

[54] **DISPENSING PACKAGE OF THE PRESSURIZED TYPE**

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[52] U.S. Cl. 222/145

[51] Int. Cl. B65d 83/14

[58] Field of Search....222/145, 136, 402.24, 402.14, 222/477, 518, 402.18; 137/625.4; 221/268; 194/DIG. 17

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[57] **ABSTRACT**

A pressurized dispensing package has a self-supporting flexible walled inner container disposed within and seated on the base of a rigid walled outer container. A valve assembly controls mixing of materials stored in the containers and flow of that mixture to the atmosphere. Dip tubes secured to the valve assembly extend to the bottom of each container. The outer container is charged with propellant through the valve stem of the valve assembly. The valve stem has two ports sealed by a common annular gasket and an actuator cap on the valve stem is depressed to open the two ports and discharge a mixture.

13 Claims, 6 Drawing Figures

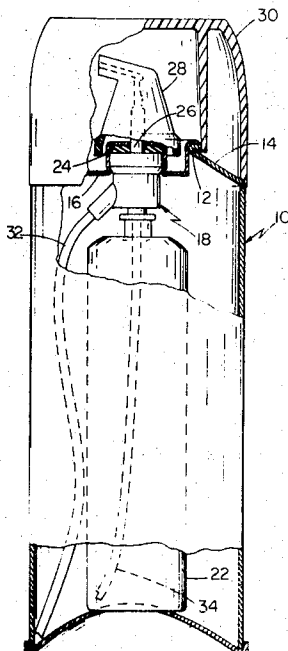


FIG 1

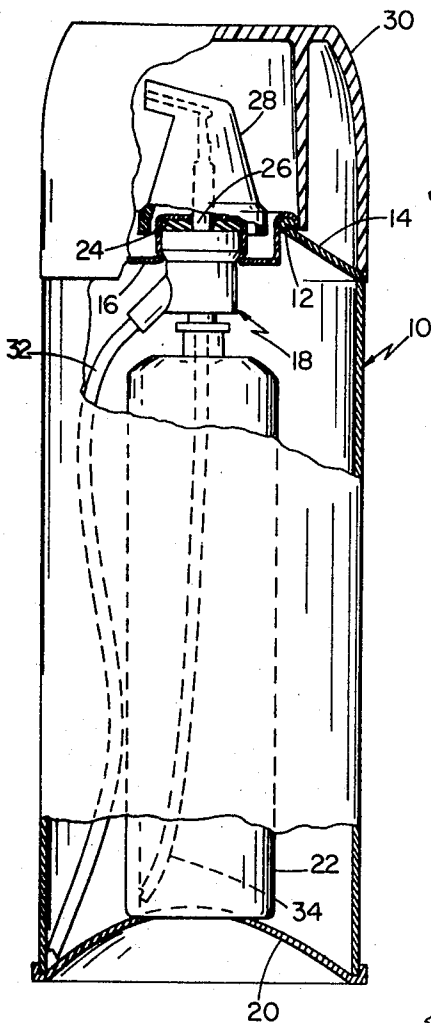


FIG 2

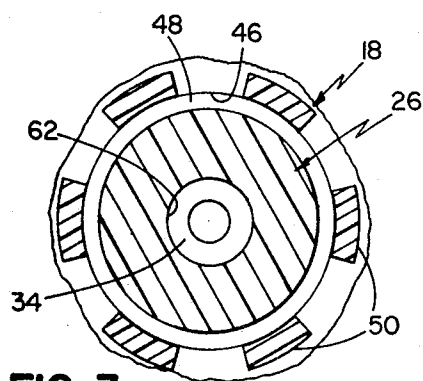
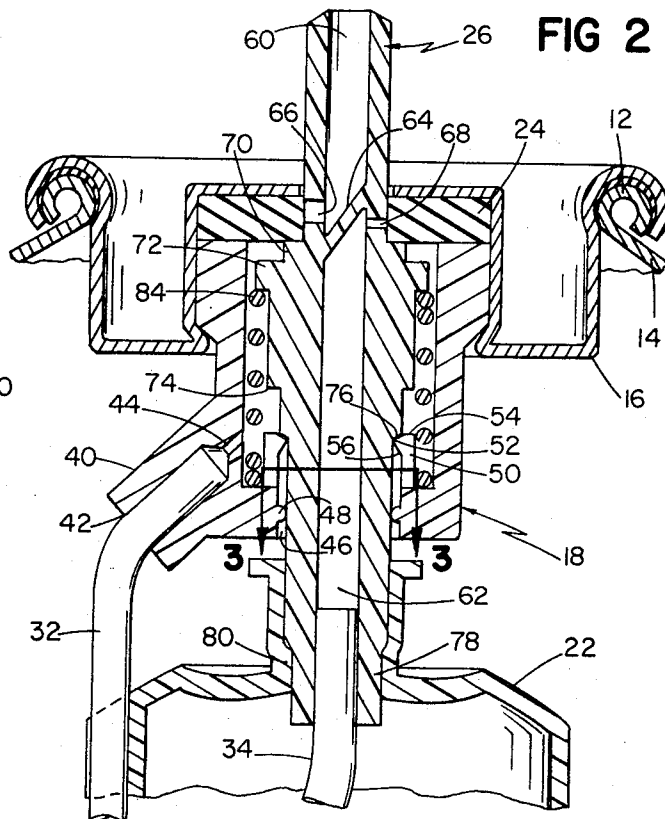


FIG 3

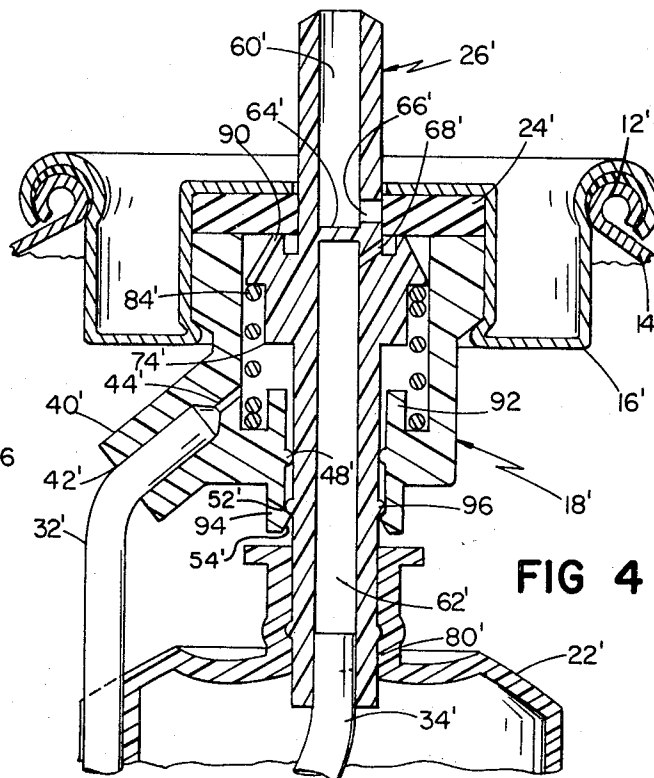


FIG 4

FIG 5

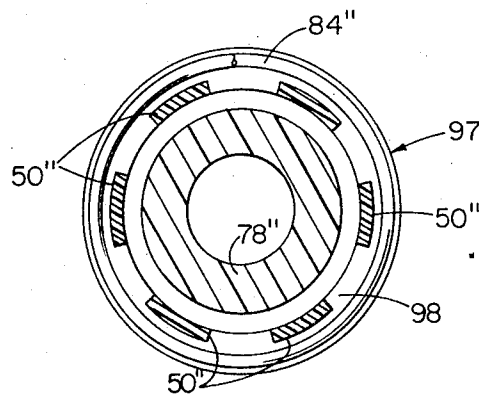
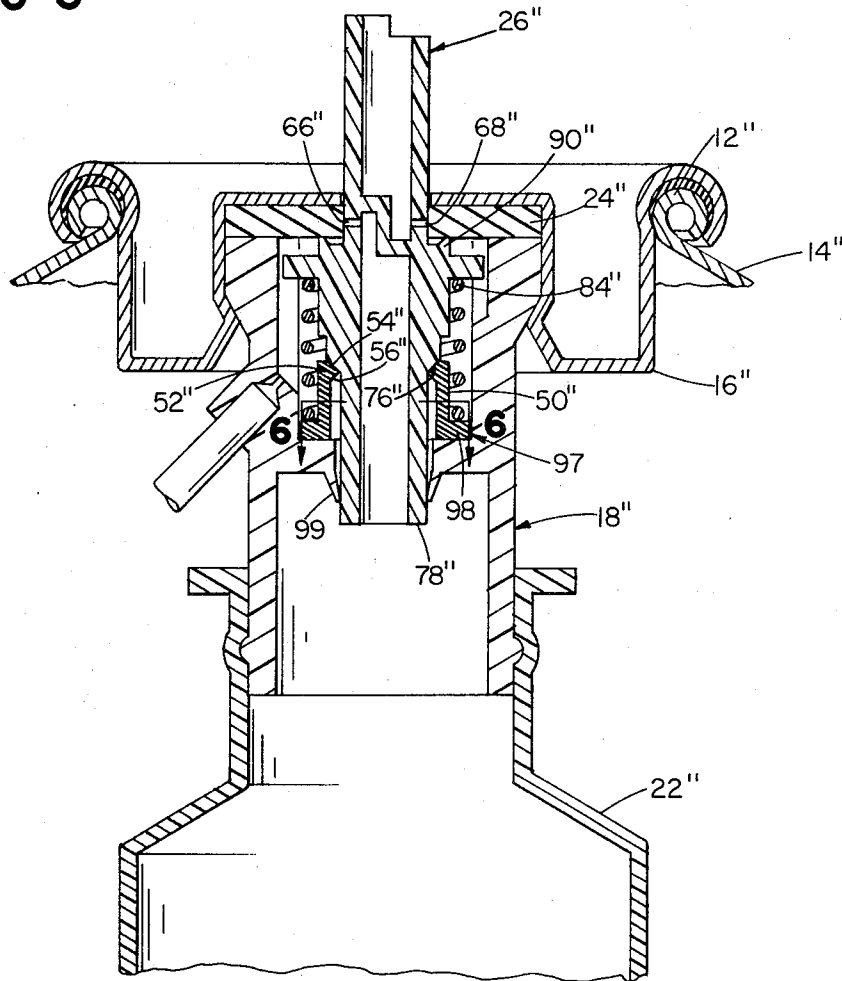


FIG 6

DISPENSING PACKAGE OF THE PRESSURIZED TYPE

This application is a continuation in part of my copending patent application Ser. No. 778,480, filed Nov. 25, 1968, entitled "Dispensing Package of the Pressurized Type."

SUMMARY OF INVENTION

This invention relates to dispensing packages of the pressurized type, and more particularly to such dispensing packages in which a material to be dispensed is relatively incompatible with a second material.

Frequently it is desired to dispense a product that results from mixing, at the time of dispensing, of two or more different ingredients that are stored separately from each other so that those ingredients will maintain their effective properties during storage. A variety of products may be usefully so dispensed, an example being a two-part, self-heating, cosmetic composition applied to the human skin, one part containing a reducing agent, and the other part containing an oxidizing agent which is reactive with the reducing agent to liberate heat. Another example is the incompatibility of a material to be dispensed with a propellant material. Still other examples of such incompatibility are well known to those in the art.

It is desirable that such dispensing packages and their valve structures be designed for production in large quantities and in the manner that minimizes cost. In many instances it is desirable that the dispensing package provide precise proportioning of the materials to be mixed, and the desired interaction or mixing of the ingredients prior to discharge. The dispensing package should be constructed so that it may be easily operated in a safe and reliable manner. Also, it is frequently desired that the dispensing package be arranged to permit ready charging of one of the compartments with propellant while insuring that in a dispensing mode of operation, ingredients from both compartments are mixed together as they are dispensed. In plural compartment packages the ingredients frequently must be mixed in particular proportions and the valve assembly should operate under the entire range of conditions of normal use to provide a mixture of satisfactory proportions.

Accordingly it is an object of this invention to provide a novel and improved dispensing package in which two materials may be kept separate from one another until immediately prior to use and which, in use, releases the ingredients in a proportioned manner for mixing and discharge.

Another object of this invention is to provide a novel and improved dispensing package which is arranged to dispense a mixture of two or more materials.

Still another object of the invention is to provide novel and improved arrangements for the dispensing of materials from pressurized dispensing package.

Another object of the invention is to provide novel and improved plural compartment dispensing packages which reliably dispense a mixture of materials in the desired proportions.

A specific object of the invention is to provide a novel and improved pressurized package for dispensing warm shaving lather.

A further object of the invention is to provide novel and improved valve arrangements for use in a pressurized dispensing package in which two materials are held separate from one another, which valve arrangements are easy to use and economical to manufacture.

In accordance with a feature of the invention there is provided a dispensing package of the pressurized type for mixing two materials to be dispensed, which materials are maintained separate prior to dispensing. The package includes structure defining first and second compartments and includes a valve assembly secured to the package and arranged to provide communication between the two compartments, and a discharge passage for discharging a mixture of the two materials to the atmosphere. The valve assembly includes a stem structure which extends outwardly of the package and defines the discharge passage. This stem is movable in an axial direction and the valve assembly further includes structure cooperating with the stem for resisting initial movement of the stem when the valve assembly is in closed position, with the resistance to movement being significantly reduced after initial movement of the stem from closed position to provide sufficient opening of passages between the two compartments and the discharge passage to avoid throttling and assure discharge of a mixture of the materials stored in the dispensing package in the desired proportions. In a particular embodiment this initial movement resisting structure includes a plurality of flexible fingers formed integrally with the housing in which are disposed about the valve stem and cooperate with a latch surface on the valve stem to provide an initial resistance to movement of the valve stem in the opening direction. In a preferred configuration these fingers have a latch surface on one side and a ramp surface on the other side so that the fingers provide less resistance to a return of the valve stem to closed position than initial movement away from the closed position.

In particular embodiments the valve stem includes a discharge passage at its upper end and a coaxial passage at its lower end that communicates with an inner container which holds one of the materials to be dispensed and is mounted directly on the valve stem. A barrier member separates these two passages and two flow control ports pass through the wall of the stem, one above and one below the barrier. In particular embodiments these two ports are located in axially overlapping positions and both are sealed by the same annular seal member so that on movement of the valve stem in the opening direction both ports are opened initially at the same time or one port opens slightly after the other depending on the location of the ports but before the first port to open is fully open. The port to the other compartment, in these embodiments a rigid outer container, is an unvalved port in the valve housing. In these embodiments one material to be dispensed is stored in the inner container secured to the valve stem and a second material and the propellant is stored in the outer container. Dip tubes are employed so that the dispensing package may be operated in the upright position. For dispensing, the valve stem is depressed to open the valve assembly and initial movement of the valve stem is resisted, but after initial movement resistance is reduced, and the assembly moves to the fully open position so that mixture of the materials from the

inner and outer containers may be dispensed in proportions as determined by the dimensions of the port from the inner container through the valve stem wall and the port from the outer container through the valve housing for flow in a mixture through the second port in the valve stem wall to the discharge passage. A suitable valve actuator device may be used with this valve assembly and may be mounted directly on the valve stem for example.

In a particular embodiment of the invention, the valve assembly features an annular sealing member which surrounds the valve stem and provides a seal of an orifice through the stem and a ledge extending radially from the stem that engages the underside of the sealing member. Radially outward from the ledge portion is a flange surface that is spaced from the under surface of the sealing member to provide a surface on which pressure within the package acts downwardly on the stem to facilitate operation of the valve assembly. This valve assembly is designed to be filled through the stem and the ledge portions of the stem acting against the underside of the gasket assist in returning the inner portions of the seal member to their initial position after the charging operation or operation of the valve in a dispensing operation.

Other objects, features and advantages of the invention will be seen as the following description of particular embodiments progresses in conjunction with the drawings in which:

FIG. 1 is a side elevational view, with parts broken away, of a dispensing package constructed in accordance with the invention;

FIG. 2 is a sectional view of the valve assembly employed in the dispensing package shown in FIG. 1;

FIG. 3 is a sectional view taken along the line 3—3 of FIG. 2 showing a configuration of the snap fingers employed in that embodiment;

FIG. 4 is an enlarged sectional view of a modified form of valve assembly suitable for use in a dispensing package of the type shown in FIG. 1;

FIG. 5 is an enlarged sectional view of still another modified form of valve assembly suitable for use in a dispensing package of the type shown in FIG. 1; and

FIG. 6 is a sectional view taken along the line 6—6 of FIG. 5 showing the snap ring employed in this embodiment.

DESCRIPTION OF PARTICULAR EMBODIMENTS

The dispensing package shown in FIG. 1 is of the general type shown in Nissen U.S. Pat. No. 3,241,722 and includes an aluminum outer container 10 that has an opening defined by bead 12 in its top wall 14 to which is secured a mounting cap 16 which in turn supports a valve assembly housing 18. The outer container 10 has a bottom wall member 20 on which is seated an inner container 22 in the form of a generally cylindrical, self-supporting, flexible walled bottle of low density polyethylene. Secured between the upper surface of valve housing 18 and the mounting cup 16 is an annular seal disc 24 of synthetic rubber such as Buna N or Neoprene that has an inner diameter of 0.149 inch and is 0.080 inch thick. A stem 26 projects upwardly from the housing and extends upwardly beyond the mounting cup 16 and has an actuator cap 28 positioned thereon. A package cap 30 encloses the actuator cap

28 and is seated on the upper wall 14 of the outer container. A dip tube 32 extends from valve housing 18 to the bottom of the outer container 10 and a second dip tube 34 extends from the valve stem to the bottom of the inner container 22.

Additional details of the valve assembly may be seen with reference to FIGS. 2 and 3. The valve assembly housing 18 is molded of an acetal resin (Delrin) and received within it a valve core stem 26 also molded of an acetal resin. At the upper end of the housing is a projecting ridge under which the wall of the mounting cup 16 is crimped to force the upper surface from housing 18 into gasket 24 to secure that gasket in place and to provide a seal at that point. A stub 40 projects from the lower portion of housing 18 downwardly at an angle of 45° and includes a bore of 0.090 inch diameter in which dip tube 32 is inserted. A metering orifice 44 of 0.028 inch diameter connect tube 32 with the interior of housing 18. The lower portion of stem 26 extends through port 46 in the lower wall of housing 18 and a bead 48 which defines a surface of 0.168 inch diameter engages the wall of stem 26 to provide a seal at that point. Projecting upwardly from lower wall housing 18 are a set of six snap fingers 50 as indicated in FIG. 3 which extend in a circle around port 46. Each finger has an inner tip 52, which tips are located at a diameter of 0.173 inch. Above tip 52 is inclined surface 54 disposed at an angle of 30° to the horizontal and below tip 52 is a ramp surface 56 which is inclined at an angle of 60° to the horizontal.

Stem 26 has an upper bore 60 which defines a discharge passage of 0.090 inch diameter and a lower bore 62 that is coaxial with upper bore 60 and of the same diameter which receives a dip tube 34. A barrier web 64 disposed at an angle as indicated in FIG. 2 separates bores 60 and 62. A port 66 of 0.031 inch diameter provides communication with discharge passage 60 and a port 68 of 0.014 inch diameter provides a metering passage for dip tube 34. Ports 66 and 68 are located so that the center line of port 68 is aligned with the lower wall of port 66, the center line of port 66 being 0.015 inch above the center line of port 68. Below ports 66 and 68 is a continuous annular ledge 70 of 0.025 inch width and flange 72 of 0.310 inch in diameter which has an upper surface spaced 0.030 inch below the upper surface of ledge 70. Below flange 72 is a stop surface 74 formed at the base of a section of 0.230 inch diameter. The stem diameter next decreases from 0.185 inch to 0.170 inch at transition (latch) surface 76 which is inclined at an angle of 30°. The stem diameter at its lower end 78 is 0.159 inch. Dip tube 34 is inserted into the lower end of bore 62 and the tubular neck 80 of inner container 22 is secured on the lower portion of stem 26 as indicated in FIG. 2.

It will be seen that all the components of the dispensing package may be inexpensively manufactured by mass production techniques. In assembling the dispensing package, the stem 26 and spring 84 are inserted into the housing 18 and the mounting cup 16 and gasket 24 positioned so that the mounting cup may be crimped into the position shown in FIG. 2 to secure the assembly together. Dip tubes 32 and 34 are secured to the housing and stem respectively and the inner container 22 with its ingredient stored therein is secured on

the lower portion of stem 26. The outer container 10 is filled with its ingredient and the inner container and valve assembly mounting cup is inserted through the opening defined by bead 12 in the upper wall 14 of the container 10 and the mounting cup assembly crimped to that bead 12 to provide a sealed container. In this position the bottom of container 22 may be seated on the bottom of container 10 (as indicated in FIG. 1) so that the upper wall of container 22 may provide a biasing force to maintain the seal between the lower end of stem 26 and neck 80 of the container 22.

A suitable pressure generating propellant is introduced into the outer container 10 under pressure through the valve assembly. In this mode the stem 26 is forced downwardly in an axial direction against the biasing force of spring 84 to open orifice 66 so that propellant flows into the outer container 10.

In this dispensing package, the pressure of the propellant in the outer container is applied against the flexible wall of the inner container to the ingredient stored therein. To dispense a mixture of the two ingredients, stem 26 is moved axially downwardly under manually applied pressure. To produce this axial movement the latch provided by the cooperation of the tips of fingers 50 and the latch surface 76 must be overcome. As soon as the latch is released, the resistance to axial movement is sharply reduced so that under manual force the stem moves rapidly downwardly to open first the inner container metering orifice 68 to allow the ingredient from the inner container to flow into the mixing chamber defined by housing 18 and immediately thereafter to open the discharge orifice 66 so that a mixture of the ingredients from the inner and outer containers flows through orifice 66 and discharge passage 60 to the discharge structure for dispensing in stable condition ready for use. In a modified embodiment the lower edges of orifices 66 and 68 are located in the same plane so that both orifices open at the same time. It will be noted that the pressure differential on the surfaces of the valve stem tend to force the valve stem upwardly to its closed position but this force is reduced due to the exposed upper surface area of flange 72 and thus has less resistance to axial movement due to container pressure. When the valve stem 26 is released, the spring 84 and propellant pressure returns the stem to its upper position closing ports 66 and 68. Ledge 70 carries the inner edge of gasket 24 upwardly to return it to its initial position providing a seal of ports 66 and 68.

Another embodiment is shown in FIG. 4. In describing this embodiment, components similar to those shown in FIG. 2 will be identified by a primed reference numeral. Thus this embodiment includes a mounting cup 16', a valve housing 18', an inner container 22', and a valve stem 26'. Components 18', 22' and 26' are molded of suitable organic plastic material. The valve stem has a barrier 64', a discharge port 66' and a metering port 68'. Port 68' is sealed from the chamber defined by housing 18' by a valve ridge 90 which engages the under surface of gasket 24'. Formed in valve housing 18' is an upstanding annular ridge 92 which provides a stop surface engaging cooperating stop surface 74' on stem 26'. Depending from housing 18' is a ring 94 which includes a latch surface that engages and cooperates with ridge 96 on the stem to provide a struc-

ture for resisting initial downward movement of stem 26'. Ridge 48' engages the wall of stem 26' and provides a seal at that point. Ring 94 includes an upper latch surface 52' and a lower ramp surface 54' which provide a differential in resistance of this latch structure between downward movement of stem 26' in an opening operation and upward movement of the stem in a closing operation.

Still another embodiment is shown in FIG. 5. In describing this embodiment, components similar to those shown in FIGS. 2 and 4 will be identified by a doubly primed reference numeral. This embodiment includes a mounting cup 16'', a valve housing 18'', and inner container 22'', and a valve stem 26''. Components 18'', 22'' and 26'' are molded of a suitable organic plastic material, preferably one having good sealing properties such as polyethylene. The valve stem has a barrier 64'', a discharge port 66'', and a discharge port 68'', the ports 66'' and 68'' having their lower edges located in the same plane so that both ports open at the same time. Both port 66'' and port 68'' are sealed from the chamber defined by housing 18'' by a valve ridge 90'' which engages the under surface of gasket 24''. Stem 26'' has a latch surface 76'' which is inclined at an angle of 30° to the horizontal. A snap ring 97, formed of a high-snap (harder and more resilient) material such as an acetal resin, has an annular base structure 98, about which are peripherally spaced a set of six axially extending snap fingers 50''. Each finger has an inner tip 52'', including an inclined surface 54'' disposed at an angle of 30° to the horizontal, and a ramp surface 56'' inclined at an angle of 60° to the horizontal. The snap ring 97 thus provides, with surface 76'', structure for resisting initial downward movement of valve stem 26''. A depending skirt 99, formed integrally with valve housing 18'', engages the lower end 78'' of valve stem 26'' to provide a seal. A dip tube may be sealed within valve stem 26'' if desired.

Other forms of resistance structures may be employed to provide a "snap" type of action so that the metering proportioning of the ingredients for mixing and discharge is not distorted as might occur if only a small part of metering port 68 or 68' was opened.

While particular embodiments of the invention have been shown and described, various modifications thereof will be apparent to those skilled in the art and therefore it is not intended that the invention be limited to the disclosed embodiments or to details thereof and departures may be made therefrom within the spirit and scope of the invention as defined in the claims.

What is claimed is:

1. A dispensing package for mixing two materials to be dispensed and to be maintained separate prior to dispensing comprising:

structure defining first and second compartments, a valve assembly secured to said compartment structure,

said valve assembly including a first valve controlling flow of material between said first compartment and a discharge passage, a second valve controlling flow of material between said second compartment and said discharge passage, and a stem extending outwardly of said package that defines a passage for discharging a mixture of the materials stored in said compartments to the atmosphere,

said stem being axially movable between a first position in which both of said valves are closed and a second position in which both of said valves are open, and

structure cooperating with said stem for providing resistance to initial movement of said stem from said first position towards said second position in a valve actuating and material dispensing operation, said movement resistance structure including a latch surface and a ramp surface and providing greater resistance to the movement of said stem away from said first position than to return of said stem to said first position, said latch surface being disposed at a greater angle to the direction of movement of said stem than said ramp surface, and said movement resistance being reduced as soon as said stem has moved away from said first position so that said valves are opened with snap action.

2. The dispensing package as claimed in claim 1 wherein said stem includes a latch surface and said movement resistance structure includes a latch member fixed to said package which engages said latch surface when said stem is in said first position.

3. A dispensing package as claimed in claim 1 wherein said movement resistance structure comprises an annular ring surrounding said stem.

4. A dispensing package as claimed in claim 3 wherein said ring is formed of a more resilient material than said stem.

5. A dispensing package for mixing two materials to be dispensed and to be maintained separate prior to dispensing comprising:

structure defining first and second compartments, a valve assembly secured to said compartment structure,

said valve assembly including a first valve controlling flow of material between said first compartment and a discharge passage, a second valve controlling flow of material between said second compartment and said discharge passage, and a stem extending outwardly of said package that defines a passage for discharging a mixture of the materials stored in said compartments to the atmosphere,

said stem being axially movable between a first position in which both of said valves are closed and a second position in which both of said valves are open, and

structure including a plurality of resilient fingers that engage a latch surface on said stem when said stem is in said first position for providing resistance to initial movement of said stem from said first position towards said second position in a valve actuating and material dispensing operation, said movement resistance being reduced as soon as said stem has moved away from said first position so that said valves are opened with snap action.

6. A dispensing package as claimed in claim 5 wherein said movement resistance structure comprises a separate ring member, arranged to surround said stem, said member having an annular base structure supporting said fingers.

7. A dispensing package as claimed in claim 6 wherein said fingers extend axially of said base structure and are peripherally spaced about said base structure.

8. A dispensing package as claimed in claim 6 wherein said ring is formed of a more resilient material than said stem.

9. A pressurized dispensing package for mixing two materials to be dispensed, said materials being maintained separate from one another prior to dispensing comprising:

a rigid outer container holding a first material, a second container holding a second material, a valve assembly secured to two said containers, structure defining a passage for discharging a mixture of the material stored in said first and second containers to the atmosphere,

said valve assembly defining a first valve for controlling flow of material between said first container and said discharge passage and a second valve for controlling flow of material between said second container and said discharge passage, and

a valve stem movable between a first position in which both of said valves are closed and a second position in which both of said valves are open, and an annular sealing member surrounding said stem and defining an annular seal,

said stem having a connector structure and said second container having a cooperating connector structure disposed in sealing relation to said connector structure of said stem, said second container being secured against the wall of said outer container so that a biasing force is exerted by said second container against said stem tending to maintain said stem in said first position, said stem defining a discharge passage at one end for discharging a mixture of the material stored in said first and second containers to the atmosphere and a second passage at the other end connected to one of said containers,

two orifices through the wall of said stem, one of said orifices communicating with said discharge passage and the other orifice communicating with said second passage, said orifices being located in axially overlapping position and both said orifices being sealed by said sealing member when said stem is in said first position, a valve housing providing guiding support for said stem and including a metering orifice for controlling the flow of material from said outer container to said discharge passage,

a latch surface on said stem and structure cooperating with said stem for providing resistance to initial movement of said stem from said first position towards said second position in a valve actuating and material dispensing operation, said movement resistance being reduced as soon as said stem has moved away from said first position so that said valves are opened with snap action, said movement resistance structure includes a latch member fixed to said package which engages said latch surface when said stem is in said first position.

10. The dispensing package as claimed in claim 9 wherein said movement resistance structure provides greater resistance to the movement of said stem away from said first position than to return of said stem to said first position.

11. The dispensing package as claimed in claim 10 wherein said movement resistance structure includes a latch surface and a ramp surface, said latch surface

being disposed at a greater angle to the direction of movement of said stem than said ramp surface.

12. The dispensing package as claimed in claim 11 wherein said movement resistance structure includes a plurality of resilient fingers, said fingers engaging a latch surface on said stem when said stem is in said first position.

13. The dispensing package as claimed in claim 12

wherein said stem further includes a radial flanges portion spaced from the lower edge of said sealing member to provide a surface on which pressurized material in said package acts to tend to move said stem in a downward direction from said first position towards said second position, and biasing means for maintaining said stem in said first position.

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