-regulating mechanism such as is used in connection with soda-water fountains and generally for fluids under pressure and in the use of which the flow of the fluid is subject to restraint and regulation as to feed and quantity.

The invention therefore consists in the construction and combination of parts of the apparatus, substantially as herein shown and described, and particularly pointed out in the claim.

In the accompanying drawings, Figure 1 is a front elevation of a pressure-regulating device embodying my invention. Fig. 2 is an enlarged cross-section of the valve and valve-controlling mechanism on line 2 2, Fig. 1. Fig. 3 is a cross-section corresponding to line 3 3, Fig. 2, of the casing only.

I am of course aware that pressure-regulating devices of the general character of the present invention are not broadly new, and I do not therefore make claim, broadly, to the device shown; but I do claim as new and original with me certain constructions and combinations of the device which are essential to its operation and efficiency, as will appear in the further description thereof and the claim.

Referring to Fig. 2, in which the invention is chiefly disclosed, A represents the entire casing, consisting, for convenience, of three sections, 1, 2, and 3, threaded together.

B and B are gas-supply pipes or tubes, one or two of which, or even more, may be used; but generally two are preferred, so that as one supply-chamber is emptied the other may be opened and the supply of gas be continued without interruption till both are exhausted.

C represents a common form of indicator, and D a discharge-nozzle with a controlling valve or cock *d*.

Passing now to the inside of casing A, we have the valve 4, the seat 5, and the orifice or passage 6 through bridge-piece F and in communication with supply-pipes B. Now inasmuch as the valve 4 is to be used in the supplying of gas under pressure ranging possibly from one thousand to twelve hundred pounds as a maximum down to two or three pounds as a minimum, the organization of the device must necessarily be of a very substantial as well as a very delicate and perfect character, so as to work equally well and perfectly whatever the pressure may be. If this be not the case, there may be excessive flow of gas or liquid at high pressures and insufficient flow at low pressures, and it is at this point more particularly that the chief difficulties have been encountered in the operation of these devices. So true and important is this that I have found devices which seemed to be complete in every essential particular, but which were, in fact, so defective in their finer points as to be found practically worthless in operation and had to be cast away. The present invention, therefore, is built with a full knowledge of these difficulties and defects and with especial reference to its operation under any and all ranges of pressure, whether high or low or anywhere between. To these ends it is, first of all, necessary to have always a prompt and perfect seating of the valve 4. This valve, therefore, is made of a very hard metal which will resist wear and receive a high finish. The valve-seat 5 is made correspondingly hard—say of hard rubber or other material which will furnish a good seat and is not liable to be cut or worn by the valve. It will be noticed that in this instance the valve is a fixed and stationary member, being set and supported in the bridge-piece F, which is integral with the middle section 2 of the casing and has the gas-passage 6 therein. The valve-seat 5 is socketed or seated in the threaded plug 7, which is set into the valve-seat support G from below through the tubular and threaded stem 8 on the opposite side of said support. A yoke H engages the support G at its ends and is itself fixed to the diaphragm J, which is secured about its edge between the sections 1 and 2 of the main casing. A spring K bears upon the said diaphragm on the opposite side from the gas-

chamber, and the tension thereof is regulated or governed by the hand-screw 9. At the opposite side of the casing and valve mechanism is a substantially ball-shaped guide 10 for the valve-supporting piece G, having a threaded shank 11, which extends into the threaded stem 8 and has its ball-bearing in a well in the plug L. Now since the gas enters the casing through the valve 4 and when expanded exerts its pressure inside against diaphragm J the tendency thereof is to close the seat 5 against the valve and cut off the further inflow of gas; hence also the use of spring K and screw 9, pressing against the disk 12, on the end thereof, to set the spring K with more or less tension against the gas-pressure and overcome the same and let in more gas when the gas is counterbalanced by the spring; but since it is a flexible connection of diaphragm and yoke which carries and controls the position of the valve-seat there is found a natural tendency toward uneven seating, and consequent danger from leakage at one side or another of the valve. The yoke H is therefore used designedly to help in evening up the seat to the valve and serves a very excellent purpose, and yet this alone is not enough for all purposes. I have therefore adopted the ball-shaped or substantially spherical guide 10, which works in a comfortably-fitting cylindrical well and which by reason of its circular side and comparatively slight engagement in the well avoids friction and leaves the valve-seat free to adapt itself evenly to the valve, and thus prevents or avoids uneven seating. I have tried various constructions for this purpose, but have found that a free-rocking bearing of the guide 10 is absolutely essential to perfect work.

In operation the device is automatic after the parts have been set, the degree of pressure in or by the gas determining the tension to be put upon spring K to set it for operation, and there is thereafter more or less play or vibration back and forth of the diaphragm and valve-seat in maintaining the desired pressure of the gas in the chamber A. If the pressure should drop below the then existing tension of the spring, the valve would of course be opened till the spring was overcome by the pressure, when the valve would again be automatically closed till the conditions were reversed, and so on.

The seat-plug 5 is adjustable to get the seat at the right place with respect to the valve 4, and then the guide-stem is inserted and run up against the plug 5 to lock it in position.

What I claim is—

The main casing having an integral transverse duct 6 across its center interiorly and a valve fixed midway in said duct and having an open passage, a flexible diaphragm secured about its edge in the said casing and a yoke H attached to one side thereof and a spring K bearing against the opposite side of said yoke, a valve-seat and its support secured to said yoke and having a threaded tubular stem 7 adjustable in the said support, a guide-screw threaded into said support against said valve-stem and having a spherical guide-head 10 at its exposed end, and a close-fitting well L in which said guide-head is free to rock, substantially as described.

Witness my hand to the foregoing specification this 20th day of September, 1898.

EDWARD H. WEATHERHEAD.

Witnesses:
H. T. FISHER,
R. B. MOSER.