

Sept. 13, 1966

M. H. KATZ ETAL

3,272,387

SELECTIVE DISPENSER

Filed Oct. 6, 1964

2 Sheets-Sheet 1

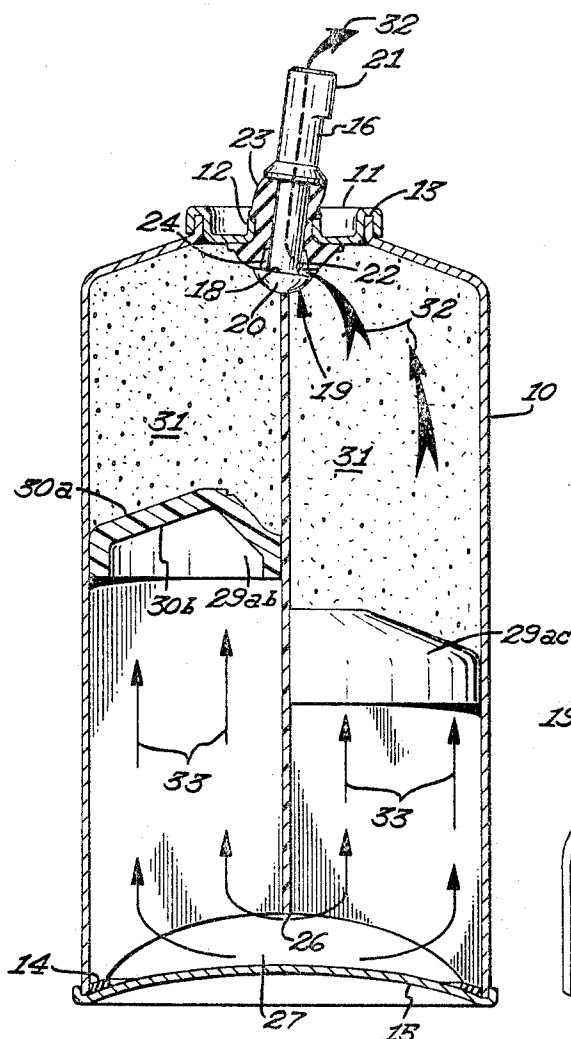


FIG 1

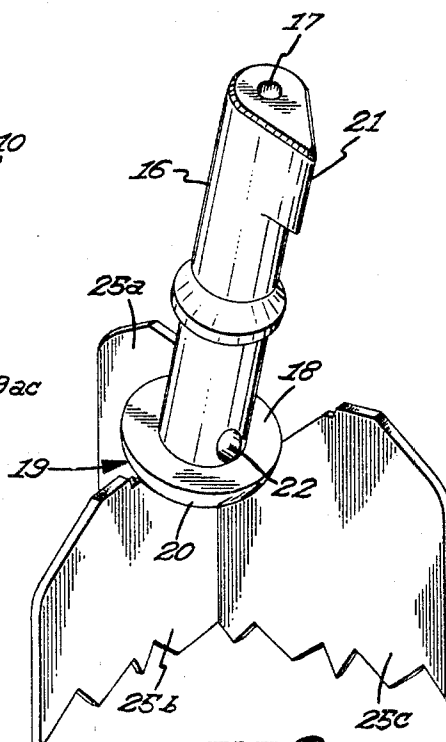


FIG 2

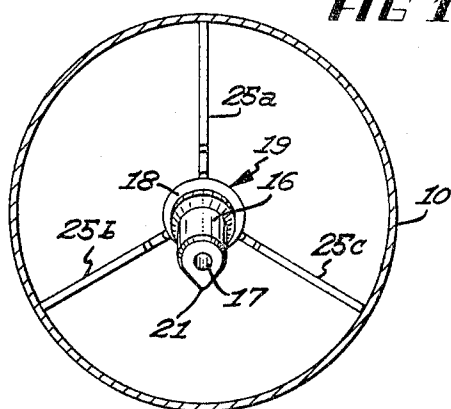


FIG 3

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2 Sheets-Sheet 2

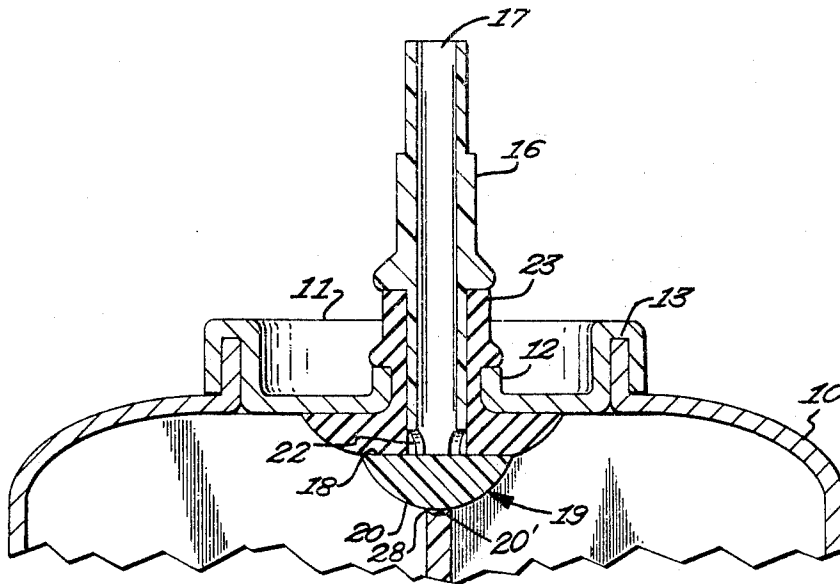


FIG 6

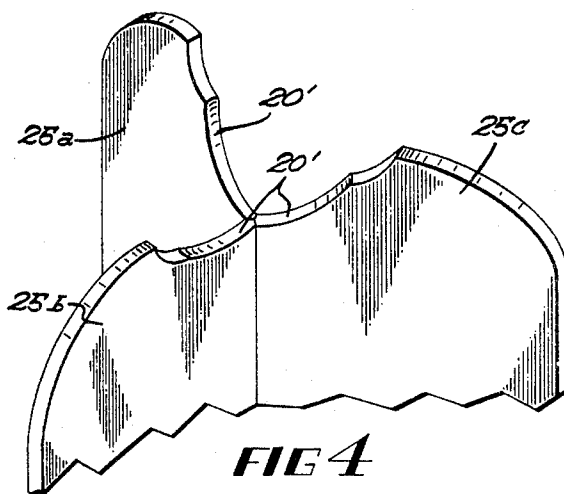


FIG 4

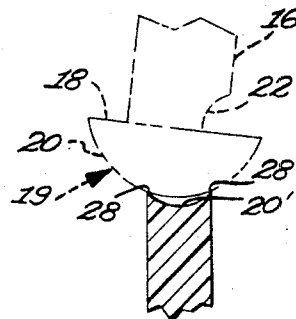


FIG 5

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3,272,387

SELECTIVE DISPENSER

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7 Claims. (Cl. 222-48)

This invention relates to a dispenser for materials such as frosting, shaving cream, food batters, jellies, and other flowable substances. More particularly, it relates to a dispenser capable of selectively dispensing one of a plurality of segregated flowable substances contained in it through a single dispensing nozzle.

Simple single-use, convenient pressurized dispensing containers have become widely used to dispense shaving cream, ointments, pastes, flowable powders, flowable multicomponent systems and other substances. They have become commonly referred to as "aerosol" containers and generally include a source of pressure (compressed gas, for example) which causes the dispensing of the substance through a nozzle, which, in one position, seals the material in the container, and in another position, allows it to extrude as the substance is vented into the atmosphere. Although some of the dispensers of the prior art are capable of dispensing two materials concurrently, none of the containers are capable of selectively dispensing one of a plurality of segregated flowable substances contained therein through a single nozzle. There has been no valve design which discriminates between segregated substances contained in the dispenser and allows the extrusion of one to the exclusion of the other. Such a capability is especially desirable when it becomes advantageous to dispense a variety of flavors, colors, or products from a single container. For example, it is advantageous to provide a dispenser capable of selectively dispensing a number of flavored and colored frostings contained therein, and the invention described hereafter is particularly adaptable to such a use.

Accordingly, it is an object of the invention to provide a dispenser capable of selectively dispensing flowable substances from one of a plurality of compartments through a single dispensing nozzle.

It is another object to provide a dispenser capable of selectively dispensing flowable substances from one of a plurality of compartments in the dispenser through a single nozzle wherein said nozzle is capable of discriminately communicating with said compartments by simply tilting said nozzle toward the compartment from which substance is desired.

It is a further object to provide a dispenser as described above in which segregation of the flowable substance is maintained during dispensing, that is, while the dispensing nozzle is in a tilted position, through the utilization of a joint formed by the terminal portion of the dispensing nozzle and the divider which defines the compartments.

The invention will be particularly described with reference to the accompanying drawings in which:

FIGURE 1 is a partial, sectional view of the dispenser taken in a plane which intersects the longitudinal axis of the container perpendicularly to one of the dividers. It is a partial sectional view because the valve stem 16 is not shown in section.

FIGURE 2 is a perspective view of the nozzle and dividers only, with the resilient nozzle grommet and container wall not shown.

FIGURE 3 is a top perspective view of the elements shown in FIGURE 2 with the container wall added and shown in section.

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FIGURE 4 is a perspective view of the dividers showing that portion of the dividers designed for sealing contact with the terminal portion of the nozzle.

FIGURE 5 is an enlarged sectional view of the base portion of the nozzle showing the divider in contact with the terminal surface of the base portion. FIGURE 5 is enlarged from the view shown in FIGURE 1.

FIGURE 6 is a sectional view of the top portion of the dispenser taken as the view of FIGURE 1 and shows a variation in the dispensing nozzle. More particularly, it shows a dispensing nozzle having a plurality of openings at its base and capable of discriminately communicating with the various compartments in the container through each of said openings.

The best mode contemplated for carrying out the invention appears in FIGURES 1, 2, 3, 4 and 5. The following detailed description of the invention is made with constant reference to those views.

The complete dispenser is best viewed in FIGURE 1. It consists of a container body 10 which is generally cylindrical and defines a fixed, enclosed volume. The container body 10 has a longitudinal axis, not shown, which is simply the longitudinal axis of the cylinder. The container body 10 may consist of any rigid material that is capable of withstanding the pressures necessary to provide extrusion of the material out of the container. Specifically, the container body 10 may consist of a metal alloy such as that used to form the aerosol containers of the prior art.

A flanged adapter 11 is in sealing contact with aperture 13 of the container body 10. Aperture 13 is radially positioned about the longitudinal axis. Adapter 11 contains a flanged aperture 12. Adapter 11 is crimped at flanged aperture 13 and forms a sealed joint. If desired, flanged aperture 13 may be gasketed or coated with a sealing compound prior to the crimping of adapter 11 about its edges to insure a sealed joint.

Adapter 11 is not essential. It may be eliminated, in which case container body 10 would be continuous and would itself form aperture 12. Adapter 11 allows a separate manufacture of the valve assembly, which includes adapter 11, resilient sealing member 23 and tubular valve stem 16. And thus assembled, the valve unit is attached to container body 10 by crimping adapter 11 about flanged aperture 13.

The container bottom consists of concave bottom 15 and gasket 14, which provides a sealed joint between the lower extremity of container body 10 and concave bottom 15.

Valve stem 16 is axially positioned and extends through aperture 12 of flanged adapter 11. In FIGURE 1, valve stem 16 is shown in a tilted position, the tilted position being used during the dispensing operation. The tilted position, however, is not a normal position. The valve stem is positioned "at rest" so that its longitudinal axis coincides with the longitudinal axis of the container, and that is what is meant by the term "axially positioned." Valve stem 16 is tubular, and its hollow construction may be best seen in FIGURE 6. The tubular construction of valve stem 16 extends from the exposed dispensing aperture 17, the length of the stem to sealing surface 18, which is perpendicular to the longitudinal axis of valve stem 16. Thus valve stem 16 is not tubular throughout its entire length.

That portion of valve stem 16 that extends beyond sealing surface 18 is referred to generally as base portion 19. Base portion 19 is defined by sealing surface 18 and terminal surface 20. Terminal surface 20 comprises a segment of a sphere, and the degree of curvature is related to the point on the longitudinal axis of the container about

which valve stem 16 rotates when tilted. More particularly, terminal surface 20 is the locus of points equidistant from the point of rotation which lies on the longitudinal axis. That point is imaginary, but is somewhere on that portion of the longitudinal axis which lies in flanged aperture 12. Thus terminal surface 20 is designed so that it is constantly intersecting a fixed point on the longitudinal axis of the container in spite of the fact that it may be tilted in an infinite number of directions about the point of rotation. This aspect of the design is critical, and it will be referred to later in connection with the operation of the dispenser. Valve stem 16 contains a collar, which is nonessential but which provides for the positive seating of resilient sealing member 23 about the valve stem 16. Exposed marker 21 is an integral part of valve stem 16 and is placed on the same side of valve stem 16 as opening 22. Thus, the location of opening 22 is apparent from viewing exposed end of valve stem 16.

Opening 22 completely penetrates the wall of valve stem 16 and communicates with dispensing aperture 17 through the hollow length of valve stem 16. The position of opening 22 is critical. It must be placed in close proximity to sealing surface 18. More particularly, it is advisable, but not essential, to place opening 22 such that it is tangential to the plane defined by sealing surface 18.

Valve stem 16 is axially mounted in aperture 12 by means of resilient sealing member 23. Sealing member 23 provides a seal between flange 12 and valve 16. It is designed so that its lower portion is engaged with sealing surface 18 (during the "rest" position of valve stem 16), completely sealing the enclosed volume of container body 10 from the atmosphere. Sealing member 23 is essentially a grommet and has an inside diameter slightly less than the outside diameter of valve stem 16. Its outside diameter, in that portion which engages flanged aperture 12, should be slightly in excess of the diameter of aperture 12 to insure an efficient seal there. Sealing member 23 may consist of natural rubber, synthetic rubber, neoprene rubber, high density resilient polyethylene or any applicable elastomer. Sealing member 23 must be resilient to allow the tilting of valve stem 16 without interrupting the seal between aperture 12 and valve stem 16. Resilient sealing member 23 must be deformable to allow tilting of valve stem 16 and at the same time seal aperture 12. In general, any substance that is stable in the environment and meets the foregoing requirement may be used.

The inside diameter of the portion of sealing member 23 that circumscribes opening 22 may be greater than the outside diameter of valve stem 16. That portion appears best in FIGURE 1 and is referred to generally as cavity 24. The diameter of cavity 24, however, must be less than the diameter of sealing surface 18 so that sealing surface 18 may sealably engage the lower portion of resilient sealing member 23 when valve stem 16 is axially positioned. Cavity 24 is not essential, but it is a refinement which makes operation of the dispenser somewhat more efficient.

The enclosed volume defined by container body 10 is divided longitudinally into compartments by axially positioned dividers 25a, 25b and 25c. Dividers 25 are axially positioned since each defines a plane which includes the longitudinal axis of container body 10. The periphery of dividers 25 is designed so that each divider is in sealing contact with terminal surface 20, resilient sealing member 23 and the inner surface of container body 10 apart from concave bottom 15. From a point above the lower axial limit 26, container body 10 is divided longitudinally into three distinct compartments. Those compartments may be referred to as by compartment *ab*, defined by divider 25a, 25b and container body 10; compartment *ac*, defined by divider 25a, 25c and container body 10; and compartment *bc* defined by divider 25b, 25c and container body 10 (FIGURE 3). It should be particularly noted that dividers 25 are designed so that portion 20' (see FIGURE 4) is in sealing contact with terminal surface 20 of valve

stem 16. Thus, as valve stem 16 is tilted, terminal surface is constantly in sealing contact with generally coincidental surface 20' of dividers 25. That portion of dividers 25 lying below the lower axial limit 26 curves regularly to gasket 14. Thus, cavity 27 is common to all three compartments *ab*, *bc* and *ac*, which maintains equal pressure in all compartments.

The surface 20' is referred to as being generally coincidental with terminal surface 20, because, as best seen in FIGURE 5, surface 20' in cross section is circular. The degree of curvature, viewing surface 20' in a section perpendicular to a line tangent to surface 20' and intersecting the longitudinal axis of the container, is a segment of a circle. That circle has a radius of curvature less than the radius of curvature of terminal surface 20. Thus, surface 20' is coincidental with terminal surface 20 at edges 28, but is not coincidental throughout the thickness of the divider. That design, though nonessential, provides for efficient cleaning of terminal surface 20 since edges 28 provide a knife-like cleaning action. As valve stem 16 is tilted, edges 28 scrape product in contact with terminal surface 20.

Pistons 29ab, 29ac and 29bc are placed in compartments *ab*, *ac* and *bc* respectively. The pistons are, of course, designed to seal the material on one side from the propellant on the other. Each piston has a leading surface 30a, which is in contact with the flowable material 31 in the container. Leading surface 30a is designed so that when piston 29 is in a position close to valve stem 16, that is, in a position which comes about when the supply of flowable substance from the compartments is exhausted, leading surface 30a accommodates the design of container body 10, resilient sealing member 23 and terminal surface 20. Such a design, though nonessential, insures efficient dispensing of the flowable substance. Pistons 29 have a trailing surface 30b which appears best in FIGURE 1, and which is in contact with the propellant in cavity 27.

Pistons 29 may be made of polyethylene, natural or synthetic rubber, silicone rubber, polypropylene, polytetrafluoroethylene or other halocarbon or fluorinated hydrocarbon plastics, aluminum, epoxy coated steel, or any other material that provides a surface in contact with the dividers and container body 10 which seals one side from the other and is slideable therein.

After substance 31 is placed in the container, pistons 29ab, 29ac and 29bc are placed in compartments *ab*, *ac* and *bc* respectively, and after adapter 11, including a valve stem 16 and resilient sealing member, is crimped tightly onto aperture 13 of the container body 10, and gasket 14 and bottom 15 is secured to container body 10, the can may be pressurized. Pressurizing may be accomplished through a small orifice (not shown) in container bottom 15. A number of propellants may be used. Examples of propellants are: Compressed air, nitrogen and oxygen, nitrogen, carbon dioxide, helium, nitrous oxide, dichlorodifluoromethane, dichlorotetrafluoroethane, chlorodifluoromethane in combination with trichloromonofluoromethane, butane, isobutane, propane, and perfluorocyclobutane and combinations thereof. Those skilled in the art may recognize that others might also be used.

The pressure in cavity 27 may vary considerably depending upon the degree of flowability of substance 31. When substance 31 is frosting, a pressure of 90 p.s.i. is suitable.

The operation of the assembled, pressurized container is readily apparent with reference to FIGURE 1. In FIGURE 1, arrows 32 designate the path of substance 31 from its respective compartment through opening 22, the hollow length of valve stem 16, and out dispensing aperture 17. To dispense substance, valve stem 16 is twisted in resilient sealing member 23 so that exposed marker 21 points to the compartments from which substance is desired. Opening 22 is then also positioned in

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close proximity to the compartment. Valve stem 16 is then tilted in the direction indicated by marker 21 and tilts or rotates about the imaginary point of rotation. Resilient sealing member 23 is deformed as shown in FIGURE 1, and sealing surface 18 is disengaged from the lower portion of sealing member 23, which lies in the compartment from which substance is desired. In FIGURE 1, that compartment is compartment *ac*. When tilted about the imaginary point of rotation, resilient surface 20 of valve stem 16 remains in constant sealing contact with edges 28 of surface 20'. Thus, the tilting of valve stem 16 does not disrupt the seal between the terminal surface 20 and the dividers. It does, however, disrupt the seal between sealing surface 18 and the lower portion of resilient sealing member 23 in compartment *ac*. Thus, as arrows 32 indicate, substance 31 is vented to the atmosphere, and the pressure in cavity 27 exerts a force on piston 29 in the direction of arrows 33. Material flows through opening 22 and out dispensing aperture 17.

If substance is desired from another compartment, compartment *bc*, for example, valve stem 16 is positioned as shown in FIGURE 2. It is then tilted in the direction of compartment *bc*, and substance 31 is dispensed. It may be readily seen that valve stem 16 may be tilted in an infinite number of directions without disrupting the seal between terminal surface 20 and surface 20' of dividers 25.

Valve stem 16 may be designed with a series of openings 22 placed radially in the area of valve stem 16 near sealing surface 18. When so designed, the need to twist valve stem 16 to align the circular opening with the compartment from which substance is desired is eliminated. Thus, marker 21 is also eliminated. Such a design requires merely that the valve stem 16 be tilted in the direction of the compartment from which dispensing is desired.

If only two compartments are desired in container body 10, the design may correspond with that shown in FIGURE 6. If so designed, terminal surface 20 need be only cylindrical, and valve stem 16 need be tiltable about an axis, as opposed to a point. The surface of the divider, which contacts the cylindrical surface 20, need merely be rectangular, as opposed to generally circular, as shown in FIGURE 4. Only two openings 22 are necessary, one to serve each compartment. With reference to FIGURE 6, valve stem 16 need only be tiltable in the plane of the drawing to the right and to the left.

If the dispenser is designed according to either of the two variations described immediately above; that is, either with a series of radially positioned openings 22 or with two opposing openings 22, one for each of two compartments; valve stem 16 does not have to be twistable in sealing member 23. The design of FIGURE 1, however, which utilizes only one opening 22 requires that valve stem 16 be rotatable about the longitudinal axis of container body 10. In other words, the design of FIGURE 1 requires that valve stem 16 be twistable. In the claims, "twistably mounted" refers to the ability of valve stem 16 to be twisted in resilient sealing member 23 thus altering the position of opening 22.

It will be readily seen that though two and three compartments have been shown, the invention may be used with a greater number.

If desired, exposed marker 21 may be replaced by a thumb seal on the opposite side of valve stem 16. Thus, aperture 22 would be located with respect to the thumb seat. It would only be necessary to twist valve stem 16 so that position on the thumb seat would tilt valve stem 16 toward the compartments from which dispensing is desired.

We claim:

1. A dispenser capable of selectively dispensing one of a plurality of segregated, flowable substances contained

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therein through a single dispensing nozzle which comprises:

- (1) a container body
 - a. defining a fixed enclosed volume
 - b. having a longitudinal axis, and
 - c. an aperture positioned about said longitudinal axis
- (2) a tubular-walled valve stem
 - a. axially mounted in said aperture
 - b. by means of a resilient sealing member, said sealing member
 - (i) allowing tilting of said stem about at least one axis of rotation perpendicular to said longitudinal axis, and
 - (ii) being in sealing contact with said aperture and said valve stem,
 - c. said valve stem having a base portion including
 - (i) a terminal surface defined by the locus of points equidistant from said axis of rotation, and
 - (ii) two openings penetrating said tubular-walled valve stem near said base portion,
- (3) an axially positioned divider in said container body
 - a. dividing said enclosed volume into at least two compartments, said compartments positioned on opposite sides of said axis of rotation,
 - b. said divider being in sealing contact with
 - (i) said terminal surface,
 - (ii) said resilient sealing member, and
 - (iii) said container body,
- (4) said openings being positioned on opposite sides of said divider,
- (5) a flowable substance in said compartments and means for maintaining said substance under pressure greater than atmospheric and in contact with said terminal surface
 - a. including compressed gas and pistons having a leading and trailing surface, said leading surface being in contact with said substance, and said trailing surface being in contact with said compressed gas.

2. A dispenser capable of selectively dispensing one of a plurality of segregated flowable substances contained therein through a single dispensing nozzle which comprises:

- (1) a container body
 - a. defining a fixed enclosed volume,
 - b. having a longitudinal axis, and
 - c. an aperture positioned about said longitudinal axis,
- (2) a tubular-walled valve stem
 - a. axially mounted in said aperture
 - b. by means of a resilient sealing member, said sealing member
 - (i) allowing tilting of said valve stem about a point lying on said longitudinal axis, and
 - (ii) being in sealing contact with said aperture and said valve stem,
 - c. said valve stem having
 - (i) a base portion including a terminal surface defined by the locus of points equidistant from said point, and
 - (ii) at least one opening penetrating said tubular-walled valve stem near said sealing surface,
- (3) an axially positioned divider in said container body
 - a. dividing said enclosed volume into at least two compartments,
 - b. said divider being in sealing contact with
 - (i) said terminal surface,
 - (ii) said resilient sealing member, and
 - (iii) said container body,
- (4) a flowable substance in said compartments and means for maintaining said substance under pressure

greater than atmospheric and in contact with said terminal surface,

- a. said means for maintaining said substance under pressure including compressed gas and pistons having a leading and trailing surface in said compartments, said leading surface being in contact with said substance and said trailing surface being in contact with said compressed gas.

3. A dispenser capable of selectively dispensing one of a plurality of segregated flowable substances contained therein through a single dispensing nozzle which comprises:

- (1) a container body
 - a. defining a fixed enclosed volume
 - b. having a longitudinal axis, and
 - c. a circular aperture positioned radially on said longitudinal axis,
- (2) a tubular-walled valve stem
 - a. axially mounted in said aperture
 - b. by means of a resilient sealing member, said sealing member
 - (i) allowing tilting of said valve stem about a point, and
 - (ii) being in sealing contact with said aperture and said valve stem,
 - c. said valve stem having a base portion defined by
 - (i) a sealing surface perpendicular to said longitudinal axis in sealing contact with said sealing member, and
 - (ii) a terminal surface defined by the locus of points equidistant from said point, and
 - d. one opening penetrating said tubular-walled valve stem near said sealing surface,
 - e. said valve stem having an exposed marker,
- (3) an axially positioned divider in said container body
 - a. dividing said enclosed volume into at least two compartments,
 - b. said divider being in sealing contact with
 - (i) said terminal surface,
 - (ii) said resilient sealing member, and
 - (iii) said container body,
- (4) a flowable substance in said compartments and means for maintaining said substance under pressure greater than atmospheric and in constant contact with said terminal surface,
 - a. said means for maintaining said substance under pressure including compressed gas and pistons having a leading and trailing surface in said compartments, said leading surface being in contact with said substance, and said trailing surface being in contact with said compressed gas.

4. A dispenser capable of selectively dispensing one of a plurality of segregated flowable substances contained therein through a single dispensing nozzle which comprises:

- (1) a container body
 - a. defining a fixed enclosed volume
 - b. having a longitudinal axis, and
 - c. an aperture positioned about said longitudinal axis,
- (2) a tubular-walled valve stem
 - a. axially mounted in said aperture
 - b. by means of a resilient sealing member, said sealing member
 - (i) allowing tilting of said valve stem about a point lying on said longitudinal axis, and
 - (ii) being in sealing contact with said aperture and said valve stem,
 - c. said valve stem having a base portion defined by
 - (i) a sealing surface perpendicular to said longitudinal axis in sealing contact with said sealing member, and
 - (ii) a terminal surface defined by a locus of points equidistant from said point, and

- d. a series of openings circumferentially positioned and penetrating said tubular-walled valve stem near said sealing surface

(3) an axially positioned divider in said container body

- a. dividing said enclosed volume into at least two compartments,
- b. said divider being in sealing contact with
 - (i) said terminal surface,
 - (ii) said resilient sealing member, and
 - (iii) said container body,

(4) said means for maintaining said substance under pressure includes compressed gas and pistons having a leading and trailing surface in said compartments, said leading surface being in contact with said substance, and said trailing surface being in contact with said compressed gas.

5. A dispenser capable of selectively dispensing one of a plurality of segregated flowable substances contained therein through a single dispensing nozzle which comprises:

- (1) a container body
 - a. defining a fixed enclosed volume
 - b. having a longitudinal axis, and
 - c. a circular aperture positioned radially on said longitudinal axis,
- (2) a tubular-walled valve stem
 - a. axially mounted in said aperture
 - b. by means of a resilient sealing member, said sealing member
 - (i) allowing tilting of said valve stem about a point, and
 - (ii) being in sealing contact with said aperture and said valve stem,
 - c. said valve stem having a base portion defined by
 - (i) a sealing surface perpendicular to said longitudinal axis in sealing contact with said sealing member, and
 - (ii) a terminal surface defined by the locus of points equidistant from said point, and
 - d. an opening penetrating said tubular-walled valve stem near said sealing surface,
 - e. said resilient sealing member having an inside diameter such that said member fits snugly around said valve stem, said inside diameter being greater than the outside diameter of said valve stem in that portion of said sealing member circumscribing said opening,
 - f. said valve stem having an exposed marker,
- (3) axially positioned dividers in said container body dividing said enclosed volume into at least three compartments, said dividers being in sealing contact with:
 - a. said terminal surface
 - b. said resilient sealing member, and
 - c. said container body

(4) flowable substance in said compartments

(5) means for maintaining said substance under pressure greater than atmospheric and in contact with said terminal surface including:

- a. compressed gas, and
- b. pistons

- (i) in said compartments
- (ii) having a leading and trailing surface,
- (iii) said leading surface being in contact with said substance and said trailing surface being in contact with said compressed gas.

6. A container body defining a fixed enclosed volume, said container body having an aperture therein; a tubular-walled valve stem movably mounted within said aperture; a resilient sealing member positioned within said aperture around said tubular-walled valve stem, said sealing member allowing tilting of said stem about at least one axis of rotation perpendicular to said stem and being in sealing contact with said aperture and said valve stem, said valve stem having a base portion including a terminal

surface defined by the locus of points equidistant from said axis of rotation and at least one opening penetrating said tubular-walled valve stem near said base portion, said base portion having a sealing surface on the opposite side thereof from the terminal surface; a corresponding sealing surface on said resilient sealing member normally positioned in abutting sealing engagement with the sealing surface of the base entirely around the stem; a divider positioned within the container body dividing the enclosed volume into at least two compartments, said compartments each communicating with the sealing member and base on opposite sides of the axis of rotation, said divider being in sealing contact with said terminal surface, said resilient member and said container body and the tilting of the stem opening a predetermined portion of said sealing engagement between the base and the sealing surface of the resilient member to allow communication between the opening and one of said compartments and the remaining portion of said sealing engagement being maintained to prevent communication between said opening and the other compartments.

7. A dispenser capable of selectively dispensing one of a plurality of segregated flowable substances contained therein through a single dispensing nozzle which comprises a container body defining a fixed enclosed volume having a longitudinal axis, and a circular aperture positioned radially on said longitudinal axis; a tubular-walled valve stem axially mounted in said aperture by means of a resilient sealing member, said sealing member allowing tilting of said valve stem about a point being in sealing contact with said aperture and said valve stem, said valve stem having a base portion defined by a sealing surface

perpendicular to said longitudinal axis in sealing contact with said sealing member, a terminal surface defined by the locus of points equidistant from said point and one opening penetrating said tubular walled valve stem near said sealing surface, said valve stem having an exposed marker; an axially positioned divider in said container body dividing said enclosed volume into at least two compartments, said divider being in sealing contact with said terminal surface, said resilient sealing member, and said container body, said resilient sealing member having an inside diameter, said tubular-walled valve stem having an outside diameter, said inside diameter of said sealing member being less than said outside diameter of said valve stem such that said sealing member fits snugly around said valve stem, but said inside diameter being greater than said outside diameter in that portion of said resilient sealing member near said sealing surface and circumscribing said opening.

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