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HAND-HELD DISPENSER WITH DUAL VALVE

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Fig. 2

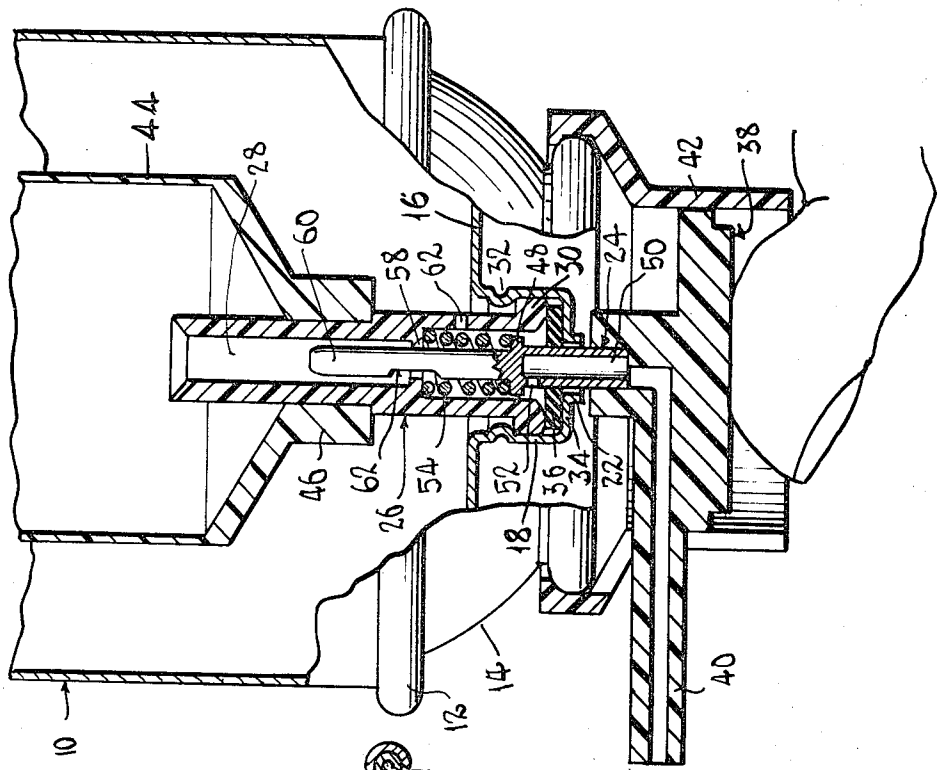
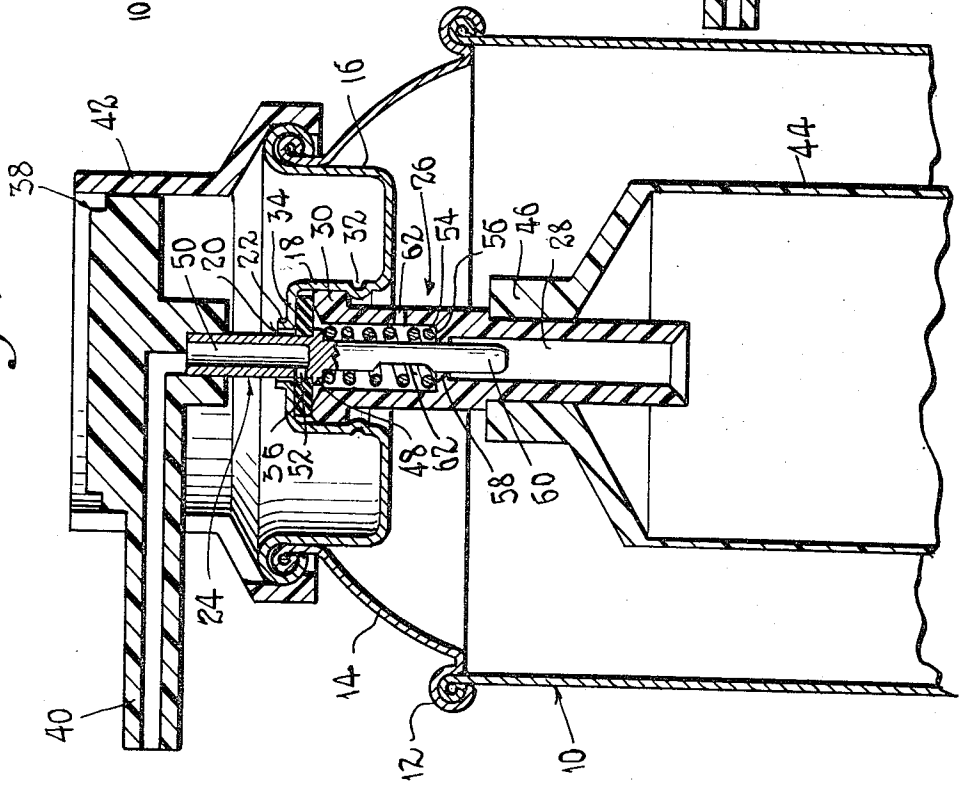


Fig. 1



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HAND-HELD DISPENSER WITH DUAL VALVE

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ABSTRACT OF THE DISCLOSURE

A dispenser with dual valve and multiple compartments, comprising a tubular valve housing having two annular seats, and a valve stem longitudinally movable in the housing and having valve portions for simultaneously closing and opening the seats. The housing has a side passage, and is at one end carried in the neck of a pressurized container in which there is also a flexible bag connected to the other housing end. Different liquids in the container and bag are mixed and discharged when the valve stem is shifted to open the valve seats.

RELATED PRIOR ART

U.S. Pats. Nos. 3,217,936, 3,272,389, 3,325,056, and 3,326,416.

BACKGROUND

This invention relates to small, hand-held pressurized dispensers such as are used for shaving cream and the like. The invention particularly involves a dispenser of the kind indicated, wherein several different liquids are stored and kept separate, these becoming mixed only at the valve means, during the dispensing action.

A prior dispenser of shaving lather, which effects a mixing of two separate liquids at the valve means to obtain a heating of the lather, is disclosed in U.S. Pat. No. 3,326,416. One liquid suitable for such use is hydrogen peroxide; the other liquid can contain sodium hypophosphite. The reaction of these results in an exothermic non-explosive decomposition of the hydrogen peroxide, supplying heat to lathering ingredients whereby the discharge comprises a heated, foam-forming mixture or lather. Potassium sulfite may be utilized, to react with the hydrogen peroxide, instead of the sodium hyophosphite.

Other mixing valve arrangements are shown in Pats. 3,217,936; 3,272,389; and 3,325,056. While the prior devices were operative in most circumstances and enjoyed various degrees of success, the valves and dispensers as shown were either complicated and costly, difficult to manufacture, not fully reliable when in extended use, or else lacked convenience of operation. The valve arrangements had, as a rule, a multiplicity of parts which necessitated considerable tooling, inventories, and assembly labor. Where the movements were complicated, or depended on critical values of resilience there ensued unreliability of operation, malfunctioning, etc. If critical dimensions were involved, there was in addition the matter of added cost.

SUMMARY

The above disadvantages and drawbacks of prior, mixing-type dispensers are obviated by the present invention, one object being to provide a novel and improved multiple-chamber dispenser and mixing valve therefor which is extremely simple and uncomplicated, having very few components characterized by simple, time-proved movements whereby there is achieved an especially low cost, and an improved and reliable performance.

This is accomplished by the provision of a molded plastic, tubular valve housing having internal axially-spaced annular valve seats, one end portion of the housing being secured in the mounting cup or closure of the pressurized container and the other end portion carrying, communicating with, and being sealed to the neck of a flexible bag disposed in the container. One of the annular valve seats constitutes part of a slide valve mechanism. A longitudinally movable valve stem in the housing has a tubular projecting end portion through which the discharge passes, and has a valve shoulder at the base of the tubular portion, said shoulder being engageable with the other of the valve seats. Another portion of the stem slidingly engages the said one valve seat to close off the same. Both seats are open when the valve stem is depressed, and for such condition flow occurs from the flexible bag axially through said other valve seat, and from the container area which is exterior to the bag, through a side wall passage of the valve housing into the latter to mix with the first-mentioned flow. The mixture passes out of the housing through said one valve seat and through the tubular end portion of the stem. The stem shoulder is an effective seal when the stem is not depressed. The valving member, comprising poppet and slide valve portions, is a single, simple molded piece. Besides such piece there is only the valve housing, a simple spring, and a washer-like valve seat member making up the valve assembly.

Other objects of the invention are to provide an improved mixing valve and dispenser as above set forth, wherein the likelihood of undesired leakage or mixing of the plurality of liquids is greatly minimized if not completely eliminated, and wherein only one of the valve devices, namely the poppet portion of the valve stem, is called on to withstand relatively high uni-directional pressures as effected in the container by the pressurized substance.

Other features and advantages will hereinafter appear.

In the drawings:

FIG. 1 is an axial sectional view of the simplified mixing valve and multiple-compartment dispenser as provided by the invention. The valve device is shown in the closed or non-dispensing condition.

FIG. 2 is an axial sectional view like that of FIG. 1 but showing the dispenser inverted, with the valve in discharging position.

As shown, the hand-held dispenser and mixing valve of the invention comprises a relatively rigid, metal outer container or can **10** of a usual type, having a top shoulder **12** and neck portion **14**, the latter being spanned by a usual type of metal mounting cup **16**. The cup **16** has a raised central portion **18** of inverted cup-like configuration, provided with a central opening **20** in its transverse or top wall, the said opening having an upwardly drifted edge **22** and being of a size to slidably receive a vertical valve stem designated generally by the numeral **24**.

Within the container **10** and carried by the raised portion **18** of the mounting cup **16** thereof is a tubular molded plastic valve housing **26** having a stepped central bore **28**, and having at its upper end an annular exterior mounting flange **30** which is snugly received in the portion **18** of the mounting cup, and is retained therein by inwardly offset portions **32** of the cup.

Clamped between the top wall **34** of the cup portion **18** and the upper end of the valve housing **26** is a resilient diaphragm or valve washer **36**, having a central opening through which the valve stem **24** extends.

The upper portion of the valve stem **24** carries a usual type of depress button **38** having a discharge nozzle **40**, said button being guided in a stationary body **42** attached to the upper portion of the container **10**.

In accordance with the invention, the valve stem **24** and housing **26** with the valve washer or seat **36** are so constituted as to comprise a dual mixing valve including a positive shut-off poppet whereby, in conjunction with

a flexible and collapsible bag or compartment provided in the container **10**, there is effected in the housing a separation or else a mixing of two liquids, one from the container contents and the other from the enclosed compartment or bag.

Accordingly, there is provided a flexible and collapsible compartment or bag **44** having a neck portion **46** which is secured around the lower portion of the valve housing **26** so that the bore of the latter communicates with the interior of the bag **44**. Any suitable means may be employed to secure the bag **44** to the valve housing **26** in tight sealing relation therewith, as will be understood.

I have discovered that, contrary to what might be expected, the contents within the containers **44** and **10** can be effectively kept separated during non-use of the dispenser by means of a simple slide-type valve, whereby the dual-valve requirements of a dual-liquid dispenser of the kind illustrated herein can be filled by use of a simple, one-piece molded valve stem like the stem **24**, thereby simplifying greatly the valving structures and reducing considerably the cost of the same. The combined poppet and slide-type valve as thus provided by the invention is constituted in the following manner:

Cooperable with the valve washer **36** is an annular exterior shoulder or poppet portion **48** provided intermediate the ends of the valve stem **24**, said stem having an upper portion **50** of tubular configuration located above the shoulder **48**, and having a side passage **52** in the wall of the portion **50**, immediately adjacent the valve shoulder. A valve return spring **54** engages the shoulder **48** and also an interior annular shoulder **56** in the valve housing, thereby to bias the valve stem **24** upward as viewed in FIG. 1, maintaining the shoulder **48** in engagement with the valve washer **36** whereby the valve is closed, preventing egress of the contents of the container **10** and bag **44**.

Adjoining the shoulder **56** in the valve housing **26** is an annular valve seat or slide-valve portion in the form of an integral bead **58**, which is engageable with a lower cylindrical slide valve or portion **60** of the valve stem **24**, thereby to close off the bore of the valve housing at said point and prevent passage of liquid upward from the flexible bag **44**.

The valve stem **24** has a side depression **62** located above the cylindrical slide valve portion **60** as seen in FIG. 1, which is adapted to be disposed within the annular valve seat or bead **58** when the valve stem is depressed or forced inward as illustrated in FIG. 2. For such position, the side passage **52** of the tubular portion **50** of the valve stem **24** will be disposed within the valve housing **26**, and accordingly a passage is thus provided whereby the contents of the flexible bag **44** can be discharged upward through the housing **26**, past the lower portion of the valve stem **24**, inwardly through the side passage **52** thereof and up through the tubular upper portion **50** of the stem, to be discharged from the nozzle portion **40** of the depress button **38**.

The valve housing **26** also has a side passage **62** by which communication is established between the interior of the container **10** and the interior of the valve housing **26**. Accordingly, when the valve stem **24** is depressed as illustrated in FIG. 2, the contents of the container **10** may also be discharged, such contents flowing inward through the side passage **62** into the interior of the valve housing **26** and (at such location) mixing with the liquid which is flowing upward from the flexible bag **44**.

The mixture of these liquids will then pass through the side passage **52** of the valve stem, and upward through the tubular portion **50** to be discharged from the nozzle **40** of the depress button **38** as a mixture.

Where the dispensing device is intended to dispense a warm lather of foam, the flexible bag **44** may contain hydrogen peroxide. A lathering mixture may be provided in the container **10**, made up of various ingredients. Such lathering mixture, in addition to soaping, foaming and softening agents, may contain as an example sodium hypophosphite; or instead it may contain potassium sulfite. Such substances, when mixing with the hydrogen peroxide flowing upward from the flexible bag **44**, causes a chemical reaction which results in an exothermic non-explosive decomposition of the hydrogen peroxide whereby heat is produced and supplied to the mixture so that the discharge from the nozzle **40** of the depress button **38** is in the form of a heated foam or lather.

It will be understood that the contents of the container **10** may be pressurized by the addition of any suitable non-reactive, pressurizing agent, as for example a 40/60 mixture of dichlorofluoromethane and symmetrical dichlorotetrafluoroethane. Other propellant substances may be used, as well, their use being well known in the art.

Accordingly, the contents of the container **10** will effect a pressurizing of the same, and such pressure will be transmitted to the flexible bag **44**, causing a collapsing action of the same and effecting an internal pressure to which the hydrogen peroxide in the bag is subjected. In consequence, when the valve stem **24** is depressed as illustrated in FIG. 2, the pressurized liquids in the container **10** and bag **44** will result in the contents thereof being discharged through the valve housing **26**, upper valve stem portion **50** and discharge nozzle **40**.

It will be understood that for the non-discharging position of FIG. 1, the pressure within the container **10** will at all times be transmitted to the contents of the flexible bag **44**, tending to discharge the contents of the same upward through the valve housing **26**. Such pressure will be manifested at the underside of the annular valve seat **58**, considering FIG. 1. However, a corresponding and opposite pressure will be manifested within the valve housing **26** in a downward direction against the valve seat **58**, due to the communication which exists between the interior of the housing and the interior of the container **10**.

Accordingly, the only valve device which is called upon to withstand the total pressure existing in the dispenser comprises the valve shoulder or poppet portion **48** of the valve stem, cooperating with the valve disk or washer **36**. Due to the pressure equalization at the seat **58** I have found that, contrary to what might be expected, the simple slide-type valve comprising the stem portion **60** is wholly effective in keeping the two liquids of the dispenser completely separated for all practical purposes. Such arrangement is not only especially simple, but has been proved to be particularly effective and leakproof over a period of years.

The neck portion **46** of the collapsible bag **44** is seen to have a thick section, said neck portion being adjacent the internal shoulder **58** of the valve housing and encircling the lower housing portion **28** whereby it reinforces the latter and minimizes the likelihood of the portion **28** and shoulder **58** becoming enlarged or increasing in diameter.

Thus, the neck portion **46** of the bag **44** tends to minimize leakage past the stem portion **60** of the valve.

It will now be seen from the foregoing that I have provided an especially simple yet effective dual or mixing valve arrangement in conjunction with a dispenser having multiple compartments containing liquids which are kept separate from each other and which mix within the valve housing **26** upon the occasion of the valve stem **24** being held in the depressed position.

Relatively few parts are involved in the valving device, comprising essentially the molded housing **26**, molded valve stem **24**, valve return spring **54** and valve washer or disk **36**. Inasmuch as the valve washer **36** is rigidly affixed to the upper end of the valve housing **26** it is considered as being a part of such valve housing, and in such connection the raised portion **18** of the mounting cup **16** may be considered as not only a supporting device for the valve housing, but also as a clamping device which

permanently secures the valve disk **36** against the end of the valve housing.

The valving arrangement which is shown involves a simple straight-line movement of the valve stem, said stem being fully guided against tilting, jamming, etc. whereby especially reliable operation is had. Normally, no leakage or seepage occurs past the valve seat **58** by virtue of the equal and opposite pressures existing above and below said seat. Therefore, the valve comprising the seat **58** and cylindrical portion **60** of the stem need not be especially tight or leakproof, but instead can utilize a sliding fit involving moderate pressures or forces.

The overall organization of dispenser and mixing valve device employs a minimum number of parts, said parts being economically producible and readily assembled, as will be understood.

Variations and modifications may be made within the scope of the claim, and portions of the improvements may be used without others.

I claim:

1. A hand-held mixing-type dispenser comprising a dual valve construction, said construction comprising, in combination:

(a) a tubular valve housing having a pair of axially spaced apart annular valve portions concentric with the valve housing and through which liquid passes in flowing through the housing, said housing further having a passage through its side wall intermediate said valve portions,

(b) a valve stem axially slidable in the valve housing and passing through both valve portions, said stem having a tubular portion projecting from one end of the housing and through one of said annular valve portions, and having a first valve means comprising an annular poppet valve engaged with said one valve portion to close the same,

(c) said tubular portion of the valve stem having a side passage adjacent the poppet valve of the stem, adapted to be disposed inside the housing when the stem is depressed, thereby to conduct liquid from the interior of the housing into the tubular stem portion,

(d) second valve means on the valve stem, comprising a slide valve portion slidable along the other of the annular valve portions, for blocking the flow of liquid through said other portion when the poppet valve of the stem closes said one annular valve portion,

(e) said second valve means enabling liquid to pass into the valve housing through said second annular valve portion when the side passage of the valve stem becomes disposed inside the valve housing as the stem is depressed,

(f) asid valve stem having a side depression adjacent said second valve portion, which is disposed within the said valve portion when the valve stem is in its depressed position,

(g) said second annular valve portion comprises an internal shoulder in the valve housing,

(h) a flexible collapsible bag having a discharge, neck portion secured around the valve housing to discharge its contents at said second annular valve portion, and

(i) a rigid pressure-resistant container enclosing said bag and valve housing, said container having a neck portion secured to the valve housing at a location near the said one annular valve portion,

(j) said side passage of the valve housing being closely adjacent said neck portion of the container,

(k) the neck portion of the collapsible bag encircling the valve housing at a location adjacent said internal shoulder, thereby to reinforce the lower portion of the valve housing and reduce the likelihood that said lower housing portion and shoulder will enlarge in diameter and circumference.

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U.S. Cl. X.R.

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