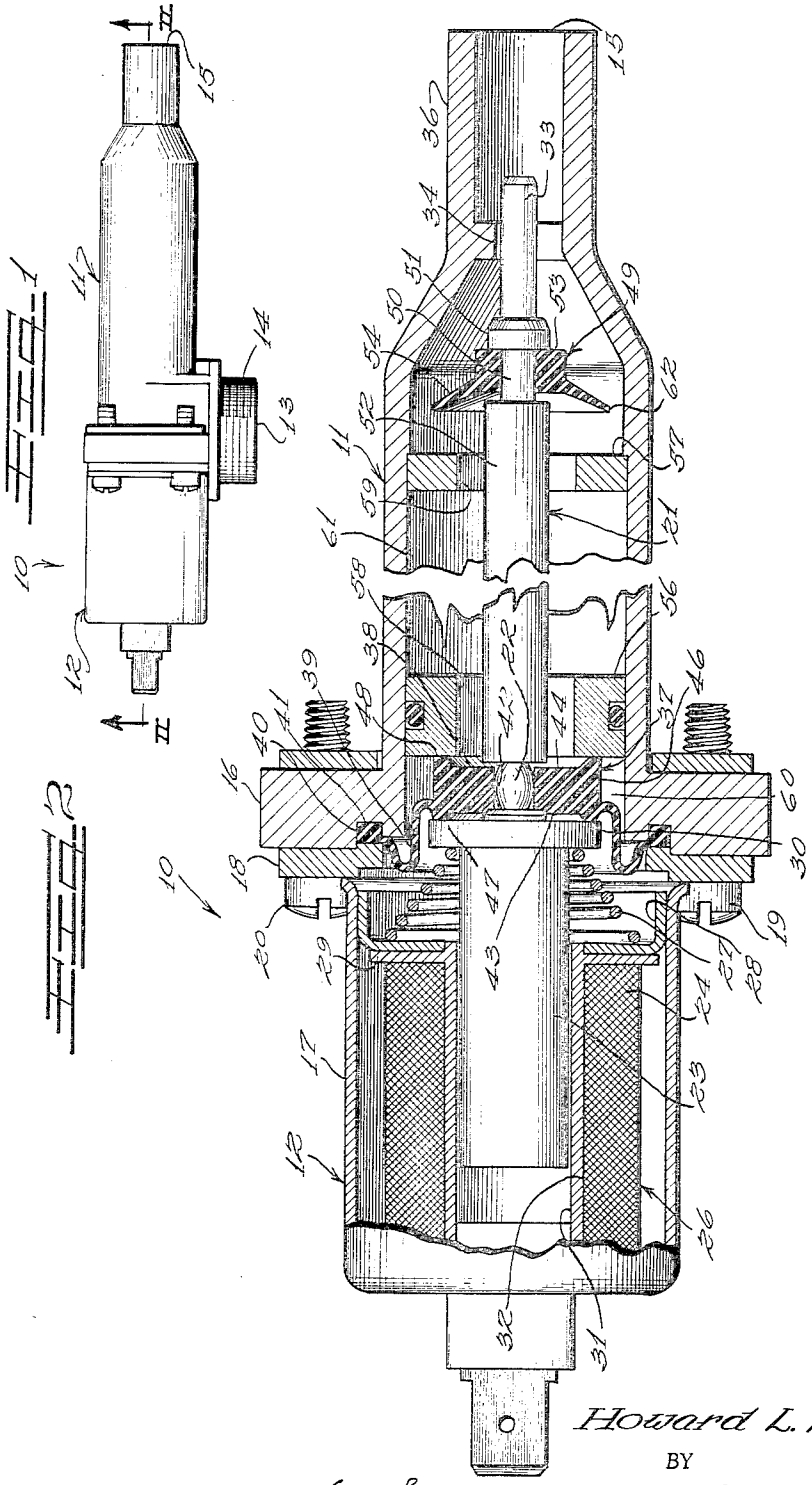
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SANITIZING MEASURING VALVE FOR FLUID DISPENSER

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SANITIZING MEASURING VALVE FOR FLUID DISPENSER

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This invention relates generally to fluid dispensers and more particularly relates to a fluid detergent dispensing or sanitizing valve especially adapted for use in conjunction with an automatic washing machine in dispensing a slug or predetermined volume of liquid detergent or the like material from a container into the machine.

The dispensing or sanitizing valve which forms the subject of the present invention comprises generally a valve body having a measuring chamber formed therein and having an inlet and an outlet in fluid communication with the chamber and disposed at opposite ends thereof. A valve stem is disposed for reciprocable movement within the valve body and has individual valve members at opposite ends thereof cooperable, respectively, with the inlet and outlet of the chamber to control fluid flow therethrough, and cooperable with each other such that the inlet is fully closed when the outlet is fully opened, and the outlet is fully closed when the inlet is fully opened.

Movement of the valve stem is effective by means of a valve actuator which, in the illustrated embodiment, comprises an electrically energizable solenoid valve, and one feature of the invention resides in the provision of a resilient diaphragm on that valve member cooperable with the outlet and effective in isolating and sealing the measuring chamber from the valve actuator.

In performing its sealing and valving function the diaphragm-outlet valve relies solely on abutting engagement rather than sliding engagement between parts, thereby avoiding the concomitant deleterious effects of "hang-up" of grit or other particles or impurities between the relatively movable parts.

It is, therefore, an object of the present invention to provide a fluid dispensing or sanitizing valve which is effective to dispense a measured quantity of fluid.

Another object of the present invention is to provide a fluid dispensing valve, the valving function of which is not seriously impeded or adversely affected by foreign particles contained in the fluid.

Yet another object of the invention resides in the provision of a simple, rugged fluid dispensing or sanitizing valve which may be manufactured economically and which will provide long, useful service with little or no maintenance.

Many other features, advantages and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description which follows and the accompanying drawings, in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example only.

On the drawings:

FIGURE 1 is an elevational side view of a fluid dispensing or sanitizing valve constructed in accordance with the principles of the present invention; and

FIGURE 2 is a sectional view of the dispensing valve of FIGURE 1 taken substantially along line II—II of FIGURE 1.

As shown on the drawings

Referring to the drawings, a fluid dispensing or sanitizing valve constructed in accordance with the principles of the present invention is shown generally at 10 and comprises a valve body portion 11 and a valve actuator assembly 12. The valve 10 is particularly suited for use in combination with automatic washing machines which include a timer mechanism for operating in a predetermined sequential operating cycle.

The body portion 11 is more particularly characterized as having an inlet 15 adapted for connection to a source of fluid to be measured and dispensed by the valve into the washing machine at a predetermined time interval in the operating cycle, as, for example, a container of sanitizing fluid. An outlet 13 including a threaded nipple 14 is formed at an end of the body 11 opposite the inlet 15 and is adapted for connection to a hose or similar conduit for discharging the fluid directly into the treatment zone of a washing machine or for discharging the fluid into the hydraulic circuitry of the machine.

It will be observed that the valve body portion 11 is substantially tubularly shaped and has formed at one end thereof opposite the inlet 15 and adjacent the outlet 13 a circumferential outturned flange 16. A cup-shaped enclosure cap 17 houses the valve actuator assembly 12 and is retained on the flange 16 in fixed assembly therewith by means of an annularly-shaped retainer ring 18 having a shoulder portion (not shown) overlying and clamping an outturned rim portion 19 of the cap 17 and securely affixed to the flange 16 by means of a plurality of fasteners as at 20.

Arranged for reciprocal axial movement within the valve body 11 is an elongated pin shaped valve member indicated generally at reference numeral 21. At one end of the valve member 21 is a reduced portion 22 to which is fixedly connected by suitable means an armature 23 which cooperates with a coil 24 of an electric solenoid indicated generally at reference numeral 26 to comprise the illustrative valve actuator assembly 12.

A biasing member which may conveniently take the form of a coil spring 27 surrounds the armature 23 and is retained between a retainer cap 28 which abuts an end wall 29 of the coil 24 and an enlarged diameter radially outwardly extending annularly shaped shoulder portion 30 formed on a forward end of the armature 23 adjacent the reduced portion 22 of the valve stem.

It will be noted that a cylindrical sleeve 31 is housed within an aperture 32 formed by the windings of the coil 24 and receives the armature 23 and supports the armature for reciprocal sliding movement therebetween.

At an opposite end of the valve member 21 a reduced diameter axially elongated extension 33 projects outwardly therefrom and is supported for axial movement by means of a plurality of radially spaced embossments as at 34 extending radially inwardly from an outer wall 36 of the valve body 11 whereby the dispensing fluid is not precluded from passing through the valve to the outlet 13 thereof.

The solenoid 26 is best kept in a dry condition, and in order to internally isolate the valve body portion 11 from the actuator assembly 12 as well as to provide a valving mechanism for the outlet 13, a flexible diaphragm-valve member indicated generally at reference numeral 37 and which may preferably be constituted of resilient material such as rubber or the like, is situated between the body portion 11 of the valve and the actuator 12 and is particularly characterized as comprised a centrally apertured annularly shaped valve or body portion 38 and a relatively thin flexible diaphragm portion 39 having a somewhat serpentine cross-section as illustrated in the drawing, and terminating at its radially outward extremity in a circumferentially continuous peripheral bead 40 confined within a complementarily shaped groove 41 formed between the flange 16 and the retainer ring 18.

The valve or body portion 38 of the valve 37 has formed therein an axial aperture 42 adapted to receive

in snug leak-proof relation the reduced portion 22 of the valve rod or stem 21 and in addition comprises a pair of axially spaced radially extending end surfaces as at 43 and 44 which form at their peripheries in association with an outer surface 46 a pair of annularly shaped radially extending seating surfaces as at 47 and 48.

Another valve member 48 is mounted on the valve stem 21 adjacent the extension 33 on a reduced diameter portion 50 situated between an enlarged shoulder portion 51 and a main shaft portion 52. The valve member 49 is also constituted of resilient material such as rubber or the like and is more particularly characterized as comprising a centrally apertured annular body portion 53 and a relatively thin saucer-shaped backwardly radially extending skirt portion 54, the diameter of which is substantially less than the diameter of the adjacent portion of the outer wall 36 in order to provide a fluid flow path therearound.

In accordance with the principles of the present invention the valve 10 not only serves to control the flow of dispensing fluid therethrough, but also serves to supply a predetermined quantity or slug of fluid into the washing machine at a predetermined time interval during the operating cycle of the machine. For this purpose, a pair of disc-shaped valve insert or seating members 56 and 57 are axially spaced within the valve body 11 adjacent, respectively, the valve members 37 and 49. The seating members 56 and 57 are immovably confined within the valve body by means of a press-fit connection or other suitable fastening means and are apertured respectively as at 58 and 59 to receive the shaft portion 52 of the valve stem 21.

It will be appreciated that the valve outlet 13 opens through the valve body in fluid communication with a chamber 60 which is, in turn in fluid communication with an enlarged measuring chamber 61 formed within the valve body portion 11 between the seating members 56 and 57, the volume of which substantially determines the quantity or slug of dispensing fluid to be supplied to the washing machine per operation of the valve.

As illustrated in FIGURE 2, the valve is in a "discharged" position, whereby the coil 24 is deenergized and the coil spring 27 imparts a biasing force to the armature 23 and the valve stem 21 to cause the seating surface 48 of the valve member 37 to abuttingly engage the valve seating member 56. In this position of the valve, fluid entering the valve through the inlet 15 is confined within the chamber 60.

Energization of the coil 24 of the solenoid 26 by means of a suitable electric power source will have the effect of urging or snapping the armature 23 and the valve stem 21 leftwardly as viewed in the drawings to the extent that an outer peripheral edge 62 of the valve member 49 abuttingly engages the valve seating member 57, whereupon the flow path through the aperture 59 of the seating member 57 is closed. Simultaneously, the valve body portion 38 of the valve member 37 is displaced correspondingly leftwardly to unseat the valve member 37 from the seating member 56, thereby providing fluid communication between the chambers 60 and 61. Fluid confined within the chamber 60 will thereupon flow from the outlet 13, while flow through the inlet 15 will cease.

At a predetermined time interval in the operating cycle of the washing machine to which the valve 10 may be connected, the coil 24 of the solenoid 26 will be again deenergized by a suitable timer mechanism, and the armature 23 in the valve stem 21 will thereupon be urged or snapped rightwardly to unseat the valve member 49 and seat the valve member 37 on the seating member 56. Fluid will again gravitationally feed through the inlet 15 to fill the measuring chamber 61.

It will be noted that as the valve member 37 is moved axially reciprocally during operation of the valve 10 there is an absence of any sliding engagement between the valve member and any other portion of the valve 10.

The sealing or valving function of the valve member 37 is performed by mere abutting engagement of the seating surfaces 47 and 48 with the shoulder 30 of the armature 23 and the valve seating member 56, respectively. Such arrangement substantially reduces the effects of wear on the valve member 37, particularly as a result of foreign particles contained within the dispensing fluid, and assures a long-useful life of the dispensing valve 10.

Although minor modifications might be suggested by those versed in the art, it should be understood that I wish to embody within the scope of the patent warranted hereon all such modifications as reasonably come within the scope of my contribution to the art.

I claim as my invention:

1. A fluid dispensing measuring valve comprising, a valve body having a tubular side wall and having formed therein an inlet, an outlet which opens laterally through said side wall and spaced axially from said inlet and an elongated passage communicating said inlet and said outlet, an axially extending valve stem in said body carried for axial movement within said passage, a pair of valve seating members in said passage situated respectively axially inwardly of said inlet and said outlet and having fluid flow path defining apertures formed respectively therein and forming therebetween a fluid measuring chamber for confining a slug of dispensing fluid having a predetermined volume,

a pair of axially spaced valve members fixedly mounted on said valve stem and movable relative to and cooperable respectively with said seating members to close and to open said apertures to confine and then to discharge a slug of fluid from said valve body,

said valve member which is cooperable with said seating member adjacent said outlet being situated axially outwardly of said cooperating seating member and having a peripheral outer surface spaced radially inwardly of said side wall of said valve body to preclude engagement therebetween and engaging said cooperating seating member only in abutting engagement to close its associated aperture, and a shoulder formed on said valve stem for engaging and for urging said valve member adjacent said outlet into good seating engagement with its cooperating seating member in the closed position of the valve member.

2. A fluid dispensing measuring valve comprising, a valve body having a tubular side wall and having formed therein an inlet, an outlet which opens laterally through said side wall and spaced axially from said inlet and an elongated passage communicating said inlet and said outlet, an axially extending valve stem in said body carried for axial movement within said passage, a pair of valve seating members in said passage situated respectively axially inwardly of said inlet and said outlet and having fluid flow path defining apertures formed respectively therein and forming therebetween a fluid measuring chamber for confining a slug of dispensing fluid having a predetermined volume,

a pair of axially spaced valve members fixedly mounted on said valve stem and movable relative to and cooperable respectively with said seating members to close and to open said apertures to confine and then to discharge a slug of fluid from said valve body,

a valve actuator assembly mounted on said valve body adjacent said outlet and having a reciprocally movable actuator member fixedly connected to said valve stem,

said valve member which is cooperable with said seating member adjacent said outlet being situated between said cooperating seating member and said actuator member and comprising,

an annular body portion having a pair of radially

extending end surfaces and an axially extending peripheral outer surface, said peripheral outer surface being radially inwardly spaced relative to the side wall of said valve body to preclude engagement therewith,

an axially projecting circularly shaped embossment formed on said end surface of said body portion facing said cooperating seating member and having a radially extending seating surface dimensioned to circumferentially surround and to close its associated aperture, a flexible diaphragm portion formed on said body portion and extending generally radially outwardly therefrom to isolate said passage from said valve actuator assembly and having formed at the radially outer periphery thereof a peripheral bead,

a groove formed in said valve body for receiving said peripheral bead in fixed assembly,

the cross-section of said flexible diaphragm member being substantially serpentine in configuration and arranged to avoid sliding contact with said side wall of said valve body upon axial movement of said body portion of said valve member, and a shoulder formed on said valve stem for engaging and for urging said valve member adjacent said outlet into good seating engagement with its cooperating seating member in the closed position of the valve member.

3. A fluid dispensing measuring valve comprising, a valve body having a tubular side wall and having formed therein an inlet, an outlet which opens laterally through said side wall and spaced axially from said inlet and an elongated passage communicating said inlet and said outlet, an axially extending valve stem in said body carried for axial movement within said passage, a pair of valve seating members in said passage situated respectively axially inwardly of said inlet and said outlet and having fluid flow path defining apertures formed respectively therein and forming therebetween a fluid measuring chamber for confining a slug of dispensing fluid having a predetermined volume,

a pair of axially spaced valve members constituted of resilient material fixedly mounted on said valve stem and movable relative to and cooperable respectively with said seating members to close and to open said apertures to confine and then to discharge a slug of said fluid from said valve body,

a solenoid valve actuator assembly mounted on said valve body adjacent said outlet and having a reciprocally movable armature fixedly connected to said valve stem,

said valve member which is cooperable with said seating member adjacent said outlet being situated between said cooperating seating member and said armature,

said armature having a radially extending shoulder portion formed thereon in axially spaced relation to said cooperating seating member,

said cooperating valve member comprising, an annular body portion having a pair of radially extending end surfaces and an axially extending peripheral outer surface,

said peripheral outer surface being radially inwardly spaced relative to the side wall of said valve body to preclude engagement therewith,

a pair of axially projecting circularly shaped embossments formed respectively on said end surfaces of said body portion and having a radially extending seating surface formed respectively thereon for engaging respectively said cooperating valve member and said shoulder portion of said armature,

a flexible diaphragm portion formed on said body portion and extending generally radially outwardly therefrom to isolate said passage from said solenoid valve actuator assembly and having formed at the radially outer periphery thereof a peripheral bead, and

a circular groove formed in said valve body for receiving said peripheral bead,

the cross-section of said flexible diaphragm member being substantially serpentine in configuration and arranged to avoid sliding contact with said side wall of said valve body upon axial movement of said body portion of said valve member.

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