United States Patent

[11] 3,598,292

[72] Inventor Joseph W. Kiliany
Prospect, Conn.

[21] Appl. No. 832,660
[22] Filed June 12, 1969
[45] Patented Aug. 10, 1971
[73] Assignee Geigy Chemical Corporation
Greenburgh, N.Y.

[54] AEROSOL DISPENSER WITH PLASTIC PROPELLANT CARTRIDGE
3 Claims, 2 Drawing Figs.

[52] U.S. Cl. 222/193
[51] Int. Cl. B67d 5/54
[50] Field of Search 222/193; 239/302, 303, 308, 337; 128/173, 173.1

[56] References Cited

UNITED STATES PATENTS

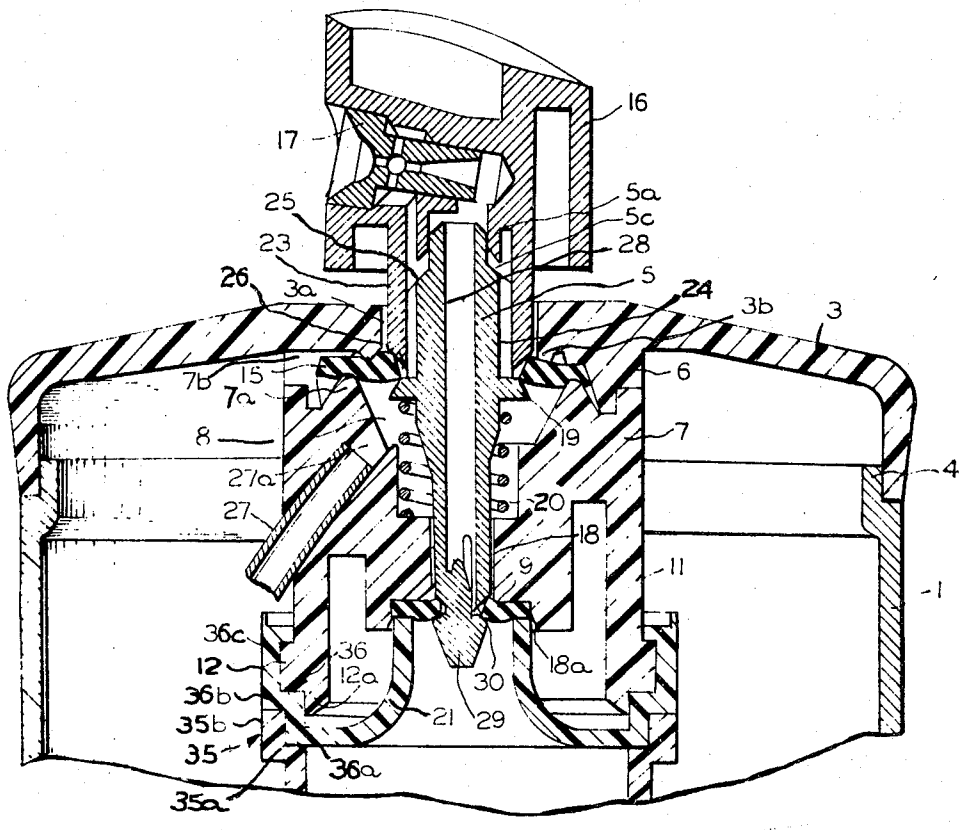
2,973,885 3/1961 Ferguson 222/399

FOREIGN PATENTS

1,089,636 10/1954 France 239/308

Primary Examiner—M. Henson Wood, Jr.
Assistant Examiner—Edwin D. Grant
Attorney—Wenderoth, Lind and Ponack

ABSTRACT: An aerosol-type dispenser for fluent products. A cap for a container for a fluent product has a plug valve assembly depending from the under surface of said cap. The plug valve assembly has a depending flange and a propellant cartridge of a different plastic material than said depending flange has the open end thereof joined to the bottom of said flange with the plug valve assembly sealing the said open end of said propellant cartridge.



PATENTED AUG 10 1971

3,598,292

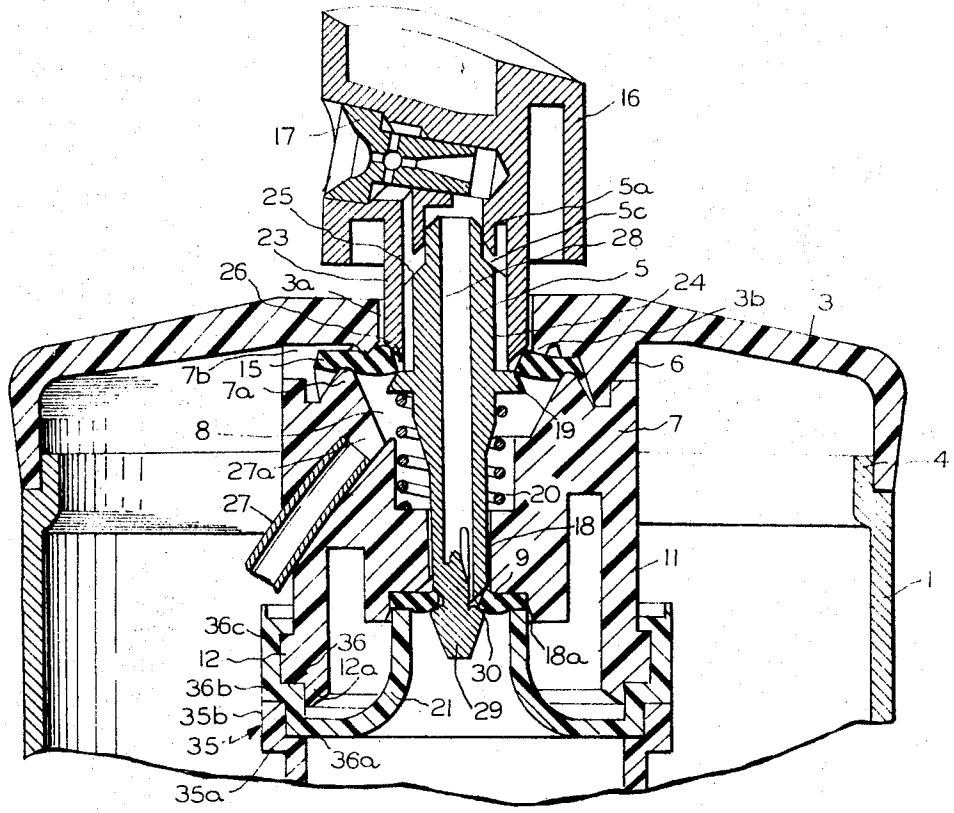


FIG. 1

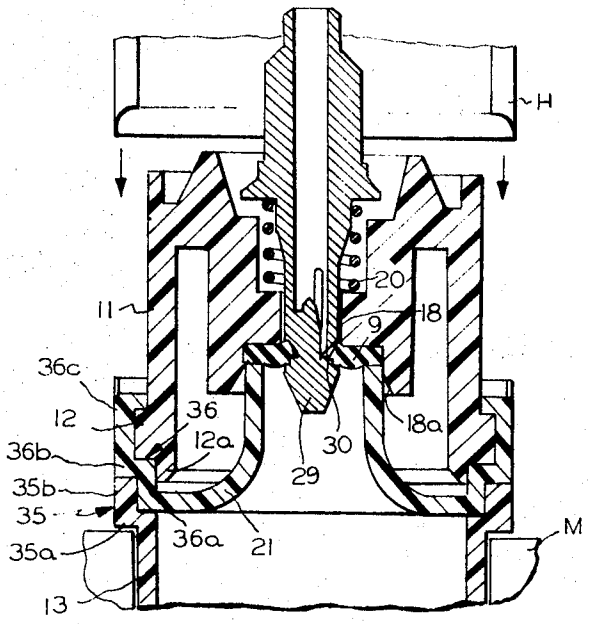


FIG. 2

INVENTOR
JOSEPH KILIANY

BY Wendroth, Lind & Ponack

ATTORNEYS

AEROSOL DISPENSER WITH PLASTIC PROPELLANT CARTRIDGE

This invention relates to an aerosol dispenser, and more particularly relates to an aerosol dispenser of the type in which the product to be dispensed is in an outer product container separate from the propellant, the propellant is contained in an inner cartridge within the outer container.

Heretofore there have been proposals for providing such an aerosol dispenser having a plug valve assembly in which an inner cartridge, for example of a metal material, is attached to a body depending from a cap for the outer or product container, which body contains the valve mechanism which, during dispensing, controls the flow of the propellant and the product to be dispensed. The most practical manner of attaching such a propellant cartridge to this body has been by bending over the metal at the upper edge of the cartridge around a flange depending from the bottom of the body with a seal being positioned between the cartridge and the flange. A retaining ring is also provided, the outer peripheral edge of which is held between the top of the propellant cartridge and the bottom of the flange by the bent over upper edge of the cartridge. The retaining ring has an inner edge pressing a high-pressure gasket against the bottom of the body, and a valve stem having a bore therein is movable through the high-pressure gasket and the bore is obturated by the gasket.

The cap, depending plug valve assembly, and various valve parts have heretofore been made of plastic. It would be desirable in order to eliminate corrosion of the propellant cartridge and also to reduce the cost of the apparatus to provide plastic propellant cartridges which are resistant to corrosion by the propellant, i.e. are inert to the propellant, and which are also impervious to the propellant so that it cannot escape.

Plastics are known which are inert to and impervious to the propellants commonly used in such aerosol dispensers, and which could be formed into satisfactory containers for liquid propellant under high pressure.

The cap, depending plug valve assembly, and various valve parts have heretofore been made of a plastic which is easily molded to close tolerances, but which is not necessarily inert to and impervious to propellant. Plastics of this type are different from the type of plastic which would be suitable for propellant cartridges. There is, therefore, a problem in joining the propellant cartridge to the valve body of the plug valve assembly, for example by welding, because of the fact that the plastics used are different and cannot be joined by such plastic-joining processes.

It is an object of the present invention to provide a construction for an aerosol dispenser of this type in which the above problems are overcome.

This object is accomplished by providing an aerosol dispenser assembly in which the valve body of the plug valve assembly is made of one type of plastic and the propellant cartridge is made of a different and propellant inert and impervious plastic material, and these parts are secured together at the top of the propellant cartridge by securing a retaining ring of the same plastic material as the cartridge to the open top of the cartridge by sonic welding or some other plastic-joining process, and then crimping the outer edge of the retaining ring around a flange on the bottom of the valve body of the plug valve assembly. This not only provides a way to attach the cartridge to the valve body, but also seals the joint between the retaining ring and the top of the cartridge against escape of propellant, so that no gasket need be provided between the flange of the retaining ring and the flange on the valve body.

This invention will now be described in connection with the accompanying drawings, showing one embodiment of an aerosol dispenser according to the present invention, and in which:

FIG. 1 is a sectional elevation view of the aerosol dispenser according to the invention; and

FIG. 2 is an enlarged partial sectional view of the connection between the plug valve assembly and the plastic propellant cartridge according to the invention in one stage of its assembly.

The aerosol dispenser according to the invention comprises an outer container 1 for containing a product to be dispensed, which product is in a fluent form, for example liquid or a finely divided powder. A cap 3 is mounted on the outer container 1 at the upper edge 4 of the outer container. The cap 3 has an aperture 3*a* in the center thereof through which a valve stem 5, to be described below, projects.

Depending from the under surface of the cap 3 is an annular ring 6. Positioned below the cap 3 is a plug valve assembly having a valve body 7 with a hollow interior 8, and having an opening through the bottom thereof. The top of the valve body 7 is secured to the annular ring by sonic or spin welding or some other conventional plastic-joining process.

Depending from the valve body 7 is a depending annular flange 11 which has on the lower end thereof a laterally extending flange 12.

Below the depending annular flange 11 is a container in the form of a propellant cartridge 13 having therein a propellant (not shown) which normally is held therein under high pressure in liquid form. The upper edge of the propellant cartridge 13 has a laterally outwardly and upwardly extending flange thereon generally indicated at 35. In the specific embodiment shown, the flange 35 has laterally extending portion 35*a* and an upwardly extending portion 35*b*.

A retaining ring 21 is provided which extends from the top of the propellant cartridge 13 to the bottom of valve body 7 for holding a high-pressure gasket in position therein, as will be described more fully below. The retaining ring 21 has a stepped flange 36 on the outer periphery thereof which mates with the flange 35 on the top of the propellant cartridge 13. The flange 36 has an inner upwardly extending portion 36*a* which has an outside diameter the same as the inside diameter of the upwardly extending portion 35*b* of the flange 35 on the cartridge 13, and has an inside diameter the same as the outside diameter of an annular projection 12*a* on the bottom of the depending annular flange 11. This permits quick and accurate aligning of the valve body 7 and the cartridge 13 when the retaining ring is on the cartridge. The inner upwardly extending portion 36*a* extends to the top of the upwardly extending flange portion 35*b*, and has thereon a laterally extending portion 36*b*. At the outer end of the laterally extending portion 36*b* is an outer upwardly extending portion 36*c* which has the same inside diameter as the outside diameter of the flange 12 on the depending flange 11. The bottom surface of the laterally extending portion 36*b* rests on the top of the upwardly extending portion 35*b*. Thus the flange 37 mates with the flange 35.

The propellant cartridge 13 and retaining ring 21 are made of a plastic material which is impervious to and inert to the propellant 14.

The cap 3, the depending annular ring 6, and the valve body 7, on the other hand, are made of a different plastic material.

In order to attach the cartridge 13 to the valve body depending from the cap 3 the flange 36 on the retaining ring 21 is attached to the flange 35 on the cartridge 13 by sonic welding, spin welding, or some other plastic-joining process. The cartridge 13 will then have the retaining ring on the top thereof with the outer upwardly extending flange portion 6*c* projecting upwardly. The valve body 7 with a high-pressure gasket in position in the bottom thereof and with the flange 11 depending therefrom is brought into position on the top of the propellant cartridge 13 with the flange 12 within the outer upwardly extending flange portion 36*c*, and the bottom of the flange 12 against the laterally extending flange portion 36*b*. Then while the flange 35 is supported on a mandrel M, the upwardly extending flange portion 36*c* has the upper portion 36*d* thereof bent over and crimped against the top of the flange 12 by a crimping horn H. The crimping horn H is preferably a sonic crimping means.

While the joining of the retaining ring flange to the cartridge flange has been described as a separate step from the crimping

of the retaining ring flange, it will be clear to those skilled in the art that these two steps can easily be performed simultaneously by properly designed equipment.

Clamped between an annular crown 7*a* around the top of the body 7 and a downwardly extending projection 3*b* around the opening 3*a* in the cap 3 is a ring gasket 15 which acts as a low-pressure obturator for the dispensed material and a low-pressure obturator for the admission of air to the product container 1 from the outside.

The valve stem 5 extends through the hollow interior 8 and the opening 3*a* in the cap 3 opens into the hollow interior 8. A valve actuator in the form of a pushbutton 16 is mounted on the top end of valve stem 5 and contains a nozzle insert 17 having a venturi-type spray nozzle therein. Nozzle insert 17 is set into a cavity in the pushbutton 16. An opening 18 is provided in the bottom of body 7 between the hollow interior 8 and a downwardly facing recess 18*a* opening into the interior of cartridge 13. A high-pressure gasket 9 is positioned in the recess 18*a* and is held in position by the retaining ring 21 described above.

A shoulder 19 on the valve stem 5 is urged upwardly by a spring 20 around the valve stem 5. The lower end of spring 20 rests against the bottom of the hollow interior 8. The spring acts to press the shoulder 19 upwardly so that the flexible lip of gasket 15 is held between a truncated cone-shaped seat on shoulder 19, cambered as shown, and the annular projection 3*b* around the edge of opening 3*a* and cap 3. This provides a tight closure of the hollow interior 8 with respect to opening 3*a* and a tight closure of a passage 7*b* which extends through annular ring 6 into the space beneath cap 3. In the raised position shown in the Figure, there is a space between the inner edge of gasket 15 and the tapered lower end of a depending wall 23 on the pushbutton. This opens into the channels 24 described hereinafter.

Pushbutton 16, which caps valve stem 5, has two coaxial sockets at the base thereof: an outer socket defined by depending wall 23 and which fits tightly around valve stem 5, and an inner socket which receives the reduced diameter upper end 5*a* of stem 5. The extend to which the sockets can be forced along valve stem 5 is limited by an annular shoulder 5*c* at the top of fins 25 defining between them channels 24, along the outside of the stem 5. The channels open out of the stem through apertures 26.

Into the hollow interior 8 opens the upper end of dip tube 27, force fitted in a bore 27*a* in body 7 for conducting material to be dispensed into the hollow interior 8.

Valve stem 5 is made in one piece, for example, by molding, and has an axial bore 28 with a conical head 29 closing the lower end thereof.

At the lower end of the stem 5 is a neck portion in which is a plurality of lateral openings 30 which, when the valve stem is in the raised position, are obturated by the inner peripheral edge of gasket 9. In the lowered position of the stem 5, the gasket 9 flexes to open openings 30 to admit propellant to the axial bore 28.

In operation, when the parts of the dispenser are in the positions as shown in the Figure, the high-pressure gasket 9 obturates the openings 30 into the bore 28 of the stem, thus blocking flow of propellant gas to the nozzle in the nozzle insert 17. At the same time, the gasket 15 obturates the opening between the annular crown 7*a* and the shoulder 19 on the valve stem 5, thus sealing off the hollow interior 8 of the body 7 from the openings 26 to the channels 24 and from opening 3*a* in the cap. The gasket 15 also seals off the passage 7*b* in the annular ring 6, thus sealing off the interior of the product container 1 from the outside atmosphere.

In this condition, the joint between the cartridge 13 and the depending flange 12 completely seals off the cartridge 13 from the product container 1 at this point. The only other point at which leakage can occur between the cartridge 13 and the product container 1 is past the high-pressure annular gasket 9. By making the retaining ring 21 the proper size and shape, this joint can also be completely sealed, thereby eliminating any leakage of propellant into the product container.

When the valve stem is depressed, the gaskets 9 and 15 are flexed to admit propellant through the openings 30 into the bore 28 in the stem 5. This passes through the venturi in the nozzle insert 17 and aspirates the product to be dispensed through the dip tube 27, hollow interior 8, past the now downwardly flexed gasket 15 and into the openings 26 and up the channels 24 to the space around the neck of the nozzle. At the same time, air is admitted to the interior of the product container 1 through the opening 3*a* in the cap 3, beneath the annular projection 3*b*, past the gasket 15 which is flexed away from the annular projection 3*b*, and through the passage 7*b*. This will equalize the pressure within the product container 1.

There has thus been provided an assembly for an aerosol dispenser in which the propellant cartridge is of a plastic material and is joined to the valve body of the plug valve assembly in a simple and efficient manner. Because the plastic of the cartridge is inert to the propellant, the cartridge does not corrode, and because it is impervious to the propellant, the propellant cannot escape. The cost of the assembly is thus substantially reduced due to the fact that only plastic materials are used for the major parts. In addition, the assembly is simplified in that no gasket need be provided between the retaining ring and the flange on the depending flange. The joint between the retaining ring and the top of the cartridge seals this connection against escape of propellant, so that there is no pressure differential across the crimped joint between the flanges. The need for a gasket is thus eliminated, and the operation of placing the gasket in position is eliminated.

What I claim is:

1. An aerosol dispenser assembly comprising a plug valve assembly having a plastic material valve body with a depending flange depending therefrom, said flange having a laterally extending flange extending outwardly therefrom, a container of plastic material having a laterally outwardly and upwardly directed flange at the top thereof, a retaining ring at the upper end of said container extending inwardly from said flange thereon and upwardly to said valve body, the valve body having a downwardly open recess in the bottom thereof having a high-pressure sealing gasket therein adapted to seal openings in a valve stem extending therethrough, the upper end of said retaining ring engaging said gasket and holding it tightly in said recess, an outwardly and upwardly extending flange at the outer periphery of said retaining ring mating with and joined to said flange on said container, said retaining ring flange having the upwardly extending portion crimped over the top of said laterally extending flange on said depending flange and holding said container tightly in engagement with said depending flange with said plug valve assembly and retaining ring closing the top of said container.

2. An aerosol dispenser assembly as claimed in claim 1 in which the plastic material of said container is the same as that of said retaining ring and is welded thereto, and the plastic material of said container and said retaining ring is different from the plastic material of said valve body.

3. An aerosol dispenser assembly comprising a plug valve assembly having a plastic material valve body having a laterally extending flange extending outwardly from the lower end thereof, a container of plastic material, a retaining ring secured to the upper end of said container and extending inwardly and upwardly to said valve body, the valve body having a downwardly open recess in the bottom thereof having a high-pressure sealing gasket therein adapted to seal openings in a valve stem extending therethrough, the upper end of said retaining ring engaging said gasket and holding it tightly in said recess, an outwardly and upwardly extending flange at the outer periphery of said retaining ring having an upwardly extending portion crimped over the top of said laterally extending flange on said valve body and holding said container tightly in engagement with said valve body with said plug valve assembly and retaining ring closing the top of said container.