July 2, 1963 W. Z. NESIN 3,096,003

AEROSOL VALVE PERMITTING FAST INJECTION

Filed May 29, 1961 2 Sheets-Sheet 1

FIG. 1

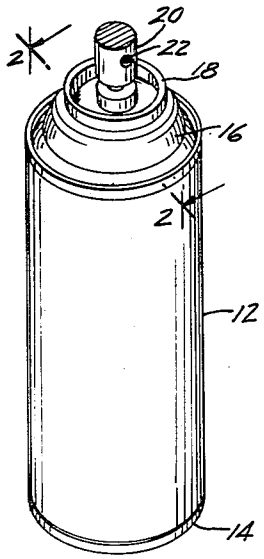


FIG. 2

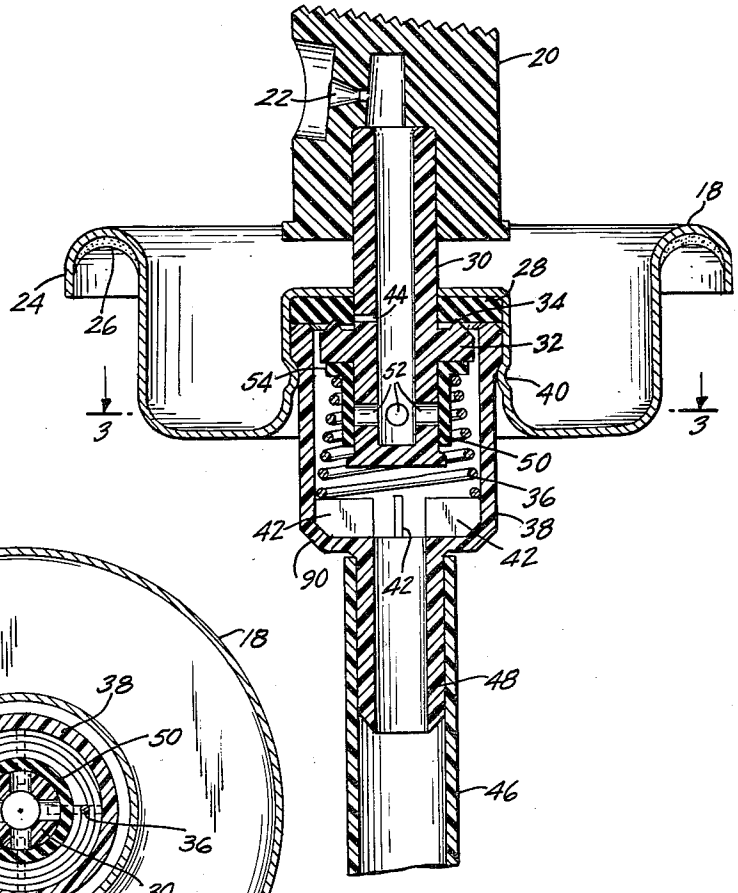
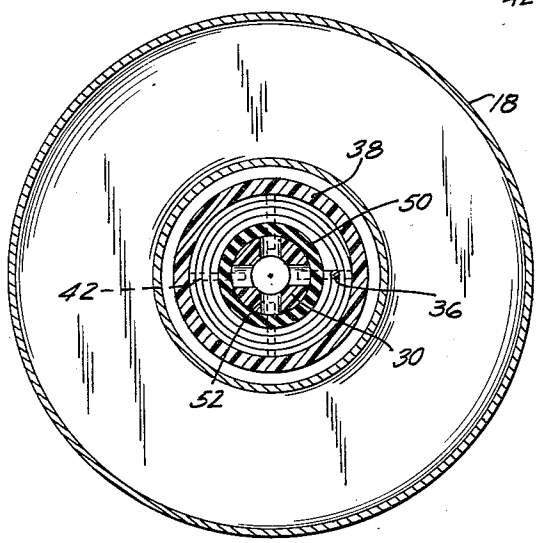


FIG. 3



INVENTOR.
WILLIAM Z. NESIN

BY James and Franklin
ATTORNEYS

July 2, 1963 W. Z. NESIN 3,096,003

AEROSOL VALVE PERMITTING FAST INJECTION

Filed May 29, 1961 2 Sheets-Sheet 2

FIG. 4

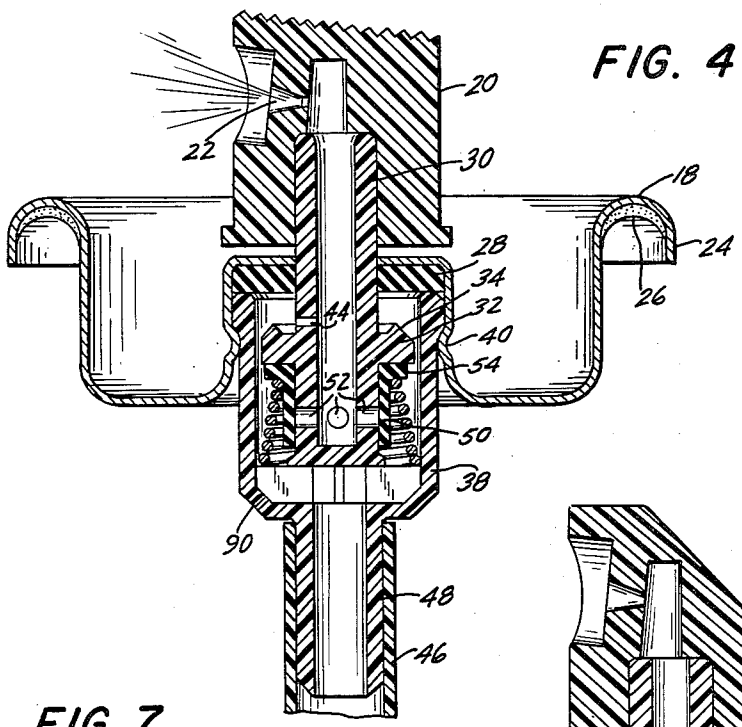


FIG. 5

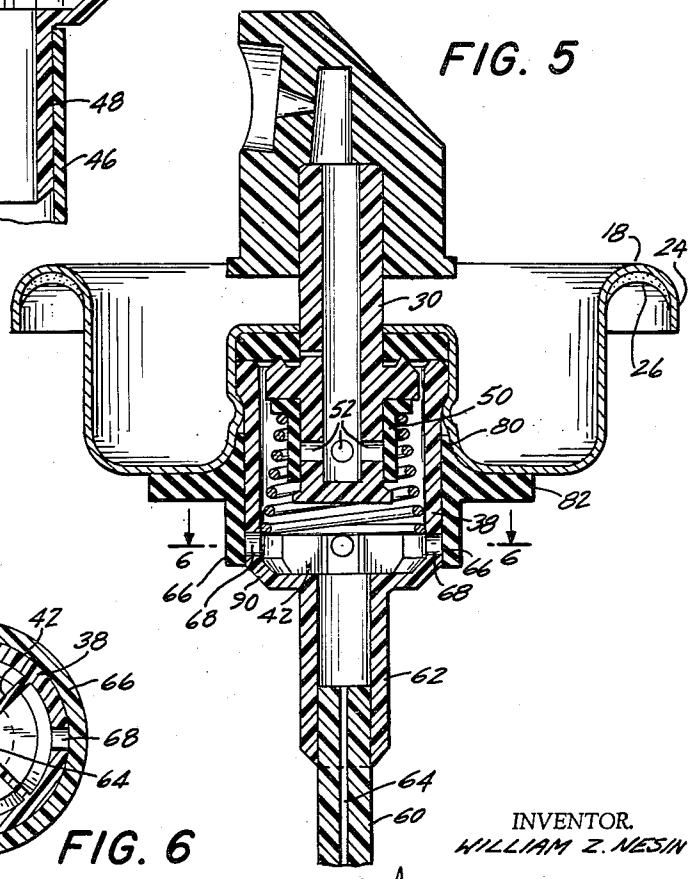
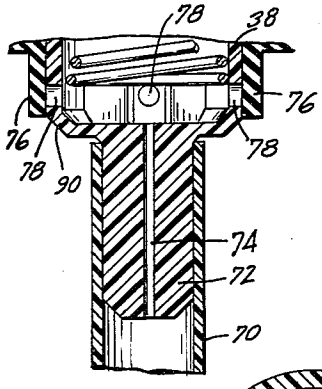


FIG. 7



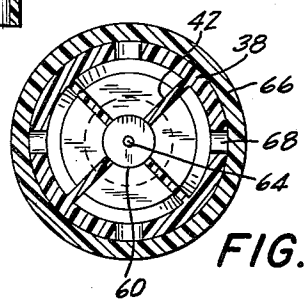


FIG. 6

INVENTOR.
WILLIAM Z. NESIN

BY James and Franklin

ATTORNEYS

United States Patent Office 3,096,003 Patented July 2, 1963

3,096,003

AEROSOL VALVE PERMITTING FAST INJECTION

William Z. Nesin, 2785 University Ave., New York, N.Y.

Filed May 29, 1961, Ser. No. 122,049
11 Claims. (Cl. 222—394)

This invention relates to aerosol containers, and more particularly to the valves thereof.

Aerosol containers and valves are now well known and widely used. They contain a product and a "propellant" fluid. It is customary to assemble the container with its valve, and to then fill the container through the valve stem. This type of filling operation is called "injection" or "pressure fill." Inasmuch as the injection must take place through a constricted orifice in the valve. it is comparatively slow, especially in relation to the capacity of high speed automatic filling machines using a rotary turret.

The general object of the present invention is to overcome the foregoing difficulty, and to provide an aerosol valve which permits fast injection. A further object is to provide such a valve which permits fast injection even when the valve has a constricted tail piece or a constricted or "capillary" dip tube.

To accomplish the foregoing general objects, and other more specific objects which will hereinafter appear, my invention resides in the aerosol valve elements and their relation one to another, as are hereinafter more particularly described in the following specification. The specification is accompanied by drawings in which:

FIG. 1 is a perspective view showing an aerosol cam;

FIG. 2 is a vertical section taken approximately in the plane of the line 2—2 of FIG. 1, and is taken through my improved aerosol valve, drawn to larger scale;

FIG. 3 is a horizontal section taken approximately in the plane of the line 3—3 of FIG. 2;

FIG. 4 is a vertical section similar to FIG. 2, but showing the valve stem depressed;

FIG. 5 is a vertical section similar to FIG. 2 but showing another form of the invention, used with a capillary dip tube;

FIG. 6 is a horizontal section taken approximately in the plane of the line 6—6 of FIG. 5; and

FIG. 7 is a fragmentary vertical section corresponding to the lower part of FIG. 5, but showing the invention applied to a valve having a constricted tail piece.

Referring to the drawing, and more particularly to FIG. 1, the areosol container or can 12 is closed by a bottom 14 and a top 16. The latter has a large opening which is closed by a valve cup 18 which forms a part of the valve assembly. The valve stem is topped by a button 20 which may be depressed to open the valve, and thereby spray the contents through a spray hole 22.

Referring now to FIGS. 2 and 4 of the drawing, the valve or mounting cup 18 is shown with its flange 24 lined at 26 with an appropriate sealing material, the flange being shown still open as it is prior to being crimped to the container top 16 (FIG. 1). The mounting cup carries a valve gasket 28, and a hollow conduit member or valve stem 30 passes through gasket 28. Stem 30 has a flange 32 beneath gasket 28, and this flange preferably has an annular bead or ridge 34 which seats into gasket 28 when the valve is closed, as by means of compression valve spring 36, and the pressure of the propellant. The spring 36 is carried in a cup 38 which is secured in position by a bead 40. The lower end of the spring rests on four radial supports 42, and the upper end of the spring reacts on flange 32 and urges the valve stem upward, thus closing the valve.

The valve stem has a discharge passageway including

an orifice at 44. The button 20 caps the upper end of valve stem 30, and is itself provided with an appropriate spray hole 22.

By comparison with FIG. 4 it will be seen that depression of button 20 moves flange 32 downward and away from gasket 28. It also brings the orifice 44 below gasket 28, thus permitting discharge of contents from the can upwardly through the dip tube 46 and tail piece 48, and thence through orifice 44 and the hollow valve stem 30 to the spray hole 22. The dip tube 46 extends to the bottom of the can.

As so far described the valve is essentially conventional. The filling operation has been performed after mounting of the valve on the container, but before application of the button 20. A suitable filler nozzle or injection adapter is applied to and depresses the then free upper end of the hollow stem 30. I have found that the injection is slowed primarily by the constricted orifice 44.

The present improvement may be described with reference to FIGS. 2 and 3 of the drawing. The closed lower end of valve stem 30 is provided with a check valve of substantial flow area, this valve being so faced as to afford fast injection when filling the container, but thereafter preventing return discharge therethrough of the contents of the container. The check valve comprises a sleeve 50 of elastic material, typically rubber or a rubber-like material. The stem 30 has a plurality of radial holes 52, in this case four, and these are covered by the sleeve 50. Sleeve 50 may expand during injection or filling of the container, thereby permitting very fast injection, but thereafter the pressure of the propellant gas inside the container closes the sleeve 50 tightly against the holes 52, and so prevents leakage or escape.

In preferred form the upper end of sleeve 50 has a flange 54 which is located between the stem flange 32 and the compression spring 36, so that the latter bears upwardly against the sleeve flange 54, and through it against the stem flange 32. On reflection it will be seen that the addition of the check valve 50, 52 does not affect the conventional spray or foam discharge operation of the valve. During the useful life of the container, once it has been filled, the check valve remains permanently closed, and the operation is as though it did not exist. However, during injection the check valve opens and provides a very substantial flow area compared to the highly constricted orifice 44.

As so far described the dip tube 46 and tail piece 48 are assumed normal. However, in certain cases dealing with special substances in the aerosol can, the dip tube may have a very constricted passage. This is frequently referred to as a capillary dip tube, and such a tube is indicated at 60 in FIG. 5, it being received inside a tail piece 62. As before, the lower end of the valve stem 30 is provided with a sleeve 50 normally closing radial check valve passages 52. However, in this case the fast injection afforded through passages 52 may not help matters, because the contents then must flow through the capillary passage 64 of dip tube 60.

To overcome this difficulty the valve is provided with a second check valve in series with the first check valve 50, 52. More specifically, there is an elastic sleeve 66 disposed around the spring cup 38, and the latter is provided with a plurality of radial holes 68, in this case four, which are normally closed by the sleeve 66. It will be evident that the second check valve 66, 68 bypasses the capillary dip tube 60.

In some cases the dip tube may be of large diameter, but the tail piece may have a constricted passage. FIG. 7 is a fragmentary section corresponding to the lower por-

tion of FIG. 5, and it will be seen that large diameter dip tube 70 is received around a tail piece 72 which has a constricted passage 74. This would interfere with fast injection, and accordingly the spring cup 38 is fitted with an elastic sleeve 76 which acts as a check valve by normally closing the four radial holes 78. This is a second check valve which is in series with the first check valve, as shown in FIG. 5. The second check valve 76, 78 bypasses the constricted tail piece 74.

To help anchor the sleeve 66 (FIG. 5) or 76 (FIG.7) in position, it may be provided with a flange 82. This prevents expansion of the upper part of the sleeve, which grips the cup. Only the lower part or skirt of the sleeve expands. The upward extension 80 of the sleeve is not essential, but takes advantage of space anyway present in the valve.

Attention may be called to the vapor tap 90 shown in FIGS. 2, 4, 5, and 7. The use of such a tap is optional. It is sometimes used when it is desired to warm the spray, as when using an underarm deodorant, or a baby powder, or other such product which might cause discomfort if chilled. In the arrangement of FIG. 2 the tap 90 in no way slows (and in theory should slightly speed) the fast injection operation of the valve, and similar remark applies to the arrangements of FIGS. 5 and 7 in which two check valves are provided in series.

The materials used for the valve may be the customary materials, selected to be appropriate for the contents of the can. The mounting cup 18 is usually made of metal. The valve stem and its operating button and the spring cup are usually made of a molded plastics material selected in relation to the can contents, but often metal is used. Nylon frequently is employed. The compression spring is usually made of stainless steel. The gasket 28 and the check valve sleeves may be made of artificial rubber such as buna or neoprene. The dip tube frequently is made of a flexible plastics material such as polyethylene.

It will be understood that the foregoing materials have been mentioned merely by way of example, rather than in limitation of the invention, and that in all cases the materials are selected to meet the requirements of and to withstand chemical attack by the filler and propellant being stored in the container.

It is believed that the construction and operation of my improved aerosol valve, as well as the advantages thereof, will be apparent from the foregoing detailed description. It will also be apparent that while I have shown and described the invention in several preferred forms, changes may be made in the structures shown without departing from the scope of the invention, as sought to be defined in the following claims.

I claim:

1. A fast injection aerosol valve assembly comprising a mounting cup, a valve gasket, a movable hollow valve stem passing through the gasket and having a flange beneath the gasket, a stationary spring cup around the lower end of the valve stem, a spring in said cup bearing against the flange of the valve stem to close the valve, the side of said valve stem having a small discharge orifice which is exposed to the container contents when the valve stem is moved, said valve stem having a closed lower end, a plurality of radial holes through the valve stem near its lower end, and a sleeve made of elastic material surrounding and movable with the lower end of the valve stem and acting with the holes to provide a check valve to afford fast injection when filling the aerosol container but thereafter preventing escape therethrough of contents from the container.

2. A fast injection aerosol valve assembly comprising a mounting cup, a valve gasket, a depressible hollow valve stem passing through the gasket and having a flange beneath the gasket, a stationary spring cup around the lower end of the valve stem, a compression spring in said cup bearing upward against the flange of the valve stem to close the valve, the side of said valve stem above the flange having a small discharge orifice which is exposed beneath the valve gasket to the container contents when the valve stem is depressed, said valve stem having a closed lower end, a plurality of radial holes through the valve stem near its lower end, and a sleeve made of elastic material surrounding and axially movable with the lower end of the valve stem and acting with the holes to provide a check valve to afford fast injection when filling the aerosol container but thereafter preventing escape therethrough of contents from the container, the bottom of said spring cup having a tail for receiving a dip tube.

3. A fast injection aerosol valve assembly comprising a mounting cup, a valve gasket, a depressible hollow valve stem passing through the gasket and having a flange beneath the gasket, a button with a discharge nozzle at the top of the valve stem, a stationary spring cup around the lower end of the valve stem, a compression spring in said cup bearing upward against the flange of the valve stem to close the valve, the side of said valve stem above the flange having a small discharge orifice which is exposed beneath the valve gasket to the container contents when the valve stem is depressed, said valve stem having a closed lower end, a plurality of radial holes through the valve stem near its lower end, and a sleeve made of elastic material surrounding and axially movable with the lower end of the valve stem and acting with the holes to provide a check valve to afford fast injection when filling the aerosol container but thereafter preventing escape therethrough of contents from the container, the bottom of said spring cup having a tail for receiving a dip tube, and the inside of said spring cup near the bottom having spaced stops to limit the depression of the valve stem without obstructing flow communication with the dip tube.

4. A fast injection aerosol valve assembly comprising a mounting cup, a valve gasket, a depressible hollow valve stem passing through the gasket and having a flange beneath the gasket, a stationary spring cup around the lower end of the valve stem, the side of said valve stem above the flange having a small discharge orifice which is exposed beneath the valve gasket to the container contents when the valve stem is depressed, said valve stem having a closed lower end, a plurality of radial holes through the valve stem near its lower end, and a sleeve made of elastic material surrounding and axially movable with the lower end of the valve stem and acting with the holes to provide a check valve to afford fast injection when filling the aerosol container but thereafter preventing escape therethrough of contents from the container, said sleeve having a flange located directly beneath the flange of the valve stem, and a compression spring in said spring cup bearing upwardly against the sleeve flange and through it against the stem flange, the bottom of said spring cup having a tail for receiving a dip tube.

5. A fast injection aerosol valve assembly comprising a mounting cup, a valve gasket, a depressible hollow valve stem passing through the gasket and having a flange beneath the gasket, a button with a discharge nozzle at the top of the valve stem, a stationary spring cup around the lower end of the valve stem, the side of said valve stem above the flange having a small discharge orifice which is exposed beneath the valve gasket to the container contents when the valve stem is depressed, said valve stem having a closed lower end, a plurality of radial holes through the valve stem near its lower end, and a sleeve made of elastic material surrounding and axially movable with the lower end of the valve stem and acting with the holes to provide a check valve to afford fast injection when filling the aerosol container but thereafter preventing escape therethrough of contents from the container, said sleeve having a flange located directly beneath the flange of the valve stem, and a compression spring in said spring cup bearing upwardly against the sleeve flange and through it against the stem flange, the bottom of said spring cup having a tail for receiving a dip tube,

and the inside of said spring cup near the bottom having spaced stops to limit the depression of the valve stem without obstructing flow communication with the dip tube.

6. An aerosol valve as defined in claim 2 in which the spring cup has a dip tube depending therefrom, and in which the dip tube is capillary or constricted, the spring cup having a plurality of radial openings therethrough near its lower end, and a sleeve of elastic material around the spring cup over said openings, thereby forming a second check valve in series with the first check valve, said second check valve bypassing the constriction of the dip tube.

7. An aerosol valve as defined in claim 5 in which the spring cup has a dip tube depending therefrom, and in which the dip tube is capillary or constricted, the spring cup having a plurality of radial openings therethrough near its lower end, and a sleeve of elastic material around the spring cup over said openings, thereby forming a second check valve in series with the first check valve, said second check valve bypassing the constriction of the dip tube.

8. An aerosol valve as defined in claim 2 in which the spring cup has a tail piece for a dip tube, and in which the passage through the tail piece is constricted, the spring cup having a plurality of radial openings therethrough near its lower end, and a sleeve of elastic material around the spring cup over said openings, thereby forming a second check valve in series with the first check valve, said second check valve bypassing the constriction of the tail piece.

9. An aerosol valve as defined in claim 5 in which the

spring cup has a tail piece for a dip tube, and in which the passage through the tail piece is constricted, the spring cup having a plurality of radial openings therethrough near its lower end, and a sleeve of elastic material around the spring cup over said openings, thereby forming a second check valve in series with the first check valve, said second check valve bypassing the constriction of the tail piece.

10. An aerosol valve as defined in claim 1 in which the valve has a tail piece for a dip tube, and in which the dip tube is capillary or constricted, the aerosol valve having a second check valve in series with the first check valve, said second check valve bypassing the constriction of the dip tube.

11. An aerosol valve as defined in claim 1 in which the valve has a tail piece for a dip tube, and in which the passage through the tail piece is constricted, the aerosol valve having a second check valve in series with the first check valve, said second check valve bypassing the constriction of the tail piece.

References Cited in the file of this patent

UNITED STATES PATENTS

2,744,665	Carlson et al.	May 8, 1956
2,746,796	St. Germain	May 22, 1956
2,839,225	Soffer et al.	June 17, 1958
2,913,154	Kuffer	Nov. 17, 1959

OTHER REFERENCES

Risdon Mfg. Co., German application—1,029,304, Apr. 30, 1958.