June 17, 1969 J. A. GROSS 3,450,314

DISPENSING VALVE HAVING RUBBER-LIKE DISPENSING HEAD

Filed May 31, 1967 Sheet 1 of 3

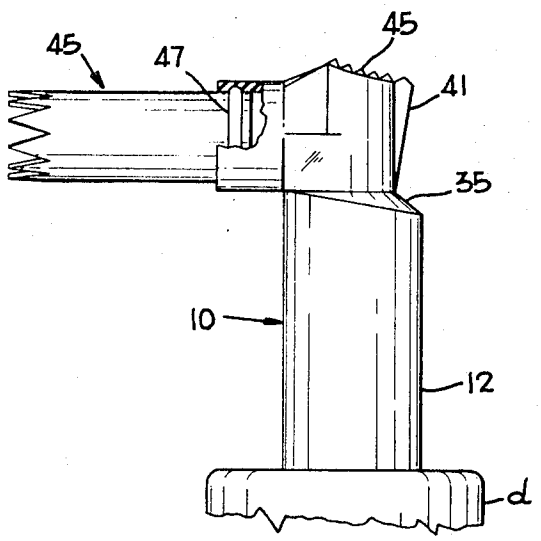

FIG. 2

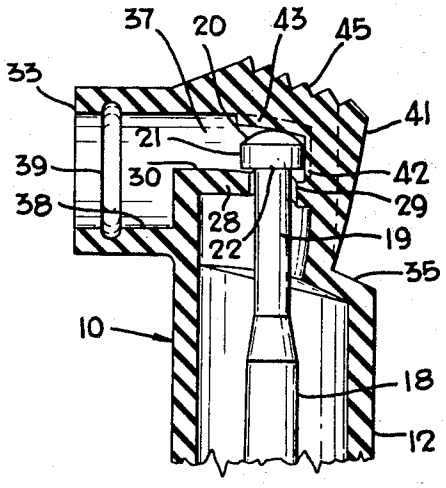

FIG. 3

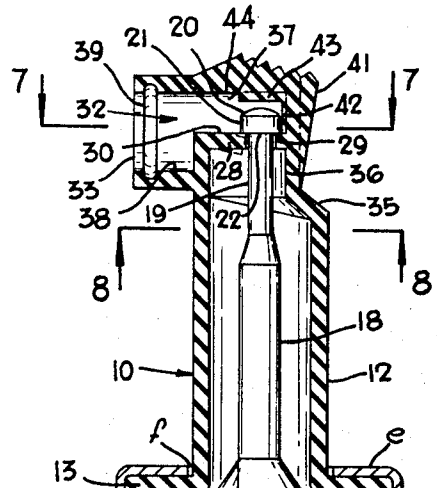

FIG. 1

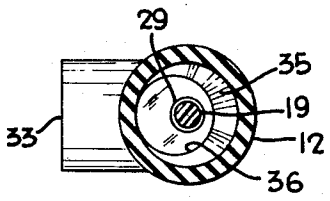

FIG. 8

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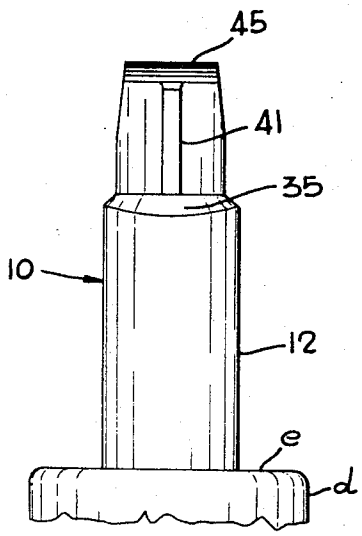

FIG. 5

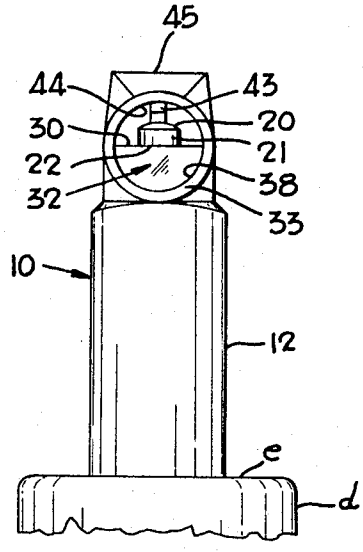

FIG. 4

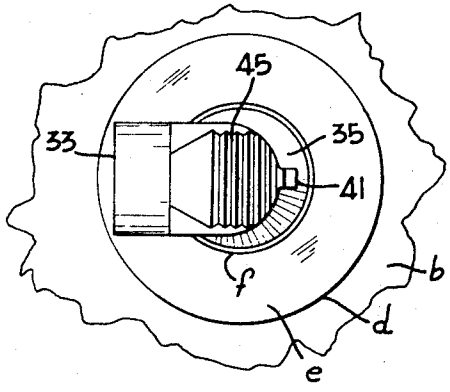

FIG. 6

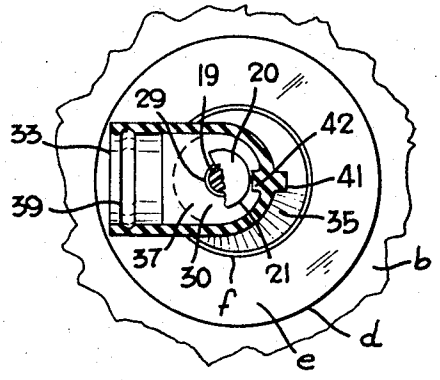

FIG. 7

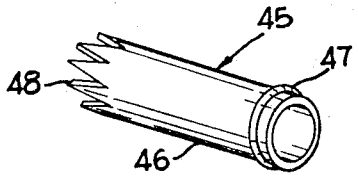

FIG. 9

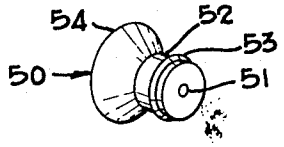

FIG. 10

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DISPENSING VALVE HAVING RUBBER-LIKE DISPENSING HEAD

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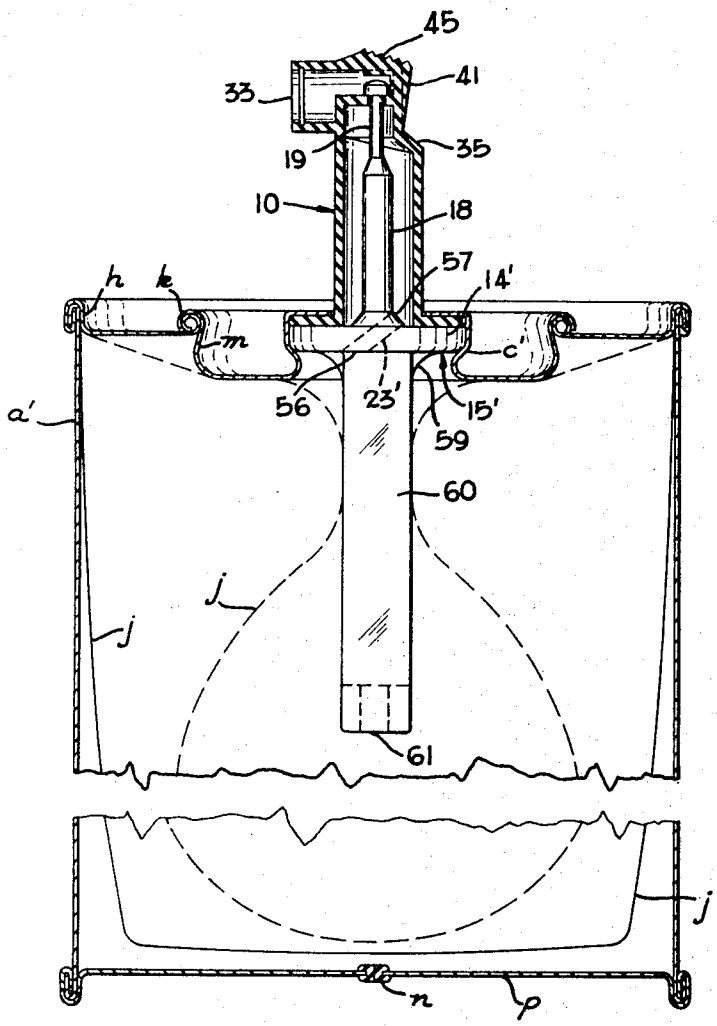

FIG. 11

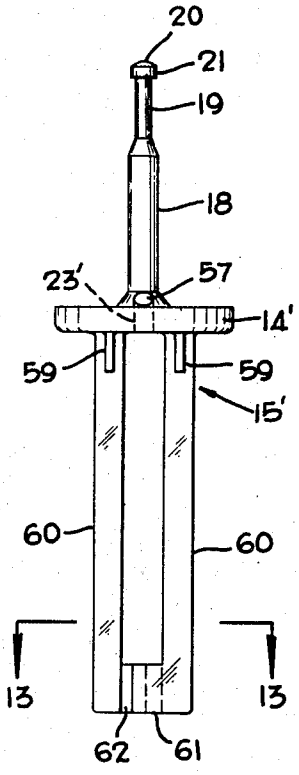

FIG. 12

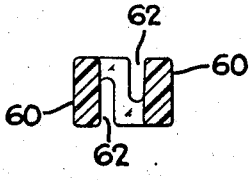

FIG. 13

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United States Patent Office 3,450,314
Patented June 17, 1969

3,450,314

DISPENSING VALVE HAVING RUBBER-LIKE DISPENSING HEAD

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Filed May 31, 1967, Ser. No. 642,594
Int. Cl. B65d *83/14*
U.S. Cl. 222—402.24 14 Claims

ABSTRACT OF THE DISCLOSURE

A two-piece dispenser valve for single-use pressure dispensers employs an outward-projecting headed valve stem rigidly retained by a base flange. A hollow rubber dispensing head encloses the headed stem and has an internal washer-like web which seals against the head. Beneath the web is an outward step; finger pressure will flex the step eccentrically downward, peeling the web away from the valve head. Where the dispenser contents are to be held in a bag to be collapsed by the gas pressure, a downward-extending bag-alignment shoe is formed onto the base flange.

Background of the invention

Single-use pressure dispensers, such as used for shaving lathers and aerosol sprays, ordinarily employ a movable rigid valve member, usually a tubular spout, which closes at its inner end against a rubber seal within the dispenser. Such spouts are not readily cleanable nor is pressurizing gas readily introduced through them. Valves which are to be actuated by pushing downward are ordinarily made up of many separate parts: typically a plastic adaptor cup onto which a syphon tube may be mounted, a spring, a sealing grommet, a tubular valving spout closing against the sealing grommet and projecting outward through it, and an outer dispensing head mounted on the outer end of the spout. If, instead of foams and sprays, the product to be dispensed is a heavy paste, such as for cake decoration, it may be held in a bag within the pressure dispenser, to be collapsed by gas pressure around it. To hold the bag straight as it collapses, an alignment shoe within the bag may be required to avoid fouling the discharge.

Summary of the invention

In the present invention, only two molded members are required for all these purposes, with the advantages of simplified assembly, positive closing under internal gas pressure, fast inflow of pressurizing gas, and easy gradual operation by finger pressure.

Uniquely, of the two molded members, a rigid plastic valve member is firmly clamped in the dispenser top, presenting its headed stem outward of the container top wall. This stem is surrounded by a hollow molded flexible dispensing head, of elastic rubber or similarly elastic material (to designate which the term "rubber-like" is used hereafter). The hollow elastic head has an integral internal web separating an upper flow conduit portion from its side wall beneath. The web has a bore which accommodates the plastic stem; internal pressure tends to seal the web against the head of the stem. Finger pressure on the head distorts one side of the web unsymmetrically downward out of sealing contact, to open the valve.

In the preferred embodiment, one side of the wall below the web is rendered unsymmetrically flexible by molding an offset, so that this side possesses little compressive resistance to support the web. Finger pressure transmitted downward to the web of this side will distort the web downward to open the valve. To pressurize the dispenser the web is readily blown down when customary gassing apparatus, which supplies gas under high pressure, is applied over the dispensing head.

The upper surface of the web serves as the base of a flow conduit portion, which may be semi-cylindrical so as to merge with a hollow cylindrical side dispensing outlet. By providing an internal circumferential retaining groove at the outlet cleanable tubular decorator tips or spray nozzles may be removably inserted to be securely held by the elasticity of the dispensing head.

Despite the many unique operating features incorporated in the dispensing head of the preferred embodiment, its cavities above and below the web are readily formed, as will be apparent from the detailed description which follows.

In the alternate embodiment, for use with a dispenser in which a collapsible bag holds a pasty product, the plastic member includes a bag-alignment shoe, having two legs which extend downward from the rigidly-held base flange and flank the flow opening through it. When pressure collapses the bag, the shoe holds it straight, to evacuate all the contents.

Brief description of the drawings

FIG. 1 is a sectional view of a preferred embodiment of a dispensing valve incorporating the present invention.

FIG. 2 is an elevational view of the upper portion of the valve of FIG. 1, shown with a decorator tip secured within its dispensing outlet.

FIG. 3 is an enlarged fragmentary view of the upper portion of the valve of FIG. 1 with the web distorted downwardly for dispensing.

FIG. 4 is a front elevation corresponding to FIG. 2.

FIG. 5 is a rear view corresponding thereto.

FIG. 6 is a top plan view.

FIG. 7 is a sectional view taken along line **7—7** of FIG. 1.

FIG. 8 is a sectional view taken along line **8—8** of FIG. 1.

FIG. 9 is a perspective view of a decorator tip of FIG. 2.

FIG. 10 is a perspective view of a removable spray nozzle, which may be inserted in the same manner as such decorator tip.

FIG. 11 is a sectional view of an alternate embodiment, for use with a pressure dispenser having an internal collapsible bag to hold the product to be dispensed.

FIG. 12 is a front elevational view of the molded plastic member included in FIG. 11.

FIG. 13 is a sectional view taken along line **13—13** of FIG. 12.

Description of the preferred embodiments

FIG. 1 shows certain members heretofore known for use in pressure dispensing of foams and sprays; these include the pressure container or can *a* having a container top wall *b* formed of ductile metal and seamed thereto. The top wall *b* is domed slightly upward toward center, where it is provided with a hollow cylindrical pedestal portion generally designated *c* having a sidewall portion *d* and an inward rim *e* at its upper surface terminating in a circular aperture *f*.

In the present invention, extending outwardly through the aperture *f* is a hollow molded rubber-like dispensing head generally designated **10**. It includes a lower erect tubular sidewall portion of larger diameter cross-section **12**, having at its lower margin a diametrically enlarged flange **13** presented sealedly against the undersurface of the rim *e*. The flange **13** is held tightly thereagainst, and thus sealed in the aperture *f*, by the upward pressure of the enlarged base flange **14** of a rigid plastic valve member generally designated **15**. In turn, the valve member **15** is rigidly clamped in erect position, centrally within the pedestal sidewall portion *d*, by means which include its base flange **14** and a reduced diameter pedestal sidewall

portion *g*, which on assembly of the valve is formed inwardly beneath and adjacent to the lower edge of the base flange **14**.

Rising from the enlarged base flange **14** of the rigid plastic valve member **15** is a stem **18**, having a relatively small diameter upper stem portion **19** topped by an integral stem head **20**. The stem head **20** has a cylindrical side surface **21** and an annular valve-seating surface **22** presented downwardly. An upward flow passage **23** extends through the base flange **14** adjacent to the base of the stem **18**, to provide flow communication from beneath the base flange **14** to the outer side of the stem **18**. In the embodiment illustrated in FIG. 1, the lower end of the flow passage **23** is provided with a hollow cylindrical nipple extension **24** onto which a plastic dip tube **25** may be fitted, to extend downwardly to the lower part of the container *a*.

Sealing against the annular valve-seating surface **22** is accomplished by an integral internal washer-like web **28**, having a bore **29** surrounding the upper stem portion **19** with clearance, and having an upper web surface **30**. Pressure within the container, communicated through the flow passage **23**, normally maintains sealing contact between the upper web surface **30** and the valve-seating surface **22**. Flexing the dispensing head **10**, as hereinafter described, so draws the web **28** from the stem head **20** as to open the valve and permit outflow of the dispenser contents through an upper conduit, generally designated **32**, of the dispensing head **10** to its dispensing outlet **33**.

The details of construction of the preferred embodiment, by which this result is achieved, will now be described. Generally, means are provided to distort one side of the web **28** unsymmetrically downward out of sealing contact with the annular valve-seating surface **22**. These means give eccentric compressive flexibility to a portion of the sidewall of the dispensing head **10** beneath the web **28** on the side which is so to be distorted downwardly out of sealing contact; thus, on application by the user of finger pressure above the web, eccentric flexure will draw the web **28** downward at that side. In order to avoid unduly complex molding cores, such eccentric compressive flexibility is here provided by an offset **35** in the sidewall of the dispensing head **10** beneath the integral head **20**, adapted to buckle downward when the finger pressure is applied. The offset **35** is generally crescent shaped, as seen in the upward-looking cross-sectional view FIG. 8 and in the plan view FIG. 6; it slopes upward and inward from a lower wall portion of larger diameter cross-section **12** to a smaller diameter circular cross-section wall portion **36** non-concentric therewith. Thus at the left side of FIG. 1, the larger diameter cross-section wall portion **12** and the smaller diameter circular cross-section wall portion **36** are aligned with each other, whereas their opposite sides are out of alignment and joined by the widest portion of the offset **35**. The compressive flexibility of the dispensing head **10** is greatest where the offset **35** is widest.

The upper conduit portion generally designated **32** includes an inner sidewall flow passage **37** which preferably is semi-cylindrical, its flat bottom wall portion being formed by the upper web surface **30**. It continues outward, past the web **28**, to the dispensing outlet **33**, as a cylindrical outer sidewall flow passage portion **38**. Near the outlet **33** is an internal circumferential groove **39**, in which supplemental removable dispensing members may be retained by the elastic grasp of the rubber-like material.

The bore **29** of the web **28** is not concentric with the smaller diameter circular cross-section wall portion **36** immediately beneath; as measured from the central axis of the bore **29**, it is longer on its forward side, near the outlet **33**, than on its aft side remote therefrom. The shorter aft side is therefore less flexible, and may be readily driven downward against gas pressure within the container *a*.

Means to distort the web **28** eccentrically away from the stem head **20** include the provision, hereinabove described, by which the sidewall of the dispensing head **10** buckles eccentrically. In the portion of the dispensing head **10** above the web **28** are means to drive the web downward; such means may include an exterior reinforcing rib **41** which extends from the top of the dispensing head **10** taperingly downward to a point above the offset **35**. More significant is an internal vertical rib **42** within the upper conduit portion **32** opposite to the dispensing outlet **33**. It extends upward from the web **28**, abutting adjacent to the vertical cylindrical side surface **21** of the stem head **20**, and merges into a forwardly extending rib portion **43** which projects downward from the top wall **44** of the upper conduit portion **32** above the stem head **20**.

Operation is shown on the enlarged fragmentary view, FIG. 3. When finger pressure is applied downwardly, onto the serrated finger pad portion **45** at the upper end of the dispensing head **10**, the eccentric flexibility heretofore described results in downward deflection of the offset **35**. Above the web **28**, stiffening effect provided by the exterior reinforcing rib **41** and the internal vertical rib **42** (as seen in the cross-sectional view, FIG. 7) assures that the portion of the web **28** at and adjacent to the internal vertical rib **42** will be driven positively downward from the annular valve-seating surface **22**, as shown in FIG. 3. This causes downward sliding of the internal vertical rib **42** abutting the cylindrical side surface **21**. In this manner the rib **42** maintains the clearance between the bore **29** and the relatively small diameter upper stem portion **19**, and the spaces adjacent to the rib **42** are held open for unimpeded outflow.

Increased finger pressure flexes the offset **35** increasingly downward and withdraws an increasing portion of the web **28** farther from sealing contact with the annular valve-seating surface **22**. At maximum deflection, the forwardly extending rib portion **43** abuts the top of the stem head **20** as shown in FIG. 3, and serves to hold open the spaces adjacent to it, for unimpede outflow. When finger pressure is removed, the gas pressure within the container *a*, aided by the elasticity of the rubber-like dispensing head **10**, restores sealing contact against the annular valve-seating surface **22**.

The elasticity of the rubber-like material utilized for the dispensing head **10** is availed to retain in the groove **39**, any desired removable supplemental dispensing member, such as the tubular decorator tip generally designated **45** shown in FIG. 9, and the spray nozzle generally designated **50** shown in FIG. 10. The decorator tip **45** has a tubular wall **46** with an external ridge **47** adjacent to its inner end, formed to fit within the circumferential groove **39** as shown in FIG. 2. At its outlet it has conventional decorator tip outlet serrations **48**. Such decorator tips **45** may be provided in a variety of internal diameters and decorative outlet configurations, to be inserted and replaced at the choice of the user.

Removability of the spray nozzle **50**, of FIG. 10, permits its spray orifice **51** to be cleaned. The nozzle **50** has a tubular body portion **52** on which a ridge **53** is formed, and may optionally have a flared horn-like outlet **54** to confine the spray and by which the nozzle **50** is readily handled for insertion and removal.

The container *a* may be gassed after it has been filled and the container top wall *b* seamed onto its upper edge. A conventional gassing head, not shown, may be readily fitted over the dispensing head **10** and sealed against the upper surface of the container top wall *b* or against the pedestal sidewall portion *d*. When so fitted, gas supplied under pressure greater than the pressure within the container *a* will readily deflect the more flexible forward portion of the web **28** downward from the annular valve-seating surface **22**, as shown in phantom lines in FIG. 1. Such pressurizing gas will thus flow through the hollow dispensing head **10** with great rapidity to the vertical flow passage **23** and dip tube **25**.

The alternative embodiment shown in FIGS. 11, 12 and 13 has structural portions which, for the most part, are identical with those heretofore described; such identical parts include the entire dispensing head **10**. Where identical, they are numbered identically with the embodiment already described; and their detailed description will not be repeated.

The alternate dispenser *a'* has, folded within a top seam by which a narrow annular top wall *h* is joined to it, the upper edge of a flexible plastic bag *j*, suitable for filling with a creamy or pasty substance such as cake decoration or soft cheese. A rim *k* at the inner periphery of the narrow annular top wall *h* supports a conventional mounting cup *m*, fitted in place after the bag is filled, and sealed by crimping. At the center of the mounting cup *m* is a pedestal portion *c'*, similar in all respects to the hollow cylindrical pedestal portion *c* heretofore described. Pressurizing gas is inserted into the container *a'* below the bottom of the flexible plastic bag *j* through the rubber sealing valve *n* in the container bottom wall *p*.

A rigid valve member generally designated **15'** has a base flange **14'**, and a stem **18** arising therefrom like that of the valve member **15** of said described embodiment. However, from the lower surface of the base flange **14'** extends downwardly an integral bag alignment means to assure that, when the bag *j* is pressed together by gas pressure, it will be emptied evenly and without fouling a flow passage **23'** through the base flange **14'**.

In contrast to the embodiment of FIG. 1, the flow passage **23'** slopes upward from a flow inlet **56**, shown at the left side of center of FIG. 11, to a flow outlet **57** immediately above the upper surface of the base flange **14'** and shown at the right side of the stem **18**. The flow inlet **56** is protected by flanking ribs **59** at the juncture with the base flange **14'** of a pair of closely spaced, parallel, downward-extending legs **60**. A shoe portion **61** joins the lower ends of the leg **60**, to add strength. Vertical grooves **62**, formed inwardly on both its sides, give the shoe portion **61** the undulating configuration shown in the cross-sectional view FIG. 13. If at some higher level, opposite portions of the bag should be pressed by the gas pressure inwardly against the legs **60**, such pressure will not stop the outflow of any contents therebeneath. Such contents will pass upward through the grooves **62** and between the legs **60** to the protected flow inlet **56**.

Bag alignment means for similar purposes have been used prior to the present invention; however no such prior used means was formed integrally with a rigidly positioned valve member, nor was any similar structure provided to avoid the cut-off of flow with the features and advantages of the structure here described.

Various modifications of the principles and teachings hereof may be made, and will occur to those skilled in the art. Accordingly the present invention is not to be construed narrowly but rather as fully co-extensive with the claims herein.

I claim:

1. A three-piece dispenser valve assembly for pressure dispensers, comprising:

(I) a dispenser top wall formed of ductile metal and including a hollow pedestal portion having an aperture defined by an inward rim, and

(II) a rigid valve member having integrally a headed stem portion projecting outward through said top wall aperture, and a base flange portion, clamped within the hollow pedestal, and

a flow passage upward through the base flange portion to the outer side of the stem,

in combination with

(III) a hollow rubber-like dispensing head having an erect tubular sidewall enclosing the stem and a flange at the lower margin thereof sealed within the aperture of the dispenser top wall above the clamped base portion of the valve member, the dispensing head further including

an integral internal washer-like web having a bore surrounding the stem, and

having an upper web surface in contact with the underside of the head of the stem, whereby pressure thereunder normally maintains such contact to seal the dispenser,

the dispensing head further having above the web an integral upper conduit portion including a dispensing outlet, and

integral means responsive to finger pressure on the dispensing head to distort one side of the web unsymmetrically downward out of sealing contact with the underside of the head of the stem,

whereby to permit outflow of the contents of such dispenser through the unsymmetrically distorted web.

2. A dispenser valve as defined in claim **1**,

wherein said means to distort the web includes means to provide eccentric compressive flexibility to a portion of the tubular sidewall beneath the web, on the side to be so distorted out of sealing contact,

whereby on application of finger pressure above the web, said sidewall will flex so eccentrically as to draw the web downward from the valve stem head.

3. A dispenser valve as defined in claim **2**,

wherein the means to distort said side of the web includes a smaller diameter circular cross-section wall portion, immediately below the web, and a large diameter cross-section wall portion therebeneath and non-concentric therewith and joined thereto by a crescent-shaped offset,

whereby flexibility of the sidewall is greatest where the offset is widest.

4. A dispenser valve as defined in claim **1**,

wherein the means to distort said side of the web includes an offset in the sidewall therebeneath,

whereby to buckle downward when subjected to finger pressure.

5. A dispenser valve as defined in claim **1**,

wherein the dispensing outlet includes a sideward flow passage having a bottom wall portion at the level of the upper surface of the web.

6. A dispensing valve as defined in claim **1**,

wherein the dispensing outlet includes a sideward flow passage having a bottom wall portion at the level of the upper surface of the web, and

the side of the web to be distorted is remote from the sideward flow passage, and

wherein the means to distort said side of the web includes a smaller diameter circular cross-section wall portion immediately below the web and a larger diameter cross-section wall portion therebeneath and non-concentric therewith and joined thereto by a crescent-shaped offset, and

wherein the bore in the web is non-concentric with the said smaller diameter cross-section immediately below.

7. A dispenser valve as defined in claim **1**,

wherein the dispensing outlet includes a sideward flow passage having a bottom wall portion at the level of the upper surface of the web, and

wherein the upper head portion includes means to drive the web downward at the side at which it is to be distorted.

8. A dispensing valve as defined in claim **1**,

wherein the stem head has a vertical side, and

wherein the bore of the web surrounds the stem beneath the head with clearance, and

wherein the means to distort the web includes an integral vertical rib extending upward from the web abutting the vertical side of the stem head,

whereby on downward sliding abutment of the rib against said side of the stem head to distort the web out of sealing contact, said clearance of its bore is maintained.

9. A dispensing valve as defined in claim 1,
wherein the dispensing outlet includes an inner semi-cylindrical sideward flow passage having a flat bottom wall portion at the level of the upper surface of the web and an outer cylindrical flow passage whose diameter is defined by said flat bottom wall portion, and
wherein the dispensing outlet has an internal circumferential retaining groove,
together with a supplemental removable dispensing member having a circumferential ridge for elastic retention within said groove.

10. A dispensing valve as defined in claim 9,
wherein said removable dispensing member is a tubular decorator tip having outlet serrations.

11. A dispensing valve as defined in claim 9,
wherein said removable dispensing member is nozzle having a spray orifice.

12. For use with a pressure dispenser of the type having a collapsible bag suspended therein,
a three-piece dispensing valve adapted to avoid fouling of the bag as it collapses, comprising
a dispenser value as defined in claim 1,
wherein the valve member has solid integral bag-alignment means extending downwardly from its base portion.

13. A dispenser valve as defined in claim 12,
wherein the bag-alignment means includes parallel legs protectively flanking the flow passage through the base portion of the valve member.

14. A dispenser valve as defined in claim 13,
wherein the parallel legs are connected, spacedly below the base of the valve member, by a vertically grooved shoe portion.

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