

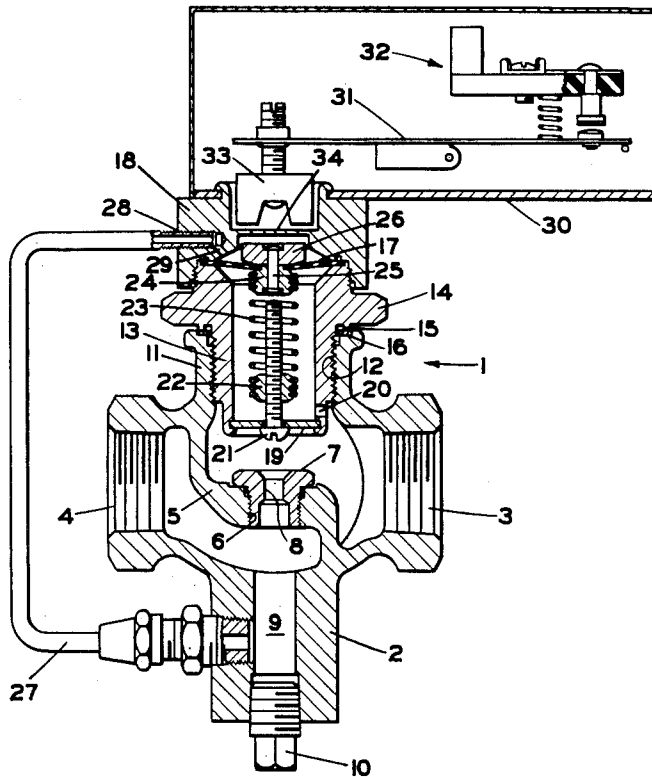
Feb. 10, 1953

E. J. DILLMAN

2,628,296

FLOW SWITCH

Filed June 20, 1950



INVENTOR.

Earnest J. Dillman
BY

Andrew K. Jones
ATTORNEY

UNITED STATES PATENT OFFICE

2,628,296

FLOW SWITCH

Earnest J. Dillman, Detroit, Mich., assignor to
Detroit Lubricator Company, Detroit, Mich., a
corporation of Michigan

Application June 20, 1950, Serial No. 169,200

2 Claims. (Cl. 200—81.9)

1

This invention relates to new and useful improvements in flow responsive control devices and more particularly to a flow responsive switch.

One of the objects of this invention is to provide a flow responsive control device of a new and improved construction.

Another object is to provide a flow responsive switch which is actuated without the use of packing or other sealing means.

Another object is to provide a flow responsive switch which is operated by cooperating magnetic members one of which is movable by a flow responsive diaphragm.

Another object is to provide a flow responsive switch which may be accurately calibrated to determine the flow at which the same will operate.

Other objects will become apparent from time to time throughout the specification and claims as hereinafter related.

This invention comprises the new and improved construction and combination of parts which will be described more fully hereinafter and the novelty of which will be particularly pointed out and distinctly claimed.

In the accompanying drawing to be taken as part of this specification there is clearly and fully illustrated one preferred embodiment of this invention, in which drawing the figure shown is a longitudinal section through this flow responsive switch.

Referring to the drawing by characters of reference there is shown a flow responsive switch structure generally designated as 1 and comprising a fluid flow casing 2 having an inlet 3 and an outlet 4. The casing 2 may be a standard valve casing or could be especially designed for this purpose if desired.

Within the casing 2 there is an internal wall or partition 5 having a threaded aperture 6 therein. Threadedly secured in the aperture 6 is a plug member 7 having an orifice 8 of predetermined size therein which provides a calibrated restriction for the passageway of which the casing forms a part. Within the casing 2 and extending directly beneath the orifice 8 there is a passage 9 which is closed by a threaded plug member 10. Overlying the orifice 8 the casing 2 has a tubular extension 11 providing an enlarged threaded aperture 12.

A hollow tubular plug 13 is threaded within the aperture 12 and has a flange 14 and an annular rim or sealing surface 15 engaging a sealing gasket 16 seated in an annular recess in the end wall of the casing projection 11. A diaphragm

2

17 is positioned across and closes the upper open end of the tubular plug 13 and is held in position by a cap member 18 which is threadedly secured on the upper end of the plug 13 above the flange 14. The plug member 13 has a wall or plate member 19 secured at its lower end and has an aperture 20 which intercommunicates the inlet side of the casing and the space below the diaphragm 17. Extending through an aperture in the plate or wall member 19 and overlying the orifice 8 is a bolt or adjustment screw 21 for controlling operation of the diaphragm 17. There is a nut or other threaded member 22 threadedly carried on the bolt 21 and which has secured to it as by soldering one end of a spring 23. The other end of the spring 23 is secured to a member 24 which in turn is secured as by a rivet 25 to the diaphragm 17, the rivet 25 also securing in position a magnetic armature 26 carried by the upper face of the diaphragm 17. From the lower side of the casing 2 and opening from the passage 9 a conduit 27 or other passageway connects to the space enclosed above the diaphragm 17 by the cap member 18. The conduit 27 is threadedly secured at its upper end in a passage 28 which opens through aperture 29 into the space above the diaphragm 17. A switch casing 30 is carried by the cap member 18 and has pivotally mounted therein an operating lever 31 for operating the switch structure generally designated as 32. One end of the lever 31 adjustably carries a magnet 33 which is positioned adjacent a wall portion 34 of reduced thickness in the cap member 18.

Operation

This flow responsive switch arrangement would have most frequent use in arrangements where as a matter of safety a flow of water is required before certain appliances are permitted to operate. One example of this is in garbage disposal grinding units which are used in connection with sinks or plumbing fixtures and wherein it is desirable that the motor of the disposal unit not be allowed to operate unless cold water is running.

This unit would be installed in series with the cold water valve with the water flowing through the casing 2 from the inlet 3 through the orifice 8 and out of the outlet 4. When the valve with which this flow switch is connected in series is closed there is no pressure drop through the casing 2 and the pressure on the opposite sides of the diaphragm 17 would be equal. At this point the spring 23 pulls the diaphragm

17 and armature 26 away from the wall 34 and magnet 33. When the main line valve is open to permit flow of water there is established a pressure drop through the orifice 8. The pressure on the inlet side of the orifice 8 is the higher pressure and is communicated through the aperture 20 to the space within the hollow plug 13 underneath the diaphragm 17. The pressure on the outlet side of the orifice 8 is communicated through the passage 9, conduit 27 and aperture 29 to the space overlying the diaphragm 17. The diaphragm 17 is thus subjected to the differential of pressure across the orifice 8. The differential of pressure through the casing 2 or across the orifice 8 will cause the diaphragm 17 to move the armature 26 upward toward the thin wall portion 34 of the cap member 18. The cap member 18 and wall portion 34 are of a non-magnetic material so as not to interfere with the magnetic attraction between the magnet 33 and armature 26. As the armature 26 moves closer to the wall 34 the magnet 33 is attracted to it moving the lever 31 to actuate the switch mechanism 32. The pressure differential required across the orifice 8 to operate the diaphragm 17 and actuate the switch mechanism is determined by the force exerted by the spring 23. The tension exerted by the spring 23 is determined by the adjustment bolt 21 and may be varied by adjustment of said bolt. The slotted head of the adjustment bolt 21, the orifice 8, the passage 9 and the end of the passage 9 closed by the plug 10 are arranged in alignment so that the plug 10 may be removed and a screwdriver inserted therein for adjustment of the bolt 21 to vary the force of the spring 23. It should also be noted that the passage from the outlet side of the casing through the conduit 27 might be incorporated in the casing 2 itself rather than through a separate conduit.

The form of flow responsive switch herein shown and described has the distinct advantage of providing a simple magnetically actuated means for operating the switch 32 in response to flow of fluid through the casing 2. By this arrangement the flow responsive mechanism does not have to operate through packing or other suitable sealing means and thus frictional losses are avoided which might impair the accuracy of the switch mechanism. It should also be noted that by this arrangement a flow responsive switch mechanism is provided which can be accurately calibrated and the rate of flow required for switch actuation varied with considerable accuracy.

While there is shown in this application only one form of this invention it will be obvious to those skilled in the art that there are numerous variations which might be made without departing from the scope and intent as herein set forth which is intended to be limited only by the appended claims.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent of the United States is:

1. In a flow responsive switch, a fluid flow passageway, an orifice in said passageway for producing a pressure drop therethrough, a diaphragm positioned away from said passageway, second and third passageways leading from op-

posite sides of said orifice to opposite sides of said diaphragm, spring means cooperable with said diaphragm to determine the pressure differential required to move the same, adjusting means for said spring means, a nonmagnetic wall, cooperable movable magnet and armature members positioned on opposite sides of said wall, one of said members being movable by said diaphragm in response to a pressure differential thereacross, said diaphragm moving said one member toward and away from said wall to attract or release the other of said members to control movement thereof, a lever member carrying said other member and movable thereby, and a switch operated by movement of said lever member.

2. A flow responsive switch mechanism, comprising a casing having an inlet and an outlet for flow of fluid therethrough, a partition within said casing having a threaded aperture therein, a plug member having an orifice of predetermined size threaded in said aperture, said casing having a passage and aperture below said orifice, a threaded plug closing said last-named aperture, said casing having an enlarged threaded aperture overlying said orifice, a hollow tubular plug threaded in said last-named aperture, a diaphragm extending across the upper end of said hollow plug, a cap member threadably secured to said hollow plug and securing the periphery of said diaphragm in position, a passageway extending from below said orifice through said cap member into the space overlying said diaphragm, said hollow plug having an aperture intercommunicating the space above said orifice and the under side of said diaphragm, said cap member having a thin wall of non-magnetic material, a magnet movably carried over said cap member adjacent said wall, a magnetic armature carried by said diaphragm and movable thereby toward and away from said wall to attract or release said magnet, a switch, a lever for operating said switch carrying said magnet, a threaded bolt carried within said hollow plug and having a nut adjustably positioned thereon, a spring secured to said nut at one end and connected to said diaphragm at the other end, said diaphragm being movable in response to a differential of pressure across said orifice to cause said armature and magnet to actuate said switch; and said second-named aperture, said orifice, and said bolt being aligned to permit access to said bolt for adjusting the compression or tension on said spring.

EARNEST J. DILLMAN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,680,142	Evans et al.	Aug. 7, 1928
2,103,747	Hamilton et al.	Dec. 23, 1937
2,307,304	Rudd	Jan. 5, 1943
2,541,643	Dusinerre	Feb. 13, 1951

FOREIGN PATENTS

Number	Country	Date
266,831	Italy	Aug. 14, 1929