United States Patent

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[72] Inventor **Norman Usen**
West Haverstraw, N.Y.

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[73] Assignee **Union Carbide Corporation**
New York, N.Y.

[54] **AEROSOL ACTUATOR ASSEMBLY HAVING AN ACTUATOR BUTTON THAT IS ROTATABLE BETWEEN DISPENSING AND NONDISPENSING POSITIONS**
1 Claim, 6 Drawing Figs.

[52] **U.S. Cl.** **222/402.11**
[51] **Int. Cl.** **B65d 83/00**
[50] **Field of Search** 222/402.13, 402.11, 182

[56] **References Cited**
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Primary Examiner—Stanley H. Tollberg
Attorneys—Paul A. Rose, John F. Hohmann and John R. Doherty

ABSTRACT: An aerosol actuator assembly is described. The actuator comprises a cap member and an actuator button concentrically mounted thereon. The button moves axially over the cap member to effect dispensing of aerosol formulation and when the button is rotated a stepped configuration on the cap member engages the inner structure of the button in a manner whereby the button is either in a nondispensing position or in a position wherein dispensing is enabled. The cap member is structured to firmly engage an aerosol container with the outer surfaces of the cap member and actuator button shaped to blend with the container to effect a streamlined contour comprising a continuous cylindrical shape.

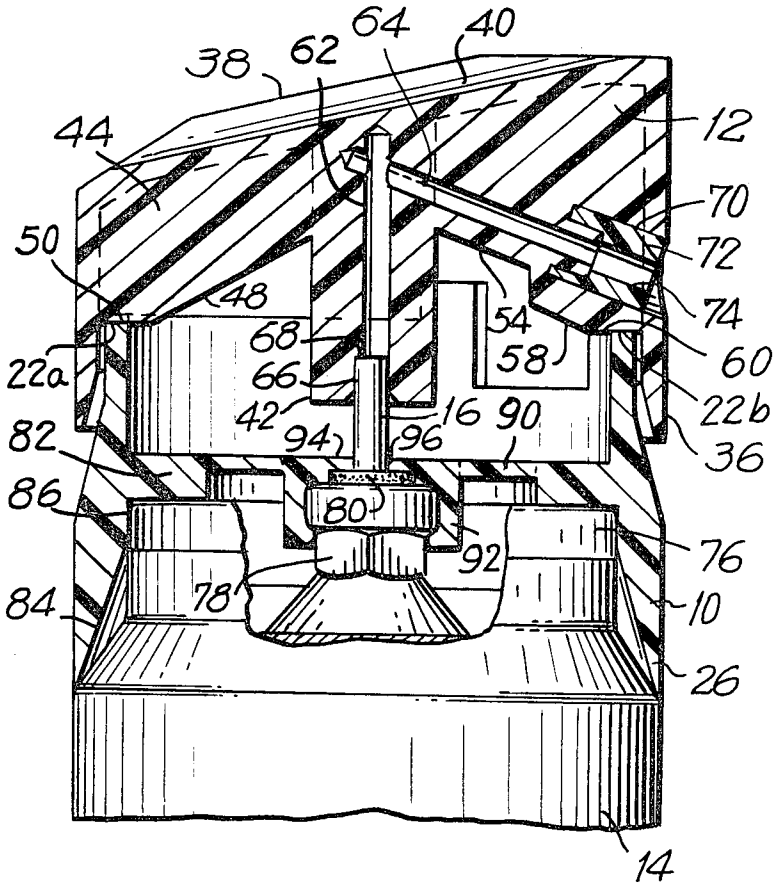


FIG. 1

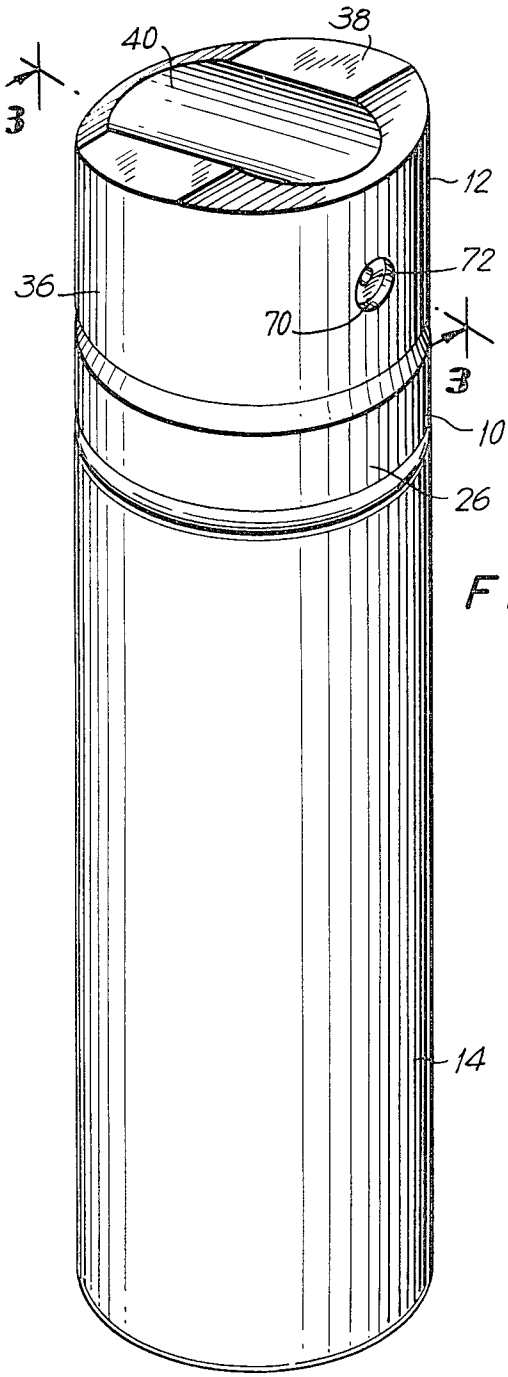
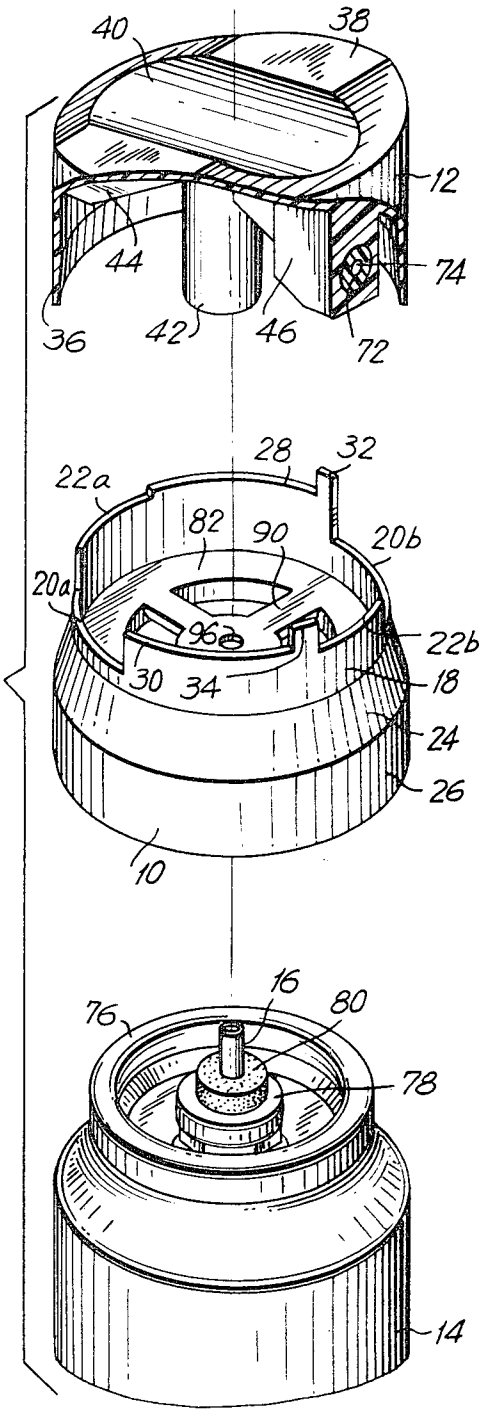


FIG. 2



INVENTOR
NORMAN USEN

BY

ATTORNEY

FIG. 3

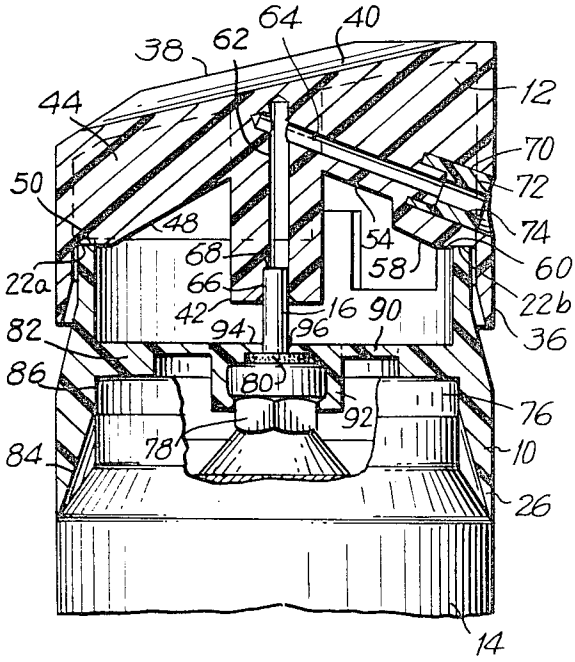


FIG. 4

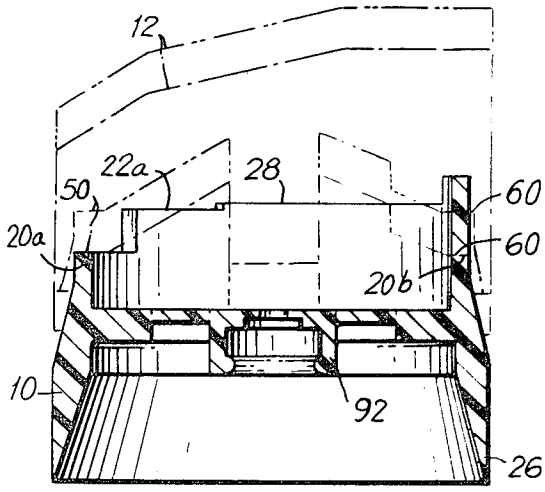


FIG. 5

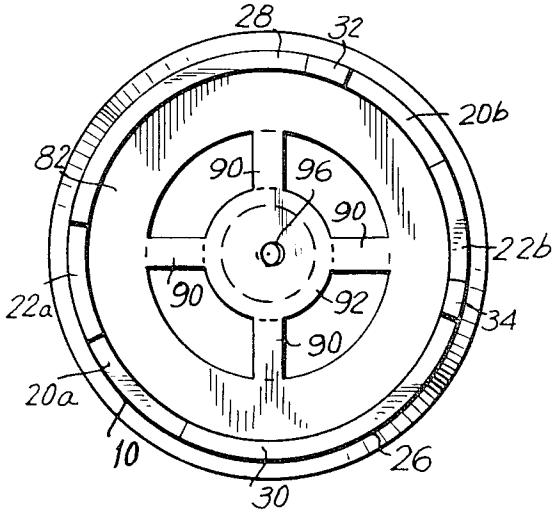
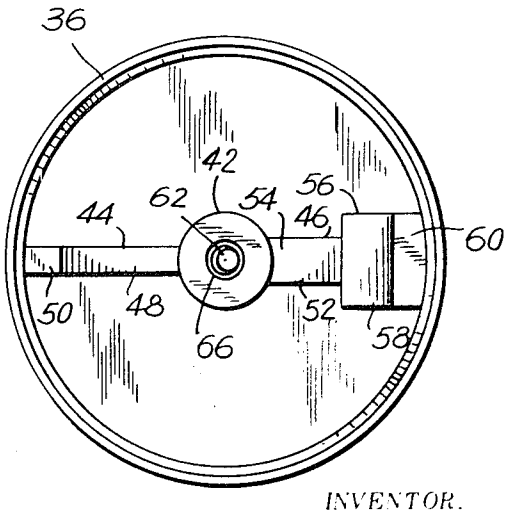


FIG. 6



INVENTOR.
NORMAN USEN

BY

ATTORNEY

AEROSOL ACTUATOR ASSEMBLY HAVING AN ACTUATOR BUTTON THAT IS ROTATABLE BETWEEN DISPENSING AND NONDISPENSING POSITIONS

The present invention relates to aerosol-dispensing systems and more particularly to an actuator structure for an aerosol container.

Aerosol-dispensing systems generally comprise a can or container within which is stored aerosol formulation to be dispensed. A valve assembly fixedly mounted within the container operates to release aerosol formulation from within the container through a valve stem when appropriately actuated. Actuation of the valve stem is effected through an actuator assembly which is mounted upon the container top in a position overlying the valve stem. The actuator assembly comprises suitable means including an actuator button which when manipulated by the user effects actuation of the valve stem thereby enabling emission of aerosol formulation from the valve stem through the actuator internal structure for dispensing and eventual use.

The actuator assembly of an aerosol system is usually required to serve several important utilitarian functions, the primary function, of course, being to provide means whereby the valve stem of the aerosol container may be selectively actuated by the user for dispensing aerosol formulation when desired. However, another important aspect of the actuator assembly relates to the role that such an assembly fulfills in providing an aerosol dispenser which is stylistically attractive and aesthetically appealing. Aerosol formulations in most cases relate to consumer items involving household or personal use. As such, the aerosol dispenser must provide an appropriately attractive appearance to enhance the marketability of the product by appealing to a prospective purchaser. Such purchaser appeal can be a crucial factor in the commercial success of the product.

An additional significant consideration relates to the manufacture of the actuator assembly particularly the ease and cost with which such items can be produced. Actuator assemblies are usually molded of thermoplastic materials, and it is necessary that the structural configuration thereof be such that there can be provided the required performance and versatility of operation with enhanced aesthetic appeal. However, these features must be provided in a structure which is configured and arranged to permit molding in a relatively simple and economic manner. Inasmuch as cost is a crucial factor in any aerosol system component, the most desirable actuator arrangement would be one which provided all of the features enhancing performance and appeal of the aerosol dispenser at a cost which would not be prohibitive.

Accordingly, it is an object of the present invention to provide an improved aerosol actuator assembly featuring enhanced operational and utilitarian aspects with an appealing external appearance which involves ease and simplicity of manufacture and which can be produced at a commercially acceptable cost.

Briefly, the present invention may be described as an actuator assembly comprising a cap member defining step means and an actuator button movably mounted thereon covering said step means. The actuator button includes surface means formed interiorly thereof engaging said step means in a manner whereby rotation of said actuator button to a first angular position prevents movement thereof to a dispensing position, with rotation of said actuator button to a second angular position enabling movement thereof to a dispensing position. The cap member comprises a cylindrical wall including means for engaging an aerosol container to effect firm mounting thereon of the entire assembly in a manner whereby there is effected the appearance of a continuous cylindrical contour.

A better understanding of the invention may be had by reference to the following detailed description of a preferred embodiment thereof taken in connection with the accompanying drawings wherein:

FIG. 1 is a view in perspective illustrating the actuator arrangement of the present invention mounted upon an aerosol container;

FIG. 2 is an exploded view showing part of an aerosol container and the actuator assembly of the present invention which is mounted thereon;

FIG. 3 is a sectional view partially broken away taken along the line 3—3 of FIG. 1;

FIG. 4 is a sectional view similar to FIG. 3, showing the actuator with the button in dotted form to illustrate two positions thereof during a dispensing action;

FIG. 5 is a top view of the cap member of FIG. 1; and

FIG. 6 is a bottom view of the actuator button of FIG. 1.

Referring now to the drawings wherein like reference numerals represent similar structural elements, the actuator assembly of the present invention is depicted as comprising two basic structural elements, a cap member **10** and an actuator button **12** both made of molded thermoplastic material and mounted upon an aerosol container **14**. The actuator button **12**, when in the appropriate angular position, is movable vertically relative to the cap member **10** to effect actuation of the valve stem **16** of the aerosol container **14**, in a manner to be more fully described hereinafter, thereby to produce dispensing of aerosol formulation.

The cap member **10** is generally cylindrical in configuration and comprises an upper cylindrical wall **18** shaped to provide step means defined by a series of arcuate horizontal edges **20***a*, **20***b*, **22***a* and **22***b*. It will be noted from the drawings that the horizontal edges **20***a* and **20***b* occupy one and the same vertical level, while horizontal edges **22***a* and **22***b* occupy one and the same vertical level higher than that occupied by edges **20***a* and **20***b*.

The outer surface of the cap member **10** slants by means of a conically shaped wall **24** to a lower, larger diameter cylindrical wall **26** which is of the same diameter as the container **14**, and which forms a generally continuous cylindrical outer surface for the assembly when the actuator of the present invention is mounted upon the container. The step means are positioned between and on either side of two upper arcuate edges **28** and **30** of cap member **10**, with stop means in the form of a pair of upstanding lips **32** and **34** being provided at an end of edges **28** and **30**.

The actuator button **12** which is generally of an inverted cup shape comprises an outer cylindrical wall **36**, which corresponds in outer diameter with the wall **26** of cap member **10**, and a slanted upper surface generally labeled **38** having formed therein a recessed surface **40** shaped to accommodate the finger of a user of the aerosol container.

The interior of the actuator button **12** is generally formed as a hollow cavity having located therein a centrally positioned, depending leg **42** and radially extending ledges **44** and **46**. The ledge **44** comprises a slanted edge **48** and a horizontal edge **50**, with the ledge **46** comprising a thinner section **52** having a slanted edge **54**, and a thicker section **56** comprising a slanted edge **58** and a horizontal edge **60**.

The interior of the actuator button **12** comprises conduit means whereby aerosol formulation may be caused to flow from the stem **16** to a target area for use. The conduit means generally comprise a vertical conduit **62** and a slanted conduit **64** in flow communication therewith. The vertical conduit **62** comprises at its lower end an offcenter enlarged opening **66** which engages the valve stem **16** and enables downward actuation thereof by means of abutment of the top of the valve stem with a horizontal edge **68** formed between the enlarged opening **66** and the vertical conduit **62**. The slanted conduit **64** extends to an enlarged cylindrical opening **70** in the front face of the actuator button **12** which is shaped and sized to receive therein a nozzle insert **72** which comprises an interior conduit **74** serving as the exit orifice means for the aerosol formulation to be dispensed. The nozzle insert **72** is mounted within the cylindrical opening **70** in any appropriate manner, which should be well known to those skilled in the art, and it may be interchangeable with other similar nozzle inserts hav-

ing differing exit orifice configurations thereby to adapt the spray pattern of the dispensed aerosol formulation to the particular use intended.

It will be noted that the slanted conduit **64** extends internally within ledge **46**. As previously described, the ledge **46** comprises a thinner section **52** and a thicker section **56**. The thicker section **56** is provided to accommodate the nozzle insert **72** which requires a larger diameter opening than the diameter of conduit **64**. Due to the increased thickness of section **56**, opening **70** may be formed with a diameter sufficiently large to accommodate insert **72**.

The aerosol container **14** upon which the actuator assembly of the present invention is to be mounted is conventionally configured and comprises an upper annular rim **76** and a centrally located column **78** through which the stem **16** extends. A lubricating washer **80**, which is an optional element of the assembly, is loosely fitted around stem **16** atop column **78**.

In mounting the actuator assembly of the invention upon the container **14**, the cap member **10**—which comprises an inner annular ledge **82**, a slanted internal surface **84** and a vertical internal surface **86** formed on the interior of cylindrical wall **26**—is placed upon the container **14** with the vertical surface **86** surrounding the rim **76** and in frictional engagement therewith. In the formation of the inner surface of the cap member **10**, the vertical surface **86** is formed with a diameter appropriately sized to permit frictional engagement with the rim **76**. If the diameter of surface **86** is slightly undersized, the tapered surface **84** permits the cap member **10** to slide over the rim **76** in a manner whereby downward pressure will snap the surface **86** into position around the rim **76**. Downward movement of the cap member **10** as it is being fitted over the container **14** is limited by engagement of the rim **76** with the underside of ledge **82**.

With the cap member **10** in place upon the container **14** as shown in FIGS. **1** and **3** and as described, the outer surface of wall **26** will be concentric and in alignment with the outer wall of the container **14** thereby giving the appearance of a generally continuous cylindrical outer configuration. Extending radially inwardly from the ledge **82** of cap member **10** and four rib members **90** which support a centrally located washer cup **92** shaped as an inverted cylinder having an upper surface **94** with an opening **96** extending therethrough. The opening **96** is adapted to receive therethrough the valve stem **16** in a manner permitting free axially sliding movement thereof. The purpose of the washer cup **92** is to retain in place about the valve stem **16** the lubricating washer **80**. In view of the fact that the provision of a lubricating washer **80** is optional, the retaining cup **92** may be dispensed with in assemblies where no lubricating washer **80** is to be utilized. The ribs **90** are formed as frangible members thereby enabling removal of the inner section of the cap member **10**, including the ribs **90** and retaining cup **92**, merely by breaking the ribs **90** from the ledge **82** thereby permitting removal of the entire inner section.

With the cap member **10** in place upon the container **14**, with or without the retaining cup **92** and the ribs **90**, the valve stem **16** will protrude upwardly above the ledge **82** in a manner whereby it may be engaged by the actuator button **12** when it is positioned above and about the cap member **10**. With the actuator button **12** in position, the valve stem **16** will be frictionally engaged within the opening **66** which is sized to firmly hold the stem **16** therein. Depression of the actuator button **12** by a user will, in a manner to hereinafter more fully described, effect flow of aerosol formulation from within the container **14** through the stem **16**, and through the conduit members **62** and **64** to the exit orifice defined by the insert **72**. The interior structure of the container **14** and the valving mechanism included therein whereby controlled aerosol formulation dispensing is enabled may be in accordance with known principles. The actuator assembly of the present invention may be utilized with a side variety of well-known valve structures, and in the specific embodiment depicted herein downward depression of valve stem **16**, which is achieved by downward depression of the actuator button **12**, will cause aerosol formulation flow from within the container **14** in a manner known to those skilled in the art. Release of the actuator button **12** will automatically cause the valve stem **16** to move upwardly to its original position by means of a valve spring (not shown) provided within the interior of the container **14**. Accordingly, it will be understood that initiation and cessation of dispensing of aerosol formulation will be controlled due to the internal valving arrangement (not shown) of container **14**, which may be constructed by those skilled in the art in accordance with known principles.

The relative angular positioning between the actuator button **12** and the cap member **10** is of significant importance in the completed assembly. Angular alignment between button **12** and cap member **10** must be such that the flat horizontal surfaces **50** and **60** of ledges **44** and **46**, respectively, are engaged upon either edges **20***a* and **20***b*, respectively, or edges **22***a* and **22***b* respectively.

The interreaction between the horizontal surfaces **50** and **60**, and the step means of cap member **10**, enables operation of the actuator assembly of the present invention in a manner whereby the actuator button **12** may be rotated between two angular positions, one of said positions being such that the actuator button **12** may be depressed to effect dispensing of aerosol formulation in the manner previously described, and the other of said two angular positions being such that downward depression of the actuator button **12** is prevented with the actuator button in a nondispensing position.

The manner whereby operation of the actuator assembly of the invention occurs is depicted in FIGS. **3** and **4**. In FIG. **3**, the actuator button **12** is shown in the angular position whereby dispensing of aerosol formulation is prevented. It will be seen in FIG. **3** that the surface **50** is engaged upon the edge **22***a* and that the surface **60** is engaged upon the edge **22***b*. Therefore, the actuator button **12** is held in its uppermost position and it is prevented from being downwardly depressed to drive the stem **16** into the dispensing position.

Rotation of the actuator button **12** to an angular position whereby the surfaces **50** and **60** are in alignment with the edges **20***a* and **20***b*, respectively, is depicted in FIG. **4**. When in this position, the actuator button **12** may be depressed and moved between the two vertical positions depicted in dotted form in FIG. **4**. When dispensing of aerosol formulation is to be effected, the actuator button **12** may be depressed from the upper dotted position to the lower dotted position of FIG. **4**. When in the lower dotted position, the actuator button **12** will cause depression of the valve stem **16**, in the manner previously described, and aerosol formulation will be dispensed. When in this lower position, the surface **50** will be in abutment with the edge **20***a* and the surface **60** will be in abutment with the edge **20***b*. Release of downward pressure upon the actuator button **12** will cause the internal spring of the container **14** to drive the valve stem **16** upwardly to the nondispensing position thereby also driving the actuator button **12** to the upper dotted position of FIG. **4**. It will be noted that when the actuator button is in the upper position the surface **50** will be lifted from the edge **20***a* and the surface **60** will be lifted from the edge **20***b*.

The stop means **32** and **34** are arranged to confine rotative movement of the actuator button **12** in a manner whereby the surfaces **50** and **60** are maintained, respectively, angularly disposed over the appropriate surfaces **20***a–b* and **22***a–b*. The stop means **32** and **34** are of sufficient elevation that even with the actuator button **12** in its uppermost position, neither of the surfaces **50** or **60** will be elevated above the stop means **32** and **34**. Therefore, rotation to beyond the angular section defined by the step means of the cap member **10** will be prevented. This will occur due to engagement between the stop means **32**, **34** and the sides of ledge **46**.

It will be apparent that the relationship between the surfaces **50** and **60** and the step means may be reversed from that described and depicted herein. That is, in the description herein set forth the surface **50** is shown to be aligned either

over edge **20***a* or edge **22***a*, with the surface **60** being aligned either over edge **20***b* or **22***b*. With the button **12** in this position, the ledge **46** is engaged between stop means **32**, **34**. It will be apparent that the positions of ledges **44**, **46** may be reversed by a 180° rotation of actuator button **12** thereby to reverse the positions of ledges **44** and **46**, and of surfaces **50** and **60**, without altering or detracting from the operability of the invention as described herein.

In the preferred embodiment of the invention described herein, the cap member **10** and the actuator button **12** are formed of molded thermoplastic material. It is a significant feature of the present invention that there is provided by the particular structure and configuration set forth herein an arrangement whereby an aerosol actuator assembly, which operates between a dispensing condition and a condition wherein dispensing cannot occur, may be constructed utilizing conventional plastic molding techniques with enhanced style and aesthetic appeal. It will be noted that the structure of the present invention when in the final assembled condition provides a smooth, streamlined, continuous cylindrical shaped due to the interrelationship between the container **14** and the cap member **10** and actuator button **12**. Inasmuch as these elements combine structurally to produce a smooth form, they can be manufactured and assembled to give the appearance of one continuous body, particularly if they are made from similar material. Additionally, the step means which cooperates with internal structure of the actuator button to provide the important operational features of the assembly enables a functional result of significant value without detracting from the external appearance and aesthetic appeal of the assembly while contributing to the simplicity of structure and economy of manufacture.

What is claimed is:

1. An aerosol actuator assembly adaptable for mounting upon a cylindrical aerosol container to form therewith the appearance of a continuous cylindrical shape comprising:

a. a cap member having a lower cylindrical wall with an outer diameter generally equivalent to the outer diameter of said container and an upper cylindrical wall smaller in diameter than said low cylindrical wall defining an upper edge;

b. step means defined by said upper edge of said upper cylindrical wall, said step means comprising a first and a second pair of sections of said upper edge located, respectively, at a first and a second vertical level, each of said pairs positioned in a generally opposed relationship relative to each other;

c. a cylindrical actuator button, having an inverted cup shape and an outer diameter generally equivalent to the outer diameter of the lower cylindrical wall of said cap member, mounted upon said container concentrically with said cap member and movable to effect dispensing of aerosol formulation therefrom, said button extending to surround and cover said upper cylindrical wall including said upper edge; and

d. surface means defined internally of said actuator button engaging said step means in a manner whereby rotation of said button to a first angular position renders said button incapable of movement to a dispensing position, with rotation of said button to a second angular position enabling dispensing movement thereof;

e. wherein said cap member includes lubricating washer retaining means mounted thereon by frangible means enabling removal of said retaining means when use thereof is not required.

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