June 19, 1962 P. H. SAGARIN 3,039,659

AEROSOL VALVE ACTUATOR AND CAP CONSTRUCTION

Filed Aug. 11, 1959

Fig. 1

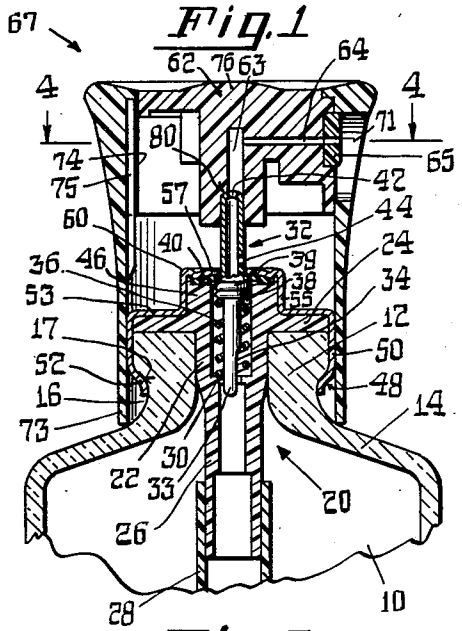


Fig. 2

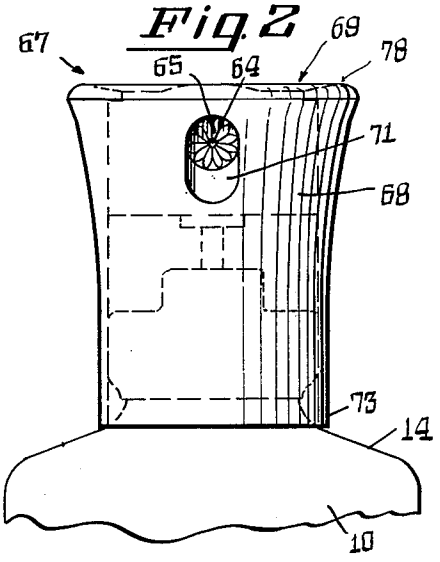


Fig. 3

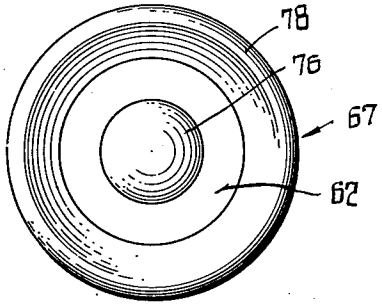


Fig. 4

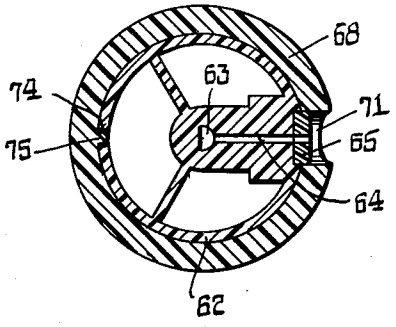
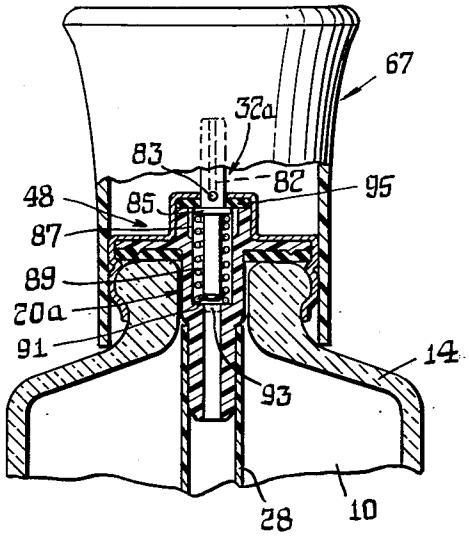


Fig. 5



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AGENT

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AEROSOL VALVE ACTUATOR AND CAP CONSTRUCTION

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This invention relates to aerosol devices, and more particularly to valve actuator and cap structures of small aerosol dispensers such as those involving pressurized containers adapted to be held in the hand when in use.

The invention provides improvements in the aerosol device described and claimed in Patent Number 2,772,820 issued to W. R. O'Donnell and entitled, "Valve for Aerosol Dispenser." A similar aerosol device is also described and claimed in the copending application of W. Steinman and W. R. O'Donnell, Serial No. 833,077 filed August 11, 1959 and entitled, "Aerosol Valve Construction," said application being owned by the assignee of the present application.

In the past hand-held aerosol dispensers have been generally constituted of a pressurized container having a reduced neck portion in which a manually operable valve mechanism is disposed, said mechanism including a depress-button type valve actuator having a side discharge opening or orifice from which the container contents are discharged when the button is depressed. To prevent accidental or inadvertent operation of the depress button a removable metal cap is provided, said cap being frictionally held on the container neck and being arranged to completely enclose the valve actuator button so as to prevent accidental actuation of the same. The cap structure was commonly made in the form of a drawn metal shell, which shell had a rim portion closely controlled as to its diameter by which the cap could be frictionally fitted to an upwardly extending shoulder disposed around the container neck.

The user of such an aerosol device was required to first remove the protective cap, before the device could be put into operation. This constituted a distinct and separate operation, which was necessary in order that the benefit could be had of a guard for the valve actuator button. Further, in most cases prior to the actual use of the aerosol device the cap had to be put down and not continually held in the hand, and thus necessitated finding a suitable resting place. And, after use of the device, the cap was usually replaced so as to enable it to continue safeguarding the actuator button. Thus, this replacement of the cap involved yet another operation which was required of the user, and such additional operations as well as the necessity for finding a place on which the removed cap could be temporarily rested, and the likelihood of the cap dropping to the floor and/or becoming lost, constituted disadvantages which were generally considered to be necessary in this type of device.

The above drawbacks and disadvantages of aerosol dispensers as above outlined are obviated by the present invention, and one object of the invention is to provide, in conjunction with a depress-button type valve actuator, a novel guard-type cap construction which normally does not require removal in order to put the dispenser to use, thereby avoiding the necessity for finding a resting place for the cap, eliminating the needless operations heretofore required in connection with guarding the valve actuator, and further eliminating the possibility of the cap becoming lost.

Another object of the invention is to provide a combination depress-button type valve actuator and normally-not-removed cap construction as above set forth, wherein the cap is characterized by a large guarded access opening to permit easy actuation of the depress button and a second and smaller side opening through which the discharge of the contents of the container may take place.

A further object of the invention is to provide, in conjunction with a depress-button type valve actuator, a novel fixed and normally-not-removed plastic cap construction arranged to be carried by the container neck, said cap construction being resilient and so organized that one basic size may be employed to engage and grip container neck structures and/or ferrules which vary appreciably in diameter.

Still another object of the invention is to provide an improved combination valve actuator and normally-not-removed cap construction, wherein easy manipulation of the actuator is insured while at the same time the cap construction constitutes an effective guard and prevents inadvertent operation of the valve actuator if the device should be accidentally brought in contact with adjoining objects.

Yet another object of the invention is to provide an improved combination container closure member, valve means and cap structure of the type which is normally not removed, wherein an additional bearing for the valve actuator is provided by the cap structure, thereby to supplement the bearing normally provided by the closure member and to impart a desirable stability to the actuator.

A still further object of the invention is to provide an improved combination actuator or depress button and normally-not-removed, guard-type cap construction as above set forth, wherein there are registered side openings and simple, effective means to prevent relative turning between the depress button and the cap so as to insure registration of the side openings at all times.

An additional object of the invention is to provide in a combination depress button and normally-not-removed, guard-type cap structure an effective backing or abutment for said structure, to secure a positive positioning of the same on the container at all times.

A further object of the invention is to provide in conjunction with an actuator or depress button, a novel frictionally-held plastic cap structure adapted to grip the container neck so as to be supported thereby, the resilience of the cap structure being utilized in a unique and simple manner to effect a secure retention thereof on the container.

A feature of the invention resides in the provision of a novel combination actuator button and normally-not-removed cap structure adapted to be fixedly positioned on the container, in conjunction with a longitudinally movable valve stem fitted into the actuator button, said button having a pre-formed bore which requires enlargement to receive the valve stem and the said enlargement being accomplished by a secondary operation whereby adjustment of the depth to which the bore is enlarged will enable the actuator button to be located at the proper level for accommodation in the cap without requiring alteration of any of the cap dimensions.

In the drawings accompanying this specification, similar characters of reference are used to designate like components throughout the several views, in which:

FIG. 1 is an axial sectional view, enlarged, of a valve means, valve actuator mechanism and the improved cap construction as provided by the invention.

FIG. 2 is a front elevational view of the device shown in FIG. 1.

FIG. 3 is a top plan view of the device.

FIG. 4 is a horizontal sectional view, taken on the line 4—4 of FIG. 1.

FIG. 5 is a view somewhat similar to that of FIG. 1 but partly in side elevation and partly in axial section,

showing a different type of valve and container closure member.

Referring first to FIGS. 1 and 2, there is shown an aerosol device having a pressurized container indicated generally by the numeral 10. The container 10 has a reduced neck portion 12, adjoining which there is a wide shoulder portion 14. Between the neck and shoulder portions 12 and 14 an annular groove or depression 16 is provided, forming a downwardly facing annular shoulder 17 on the neck portion for cooperation with a clincher ring or ferrule by which a closure and valve means is secured in the neck of the container. The said closure and valve means, although briefly described herein, forms the subject matter of a copending application in the names of W. R. O'Donnell and W. Steinman, assigned to the same assignee as the present application.

As shown, the closure and valve means comprises a member 20 molded of resilient plastic composition, having a main body portion 22 provided with a through bore, said main portion including an outwardly extending flange 24 which overlies the edge of the neck 12. The member 20 has a second tubular portion 26 connected to a dip tube 28, and has an annular valve seat 30 disposed between said main and second portions, which seat is cooperable with a longitudinally movable valve stem 32.

The valve stem 32 is hollow and has its lower end 33 closed, the lower end portion having a flat 34 at the right side as seen in the figure. This flatted portion of the stem 32 is normally disposed within the valve seat 30, and by virtue of the flat 34 provides a clearance space to enable fluid to pass from the dip tube 28 past the valve seat 30.

The valve stem 32 carries a spring 36 engaging the seat 30 and an enlargement 38 intermediate the ends of the stem.

Immediately above the enlargement 38 the stem 32 has a second enlargement 39 constituting a sealing means, which is engageable with a resilient sealing disc 40 through which the upper portion of the stem 32 passes.

For the passage of pressurized fluid, the upper extremity of the stem 32 has an opening 42, and there is also a side opening 44 in the stem, slightly above the seal 40.

The member 20 provides spaced bearing surfaces for the stem 32, one such surface being constituted by the seat 30 and the second bearing surface being in the portion 46, where the bore engages the enlargements 38 and 39.

The upper end 46 of the member 20 is disposed in a stepped ferrule 48 which has a cylindrical body or rim 50 fitting about the container neck 12 and the sealing flange 24. The body 50 has lower edge 52 turned inward to occupy the groove 16 and engage the shoulder 17 of the container neck. The ferrule 48 has an outer top portion 53 which engages the flange 24, and has a smaller cylindrical portion 55 which surrounds and engages the part 46 of the member 20. The ferrule 48 also has a perforated top 57 through which the stem 32 passes, said top 57 retaining in place the sealing disc 40.

The top 57 of the ferrule 48 is convex and has a peripheral bead 60 providing high pressure points adjacent the periphery of the sealing member 40 and portion 46 of the member 20.

A depress button or knob 62 is carried by the upper end portion of the valve stem 32, said knob having intersecting fluid discharge channels 63 and 64 and the latter channel communicating with a side nozzle or orificed member 65 on the knob.

The above value mechanism as shown in FIG. 1 may be actuated to its open position by applying a suitable downward pressure upon the depress knob 62. This will cause the knob to move downward, shifting with it the valve stem 32, whereupon the side opening 44 thereof will be shifted past the seal 40. While this is occurring, the flatted portion 34 of the stem 32 will be moved downward through the seat 30, and the full circular circumference of the stem will completely fill the seat, shutting off the flow of fluid into the metering chamber occupied by the spring 36. The entrance of the side opening 44 into the said metering chamber will enable a charge of the pressurized fluid to be discharged through the hollow upper portion of the stem 32, and through the discharge channels 63 and 64 of the depress knob, said charge emerging from the nozzle 65. Upon release of the depressing force from the knob 62, the spring 36 will restore the stem 32 and the knob to the valve-closing positions shown in FIG. 1, wherein the stem enlargement 39 engages the seal 40 and shuts off further flow.

In accordance with the present invention, in conjunction with the closure and valve means 20, ferrule 48, and depress button 62 there is provided a novel normally-not-removed combination cap and guard 67 arranged to completely surround and enclose the valve construction, and also to surround the side portions of the depress button 62 and constitute a cover therefor while imparting a desirable stability thereto, both while the button is at rest and when it is being actuated. The cap structure 67 is fixedly carried by the container 10, being preferably frictionally mounted on the neck portion 12 as by frictional engagement with the ferrule 48. The cap structure 67 in being so frictionally mounted on the container neck portion 12 is intended to remain in place permanently or without requiring removal, as will be explained in greater detail below. The cap structure 67 is constituted of a flexible or resilient molded plastic composition such as polyethylene or a similar formulation, and comprises a generally cylindrical body 68 having a large central top opening 69 to provide access to the top of the depress knob 62. For the purpose of imparting the stated stability to the depress knob 62, and to supplement the bearing means provided for the valve stem 32, the large bore of the cap 67 is arranged to constitute a bearing means or guide for the knob, as seen in FIGS. 1 and 2. By this construction a smoother operation of the valve mechanism is had, as well as greater strength in the mounting of the depress knob and valve stem 32.

As seen in FIGS. 1, 2 and 4 an elongate opening or slot 71 is provided in the side wall of the cap structure 67, said slot being registered with the discharge nozzle 65 of the button 62, thereby to enable the discharge of the container contents to be at all times freely made through the side wall of the cap structure. As seen in FIGS. 1 and 4, the nozzle 65 extends partly into the slot 71 and thus is guided thereby and has a keying action to prevent relative turning between the button 62 and the cap 67. Considering FIGS. 1 and 2, when the button 62 is depressed the nozzle 65 will be positioned at the bottom of the slot 71, and when the knob 62 is in its valve-closing position as shown, the nozzle 65 will be at the top of the slot 71.

Preferably, as provided by the invention, the nozzle or orificed spout member 65 is given a contrasting color with respect to the cap structure 67, thereby to direct the attention of the user to the point or location from which the spray will issue. For example, the cap 67 may be in various deep or pastel colors whereas the nozzle member 65 may be pure white. Other combinations are, of course, possible. Also, the prominence of the slot 71, in conjunction with the contrasting colors above mentioned will further aid the user in directing the spray in the desired direction.

In accordance with the present invention, by molding the cap structure 67 of a flexible and resilient plastic, the lower portion of the cap body 68, which is in the form of a thin, depending skirt may be made of slightly smaller diameter than the outside diameter of the ferrule 50, and the said skirt portion may be made to stretch as it is being forced downward over the ferrule, thereby to effect a secure frictional engagement with the ferrule for the purpose of retaining the cap structure in place. Refer-

ring to FIGS. 1 and 2, the lower rim of the cap structure is seen as engaging the shoulder **14** of the container, whereby the cap structure is securely positioned on the container in its proper location with respect to the depress-button **62**, in consequence of the two annular zones or areas of support constituted by the ferrule **50** and shoulder **14** of the container. By virtue of the resilience or elasticity of the lower portion of the skirt of the cap structure, the bottom rim **73** thereof will tend to close in somewhat below the ferrule **50**, so as to resume its normal, unstretched condition, and in so doing there will be effected a more secure retention of the cap structure on the container neck **12**.

In order to maintain the registration of the discharge orifice **65** with the slot **71** simple cooperable keying means are provided on the interior of the cap structure **67** and the outer surface of the depress-button **62**. This keying means may comprise an axially extending groove **74** provided in the outer periphery of the button **62** and an interior axially extending rib **75** provided on the inside of the cap structure **67** and adapted to be slidably received in the groove **74**.

Preferably, in accordance with the invention, the central top portion of the depress-button **62** is provided with a slight bulge in the form of a convex portion **76**, which is readily engageable by the fingers and which facilitates the operation of depressing the button. However, as seen in FIGS. 1 and 2, the convex central portion **76** of the button **62** is not above the plane defined by the upper rim **78** of the cap structure **67**, and accordingly the said upper rim constitutes a guard for the button and prevents the latter from being inadvertently depressed, as might occur if the device without the guard were to be brought into contact with an external object, and this is an important feature of the invention.

From the foregoing it will be seen that I have provided a simple and advantageous cap construction which effectively guards the valve actuator button and prevents its inadvertent actuation while at the same time remaining permanently in place on the container. Thus, there is eliminated the nuisance of continually removing the cap, finding a place for it, and later replacing it whenever it is desired to use the aerosol device. The provision of the contrasting colors between the cap **67** and the nozzle member **65**, together with the prominence of the slot **71** will reliably apprise a user of the direction of the spray. By the provision of the large access opening in the top of the cap structure, the bulbous center portion **76** of the depress button, and the cooperable bearing surfaces between the depress button and the cap, the actuation of the valve is greatly facilitated while at the same time a desirable stability is imparted to it. A single size of cap may, in accordance with the invention, be utilized in spite of variations in dimensions of associated parts and components as follows: In positioning the valve stem **32** in the depress button **62**, a boring operation may be employed to enlarge the lower portion of the discharge channel **63** whereby there is provided an abutment shoulder **80** for engagement with the upper extremity of the valve stem. By controlling the depth of the boring operation, a control is had over the extent to which the valve stem **32** is received in the button **62**, and accordingly different lengths of valve stem and variations in the button structure will not necessarily require different sizes of caps **67**, but instead one basic cap size may be employed with the said variations being compensated for merely by changing the depth to which the boring is carried out.

Also, by virtue of the cap structure **67** being molded of a resilient and flexible plastic, the single basic size of cap may be made to fit ferrules and container necks which vary appreciably in diameter, since the skirt portion of the cap structure may be considerably expanded when the structure is applied to the container.

Another embodiment of the invention is illustrated in FIG. 5, wherein a different type of valve stem **32*a*** is provided within the combination closure and valve seat member **20*a***. The valve stem **32*a*** may be molded of suitable plastic, as for example nylon, and may have a central bore **82** in its upper portion communicating with a side opening **83**. The valve stem **32*a*** may have an annular sealing shoulder **85** intermediate its ends, for engagement with the walls of the large bore provided in the member **20*a***. By this construction, a bearing is had between the closure member **20*a*** and the valve stem **32*a*** at a point intermediate the ends of the latter, namely at the shoulder **85**. To permit fluid to bypass the shoulder **85** readily, short longitudinally extending grooves **87** may be provided in the walls of the large bore, as shown. The lower portion of the valve stem **32*a*** is surrounded by a helical compression spring **89**, the lower end of which spring engages an internal annular shoulder **91** formed between the large and small bores of the member **20*a***.

The lower extremity of the valve stem **32*a*** is normally disposed just above the shoulder **91*a***, which latter together with adjoining portions **93** of the member **20*a*** constitute a valve seat for engagement with the lower extremity of the stem **32*a*** when the latter is depressed. The dotted line showing in FIG. 5 indicates the closing position of the valve stem **32*a***, and for such position the side opening **83** is disposed below the sealing washer **95** whereby fluid within the metering chamber containing the spring **89** may be discharged through the upper portion of the valve stem. Thus, the valve structure as illustrated in FIG. 5 is seen to be of the metering type.

It will now be understood from the foregoing that I have provided a novel and improved cap structure in conjunction with a depress type valve actuator whereby removal of the cap is unnecessary in order to place the dispenser in use. Further, the present plastic cap construction provides also a desirable economy of manufacture together with increased reliability and smoothness of operation, thereby making for an improved overall product.

In the foregoing specification and in the appended claims reference is made to an "upward" direction or a "downward" direction; it will be understood that this is for convenience of description only, and is not to be taken in a limiting sense.

Variations and modifications may be made within the scope of the claims, and portions of the improvement may be used without others.

I claim:

1. In an aerosol dispenser, in combination, an upright container having on its upper portion a reduced external rim; a manually operable valve construction carried by the container within said rim, said valve construction including an upwardly extending, accessible and depressible hollow actuating knob having at one side an open and accessible spray nozzle and having within it an enclosed channel constituting a discharge passage communicating with the nozzle; and a fixed cap having a tubular body extending completely around and fully enclosing said reduced rim, said body surrounding said depressible knob and having a top opening to provide access to the knob, and said cap body being fixedly frictionally mounted on and carried by the said rim whereby the cap is held in a mechanically stable manner and is normally immovable on the container, particularly when upward force is applied to the latter with respect to the cap, said cap further having guard portions surrounding said openings which are at least as high as the said depressible knob to prevent accidental or inadvertent actuation of the knob by contact with a broad-surfaced exterior object, and having a side opening in the tubular body which is aligned with the spray nozzle of the knob to pass aerosol substance sprayed from the nozzle, said supporting rim of the container being located relatively remote from the side opening of the cap and from the said spray nozzle, the tubular body of the cap comprising a single-thickness wall and having a generally cylindrical bore, the walls of which

engage the said rim and also constitute a bearing surface above the rim, said depressible knob having an outer surface engaged and cooperable with said bearing surface at points both above and below said spray nozzle whereby the knob is guided in the cap body for axial movement therein.

2. The invention as defined in claim 1, in which the cap and depressible knob have cooperable keying means comprising the spray nozzle and the side opening, preventing relative turning.

3. The invention as defined in claim 2 in which the depressible knob has a side projection constituting the said nozzle, said projection extending into the opening in the side wall of the cap and being visible from the exterior of the cap, and in which the cap and nozzle have contrasting colors to direct the user's attention to the nozzle.

4. The invention as defined in claim 1, in which the cap and depressible knob have cooperable keying means comprising the spray nozzle and the side opening, and comprising a rib and groove provided on said cap and knob, preventing relative turning.

5. In an aerosol dispenser, in combination, an upright container having an upper body portion and an external shoulder at the same, and having above said shoulder a reduced neck and a rim on said neck, said rim and neck being centralized on and the rim being spaced above the said shoulder; a manually operable valve construction carried by the container within said neck and rim, said valve construction including an upwardly extending, accessible and depressible hollow actuating knob having at one side an open and accessible spray nozzle and having within it an enclosed channel constituting a discharge passage communicating with the nozzle; and a fixed cap having a tubular body extending completely around and fully enclosing said reduced neck and rim, said body surrounding said depressible knob and having a top opening to provide access to the knob, and said cap body having a lower skirt portion which is fixedly frictionally mounted on and carried by the said rim and removable therefrom, and which is engaged with both the said rim and the said shoulder whereby the cap is held in a mechanically stable manner and is normally immovable on the container, particularly when upward force is applied to the latter with respect to the cap, said cap further having guard portions surrounding said opening which are at least as high as the said depressible knob to prevent accidental or inadvertent actuation of the knob by contact with a broad-surfaced exterior object, and having a side opening in the tubular body which is aligned with the spray nozzle of the knob to pass aerosol substance sprayed from the nozzle, said supporting rim and shoulder of the container being closely juxtaposed to each other and being located relatively remote from the side opening of the cap and from the said spray nozzle, the tubular body of the cap comprising a single-thickness wall.

6. The invention as defined in claim 5, in which the depressible knob has a raised portion at its top for engagement by the fingers, said raised portion being no higher than the said guard portions of the cap.

7. The invention as defined in claim 5 in which the cap body has an overhang at the said side opening, extending outwardly of the spray nozzle and partially surrounding and shielding the same.

8. The invention as defined in claim 5 in which, there is a detent means on the knob and cap body, retaining the knob in the body whereby these constitute an assemblage, said knob being removed from the remainder of the valve assemblage when the cap is removed from the container rim.

9. The invention as defined in claim 8 in which the detent means comprises the nozzle on the knob and edge portions of the side opening of the cap.

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