April 21, 1959 J. L. KIRALY 2,883,089

AEROSOL VALVE ASSEMBLY

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Fig. 1

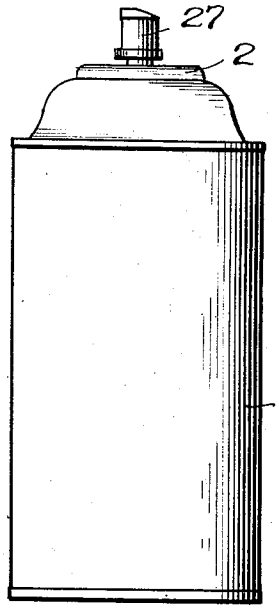
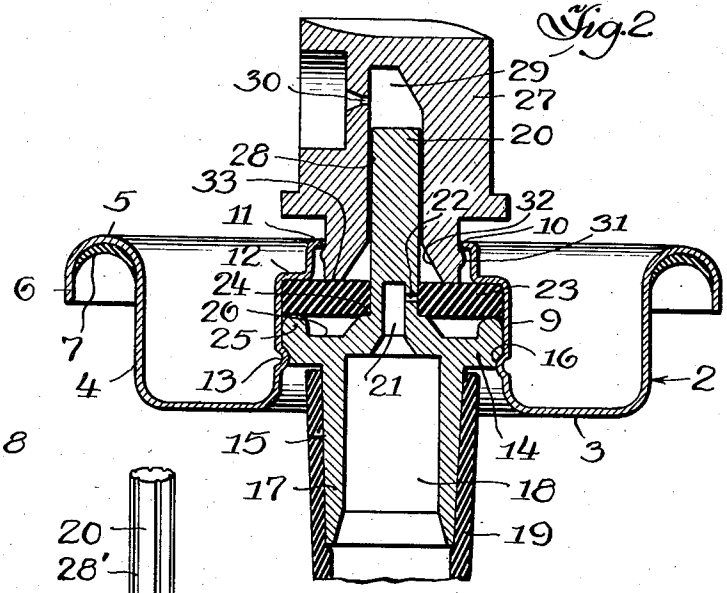


Fig. 2



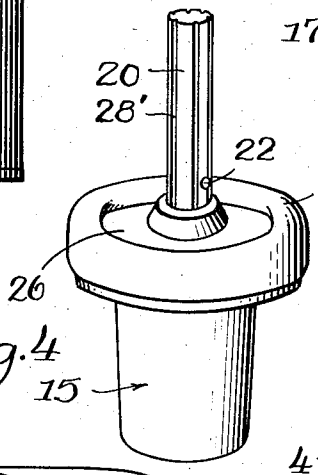


Fig. 4

Fig. 3

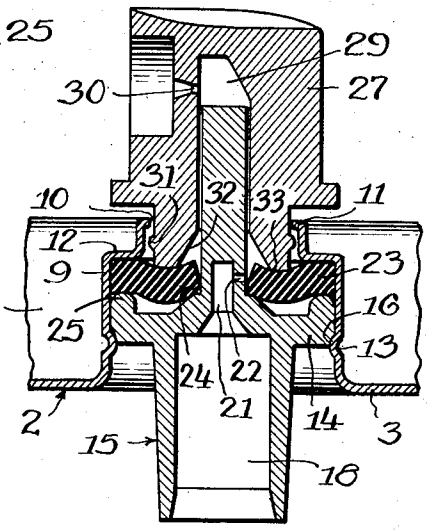
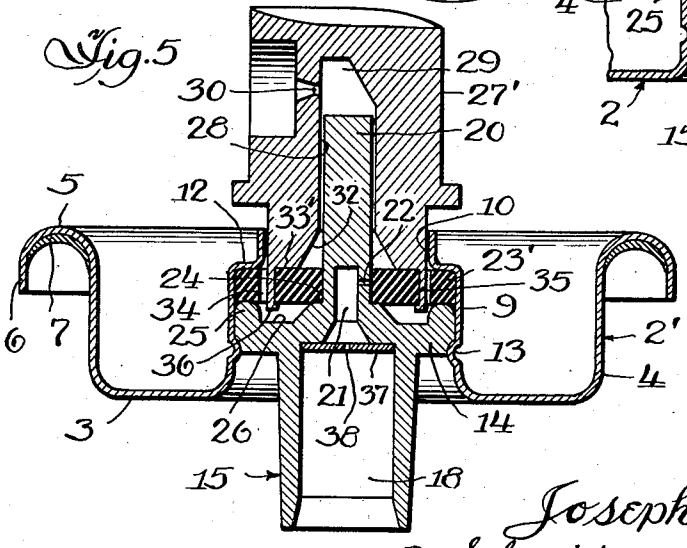


Fig. 5



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AEROSOL VALVE ASSEMBLY

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11 Claims. (Cl. 222—394)

This invention relates to an aerosol valve assembly comprising a simplified self-sealing unit adapted to dispense pressurized fluids.

The valve assembly may be assembled as a unit with any suitable mounting cup designed to be secured to an opening in one end of a can, bottle, or similar container. Preferably the mounting cup is formed of sheet metal and the other parts of the valve assembly are made of plastic or rubber. However, any of the parts may be made of plastic, metal, or rubber if desired. In the preferred embodiment all of the metering and valve mechanism are outside of the container, and do not come into contact with the contents except during the dispensing operation. A modified embodiment includes a small disk positioned within the tube holder and provided with an internal metering orifice to provide a double metering system.

The valve is provided with a stem that projects through an opening in the mounting cup, and a spray tip is loosely fitted on the stem. In the drawings the tip is of the type adapted to dispense the contents of the container in a fine spray, but it will be understood that a tip adapted to dispense the contents as a foam may be used. The tip may be secured to the mounting cup or to the sealing gasket by means of interengaging projections.

The valve has an integral tube holder depending from its lower surface. The valve stem is provided with a vertical recess communicating with the tube holder, and with a lateral orifice extending from the recess through the side of the stem. A sealing gasket of rubber or suitable composition fitting around the lower portion of the stem within the center opening of the mounting cup seals the lateral orifice. The spray tip is adapted to displace the gasket from sealing contact with the orifice upon the application of vertically downward pressure against the tip.

The tip is provided with a vertical bore which fits over the stem and extends above the upper end of the stem to provide an expansion chamber which communicates with a discharge orifice extending laterally from the expansion chamber through the side of the tip. The fit of the vertical bore on the stem may be loose enough to permit the contents of the container to travel upwardly around the outside of the stem to the expansion chamber, or metering channels may be provided either on the outside of the vertical surface of the stem or on the inside of the vertical bore of the tip.

The structure by which the above mentioned and other advantages of the invention are attained will be described in the following specification, taken in conjunction with the accompanying drawings, showing two preferred illustrative embodiments of the invention, in which:

Figure 1 is a perspective view of a container provided with an aerosol valve assembly embodying the invention;

Fig. 2 is a cross sectional view of the valve assembly with the valve in closed position;

Fig. 3 is a fragmentary cross sectional view of the valve assembly with the valve in dispensing position;

Fig. 4 is a detail perspective view of the valve; and

Fig. 5 is a cross sectional view of a modified embodiment of the valve assembly.

Referring to the drawings, the reference numeral 2 indicates a mounting cup having an annular base 3. The outer edge of the mounting cup extends upwardly as indicated at 4, and is curved outwardly, as indicated at 5, and downwardly, to form a peripheral flange 6. A suitable sealing composition 7 is applied to the underside of the outwardly extending portion 5 to facilitate sealing the mounting cup to a central opening (not shown) in the top of a container 8. The container is shown in the form of a can, but it will be understood that a bottle or any other suitable type of container may be used. The center portion of mounting cup 2 is embossed upwardly to provide an upstanding wall 9 and a centrally disposed opening 10.

The upper edge of the upstanding wall 9 is turned inwardly to form an annular flange 11. Another annular flange 12 is formed intermediate the height of upstanding wall 9. Below flange 12 an annular rib 13 is formed to extend inwardly of wall 9. The purposes of these flanges and rib 13 will be hereinafter described, in connection with the structural features of the valve assembly with which they cooperate.

The valve comprises a circular disk 14 having an integral tube holder 15 depending from its lower surface. Disk 14 is dimensioned to fit snugly within upstanding wall 9 of the mounting cup. The lower edge of disk 14 is recessed, as indicated at 16, to engage annular rib 13 whereby the valve is secured to the mounting cup. Upstanding wall 9 is sufficiently resilient to permit disk 14 to be pressed into the space defined by wall 9 with the circumferential edge of disk 14 sliding past rib 13 until the recessed portion 16 is aligned with rib 13 when the resilience of wall 9 causes rib 13 to snap into place in recess 16.

Tube holder 15 comprises a cylindrical skirt 17 depending from disk 14 to define an open bottom recess 18 adapted to communicate with the interior of a container when the valve assembly is mounted in an opening in the top of the container. A tube 19 is secured on the skirt 17 and extends into the interior of container 8. Tube 19 may fit either on the outside or inside of skirt 17, and may be secured thereto in any suitable manner.

A valve stem 20, integral with the valve, extends upwardly from disk 14 through opening 10. The lower end of stem 20 is provided with a vertical recess 21, and a lateral metering orifice 22 extends from recess 21 through the wall of stem 20. A sealing gasket 23 fitting around stem 20 is positioned above disk 14 and below flange 12. The sealing gasket is sufficiently thick to permit its inner edge to seal the outer end of orifice 22.

The upper surface of disk 14 is provided with an annular shoulder 24 at the base of stem 20 to provide a seat for the inner edge of sealing gasket 23. The peripheral rim of disk 14 is provided with an upstanding annular bead 25 having its upper edge in the horizontal plane of shoulder 24. Bead 25 supports the outer edge of sealing gasket 23. The upper edge of bead 25 is spaced below flange 12 a distance substantially equal to the thickness of gasket 23, so that the gasket is compressed slightly between the bead and flange 12 to prevent any of the contents from leaking past the sealing gasket. Bead 25 is spaced annularly from shoulder 24 to provide an annular groove 26 spaced below the bottom surface of gasket 23.

A spray tip 27 is provided with a vertical bore 28 adapted to fit over valve stem 20. Preferably the fit of bore 28 over stem 20 is loose, to permit passage of material flowing through lateral orifice 22 when gasket 23 is displaced, as hereinafter described. If desired, bore 28 may fit snugly over stem 20 and either the stem or

the bore may be provided with suitable metering grooves, for example as shown at 28' in stem 20 in Fig. 4, to permit passage of the contents of the container. Bore 28 is longer than stem 20 to provide an expansion chamber 29 above the upper end of the stem. A discharge orifice 30 extends from expansion chamber 29 through the wall of tip 27 to communicate with the atmosphere.

The lower end portion of tip 27 is dimensioned to fit within opening 10 and is provided with a circumferential rib 31 having an outer diameter slightly larger than the diameter of opening 10. Flange 11 is sufficiently resilient to snap over rib 31 as tip 27 is pressed downwardly to assemble it with the rest of the valve assembly. When tip 27 is positioned with its lower edge engaging the top surface of gasket 23, rib 31 is positioned just below flange 11. The interengagement of flange 11 and rib 31 prevents separation of tip 27 from the mounting cup.

The lower edge of tip 27 is recessed internally, as indicated at 32, to leave a comparatively narrow bottom 33 in contact with the upper surface of gasket 23. It will be noted that bottom 33 is positioned in line with groove 26, so that when tip 27 is depressed bottom 33 tends to press the intermediate annular portion of gasket 23 into groove 26, as shown in Fig. 3. Since the outer edge of gasket 23 is firmly held between flange 12 and bead 25, the downward pressure of bottom 33 on the intermediate portion of gasket 23 pulls the inner edge of the gasket away from the outer surface of stem 20, thereby breaking the seal between gasket 23 and lateral orifice 22 to cause discharge of the contents of the container. In the embodiment illustrated in Figs. 2 and 3, the upper portion of the edge of the gasket defining the central opening fitting around the stem is displaced outwardly to uncover lateral orifice 22, but it will be understood that the lower portion of this edge would be displaced if the cooperating projections engaging opposite surfaces of gasket 23 were reversed. Gasket 23 is preferably rubber, but in any event is made of material having sufficient resilience to cause it to return to its normal position when the pressure against tip 27 is released. The ability of gasket 23 to return to its normal position eliminates the necessity of providing a spring to stop the discharge of material when the spray tip is released.

In the embodiment of Fig. 5, the structure is essentially the same as that previously described, and only the modified parts will be described. The same reference characters are used to indicate identical structure. The mounting cup 2' differs from the mounting cup 2 only in that the flange 11 is omitted. Gasket 23' is provided with a series of apertures 34, and tip 27' is provided with integral prongs 35 depending from the bottom 33' to project through the apertures 34. The lower end of each prong 35 is bent at right angles to form a flange 36 adapted to engage the lower surface of gasket 23' to prevent separation of tip 27' from the assembly. The operation of tip 27 for dispensing the contents of the container to which the valve assembly is secured is the same as the operation of the tip 27.

Additionally, the embodiment of Fig. 5 is provided with a second metering device which may be used with either embodiment of the invention. The second metering device comprises a disk 37 fitting against the inside of the upper end of recess 18. The disk 37 may be made of any suitable material, but is preferably plastic, and is provided with a metering orifice 38 communicating with recess 21. The metering disk 37 is effective to prevent any seepage of the contents.

From the foregoing description it will be seen that I have devised a valve assembly for aerosol dispensing containers that does not require any spring or other metal part that might come in contact with the material being dispensed. The material does not come into contact with the sealing gasket except for a small area at the inner edge of the gasket. The elimination of the metal spring simplifies the construction of the valve assembly and thereby reduces the manufacturing cost. The possibility of seepage between the gasket and the tip is reduced by keeping the surface area of the gasket that may come into contact with the material being dispensed at a minimum.

While I have described two preferred embodiments of my invention in considerable detail, it will be understood that the description thereof is intended to be illustrative, rather than restrictive, as many details may be modified or changed without departing from the spirit or scope of the invention. Accordingly, I do not desire to be restricted to the exact construction described.

I claim:

1. In an aerosol valve assembly, a mounting cup and a valve secured together in fixed relationship, said valve having a valve stem projecting above said cup, a metering orifice in said stem, an annular gasket fitting around said stem, the inner edge of said gasket normally sealing said metering orifice, the peripheral edge portion of said gasket being securely held in fixed relationship to said cup and valve, and a spray tip slidably mounted on said stem and secured against separation from said assembly; said spray tip engaging said gasket and operable, under depressing finger pressure, to displace the inner edge of said gasket from sealing engagement with said metering orifice.

2. In an aerosol valve assembly, a mounting cup, a valve comprising a disk secured in fixed relationship to said cup, a valve stem projecting from said disk, said stem having a metering orifice, an annular gasket seated on said disk, the inner edge of said gasket normally sealing said orifice, a spray tip slidably mounted on said stem, and means holding the lower end of said tip in engagement with said gasket, said tip and said disk cooperating to displace the inner edge of said gasket from sealing engagement with said orifice upon movement of said tip towards said disk.

3. In an aerosol valve assembly, a mounting cup, a valve comprising a disk secured in fixed relationship to said cup, a valve stem projecting from said disk, said stem having a metering orifice, an annular gasket seated on said disk, the inner edge of said gasket normally sealing said orifice, said gasket having a plurality of apertures extending therethrough, a spray tip slidably mounted on said stem, said tip having its lower end seated on said gasket, and a plurality of prongs depending from the lower end of said tip through said apertures, each of said prongs having its lower end bent against the lower surface of said gasket to prevent disengagement of said tip and said gasket.

4. In an aerosol valve assembly, a mounting cup having a centrally disposed opening defined by a vertical wall, said vertical wall having an intermediate flange extending inwardly therefrom, a valve comprising a disk fitting snugly within said opening below said flange, a valve stem projecting upwardly from said disk, a metering orifice extending laterally from the peripheral surface of said stem, a sealing gasket fitting around said stem to seal the outer end of said metering orifice, the outer edge portion of said gasket being securely held between said disk and said flange, said disk having an annular groove disposed beneath the intermediate portion of said sealing gasket, and a tip having an annular bottom of less width than said groove engaging the upper surface of said gasket in alignment with said groove, said tip being depressible to displace the inner edge of said gasket from said metering orifice.

5. In an aerosol valve assembly, a mounting cup having a centrally disposed opening defined by a vertical wall, said vertical wall having an inwardly extending flange at its upper edge and an intermediate flange below said upper edge, a valve comprising a disk fitting within said opening below said intermediate flange, said disk having an

annular groove in its upper surface, a sealing gasket mounted between said disk and said intermediate flange, a valve stem extending upwardly from said disk through a central opening in said sealing gasket, said valve stem having a metering orifice normally sealed by the inner edge of said gasket, and a tip having a circumferential rib interengaged with said first mentioned flange to hold said tip in said assembly, said tip having an annular bottom engaging the upper surface of said gasket in alignment with said annular groove and being depressible to displace the inner edge of said gasket from sealing engagement with said metering orifice.

6. In an aerosol valve assembly, a mounting cup having a centrally disposed opening defined by a vertical wall, a valve comprising a disk fitted within said opening, said disk and said vertical wall having a cooperating recess and rib interengaged to prevent relative movement therebetween, a valve stem projecting from said disk, said stem having a metering orifice in its side, an annular gasket fitted over said stem to normally seal said metering orifice, the peripheral edge portion of said gasket being secured between said disk and a portion of said cup, and a spray tip having a lower end engaging the intermediate portion of the upper surface of said gasket, said tip being movable relative to said disk to displace said gasket from sealing engagement with said metering orifice.

7. In an aerosol valve assembly, a mounting cup having a centrally disposed opening defined by a vertical wall, a valve comprising a disk fitted within said opening, said disk and said vertical wall having a cooperating recess and rib interengaged to prevent relative movement therebetween, a valve stem projecting from said disk, said stem having a metering orifice in its side, an annular gasket fitted over said stem to normally seal said metering orifice, the peripheral edge portion of said gasket being secured between said disk and a portion of said cup, a spray tip having a lower end engaging the intermediate portion of the upper surface of said gasket, said tip being movable relative to said disk to displace said gasket from sealing engagement with said metering orifice, and means locking said spray tip against separation from said gasket.

8. In an aerosol valve assembly, a mounting cup having a centrally disposed opening defined by a vertical wall, a valve comprising a disk fitted within said opening, said disk and said vertical wall having a cooperating recess and rib interengaged to prevent relative movement therebetween, a valve stem projecting from said disk, said stem having a metering orifice in its side, an annular gasket fitted over said stem to normally seal said metering orifice, the peripheral edge portion of said gasket being secured between said disk and a portion of said cup, a spray tip having a lower end engaging the intermediate portion of the upper surface of said gasket, said tip being movable relative to said disk to displace said gasket from sealing engagement with said metering orifice, and prongs depending from said spray tip, said prongs engaging said gasket to lock said spray tip against separation from said gasket.

9. In an aerosol valve assembly, a mounting cup, a valve comprising a disk secured within said cup, a valve stem projecting from said disk, said valve stem having a metering orifice at one side thereof, said disk having an annular shoulder adjacent the lower portion of said stem and an annular bead projecting upwardly adjacent its peripheral edge, a resilient annular gasket seated on said bead and said shoulder, the inner edge of said gasket sealing said orifice, and a spray tip having a lower end engaging the upper surface of said gasket, said spray tip being depressible, upon the downward application of vertical pressure against said tip, to displace the inner edge of said gasket from sealing engagement with said orifice, said gasket being effective by reason of its resilience, to return to its sealing position and to return said spray tip to its initial position upon release of said pressure against said tip.

10. In an aerosol valve assembly, a mounting cup having a centrally disposed opening therein, a valve stem immovably mounted in said mounting cup and projecting upwardly through said centrally disposed opening, a metering orifice extending laterally from the peripheral surface of said stem, a sealing gasket secured in said mounting cup and having an aperture fitting around said stem to seal the outer end of said metering orifice, and a spray tip extending through said opening and having a lower edge engaging said gasket, said spray tip being depressible to move the portion of the sealing gasket in engagement with the lower edge of the spray tip to displace the gasket from sealing engagement with the outer end of said metering orifice.

11. In an aerosol valve assembly, a support member having an opening therein, a resilient valve gasket having an aperture therein, means mounting said gasket in said support member with said aperture aligned with said opening and supporting said gasket at the inner and outer edges thereof at the side thereof remote from said opening in said support member, a valve stem projecting through said aperture in said gasket in sealing relation thereto, said valve stem secured to said support member and having an aperture therein normally sealed by said gasket, a spray tip projecting through said opening and engaging said gasket opposite a region thereof between the supported portions thereof so that depression of said spray tip deforms said gasket to move the same away from the aperture in the valve stem.

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