Feb. 11, 1958 M. C. LENGEL 2,822,960

VALVE STRUCTURE

Filed March 7, 1956

FIG. 1.

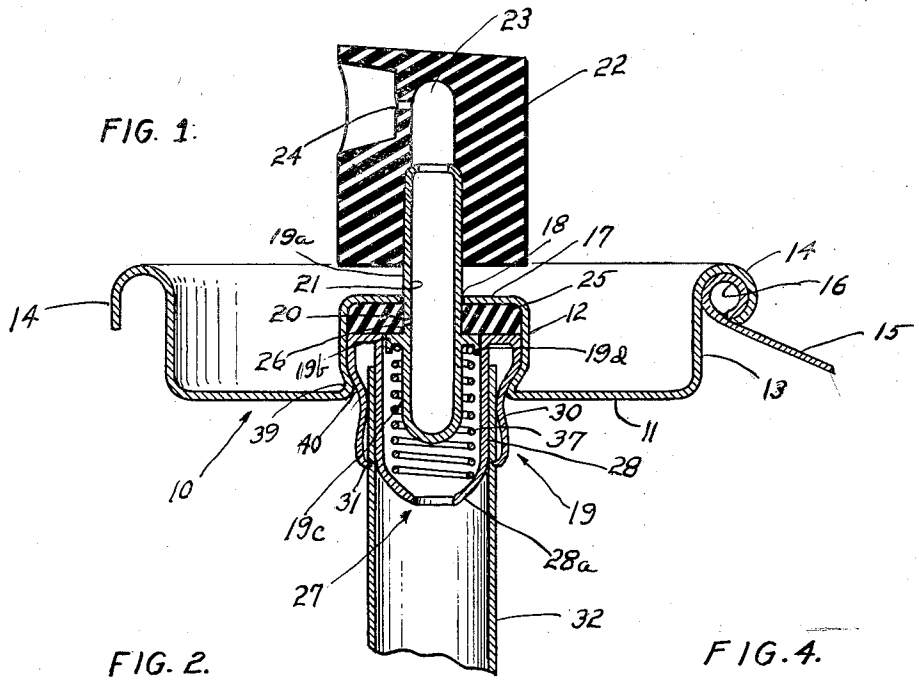


FIG. 2.

FIG. 4.

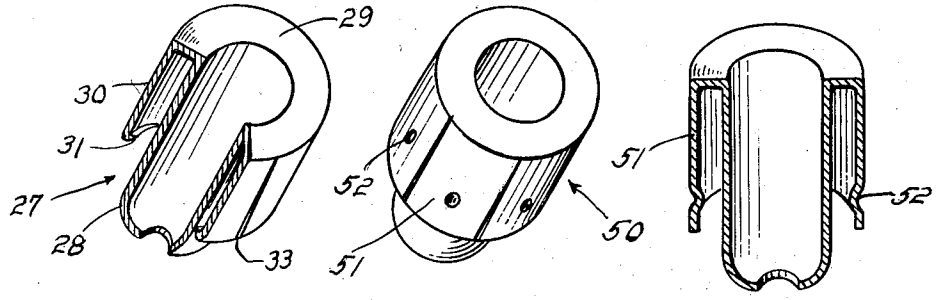


FIG. 3.

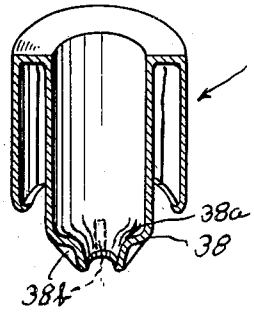


FIG. 5.

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VALVE STRUCTURE

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8 Claims. (Cl. 222—394)

This invention relates to a valve structure and more particularly to an improved valve construction for use in an aerosol receptacle or the like for containing a substance under pressure.

A critical problem presently existing in the art of dispensing an aerosol product from an aerosol container is that of the syphon tube becoming separated from the valve means, thus rendering it impossible for the fluid to be properly discharged from the container. As a result a relatively large number of aerosol containers are thus rendered defected whereby such defective containers are either rejected or the container and substance contained therein are rendered useless. Since the inspection thereof is rendered difficult and expensive because of the difficulties of ascertaining the conditions within the containers, the defect remains undetected until the defected article reaches the ultimate consumer. Consequently for every such defected item which reaches the consumer, the goodwill of the product is proportionally reduced.

Heretofore, it has been the practice to fit the end of the syphon tube, to the valve means by simply sliding the end of the tube over the valve eyelet. Thus the snugness of the fit between the tube and the valve eyelet provided the only means of attachment. Consequently, any expansion of the tube relative to the eyelet due to any changes in climatic conditions, or by the inherent pressure of the fluid passing therethrough or by excessive or rough handling or the like, in addition to the weight of the tube would cause the latter to become so loose that it would frequently slip off or become separated from the valve means. When this occurred, it became impossible to remedy the defect in the field, and as a result, the container and substance therein were rendered totally useless and wasted. A further disadvantage of the valve structure heretofore used is that they were relatively complex, difficult to assemble and expensive to manufacture.

An object of this invention is to provide means for positively securing the syphon tube to the valve means.

Another object of this invention is to provide means for positively securing the syphon tube to the valve means so that as the tendency of the tube and valve means to separate becomes greater, the resistance against the force acting to separate the tube from the valve means is increased proportionately.

Another object of the present invention is to provide a simplified valve structure which is relatively inexpensive to produce, simple to assemble and positive in operation.

Another object of this invention is to provide the tube receiving portion of the valve means with guiding means to facilitate the fitting and centering of the tube thereto together with means for positively securing the tube to the valve means.

A feature of this invention resides in the provision of a novel valve eyelet having a pair of spaced depending wall portions wherein the syphon tube is adapted to be disposed between the walls thereof and positively secured

thereto by bending inwardly the outer wall portion to grip the tube between the walls thereof.

Another feature of this invention resides in the provision whereby the individual components of the valve are relatively simple, easily assembled and positively secured in the assembled form.

Another feature of this invention resides in the provision whereby the inner wall of the eyelet is provided with an inwardly and downwardly stepped terminating end portion having a plurality of tapered webs spacially positioned exteriorly of the inner wall adjacent the stepped portion whereby the fitting of the tube thereto is facilitated by guiding the tube end over the webs and onto the inner wall of the eyelet.

Other features and advantages will be apparent from the following description and drawing in which:

Figure 1 is a sectional view illustrating the improved valve structure according to this invention.

Figure 2 is a detail perspective view partly shown in section of an improved valve eyelet.

Figure 3 is a perspective view of a modified form of eyelet.

Figure 4 is a sectional view of the eyelet of Figure 3.

Figure 5 is a detail perspective view, partly in section of still another modified form of eyelet.

Referring to the drawing, Figure 1 illustrates the general assembly of the valve structure according to the instant invention. As shown the valve structure includes a cap member **10** which forms the mounting portion or housing for the component parts of the valve. The cap member **10** generally consists of a circular blank provided with a laterally extending bottom portion **11** having a raised center portion **12** and an upwardly extending outer peripheral portion **13** provided with a downwardly turned terminating flange **14**. Accordingly, the cap **10** is secured to a suitable aerosol receptacle or container **15** as by beading or crimping the downwardly turned flange **14** to the co-operating edge or neck **16** of the receptacle **15** in the well known manner.

The centrally positioned raised portion **12** of the cap is provided with a top **17** having an aperture **18** therein through which the valve means **19** projects. As illustrated the valve means **19** comprises a hollow stem portion **19*a***, having an integral formed flange portion **19*b*** which is adapted to function as the valving member and lower portion **19*c*** for receiving a spring. If desired the flange portion **19*b*** may be provided with a depending peripheral skirt **19*d*** to form a retaining groove for receiving the upper end of the spring **37**.

The hollow tubular portion **19*a*** is provided with a small intake orifice **20** positioned adjacent the lower end thereof, the orifice **20** extending laterally to communicate with the central passageway **21** of the stem. If desired, the upper end of the stem is fitted with a head **22** having a mixing chamber **23** and laterally extending nozzle **24** through which the aerosol substance is discharged.

Disposed below and underlying the undersurface of the top **17** is an annular sealing washer or gasket **25** which is provided with a center opening **26** axially aligned with the aperture **18** and valve stem **19*a***. It will be noted that opening **26** is sufficiently large so as to snugly embrace the hollow valve stem **19*a*** to form a tight seal, yet permitting the latter to be slidably mounted therein. According to this invention the sealing washer **25** is generally formed of a rubber, neoprene or other suitable resilient sealing material. While the washer or gasket **25** may be frictionally secure within the raised portion **12**, a novel valve eyelet **27** is frictionally fitted within the raised portion **12** of the cap to positively hold the washer in place.

As illustrated in Figures 1 and 2 the novel valve eyelet

27 according to this invention includes a main depending body portion 28 forming a guide well for the valve member 19*b* and a seat for the spring 37. The upper end of the body is laterally bent to form a flange or shoulder 29 and has connected thereto a depending skirt or outer wall 30 spaced from said main body or inner depending inner wall portion 28. As illustrated, the terminating, depending edge portion of the skirt or outer wall 30 is provided with an inturned flange or hook portion 31 which is adapted to bite or engage the end of the syphon tube 32 as will be hereinafter described. If desired, in order to facilitate the manufacture of the eyelet, the depending skirt 30 may be provided with a plurality of spaced longitudinally extending slots 33 to expedite the shaping of the same substantially as shown.

The valving member 19*b* which is preferably integrally formed intermediate the ends of the valve stem is normally urged into sealing position against the under surface of the washer or gasket 25. Since the washer or gasket 25 is provided with an aperture for snugly engaging the valve stem, it will be noted that the valving member 19*b* is sufficiently large to form a tight seal with the gasket. Further it will be noted that the valve portion 19*b* prevents the valve stem from being pulled through the aperture of the gasket. The upper surface of the valving member 19*b* is made flat so that it may engage the gasket to form a flush and tight seal.

Thus, it will be noted that the spring 37 normally urges the valve 19*b* against the washer so that it is maintained in normal seating position. As a result the orifice 20 is sealed or closed by the washer 25, the latter being sufficiently wide to completely close the orifice as illustrated in Figure 1. With the orifice thus blocked, the valve portion 19*b* is firmly seated against the gasket 25 to seal the interior of the container from the atmosphere. Consequently no gas is permitted to flow beyond the valve.

According to this invention the syphon tube 32 is positively secured to the valve means by snugly fitting the upper end of the tube about the inner wall portion 28 of the eyelet. Accordingly, the tube is disposed between the spaced wall portions of the eyelet.

To positively secure the tube 32 to the eyelet, the depending skirt or outer wall 30 is inwardly bent so that the terminating hook portion 31 of the skirt bites into the tube 32 to positively clamp the tube to the eyelet. If desired an inward bend may be formed by a suitable crimping operation to secure the eyelet and the assembled valve to the raised portion 12 of the cap member as indicated at 39, 40. Or if desired, the eyelet bend at 40 may be preformed and the eyelet snapped in position to the cap.

While the terminating edge portion 28*a* of the eyelet 27 may be simply inwardly turned to form a seat or backing member for the spring 37, the lower end of the inner depending wall portion of the eyelet 27*a*, illustrated in Figure 5, may be provided with an inwardly and downwardly stepped terminating end portion 38. In this form the lower end of the spring can be more firmly supported on the stepped portion 38*a*.

As illustrated, circumferentially spaced about the stepped portion 38 of the eyelet there is provided a plurality of diverging web portions 38*b*. By the use of such diverging webs it has been discovered that positioning of the upper end of the tube on the eyelet is greatly facilitated in that the diverging webs aid in centering and positioning the tube onto the eyelet as the tube is fitted thereto. In production line assembly, this feature greatly increases production with proportional savings as a result thereof.

Thus, it will be noted that the improved eyelet 27 or 27*a* securely grips the tube 32 in such a manner that as forces tending to separate the two are increased, the resistance against the separation of the tube from the eyelet is increased. This is readily apparent by the fact that as the tendency of the tube to be pulled is increased, the resistance of the hook portion 31 to such reaction is likewise increased. As a result the critical problem of the tube becoming separated from the valve which heretofore existed and which so frequently rendered the product useless is positively remedied. The intermediate bend portion 40 of the skirt and terminating edge portion 31 engaging the tube complement each other in positively securing the tube to the eyelet.

As a result, expansion of the tube and all the other influencing factors which heretofore tended to separate the tube from the valve eyelet no longer can effect the separation of the tube valve and eyelet. For this reason, it is apparent that a substantial saving is afforded in that waste is reduced and the goodwill of the product is less likely to be injured as a result of defective containers. Furthermore the webs portion of the eyelet facilitates the positioning of the tube on the eyelet.

In the modified form of eyelet illustrated in Figures 3 and 4, the eyelet 50 is similar in construction as the eyelet 27 except that in lieu of the hooks portion 31, the outer skirt 51 is provided with a plurality of dimples or protuberances 52 circumferentially spaced about the skirt 51 to secure the syphon tube to the center body or inner wall portion 53. Thus it will be apparent that as the skirt is crimped to the cap portion 12, the skirt 51 is bent so that the dimples 52 will bite into the tube, to securely and positively connect the tube to the eyelet.

For operation of the improved valve, it is simply necessary to depress the valve stem an amount sufficient to move the orifice 20 downwardly to a point just beyond the gasket 25, so that the fluid under pressure passes upwardly through the tube 32 into the main eyelet body 28, through orifice 20 to passageway 21 and out through nozzle 24. When the desired amount of fluid is dispensed, the valve stem is released, whereby the valve 24 is automatically urged into normal sealing position by the spring 37.

Although the invention has been described in detail, it will be understood that the description thereof is intended to be illustrative rather than restrictive, as many structural details are susceptible to modification and change without departing from the spirit and scope of this invention.

I claim:

1. For use in an aerosol container having a valve means and a syphon tube connected thereto, the improvement of a securing means for positively mounting the tube to the valve means so as to prevent any possible separation of the tube therefrom, said securing means comprising an eyelet having inner and outer depending spaced wall portions, the outer wall portion being provided with a plurality of spaced, longitudinally extending slots, said inner depending wall portion adapted to be received in the end of said tube so that the tube is disposed between said inner and outer wall portions, and said outer wall portion being inwardly bent to securely grip said end of the tube between the depending walls of said eyelet.

2. For use in an aerosol container having a valve means and a syphon tube connected thereto, the improvement of a securing means for positively mounting the tube to the valve means so as to prevent any possible separation of the tube therefrom, said securing means comprising an eyelet having integrally formed inner and outer, depending spaced wall portions, said inner depending wall portion having an inwardly turned terminating edge portion adapted to form a seat for a valve spring, said inwardly turned edge portion adapted to be received in the end of said tube so that the tube is disposed between said inner and outer depending wall portions, said outer depending wall portion being inwardly bent to securely grip said end of the tube between the walls of said eyelet.

3. For use in an aerosol container having a valve means and a syphon tube connected thereto, the improvement of a securing means for positively mounting the tube to the valve means so as to prevent any possible separation of the tube therefrom, said securing means comprising an eyelet having inner and outer, depending spaced wall por-

tions, said inner depending wall portion having the lower portion provided with an inwardly and downwardly stepped end portion, said step adapted to form a firm seat for a valve spring, said stepped portion being adapted to be received in the end of said tube so that the tube is disposed between said inner and outer depending wall portions, and a plurality of spaced tapering web portions circumferentially disposed about said stepped lower end portion of said inner wall portion for facilitating the positioning of said tube thereon and said outer wall portion being inwardly bent to securely grip said end of the tube between the walls of said eyelet.

4. In combination with an aerosol container having a valve means and a syphon tube connected thereto, the improvement wherein said valve means includes a securing means for positively holding the tube to said valve means to prevent any possible separation of the tube therefrom, said securing means comprising an eyelet having a depending body portion adapted to house a spring loaded valve means, said body portion having integrally formed therewith a laterally extending flange provided with a depending skirt portion spaced from said body portion, said body portion being adapted to be received in the end of said tube whereby said tube end is disposed between said depending body and depending skirt portion, said skirt being inwardly bent to engage said tube for positively securing tube therebetween.

5. In combination with an aerosol container having a valve means and a syphon tube connected thereto, the improvement wherein said valve means includes a means for positively securing said tube to said valve means to prevent any possible separation of the tube therefrom, said means comprising an eyelet having a body portion adapted to house a spring biased valve member, said body portion having a laterally extending flange, and a depending skirt portion connected to said flange and spaced from said body portion, said skirt having an inwardly turned, lower terminating edge portion, said tube being adapted to be fitted to said body portion whereby said fitted end of said tube is disposed between said spaced depending skirt and body portions, said inturned edge portion of the skirt being adapted to bite into said tube to positively secure the same to the valve means whereby said resistance to separation of the tube from the valve means increases as the tendency of the same to separate increases.

6. In combination with an aerosol container having a valve means and a syphon tube connected thereto, the improvement wherein said valve means includes a means for positively securing said tube to said valve means to prevent any possible separation of the tube therefrom, said means comprising an eyelet having a body portion adapted to house a spring biased valve member, said body portion having a laterally extending flange, and a depending skirt portion connected to said flange and spaced from said body portion, said skirt having an inward bend at an intermediate portion thereof and an inwardly and upwardly turned lower, terminating edge

portion, said tube being adapted to be fitted to said body portion whereby said fitted end of said tube is disposed between said spaced depending skirt and body portions, said intermediate bend and upwardly inturned edge portion of the skirt being adapted to engage said tube to positively secure the same to the valve means, whereby said resistance to separation of the tube from the valve means increases as the tendency of the same to separate increases.

7. An improved valve structure for use with an aerosol receptacle for containing a fluid under pressure comprising a cap member provided with a raised portion, said raised portion having a top provided with an aperture, a valving means having a valving member and hollow stem integrally connected for dispensing said fluid, said stem having an intake orifice adjacent the lower end thereof and projects upwardly through said aperture, a resilient annular member disposed adjacent said aperture and immediately below said top, said member being of sufficient thickness to snugly embrace said valve stem to form a seal for said orifice and valve stem in normal non operative position of the stem, an eyelet having spaced depending wall portions forming an opening aligned with said aperture and valve stem, a spring mounted in the eyelet normally biasing said valving member, said eyelet retaining said annular member in said cap and said spring normally biasing valving member into seating, sealing position against said annular member, and a syphon tube for directing fluid to the valve means connected to said eyelet, said eyelet including means for positively securing said tube between the spaced depending wall portion thereof so that as the tendency for the said tube to separate from said eyelet increases, the resistance against separation is increased.

8. For use in an aerosol container having a valve means and a syphon tube connected thereto, the improvement of a securing means for positively securing the tube to said valve means to prevent the separation of the tube from the valve means, said securing means comprising an eyelet having spaced inner and outer depending wall portions, said inner wall portion being adapted to be received in the end of said tube so that said tube is disposed between said wall portions, and securing means on said outer wall portions for positively gripping said tube to frictionally secure said tube between said wall portions, said securing means including a plurality of circumferentially spaced protuberances on said outer wall, said protuberances being adapted to engage said tube to frictionally secure said tube between said wall portions.

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