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[54] AEROSOL ACTUATOR ASSEMBLY

4 Claims, 7 Drawing Figs.

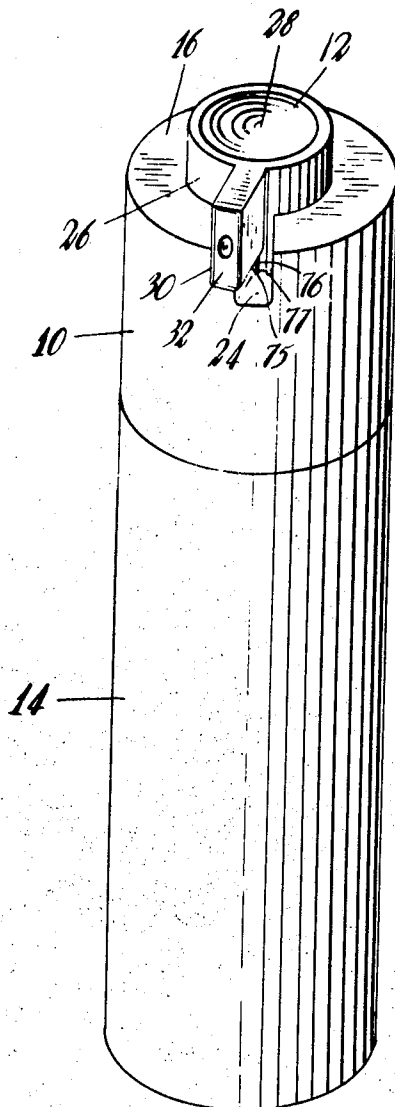
[52] U.S. Cl..... 222/402.11
 [51] Int. Cl..... B65d 83/14
 [50] Field of Search..... 222/182,
 402.1, 402.11, 402.13, 320, 321, 526, 537

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ABSTRACT: An aerosol actuator assembly is provided which is functionally improved, aesthetically superior and capable of manufacture at a cost which is economically competitive. The actuator comprises a cap member and an actuator button concentrically mounted therein. The button moves axially within the cap member to effect dispensing of aerosol formulation and, when the button is rotated, a spout thereon engages a stepped configuration on the cap member whereby the button is either locked in a nondispensing position or moved to a position wherein dispensing is enabled. The cap member comprises a double-walled configuration with an inner wall firmly engaging an aerosol container and an outer wall shaped to blend with the container to effect a streamlined contour.



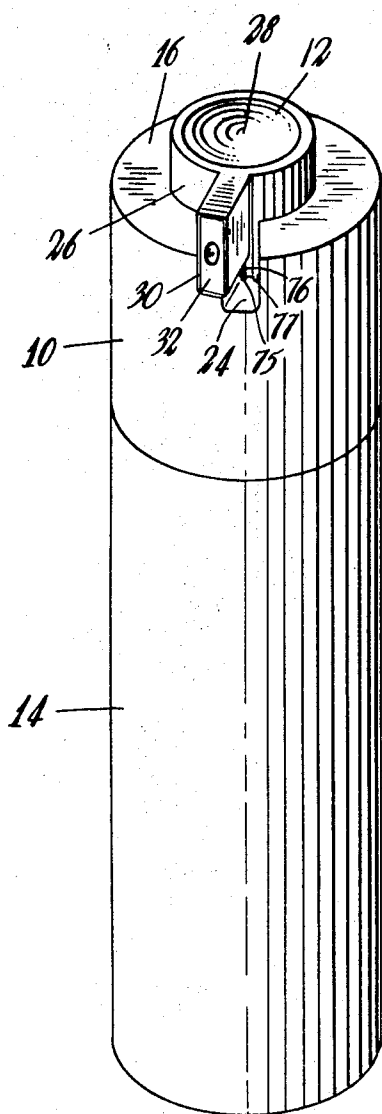


Fig. 1.

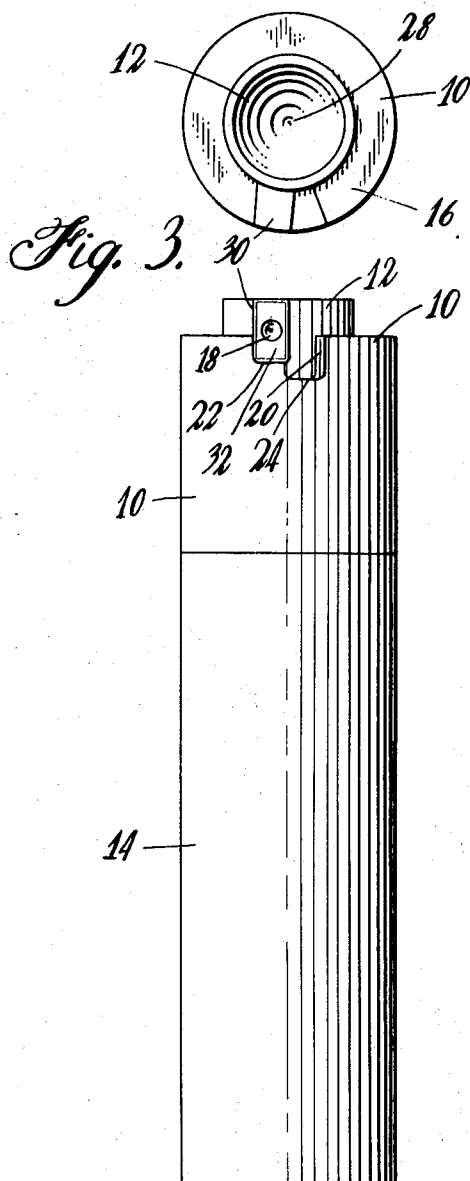
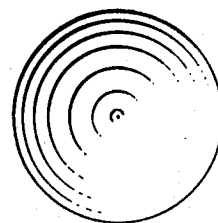


Fig. 2.

Fig. 4.



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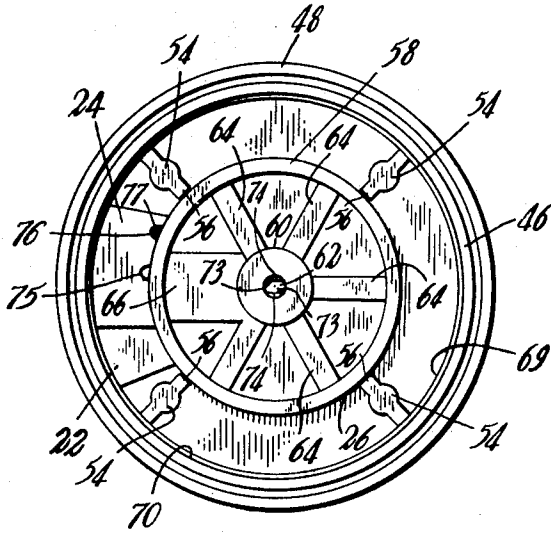


Fig. 7.

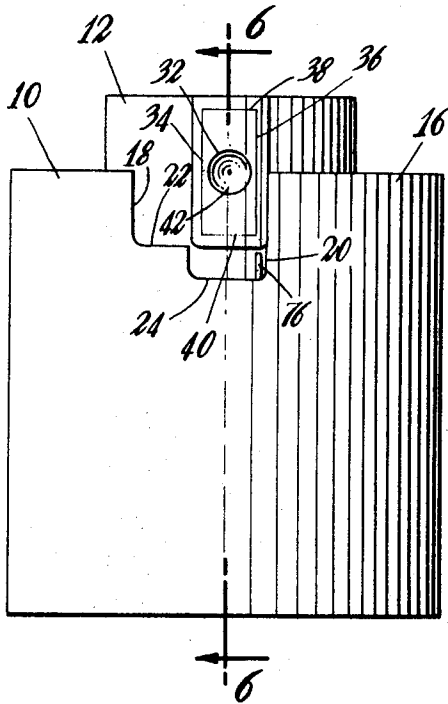


Fig. 5.

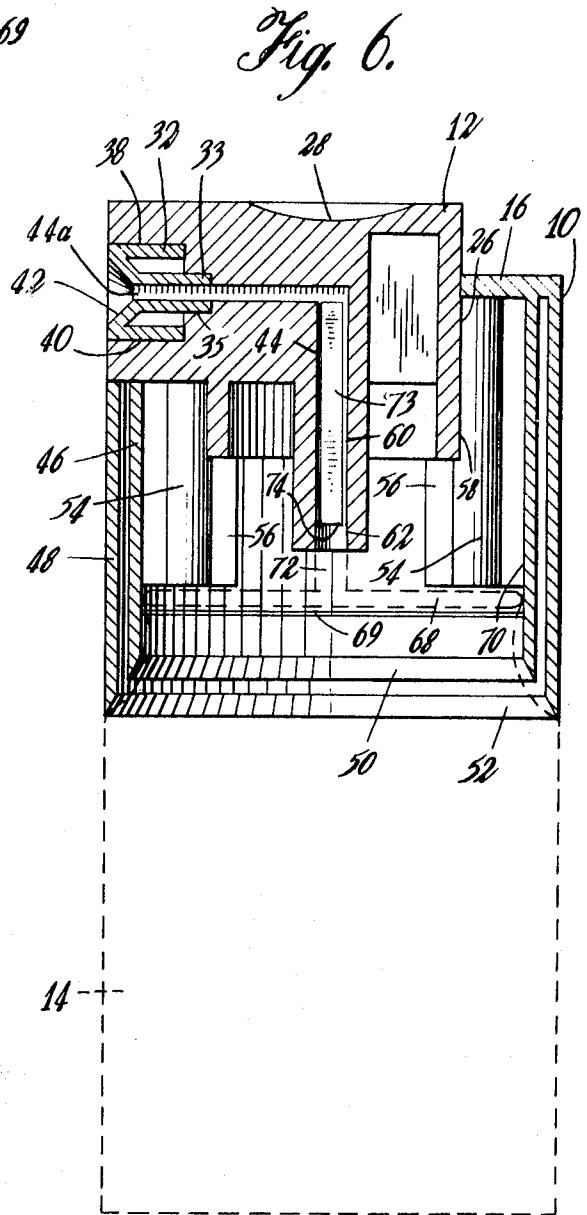


Fig. 6.

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AEROSOL ACTUATOR ASSEMBLY

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 an 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 thereof. 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 resinous 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 cylindrical double-walled cap member including internal rib means supporting a concentrically arranged button surrounded by said cap member and axially slidable relative thereto. Stepped means on said cap member cooperate with a radially extending spout formed integrally with said button in a manner whereby rotation of the button effects switching of said aerosol dispenser between a condition wherein it is locked in a nondispensing position and a condition wherein it may be moved to a dispensing position. An interchangeable nozzle insert is removably mounted within said spout and the entire assembly is mounted upon an aerosol container to produce a smooth, modernistic 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 elevational view of an aerosol container having the actuator assembly of the present invention mounted thereon;

Fig. 3 is a top view of FIG. 2;

FIG. 4 is a bottom view of FIG. 2;

FIG. 5 is an elevational view of the actuator assembly of the present invention;

FIG. 6 is a cross-sectional view taken along the line 6-6 of FIG. 5; and

FIG. 7 is a bottom view of the actuator assembly of the present invention depicting the interior structural arrangement thereof.

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 mounted upon an aerosol container 14. The actuator button 12, when in the appropriate radial position, is movable vertically relative to the cap member 10 to effect actuation of the valve stem of the aerosol container 14, in a manner to be more fully described hereinafter, thereby to effect dispensing of the aerosol formulation.

The cap member 10 is generally cylindrical and comprises an upper, flat annular surface 16 shaped to provide stepped means defined by a pair of vertical walls 18 and 20, and a pair of horizontal step surfaces 22 and 24.

The actuator button 12 comprises an outer cylindrical surface 26 which is surrounded by the annular surface 16, and an upper recessed surface 28 which is recessed to enable comfortable manipulation of the actuator button 12 by a user. The cylindrical surface 26 terminates at a radially extending, quadrilaterally shaped spout 30 which includes a removable interchangeable nozzle insert 32. The spout 30 includes a recess defined by vertical walls 34 and 36 and horizontal walls 38 and 40, with the recess thus defined being dimensionally proportioned to receive therein in tight frictional engagement the nozzle insert 32. The insert 32 comprises an exit orifice defined by conically shaped surface 42 with an internal conduit 44 extending with a right-angle turn through button 12 through which aerosol formulation flows from the stem of the aerosol container 14 terminating at the apex of conical surface 42. Although the embodiment of the present invention depicted and described herein illustrates the nozzle insert 32 as comprising a conically shaped orifice, it is to be understood that inserts 32 are interchangeable and that a variety of appropriately shaped alternatives are possible. The shape and configuration of the exit orifice means provided will depend upon the particular spray pattern desired. It will be clear that by exerting an appropriate outward pull or force, the insert 32 may be removed from the recess in the spout 30 and another insert substituted therefor, with the substituted insert comprising exit orifice means shaped and configured to adapt the spray pattern to the particular aerosol application or use involved.

The insert 32 comprises a rearwardly extending cylindrical nose 33 which defines a conduit 44a, which is an extension of and aligned with conduit 44. The nose 33 fits snugly into a recess in button 12 defined by a cylindrical wall 35. The interfitting arrangement of nose 33 and recess 35 enables positive alignment of conduits 44 and 44a as well as a leakproof engagement between button 12 and insert 32.

The cap member 10 is molded from thermoplastic resinous material in a double-walled configuration including inner cylindrical wall 46 and outer concentric cylindrical wall 48 each of which has, respectively, a bottom beveled surface 50 and 52. The inner cylindrical wall 46 has integrally formed thereon four spaced guide ribs 54 each of which includes a bearing surface 56 in slidable engagement with the outer cylindrical surface 26 of actuator button 12.

The actuator button 12 is basically constructed with a single cylindrical wall 58 upon which outer surface 26 is formed, and a centrally disposed downwardly extending cylindrical tube 60 defining internally thereof conduit 44 and including an en-

larged diameter cylindrical recess 62 at the lower extremity thereof. A plurality of internal rib means 64 integrally formed between the upper portions of wall 58 and tube 60 provide structural rigidity and support for the actuator button 12. An enlarged rib 66 through which the conduit 44 extends is positioned internally of wall 58 and in alignment with spout 30.

The actuator assembly of the present invention is mounted upon an aerosol container in the manner indicated in FIG. 6 wherein the aerosol container 14 is shown in dotted form with the actuator assembly of the invention held in operating position upon container 14 by frictional engagement between an upper rim 68 and the inner cylindrical surface 70 of inner cylindrical wall 46. Additionally, an actuator-locking ring 69 is provided upon surface 70 to effect a more secure engagement of the cap member 10 upon container 14. The actuator assembly of the invention and the aerosol container 14 will thereby be held firmly together not only by frictional engagement between rim 68 and surface 70, but also by the locking feature whereby locking ring 69 tends to prevent rim 68 from moving exteriorly of cap member 10. When mounting the actuator assembly upon the container 14, beveled surface 50 which first engages the rim 68 facilitates the insertion of the rim to within surface 70 by providing a surface of gradually decreasing diameter. The locking ring 69 is adaptable to permit passage thereby of rim 68 by the application of sufficient force when assembling the container and actuator. When in the operative position, the lower extremities of ribs 54 will engage the upper surface of rim 68 thereby acting as stop means preventing further insertion of the rim 68 into the cap member 10 beyond the desired position, and the rim 68 will be held between ribs 54 and ring 69. The beveled surface 52 slopes to a point contact with the outer surface of container 14 and thereby provides a smooth, streamlined effect for the aerosol dispenser.

With the actuator assembly in position upon the container 14, a valve stem 72 protruding from the upper end of container 14 and centrally disposed thereon will engage the lower portion of tube 60 by extending to within the cylindrical surface 62. The diameters of stem 72 and surface 62 are such that a tight frictional engagement occurs therebetween, with a pair of flat, planar surfaces 73 extending to within the cylindrical surface 62. The diameters of stem 72 and surface 62 are such that a tight frictional engagement occurs therebetween, with a pair of flat, planar surfaces 73 extending in facing relationship along two sides of the vertical portion of conduit 44. Surfaces 72 terminate at surface 62 thereby forming two flat surfaces 74 which downward movement of the button 12 will transmit a downward force by engagement between surfaces 74 and stem 72 to depress the stem 72 and thereby to cause emission of aerosol formulation from stem 72 into conduit 44. The stem 72 is spring biased toward the upper or nondispensing position. The actuator button 12 is guided in its vertical movement by the surfaces 56 of ribs 54. A user wishing to dispense aerosol formulation when applying a downward force upon recessed surface 28 will cause the actuator button 12 to slide downwardly along the surfaces 56 thereby to depress stem 72 by engagement thereof by surfaces 74. With the button 12 held in the downward position, aerosol formulation will flow from stem 72 into conduit 44 and through the exit orifice defined by conical surface 42 to be dispensed therefrom. When the user releases the downward force upon recessed surface 28, the spring bias of the stem 72 will drive the actuator button upwardly to the nondispensing position. Accordingly, it will be clear that the actuator button 12 is freely slidable in both vertical directions with the surfaces 56 of ribs 54 serving as guideways for said motion and with the button 12 being driven downwardly by a user for dispensing purposes and returned to the upward nondispensing position by the spring bias of stem 72. Furthermore, the tight frictional engagement between surface 62 and stem 72 tends to keep the button 12 in place within cap member 10.

In addition to being vertically movable within the guideways provided by surfaces 56, actuator button 12 is also rotatable

therein with a limited degree of angular motion. The limits of this rotative angular motion are depicted in FIGS. 1 and 5, with the condition shown in FIG. 5 being the condition wherein dispensing may be effected and the condition shown in FIG. 1 being the condition wherein the dispenser is locked in the nondispensing position. With the actuator button 12 in the position shown in FIG. 5, which is the extreme counterclockwise position as viewed in FIG. 3, the wall 20 of cap member 10 acts as a stop abutting the spout 30, with the spout 30 being free to move in a downward direction for a distance terminated when the spout 30 engages the surface 24 and cap member 10. When the actuator button 12 is released by the user the spring force of stem 72 will drive the actuator button 12 to an upward position. When in the upward position, the button 12 may be rotated clockwise to the position shown in FIG. 1. In this position the spout 30 will be directly above the surface 22 with a side thereof abutting the sidewall 18 which acts as a stop, and with downward movement of the actuator button 12 being prevented by engagement of surface 22 with the bottom surface of spout 30. Accordingly, when in this position, downward movement of the button 12 is prevented thereby preventing accidental or unintended dispensing of the aerosol formulation.

The actuator of the present invention includes detent means which comprise a ridge 76 formed upon outer surface 26 of actuator button 12, and a pair of notches 75 and 77 formed in surface 24 of cap member 10. Ridge 76 engages either notch 75 or 77 to hold button 12 either in the condition where dispensing is enabled or locked in the nondispensing position. With ridge 76 in the position shown in FIG. 7 engaging notch 77 the actuator button 12 is held in the position wherein dispensing is enabled since counterclockwise rotation thereof, as viewed, in FIG. 7, is impeded by engagement of the ridge 76 with the notch 77. When it is desired to rotate the button 12 in a counterclockwise direction, as viewed in FIG. 7, it becomes necessary for the user to apply a slight rotative force to drive the ridge 76 into engagement with notch 75 thereby placing the spout 30 directly above the surface 22 and radially locking the actuator button 12 in a nondispensing position. When rotated by the user in this fashion the engagement of ridge 76 with the notches 75 and 77 as it passes from one notch to the other will effect a clicking sound thereby giving an audible indication of the radial movement of the button 12. Accordingly, it will be clear that by virtue of the engagement between ridge 76 and one of the notches 75, 77, the actuator button 12 may be held in either one of two angular positions thereby to avoid inadvertent rotation thereof to either the position enabling dispensing or to the position preventing dispensing.

A significant aspect of the present invention is the double-walled configuration of the cap member 10. As previously pointed out, member 10 is a molded plastic piece. As a result of the molding process, the ribs 54 which are formed integrally with the inner cylindrical wall 46 will produce a disfiguration upon the outer surface of wall 46. Inasmuch as one of the more important achievements of the present invention is considered to be the improved appearance of the aerosol dispenser provided by utilization of the invention, the disfiguration caused by the presence of ribs 54 would produce unacceptable results. Therefor, in accordance with the teachings of the present invention, the cap member 20 is provided with a second outer wall 48 which can be produced with a smooth outer surface free of the disfiguration resulting from the presence of the ribs 54. A further significant aspect and advantage of the present invention pertains to the overall configuration of the aerosol dispenser which is produced by the structural combination of the actuator assembly including the cap member 10 and the aerosol container 14. It will be noted that a smooth, streamlined, continuous cylindrical shape is provided by the structural interrelationship between container 14 and cap member 10. Inasmuch as these elements together produce a smooth form, they can be manufactured to appear as one continuous body, particularly if they are made from

similar materials. Furthermore, the stepped-locking feature provided by the interrelationship between spout 30 and the steps formed by surfaces 22 and 24, produces a functional result of significant value while simultaneously providing an external appearance and configuration which exhibits an appealing, modern design enhancing the aesthetic appeal of the item to a potential purchaser.

Accordingly, it will be clear that the present invention provides a aerosol actuator assembly combining aesthetic appeal and attractiveness with enhanced functional performance. Not only does the embodiment of the invention include operational features advancing the usefulness of the dispenser, but it achieves this with an external design and appearance which is attractive and modern in a structure which may be manufactured at a cost which does not detract from a potential commercial success thereof.

We claim:

1. An aerosol actuator assembly comprising a molded plastic cap member generally cylindrical in configuration adaptable for mounting upon an aerosol container including a valve stem, said cap member comprising an inner cylindrical wall engaging said container to effect firm mounting of said actuator assembly thereon, an outer cylindrical wall concentric with the closely spaced to said inner wall having an external configuration blending with the external configuration of said container to effect a unitary appearance therewith, longitudinal rib means integrally formed on the interior side of said inner wall circumferentially spaced to define a guideway, an actuator button including valve-stem-engaging means movably mounted within said cap member and operable to effect movement of said valve stem between a dispensing and nondispensing position, said rib means extending about said actuator button in engagement therewith to guide and support movement thereof within said guideway, stepped means defined by the external contour of said cap member for controlling movement of said actuator button, conduit means defined by said actuator button guiding flow of aerosol formu-

lation from the valve stem of said container for dispensing, spout means formed integrally with said actuator button through which said conduit means extend engaging said stepped means in a manner whereby rotation of said actuator button to a first angular position causes said stepped means to block movement of said actuator button to a dispensing position and whereby rotation of said actuator button to a second angular position enables movement thereof to a dispensing position, detent means comprising a longitudinally extending ridge formed on said button member separate from and below said spout means, and a pair of notches 20 in said cap member upon the edge of a horizontal wall thereof, said ridge engaging said notches and movable between a first and second position relative thereto, said first and second relative positions corresponding, respectively, to said first and second angular positions of said actuator button whereby frictional engagement between said ridge and said notches tends to resist rotation of said actuator button and provides an audible indication of movement of said button between said first and second angular positions.

2. An actuator assembly according to claim 1 wherein the external diameter of said cap member is equivalent to the external diameter of said aerosol container whereby when mounted thereon said cap member forms together with said container the appearance of a continuous right circular cylindrical shape.

3. An actuator assembly according to claim 1 wherein said stepped means comprise a first level and a second level, said spout means being movable into alignment with either one of said levels by rotation of said actuator button.

4. An actuator assembly according to claim 1 wherein said actuator button is generally cylindrical in configuration with said spout comprising a quadrilateral configuration extending radially therefrom, said button being smaller in diameter than said cap member and mounted concentrically therewith.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,608,791 Dated September 28, 1971

Inventor(s) Gilbert S. Jordan and Paul H. Mohr

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 5, line 25, "ø" should read --of--.

Column 5, line 27, "o" should read --on--.

Column 6, line 5, "t" should read --to--.

Column 6, line 7, "o" should read --of--.

Column 6, line 9, "mans" should read --means--.

Column 6, line 11, "20" should read --formed--.

Column 6, line 15, "t" should read --to--.

Column 6, line 23, "wen" should read --when--.

Column 6, line 28, "lever" should read --level--.

Column 6, line 33, insert --means-- between "spout" and "comprising".

Signed and sealed this 5th day of December 1972.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents