United States Patent [19]

Prussin et al.

[11] **3,806,005**

[45] **Apr. 23, 1974**

[54] **AEROSOL CONTAINER WITH PLUG-IN CAP AND VALVE STRUCTURE**

[76] Inventors: **Samuel Prussin,** 2126 Banyan Dr., Los Angeles, Calif. 90049; **Jimmie L. Mason,** 15005 E. Ladonna, Hacienda Heights, Calif. 91745

[22] Filed: **Aug. 7, 1972**

[21] Appl. No.: **278,669**

Related U.S. Application Data

[62] Division of Ser. No. 810,518, March 26, 1969.

[52] **U.S. Cl.** **222/402.16**

[51] **Int. Cl.** **B65d 83/14**

[58] **Field of Search** 239/337, 373, 394; 222/402.1, 402.24, 545, 563, 402.16, 95; 220/63; 285/231, 345

[56] **References Cited**

UNITED STATES PATENTS

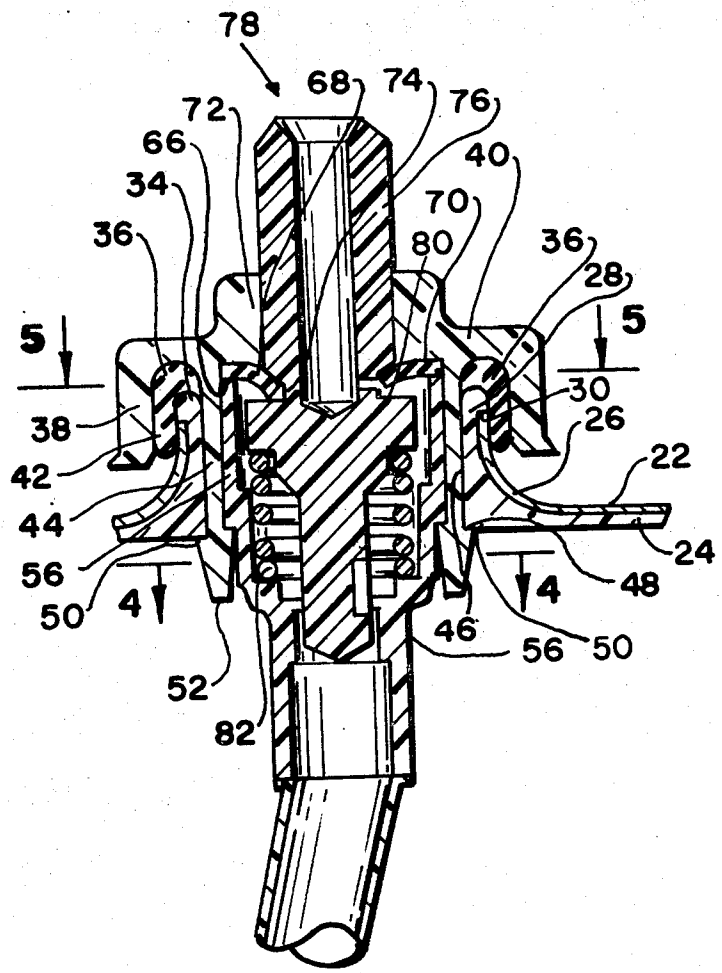
3,372,844	3/1968	Kitabayshi	222/402.1
3,225,967	12/1965	Heimgartner	222/95 X
3,357,603	12/1967	Kitabayashi	222/402.16
3,458,084	7/1969	Laurizio	220/63
3,471,059	11/1969	Moller et al.	222/95
3,606,089	5/1969	Chambers	222/95
3,709,410	1/1973	Cunningham	222/402.16
R25,879	10/1965	Rhodes et al.	222/402.16
2,721,010	10/1955	Meshberg	222/402.16 X

Primary Examiner—Stanley H. Tollberg
Assistant Examiner—Norman L. Stack, Jr.
Attorney, Agent, or Firm—Kenneth J. Hovet; Paul R. Wylie; Leigh B. Taylor

[57] **ABSTRACT**

An aerosol container plug in cap and valve structure comprising resiliently deflectable snap action ledge means adapted to be forced and snapped into position in a hollow container top, wherein ledge means of the top is engaged by ledge means of the cap, such that the cap may be axially pressed and plugged into the opening in the top; said cap also having similar ledge means adapted to hold an aerosol dispensing valve in said top, said means also comprising resiliently deflectable ledge means adapted to lock a valve structure in said top by axially pressing the valve structure body directly into said cap.

3 Claims, 14 Drawing Figures



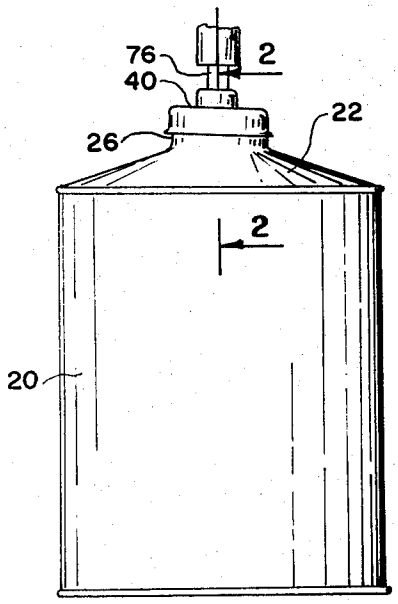


FIG 1

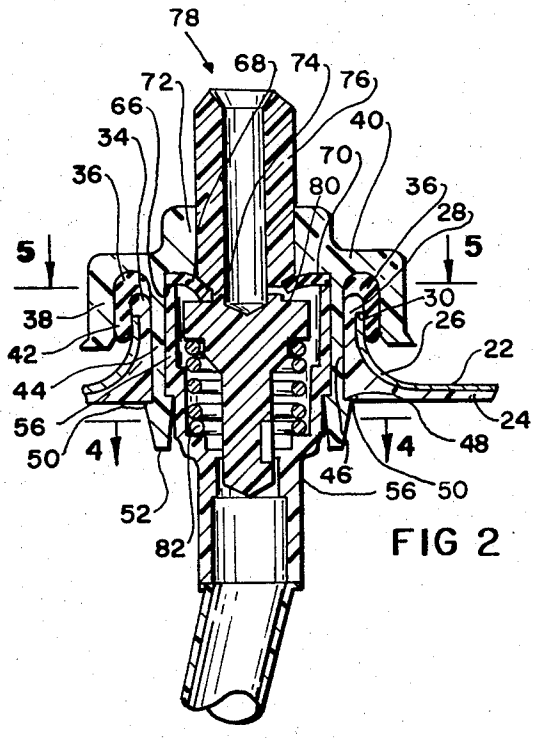


FIG 2

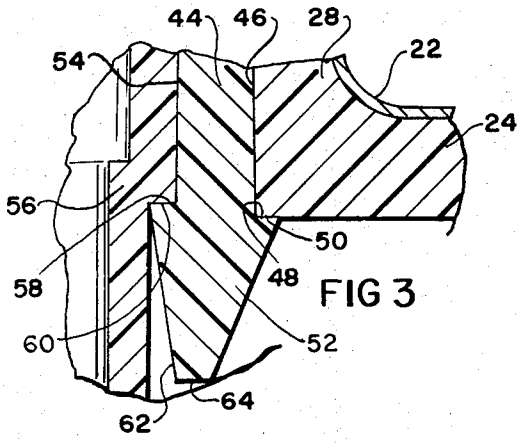


FIG 3

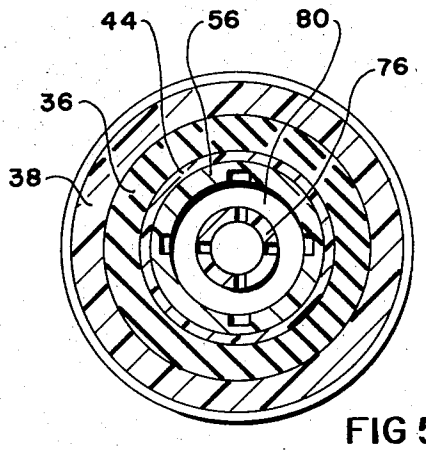


FIG 5

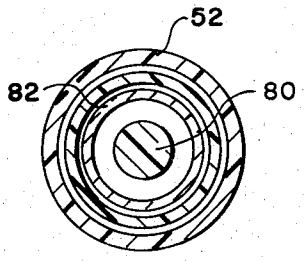


FIG 4

FIG 6

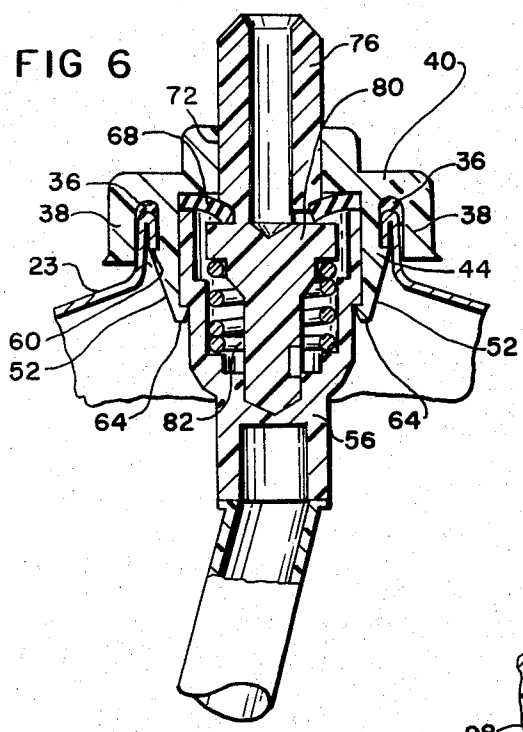


FIG 7

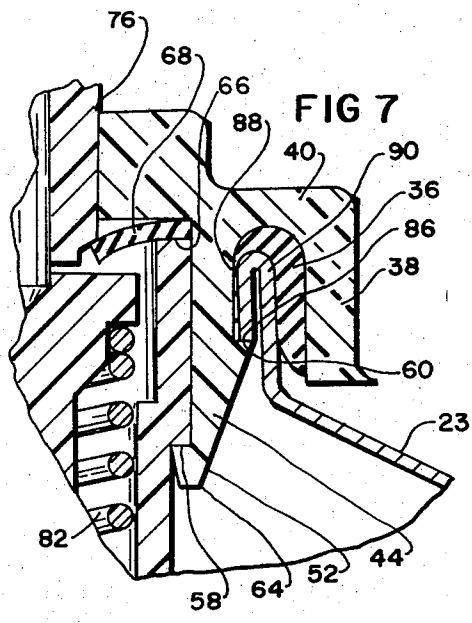
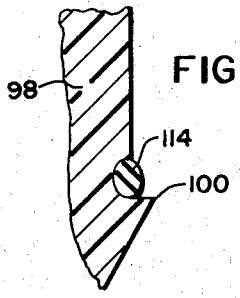


FIG 9



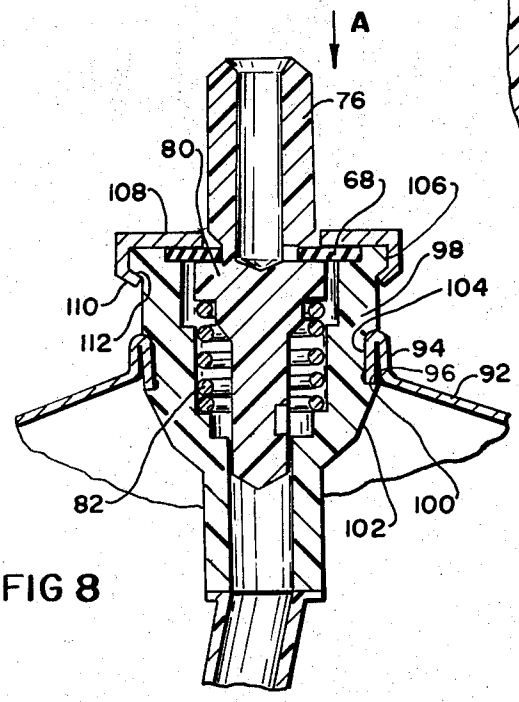


FIG 8

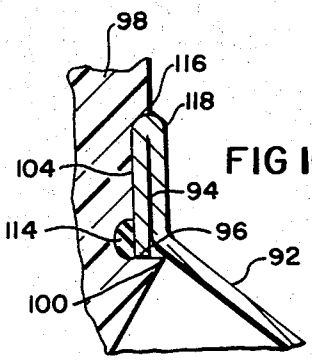


FIG 10

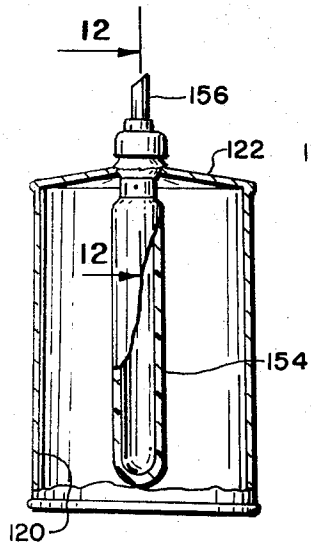
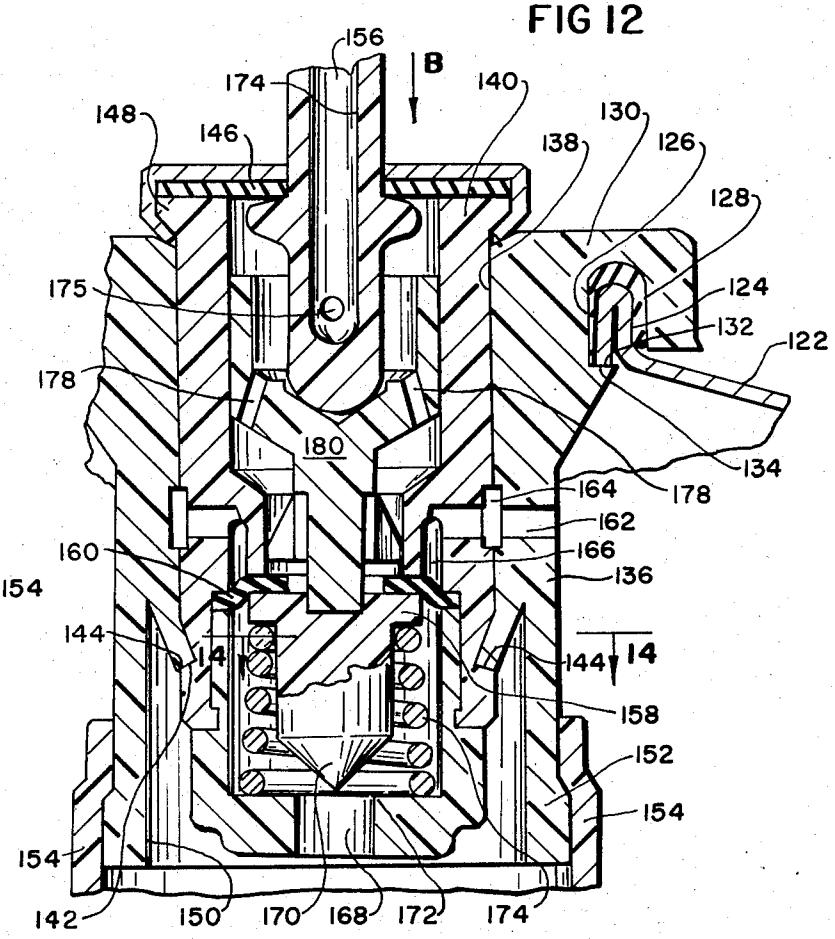


FIG 11

FIG 12



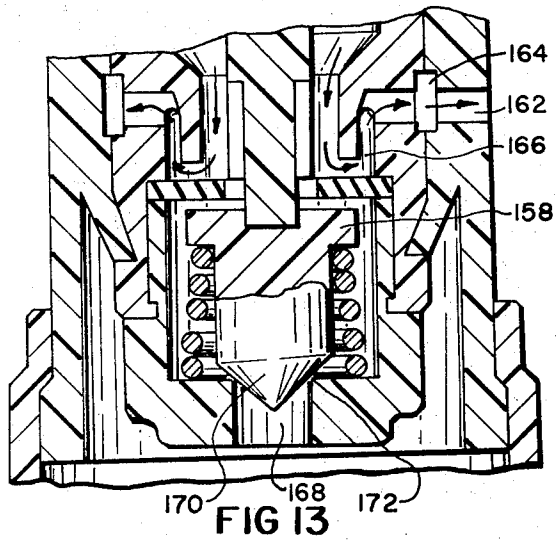


FIG 13

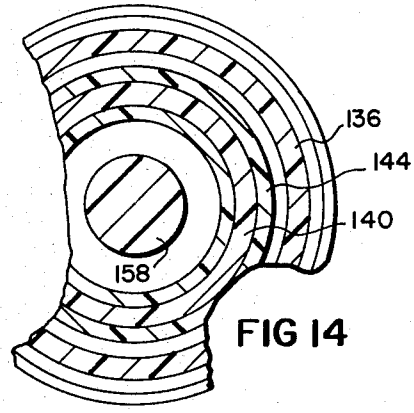


FIG 14

AEROSOL CONTAINER WITH PLUG-IN CAP AND VALVE STRUCTURE

This is a division of application Ser. No. 810,518, filed Mar. 26, 1969.

BACKGROUND OF THE INVENTION

Various aerosol containers have utilized valves in connection with the tops of such containers. Such valves have been secured into the tops of the containers by caps which must be crimped, or otherwise secured in relation to the tops of the containers, at a time when the containers have been charged with aerosol fluids. Many of the prior art cap structures have included complicated geometrical structures that have been difficult and expensive to produce and have posed considerable problems in the filling and sealing of aerosol cans during the production packaging of various aerosol fluids in their respective containers.

SUMMARY OF THE INVENTION

The present invention comprises a novel aerosol container plug in cap structure, wherein aerosol dispensing valves may be simply pressed or plugged into a container top, preliminary to, or at the time of filling the container. The invention comprises snap action ledge means for, snap in, or plug in, fixation of a cap in a container top and also, plug in, or snap in, fixation of a valve body or valve structure in the cap, which requires only axial pressing or forcing of the parts into a plugged in position relative to the top and the cap. The invention thus permits considerable facility and simplicity in the filling and capping of aerosol containers, as well as the installation of the aerosol dispensing valves in connection therewith. Further, the invention comprises novel snap action ledge means for installing caps in the tops of aerosol containers, and also include means for snap in installation of aerosol dispensing valves in communication with the interior of the collapsible containers, and the interior of the main container body surrounding such collapsible containers.

The invention comprises novel resiliently deflectable snap action ledge means in connection with the cap and valve structures in an aerosol container. This permits the caps and aerosol valve bodies to be forced axially into position relative to each other and relative to the top of a container to thereby permit snap action installation of such caps and valve bodies in relation to a container preliminary to or after certain operations which are required to place liquid contents or propellant fluids in such containers.

The invention also comprises aerosol container cap structures and valve structures which may be made of tough resilient plastic materials particularly adapted for, plug in, or snap in, installation relative to a container top to thereby provide economy in the production of such structures, as well as to provide facility and economy in the placement of fluids in the containers, and the final capping or sealing of the containers with such fluids therein. Further, the invention comprises novel, plug in, cap and valve structures particularly adapted for use in connection with metal cans having corrosion resistant liners therein to thereby provide a corrosion resistant liner for metal cans, as well as a corrosion resistant cap and valve body enclosure structure for aerosol containers.

Additionally, the invention includes novel compression seal means in combination with resiliently deflectable snap action ledge means adapted to permit axial, snap in, installation of a container cap and valve structure in relation to a container top so that the snap in ledge means of the invention forcefully opposes a resiliently compressible seal structure to hold caps and valve structures in sealed relation to the tops of aerosol containers.

Accordingly, it is an object of the present invention to provide a novel aerosol container plug in cap structure which facilitates capping and the installation of aerosol dispensing valves in relation to the top of an aerosol container.

Another object of the invention is to provide novel snap in ledge means in connection with aerosol container caps and valve structures; said snap in ledge means being resiliently deflectable so as to be forcefully engaged with each other to interlock with a container top in opposition to fluid pressure therein for holding the cap and/or a valve structure in sealed juxtaposition relative to the top of an aerosol container.

Another object of the invention is to provide a novel plug in or snap in aerosol container cap structure particularly adapted for use in connection with corrosion resistant liners for aerosol containers.

Another object of the invention is to provide a novel snap in or plug in aerosol container cap of the type which supports a flexible and collapsible inner container in a main aerosol container; said cap having a hollow cylindrical portion having snap action ledge means adapted to receive a plug in valve structure therein for communication with the interior of said inner container; said cap and said valve structure both being installed by axial plug in force to facilitate the successive filling of the outer container formed by said collapsible inner container and said inner container and the installation of aerosol propellant fluid in the cuter containers.

Further objects and advantages of the invention may be apparent from the following specification, appended claims, and accompanying drawings:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of an aerosol container utilizing a plug in cap and valve structure of the invention in connection therewith;

FIG. 2 is an enlarged fragmentary sectional view taken from the line 2—2 of FIG. 1;

FIG. 3 is an enlarged fragmentary sectional view taken on the same plane as that of FIG. 2, but showing the structure on sufficient scale to amplify the illustration;

FIG. 4 is a sectional view taken from the line 4—4 of FIG. 2;

FIG. 5 is a view similar to FIG. 4 but taken from line 5—5 of FIG. 2.

FIG. 6 is a view similar to FIG. 2, but showing a modification of the invention;

FIG. 7 is an enlarged fragmentary section view taken on the same plane as that of FIG. 6 to amplify the disclosure of the structure therein;

FIG. 8 is another view similar to FIGS. 2 and 6 showing a further modification of the invention;

FIG. 9 is an enlarged fragmentary sectional view taken on the same plane as FIG. 8, but showing the

structure on sufficient scale to amplify the disclosure of FIG. 8;

FIG. 10 is a fragmentary sectional view taken on the same plane as that of FIG. 8 and showing snap action ledge means and seal structure illustrated therein on enlarged scale;

FIG. 11 is a side elevational view of an aerosol container showing parts and portions thereof broken away and in section to amplify the illustration and showing a modified aerosol container plug in cap and valve structure of the invention in the container;

FIG. 12 is an enlarged fragmentary sectional view taken on line 12—12 of FIG. 11 showing structure of a dual dispensing aerosol valve in closed position;

FIG. 13 is a fragmentary sectional view taken on the same plane as that of FIG. 12, but showing the dual dispensing aerosol valve in a container filling position, such that only one of the dual dispensing valve structures is open to permit flow therethrough and to permit filling of the outer container with aerosol propellant fluid; and

FIG. 14 is a fragmentary sectional view taken from the line 14—14 of FIG. 12.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The terms "plug in" or "snap in" as used herein shall be construed to mean any cap or valve body structure having means adapted to permit the installation of a cap or valve body in relation to the top of an aerosol container by simply forcing the cap or valve body structure into an opening in the top of the container and allowing resiliently deflectable snap action ledge means to interengage between the cap or valve body and ledge structure at the opening in the top of the container.

The term "cap" as used herein shall be construed to means either, as individual cap, a combination of a cap and valve structure, or a valve structure body plugged directly into an opening in the top of an aerosol container.

As shown in FIG. 1 of the drawings, a hollow aerosol container 20 is provided with a substantially rigid top 22. This top 22, as shown in FIG. 2 of the drawings, is provided with a liner 24 contiguous with the inner and normally lower side of the top 22. This liner 24 is preferably a non-corrosive liner made of plastic, or the like, and extends throughout the interior of the hollow container 20. The non-corrosive liner 24 is capable of containing corrosive materials and thereby prevents corrosion of the container 20 and top 22 thereof which may be made of steel or other metal.

The top 22 is provided with a short upwardly extending hollow cylindrical neck 26, wherein a neck portion 28 of the liner 24 is conformingly fitted. The liner is provided with an inwardly directed abutment ledge 30 abutted to and interlocked with the normally outer end of the hollow cylindrical neck portion 26 of the top 22.

The neck structure of the liner is provided with a peripheral outer edge 34 engaged by a compressible annular gasket 36 which is contained in an annular skirt portion 38 of a container cap 40. The annular compressible gasket 36 is provided with a substantially U-shaped or cross-section portion disposed over said annular outer edge 34 of the neck portion 28 of the liner 24.

The skirt portion 38 of the cap 40 generally surrounds a conforming annular skirt portion 42 of the compressible gasket 36 and this skirt portion 42 also surrounds the hollow cylindrical neck portion 26 of the container top 22.

The cap 40 as best seen in FIG. 2 is provided with a hollow cylindrical portion 44 which extends into a hollow bore portion 46 of the neck portion 28 of the liner 24. The bore portion 46 of the liner 24 terminates in an inwardly directed ledge portion 48 engaged by an opposed or outwardly directed resiliently deflectable snap action ledge portion 50 of the hollow cylindrical portion 44 of the cap 40. This structure is shown in detail and on enlarged scale in FIG. 3 of the drawings.

The hollow cylindrical portion 44 of the cap 40 at its inner end, as shown in FIG. 3, is provided with an externally tapered frusto conical portion 52 having a terminal outside diameter smaller than the diameter of the bore 46 in the neck portion 28 of the liner 24 so that the hollow cylindrical portion 44 may be forced into the bore portion 46, whereupon slight resilient deflection of the ledge portion 50 permits it to pass through the bore 46 and to snap radially outward into interfitting relation with the inwardly facing ledge 48 of the liner 24 at the inner terminus of the bore 46 of the neck portion of said liner 24. It will be seen, as shown in FIG. 3, that the ledge portion 48 of the liner neck portion 28 at the terminus of the bore 46 faces the interior of the container 20 and that the resiliently deflectable snap action ledge 50 of the hollow cylindrical portion 44 of the cap 40 faces an opposite direction to that of the ledge 48. Thus, the ledge portion 50 faces a direction toward the outer side of the container or toward the open end or peripheral edge 34 of the neck portion 28 of the liner 24.

The hollow cylindrical portion 44 is provided with an internal bore 54, wherein an aerosol valve body 56 is disposed. This body 56 is provided with a ledge portion 58 which is directed toward the interior of the container 20 and engages an outwardly directed snap action ledge portion 60 of the hollow cylindrical portion 44. The ledge portion 60 faces the end 34 of the neck portion 28 of the liner 24. The ledge structures 58 and 60 are radially resiliently deflectable and this deflectable character is characteristic of the material of which the parts are made; the material being preferably tough resiliently deflectable plastic, or the like.

The hollow cylindrical portion 44 is provided with an internally disposed frusto conical tapered portion 62 which extends from a terminal edge portion 64 of the hollow cylindrical portion 44 to the ledge portion 60 thereof. This frusto conical tapered portion 62 permits the valve body 56 to be press fitted or plugged into the bore 54 of the hollow cylindrical portion 44 of the cap 40. Thus, the valve body 56 may be plugged into, or snap fitted into the cap 40, preliminary to its installation in the bore 46 of the liner 24, as hereinbefore described. The resiliently and radially deflectable snap action ledge means 58 and 60 hold the valve body securely in the hollow cylindrical neck portion of the cap 40 and hold a normally upper annular edge 66 of the valve body 56 in engagement with a resilient seal gasket 68 so as to hold the gasket 68 slightly compressed against an inner wall 70 of the interior of the cap 40, as shown best in FIG. 2 of the drawings.

The cap 40 is provided with a central opening 72 with which said gasket 68 is concentric. The gasket 68 is

provided with a central opening **74** in which a hollow dispensing nozzle **76** of an aerosol valve structure **78** is disposed. This nozzle **76** is slidably mounted in the opening **72** of the cap **40**, all as shown best in FIG. **2** of the drawings.

A poppet valve portion **80** of the valve structure is adapted to sealingly engage the gasket **68** in opposition to the inner wall **70** of the cap **40** in order to provide for a shut off function of the valve mechanism; the valve structure being normally forced by a spring **82** causing the poppet valve portion **80** firmly to engage the resilient gasket **68.** As shown in FIG. **2**, the spring **82** is slightly compressed and the valve is in open position. A normally closed position of the valve would be one in which the poppet portion **80** of the valve structure **78** firmly and compressively engages the resilient gasket **68** and holds it firmly sealed and contiguous with the inner wall **70** of the cap **40.**

Further functional details of the valve structure **78** are no part of the present invention.

It will be appreciated that the valve body **56** may be plugged into or snapped into the hollow cylindrical portion **44** of the cap **40** and that the hollow cylindrical portion **44** of the cap **40** may be snapped into the top **22** of the container **20**, as hereinbefore described. In such disposition, the cap and valve body are held against fluid pressure tending to force the cap and valve body in a direction outwardly relative to the container **20.** The ledge means **48** and **50** are disposed to hold the seal gasket **36** under compression and this structure therefore obviously facilitates the filling of the container **20** and the capping thereof due to the simple installation of the cap, and the valve body by axially forcing the frusto conical portion **52** of the hollow cylindrical portion **44** of the cap into the bore **46**, as hereinbefore described, until the snap action ledge means **48** and **50** are engaged by resilient reaction of the structure thereof, as hereinbefore described.

In the modified structure of the invention, as shown in FIGS. **6** and **7**, the cap **40** and the valve housing **56** are similar in construction. However, the modified structure, shown in FIGS. **6** and **7**, includes dimensional differences in the tapered portion **52** of the hollow cylindrical portion **44** of the cap **40.** It will be seen from an inspection of FIGS. **6** and **7**, that the outwardly directed ledge structure **60** of the cylindrical portion **44** of the cap **40** is adapted to engage an inwardly directed edge portion **86** which constitutes an inwardly directed ledge structure of a substantially rigid top **23** which is basically similar to the top **22**, but which is an all metal top having no liner therein. The inwardly directed edge **86** therefore termed an inwardly directed ledge portion of the top **23.** This ledge **86** surrounds an opening **88** in which the hollow cylindrical portion **44** of the cap is disposed. The top **23** surrounding said opening **88** is provided with an annular inwardly and downwardly folded portion **90**, integral with the top **23** and therminating at said edge **86**, all as shown best in FIGS. **7** of the drawings. It will be seen that these modifications of the interlocking ledge structures of the invention are the only substantial differences in the structure, shown in FIGS. **6** and **7**, as compared to the structures, shown in FIGS. **2** and **3** of the drawings. It will therefore be appreciated that the dimensional changes only are required relative to the tapered portion **52** of the hollow cylindrical portion **44** of the cap **40**, and the inwardly directed ledge **86** which is equivalent to the inwardly directed ledge **48** of the liner **24**, as shown in FIG. **2** of the drawings. Inasmuch as to liner is disposed in connection with the container top **23**, the inwardly folded structure terminating in an abutment or ledge **86** provides an inwardly directed ledge which faces the interior of the container top **23.**

The connection relationship of the valve body **56** and the cap **40** employs basically the same structure, as disclosed in FIGS. **2** and **3.**

In the modification, as shown in FIG. **8**, a substantially rigid container top **9** is provided with an annular folded portion **94** similar to the folded portion **90**, shown in FIG. **7.** This inwardly folded annular structure is provided with an inwardly directed edge **96** forming a ledge or abutment which faces the inner side of the container top **92.** This ledge **96**, shown in FIG. **8**, is shown on enlarged scale in FIG. **10**, and it will be seen that the modified valve body **98** is provided with a snap action ledge **100** which opposes the ledge **96.** The ledge **100** is integral with the valve body and composed of resiliently deflectable material and is located adjacent to a conical portion **102** which is annular and which facilitates the insertion of the valve body **98** into an opening **104** which is surrounded by the annular folded structure **94.**

The valve body **96** is similar in construction to the valve body **56.** However, a normally upper end of the valve body is provided with an annular flange **106** having a metal retainer **108** disposed thereover and having an annular crimped portion **110** crimped under a shoulder portion **112** of the flange **106**, as shown best in FIG. **8.** This retainer **108** clamps the gasket **68** in fixed position relative to the valve body or housing **98**, all as shown best in FIG. **8** of the drawings. Accordingly, it will be seen that a valve housing or valve body, as shown in FIG. **8**, may be plugged or snapped directly into an opening in a container top without the use of cap structures, such as the cap **40**, as shown in FIGS. **1, 2, 3, 6** and **7.**

In accordance with the present invention, the housing **98** serves as a cap for the top **92** in lieu of the use of a cap **40** which, as hereinbefore described, serves a dual function, namely, as a cap for the top of the container and also as a part of the valve housing structure. The retainer **108**, shown in FIG. **8** of the drawings, replaces one function of the cap **40**, in that it is secured to a normally upper end portion of the valve housing and retains the seal and valve gasket **68** in proper position to be engaged by the poppet valve **80**, as described in connection with FIG. **2** of the drawings.

As shown in FIG. **9** of the drawings, a soft plastic annular seal **114** is disposed adjacent the snap action ledge **100** of the valve housing **98**, shown in FIG. **8** of the drawings. This soft annular plastic seal **114**, as shown in FIG. **10**, is engaged by the annular folded portion **94** of the top **92** at the opening **104** in the top **92**, which opening is surrounded by said annular folded portion **94.** Thus, the seal **114** at the ledge **100** is disposed to be compressed when the resiliently yieldable ledge portion **100** is forced beyond the ledge **96** and snaps radially outward into engagement with the ledge **96.** Thus, an efficient seal is made between the valve housing **98** and the opening **104** in the annular folded neck structure **94** of the top **92.**

The installation of the valve body or valve housing **98** is accomplished simply by forcing or pressing the housing **98** into the opening **104** in the top **92** in a direction

as indicated by an arrow A in FIG. 3 of the drawings. This is facilitated by the conically tapered portion 102 which readily enters the opening 104 surrounded by the annular folded structure 94 of the top 92. As the valve body 98 is pressed into the opening 104, the outwardly facing snap action ledge means 100 resiliently deflects inward until it passes the inwardly facing ledge means 96, whereupon the ledge structure 100 resilient snaps outwardly and this extends radially to form an interference abutment with the inwardly directed ledge structure 96 to thereby hold the valve body 98 firmly engaged in the opening 104 of the neck 92. In this position, a slight shoulder 116 of the valve body abuts the peripheral extremity 118 of the annular folded portion 94 to prevent inadvertent movement of the housing 98 to a further inward position than is necessary for engagement of the ledge structure 100 with the ledge structure 96, as shown best in FIG. 10 of the drawings. The simple function of pressing the valve housing 98 into the opening 104 greatly facilitates installation of valves in aerosol container tops and economizes in the capping of aerosol containers.

The structure shown in FIG. 2 of the drawings, including the cap 40 which is also shown in FIG. 6 of the drawings, is all made of plastic which provides for low cost materials and the installation of the cap 40, as well as the valve housing 98, is similar in function since the capping of the container top is accomplished by pressing the cap structure or valve body structure axially into an opening in the container cap until snap action of the resiliently deflectable ledge means takes place, as hereinbefore described.

In the modification of the invention, as shown in FIGS. 11 to 14, a hollow aerosol container 120 is provided with a substantially rigid top 122 which is similar to the hereinbefore described tops 22 and 23.

The top 122, as shown in FIG. 12, is provided with an annular folded portion 124 similar to the hereinbefore described annular folded portions 90 and 94, shown in FIGS. 7 and 10 of the drawings. This annular folded portion 124, as shown in FIG. 12, surrounds an opening 126 in the top 122 and a seal gasket 128 is engaged with an outer annular terminal portion of the folded portion 124. The gasket 128 being similar to the hereinbefore described gasket 36. This gasket 128 provides a fluid seal between the top 122 and a cap 130 which is similar in construction to the cap 40, but including some changes, as will be hereinafter described. The annular folded portion 124 is provided with an inwardly directed ledge 132 similar to the hereinbefore described ledges 86 and 96, shown in FIGS. 7 and 10 of the drawings.

Engaging the ledge 132 is a resiliently deflectable snap action ledge 134 which is integral with a hollow cylindrical portion 136 of the cap 130. This resiliently deflectable ledge 134 is adapted to be pressed into the opening 126 in a similar manner to the installation of the ledge 96 described in connection with FIG. 10 of the drawings. This ledge 134 is resiliently deflectable and thereby operating as a snap action structure when it passes the ledge 132 during its movement inwardly in the direction of an arrow B, as shown in FIG. 12 of the drawings. Thus, the cap 130 may be pressed or plugged into the opening 126 of the top 122 so that the resiliently deflectable ledge 134 may operate in a snap action manner to engage the ledge 132 and thereby hold the gasket 128 in compression and hold the cap 130 in fixed seal relation with the top 122.

A hollow cylindrical portion 136 of the cap 130 is provided with a bore 138 in which a valve body or valve housing 140 is disposed. This body 140 is a hollow annular cylindrical body provided with an outwardly directed ledge 142 engaged by an inwardly directed ledge 144 of the cap 130.

The inwardly directed ledge 144 faces toward the interior of the container 120 and the outwardly directed ledge 142 faces outwardly in the opposite direction.

These ledge structures 142 and 144 are resiliently deflectable so that the valve housing 140 may readily be pressed into the bore 138 of the cap 130 until snap action of the ledge structure 144 occurs so that ledge structure 144 snaps into engagement with the ledge structure 142.

The ledge structure 144, when deflected radially outward, may assume an inner diameter substantially similar to the bore 138, and when the ledge 142 passes the ledge 144 it thus snaps radially inward to engage the ledge 142 in the periphery of the valve body or valve housing 140.

The ledge structures 142 and 144, when engaged, as shown in FIG. 12, hold a seal gasket 146 under compression between the end of the cap 130 and a shoulder portion 148 extending radially outward at the normally upper end of the valve housing 140.

The hollow cylindrical portion 136 of the cap 130 is provided with a normally hollow cylindrical lower end portion 150 having an attachment structure 152 holding a hollow cylindrical flexible and collapsible bag 154. This bag 154 forms an inner container and is designed to cooperate with the container 120 and fluids therein to effect a two phase fluid dispensation of the materials through the valve housing 140, as will be hereinafter described.

The interior of the container 120 is adapted to hold one fluid product, while the interior of the collapsible bag 154 is adapted to hold another product, and both products are adapted to be dispensed concurrently for reacting to provide an end product adapted to be dispensed through a hollow nozzle 156 of valve structure contained in the valve housing 140, as will be hereinafter described in detail.

The container 120 is adapted to hold one product and an aerosol propellant which creates pressure in the container 120 tending to collapse the container 154 and to thereby pressurize fluid therein for driving the fluid through the valve structure contained in the housing 140.

The dual dispensing aerosol valve structure disclosed in FIG. 12, and contained in the housing 140, is generally similar to the dual dispensing aerosol valve disclosed in a copending patent application, Ser. No. 704,359, filed on Feb. 9, 1968, now U.S. Pat. No. 3,447,722.

This valve structure includes means for tilting the hollow nozzle 156 for normal actuation of a poppet valve member 158 relative to a flexible diaphragm valve element 160 so that fluids may pass on both sides thereof and from the container 120, as well as the flexible bag 154.

Fluids passing from the container 120 and bag 154 are normally dispensed when the container 120 is in an inverted position with the nozzle 156 directed downwardly. In this position, fluids from the interior of the

container **120** pass inward through a port **162** in the hollow cylindrical portion **136** of the cap **130** and into an annular groove **164** in the exterior of the housing **140,** and then into an annulus **166** communicating with one side of the flexible valve element **160.**

Fluid from the collapsible bag or container **154** passes through an opening **168** in the end of the valve housing **140,** and passes upwardly around the poppet valve **158** and around the opposite side of the flexible valve element **160** from the annulus **166,** and the fluids pass outwardly through the nozzle **156** in a manner as described in the aforementioned patent application.

The valve structure of the invention comprises a conical poppet valve **170** adapted to seat on a thin annular lip **172** at the inner end of the opening **168** so as to permit back filling through the valve to charge the container **120** with aerosol propellant fluid. This valve position is shown in FIG. **13,** wherein the conical poppet valve **170** is engaged with the annular lip seat **172,** prevents fluid from being forced from the collapsible container **154** through the valve structure when aerosol propellant fluid is being charged into the interior of the container **120.** Thus, when the poppet portion **170** is seated on the seat **172,** as shown in FIG. **12,** the poppet **158** is moved away from the flexible valve element **160** so as to permit the back filling or charging of the container **120** with aerosol propellant fluid which flows through a bore **174** in the nozzle **156,** through ports **175** communicating with the bore **174,** then through ports **178** in the poppet valve actuator **180** of the valve structure. The fluid then flows as indicated by arrows in FIG. **13** at the upper side of the flexible valve element **160** and through the annulus **166** and outwardly through the annular groove **164** and port **162** into the interior of the container **120.**

The foregoing structural arrangement is intended to provide for assembly line filling, capping and charging of a two phase aerosol fluids dispensing system. The container **120** is first charged with a product through the opening **126,** when the cap **130** is forced into the opening **126** until snap action of the resiliently deflectable ledge **134** occurs so as to abut this ledge structure with the ledge structure **132** of the top **122.** During the insertion of the cap **130,** the bag or collapsible container **154** is carried by the hollow cylindrical portion **136** of the cap **130** and is thereby inserted and supported in the container **120** which already contains, at this stage of assembly, liquid material. The collapsible container **154** is then readily charged through the bore **138** of the cap **130** with another liquid material. Then the valve housing **140** containing all of the valve elements, hereinbefore described, is pressed into the bore **138** of the cap **130** until the resiliently deflectable ledge structure **144** acts in a snap action manner to engage the ledge structure **142** of the valve housing **140.** At this position, the compression seal gasket **146** is sealed at the end of the cap **130** and the system is ready for back filling of propellant fluid into the container **120.**

In this operation, the hollow cylindrical nozzle **156** is forced inwardly in the direction of the arrow B until the nozzle forces the valve actuator **180** and the poppet valve **158** to a position, as shown in FIG. **13,** wherein the conical poppet valve portion **170** seals off on the annular lip seal **172,** so that aerosol propellant fluid may be charged through the nozzle **156** and into the interior of the container **120,** as hereinbefore described.

When the propellant fluid has been thus forced under pressure into the interior of the container **120,** the nozzle **156** is released and the return spring **174,** shown in FIG. **12,** closes the poppet valve **158** against the resilient valve element **160.**

It will be appreciated that axial pressing or plugging of the cap and the valve housing into the container top is greatly facilitated by snap action of the resiliently deflectable snap action ledge structures, hereinbefore described, and that the combination of plug in cap and valve body structures, together with the back filling valve mechanism, shown in FIG. **12,** greatly facilitates an assembly line production of a charged aerosol container having a plurality of phases, such as may be used in producing a hot foam shave lather, or other product requiring reaction of two materials or mixing of two materials during the dispensation thereof through a common dual dispensing valve.

The structures including the cap and the valve body are all made of plastic, they are subject to economical, high production methods, and the manner of assembling and charging a container and dispensing system, as shown in FIGS. **11, 12** and **13,** may be easily accomplished with the plug in cap and valve body structures having resiliently deflectable snap action ledge structures adapted automatically to response to axial pressing of the parts into the top of an aerosol container, all as hereinbefore described and shown.

It will be obvious to those skilled in the art that various modifications of the invention may be resorted to without departing from the spirit of the invention.

We claim:

1. In an aerosol container plug in cap structure, the combination of:

a hollow aerosol container having a substantially rigid top;

said top having an opening therein adapted to be capped;

said top, at said opening, provided with ledge means facing the interior of said container;

a plug in cap means having ledge means of slightly larger diameter than said opening and adapted to be forced into interference abutment contact with said ledge means of said top, said cap being provided with an opening therein;

a third ledge means at said opening in said cap, said third ledge means facing outward from the interior of said container;

an aerosol dispensing valve having fourth ledge means adapted to be forced into interference abutment contact with said third ledge means;

said fourth ledge means facing a direction opposite to that of said third ledge means and at least one of said third or fourth ledge means being radially and resiliently deflectable to permit snap in locking of said valve body into said opening in said cap;

a resilient deflectable bag carried by said cap with the interior of said bag in communication with said dispensing valve;

said dispensing valve including a first valve means in communication with the interior of said aerosol container outwardly beyond said bag and a second valve means communicating with the interior of said bag;

said dispensing valve having means disposed to shut off flow from said bag through said second valve means to thereby permit filling of aerosol propellant fluid through said first valve means and into said hollow aerosol container outwardly relative to said bag after said cap and dispensing valve have been installed in place relative to said container and after fluids have been placed in said container and in said bag.

2. The invention, as defined in claim **1,** wherein:

a compressible gasket is compressively engaged between a normally outer end of said dispensing valve and said cap;

said dispensing valve including a dispensing nozzle movably disposed in said opening of said cap; and,

poppet valve means connected to said nozzle and engageable with said gasket forming a valve seal adjacent the end of said cap, whereby said poppet valve structure engages said seal in opposition to an end portion of said cap.

3. The invention, as defined in claim **1,** wherein: an annular soft deflectable gasket is disposed on said cap adjacent said ledge means thereof for compressively engaging adjacent said ledge means of said cap in said opening therein.

* * * * *