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Leimbach

[11] **3,749,360**

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[54] **TILTABLE AEROSOL DISPENSING**

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[52] **U.S. Cl.** **251/348**

[51] **Int. Cl.** **F16k 31/58**

[58] **Field of Search** 251/348, 353, 342, 251/346, 347; 222/402.22, 402.23, 402.24

[56] **References Cited**

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FOREIGN PATENTS OR APPLICATIONS

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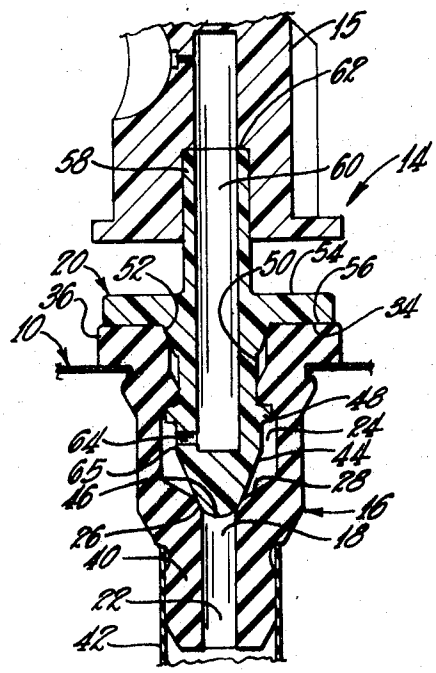
Primary Examiner—Samuel Scott
Attorney—Thomas E. Davis

[57] **ABSTRACT**

A tilt-type dispensing valve has a resilient valve body member with a configured passageway therethrough, a chamber therein and a valve element located in the passageway. The valve insert member includes a head portion disposed in the chamber to resiliently deform the chamber to provide sealing engagement between the valve body and the valve element. The valve element engages the body and permits relative pivotal movement between the insert member and the body member in response to the application of a lateral force to the protruding portion of the insert member to thereby open a flow passageway through the dispensing valve.

4 Claims, 5 Drawing Figures



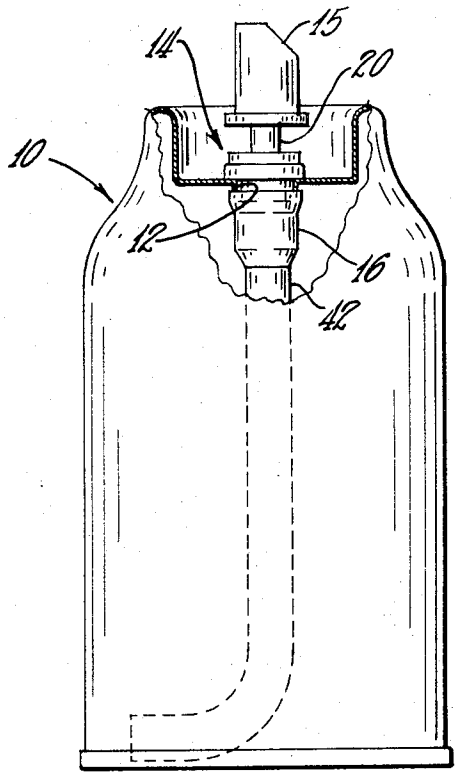


Fig. 1

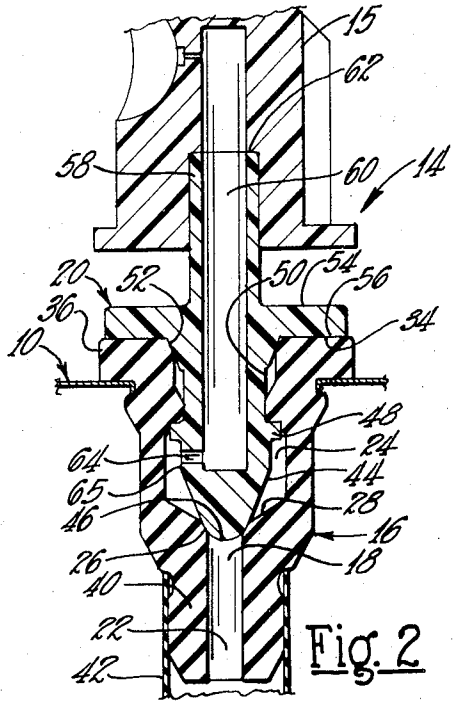


Fig. 2

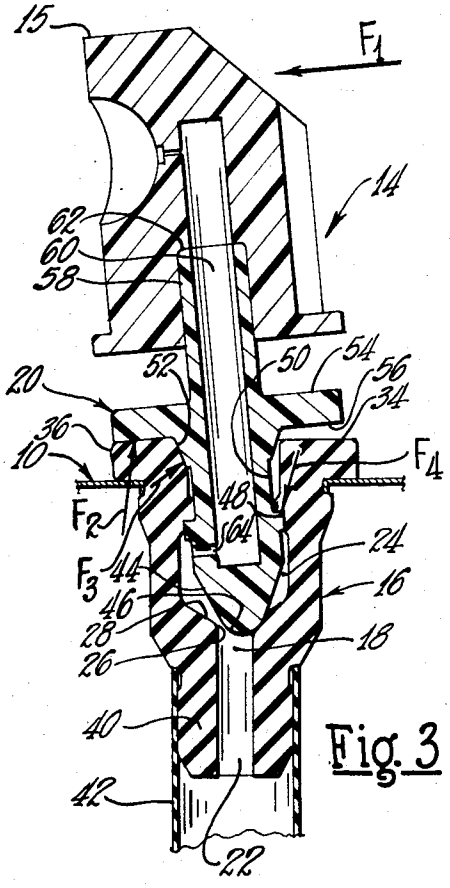


Fig. 3

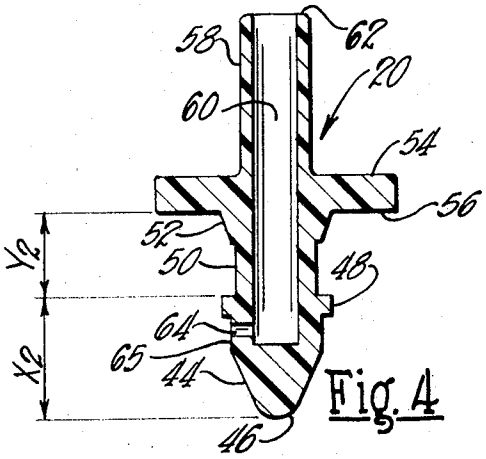


Fig. 4

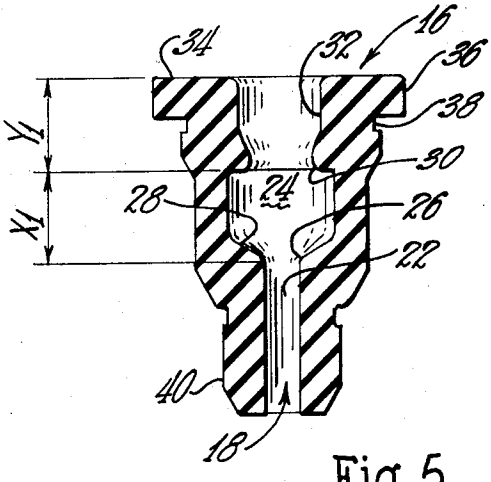


Fig. 5

TILTABLE AEROSOL DISPENSING

BACKGROUND OF INVENTION

I. Field of Invention

This invention relates to aerosol valves, and more particularly to tiltable type aerosol valves having a unitary resilient valve body member with a configured passageway therethrough and a valve insert member disposed within the passageway.

II. Discussion of Prior Art

Valves of this general type have been used in pressurized containers to dispense the contents of the container and although such valves were simple in construction and economical to manufacture, they were subject to several inherent problems. The most pertinent examples of prior art known to the applicant are as follows:

U.S. Pat. No. 2,763,406 to Countryman issued Sept. 18, 1956;

U.S. Pat. No. 2,779,516 to Soffer issued Jan. 29, 1957;

U.S. Pat. No. 2,829,806 to Tedaldi issued Apr. 8, 1958;

U.S. Pat. No. 2,889,086 to Collins issued June 2, 1959;

U.S. Pat. No. 3,088,682 to Venus Jr. issued May 7, 1963;

U.S. Pat. No. 3,454,198 to Flynn issued July 8, 1969;

U.S. Pat. No. 3,549,050 to Bruce et al. issued Dec. 22, 1970;

U.S. Pat. No. 3,534,771 to Eyerdam et al. issued Oct. 20, 1970.

One of the major problems of prior art valves was the prevention of leakage and maintainence of sealing engagement between the valve insert member and the body member throughout repeated actuations of the valve. Many times, after several actuations, the prior art valve would begin leaking before all of the product in the pressurized container had been dispensed.

SUMMARY OF THE INVENTION

The present invention overcomes the drawbacks of the prior art by providing for a coactive relationship between a resilient valve body and a valve element wherein several different areas of the resilient valve body are stressed or resiliently deformed by the valve element to provide a biasing force acting on the element tending to return the element to sealing engagement with a flow passageway through the valve body upon removal of an external force applied thereto.

The present invention accomplishes this by providing a resilient valve body having a configured passageway therethrough and including a chamber therein. A particularly configured rigid valve element is disposed in sealing engagement with the chamber and protrudes from the passageway. The valve element includes a head having a rounded end portion disposed in the chamber and in sealing engagement with a portion of the passageway. The head on the valve element has a greater axial dimension than the chamber of the body whereby the head of the valve element will deform the chamber to provide a resilient tensile biasing force in the body member acting to maintain sealing engagement of the valve element with the passageway. The valve element further includes a radially extending flange adapted to engage an end surface of the resilient valve body. The distance between the flange and the head portion of the valve element is less than the corresponding distance of the resilient valve body member to thereby provide a compressive force in the resilient valve body. These forces act on the valve element to maintain it in sealing position with the passageway. Additional forces tending to ensure return of the valve element to sealing engagement with the flow passage upon removal of a valve opening force are provided by coaction between other portions of the valve element and body.

Accordingly, it is an object of this invention to provide a tiltable type valve having a resiliently deformable valve body with a passageway therethrough and a valve element disposed in sealing engagement with said passageway and protruding therefrom and wherein the valve element is dimensioned to continuously deform the valve body in a plurality of different modes to ensure sealing engagement between the valve element and the body.

Another object of the present invention is to provide a tiltable type valve having a resiliently deformable valve body including a passageway therethrough, and a valve element disposed in sealing engagement with the passageway, and wherein the valve element includes a rounded nose portion movable to open said passageway and a radially extending flange for engaging an end surface of the body member to provide for pivotal movement of said valve element upon application of an external force thereto.

A further object of the present invention is to provide a tiltable type valve having a resiliently deformable body and a valve insert member and wherein the insert member normally places one portion of the body in tension and another portion in compression.

Other objects and advantages of the present invention will become more apparent from a consideration of the drawing and description of the preferred embodiment which follows hereinafter.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a view showing the valve of the instant invention in a pressurized container.

FIG. 2 is an enlarged cross-sectional view of the valve assembly of FIG. 1.

FIG. 3 is a view similar to FIG. 2 showing the valve assembly in the open position permitting flow therethrough.

FIG. 4 is a cross-sectional view of the valve element of the instant invention.

FIG. 5 is a cross-sectional view of the valve body of the instant invention.

Referring now to FIG. 1 of the drawing wherein there is shown a pressurized fluid container **10** having a circular aperture **12** through a wall thereof adapted to receive a valve assembly **14** in sealing engagement therewith. An actuator head **15** is shown disposed on the valve assembly **14.** The actuator head **15** is of conventional design well known in the art and forms no part of the invention of the instant application, consequently further description of the actuator head will not be undertaken.

Referring now to FIG. **2,** the valve assembly **14** comprises a resiliently deformable valve body member **16** having a configured flow passageway **18** therethrough. A valve element **20** is disposed in sealing engagement with the passageway **18** and extends outwardly from the body **16.**

The passageway 18 of body 16 has an axially extending bore 22 and an enlarged chamber 24. A first sealable surface 26 of body 16 is disposed at the juncture of bore 22 and chamber 24. One end of the chamber 24 is defined by a generally concave surface 28 of body 16 while the other end is defined by a radially inwardly extending annular lip 30. In the relaxed, undeformed condition of body 16 as shown in FIG. 5, the sealing surface 26 is axially spaced a first predetermined distance (X_1) from the annular lip 30 at the opposite end of the chamber. Beyond the annular lip 30, the configured passageway 18 has an axially extending cylindrical recess 32. The recess 32 extends axially to an end surface 34 of the body. In the relaxed, undeformed condition of body 16 as shown in FIG. 5, the end surface 34 is spaced a second predetermined distance (Y_1) from the annular lip 30.

The resilient valve body 16 has an enlarged flange 36 and annular groove 38 disposed thereon adapted to sealingly engage the peripheral surface of aperture 12 in the container 10. The resilient valve body 16 further includes a depending skirt 40 for receiving a standard dip tube 42. The annular groove 38 is axially positioned between the annular lip 30 and end surface 34, to ensure peripheral sealing engagement between the annular lip 30 and the valve element 20 when the valve assembly 14 is in position with aperture 12 of container 10.

The valve element 20, as shown in FIG. 4, has a head portion 44 with a rounded nose portion 46 at one end thereof and a radially extending flange 48 at the other end thereof. The distance between the nose 46 and the farthermost end of the flange 48 being a third predetermined distance (X_2). The valve element 20 further includes a reduced intermediate portion 50, a conically configured surface 52, a radially extending flange 54 having a radially extending surface 56 thereon, and a stem portion 58 for receiving the actuator head 15. The distance between adjacent surfaces of the flanges 46 and 54 is a fourth predetermined distance (Y_2). Intermediate portion 50 of valve element 20 is slightly larger than the diameter across the tip of annular lip 30. Further, conical portion 52 at its upper end is slightly larger than cylindrical recess 32.

The valve element 20 has an axial bore 60 extending from one end 62 of the stem portion 58 to a position intermediate the rounded nose portion 46 and the flange 48, and an orifice 64. The orifice 64 extends in a radial direction from bore 60 to a surface 65 of the valve element between nose 46 and flange 48. Bore 60 and orifice 64 thus provide a fluid flow path from chamber 24 to the atmosphere when valve element 20 is assembled in the resilient valve body 16.

With reference to FIGS. 4 and 5 in the preferred embodiment, the distance X_1 of the resilient valve body is less than the corresponding distance X_2 of the rigid valve element, and the distance Y_1 of the resilient valve body is greater than the corresponding distance Y_2 of the rigid valve element. Thus when the valve element 20 is assembled into the resilient valve body 16, the material of the resilient valve body in the area corresponding to the distance X_1 will be placed under a tensile stress and the material in the body corresponding to the distance Y_1 (will be placed in a compressive stress. The particular variances in the distances X and Y must be determined from such considerations as the hardness or durometer of the resilient valve body material and the operating conditions for the particular valve.)

Accordingly, when the valve assembly 14 is in the normally closed condition (FIG. 2) it should now be noted that sealing contact will exist between the valve element 20 and the valve body 16 at the following locations: between rounded nose 46 and sealing surface 26, between upper corner edge of flange 48 and lower portion of lip 30, between intermediate portion 50 and tip of annular lip 30, between concial surface 52 and cylindrical recess 32, and between end surface 54 and end surface 34.

Thus, when the valve element 20 is disposed within the passageway 18 of the resilient valve body, the resilient valve body will exert a plurality of different types of forces acting on the valve element tending to maintain the rounded nose portion of the valve insert member in sealing engagement with the sealing surface 26 of the resilient valve body.

DESCRIPTION OF OPERATION

With reference to FIG. 3, when an external radial force (F_1) is applied to the protruding end 62 of valve element 20, such as by pushing on actuator head 15, the valve element 20 will be pivoted about an outer edge of the flange 54 thereby deforming the resilient valve body and the rounded nose portion 46 will open a fluid flow path through the valve assembly. When this happens, the contents of the container 10 being under pressure in the container 10 will travel up the dip tube 42 through the cylindrical bore 22, across the sealing surface 26 and into the enlarged chamber 24. From chamber 24, the contents pass through the orifice 64 into axially extending bore 60 and out the atmosphere through the actuator 15 which may be attached to the end 62 of the valve element.

As previously noted, the concially configured surface 52 of valve element 20 continuously deforms the material of the resilient valve body at the upper end of recess 32 to provide an additional sealing surface when the valve is in its normal closed condition. The conical surface 52 further provides additional biasing forces and acts as a guide for valve element 20 when the valve is opened as shown in FIG. 3 to ensure return of the nose 46 into sealing engagement with sealing surface 26 upon removal of the radial force which may have been applied to actuator 15.

When the valve element 20 is tilted to the open position as shown in FIG. 3, sealing engagement between the valve element 20 and resilient valve body 16 exists between the upper corner edge of flange 48 and annular lip 30 and further between intermediate portion 50 and the tip of annular lip 30. Due to coaction between the valve element and body, additional forces tending to ensure a return of nose 46 to sealing engagement with sealing surface 26 exist at the locations indicated by F_2, F_3 and F_4 as shown in FIG. 3.

It should now be evident to those skilled in the art that the foregoing specification discloses a new and useful valve for use in pressurized containers, which valve will accomplish the purpose intended.

I claim:

1. A valve assembly for use in a pressurized fluid container, said valve assembly comprising a resiliently deformable body having a passageway therethrough and a valve element located within and extending from said passageway, said body having an enlarged chamber

therein disposed along said passageway, one end of said chamber being defined by a generally concave internal surface of said body to provide a first sealing surface, the other end of said chamber being defined by a radially inwardly extending lip of said body to provide a second sealing surface, said valve element having a rounded portion at one end thereof disposed in sealing engagement with said first sealing surface, a first radially extending flange spaced from said rounded portion and including a surface in sealing engagement with said lip, a second radially extending flange located intermediate said first radially extending flange and the other end of said valve element, said second radially extending flange engaging an end surface of said body and cooperating therewith for permitting tipping pivotal movement therebetween, and a flow passageway communicating between said chamber and said other end of said valve element whereby said valve element may be pivoted about said second flange to deform said body at said second sealing surface and open a fluid flow path through said valve assembly.

2. The invention as defined by claim **1** wherein said valve element has an axial bore and a radial bore, said axial bore extending from said other end of said valve element to a position intermediate said first radially extending flange and said rounded end portion, and said radially extending bore communicating between said axially extending bore and an outer surface of said valve element thereby providing the flow passageway communicating between said chamber and said other end of said valve element.

3. In a valve assembly comprising a resiliently deformable body, said body having a passageway therethrough, and a valve element disposed in sealing relationship with the passageway for normally preventing flow therethrough, said valve element having a flow passage therein, said valve element being tiltable relative to said body to allow fluid communication between the passageway in said body member and the flow passage in said valve element;

the improvement which comprises;

said body defining a first sealing surface in the passageway near one end thereof, a second sealing surface in the passageway spaced from said first sealing surface, and a third sealing surface at the opposite end of said passageway,

said valve element having a rounded portion disposed in sealing engagement with said first sealing surface, a first radially extending flange disposed in sealing engagement with said second sealing surface, the distance between said rounded portion and said first flange on said valve element being greater than the corresponding distance between said first and second sealing surfaces of said deformable body for resiliently tensioning the material of said body between said surfaces to thereby provide a force biasing said rounded portion into sealing engagement with said first sealing surface, and a second radially extending flange on said valve element outside of said body and sealably engaging said third sealing surface thereof, the distance between said first and second flanges on said body being less than the corresponding distance between said second and third sealing surfaces of said deformable body for resiliently compressing the material of said body disposed therebetween.

said valve element including a flow passage extending from a position between said rounded portion and said first flange to beyond the opposite end of said body, and

said valve element being pivotable about said second flange to move said rounded portion arcuately from sealing engagement with said first sealing surface to open a flow path through said valve assembly whereby the resiliently compressed material of said body between said second surface and said opposite end will be effective to bias the rounded portion toward sealing engagement with said first sealing surface.

4. A valve assembly comprising a resiliently deformable body having a configured passageway therethrough and a valve element disposed partly within said passageway and extending outwardly therefrom, said body having a radially extending end surface thereon and an enlarged chamber therein disposed along said passageway, said valve element having a head portion thereon, said head portion being received in the chamber of said body, said head portion continuously deforming said body to provide a sealing engagement of said body and said valve element with each end of said chamber, said valve element including a flow passageway communicating between said chamber and the outwardly extending end of said valve element, a radially extending flange abutting the radially extending surface of said body whereby a tilting force exerted on the outward extension of said valve element will pivot the valve element about an edge of said flange to open a flow passageway through said valve assembly and a conical surface adjacent said radially extending flange, said conical surface being disposed to deform a portion of the passageway in said resilient body whereby said conical surface will be effective to create a biasing force to urge said valve element into sealing engagement with said body passageway upon removal of a tilting force applied to the outwardly extending portion of said valve element.

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