Aerosol Dispenser Valve

A valve for dispensing a mixture from plural ingredient compartments in an aerosol dispenser. The valve has a hollow main body provided with a pair of passages each communicating respectively with a separate ingredient compartment within the container. A closure element in the form of a disc and integral discharge tube is mounted slidably in the valve body and spring means normally urge the disc against the outlet openings of the passages in closure condition of the valve. By depressing the discharge tube and its connected disc, the valve is opened to allow discharge from the passages into a mixing chamber in the valve from whence the product mixture enters the discharge tube through orifices therein for discharge from the dispenser.
AEROSOL DISPENSER VALVE

BACKGROUND OF THE INVENTION

Pressurized or aerosol-type dispensers for the dispensing of mixtures comprised of two or more ingredients are known. Most usually the valving means for releasing the ingredients from the respective compartments employ a slide-closing valving arrangement. To ensure reliability in service and practicability for mass production, such a valve must be of a reasonably low nature, and hence the fit of the mating parts not too tight. This has a drawback in that an opportunity for leakage of the ingredients from the compartments during non-use exists notwithstanding the fact that the valving means is in fully closed condition. Moreover, the spring devices which are commonly employed for biasing the valve mechanism to close condition are usually disposed in structure which exposes them to the ingredients being dispensed. In time these spring devices can become corroded or dirtied to such degree as to render positive operation of the valve means difficult if not impossible with the consequence that the dispenser may have to be discarded while still filled with an appreciable quantity of usable product. Finally, such known valving means as have been employed for releasing two or more ingredients from the same container are unnecessarily complex, and hence expensive to make thereby making them undesirable for use in inexpensive throw-away-type dispensers.

THE PRESENT INVENTION

The present invention relates to a valve construction for use on pressurized or aerosol-type dispensers. It is particularly concerned with the provision of a valve for use where two or more ingredients must be released from corresponding separate compartments within the container to provide a product mixture at the dispensing nozzle of the container. In accordance with the present invention the valve comprises a valve body mounted in the main container of an aerosol-type dispenser and is provided with a first encircling wall portion enclosing a central space and a second portion extending radially inwardly from the first portion at one end, the second portion also having a passage therethrough which communicates with the central space. A closure element is received in the valve body and includes a disc slidable in the central space and a discharge tube fixed to the disc and slidable within the valve body second portion passage, the discharge tube extending outwardly from the container. The valve body first portion is provided with at least two axial passages which communicate with radially inwardly directed branch passages formed in the valve body second portion, the latter outlying in a seat surface of the second portion facing the central space of the valve body first portion. The axial passages of the valve body first portion communicate by means of dip tubes or like conduits with the respective ingredient compartments within the pressurized container. The hollow central part of the valve body is provided with a transverse retainer plate fixed against downward movement within the body and upon which is supportingly received a compression spring, the compression spring receiving on its top the movable closure disc. The tolerance of fit between the disc and the central space of the valve body first portion is quite close to preclude product leakage from the upper face thereof around the disc periphery into the space containing the spring. The upper face of the closure disc is provided with an annular groove in which is received a resilient seal means such as an O-ring. A correspondingly shaped annular groove is provided in the seat surface of the valve body second portion, and such groove is in communication with the terminal branches of the product delivery passages formed in the valve body. In normal condition of closure, the closure element is biased upwardly so that the O-ring contained in the groove is received closely within the groove in the seat surface of the valve body second portion closing off the terminal branches of the body passages. The disc which is preferably formed integral with the delivery tube upon being displaced downwardly during dispensing uncovers the terminal branches of the passages and the product under pressure from both compartments is released into a product mixing chamber, i.e., the space defined and bounded by the seat surface of the valve body second portion and the upper face of the closure disc. Communication ports formed as openings in the discharge tube portion near its point of connection with the disc and which locate in the mixing chamber when the discharge tube is displaced downwardly, admit product to the central passage of such tube from whence the mixed-together ingredients now constituting the product being dispensed exit the dispenser. Upon releasing application of dispensing force to the discharge tube the spring returns the disc to its closure condition on shutting off flow through the terminal branches of the valve body passages. During the dispensing operation therefore there is no contact of the vital operable elements of the valve assembly and, more particularly, the spring with the product being dispensed such as would cause corrosion or sticky deposits thereon which would promote malfunction of the valve.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will appear more clearly from the following detailed description when taken in conjunction with the accompanying drawings in which:

FIG. 1 is an elevational view of an aerosol-type dispenser with which at least two product ingredients are dispensed as a single product mixture, the container being fitted with a valve body second portion passage, the discharge tube extending outwardly from the container. The valve body first portion is provided with at least two axial passages which communicate with radially inwardly directed branch passages formed in the valve body second portion, the latter outlying in a seat surface of the second portion facing the central space of the valve body first portion. The axial passages of the valve body first portion communicate by means of dip tubes or like conduits with the respective ingredient compartments within the pressurized container. The hollow central part of the valve body is provided with a transverse retainer plate fixed against downward movement within the body and upon which is supportingly received a compression spring, the compression spring receiving on its top the movable closure disc. The tolerance of fit between the disc and the central space of the valve body first portion is quite close to preclude product leakage from the upper face thereof around the disc periphery into the space containing the spring. The upper face of the closure disc is provided with an annular groove in which is received a resilient seal means such as an O-ring. A correspondingly shaped annular groove is provided in the seat surface of the valve body second portion, and such groove is in communication with the terminal branches of the product delivery passages formed in the valve body. In normal condition of closure, the closure element is biased upwardly so that the O-ring contained in the groove is received closely within the groove in the seat surface of the valve body second portion closing off the terminal branches of the body passages. The disc which is preferably formed integral with the delivery tube upon being displaced downwardly during dispensing uncovers the terminal branches of the passages and the product under pressure from both compartments is released into a product mixing chamber, i.e., the space defined and bounded by the seat surface of the valve body second portion and the upper face of the closure disc. Communication ports formed as openings in the discharge tube portion near its point of connection with the disc and which locate in the mixing chamber when the discharge tube is displaced downwardly, admit product to the central passage of such tube from whence the mixed-together ingredients now constituting the product being dispensed exit the dispenser. Upon releasing application of dispensing force to the discharge tube the spring returns the disc to its closure condition on shutting off flow through the terminal branches of the valve body passages. During the dispensing operation therefore there is no contact of the vital operable elements of the valve assembly and, more particularly, the spring with the product being dispensed such as would cause corrosion or sticky deposits thereon which would promote malfunction of the valve.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention is concerned with a valve for use in a pressurized or aerosol-type dispenser from which a plurality of ingredients are to be dispensed as a mixture thereof. In the preferred form depicted, the valve is described as being used in conjunction with the dispensing of a mixture comprised of two ingredient components. However, it will be apparent that the valve could be used for the dispensing of three or more ingredients with but minor modification to the valve to provide correspondingly additional separate passages in the valve body.

Referring to FIG. 1 there is shown an aerosol dispenser 10 of known construction and which includes a main body 12, a neck portion 14, which is provided with an upper opening for reception of a head seal member 16 to which can be connected the valve means 20 of the present invention. Also the dispenser may include a cap 22 provided with the customary nozzle 24 for the purpose of initiating and controlling the issuance of the product from the dispenser as a lateral discharge. Provided within the container 10 are two or more separate compartments 26,28 for receiving and storing under pressure the ingredients to be dispensed. In the depicted embodiment, the body of the container itself provides one compartment 26 whereas the second compartment 28 for storing the second ingredient can be provided in the form of a flexibly structure envelope 30 disposed in such manner as to be under the influence of the vehicle or carrier pressure contained in the larger compartment.
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With reference still to FIG. 1, the valve means 20 of the present invention is of relatively simple construction yet of optimum reliability incorporation, utilizes a minimum of moving parts and is such as to lend itself readily to mass production manufacturing. The valve includes a specially shaped main valve body which can be mounted or supported in the container in any suitable manner as for example from the seal plate 16, and which has a first encircling wall portion 30 in the form of a hollow cylinder, which encloses a central space 32. The valve body also includes a second portion 34, preferably integrally formed with the first portion 30 at one end of the latter and being made so as to extend radially inwardly and axially of the first portion 30 in the manner shown terminating in a section of relatively narrow diameter as at 36. The second portion 34 is provided with an axially extending bore 38 which extends completely through the second portion and communicates with the central space 32 of the first portion, the second portion being provided with a flat radial seat surface as at 40 which faces the central space 32 of the valve body first portion 30.

The valve also includes a closure element formed as a discharge tube 42 which is slidably received in the bore passage 38 and which is fixed to, but preferably made integral with a plate-like disc 44, the latter being provided with opposed faces 46,48 and being received and slidably within the central space 32 of the valve body first portion 30. The disc upper face 46 is intended to provide positive closure means for the passages which the respective ingredients transit during discharge from their associated compartments to the discharge tube 42. To that purpose the face 46 of the disc 44 is provided with an annular groove 50 in which is received and adhesively secured a resilient sealing element 52 provided preferably as an O-ring and adapted to be received in a correspondingly sized groove 54 formed in the seat surface of the valve body second portion 34.

For the purpose of conveying the ingredients from the compartments 26,28 conduits 60 and 62 are provided for communicating the valve with the respective compartments, such conduits commonly being known as dip tubes. The dip tubes 60,62, it will be noted, are conveniently received in suitable bored recesses 64 and 66 respectively formed at the lower end of the valve body first portion 30. The valve body first portion 30 is provided with a pair of generally diametrically located axially directed passages 70 and 72 which it will be noted continue into the second body portion 34 from whence they undergo a radial transition to form branch passage parts 74,76 respectively which in turn extend in short axial downwardly directed sections 78,80 respectively within the second body portion 34 so as to outlet in openings formed in the seat surface of the second body portion in the manner shown. The thus formed passages provide for selective unobstructed communication of the ingredient compartments 26,28 with the central space 32 of the valve body first portion 30.

The closure element of the valve is normally maintained in a closed position by means of a compression spring 82 received in the central space 32 of the valve body first portion on the underside of the closure element disc 44 or the face 48 remote from the valve body second portion seat surface 40. The spring 82 is retained in operative position within the valve body by means of a retainer plate 84 which in turn can be positioned by means of a snap-ring or keeper 86 to provide a generally fluid-tight seal between the space within which the spring is housed and the other compartments within the dispenser body.

Further understanding of the constructional features of the valve 20 will be had from a description of the manner in which it functions to release the ingredients from the respective compartments 26,28 for the purpose of dispensing a product mixture. The valve is shown in its closed position in FIG. 1. To dispense the product, a downwardly directed force is applied against the cap 22 and in turn causes retraction downwardly of the closure element in opposition to the upwardly biasing force of the spring 82. In moving away from the seat 40 of the valve body upper portion, the O-ring 52 thereby establishes free communication of the central space of the body first portion which is above the disc 44 (and which constitutes a mixing chamber 100) and the compartments containing the ingredients under pressure, and the ingredients thereafter flow through the dip tubes 60,62, the respective passages 70,72, 74,76 and 78,80 into such space. Access from the last-mentioned space to the central passage 90 of the discharge tube is provided by a number of orifices 92 formed in the discharge tube at the base thereof, i.e., the region of its juncture with the disc 44, the orifices locating in the mixing chamber 100 when the closure element moves downwardly. The ingredients thus enter the discharge tube in the manner shown in arrows in FIG. 2, become mixed and issue from the nozzle 24 of the cap 22. With release of the downwardly directed pressure applied to the cap 22, the spring 82 which was compressed under such force urges the closure element upwardly until the O-ring 52 seats in groove 54 and closes off the passes 78 and 80, the upward movement of the disc being such as to act like a piston for expelling all product from the mixing chamber 100 thereabove and providing a firm seating of the closure member.

As can be noted in FIG. 4 the orifices 92 formed in the stem can be plural in number to ensure access around the greatest possible expanse of the discharge tube to provide rapid entry of the ingredients into the discharge tube during dispensing. FIG. 3 depicts the manner in which the retainer plate 84 is held in the valve body first portion 30 by means of snap-ring 86. Furthermore, suitable seal means such as the gasket 94 can be received around the periphery of the retainer plate in a slot 96 provided for that purpose to thereby ensure a generally fluid-tight seal of the space in which is located the spring 82 to prevent its exposure to the ingredients contained within the dispenser compartment 22.

From the foregoing description it will be apparent that the valve of the present invention offers a number of advantages when used in aerosol-type dispensers. It is of uncomplicated construction, reliable in operation and conveniently and cheaply manufactured.

While there is above disclosed but one embodiment of the valve of the present invention, it is possible to produce still other embodiments without departing from the scope of the inventive concept herein disclosed, and accordingly it should be understood that all matter contained in the above description and accompanying drawings should be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A pressurized dispensing container for dispensing a mixture of product from at least two separate product ingredients contained in corresponding separate compartments within the container under pressure, a valve for controlling simultaneous release of said product ingredients from their associated components, said valve comprising a valve body mounted within said container and comprising a first encircling wall portion enclosing a central space, and a second portion extending radially inwardly of said first portion at one end of the latter, said second portion having a bore passage extending therethrough and communicating with said space, said second portion having a seat surface facing the central space of said first portion, a closure element including a disc slidably received in the central space of said first portion, said disc having a pair of opposed faces, one of said faces being juxtaposed to said seat surface and a discharge tube fixed to said disc and slidably received in the bore passage of said second portion and extending therefrom outwardly of said container,

the first portion of said valve body having a pair of axial passages formed therein, said conduit means communicating the last-mentioned passages with the separate compartments within said container, the second portion of the valve body having axial branch passages therein communicating with said axial passages, said radial branches having terminal parts outletting in openings in the seat surface of said second portion,
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springs means disposed in said central space at the face of said disc which is remote from said seat surface, resilient sealing means carried on said one face of said disc, said spring means normally urging said disc in the direction of said body second portion for urging said sealing means into closed position covering the openings in said seat surface, and a retainer plate received in the central space of said first portion at a location remote from said second portion for retaining said spring means in the latter and fluid-tightly sealing said space from communication with the ingredient compartments within said container, said discharge tube having at least one orifice extending therethrough adjacent its location of juncture with said disc, depression of said closure element in opposition to the force of said spring means retracting said disc and sealing means away from said seat surface thereby uncovering the openings in said seat surface and placing said orifice in communication with the central space of said first portion.

2. The valve of claim 1 wherein said resilient sealing means comprises an O-ring fixed to said disc.

3. The valve of claim 2 wherein said seat surface is provided with an annular groove for receiving said O-ring when said valve is in closed position, the openings in which the terminal parts of said radial branches outlet being disposed in said annular groove.

4. The valve of claim 2 wherein said disc is provided with an annular groove in which said O-ring is secured to said one face.

5. The valve of claim 1 wherein said retainer plate is fixed in said valve body first portion by means of a snap ring received in a groove formed on the inner surfaces of the valve body first portion.  

6. The valve of claim 1 further comprising means for providing a fluid-tight seal of said retainer plate with the inner surface of said valve body first portion.

7. The valve of claim 6 wherein said means for providing a fluid-tight seal comprises a gasket extending around the periphery of said retainer plate and engageable with the inner wall surface of said valve body first portion.

8. The valve of claim 1 wherein the conduit means communicating the valve body passages with the separate compartments comprises dip tubes connected with said compartments and received in bored openings in the encircling wall portion of said valve body, said bored openings communicating with the axial passages in said portion.

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