# United States Patent [19]

**Sette**

[11] **3,844,448**

[45] ***Oct. 29, 1974**


[54] **VALVE ACTUATING SAFETY CAP ASSEMBLY FOR PRESSURIZED DISPENSERS**


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[ * ] Notice: The portion of the term of this patent subsequent to Apr. 24, 1990, has been disclaimed.

[22] Filed: **Apr. 27, 1972**

[21] Appl. No.: **248,259**

[52] **U.S. Cl.**..... **222/153,** 222/182, 222/402.11

[51] **Int. Cl.**..... **B67b 5/00**

[58] **Field of Search**..... 222/402.13, 402.11, 182, 222/153, 394; 215/9



[56] **References Cited**

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[57] **ABSTRACT**

A generally cylindrical cam track element with a plural stage cam track on a cylindrical face thereof is fixed upon the dispener's head, and an inverted cup shaped overcap with a node-like cam follower engages, by the latter, with a first stage of said cam track to hold the overcap on said element and, by rotation of the overcap during engagement of said follower in a later, frusto-spiraled stage of the cam track, a nozzle in the overcap seats upon and actuates the dispenser's valve to discharge the dispenser's contents through said nozzle. The cam track has an intermediate stage along which the follower must move differently from said first stage to said later stage. It is preferable that the cam track element have similar opposed cam tracks at opposite sides thereof and that the overcap be provided with two such followers to work therewithin.


**1 Claim, 5 Drawing Figures**

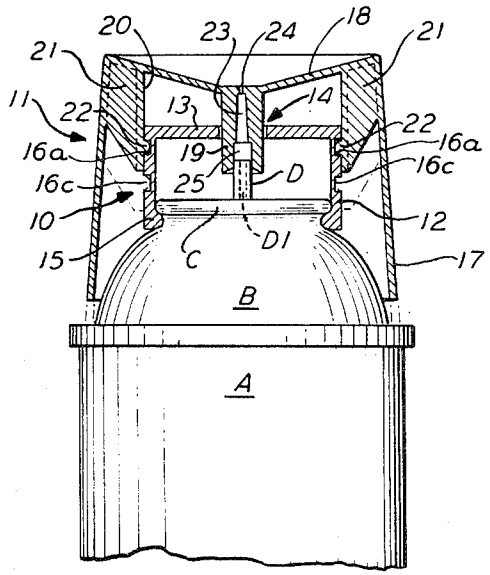


FIG. 1

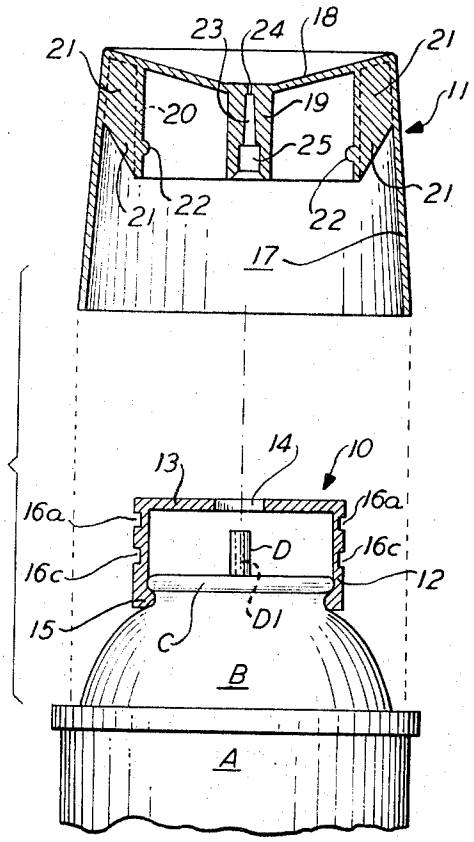



FIG. 2

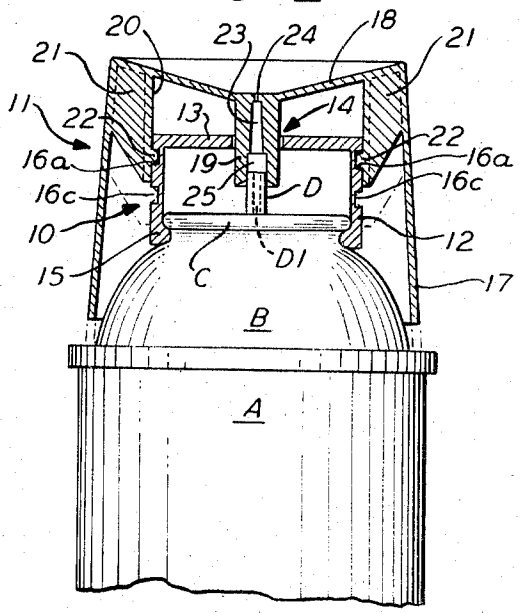



FIG. 3

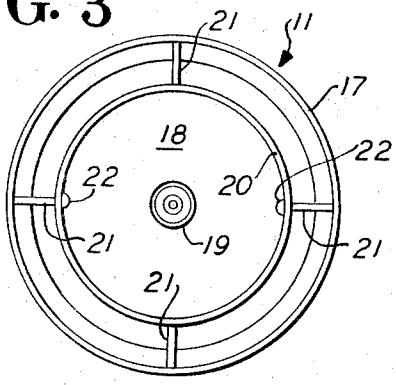



FIG. 4

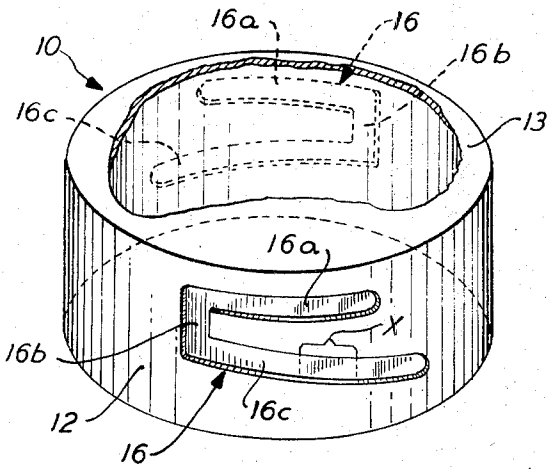
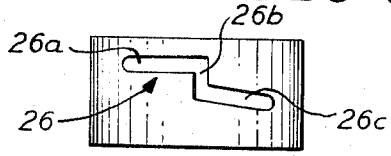



FIG. 5



# VALVE ACTUATING SAFETY CAP ASSEMBLY FOR PRESSURIZED DISPENSERS

## CROSS REFERENCE TO RELATED APPLICATIONS

This application is an improvement over the present inventor's co-pending applications, Ser. No. 142,316 for CHILDPROOF OVERCAP WITH HORIZONTAL SPRAY filed May 11, 1971 and now U.S. Pat. No. 3,729,119 issued Apr. 24, 1973, and Ser. No. 142,317 for CHILDPROOF RELOCKABLE ACTUATOR OVERCAP filed May 11, 1971 and now U.S. Pat. No. 3,729,120 issued Apr. 24, 1973.

## BACKGROUND OF THE INVENTION

Aerosol dispensers constitute an attraction to children probably because of the ease with which a spray of some sort may be created simply by pressing a valve. As the contents of such dispensers are, in many cases, highly toxic, they have given rise to many traumatic and sometimes fatal occurrences.

As aerosol dispensers are very useful in many ways, some serious efforts are indicated to minimize and eliminate, if possible, the dangers encountered with such dispensers as have hitherto been used.

The principal object of this invention is to provide a cap arrangement which may be easily manipulated to operate the dispenser's valve but which operation requires several stages of manipulation of the overcap, thereby rendering the valve non-operable except by persons who understand the sequence of operations and who, of course, would be of such maturity to fully understand the possible dangers involved in careless use of the dispenser.

## BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is an exploded, vertical, central sectional view of a preferred embodiment of the cap assembly of the present invention.

FIG. **2** is a similar view sectionally with respect to FIG. **1**, but showing in full lines the overcap held in retained, non-valve-operating position upon the cam track element; and including broken lines showing the overcap in valve opening position.

FIG. **3** is a bottom plan view of the overcap.

FIG. **4** is a perspective view of the cam track element with most of its top wall broken away to show an obscured area more clearly.

FIG. **5** is an elevational view of a cam track element having a modified form of cam track.

## DETAILED DESCRIPTION

As shown in FIGS. **1** and **2**, a head portion B of an aerosol dispenser A is formed with a rounded edge flange C, and the dispenser's valve D extends upwardly, centrally from a top, horizontal wall (not visible) of the head portion B.

The cap assembly of this invention comprises a generally cylindrical cam track element **10** and an inverted, cup shaped overcap **11**, both of which parts may, advantageously be molded of polypropylene.

The cam track element **10** has a cylindrical wall **12** and a flat top wall **13** formed with a circular center opening **14** therein. A continuous circular inner flange **15**, extending about the lower end of the wall **12** is tightly engaged with and underneath the dispenser's flange C to hold the cam track element fixedly upon the dispenser against other than deliberate removal from the latter and against turning relatively thereto in use of the assembly in the manner hereinafter described.



The outer face of the cylindrical wall **12** is formed with at least one, but preferably two or more opposed cam tracks **16**, each having, as best understood from FIG. **4**, an upper or first partially circular portion **16***a* extending in parallelism to the upper edge of the wall **12**, an intermediate or second portion **16***b* extending axially of the cam track element **10**, and a lower or third portion **16***c* extending convergently downwardly toward the lower edge of the wall **12**. All said cam track portions are interconnected to form a more or less U-shaped cam track which is uninterrupted from one end to the other.

The overcap **11** is formed with an outwardly flaring skirt **17**, a circular top wall **18** shown as slightly dished, a combined nozzle-valve actuator **19** depending centrally from said top wall, an inner, coaxial, cylindrical wall **20**, also depending from said top wall, and plural radial webs **21** interconnecting the skirt **17** and the wall **20** to support the latter against distortion during use of the cap assembly. All of the just mentioned parts of the overcap are integral to constitute the latter as a one piece element.

The cylindrical wall **20** is provided at its inner surface with diametrically opposite nodes **22** serving as cam followers working in the cam tracks **16**.

## APPLICATION OF THE CAP ASSEMBLY TO A DISPENSER

In a first step in applying the cap assembly to the dispenser, the cam track element **10** is forcibly pressed downwardly upon the dispenser head B to cause said element's flange to expand to pass downwardly over the dispenser's flange C, and instantly then to contract and thereby engage the dispenser's head B firmly beneath said flange C against both removal and rotation relatively to the dispenser. If desired, a suitable adhesive may be employed to more securely hold the element **10** upon the dispenser.

In a second and final step in applying the cap assembly to the dispenser, the overcap **11**, with its nodes **22** in axial alignment with some part of the cam track portion **16***a*, is forcibly pushed downwardly upon the element **10**, until said nodes seat into the cam track portion **16***a* as illustrated in FIG. **2**. During this step, the wall **20** expands slightly in the areas of the nodes **22** to permit the latter to slide downwardly over the upper margin of the wall **20** until the nodes snap into the cam track, thus holding the overcap in operative association with the element **10**.

The dispenser valve D is of the type having a coaxial passage D1 through which contents of the dispenser discharge when the valve is depressed.

## OPERATION OF THE CAP ASSEMBLY

When the nodes **22** are in cam track portion **16***a* as in FIG. **2**, the valve D is in its uppermost or closed position. To effect discharge from the dispenser, the overcap is rotated clockwisely (as considered with reference to FIG. **4**) until the nodes **22** oppose such rotation by engagement with the outer wall of cam track portion **16***b*.

Then the overcap is pressed downwardly until the nodes **22** oppose such downward movement by engagement with the bottom wall of cam track portion **16***c*,

whereafter, counterclockwise rotation of the overcap, with the nodes sliding down the inclined part of said portion **16***c*, causes the valve actuator **19** to open valve D to effect discharge from the dispenser through valve passage D1 and through passage **23** and nozzle port **24** of the overcap.

When the assembly's parts are relatively positioned as illustrated in full lines in FIG. **2**, with the valve D closed, the latter initially extends partially into a counterbore **25** in the valve actuator **19**, but spaced from the upper end of said counterbore.

The mentioned spacing permits the described downward movement of the overcap (indicated in broken lines in FIG. **2**) without operating the valve while the nodes **22** slide downwardly in the cam track portion **16***b* and initially to some extent in the cam track portion **16***c* before such downward movement causes the upper end of the counterbore **25** to engage and press the valve D to open it for discharge.

The opening of the valve D occurs when each node **22** is at some intermediate area of cam track portion **16***c* which area, for example, may be that marked *x* in FIG. **4**. The precise location of this area depends upon the amount of downward movement of the overcap **11** required to open the valve D.

Reversal of the valve opening operation serves to close said valve. As a metter of safety, particularly to children, the valve closing should proceed to a point wherein the nodes **22** are restored to their positions in the upper cam track portions **16***a*.

The modified cam track **26** shown in FIG. **5** differs from that shown in FIG. **4** chiefly in that there need be no reverse turning of the overcap in opening a related valve. Thus, to open the valve of a related dispenser, an initial counterclockwise turning of the overcap causes a node in upper cam track portion **26***a* to pass to cam track portion **26***b*, and then, following depressing of the overcap, further turning of the overcap counterclockwisely causes the node, then sliding downwardly along cam track portion **26***c*, to force the overcap downwardly sufficiently to open the dispenser's valve. Reverse or two stage clockwise turning of the overcap serves to close the valve and to hold the overcap against accidental or irresponsible operation.

This invention obviously may be utilized in various ways other than those disclosed herein.

I claim:

**1.** A cap assembly for a pressurized dispenser having a depressible valve that opens when axially depressed and closes when axially extended, said assembly consisting essentially of:

1. a generally cylindrical element fixable upon said pressurized dispenser coaxially to said valve,
   i. said element having a top wall with an opening therein aligned with said valve,
2. an overcap coactable with said element upon manipulation of said overcap to depress and thereby open said valve, said overcap including
   i. a top wall parallel to the top wall of the element,
   ii. a valve actuator integral with the top wall of the overcap, depending from said top wall in alignment with said valve, extending through the opening in the top wall of the element, having a discharge passageway therein for receiving and discharging emissions emanating from said valve when the valve is open, and including a counter bore at the valve facing end of the discharge passageway,
   iii. a skirt,
   iv. a radially inwardly extending node on the inner surface of said overcap,
3. means providing a cam track in the outer surface of the cylindrical element, said node being slidable in said cam track, said cam track having three portions providing a node-receiving slot that runs continuously from a closed end of the first portion through the second portion to a closed end of the third portion, the second portion joining the remaining end of the first portion to the remaining end of the third portion,
   i. the first portion extending about said outer cylindrical surface of said element parallel to the top wall of the element,
   ii. the second portion extending away from said first portion in a direction perpendicular to the top wall of the element,
   iii. the third portion extending away from said second portion in a direction slanting downwardly from the top wall of said element,
4. said node being in stationary valve-inoperative position during rotation of the overcap with the node in the first portion, said node being in stationary valve-inoperative position during depression of the overcap with the node in the second portion, and said node being depressed during rotation of the overcap with the node in the third portion after leaving the second portion, said node reaching valve-operating position during movement of the third portion over the node between said remaining end of the third portion and the closed end of the third portion,
5. said element and said overcap having absent therefrom means biasing the same apart in a direction perpendicular to the top walls thereof.

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