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RESILIENT VALVE MOUNTING ASSEMBLY

Filed Aug. 23, 1955

Fig. 1.

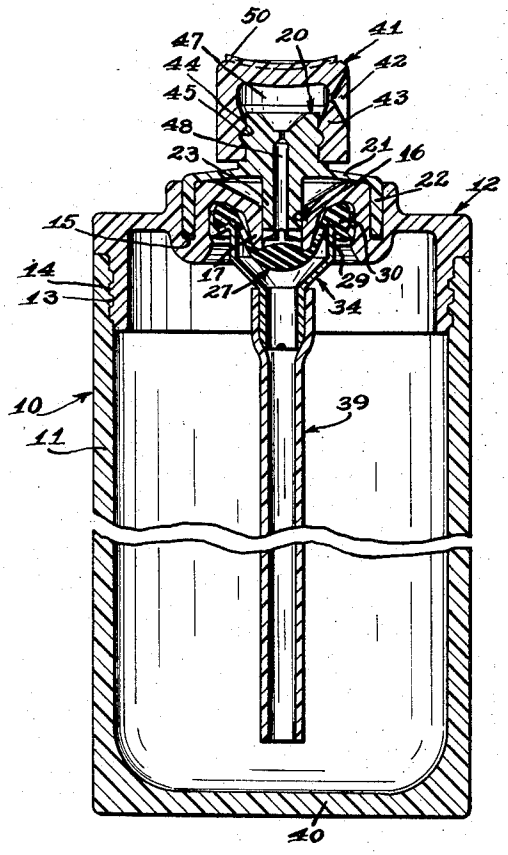
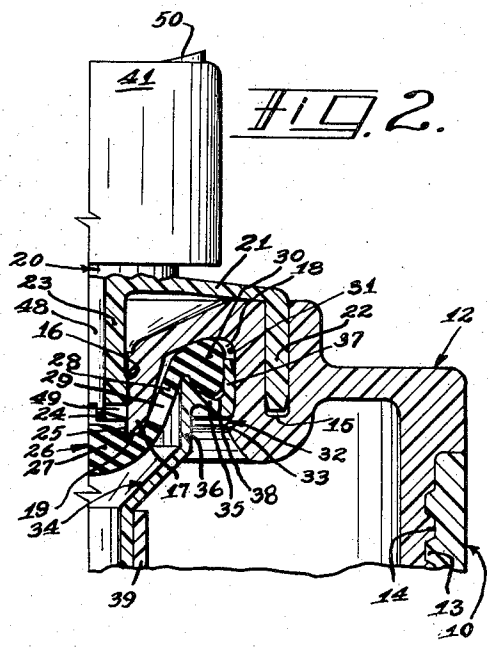


Fig. 2.



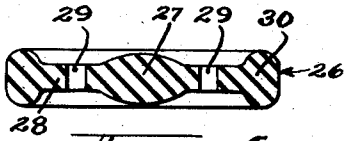


Fig. 4.

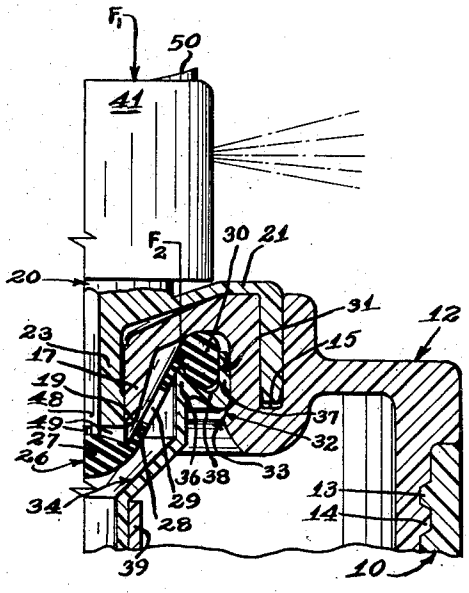


Fig. 3.

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RESILIENT VALVE MOUNTING ASSEMBLY

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4 Claims. (Cl. 299—95)

This invention relates to a non-metallic valve mounting assembly for use within a pressurized container of the aerosol type.

Containers such as those used for dispensing pressurized foams and sprays and other various fluids are well known. However, it has been common to package these substances in containers having metallic valve mounting assemblies, and due to the corrosive nature of many of the substances so packaged, these metallic assemblies become badly corroded, and, either cease to function properly or adversely affect the contents in the container. In order to effectively overcome the corrosive effects of such substances it is therefore desirable to replace them with like components of non-metallic composition, such as rubber or plastic. However, when non-metallic components are used it becomes difficult to obtain the rigidity necessary to maintain a secure assemblage of these non-metallic components throughout the repeated operational cycles to which they must be subjected.

Accordingly, it is an object of this invention to provide an improved non-metallic valve mounting assembly for an aerosol type container that will maintain its assembled relation throughout repeated opening and closing of the discharge valve.

Another object is to provide a valve mounting assembly requiring a minimum number of non-metallic parts.

The specific nature of this invention, as well as other objects and advantages thereof, will become apparent to those skilled in the art from the following detailed description, taken in conjunction with the drawing on which, by way of preferred assembly only, is illustrated a selected embodiment of this invention.

On the drawing:

Fig. 1 is a central vertical sectional view of a container embodying this invention;

Fig. 2 is an enlarged fragmentary view of Fig. 1;

Fig. 3 is an enlarged fragmentary sectional view of the valve mounting assembly in its dispensing position;

Fig. 4 is a central sectional view of the non-stressed resilient valve.

Referring to the drawings in detail, numeral **10** represents a non-metallic aerosol type container of the configuration commonly utilized in packaging pressurized fluids. The container **10** is conventionally formed with a cup-shaped non-metallic main body portion **11** defining an open end **11***a* for filling or dispensing the pressurized contents of the container. Fitting over the open end **11***a* of the container there is an inverted cup-shaped non-metallic head portion **12** which is secured to the container by engaging the internal threads **13** on the main

body portion **11** with the external threads **14** located on the head portion **12**. Preferably, these threads **13** and **14** are coated with a suitable plastic cement before they are so engaged. The container head portion **12**, which is of unit molded construction, has an external upwardly facing annular channel **15** in surrounding relationship to a cylindrical bore **16** extending transversely through the center of the head portion **12**. The wall of the cylindrical bore acts as a plunger guide **17**. Additionally, the head portion **12** defines a downwardly opening annular groove **18** in concentric relation to the cylindrical bore **16** to thereby form the tubular plunger guide **17** having an annular valve seat **19** defined on the internal axial end thereof. As illustrated, the inner wall of the annular groove **18** also forms the wall of the tubular plunger guide **17**.

A non-metallic plunger **20** is provided having an integral flexible radial flange **21** terminating in a depending peripheral flange **22**, mountable within the annular channel **15** in press fit relationship, and a tubular stem portion **23** slidably moveable within the cylindrical bore **16** and frictionally engaging the wall thereof. As best shown in Figs. 1 and 2, the plunger **20** when so mounted is positioned with the end portion **24** of the plunger stem **23** terminating just short of the interior end portion **25** of the plunger guide **17**.

A resilient non-metallic valve **26** having a hub-shaped imperforate central body portion **27** is connected by a radial skirt **28** having openings **29** therein to a thickened annular rim portion **30**. The resilient valve **26** when being mounted is flexed from its normal configuration, as shown in Fig. 4, so that the central body portion **27** is seatable on the valve seat **19** and biased thereagainst, while the valve rim portion **30** is positioned in the annular groove **18**. The outer wall **31** of the annular groove **18** is provided with a re-entrant portion **32** which defines an annular retaining lip **33**. To hold the resilient valve **26** in this flexed, or normally closed position, a non-metallic retaining funnel **34** is provided which is formed of nylon or a similar material possessing limited flexibility. The retaining funnel **34** has a peripheral rim portion **35**, cross-sectionally shaped to resemble an N, which is snugly insertable into the annular groove **18**. The rim portion **35** is comprised of an interconnected inner rib **36** and outer rib **37** which combine to define an annular notch **38** which engages the valve rim **30**. When thus inserted, the retaining lip **33** holds the retaining funnel **34** in position. To the opposite end of the retaining funnel **34**, there is attached in press-fit relationship a hollow non-metallic discharge tube **39** which extends into the interior of the container **10** and terminates near the bottom **40** thereof.

In addition a hollow rotatable cap **41** of non-metallic construction is provided having a radial discharge opening **42** extending through the wall **43** thereof. The cap **41** is further provided with an annular recess **44** in the periphery of the inner wall **43** which coacts with a protruding bead **45** on the outer periphery of the plunger **20** in snap-fit relationship.

When the cap **41** is so secured to the plunger **20** the hollow central portion **47** of the cap **41** communicates with both the discharge opening **42** therein and the tubular central passage **48** extending axially through the plunger **20** and which in turn communicates with the radial slots **49** in the plunger end portion **24** to form a series of interconnected passageways.

As best shown in Fig. 3, to dispense the pressurized contents from the container **10** an axially downward force "F_1" is exerted upon the concave surface **50** of the cap **41**, thereby depressing the plunger **20** attached thereto and simultaneously stressing the flexible radial flange **21**. This displacement of the plunger **20** and stem portion **23** thereof forces the hub-shaped central body portion **27** of the resilient valve **26** away from its valve seat **19** by elongating the valve skirt **28** and thereby permits the pressurized contents within the container **10** to flow through the valve openings **29**, through the radial plunger slots **49**, and out through the discharge opening **42** in the cap **41**.

When force "F_1" is applied to the cap **41** another directly proportional force "F_2" is transmitted downwardly upon the inner rib **36** by the action of the resilient valve rim **30** thereon. Force "F_2" then wedges the N-shaped rim **35** against the annular retaining lip **33** and outer wall **31** of the annular groove **18**. In addition, the resilient valve rim **30** when acting upon the inner rib **36** with a force "F_2" tends to pivot about the inner rib **36**, thereby, acting upon the outer rib **37** with a directionally outward force pressing it more firmly against the outer wall **31**.

Thus, it is apparent that the actuating force "F_1" that is applied to dispense the pressurized contents of container **10** further serves to lock the valve mounting assembly securely in position during the discharge operation.

It will, of course, be understood that various details of construction may be modified through a wide range without departing from the principles of this invention, and it is, therefore, not the purpose to limit the patent granted hereon otherwise than as necessitated by the scope of the appended claims.

I claim:

1. The combination with an aerosol-type container having a filling and dispensing end, and a resilient disc-shaped control valve for regulating the dispensation of the container's pressurized contents, in which said control valve includes an imperforate central portion and a thickened rim portion inter-connected by a perforate radial skirt, of an improved valve mounting assembly comprising; a discharge head on said filling and dispensing end of said container, said discharge head defining a vertical fluid passage and an annular groove encompassing the inner end of said fluid passage, the groove defining portion of said head portion including spaced-apart and radially opposed walls, the innermost of said walls having a tubular configuration adapted to axially abut said valve central portion in sealing relationship, an annular retainer having a peripheral portion generally N-shaped in radial cross-section partially surrounding said valve rim portion and confining same within said annular groove, said peripheral portion including an inner rib and a radially spaced flexible outer rib interconnected by an inclined web wall, whereby a vertical opening force exerted on the central portion of said valve produces a radially outward force urging said outer rib against the outermost wall of said groove.

2. The combination with an aerosol-type container having a filling and dispensing end, and a resilient disc-shaped control valve for regulating the dispensation of the container's pressurized contents, in which said control valve includes an imperforate central portion and a thickened rim portion interconnected by a perforate radial skirt, of an improved valve mounting assembly comprising; a head portion covering said filling and dispensing end and provided with means for securing said head portion to said container, said head portion having a tubular guide member defining a central bore extending through said head portion, said guide member being adapted to normally seat against the central portion of said valve to close said bore relative to the contents of said container; means having a flexible peripheral portion N-shaped in radial cross-section engaging the thickened rim portion of said valve and resiliently biasing the central portion thereof into seating engagement with said guide member; a plunger having a tubular stem portion mounted for frictional sliding movement within said bore and having an end portion engageable with said valve central portion to selectively displace same from seating engagement with said guide member in response to such sliding movement, means formed on said plunger in press fit engagement with said head portion to maintain said plunger and said head portion in assembled relationship, and said last mentioned means being flexible to accommodate relative movement between said plunger stem portion and said head portion.

3. The combination with an aerosol-type container having a filling and dispensing end, and a resilient disc-shaped control valve for regulating the dispensation of the container's pressurized contents, in which said control valve includes an imperforate central portion and a thickened rim portion interconnected by a perforate radial skirt, of an improved valve mounting assembly comprising; a cup-shaped non-metallic head portion substantially closing said filling and dispensing opening and being provided with threaded means for securing said head portion to said container, said head portion having a tubular guide member depending integrally therefrom defining a valve seat at its innermost axial end, said valve seat normally engaging the central portion of said valve to close said filling and dispensing opening; flexible means defining a peripheral portion N-shaped in radial cross-section engaging the thickened rim portion of said valve and cooperating with said head portion to resiliently maintain the engagement between said valve seat and said valve; a non-metallic operating plunger carried by said head portion mounted for frictional sliding movement within said guide member and having a tubular stem portion defining an axial discharge passage extending through said head portion, a flange extending radially from said plunger and engaging said head portion in press-fit relationship, said flange being flexible to accommodate limited relative movement between said stem portion and said head portion, said plunger defining a radial opening therein communicating with said discharge passage adjacent to said valve seat and receiving the pressurized contents of said container when said plunger is slidably moved to displace said valve from seating engagement with said guide member.

4. A valve mounting assembly for selectively regulating the discharge of the pressurized contents of an aerosol-type container having a filling and dispensing opening therein comprising, in combination; a cup-shaped non-metallic head portion substantially closing said container filling and dispensing opening and having a peripheral portion adapted for threaded securement to said container, said head portion being provided with a transverse central bore extending therethrough and an external upwardly facing annular channel and an internal downwardly opening annular groove in surrounding relationship with said bore, said bore and said groove being separated by a tubular guide member depending from said head portion having an annular valve seat defined on the lowermost axial end thereof; a disc-shaped resilient valve having an imperforate central portion normally engaging said valve seat to close the lowermost end of said bore relative to the contents of said container, said valve having a perforate skirt portion integrally connecting said central portion to a thickened rim portion positioned within said annular groove; an annular non-metallic retainer having a flexible rim portion N-shaped in radial cross-section confining said valve rim portion within said annular groove and resiliently biasing said valve central portion against said valve seat; a non-metallic open-ended tubular operating plunger carried by said head por-

tion having a reduced diameter axial stem portion slidably mounted for snug slidable movement within said central bore, a flexible radial flange integrally formed on said plunger occupying said annular channel in press-fit relationship, said stem portion having an annular inner end seating against the central portion of said valve and defining a radial inlet opening extending through the wall of the stem portion adjacent to said valve, whereby in response to selective movement of said plunger said valve may be displaced from said valve seat and permit the pressurized contents of said container to be discharged through said plunger.

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