AEROSOL MECHANICAL BREAK-UP NOZZLE INSERT

Inventor: John Richard Focht, Yonkers, N.Y.
Assignee: Precision Valve Corporation, Yonkers, N.Y.

Filed: Sept. 18, 1970
Appl. No.: 73,537

U.S. Cl. ........................................ 239/491, 239/579
Int. Cl. ...................................... B05b 1/34
Field of Search .............................. 239/490, 491, 492, 493, 579; 222/402.13

References Cited
UNITED STATES PATENTS
2,080,264 5/1937 Gray........................... 239/492 X

FOREIGN PATENTS OR APPLICATIONS
144,348 6/1920 Great Britain.................. 239/493

Primary Examiner—M. Henson Wood, Jr.
Assistant Examiner—John J. Love
Attorney—Davis, Hoxtle, Faithful & Hapgood

ABSTRACT
An insert for adapting the product passage of a conventional aerosol dispenser actuator comprises a hollow pin member and an overfitting cap member which together form a swirl chamber and feed passages for mechanical nebulization purposes.

3 Claims, 7 Drawing Figures
The present invention is concerned with a two-piece mechanical break-up nozzle which may be inserted into the dispensing orifice or spout of a side variety of aerosol dispenser actuators to adapt the actuator to provide the well known fine particle spray characteristics of a mechanical break-up nozzle.

Aerosol materials comprise mixtures of an active ingredient or product and a propellant medium. In many such materials, the product propellant are mutually soluble such that dissolved liquid propellant is present in the emerging stream. The dissolved propellant readily evolves as vapor from the stream upon exposure of the stream to the comparatively low pressure of the atmosphere. The rapid evolution of vapor from the product causes the stream to disintegrate into a spray of fine droplets. For such soluble systems a simple orifice will produce adequate sprays. In other aerosol materials, the product and propellant components are not mutually soluble.

For example, aqueous products are not mutually soluble with the popular chlorinated-fluorinated hydrocarbon propellants. In such soluble systems, the product stream contains little or no propellant in a liquid state. There is no evolution of vapor from the product stream. Thus, spray droplets must be formed by mechanical nebulization means in the flowpath proximate the nozzle. Because of the distribution problems arising in insoluble systems in which the product is a suspension of solid, semi-solid, or discrete liquid particles in the propellant medium.

The present invention is concerned with mechanical break-up devices which can be adapted to fit aerosol dispenser actuators to adapt these actuators for spray dispensing where mechanical break-up means are desirable. These and other objects will be apparent from the following description when read in the accompanying drawings wherein:

FIG. 1 is an elevational view in cross-section of a pressurized dispenser with an aerosol dispenser actuator including the mechanical break-up nozzle insert of the present invention;

FIG. 2 is a perspective view of the pin and cap components of the mechanical break-up nozzle of the present invention in disassembled form;

FIG. 3 is an elevational view in section of the cap and the pin portions assembled to form a mechanical break-up nozzle insert means;

FIG. 4 is an elevational view of the pin component taken from the plane 4--4 of FIG. 6;

FIG. 5 is an elevational view in section of the pin component taken along the plane 5--5 of FIG. 6;

FIG. 6 is a top view of the pin component portion; and

FIG. 7 shows the nozzle assembly installed in a dispenser actuator similar to that of FIG. 1 except that the entire nozzle assembly including the cap component is received within the dispensing passage.

Referring now to FIG. 1, the mechanical break-up nozzle assembly of the present invention is constituted by the assembly of stem or pin member 10 and cap member 26. This assembly is frictionally retained in the dispensing passage 7 of a valve actuating dispenser cap 1. The actuator cap 1 is snap fitted and frictionally retained on a rolled seam which is conventionally employed to secure a valve actuating cup 4 in the mouth of an aerosol pressure container C. The container C contains a product P under pressure provided by a conventional chlorinated-fluorinated hydrocarbon propellant. The product and propellant may or may not be mutually soluble. A valve 5 controls release of the pressurized product P from the container C. A product education or dip tube D is employed to convey product from the bottom of the container to the valve. The valve 5 is surrounded by a hollow valve stem 6 which fits within a valve stem receiving socket 13 on the underside of actuator cap 1. The valve stem receiving socket 13 is in communication with the product passage 7 of the cap. In the illustrated form, the valve is actuated by downward finger force on hinged tab of portion 9 of the cap. Thus, when the tab 9 is depressed the valve 5 is opened to provide a path for product under pressure which path extends through the valve 5, the valve stem 6 and product passage 7 to the mechanical break-up insert assembly pin member 10 and thence through that member to be emitted as a spray of fine droplets through outlet orifice 32 of the cap member 26 of the insert assembly.

Referring now to FIGS. 2 and 3, FIG. 2 shows mechanical break-up insert assembly of the present invention prior to assembly of the cap member 26 on the pin member 10 and FIG. 3 shows the assembly. Pin member 10 includes an axial passageway 12 for flow of product. Axial passage 12 terminates in a pair of diametrically opposed lateral apertures 16 and 18. Apertures 16 and 18 communicate with axial grooves or slots 20 and 22 which are arranged to provide feed paths tangential to an axial swirl chamber 36. Cap member 26 includes an interior bore 30 into which the upper portion of the pin member 10 is received. A discharge orifice 32 extends through the end wall of the cap member to communicate with the swirl chamber 36. An annular collar 24 integral with pin member 10 is received in an annular recess 28 in the cap member 26 to assist in securing the cap member on the stem member. A clearance 34 exists above the upper surface of the annular collar 24 to allow for flush seating of the upper end surface of the pin 10 against the inner surface of the end wall of the cap member 26. This insures that all of the product will flow through the tangential feed portions of grooves 20 and 22 to enter the swirl chamber 36 tangentially.

Referring now to FIGS. 3 through 6, the flow of product through the assembly of pin member 10 and cap member 26 is indicated by arrows. The product traverses the axial passage 12 of the pin member 10 to emerge through transverse apertures 16 and 18. The axial passage 12 is terminated by an end wall 14 which is a part of the pin member. The bore 30 of cap member 26 cooperates with the upper portion of pin member 10 to form with axial slots 20 and 22 of the pin member a pair of axial passageways in communication with apertures 16 and 18. Product traversing these apertures travels axially through the passage formed by slots 20 and 22 and then is directly radially inward along the upper surface of pin member end wall 14. The portion of slots 20 and 22 through which this radial product flow occurs are tangential to a central axial swirl chamber 36.

FIG. 6 is an end view of the top of pin member 10 and shows the tangential disposition of the upper portion of slots 20 and 22 and shows by arrows how product flowing through these slots has imparted to it a circular swirling motion as the product enters the swirl chamber 36. Discharge orifice 32 in cap member 26 is coaxial with swirl chamber 36 of pin member 10 and in communication therewith. Product emerging from the discharge orifice 32 retains the swirling motion imparted to it by the tangential feeds and swirl chamber. The emergent swirling product centrifugally radiates as a conical spray of fine droplets.

FIG. 7 illustrates the application of mechanical break-up insert assembly of the present invention to conventional dispenser cap having a large diameter discharge passage 7. Such dispenser caps are common for dispensing foam products. The exterior diameter of the cap portion 26 of the insert assembly is sized to permit the admission and frictional retention of the insert assembly in the discharge passage 7. This is an alternative manner of application to that shown in FIG. 1 wherein only the stem portion 10 is received and frictionally retained in the discharge passage.

The present invention provides a mechanical spray break-up means which can be adapted to be fitted to a wide variety of standard dispensing buttons, caps and actuators. It provides a simple economical means for converting existing caps to provide for mechanical break-up of the product. It permits the conversion of existing caps intended for dispensing viscous or foam products into caps suited for spray dispensing. Both of the pieces which constitute the insert assembly are easily molded from conventional plastic using dies having minimal complexity.

I claim:
3,669,359

1. In combination, a valve actuator for a pressurized aerosol dispenser, the valve actuator having a discharge passage, a mechanical nebulization nozzle assembly insert positioned in the discharge passage, said nebulization nozzle assembly insert including a hollow pin member of molded plastic dimensioned to be received in the discharge passage and a cap member of molded plastic fitted over the outer end of the pin member, the cap member including an axial discharge orifice, the pin member including a central axial product passage terminated by a transverse wall near the outer end of the pin member, the outer face of said wall having formed thereon a central swirl chamber depression and feed grooves tangential to said swirl chamber, the central axial product passage being in communication with the radial extremities of the feed grooves, said cap member being in the form of an inverted cup with the discharge orifice in the end wall of the cap and coaxial with the swirl chamber, the cap interior surface cooperating with the feed grooves and swirl chamber depression to form a discrete chamber and passages.

2. The combination of claim 1 wherein the pin member is adapted to be frictionally retained in the discharge passage of the valve actuator such that the cap member is exterior of said discharge passage.

3. The combination of claim 1 wherein the cap member is adapted to be frictionally retained in the discharge passage of the valve actuator such that substantially all of the insert assembly is interior of said discharge passage.

* * * *