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DISPENSING VALVES

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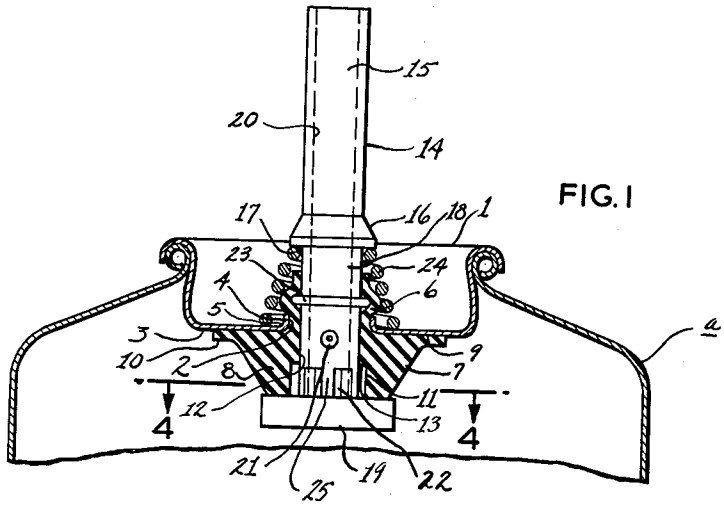


FIG. 1

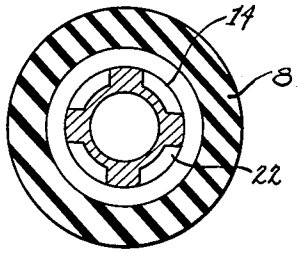


FIG. 4

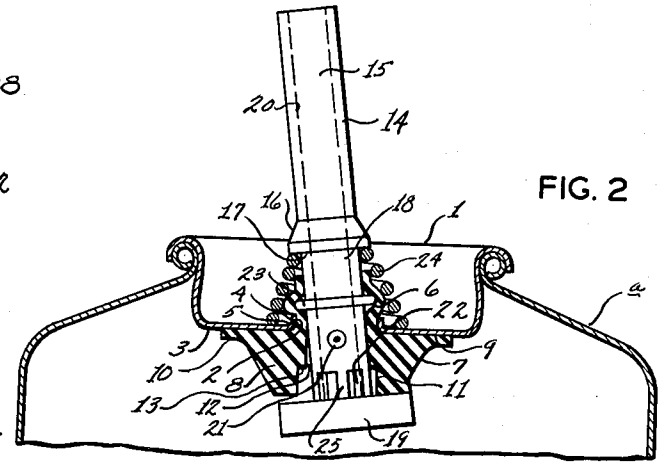


FIG. 2

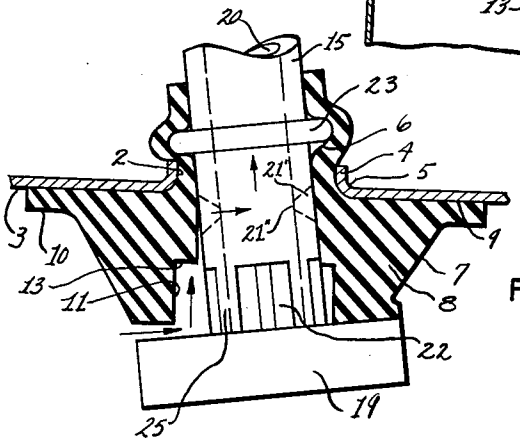


FIG. 3

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DISPENSING VALVES

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5 Claims. (Cl. 299—95)

This invention relates to improvements in dispensing valves for pressure-propelled products, and particularly to the type used on disposable single-use containers.

A commonly used form of dispensing valve for such containers employs a rigid molded plastic stem, mounted resiliently in an artificial rubber sealing member which incorporates a seat for a valve head formed integrally with the stem. On tilting the stem, the container contents, say shaving lather packaged with gas under pressure, flow between the tilted valve head and the valve seat into the dispensing stem through one or more stem ports adjacent the valve head.

While such valves have proved to be generally satisfactory, for some uses it is desirable to dispense the container contents at lower rates of discharge than has heretofore been feasible. To accomplish this result, it would seem obvious to reduce the size of the ports. However, this mode of attacking the problem has led to other difficulties, such as the problem of molding with core pins having tips of less than .020" diameter. In some uses, such restricted ports have accelerated the flow of the container contents, resulting in spurting.

The principal purposes of the present invention include: to provide a tiltable dispensing valve having improved dispensing characteristics, particularly at lower rates of discharge; and to achieve this result in reliable mass production and without requiring the use of core pins of a size likely to cause production difficulties. Other purposes will be apparent from the discussion which follows.

In the accompanying drawings:

Figure 1 is a perspective view, partly in section, of a dispensing valve embodying the present invention shown closed.

Figure 2 is a perspective view, partly in section, of the valve of Figure 1, shown turned 90° and tilted to open position.

Figure 3 is a fragmentary view of the valving portion of the structure shown in Figure 2, enlarged and with arrows showing the flow path.

Figure 4 is an enlarged cross-sectional view taken along line 4—4 of Figure 1.

To a pressure container of the throw-away type *a* is sealedly attached a top portion or "mounting cup" 1 having a central circular aperture 2 in its top wall 3, the aperture being formed with an upturned aperture flange 4 substantially perpendicular to the top wall 3 and joined thereto by a radius portion 5. Penetrating the aperture 2 and adapted for close sealing engagement against the inner surface of the aperture flange 4 is the tubular sleeve portion 6 of a resilient sealing member or grommet generally designated 7, formed preferably of synthetic rubber. At the lower end of the tubular sleeve portion 6 is an enlarged body portion 8 having a sealing face 9 adapted to seal against the inner surface of the top wall 3. The face 9 is surrounded by a tapering, flexible, unsecured peripheral edge 10. The body portion 8 further has an annular planar valve seat portion

11 facing inward, and an enlarged bore portion 12 extending axially outward therefrom part of the depth of the body portion 8, terminating at its outer end in a bore shoulder 13.

The valve member generally designated 14 is preferably formed of a rigid plastic by injection molding. It comprises a tubular dispensing tip portion 15 having a flared outer wall 16 terminating in an inward-presented annular shoulder 17, a cylindrical tube portion 18 penetrating the sleeve portion 6 and enlarged bore portion 12 of the sealing member 7, and a valve head 19 at its inner end and closing the tube's central passage 20. The contents of the container *a* move into such central passage 20 only through one of the oppositely disposed funnel-shaped lateral orifices generally designated 21 which penetrate the tube portion 18 spacedly outward of the valve head 19, and positioned somewhat outward of the bore shoulder 13 when the valve member 14 is in closed position.

Between the valve head 19 and the lateral orifices 21, the surface of the valve member 14 is indented from cylindrical form for the purpose of agitating and baffling the flow of the container contents as they pass adjacent it. Such indentations are referred to as the baffle indentations 22, and are shown in cross-section in Figure 4.

The outer wall of the cylindrical tube portion 18 has an integrally formed annular bead 23. When the valve head 19 is in closed position as shown in Figure 1, the bead 23 will be superjacent the outer edge of the aperture flange 4, and separated from it by the thickness of the sleeve portion 6. The inner diameter of the sleeve portion 6 is such as to assure a snug sealing fit over the cylindrical tube portion 18. Such sealing fit of the sleeve portion 6 is augmented by distending it over the bead 23, which improves the sealing action when the valve member 14 is tilted.

A helical spring 24, inserted between the stem shoulder 17 and the container top portion 3, holds the valve member 14 normally closed, with the valve head 19 sealed against the seat portion 11. When the valve member 14 is tilted, as in Figure 2, the spring 24 provides a yielding resistance, aiding in control of the degree of opening, and also serves to restore the valve member 14 to closed position.

That part of the outer wall of the tube 18 adjacent the valve head 19 and containing the baffle indentations 22 is designated the cylindrical baffle portion 25. Together with the enlarged bore portion 12 of the sealing member 7, it forms in effect a mixing chamber whose action is hereinafter described.

Referring to Figure 3, which shows the valving portions enlarged, each funnel-shaped orifice 21 has a tapering inlet portion 21' leading inward from the outer surface of the tube 18, and a restricted portion 21'' leading into the central passage 20 of the tube 18. The diameter of the restricted orifice portions 21 is preferably about .030", so that core pins requisite for molding the orifices need not be so small as to make manufacturing difficult. It will be noted that the tapered inlet portions 21' are located axially outward of the bore shoulder 13. When the valve member 14 is in erect position, there is no communication between the orifices 21 and the mixing chamber. Such communication is established only by distortion of the seal 7 accompanying tilting of the valve portion 14.

Fluid contents of the container are normally inserted before the top portion 1 is spun sealedly in place. Thereafter, gas under pressure may be inserted through the dispensing tip 15, the valve member 14 being first pressed axially inward so that the bead 23 presses the sleeve portion 6 of the sealing member 7 against the entire periphery of the flange 5 of the top portion 1. This

axially depressed position of the valve member **14** is not specifically illustrated, but its operation will be clear if Figures I and 3 are referred to. The amount of axial movement of the valve member **14** is not sufficient to lower the orifices **21** to a position below the bore shoulder **15**. Communication with the mixing chamber in the enlarged bore portion **12** is established by the gas pressure distorting the bore of the resilient sealing member **7**. The gas so introduced cannot escape axially outward between the flange **5** and the bead **23**; hence it must pass axially inward to the mxiing chamber and past the valve head **19**.

The effect of the foregoing structure on dispensing the container contents may now be described. Referring to Figure 3, when the dispensing tip portion **15** is pressed sideward to tilt the valve member **14**, an opening is created between the valve head **19** and the valve seat portion **11**, the entire cylindrical baffle portion **25** moving freely within the enlarged bore portion **12** of the sealing member **7**. The rate of discharge is not a function of the valve opening, for it opens freely. Such tilting likewise tends to distort the bore of the sealing member **27** axially outward of the bore shoulder **13**. The container contents flow inward substantially in a radial direction toward and against the baffle portion **25**. They must then sharply change direction and flow toward the bore shoulder **13**; thence creep between such distorted bore portion and the cylindrical tube portion **18** until one of the orifices **21** is reached. The direction of flow, and changes thereof, are illustrated by the arrows in Figure 3. This repeated change of direction, the agitation in the mixing chamber which results from flow along the baffle indentations **22**, and the creep through the distorted bore of the sealing member **7**, break up any tendency of the contents of the container to flow in a fast stream. Instead, it is possible to dispense slowly and under control, depending upon bore distortion rather than upon the extent of the valve opening.

Although the baffle indentations **22** aid in achieving the results of this invention, the baffle portion **25** may optionally be made in some other form, as for example merely cylindrical.

In the specification and claims, the terms "seal" and "sealing" refer to the prevention of the passage of fluid or gas, and do not necessarily imply restriction of relative mechanical movement.

Modifications of the present invention in embodiment, adaptation and proportion, as well as substitution of structural equivalents, will be apparent to those familiar with the problems of valve construction. Accordingly, the present invention should be considered as fully coextensive with the inventive principles herein disclosed.

I claim:

1. A dispensing valve for a pressure container for a fluid and a gas of a type adapted to be dissolved or entrapped in such fluid, the valve comprising a tubular resilient seal having a narrow bore portion, further having an enlarged bore portion and an annular seat portion within the container, a rigid tubular discharge stem extending through and mounted tiltably in the seal and having at its inner end a radially enlarged imperforate head adapted to close against the seat portion of the seal, the stem wall being imperforate within the enlarged bore portion of the seal, the stem wall having an orifice at a level slightly outward from the outer end of the enlarged bore portion of the seal, at which level the narrow bore portion closely encompasses the stem, sealing the orifice save when distortion attendant tilting the stem establishes communication therethrough.

2. A dispensing valve as defined in claim 1, there being a plurality of stem orifices disposed substantially at the same level, the distortion of the narrow bore portion of the seal accompanying tilting of the valve being such as to establish controllable flow communication between the enlarged bore portion of the seal and at least one of said orifices the enlarged bore portion permitting unimpeded sideward movement of the imperforate portion of the stem wall therein during such tilting of the valve.

3. A dispensing valve for a pressure container for a fluid and a gas of a type adapted to be dissolved or entrapped in such fluid, the valve comprising a resilient seal adapted for mounting in the wall of such container and having a seat portion within the container and an axial bore, a rigid tubular discharge stem mounted tiltably in the bore of the seal and having a radially enlarged imperforate head adapted to close against the seat portion of the seal, and a baffle portion adjacent the head, the stem being sealedly encompassed by the seal axially outward of the said baffle portion, and a lateral orifice penetrating the wall of the stem at a point spaced axially outward from the baffle and from the innermost level at which the seal sealedly encompasses the stem when in untilted position, whereby on tilting the rigid stem to unseat the head and distort the bore portion, such fluid and gas within such container are caused to pass along a path first radially inward toward said baffle portion, thence axially outward, and thence creepingly within the bore portion so distorted to the orifice.

4. A dispensing valve as defined in claim 3, the seal having a sleeve extending outwardly through the container wall, the stem having an integral outstanding annular bead positioned outward of the container wall and adapted to distend the bore of the sleeve and bar the passage of fluid and gas outward therethrough.

5. A dispensing valve as defined in claim 3, together with a compression spring between the outer side of such container wall and the outer end of the discharge stem, by which the stem is urged to a closed erect position.

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