July 21, 1953 L. P. BENUA ET AL 2,645,885

PRESSURE REGULATING VALVE MECHANISM

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Fig.1.

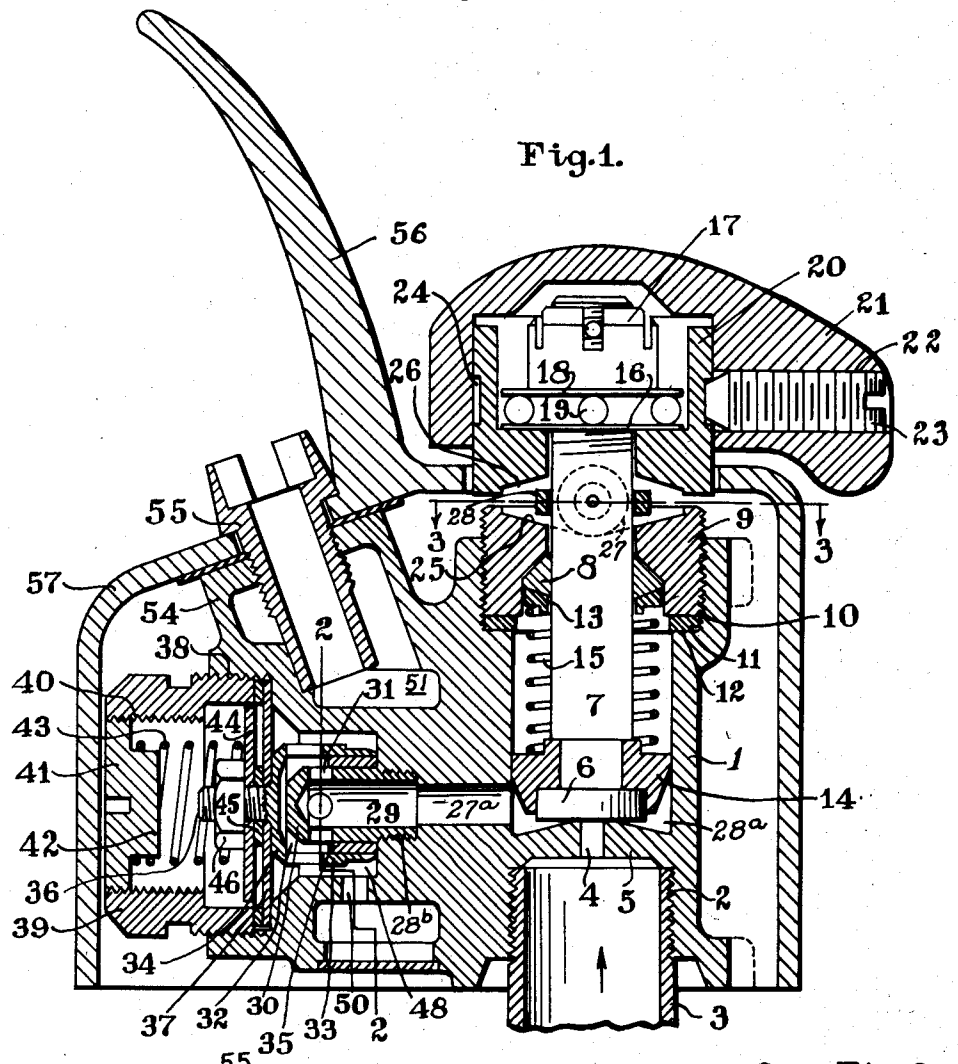



Fig.2.

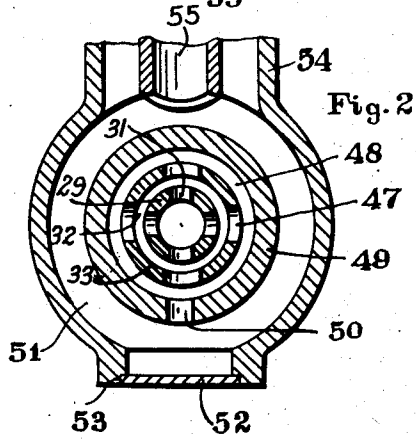
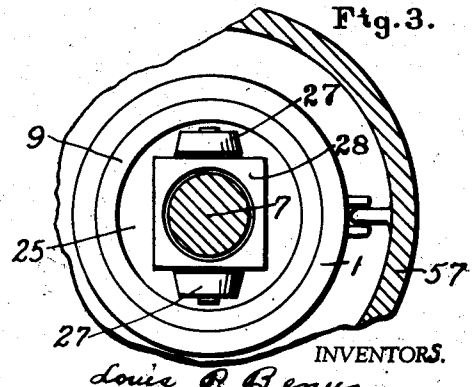



Fig.3.




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## PRESSURE REGULATING VALVE MECHANISM

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1 Claim. (Cl. 50—23)

1

This invention relates to pressure regulating valve mechanism. In one of its practical applications, our invention is concerned with the provision of an improved pressure regulating valve mechanism for controlling and rendering uniform the magnitude of water jets discharged from wall or floor mounted drinking fountains. It is well known that the pressures on the water supply furnished from municipal mains does not remain at any one location uniformly constant, but varies from time to time with changing demands placed upon the source of supply. Drinking fountains of the type used in factories, offices and public buildings, require for best usage the discharge of jets or streams of water of definite volume, trajectory or magnitude. Variations in the pressure of the water delivered to such fountains, therefore, detrimentally affects their desired operation.

It is, therefore, the object of the present invention to provide improved, simplified and reliable means for controlling the rates of flow of water through such a valve mechanism, so that under all operating conditions, a uniform jet, stream or other flow of water may be maintained at the water discharge nozzle or outlet of such a fountain, enabling patrons to use such fountains safely and effectively when the associated manually operated valve is actuated to provide water flow under pressure from their outlet nozzles.

For a further understanding of the invention, reference is to be had to the following description and the accompanying drawing, wherein:

Fig. 1 is a vertical sectional view taken through the improved valve and fluid pressure regulating mechanism forming the present invention;

Fig. 2 is a vertical transverse sectional view taken through the valve on the plane indicated by the line 2—2 of Fig. 1;

Fig. 3 is a horizontal sectional view on the line 3—3 of Fig. 1.

Referring more particularly to the drawings, the numeral 1 designates the cast body of the combined shut-off and pressure regulating valve mechanism forming the present invention. The under side of the body is provided with a threaded socket 2 for the reception of the correspondingly threaded end of a water supply pipe 3. This pipe may extend from any suitable source of water under pressure such, for example, as being connected with a municipal water supply line. Also, the water being delivered to the valve mechanism may be suitably cooled for drinking purposes.

The socket 2 terminates at its upper end in a

2

reduced opening 4 formed in a web 5, the upper surface of the web around the opening 4 constitutes a valve seat and is normally engaged by the compressible washer or disk 6 suitably fastened upon the end of a valve stem 7. The stem is slidably supported for movement in a packing 8 which is retained in a nut 9 threaded into a socket 10 provided in the upper region of the body 1. A flexible washer 11 is interposed between a shoulder 12 at the bottom of the socket 10 and the lower surface of the nut 9. The packing 8 has its lower surface engaged with a follower ring 13, and the lower end of the valve stem 7 carries a valve head 14. Surrounding the valve stem and confined between the ring 13 and the upper surface of the valve head 14 is a coil spring 15 which normally serves to maintain the disk 6 in seated engagement with the web 5 and likewise maintains the packing 8 under compression.

The upper end of the valve stem 7 is threaded as at 16 for the reception of a castellated lock nut 17, the latter being flanged as at 18 to engage with antifriction balls 19. These balls are confined in an annular race provided between the nut 17 and a collar 20. Receivable on this collar is a manually operated knob 21, which is formed with a threaded opening 22 for the reception of a set screw 23, the slotted end of the latter being accessible from the exterior of the knob. The inner end of the set screw is tapered for engagement with an annular groove 24 provided on the exterior of the collar 20, whereby when the knob is rocked, the collar rotates unitarily therewith.

The opposed complemental surfaces 25 and 26 of the nut 9 and the collar 20 are annularly and reversely tapered for engagement with correspondingly tapered rollers 27, these rollers being rotatably mounted on studs projecting from a frame member 28 surrounding the stem 7.

It will be seen that when the knob 21 is rocked to either the right or left of the position illustrated in Fig. 1, the taper of the surface 26 in contact with the rolls 27 will produce elevation of the collar 20, thus lifting the valve stem and raising the disk 6 above the port or orifice 4, so that water under pressure may pass from said port and enter an outlet passage 27 provided horizontally in the base casting 1. When the knob 21 is released by its operator, the spring 15 expands to return the valve and its operating parts to their normal positions of valve closure, as illustrated in Fig. 1.

The passage 27*a* communicates at one end with the chamber 28*a* in which the valve head 14 is

positioned and at its opposite end with an enlarged internally threaded socket 28b. Positioned in this socket is the correspondingly threaded end of a pressure-regulating nipple 29. This nipple is open at one end to the passage 27a, and is closed at its opposite end, as at 30. The annular wall of the nipple, contiguous to the closed end 30, is provided with a plurality of spaced radially disposed ports 31, which establish fluid flow communication between the interior of the nipple and an annular chamber 32 provided internally of a diaphragm-actuated movable sleeve member 33.

The member 33 is open at one end and closed at its other, the closed end forming a head 34. Near its open end, the sleeve member 33 is provided internally with a bearing collar 35, the latter being slidably supported on the circular outer surfaces of the nipple 29. Normally, the collar 35 is so formed and positioned that the ports 31 of the nipple will be uncovered to provide for water flow therethrough. However, as the pressure of the water increases, with respect to a given or normal pressure, the sleeve member 33 is slidably actuated so that the bearing collar 35 thereof may be moved to position partially covering and obstructing water flow through the ports 31, thereby diminishing fluid flow through said ports to a point adequate to diminish the flow rate of the fluid in order to maintain a uniform jet of water at the nozzle or outlet of the fountain.

To obtain this automatic movement of the sleeve member, the head 34 thereof is formed with an axially disposed stud 36. This stud passes through an axially arranged opening provided in a rubber or other flexible diaphragm 37. The outer peripheral edges of this diaphragm are held in a clamped position by providing the body 1 with a socket 38 in which is received the correspondingly threaded end of a sleeve 39. This sleeve when tightened in the socket 38 clamps the peripheral edges of the diaphragm and holds the same in its operating position. The sleeve 39 is internally threaded as at 40 to receive a plug 41, the plug being formed with a boss 42, constituting a seat for a coil spring 43. The inner end of this spring engages with a disk 44, carried by the threaded end 36 of the sleeve 33, the disk being spaced from the diaphragm by a washer 45, the assembly being held together by a nut 46 provided on the threaded extension 36. Thus, as the water pressure increases or diminishes, the diaphragm 37 responds automatically to vary the positions of the sleeve 33 with respect to the ports 31, obstructing or opening said ports to compensate for water pressure fluctuations.

Water issuing from ports 31 enters the chamber 32 of the sleeve 33 and passes from said last-named chamber through radial ports 47 provided in the outer peripheral wall of the sleeve 33, thereby entering the annular chamber 48 which is in direct communication with one side of the diaphragm 37. The annular wall 49 of the body member 1 which defines the chamber 48 is formed with a port 50, which establishes communication between the chamber 48 and an outer chamber 51, the latter having a removable access plate 52 which is confined in an opening 53 provided in the lower part of the body member 1. The walls of the body member defining the chamber 51 terminate at the top thereof in an angular extension 54, which receives a threaded outlet or bubbler pipe 55 shaped to discharge a stream or jet of water in an upward and angular direction adjacent to a parallel guard 56, the latter being formed with and arising from an outer casing 57 in which the valve mechanism is confined. By the provision of the round baffle chamber 51, water is fed to the bubbler outlet 55 in the form of a smooth uniform stream, eliminating unevenness and lack of uniformity in the flow of water in response to the actuation of the valve 7.



In view of the foregoing, it will be seen that the present invention provides a self closing and pressure regulating valve mechanism of simple and efficient construction which is readily adapted for use in the control and regulation of water jets issuing from a drinking fountain. The various parts of the mechanism are readily accessible for adjustment and may be readily removed, when necessary, for cleaning, repair or replacement purposes. While we have disclosed a preferred form of our invention, nevertheless it will be understood that the same is subject to certain structural variation or modification without departing from the spirit of our invention and therefore we reserve the right to employ such modifications that may be said to fall fairly within the scope of the following claim.

We claim:

A pressure regulator valve for drinking fountain bubblers comprising a body formed with a liquid-receiving inlet; passage means in said body arranged to be brought into communication with the inlet; a cylindrical nipple member mounted in said passage means formed with openings communicating with said passage means; a first chamber in said body surrounding said nipple member; a flexible diaphragm in said first chamber; a tubular sleeve member slidably carried on said nipple member and formed with a plurality of radially disposed ports communicating with said first chamber, said sleeve member being connected with said diaphragm and movable therewith to vary the effective size of the openings formed in said nipple member, said diaphragm being movable in response to the pressure of liquids discharged through the openings in said nipple member and into said first chamber to slide said sleeve member in a direction to decrease the effective size of the openings in said nipple member; spring means urging said diaphragm and sleeve member to move in a direction to open the openings of said nipple member; a second chamber in said body, said second chamber surrounding said first chamber and communicating with said first chamber by way of a relatively restricted port formed in said body; and a liquid-discharging outlet in said body circumferentially spaced from said restricted port and communicating with said second chamber.

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