Oct. 29, 1957 J. L. KIRALY 2,811,390

AEROSOL VALVE ASSEMBLY

Filed March 16, 1956 2 Sheets-Sheet 1

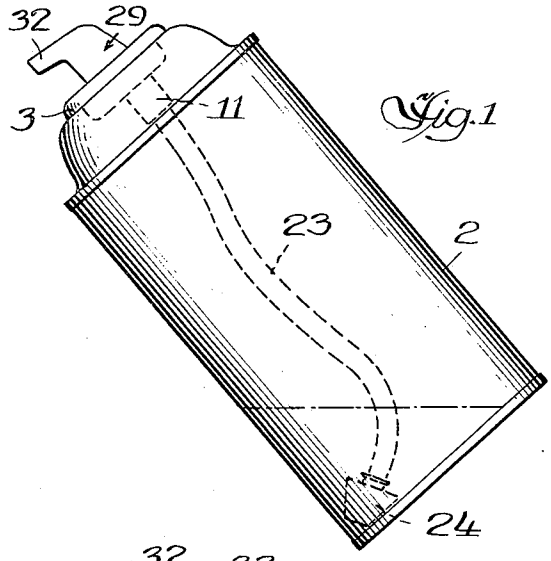

Fig. 1

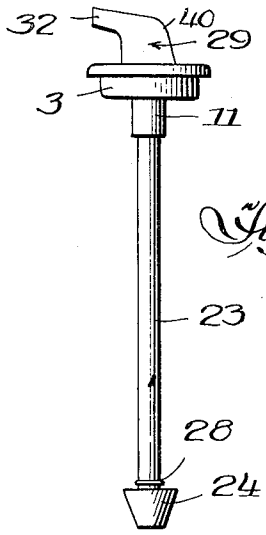

Fig. 2

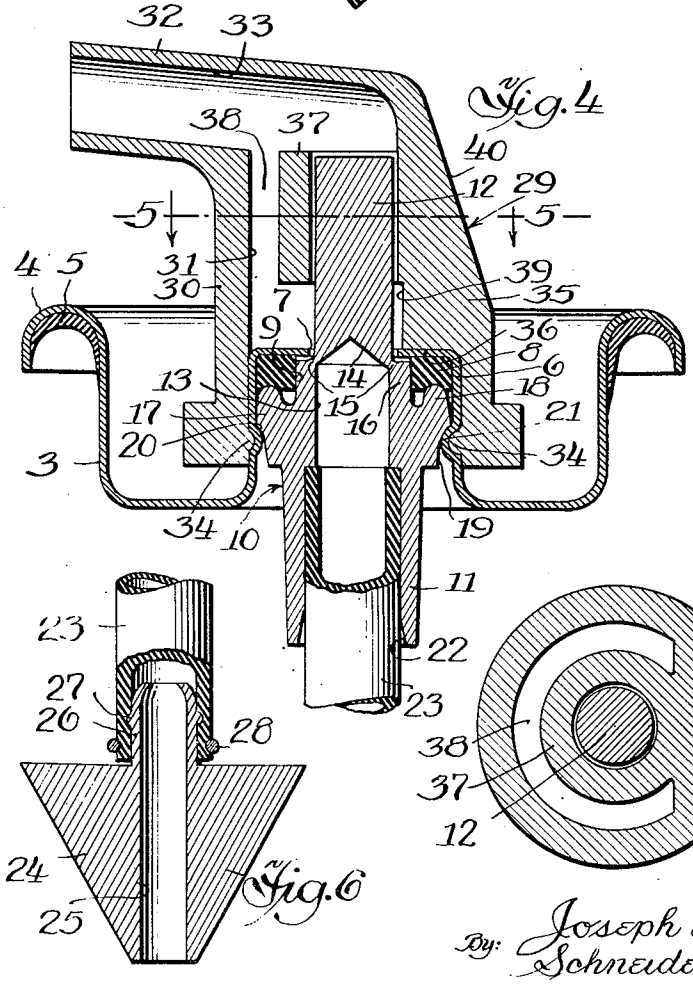

Fig. 4

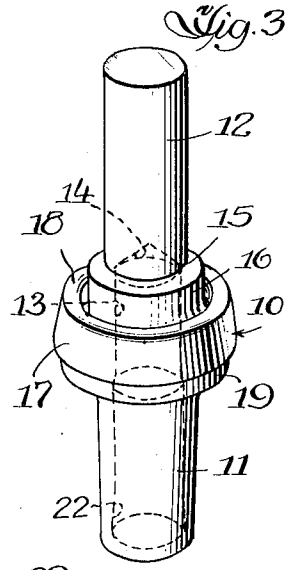

Fig. 3

Fig. 5

Fig. 6

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Fig. 7

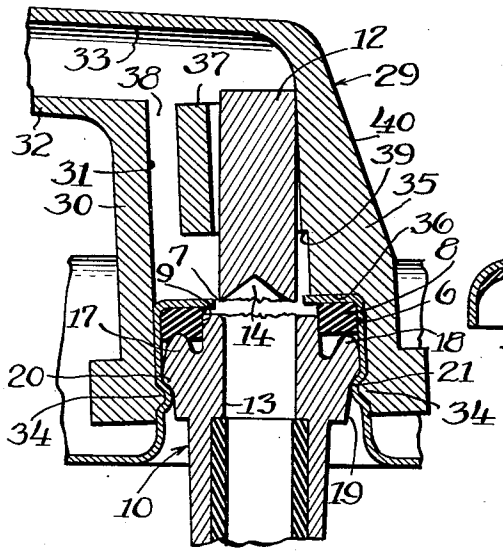


Fig. 8

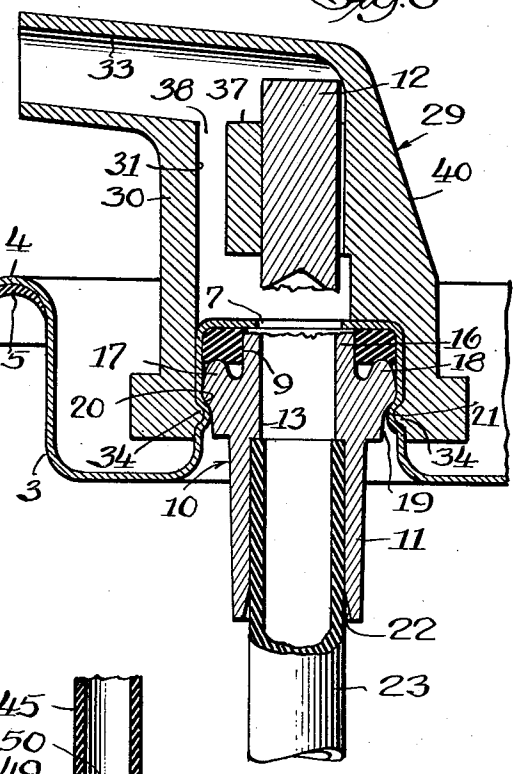
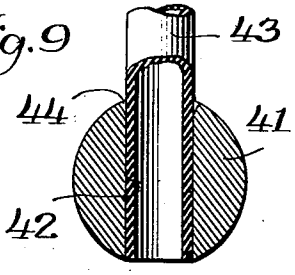


Fig. 9



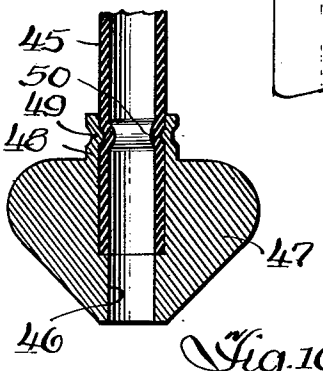
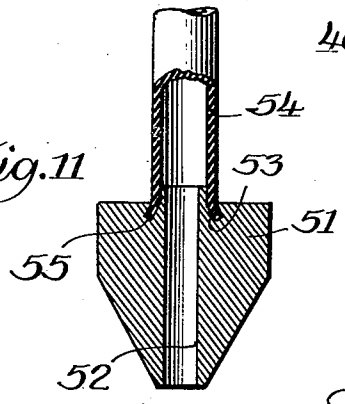


Fig. 10

Fig. 11



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AEROSOL VALVE ASSEMBLY

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5 Claims. (Cl. 299—95)

This invention relates to an aerosol valve assembly and is particularly concerned with a valve for dispersing pressurized material on a one-shot basis.

Although the embodiment illustrated in the drawings is provided with a spray tip adapted to expel the contents of the pressurized container in a suddenburst, such as would be used in connection with fire extinguishers, it is possible to use a spray tip provided with a metering orifice for dispersing the contents at a predetermined rate.

The valve is provided with a stem that seals it completely until the contents are to be dispersed. The stem is integral with the valve but is frangible so that it may be easily broken to open the passageway for the contents. When the stem is broken from the valve, the pressure within the container forces the stem upwardly away from the valve to provide an unobstructed passageway for the flow of the pressurized contents through the spray tip.

A dip tube, secured to a nipple depending from the valve, extends downwardly to the area contiguous to the bottom of the container and is provided with a weight secured to its lower end. The dip tube is flexible so that its lower end will remain immersed in the contents at the lowest point within the container regardless of what direction the container may be tilted to dispense the contents.

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

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

Fig. 2 is a side elevational view of the valve assembly embodying the invention;

Fig. 3 is an enlarged detail perspective view of the valve;

Fig. 4 is a cross sectional view through the valve assembly;

Fig. 5 is a cross sectional view, taken along the line 5—5 of Fig. 4;

Fig. 6 is a cross sectional view showing one means for securing the weight to the lower end of the dip tube;

Fig. 7 is a fragmentary cross sectional view of the valve assembly immediately after the stem is broken off the valve;

Fig. 8 is a view similar to Fig. 7, showing the stem of the valve in its position after it has been moved upwardly by the pressure of the contents;

Fig. 9 is a view similar to Fig. 6, showing another manner in which the weight may be secured to the end of the dip tube;

Fig. 10 is a view, similar to Fig. 6, showing another means for securing a weight to the end of the dip tube; and

Fig. 11 is another view, also similar to Fig. 6, showing a different means for securing a weight to the end of the dip tube.

In the drawings, the reference numeral 2 indicates a container having an opening in its top. A mounting cup 3

fits into the opening and is provided with a peripheral flange 4 coated on its undersurface with a suitable sealing composition 5 to provide a gas tight seal between the mounting cup and the container. The mounting cup has a centrally disposed boss 6 provided with an opening 7 in its top wall. An annular sealing gasket 8 positioned within boss 6 against the underside of the top wall has an opening 9 larger than opening 7, and concentric therewith.

A tube holder 10, secured within boss 6, has a tubular nipple 11 depending therefrom and an integral stem 12 projecting upwardly through aperture 7. Aperture 7 is larger than the circumference of stem 12 to permit a slight lateral movement of the stem, as hereinafter described. Tube holder 10 is provided with a vertical bore 13 of slightly less diameter than stem 12 and the bottom of stem 12 is recessed, as indicated at 14, so that stem 12 is joined to the body of the tube holder by a thin web 15. The tube holder extends outwardly adjacent web 15 so that the outer surface of its upper wall portion 16 fits against the wall of sealing gasket 8 defining opening 9.

Tube holder 10 is enlarged below upper wall portion 16, as indicated at 17, and is provided with an upwardly extending annular rib 18 which engages the underside of sealing gasket 8 to form a gas tight seal therewith. The lower portion of enlargement 17 is recessed, as indicated at 19, to form a shoulder 20. Boss 6 is provided with an indented rib 21 which engages shoulder 20 to hold the tube holder in fixed position. In assembly, the tube holder may be pressed inwardly of boss 6 until shoulder 20 snaps past rib 21.

The inner surface of nipple 11 is tapered at the bottom, as indicated at 22, to facilitate securement of a dip tube 23. The dip tube is made of any suitable flexible material and is slightly longer than the distance from nipple 11 to the bottom of container 2, as shown in Fig. 1. The extra length and the flexibility of the dip tube allows it to reach the lowermost corner of the container regardless of the direction in which the container is tilted, thereby insuring complete discharge of the contents of the container after the discharge is started.

A weight 24 is secured to the lower end of the dip tube to insure the desired positioning of the lower end of the dip tube in the lowermost corner of the container when the container is tilted. As shown in Fig. 6, weight 24 is provided with a longitudinal bore 25 to permit the contents of the container to flow therethrough and into the dip tube. A tubular stem 26 projects upwardly from the top of weight 24 and is inserted into the lower end of the dip tube. Stem 26 is provided with a peripheral rib 27, and a wire 28 is twisted or clamped around the dip tube below rib 27 to hold the weight securely attached to the dip tube.

A spray tip 29 comprises a body portion 30 having a longitudinal bore 31 and an integral spout 32 provided with a bore 33 communicating with bore 31 and open to the atmosphere. The shape of spout 32 is not critical but preferably it extends angularly from the body portion. The lower portion of bore 31 fits snugly over socket 6 and has an inwardly extending annular rib 34 adapted to fit within rib 21 of socket 6. The spray tip is assembled with the rest of the valve assembly by pressing it downwardly over socket 6 until rib 34 snaps into rib 21 to hold the spray tip in place.

The diameter of bore 31 is reduced just above the top of socket 6 and the bore is offset to provide a thick wall portion 35 and a shoulder 36. Shoulder 36 abuts the top of socket 6 when the spray tip is secured to the socket. An integral loop 37 extends laterally from wall 35 into bore 31 to fit around stem 12 which extends upwardly into bore 31 but terminates a distance below the upper wall of spout 32. The inside diameter of loop 37 is slightly larger than the diameter of stem 12 to

provide sufficient clearance so that the loop will not bind against the stem 12 when the spray tip is being assembled with the rest of the valve assembly, and also to permit the stem to move vertically relative to the loop as hereinafter described. Although stem 12 and loop 37 are preferably cylindrical, they may have any desired shape as long as the stem may move vertically relative to the loop.

The outside diameter of loop 37 is smaller than the inside diameter of bore 31 to provide an unobstructed passage 38 communicating with bore 33 of the spout. The lower end of loop 37 is spaced above the top of socket 6 and wall 35 is provided with an internal recess 39 extending from the top of socket 6 to the lower end of loop 37. The outer surface of wall 35 is tapered from its thickest portion to the top of the spray tip and is flattened, as indicated at 40, to facilitate the proper application of finger pressure to the spray tip. Preferably the smooth wall portion 40 and the end of spout 32 open to the atmosphere are diametrically opposite each other so that the direction of the spray is away from the user's hand.

The operation of the dispenser is very simple. As in all aerosol containers the contents are under pressure which tends to force them upwardly through the dip tube and the valve assembly. The tube holder has no opening through stem 12 and the contents cannot escape from the container as long as the seal between tube holder 10 and stem 12 is intact. Although the web 15 is substantial enough to hold the contents within the container, it is readily frangible.

Finger pressure against surface 40 tends to deflect spray tip 29 to the left as viewed in Fig. 2. Sealing gasket 8 is sufficiently resilient, as shown in Fig. 7 to permit the spray tip to be displaced far enough to break thin web 15 and separate stem 12 from the tube holder. The pressure of the contents of the container immediately moves stem 12 upwardly through loop 37 until its upper end abuts a portion of spout 32. Loop 37 holds stem 12 substantially upright so that it cannot block passage 38. The contents flow upwardly through dip tube 23, vertical bore 13 and bores 31 and 33 into the atmosphere. Weight 24 holds the lower end of dip tube 23 in the lowermost corner of the container as the container is tilted, so that the discharge of the contents continues until the container is entirely empty.

In Figs. 9, 10 and 11 different means are shown for securing the weight to the lower end of the dip tube. Although the weights shown in these figures are of different outward appearance, it will be understood that the means for securing the weight to the dip tube is not dependent upon the outward shape of the weight.

In Fig. 9 a substantially spherical weight 41 is provided with a bore 42 having a diameter substantially equal to the outside diameter of dip tube 43. One end of bore 42 is tapered outwardly, as indicated at 44, and the end of dip tube 43 is forced into the bore and held by friction.

In the embodiment illustrated in Fig. 10 the lower end of a dip tube 45 is forced into a bore 46 in the weight 47. A neck 48 extends upwardly from the weight and fits snugly around dip tube 45. The neck and dip tube are crimped inwardly, as indicated at 49 and 50, to hold the weight on the dip tube.

In Fig. 11 a weight 51 is provided with a bore 52 and has an outwardly flared groove 53 extending downwardly into its top surface. The lower end of dip tube 54 is forced into groove 53, as indicated at 55, to provide a flare lock. Groove 53 extends around bore 52 so that the dip tube is aligned with the bore.

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

I claim:

1. In combination with a container having an opening in one wall thereof, a mounting cup secured in said opening, a tube holder secured in said mounting cup, a stem secured to said tube holder by a frangible web integral with said tube holder and stem, and a spray tip secured to said mounting cup, said spray tip having a bore surrounding said stem, said tube holder having a bore communicating with the interior of said container and sealed from the bore of said spray tip by said frangible web, said spray tip being displaceable laterally to break said frangible web to permit pressurized contents of said container to flow through said tube holder into the bore of said spray tip for discharge into the atmosphere.

2. In combination with a container having an opening in one wall thereof, a mounting cup secured in said opening, a tube holder secured in said mounting cup, a stem secured to said tube holder by a frangible web integral with said tube holder and stem, a spray tip secured to said mounting cup, said spray tip having a bore surrounding said stem, and a loop within said bore in engagement with said stem to prevent lateral movement of said stem to an extent sufficient to block said bore, said tube holder having a bore communicating with the interior of said container and sealed from the bore of said spray tip by said frangible web, said spray tip being displaceable laterally to break said frangible web to permit pressurized contents of said container to flow through said tube holder into the bore of said spray tip for discharge into the atmosphere.

3. An aerosol valve assembly comprising a mounting cup, a tube holder secured in said mounting cup, a stem secured to said tube holder by a frangible web integral with said tube holder and stem, a spray tip secured to said mounting cup, said spray tip having a bore surrounding said stem, said tube holder having a bore communicating with the interior of said container and sealed from the bore of said spray tip by said frangible web, said spray tip being displaceable laterally to break said frangible web, said stem being movable vertically by the pressure within said container when said web is broken, and a loop within the bore of said spray tip adapted to engage said stem to prevent blocking of the air passageway between said container and said spray tip.

4. In combination with a container having an opening in one wall thereof, a mounting cup secured in said opening, a tube holder secured in said mounting cup, a stem secured to said tube holder by a frangible web integral with said tube holder and stem, a flexible dip tube secured at one end to said tube holder, a weight secured to the opposite end of said dip tube, and a spray tip secured to said mounting cup, said spray tip having a bore surrounding said stem, said tube holder having a bore communicating with the interior of said container and sealed from the bore of said spray tip by said frangible web, said spray tip being displaceable laterally to break said frangible web to permit pressurized contents of said container to flow through said tube holder into the bore of said spray tip for discharge into the atmosphere.

5. In combination with a container having an opening in one wall thereof, a mounting cup secured in said opening, a tube holder secured in said mounting cup, a stem secured to said tube holder by a frangible web integral with said tube holder and stem, a flexible dip tube secured at one end to said tube holder, a weight secured to the opposite end of said dip tube, said weight having a bore in communication with the interior of said dip tube, and a spray tip secured to said mounting cup, said spray tip having a bore surrounding said stem, said tube holder having a bore communicating with the

interior of said container and sealed from the bore of said spray tip by said frangible web, said spray tip being displaceable laterally to break said frangible web to permit pressurized contents of said container to flow through said tube holder into the bore of said spray tip for discharge into the atmosphere.

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