United States Patent

Steiman

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[54] TILT ACTION MIXING DISPENSER VALVE

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[73] Assignee: **Valve Corporation of America**, Greenwich, Conn.

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[52] **U.S. Cl.** **222/145**, 222/402.22

[51] **Int. Cl.** **B05b 7/32**

[58] **Field of Search** 222/402.21, 402.22, 402.18, 222/145

[56] **References Cited**

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[57] **ABSTRACT**

A tilting type dispensing valve comprising a cup-shaped valve housing which is covered by a resilient upper annular discharge-valve seat. A hollow valve stem extends through the valve seat and carries an annular valve shoulder inside the housing. The shoulder is engageable with the seat to close off the discharge. Within the housing there is a supporting boss constituting a second valving means on the valve stem, said boss being located below the valve shoulder and being engageable with a recessed lower annular valve seat in an opposite wall of the valve housing to both normally maintain the valve shoulder and upper seat engaged whereby the upper valve is closed, and to simultaneously close the recessed lower valve seat. The stem can be tilted, however, because the shoulder can compress a localized area of the upper valve seat. This separates another portion of the shoulder from the seat whereby liquid can flow from the housing, out through the hollow valve stem. The tilting of the stem also uncovers the lower valve seat. A container connected to the lower valve seat can empty into the valve housing, as well as a large container enclosing the housing, which discharges into the housing through a hole provided in a wall of the housing. Mixing of the liquids occurs in the valve housing.

5 Claims, 9 Drawing Figures

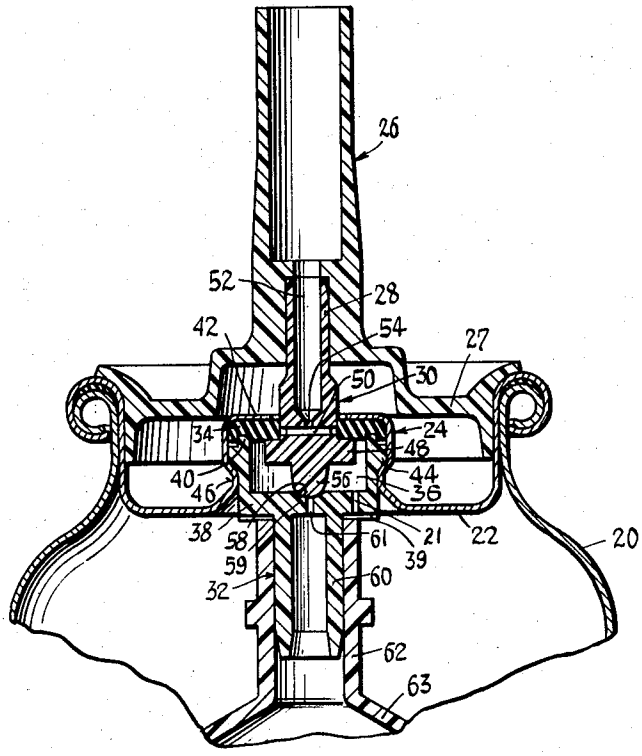


Fig. 3

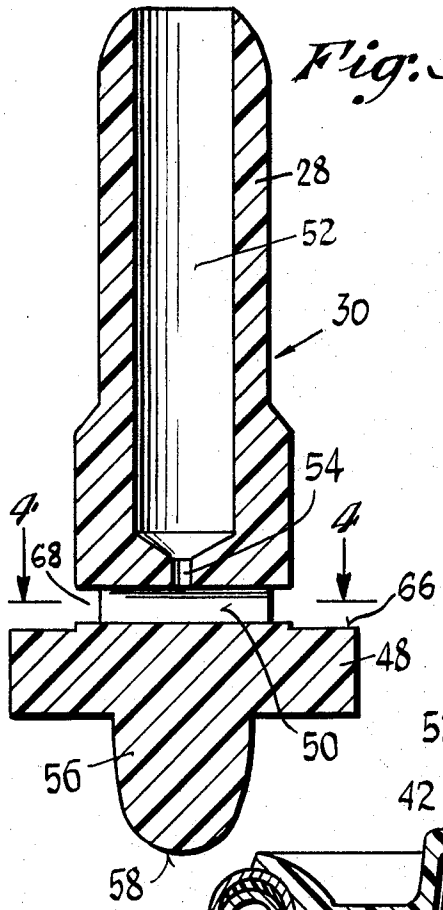
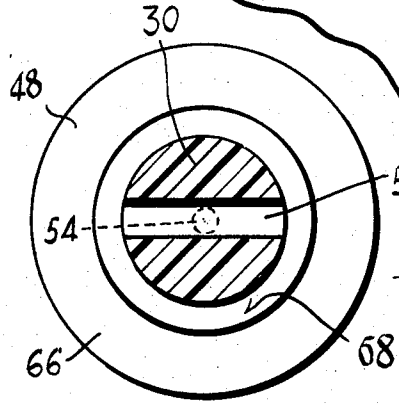


Fig. 1

Fig. 5

Fig. 4



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Fig: 2

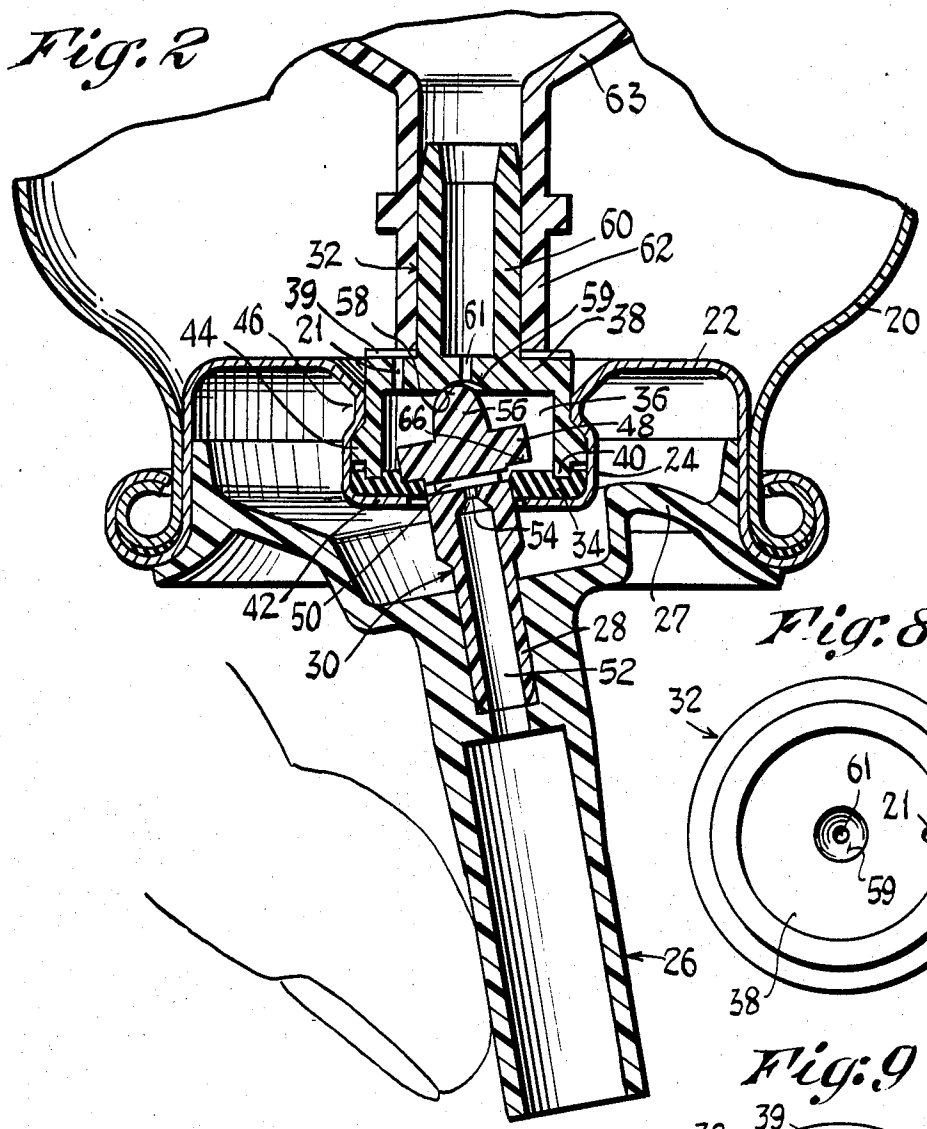


Fig: 8

Fig: 9

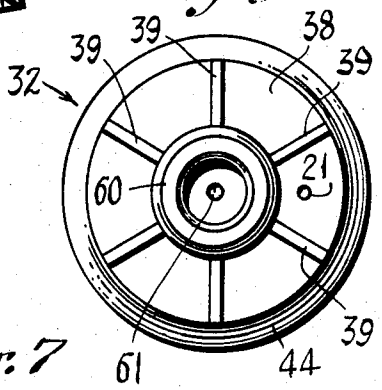
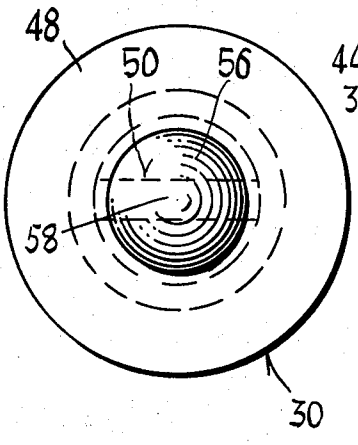


Fig: 6



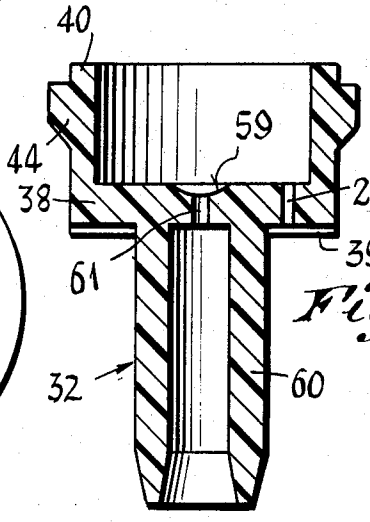


Fig: 7

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TILT ACTION MIXING DISPENSER VALVE

CROSS REFERENCES TO RELATED APPLICATIONS

Copending U.S. application of Wolf Steiman, Ser. No. 843,906, filed June 30, 1969, now Pat. No. 3,575,323, entitled "Tilt Slide Action Aerosol Valve," and having the same ownership as the present application.

BACKGROUND

This invention relates to mixing-type dispensing valves, and more particularly to tilt valves wherein a hollow valve stem carrying a discharge fitting is tiltably mounted in a valve housing to control the discharge of multiple pressurized substances from the dispenser.

Heretofore valves of this type employed return springs, or else especially arranged spring-charged parts or molded resilient plastic valve or housing parts to effect the return or closing of the valve when the discharge was to be termined. This meant additional components with consequent increased part and assembly costs, or else more expensive molds and more complicated plastic shapes which were likely to malfunction. Prior valves as a consequence could be unreliable, or unnecessarily high in relative cost or both, as well as being subject to corrosion or contamination and the like.

SUMMARY

The above drawbacks and disadvantages of prior tilting-type mixing valves are obviated by the present invention, one object being the provision of an improved tilt-type mixing valve which is self-closing or returning without requiring the use of return coil springs, or the use of especially arranged resilient plastic parts such as valve or valve housing members. This is accomplished by the provision of a simple cup-like housing which is closed or covered by a resilient annular valve seat, and a cooperable shouldered valve stem which is engageable with the valve seat and which also has a slidably engageable valving projection engageable with an annular apertured valve seat in an opposite wall of the housing, the arrangement being such that the stem can be tilted due not only to the slide action but also to the capability of the shoulder to compress a localized area of the seat as a consequence of the tilting, and the capability of the opposite valve-seated wall of the housing to flex or fulcrum about a rigid embracing cup which surrounds the housing. During the tilting another part of the valve shoulder separates from the top seat to permit the discharge flow, while simultaneously the valving projection of the valve part separates from the seat of the opposite housing wall to permit inflow into the housing. The resilience of the valve seat and of the bottom housing wall thus provides for the return movement of the valve after the tilting force is removed therefrom, making unnecessary the conventional valve return coil spring, or the not-so-conventional special valve and valve-housing configuration heretofore relied on for this purpose.

Other objects and advantages of the invention reside in the provision of an improved tilt-type dual valve as above set forth, wherein the components are particularly few and simple, inexpensive to produce and assemble, and wherein the multiple valve action is especially easy as well as reliable.

Still other features and advantages will hereinafter appear.

In the drawings illustrating one embodiment of the invention:

FIG. 1 is a fragmentary axial sectional view of the upper portion of a hand-held dispenser of the pressurized can type with plural containers, having incorporated in it the improved tilt-slide action mixing valve. The valve is shown in its closed condition.

FIG. 2 is a view like that of FIG. 1, but inverted and showing the valve tilted and in the process of mixing and discharging liquid substances.

FIG. 3 is an axial sectional view of the valve stem part of the valve.

FIG. 4 is a transverse section taken on the line 4—4 of FIG. 3.

FIG. 5 is a side elevational view of the valve stem of FIGS. 3 and 4.

FIG. 6 is a bottom plan view of the valve stem of FIGS. 3, 4 and 5.

FIG. 7 is an axial sectional view of the valve housing of the valve construction.

FIG. 8 is a top plan view of the valve housing, and

FIG. 9 is a bottom plan view of the valve housing.

Considering first FIGS. 1 and 2, the multiple-fluid dispenser and improved valve construction shown therein comprises a conventional pressurized can 20 provided at its upper end with a metal mounting cup 22, including a raised central inverted cup portion 24 adapted to carry the discharge valve assemblage and discharge tube.

In accordance with the present invention there is provided a novel and improved tilt-slide action dual valve assemblage which is mounted in the cup portion 24, said assemblage having an absolute minimum number of parts of especially simple configuration whereby the component and assembly costs are especially low while at the same time there is had a dual-valve action characterized by a desirable ease and reliability of operation. The valve construction mounts a resilient molded plastic discharge tube 26 which may be of a well known type including a yieldable circular base or shield 27, said tube being carried by the hollow shank portion 28 of a multiple-valve stem member 30 shortly to be described.

As shown in the figures, the valve construction comprises essentially two simple molded plastic parts, the valve stem part 30 and a valve housing part 32 together with a resilient, rubber washer-like valve seat 34. The valve housing 32 is molded of a suitable plastic substance which has appreciable resilience, such as polyethylene of known formulation. The valve stem 30 is molded in one piece, as seen in FIG. 3, being of rigid plastic substance, being molded of a material known commercially as "Delrin."

The housing 32 has a cup-like body portion providing a chamber 36 for receiving liquid from the container 20 through a wall opening 21, said body including a transverse wall 38 which defines one side (the bottom) of the chamber. The valve seat 34, being resilient and constituted of rubber or rubber-like material, is apertured to receive the hollow shank portion 28 of the valve stem 30. The valve seat 34 constitutes the opposite or upper side of the chamber 36, being clamped against the annular rim portion 40 of the valve housing by the top wall 42 of the mounting cup portion 24.

The valve housing 32 has an annular outer ledge or shoulder 44 against which side wall portions of the mounting cup are crimped as indicated at 46, thereby to retain the valve housing in its operative position with the rim portion 40 tightly sealed against the valve seat 34.

The valve stem 30 includes an annular valve shoulder 48 disposed in the liquid receiving chamber 36 of the housing 32, said shoulder being engageable with the resilient valve seat 34 to close the aperture thereof. The valve stem or part 30 also has a transverse or side passage 50 disposed adjacent the valve shoulder 48 and communicating with the hollow or bore 52 of the shank 28 by means of a throttling or metering aperture 54.

In accordance with the present invention the valve part 30 further has a depending valving abutment portion 56 including a bulbous slide valving surface 58 which is engageable with and slidable on a recessed annular valve seat 59 including a passage 61 in the upper portion of the transverse wall 38 of the valve housing when the valve part is upright or is not being tilted. The portion 24 of the mounting cup 22 is apertured to provide appreciable clearance for and to admit the shank 28 of the valve part 30. The abutment portion 56, 58 of the valve part 30 preferably supports said part in the normally closed position of FIG. 1 wherein the valve shoulder 48 is engaged with the valve seat 34, thereby preventing egress of liquid from the chamber 36 through the hollow shank 28, and wherein the valving portion 56, 58 closes or stoppers the valve seat 59.

The valve housing 32 has a depending hollow boss 60 depending from the transverse wall 38, to which there is affixed a collar 62 of a flexible and collapsible inner container 63 disposed in the outer container 20 as shown.

The offset inlet opening 21 provided in the transverse wall 38 is eccentrically located with respect to the boss 60 and the bore thereof whereby it is normally out of alignment with the valving abutment portion 56 of the valve part 30 as seen in FIG. 1. With such construction, pressurized liquid in the container 20 can normally occupy the chamber 36 of the valve housing when the dispenser is inverted as seen in FIG. 2, reaching said chamber through the offset inlet opening 21.

Referring to FIGS. 3, 4 and 5, the side opening or transverse passage 50 of the valve part 30 in accordance with the invention is spaced upward a slight extent from the top or sealing face 66 of the valve shoulder 48, said passage extending completely through the stem and being preferably of square or rectangular cross-sectional configuration. The passage 50 communicates with an annular external groove 68 which is also spaced slightly above the top surface 66 of the valve shoulder 48. Such spacing provides for a more effective and leakproof closing of the valve. The throttling aperture 54 communicates with the transverse passage 50 whereby communication is established between the bore 52 of the shank portion 28 of the valve stem and the annular groove 68 thereof.

The bottom 58 of the non-yielding abutment portion 56 of the valve stem in accordance with the invention comprises the second valve of the assemblage and constitutes a slide surface or bulbous terminus which is engageable with the bottom valve seat 59 of the valve housing 32 and can effectively close off the passage 61 leading from the container 63 when the stem 30 is not tilted. The housing wall 38 is resilient and firmly affixed to the side walls 44 which are backed up by the annular cup wall 24 at points closely adjacent the wall 38. Thus the wall 38, in yielding to force from the valve 58 as the stem 30 tilts, flexes and fulcrums about the crimped portions 46 which are non-yielding. This action replaces the usual coil spring return of conventional spring-type valves, and is effective in enabling tilting of the stem for discharge, and in restoring the stem to the valve-closing position of FIG. 1.

The operation of the improved, simplified tilt-slide action dual valve of the invention may now be readily understood. Considering FIG. 1, the engagement of the abutment valving portion 56 of the valve part 30 with the resilient wall 38 of the valve housing part 32 tends to maintain the valve shoulder 48 in engagement with the valve seat 34. Also, the pressure within the container 20 tends to maintain the valve shoulder 48 tightly sealingly engaged with the valve seat 34. And the force of the valving abutment 58 against the valve seat 59 seals off the seat, whereby the liquid in the flexible container 63 (under pressure from the contents of the container 20) remains isolated from the pressurized liquid in the container 20. As a consequence, no mixing of the liquids nor any discharge will normally occur, nor any leakage when the valve part 30 is in the non-tilted or vertical position of FIG. 1. When it is desired to mix and discharge the contents of the containers 20 and 63, the valve stem 30 is tilted as by applying finger pressure to the discharge tube 26 as illustrated in FIG. 2. This will cause the valve shoulder 48 to compress a localized area of the valve seat 34 and flex downward the housing wall 38 as in FIG. 2, and will cause another part of the valve shoulder to separate from the seat 34 at locations opposite to the localized indented portion of the seat, as well as effecting separation of the valve 58 from the seat 59. Communication will thus be established between the chamber 36 and the bore 52 of the valve stem, by means of the annular groove 68 and transverse passage 50 as well as the throttling passage 54. Also, flow will occur into the chamber from the container 20 through the inlet 21, and from the container 63 through the inlet 61. A mixing and discharge will occur from the tube 26 as indicated. This discharge will be constituted of liquids which have entered the chamber 36 via the center passage 61 from the container 63, as well as from the container 20 via the passage 21. During such tilting of the valve part 30 the abutment valving portion 56, 58 thereof will have slid along the top of the transverse wall 38 of the valve housing 32 and out of the valve seat 59, such sliding movement being facilitated by the resilience of the wall 38. Upon release of finger pressure, the tendency for the valve seat 34 to resume its normal, non-compressed condition will restore the valve stem part 30 to the vertical, sealing position of FIG. 1. By virtue of the provision of the annular groove 68 and the spacing of said groove and the passage 50 slightly above the top surface 66 of the valve shoulder 48 there is insured not only a reliable discharge regardless of the direction in which the valve stem is tilted but also a reliable shut-off of the flow without leakage when tilting finger force is removed from the spray head.

It will now be understood from the foregoing that I have provided a novel and improved tilt and slide action dual valve which is constituted of the fewest possible components, said components being of simple construction and being readily produced at a low cost. The components may be assembled without difficulty, utilizing automatic feeds and the like in assembling machines, and no special orientation of the tube 26 with respect to the axis of the passage 50 is required during assembly since the direction of tilt to effect a discharge is not critical. It will be especially noted that no valve-return coil spring is required in order to restore the valve part 30 to the closed vertical position, nor will the chamber 36 ever be shut off from the interior of the container 20 with the valve closed, inasmuch as the inlet passage 21 is offset or eccentrically located. Ribs 39 at the underside of the wall 38 prevent the collar 62 of the container 63 from closing off the inlet 21, which is thereby in effect recessed in the wall 38.

Variations and modifications are possible without departing from the spirit of the invention.

I claim:

1. A springless mixing valve construction for a dispenser of the type having two containers for two different liquids respectively, comprising in combination:

a. a molded plastic cup-shaped valve housing having a chamber for receiving liquids from several containers, and having an integral substantially yieldable transverse wall defining the bottom wall of said chamber, said valve housing having an integral annular side wall firmly and immovably connected to said transverse bottom wall, said transverse wall having a recessed annular apertured valve seat portion in its top,

b. a resilient, apertured valve seat separate from the valve housing and constituting the top wall of said chamber,

c. a molded, one-piece valve part having a hollow shank portion extending through the aperture of said resilient valve seat,

d. said valve part having an annular valve shoulder disposed in the chamber of the valve housing and arranged for engagement with the resilient valve seat to close the aperture thereof,

e. said valve part having a side passage disposed adjacent the valve shoulder and communicating with the hollow of the shank portion, said valve part further having a solid integral unyielding abutment valving portion including a bulbous slide surface engageable with and slidable over the annular valve seat portion of the transverse wall of the valve housing when the valve part is tilted, thereby to either close or open said valve seat portion,

f. the tilting of the valve part unseating both the valving abutment thereof and the shoulder thereof respectively from the recessed valve seat portion and the top valve seat of the housing whereby liquids from the chamber can flow into the hollow shank portion through the said side passage,

g. the force exerted by the valve seat portion on the shoulder of the valve part, and by the annular valve seat portion of the transverse wall on the abutment valving portion tending to restore the valve part to its closed position upon removal of tilting force therefrom,

h. said valving abutment portion of the valve part supporting the valve part on the transverse wall of the valve housing with the valve shoulder engaged with said resilient valve seat,

i. an unyielding inverted cup containing said resilient valve seat and said annular side wall of the valve housing, an annular side wall portion of the inverted cup surrounding and intimately engaging the annular side wall of the valve housing and backing up the same to restrict outward radial movement thereof when the valve is tilted and causes outward flexing of the bottom wall, and

j. said annular wall portion of the inverted cup being closely juxtaposed to the transverse wall of the valve housing and constituting fulcrum points about which the transverse wall can flex when the center apertured valve seat portion yields under force exerted by the valving abutment of the valve part as the latter is tilted,

k. said hollow shank portion being integral with the said valve shoulder and abutment valving portion.

2. A valve construction as in claim **1**, wherein:

a. the valve housing has a hollow boss depending from the center of said transverse bottom wall, and

b. a container connected to said hollow boss, for supplying liquid to the chamber of the valve housing.

3. A valve construction as in claim **2**, wherein:

a. the valve housing has an opening in a wall thereof, and

b. a second container surrounding the valve housing and communicating with the chamber thereof through said opening.

4. A valve construction as in claim **1**, wherein:

a. the opening in the wall of the valve housing is disposed in the bottom wall thereof, adjacent said hollow boss,

b. said bottom wall having a recessed portion surrounding said opening,

c. said first-mentioned container having a collar fitted around the hollow boss and extending closely adjacent said bottom wall but not covering said opening thereof.

5. A valve construction as in claim **4**, wherein:

a. the bottom wall of the valve housing has exterior ribs which adjoin said recessed portion and space the collar of the first-mentioned container therefrom.

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