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FLUID FLOW REGULATOR

Filed Jan. 21, 1932

Fig. 1.

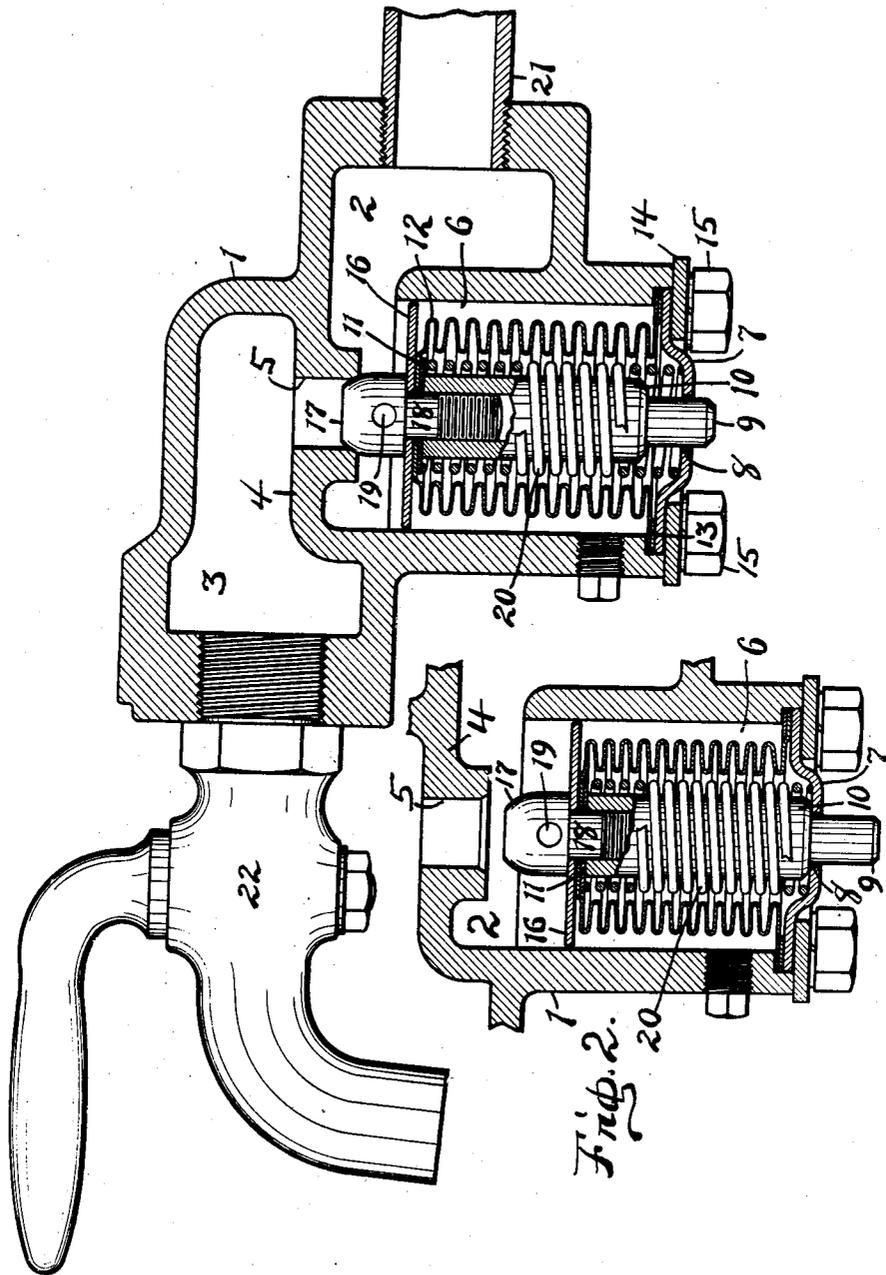


Fig. 2.

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UNITED STATES PATENT OFFICE

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FLUID FLOW REGULATOR

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This invention relates to improvements in fluid flow regulators, and an object of the invention is to provide automatic means for controlling the passage of fluid from a source of supply out through the discharge line connected therewith whereby outflow of fluid from said source takes place only when a definitely predetermined pressure of fluid from the source of supply is reached or exceeded.

A further object is to provide means whereby the outflow of liquid from a source of supply through a discharge line connected therewith is automatically stopped when the pressure of liquid in the discharge line or the head of liquid in the source of supply is reduced to or below a predetermined point, whereby entrance of air into or through the discharge line is prevented.

Other objects and advantages of the invention will appear hereinafter.

A preferred illustrative embodiment of the invention is shown in the accompanying drawing, in which:—

Fig. 1 is an elevation of a structure in which the invention is embodied, portions being in section and the valve in closed position; and

Fig. 2 is a fragmentary similar view showing the valve in open position.

The illustrative embodiment consists of a housing 1 provided with inlet and outlet chambers 2 and 3 separated by a partition 4 which has a passageway 5 extending there-through. The housing also has therein a compression chamber 6 the upper end of which is open to afford communication with the inlet chamber 2.

The housing has at the lower end of the compression chamber 6 a head 7 provided with an opening 8 through which the stem 9 of a poppet 10 extends and has guided movement therein, said poppet being disposed within the compression chamber in alignment with the passageway 5 in said partition.

Upon the top of the poppet is disposed a disc 11, and an inverted expansible cup 12 extends over the disc, the opposite end of said cup being provided with an annular external flange 13 that is clamped between the lower end of the housing and the head 7,

there being a ring 14 beneath the head and screws 15 for clamping the head and said flange firmly in place.

A dasher consisting of a plate 16 is positioned upon the top of the cup and is shaped to conform approximately with the bore of the compression chamber 6 so as to have axial movement therein. A valve 17 is secured to the poppet 10, its stem 18 extending through the plate 16, top of the cup 12, disc 11, and into the upper end of the poppet, said stem and poppet having threaded relation. The head of the valve 17 has an opening 19 for insertion therein of a suitable tool for turning of the valve upon its axis whereby the disc 11, upper end of the cup 12, plate 16 and the poppet are conjoined with the valve, and the top of the cup is also thereby sealed.

By securing the expansible cup at its respective ends in the manner above set forth leakage from the compression chamber through the cup out through the opening 8 in the head 7 is prevented. The cup 12 is of the usual cylindrical bellows type capable of expanding longitudinally under slight force. The cup, when in place, is sheltered from external interference and, as the dasher 16 has guided movement in the compression chamber, the cylindrical wall of the cup is held from contact with the surrounding wall of the compression chamber and the valve is held in alinement with the passageway 5.

An open coil spring 20 is disposed within the cup around the poppet and is compressed endwise between the disc 11 and the head 7 so that by expansion of the spring the valve 17 is raised into closed relation with the passageway 5 (Fig. 1), and thus flow of fluid from the inlet chamber 2 through said passageway into the outlet chamber 3 is stopped.

In operation, the housing is connected in any suitable manner, such as by a pipe 21, with a reservoir (not shown) or other suitable supply of fluid, so that the fluid discharged from the reservoir is conveyed into the inlet chamber 2 of the housing. When pressure is created in the inlet chamber 2 by fluid received from the reservoir the fluid leaks past the dasher 16 and fills the compression chamber 6 around the cup 12, and

because of the pressure in the inlet chamber the cup tends to collapse axially which is opposed by the spring 20. However, when the pressure in the inlet chamber 2 is raised sufficiently to overcome the pressure of the spring, the poppet is moved downwardly as the spring and cup are compressed, causing removal of the valve 17 from its seat about the passageway 5, thus opening communication between the inlet and outlet chambers 2 and 3. The amount of pressure required to cause opening of the valve is dependent upon the stiffness of the spring 20, and by selection of springs of proper strength the degree of pressure may be predetermined accordingly as desired.

The opening and closing action of the valve with respect to its seat is dampened by the resistance of the fluid in the compression chamber to movement of the dasher 16, whereby sudden closing or chattering of the valve upon its seat are obviated. In this manner the flow of fluid through the valve housing is accomplished without ramming being occasioned through action of the valve.

In Fig. 1 is shown a faucet 22 arranged to have communication with the outlet chamber 3, which, when closed, prevents flow of fluid through the housing. The faucet is illustrative of a hand operated means of regulating the final discharge of fluid from the reservoir or other suitable source through the valve body and discharge line 21. In practice, it may be desired to interpose between the faucet and the valve body an extension pipe or hose (not shown) to permit delivery of the liquid passing through the discharge line to a point more or less remote from the source of supply. Also, in practice it is in some instances desirable to account for the amount of liquid delivered through the discharge line, and in such instances the amount of liquid as delivered may readily be ascertained by coupling in the discharge line, either between the housing and the reservoir, or between the housing and the faucet, a suitable flow meter (not shown) such as is in common use.

When the faucet is closed and flow through the housing is thereby prevented, and the

pressure in the inlet chamber of fluid supplied from the reservoir or other source exceeds the predetermined point, the valve is moved to open position because of the exertion of the pressure upon the cup in opposition to the spring 20 which thereby are depressed. Upon opening the faucet, flow of fluid through the housing takes place until the pressure of fluid within the inlet chamber becomes reduced to or below the predetermined point, whereupon, the cup and spring expand, causing the valve to close upon its seat, and thus stopping flow of fluid through the housing.

Stoppage of the flow of liquid through the discharge line before the supply of liquid thereto is exhausted prevents entrance of air into the discharge line and thus only liquid is delivered through the faucet, and when a flow meter is connected in the discharge line its indications therefore are significant only of the quantity of liquid actually passing through the discharge line to the delivery point. Thus, short measuring without notice when dispensing liquid is circumvented.

I claim:

A fluid flow regulator comprising a housing having inlet and outlet chambers connected by a passageway therebetween and having also a compression chamber communicating with said inlet chamber, at one end and having an apertured head at its opposite end, a poppet disposed in said compression chamber having a valve thereon for closing said passageway and a stem guided in the aperture of said head, an expansible cup disposed in said compression chamber closed with respect thereto and operatively associated with said poppet, a dasher disposed in said compression chamber fitting loosely in the bore thereof and conjoined with said poppet, a compression spring operatively associated with the poppet to hold said valve normally in closed position, a connection for supplying fluid to said inlet chamber, and a discharge controlling means for said outlet chamber.

In testimony whereof I affix my signature.
 BYRON J. PEPPER.

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