Nov. 3, 1964 F. VENUS, JR 3,155,290

AEROSOL VALVE

Filed Sept. 7, 1961 2 Sheets-Sheet 1

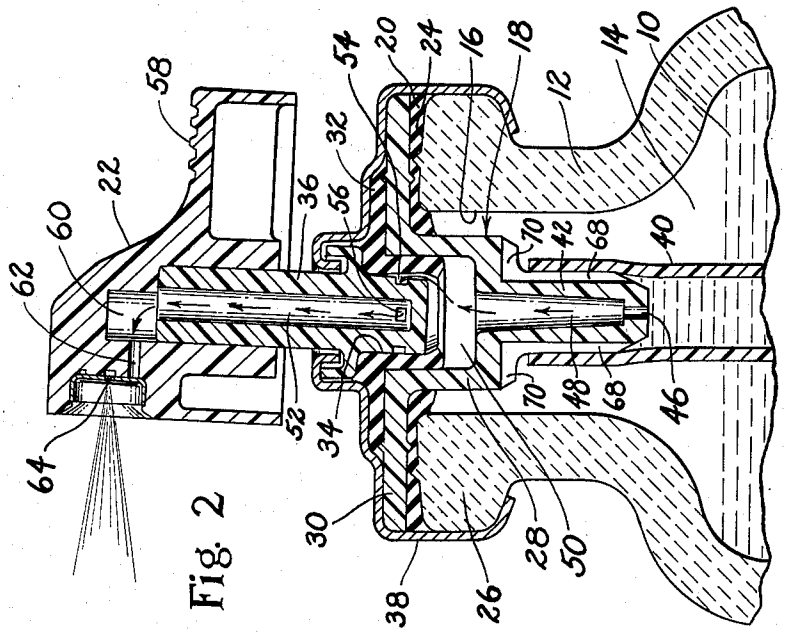


Fig. 2

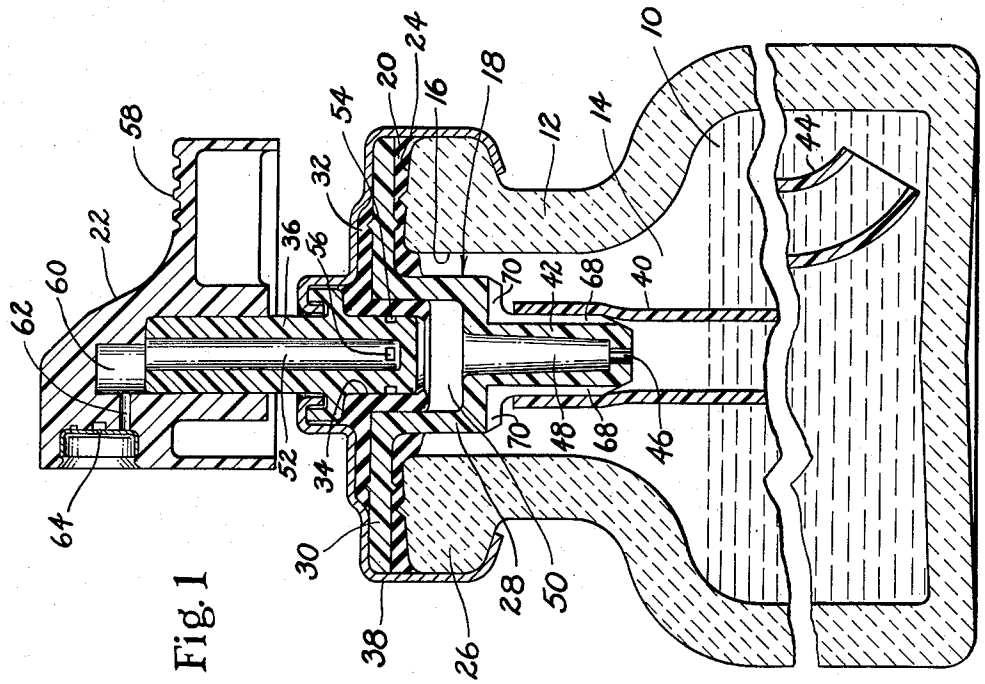


Fig. 1

INVENTOR.
Frank Venus Jr.
BY
Steward & Steward
HIS ATTORNEYS

Nov. 3, 1964 F. VENUS, JR 3,155,290

AEROSOL VALVE

Filed Sept. 7, 1961 2 Sheets-Sheet 2

Fig. 4

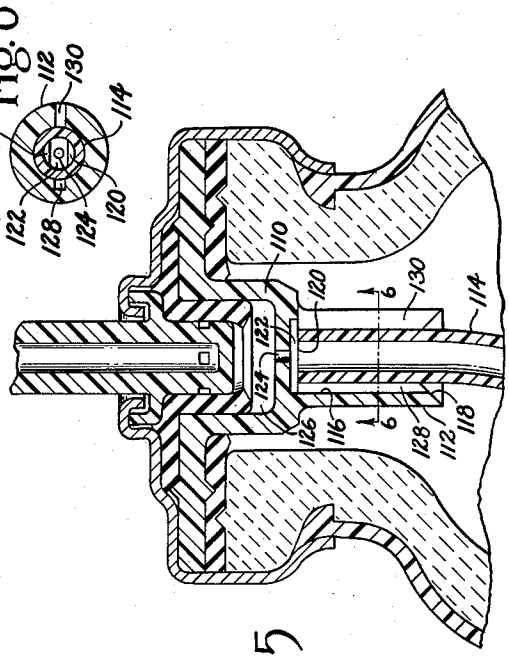


Fig. 6

Fig. 5

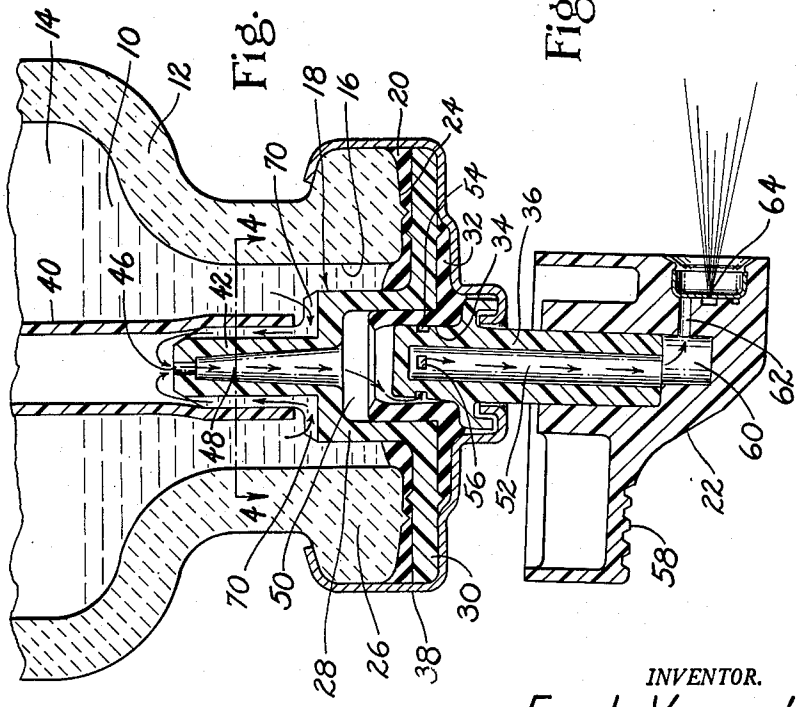


Fig. 3

INVENTOR.
Frank Venus Jr.
BY
Steward & Steward
his ATTORNEYS

United States Patent Office 3,155,290 Patented Nov. 3, 1964

3,155,290

AEROSOL VALVE

Frank Venus, Jr., Oxford, Conn., assignor to The Risdon Manufacturing Company, Naugatuck, Conn., a corporation of Connecticut

Filed Sept. 7, 1961, Ser. No. 136,542
3 Claims. (Cl. 222—394)

The invention relates to valves for pressurized aerosol packages in which a liquid product is confined within a container with a gaseous propellant under pressure.

It is customary in such packages to employ a container having a valve at the upper end thereof to control the discharge of the product from the can. The gaseous propellant normally occupies the space in the container around the valve and this space is commonly referred to as the head space. The liquid product normally occupies that portion of the container below the valve and the head space. A dip tube is fastened onto the valve and extends downwardly to a point adjacent the bottom wall of the container so as to provide a conduit through which the liquid product may be conducted to the discharge valve. When the valve is opened and the container is in a normal upright position the pressure of the gaseous propellant on the surface of the liquid product forces some of the liquid up through the dip tube to the valve where it is discharged from the container.

The dispensing of certain pressurized products, however, cannot always be accomplished conveniently with the container in an upright position. In the case of such products provision must be made for proper dispensing of the product from the container regardless of the container's position. Modification of the usual dip tube and valve construction is, therefore, necessary because in some positions of the container, for instance the inverted position, the liquid product falls below the lower end of the dip tube and has no way of getting to the valve.

Heretofore, various constructions have been resorted to to overcome this problem. In the main, these prior constructions have been such as to communicate the head space of the container with the interior of the discharge valve when the container is in an inverted position. However, all of said prior constructions known to me have been such as to require one or more secondary operations in the manufacture of the valves with the result that the cost of such valves is significantly greater than that of standard valves not so modified. Inasmuch as it is of the utmost importance that the package components be as inexpensive as possible since such packages are customarily used but once and then thrown away, the additional cost of the valve is objectionable.

The present invention, therefore, has for its object the provision of a discharge valve for a pressurized areosol package that will permit the liquid product to be discharged from the package regardless of the position of the container yet one that will not be significantly more expensive to manufacture than a standard valve.

For the purpose fo illustrating one way in which the invention may be made and used a presently preferred embodiment of the invention is shown in the accompanying drawings and this embodiment of the invention will be described in detail hereinafter. However, it is to be understood that the drawings and description are by way of example only and do not serve to define or restrict the scope of the invention, the claims appended hereto being relied upon for that purpose.

Of the drawings:

FIG. 1 is a transverse sectional view through a pressurized package showing the package in an upright position and the valve closed;

FIG. 2 is a transverse sectional view similar to that of FIG. 1 showing the valve in an open position;

FIG. 3 is a transverse sectional view showing the package in an inverted position and with the valve open;

FIG. 4 is a sectional view taken along the line 4—4 in FIG. 3 looking in the direction of the arrows;

FIG. 5 is a transverse sectional view showing a modification of the invention; and

FIG. 6 is a sectional view taken along the line 6—6 in FIG. 5 looking in the direction of the arrows.

Referring first to FIG. 1, there is shown a pressurized package in which a liquid product 10 is confined within a container 12 with a gaseous propellant that occupies the head space 14 in the container 12 above the surface of the liquid product when the package is disposed in its normal upright position. The container 12 is provided with an opening 16 at the upper end thereof and the opening 16 is closed off by a discharge valve, generally designated by the reference numeral 18, and by a resilient gasket 20 in a manner to be described hereinafter. An actuator 22 for the valve 18 is provided on the upper end of the valve and serves as an operating control member for the valve and also as a means for directing the discharge of the fluid product from the package. Valve 18 here illustrated is of the "toggle" type actuated by lateral pressure applied to the stem of the valve to effect release of the product for dispensing to atmosphere. The invention is however, equally applicable to vertically reciprocated aerosol valves, wherein the stem is depressed axially to open the valve for dispensing the product.

The container 12 may be made of metal, glass, plastic or any other suitable material as required; the container shown in the drawings being made of glass. To close off the opening 16 at the upper end of the container 12, there is provided an annular gasket 20. The gasket 20 seats on the upper surface 24 of the lip 26 of the container 12.

A generally cup-shaped valve body 28 having an annular flange 30 extends through and rests upon the annular gasket 24. A second or upper gasket 20 is disposed on the upper surface of the flange 30 and has a central opening 34 through which extends a valve stem 36. A soft metal cap 38 encloses the valve and gasket structure and is crimped over the lip 26 of the container 12 so as to compress the gaskets 20 and 32 into sealing engagement with their associated structures so as to prevent the escape of any fluid product between the flange 30 and the lip 26 of the container and between the valve body 28 and the valve stem 36.

The fluid product 10 in the container 12 is conveyed to the valve 18 by a dip tube 40 which is frictionally mounted at one end on the outer periphery of a tubular tailpiece 42 depending from the cup-shaped portion 28 of the valve body. The other end 44 of the dip tube 40 is disposed closely adjacent the bottom of the container 12. Tailpiece 42 has an inlet orifice and a central opening 46, 48 respectively, which communicates the dip tube 40 with the internal chamber 50 formed by the cup-shaped valve body 28.

Valve stem 36 has an internal passageway 52 that communicates by means of ports 56 with a peripheral groove 54 formed at the lower end of the valve stem 36. In the normal nonactuating position of the actuator 22, the groove 54 is sealed off from the chamber 50 by the gasket 32. If, however, downward pressure is applied to the finger portion 58 of the actuator 22, the valve stem 36 will be tilted and the groove 54 will be communicated with the chamber 50 by reason of the clearance between the valve stem 36 and the gasket 32 provided by the tilting of the valve stem. (See FIG. 2.) Fluid product will then flow from the chamber 50 outwardly through the passageway 52 in the valve stem 36, through the passages 60 and 62 in the actuator 22 and through the break-up orifice 64.

As long as the package is used with the container in an

upright position, or in some other position in which the lower end 44 of the dip tube 40 is covered by the fluid product 12, the discharge of the fluid product will take place as just described. However, when the container assumes an attitude in which the surface level of the liquid product 10 falls below the lower end 44 of the dip tube 40 the liquid product 10 cannot reach the valve 18. Accordingly, some alternative provision must be made to establish communication between the valve and the supply of fluid product.

In the present invention this alternative provision takes the form of one or more grooves 68, 68 formed in the outer periphery of the tailpiece 42 of the valve 18. As is shown in the drawings, two such grooves are preferred but any number of grooves may be employed as desired. The grooves 68, 68 are disposed in a direction substantially parallel to the longitudinal axis of the valve and extend substantially throughout the length of the tailpiece 42. By reason of its frictional engagement with the outer periphery of the tailpiece 42, the dip tube 40 covers the open side of the grooves 68, 68 so as to form with the tailpiece closed passageways communicating the head space 14 with the interior of the dip tube 40 adjacent the inlet orifice 46 for the valve, at the upstream side of the orifice.

Discharge of the product from the package occurs in the manner best shown in FIG. 3. Some liquid product will be trapped in the dip tube 40 upon inversion of the container 12 and this will be discharged first. When this supply is exhausted (the condition shown in the drawing) liquid product 10 will be drawn into the dip tube through the grooves, or closed passageways, 68, and will then pass out through the valve 18 as before. It will be noted that the grooves 68, 68 are continued laterally in the under surface of the cup-shaped valve body 28. The function of the lateral grooves 70, 70 so formed is to insure that the grooves 68, 68 will never be completely closed off by the dip tube 40. Inasmuch as the lateral grooves 70, 70 are located above the highest possible position of the dip tube 40 continuous communication between the head space 14 and the interior of the dip tube 40 is assured.

In this way discharge of the fluid product from the package is obtained regardless of the attitude of the container. Another feature of the invention is that intermixing of some gaseous propellant vapor with the fluid product is obtained since the gaseous propellant is almost constantly in communication with the dip tube by reason of the passageways 68, 68. This intermixing of liquid product with gaseous vapor is desirable in certain products, such as deodorants, that are applied to the skin. The additional vapor tends to diminish the cooling effect of the sprayed product on the skin.

A modified form of the invention is shown in FIG. 5. The valve structure shown therein is a type intended to be used with a so-called "capillary" type of dip tube in which the diameter of the dip tube is very small. Accordingly, the cup-shaped valve body 110 is provided with a tubular tailpiece 112 that is adapted to receive the dip tube 114 internally. An internal bore 116 is accordingly provided in the tailpiece 112 and the dip tube is press fitted into the bore of the tailpiece and frictionally retained therein. Insertion of the dip tube 114 into the bore of the tailpiece is facilitated by forming the mouth of the bore 116 with an outwardly extending flare or taper 118.

The dip tube 114 is inserted into the internal bore of the tailpiece 112 until it butts against a pair of shoulders 120, 120 formed at the upper end of the bore. A transverse slot 122 is provided between the shoulders 120, 120 at the upper end of the bore 116 and the inlet orifice 124 for the valve member is formed so as to communicate this slot 122 with the inner chamber 126 of the cup-shaped valve body 110. The interior of the dip tube 114 is thus communicated with the internal chamber 126 in the cup-shaped valve body.

The tailpiece 112 is also provided with longitudinally extending slots 128, 130 positioned at diametrically opposite points on the circumference of the internal bore 116. One or both slots may extend completely through the wall of the tailpiece 112 so that the liquid level in the bottle may communicate with the inlet orifice 124 even when it falls below the open end of the tailpiece 112 and the package is in its inverted position. In the form of the invention shown in the drawing, however, only one of the grooves 130 extends completely through the wall of the tailpiece.

The operation of this form of the invention is substantially the same as that set out in connection with the previously described embodiment. As long as the package is used in its upright position, liquid will be drawn up through the dip tube 114 and discharged out through the valve. When the package is used in its inverted position, liquid will be drawn through the slots 128, 130 in the tailpiece 112. In both situations a certain amount of vapor mixing will be obtained at the inlet to the valve by reason of communication of the headspace of the package with the interior of the dip tube through the slots or grooves 68, 70 and 128, 130 in the tailpieces of the respective valve bodies.

It will be noted that the aforementioned objects of the invention are achieved by means of a construction that requires no additional or moving parts. The only change made from standard valve design is the incorporation of the grooves 68, 68 and 70, 70 and 128, 130 into the tailpiece 42 and 112. No secondary operations, such as piercing, are required. The grooves may be molded into the valve body at the time it is formed.

What is claimed is:

1. A valve for a pressurized package containing a product to be dispensed under the pressure of a gaseous propellant normally occupying the head space of the package, said valve comprising a valve body defining an interior chamber, said valve body having a cylindrical portion adapted to receive a hollow dip tube, an inlet orifice on said cylindrical portion communicating the interior chamber with the dip tube, a continuously open longitudinal passageway formed in the outer periphery of the cylinderical portion of the valve body communicating the head space of the package with the interior of said dip tube upstream of said inlet orifice, and valve means for controlling the discharge of the product from said interior chamber.

2. A valve for a pressurized package as set forth in claim 1 wherein said hollow dip tube is adapted to be receive on the cylindrical portion of the valve body so as to close off one side of the passageway formed in the outer periphery thereof.

3. A valve for a pressurized package containing a product to be dispensed under the pressure of a gaseous propellant normally occupying the head space of the package, said valve comprising a valve body having a portion defining an interior chamber and a cylindrical portion depending therefrom, said cylindrical portion being adapted to receive a hollow dip tube and having an inlet orifice therein communicating the interior chamber in the valve body with the dip tube, a continuously open passageway in the outer periphery of the cylindrical portion of the valve body and in the end portion of the valve body defining the interior chamber communicating the head space of the package with the interior of said dip tube upstream of said inlet orifice, said dip tube being adapted to extend over said cylindrical portion so as to close off one side of the passageway therein, and valve means for controlling the discharge of the product from said interior chamber.

References Cited in the file of this patent

UNITED STATES PATENTS

965,704 Goldberg ---------- July 26, 1910

(Other references on following page)

5

UNITED STATES PATENTS

2,040,302	Fortier	May 12, 1936
2,119,643	Mendl	June 7, 1938
2,746,796	St. Germain	May 22, 1956
2,793,794	Samuel	May 28, 1957
2,906,462	West	Sept. 29, 1959
2,924,360	Samuel	Feb. 9, 1960
2,968,428	Samuel	Jan. 17, 1961
2,980,342	Armour	Apr. 18, 1961

FOREIGN PATENTS

554,377	Italy	Jan. 10, 1957
855,493	France	Feb. 20, 1940
1,066,659	France	Jan. 20, 1954
1,084,481	France	July 7, 1954