Oct. 20, 1964 P. H. SAGARIN 3,153,497

CAP CONSTRUCTION FOR AEROSOL DISPENSERS

Filed Dec. 17, 1962

Fig. 1

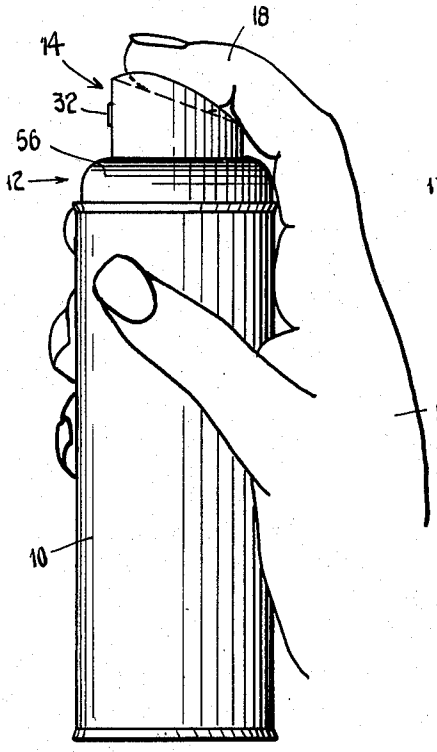


Fig. 2

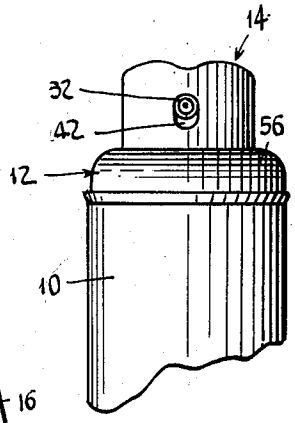


Fig. 3

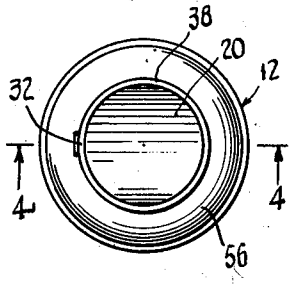


Fig. 5

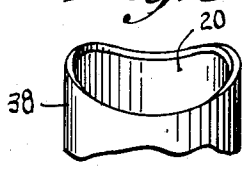


Fig. 6

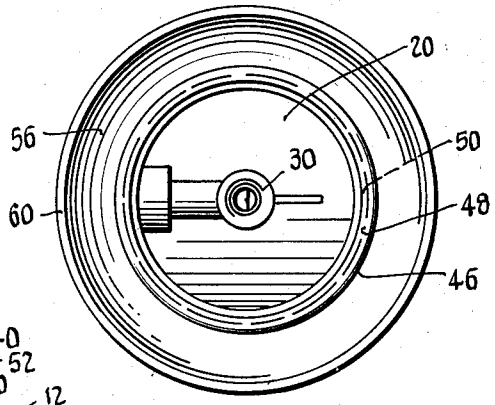
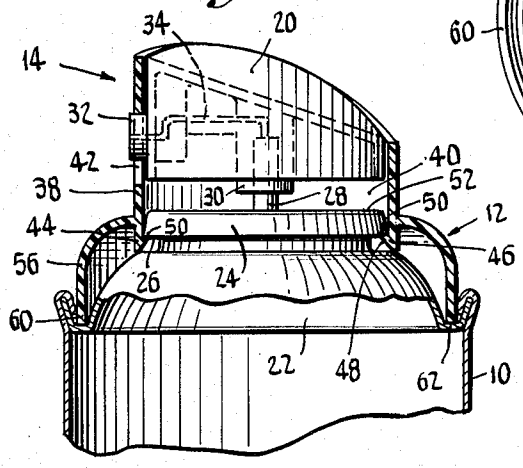


Fig. 4



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CAP CONSTRUCTION FOR AEROSOL DISPENSERS

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3 Claims. (Cl. 222—394)

This invention relates to small aerosol dispensers of the type intended to be held in the hand when in use, and more particularly to the dispensing cap constructions of such devices.

The invention provides improvements in the aerosol cap construction of my copending application Serial No. 152,472, filed November 15, 1961, and entitled "Hand-Held Aerosol Device." In this copending application the cap assemblage comprises a thin walled cylindrical cap body of resilient plastic material, within which a relatively large, plastic, valve-actuator or depress button is vertically movable. The lower rim of the cap body fits over and is frictionally retained by a shouldered neck of the aerosol container, there being internal detent means on said rim, which are forced over the neck shoulder and which remain engaged therewith.

Also, in the cap construction of this prior application there is a separate plastic, resilient collar or skirt which encircles the outer, lower rim portion of the cap and further engages a broad shoulder or ledge of the container, such skirt being engaged at its upper portion with an annular external shoulder of the cap body to retain it in place. For purposes of ease of assembly, the plastic skirt is, as a practical matter, made to have a loose fit on the cap body. If instead a tight fit of the skirt on the cap body is effected, the skirt may advantageously reinforce the body to provide a more secure retention of the latter in place, as explained in the identified application. Although the loose fit facilitates the assemblage of the skirt to the cap body it largely defeats any radial reinforcement action which the skirt otherwise may have.

In accordance with the present invention, the maintaining of a predetermined fit between a plastic skirt and plastic cap body is not depended on for radial reinforcement of the body by the skirt, and moreover the problem of assembly of the skirt and cap body is eliminated entirely.

This is accomplished, in accordance with the invention, by molding the cap body and skirt at one and the same time, as a complete integral or one piece unit, in an organization where the skirt continuously reinforces the cap body while the latter still has a minimum amount of yield necessary to the assembly operation. With the arrangement provided the reinforcement by the skirt effects a continuous and unvarying radial support, and no separate assembly of the skirt and body are required. There is thus obtained not only a saving of material and labor, but also a better product.

Accordingly, one object of the invention is to provide an improved dispensing plastic cap construction of the kind outlined and characterized by a tubular snap-assembly cap body and hollow external skirt structure, wherein a more effective retention of the cap body on the container is had while at the same time there is eliminated an assembly operation and also effected a saving of plastic material.

A feature of the invention resides in the provision of an improved cap construction as above set forth, wherein the reinforcement of the cap body is so effected as to not only increase the holding power of the cap on the container but at the same time to enable a given resilience or yieldability of the detent means to be had within its elastic limit, thereby to minimize the likelihood of permanent undesired deformation or cracking of the cap.

Other features and advantages will hereinafter appear.

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

FIG. 1 is a side elevational view of a hand-held aerosol device made in accordance with the invention, said device being shown as held in one hand for the purpose of placing it in operation.

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

FIG. 3 is a top plan view of the aerosol device of FIGS. 1 and 2.

FIG. 4 is an axial sectional view, taken on the line 4—4 of FIG. 3.

FIG. 5 is a fragmentary rear elevational view of the cap construction of the device of FIGS. 1–4, looking in the direction of the arrow 5 of FIG. 1.

FIG. 6 is a bottom plan view of the cap and button construction.

Referring to FIGS. 1 and 2, the aerosol dispensing device embodying the invention comprises an elongate cylindrical pressurized container 10 which is of a size enabling it to be conveniently held in one hand, the said container having a dispensing end 12 on which there is mounted the improved cap construction 14 provided by the invention. In FIG. 1 the container 10 is shown as being held in a hand 16, the forefinger 18 of the hand overlying and being engaged with a depress button 20 (see FIGS. 3–6) for the purpose of placing the dispenser in use.

The pressurized container 10, as seen in FIG. 4, has a frusto-conical end closure 22 provided with a neck portion 24 in the form of an annular collar having an under shoulder 26. The neck portion 24, as in my copending application referred to, carries a dispensing valve assemblage which is preferably of the metering type (not shown herein in detail), such valve assemblage including a vertically movable depressible valve stem 28. Further details of such valve assemblage are not given herein since per se they form no part of the present invention, and since various types of valve assemblages, both metering and non-metering, are well known in the art.

The valve actuator button 20 may be similar in all respects to the actuator or depress button illustrated and described in my identified copending application. The button 20 has a depending hollow boss 30 and further has a discharge orifice member 32 communicating with the bore of the hollow boss 30 by means of a discharge channel 34. The valve actuator button 20 is normally held in a raised position by the spring-charged valve stem 28. When the button 20 is depressed or shifted downward, it correspondingly moves the valve stem 28, enabling the discharge of aerosol substance to take place through the hollow valve stem, the boss 30, the discharge channel 34 and the discharge orifice 32.

In accordance with the present invention, an improved cap construction which is cooperable with the container 10 and the valve actuator button 20 is provided, by which a more effective retention of the cap construction or assemblage on the container is had despite long periods of disuse or adverse handling conditions and the like. The improved cap construction of this invention comprises essentially a substantially cylindrical plastic cap body portion and an enlarged depending hollow skirt in many respects similar to that disclosed and claimed in my copending application referred to. However, in this copending application the enlarged hollow skirt is constituted

as a separate molded piece, apart from the tubular or cylindrical cap body, whereas in accordance with the present invention the skirt and the cap body are molded simultaneously as a single piece or unit, being made integral with each other. By such integral construction several advantages are had, the most important of which is the elimination of critical tolerances and the obviating of problems involved with the assemblage of the two parts while attaining the important objective of a more secure and reliable retention of the cap on the container.

It will be observed in inspecting FIG. 4, that the annular detent shoulder 26 of the neck 24 is flat, that is, it lies in a plane which is normal to the axis of the container and of the cap construction. Further, the shoulder 26 is relatively narrow and in usual cap constructions it cooperates with a narrow detent bead or narrow ledges of molded plastic substance, for the purpose of retaining the cap construction in place. Of necessity, to enable satisfactory assemblage of the cap construction to the container, the plastic detent ledges or shoulders are or is of small cross section with comparatively little strength to resist deformation, especially when the cap part which carries the detent ledges is molded of a resilient plastic capable of readily yielding under stress. Because of such circumstance, there exists the possibility that the cap construction, due to rough handling, improper usage, etc. may become separated or disengaged from the container, rendering the dispensing device inoperative and constituting a source of annoyance to the user. Such circumstance requires the user to again apply the cap construction to the container, and if the user is an inexperienced person this may present a troublesome problem. By the present invention, there is still retained a molded cap construction involving resilient plastic material whereby the molded parts are readily yieldable, but the cap construction is so organized and arranged that there is a continuously acting, invariable reinforcement of the small detent ledges or beads, whereby the cap structure is much more securely retained in place on the container.

With the construction shown in my prior-filed application identified above, a reinforcement of the detent means may be had if tolerances are closely held between the cap body and the separate depending enlarged skirt member. However, this involves increased fabrication costs, and also makes more difficult the assembly of the skirt to the cap body by virtue of the fact that a loose, non-critical fit can not be employed between these parts while still maintaining the desired reinforcement of the detent means.

This problem is solved, by the present invention, with the illustrated construction wherein the enlarged depending skirt is made integral with the cap body at a point about the detent rim, since no fits or tolerances are now involved, and the assembly operation of these parts is entirely eliminated while at the same time the skirt, in constituting an integral part of the entire cap assemblage or structure, at all times fully reinforces the detent ledges or bead in an unvarying manner which is not dependent on close tolerances and the like.

Referring now to the figures, the improved cap construction as illustrated herein comprises a tubular and preferably cylindrical body portion 38 having an internal bore 40 which slidably receives and guides the valve actuator button 20. The tubular body 38 has a slot 42 in which there is received the discharge orifice member 32, such member having a limited amount of vertical movement in the slot, and holding the button 20 captive in the cap body 38.

The cap body 38 is seen to be thin walled, and is molded of a resilient plastic substance whereby the walls are flexible and may be readily distorted without exceeding the elastic limits of the material. The cylindrical body 38 has a lower rim 44 provided with internal detent means in the form of an annular bead or shoulder 46 of relatively small cross section. The bead 46 has a lower wall

48 which is sloping with respect to the axis of the cap structure, and has an upper flat wall 50 which is disposed in a transverse or horizontal plane which is normal to the cap axis.

As seen in FIG. 4, the sloping lower surface 48 of the detent bead 46 results in a camming action at the time that the cap structure is applied to the container neck 24. The said neck has a rounded upper surface 52 which is engaged by the sloping surface 48 when the cap structure is applied in a downward direction as viewed in FIG. 4 and by virtue of the resilience of the plastic substance, the lower rim portion 44 is expanded forcibly to enable it to be forced past the neck 24. When this is done, the detent bead 46 will snap under the shoulder surface 26 of the neck 24, occupying the position of FIG. 4.

By the present invention, the lower rim portion 44 of the cap body and the detent bead 46 are reinforced in a continuous and unvarying manner by an enlarged thin-walled downwardly extending integral exterior hollow skirt 56 which is carried by the cap body 38 adjacent but spaced from the lower rim 44.. The upper portions of the skirt structure 56 are seen to comprise an annular wall which extends both outward and downward from the cap body 38, said wall by virtue of such configuration constituting at all times a continuously acting reinforcement for the lower rim to strengthen and stiffen the same and to minimize the likelihood of the cylindrical wall rupturing when the rim is expanded by the neck of the container. Because of the reinforcement afforded by the skirt 56, the detent bead 46 is not so likely to be deformed or expanded again once it has been shifted into its operative position as shown in FIG. 4, and in consequence rough handling and adverse conditions to which the aerosol dispenser may be subjected will not cause an inadvertent dislodgement of the cap construction 14 from the container 10.

As seen in FIG. 4, the lower edge 60 of the skirt 56 is accommodated in an annular groove or recess 62 provided at the base of the closure structure 22 of the container. Such disposition and engagement of the skirt 56 further improves the cap mounting, inasmuch as it provides a large-diameter steadying influence of the cap body 38, which influence is of an unvarying nature by virtue of the integral formation of the skirt. The cap body 38 is thus not so likely to be tilted whereby the retaining stresses experienced by the detent bead 46 will at all times remain uniformly distributed, minimizing the likelihood of failure of such bead. Where the skirt, as in the prior application, is made as a separate piece and has a loose fit (as when critical tolerances are not employed) there is much more likelihood of the cap body being tilted in consequence of the application of external forces due to rought handling, etc., and such tilting action results in increased concentrated stresses on the relatively weak plastic detent means, by which the cap construction may be dislodged from the container. However where, as provided by the present invention, the enlarged steadying and reinforcing skirt is made to be integral with the cap body, there is much less likelihood that the latter may be tilted, and as a consequence the relatively weak yieldable plastic detent means is better able to withstand the effects of rough handling without failure.

The improved cap construction as thus provided by the invention is seen to eliminate an assembly operation which was heretofore employed in attaching the separate collar piece to the cap body, effecting a saving of labor and tooling. Further, by molding the cap body and the skirt in a single operation the fabrication costs of these are reduced, and less plastic substance is required in the molding. However, most important of all, the fabricating of the skirt as an integral part of the cap body provides an important and significant reinforcement of the weak detent ledges by which the cap construction is retained on the pressurized container. Since the skirt,

as illustrated in the embodiment of the invention described herein, is secured or joins the cap body at a point slightly above the bottom edge of the lower rim portion 44 of the body, such lower rim portion still retains a certain degree of resilience or yieldability, by which the cap construction may be readily applied to the container, without difficulty.

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, an actuator cap construction comprising, in combination:

(*a*) an upright aerosol container having an upper neck portion including an annular collar, the axis of said container extending vertically,

(*b*) a thin walled tubular, resilient plastic cap carried by the said upper neck portion and disposed with its axis vertical, said cap having a flexible wholly cylindrical mounting wall portion provided with a continuous and unbroken lower rim, said cap further including a cylindrical wall portion of generally the same diameter as said cylindrical mounting wall portion and extending vertically upward directly from the latter for an appreciable distance, said lower rim having internal detent means for engagement with and engagement along the outside of the collar of the aerosol container neck for the purpose of securing the cap thereto, said lower rim being forcibly but only slightly expanded substantially within its elastic limit when engaging said collar,

(*c*) said cap having an appreciably enlarged thin-walled downward-extending integral exterior hollow skirt structure which is carried by and joined to it adjacent to but spaced axially from the said lower rim, the upper portions of the skirt structure comprising an annular wall extending both outward and downward, said wall constituting at all times a continuously-acting reinforcement for the said mounting wall portion and lower rim to strengthen and stiffen the same and minimize the likelihood of the cylindrical mounting wall portion rupturing when the rim is expanded by the neck of the container,

(*d*) the flexible cylindrical wall portions of said cap having an internal bore constituting a slide bearing,

(*e*) a plastic depress button carried and slidable in the said bore of the cap, and

(*f*) said mounting wall portion being wholly vertical at all locations between the lower rim and the juncture of the skirt structure and the cylindrical wall portions.

2. A cap construction as in claim 1, wherein:

(*a*) the lower rim of the cylindrical mounting wall portion is disposed in a plane located slightly below the juncture of the annular wall of the integral collar and the flexible cylindrical mounting wall of the cap whereby a degree of yieldability is had at the rim while still retaining the strengthening effect of the collar.

3. A cap construction as in claim 2, wherein:

(*a*) the internal detent means comprises a continuous annular shoulder having a bottom cam surface which slopes with respect to the axis of the cap, and having a top surface disposed in a plane normal to said axis.

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