June 5, 1934. D. H. EBINGER 1,961,439

VALVE REGULATING MEANS

Filed Dec. 24, 1928

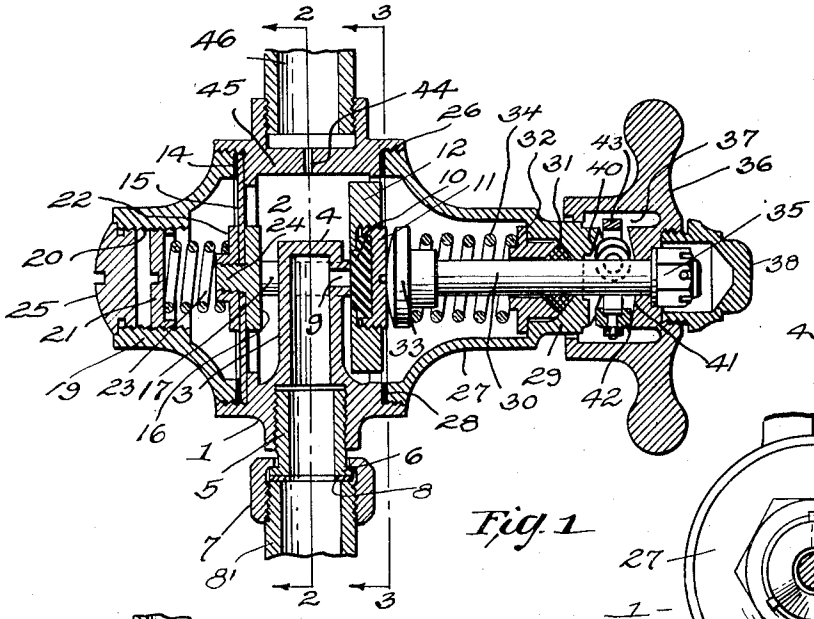


Fig. 1

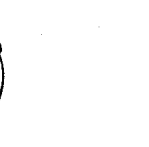


Fig. 4

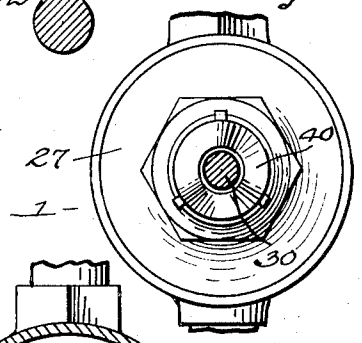


Fig. 6

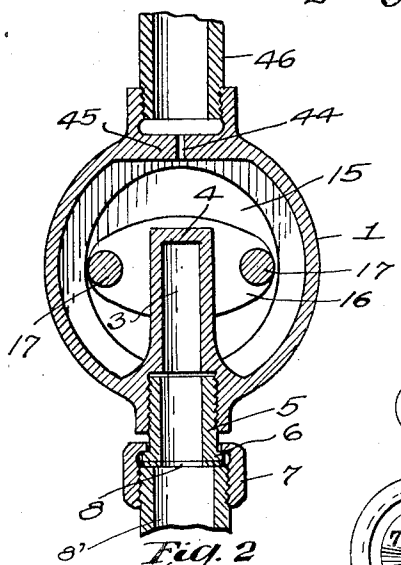


Fig. 2

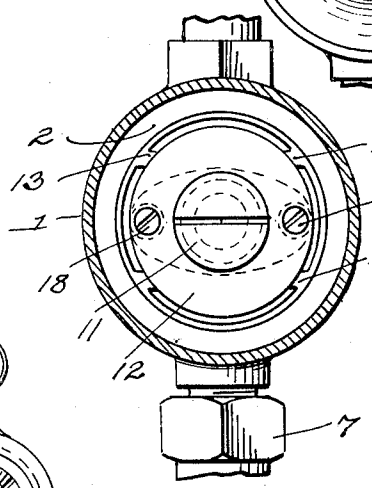


Fig. 3

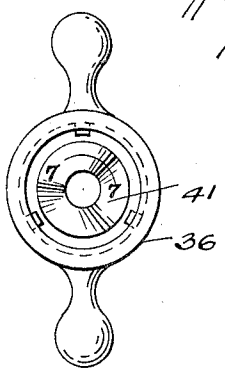


Fig 5

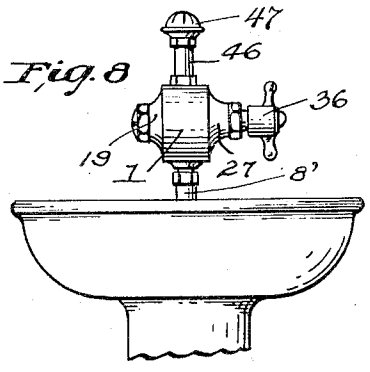


Fig. 8



Fig. 7

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VALVE REGULATING MEANS

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5 Claims. (Cl. 50—23)

This invention relates to an improved regulating and control valve and, with regard to its more specific aspects, provides a valve control means for regulating the flow of a liquid, which fluctuates with pressure, through a conduit or pipe line system.

The invention finds a wide field of use in the matter of regulating water flow in connection with drinking fountains of the type employed in office buildings, schools, factories and other public or semi-public places. Usually these drinking fountains receive their source of water supply directly from the water lines or mains of a city water system. It is well known that in such systems the water pressure fluctuates from time to time. Thus when such drinking fountains are operated with the use of ordinary control devices the streams discharged from the drinking heads thereof are of varying height, which is attributable to the change in pressure. Under certain circumstances the jet of water delivered is too high or forceful, while under other circumstances barely enough water is discharged to render the fountain useful. Earlier constructions have commonly employed a set regulator with a manually operated control valve. In accordance with the present invention, however, the regulator is of an automatic type wherein the area of its discharge port or orifice is rendered variable in proportion to the pressure of the water, or other liquid fluid medium, and passes through the regulator. Thus, if the water pressure falls below a certain normal pressure the effective area of said orifice becomes greater than the normal area, which conversely, when the pressure increases above said normal pressures, the effective area of the discharge orifice or port is varied automatically to be less than the normal or mean effective area. By this agency which is directly responsive to the variations in the liquid pressures, the stream of water discharged from the fountain remains constant throughout a wide range of water pressure fluctuations. By this means, also, the volume of water discharged at the drinking head is rendered substantially independent of the control valve. Thus, the control valve may be fully opened with either high or low water pressure and yet a constant supply of drinking water will be furnished at the discharge head or bubbler of the drinking fountain.

It is another object of the invention to combine in one casing the automatic regulator and also the manually operated control valve.

It is a further object of the invention to provide a combined regulator and valve of this character which is of simple, practical, reliable and efficient construction capable of prolonged operation without repair or adjustment.

With these and other objects in view which will appear as the description proceeds, the invention consists in the novel features of construction, combination of elements and arrangements of parts hereinafter to be fully described and pointed out in the appended claims.

In the accompanying drawing:

Figure 1 is a vertical longitudinal sectional view taken through the combined regulator comprising the present invention,

Figure 2 is a vertical transverse sectional view on the plane indicated by the line 2—2 of Figure 1,

Figure 3 is a similar view on the plane indicated by the line 3—3 of Figure 1,

Figure 4 is a detailed view showing the cam engaging rollers, and end supporting ring,

Figure 5 is an end elevation of the operating knob or handle for operating the control valve stem,

Figure 6 is an end elevation of the control valve casing with the operating handle or knob removed,

Figure 7 is a sectional view taken on the curved line indicated at 7—7 in Figure 5, and

Figure 8 is a view in side elevation of a drinking fountain provided with a regulator and valve formed in accordance with the present invention.

Referring more particularly to the drawing, the numeral 1 designates the central casing of the improved valve structure constituting the present invention. This casing is generally of circular form and is formed internally to include a chamber 2. Within this chamber there is disposed a conduit 3 provided with a closed upper end 4. The conduit 3 may be intricately formed with the walls of the casing 1, as shown in Figure 2. In alignment with the conduit 3 the casing 1 is provided in the bottom part thereof, with a threaded opening adapted for the reception of a nipple 5 which has its lower end flanged, as shown at 6, for the reception of a nut 7 and a washer 8. By this customary construction the casing may be connected wtih a water supply pipe or its equivalent, 8'.

The upper or inner end of the conduit 3 terminates in an outlet jet 9 by means of which the water entering the conduit 3 from the water supply pipe may be discharged into the chamber 2 of the casing 1. Normally, this jet has its open outer end closed by a disc 10, which may be formed from a relatively soft metal, leather or other suit-

able compressible substance. This disc is secured by means of a threaded plug 11 within an axial opening provided in a circular head 12. The head 12 is adapted to move longitudinally of the casing 1 so that the disc 10 thereof may be moved toward or away from the jet 9 for the purpose of regulating the out flow of water from the conduit 3. The inwardly projecting ribs 13 are formed with the inner walls of the casing 1 and engage with the outer peripheral portion of the head 12 so as to regulate the longitudinal movement of the head and to maintain its operative position within the casing. The rib serves to minimize friction between the head and the inner walls of the casing and to align the disc 10 with the jet 9.

One side of the casing 1 is provided with an enlarged threaded opening which terminates in an annular seat 14. Upon this seat there is positioned the outer peripheral portion of a flexible diaphragm 15. Secured to the inner wall of this diaphragm and disposed within the chamber 2 is a stirrup 16, the latter being formed with a pair of integral longitudinally extending arms 17, sufficiently spaced so that the conduit 3 projects between them, as shown in Figure 2. The outer ends of these arms engage with the head 12 and in this instance the head 12 and the arms 17 are provided with registering openings adapted to receive threaded fastening screws 18, which serve to unite for uniform movement the diaphragm 14 and the head 12.

The diaphragm 12 is retained within place by means of a closure 19 which is threaded into the open end of the casing 1 in which the diaphragm 15 is seated. The closure 19 serves to grip frictionally the peripheral edge portions of the diaphragm so as to hold the latter securely around the circumferential edges within the casing. Further, the closure 19 has its outer portion formed with an internally located threaded bore 20, in which is positioned an adjustable nut 21. Confined between the inner surface of this nut and a metallic annulus 22 is a coil spring 23, the normal tendency of which is to flex the diaphragm 15 inwardly so that the head 12 will be moved to open the jet 9. The annulus 22 is carried by a threaded stud 24 which projects through an opening in the axis of the diaphragm and is carried by the stirrup 16. The bore 20 is additionally closed by a removable cap 25 which conceals the nut 21 and must be removed before said nut is rendered accessible. By adjusting the nut 21 the tension of the spring 23 may be regulated to best adapt the device to the particular water pressures to be handled.

Now with reference to the manual features of control of the valve structure, the casing 1 on the side thereof opposite to the closure 19, is provided with a threaded bore 26 adapted for the reception of a valve housing 27, and has a sealing gasket 28 arranged between the adjoining portions of the housing 27 and the annular seat formed by the bore 26. The outer end of the housing terminates in a hub 29 provided with a central opening adapted for the reception of a slidable and rotatable valve stem 30. The stem 30 is received within a packing 31 held in place by a slip nut 32 which is arranged within the interior of the housing 27. The inner end of the stem 30 carries a head 33, the rounded surfaces of which engages with the plug 11 of the head 12. Confined between the head 33 and the slip nut 32 is a coil spring 34 of substantially greater strength than the spring 23. The spring 24 maintains the nut 32 in proper engagement with the packing 31 which functions primarily to retain the head 33 in such contact with the plug 11 and its head 12 as to keep the disc 10 seated upon the jet 9, arresting water flow through the valve structure.

In order to withdraw the head 33 from cooperation with the head 12 the outer end of the stem 30 is provided with a nut 35. Rotatable around the axis afforded by the outer portion of the stem 30 is an operating knob 36. This knob includes a cylindrical inner portion 37, which is seated around the outer terminating end or hub 29 of the housing 27. The nut 35 is so positioned as to retain the knob 36 on the outer end of the stem 30. The nut 35 is rendered accessible by the removal of a cap 38 which is carried by the outer axial portion of the knob 36.

The hub 29 terminates in a cam surface 40 arranged in complemental relationship with a corresponding surface 41 provided interiorly of the knob 36. Between the surface 40 and 41 there are arranged rollers 42 rotatable about independent axes carried by the supporting ring 43, the latter being situated within the confines of the cylindrical portion 37 of the knob 36.

In the operation of the structure described the knob 36 is rotated, which results in causing the rollers 42 to move into engagement with the outer portions of the cam surface 40 and 41, thereby longitudinally shifting the portion of the valve stem 30 so that its head 33 is moved away from the head 12 as long as the knob 36 is held in its rotated position by the manual operation. Upon release of the knob the pressure exerted by the spring 34 returns the stem to its normal position. When the head 33, by the operation described, is moved away from engagement with the head 12, the water pressure in the conduit 3 results in moving the head 12 so that the jet 9 is uncovered. This allows the water to flow from the conduit 3 by way of the jet 9 into the chamber 2, where it issues from the casing 1 by way of a restricted port 44 formed in a wall 45 provided in the top of the casing 1. The extreme top of the casing is provided with a threaded port adapted for the reception of an outlet pipe 46 constituting a part of a drinking head or bubbler 47. It should be noted that when the head 12 is moved by water pressure to move the jet 9 its extent of movement depends upon the pressure of the water flowing through the valve. For example, if the water pressure falls below a certain mean pressure, the reduced water pressure exerted on the diaphragm 15 by the water within the chamber 2, permits the spring 23 to expand to substantially its maximum extent so that the head 12 will be moved away from the jet 9 to the fullest extent of the movement allotted the same. Conversely, when the water pressure exceeds the normal pressure, the diaphragm 15 is forced outwardly to a greater extent by the water pressure within the chamber 2 and consequently the spring 23 does not function to permit of any extended movement on the part of the head 12. Thus there is automatically maintained within the chamber 2 under all conditions of water pressure, a constant volume of water which permits the water to issue from the discharge head of the drinking fountain at a uniform rate and height throughout the entire range of fluctuating water pressures. When the knob 36 is released, the stronger spring 34 operates to restore the head 33 into engagement with the head 12 so that the latter is forced into a position closing the jet 9 independently of the water pressure and the action of the opposed weaker spring 23, thus automatically closing the valve.

While I have described what I consider to be the preferred form of the invention, nevertheless, it will be understood by those skilled in the art that various changes may be made therein from time to time without departing from the spirit of the invention or the scope thereof as said invention has been set forth in the following claims.

What is claimed is:

1. A pressure regulating valve, comprising a body having a fluid passage and a valve seat, a valve member for said seat, spring-pressed self-actuating means for positively maintaining said valve member in connection with said seat, manually operable means for withdrawing the self-actuating means from engagement with said member to admit of the movement of said valve member to a passage opening position, a spring actuated diaphragm having a connection with said valve member and operable by the pressure of the fluid for varying the position of said valve member relative to its seat independent of said self-actuating means when said manually operable means has been actuated to disengage said member, the outlet side of said body having a diameter less than that of said passage.

2. A pressure regulating valve, comprising a body having a fluid passage and valve seat, including a spring-operated self-closing valve member for said seat, manually-operable means for unseating said valve member including a spring counteracting the spring of said valve member, and means operable by the pressure of the fluid for shifting the position of said valve member relatively to its seat independently from said counteracting spring when said manually operated means have been actuated to unseat said valve member.

3. A pressure regulating valve, comprising a valve body containing intake and outlet passages and a valve seat, including a movable valve member for said valve seat, means to actuate said valve member, a pressure device situated in the outlet passage for automatically controlling the movements of said valve member independently from said means, said actuating means of said valve member including means for holding said valve member upon its seat and the pressure device normally inactive.

4. A pressure regulating valve, including a chambered body, a removable closure member for said body, a pressure regulating device and valve for controlling the passage of a fluid through said body including an independent spring member actuating said valve, a spring acting normally to hold said valve closed, and a handle to render said latter spring inactive and permit said pressure regulating device to operate.

5. A pressure regulating valve, comprising a chambered body, a main valve controlling the passage of fluid through said body, a pressure device exposed to the fluid on the outlet side and connected to said valve, a spring rigidly supported in said body acting counter to said pressure device, means for adjusting the tension of said spring, and manually-operable spring means counteracting said first spring for holding said first mentioned spring and pressure device normally inactive.

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