

[54] **SPRAY CAN SAFETY CAP**
[76] Inventor: **Andrew S. Jasinski**, 407 Flanders Ln., Grayslake, Ill. 60030

[22] Filed: **Feb. 10, 1972**

[21] Appl. No.: **225,161**

[52] U.S. Cl. **220/60 A**, 215/9, 215/46 R, 220/60 R, 220/85 P, 222/153, 222/182

[51] Int. Cl. **B65d 55/02**, B67d 5/32

[58] Field of Search 220/60 A, 60 R, 85 P; 222/153, 182; 215/9, 41, 46 R

[56] **References Cited**
UNITED STATES PATENTS

2,775,372 12/1956 Jordan 220/85 P

3,022,922	2/1962	Patton	220/85 P
3,633,789	1/1972	Markowitz	220/60 R
3,647,107	3/1972	La Gratta	220/85 P
3,706,401	12/1972	Gach	220/85 P
3,773,227	11/1973	Laing	215/46 R

Primary Examiner—George E. Lowrance
Attorney, Agent, or Firm—Darbo, Robertson & Vandenburg

[57] **ABSTRACT**

A cap for an aerosol spray can has an inner skirt which serves the dual functions of compound leaf spring to urge detents which engage the underside of the spray assembly collar inwardly and as a lever to disengage the detents for removal of the cap.

4 Claims, 10 Drawing Figures

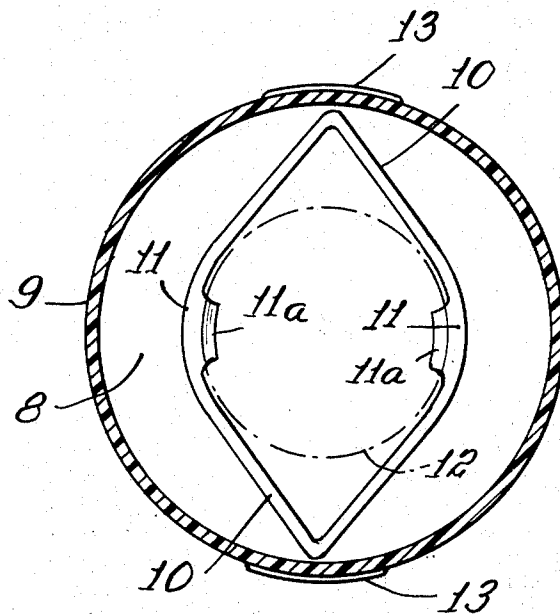


Fig. 1

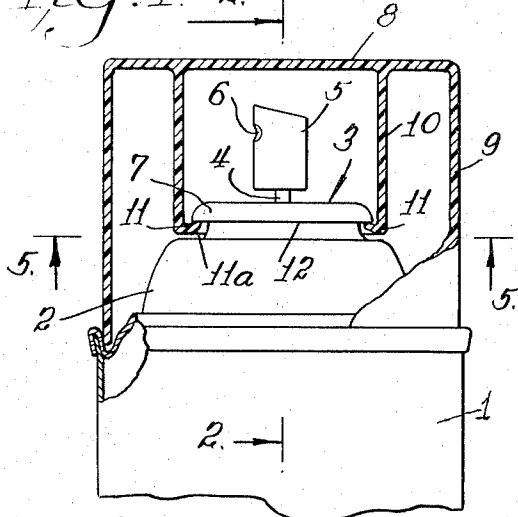


Fig. 2

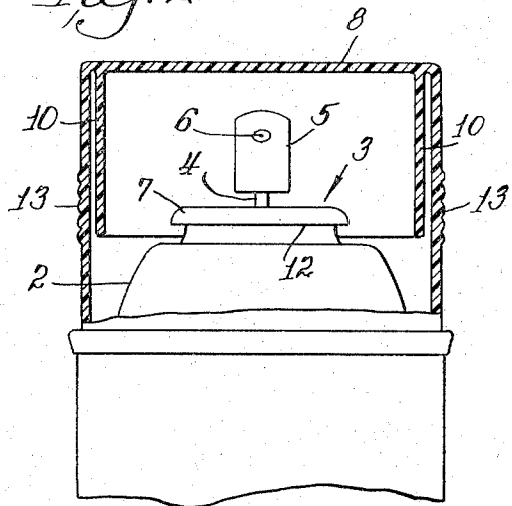


Fig. 3

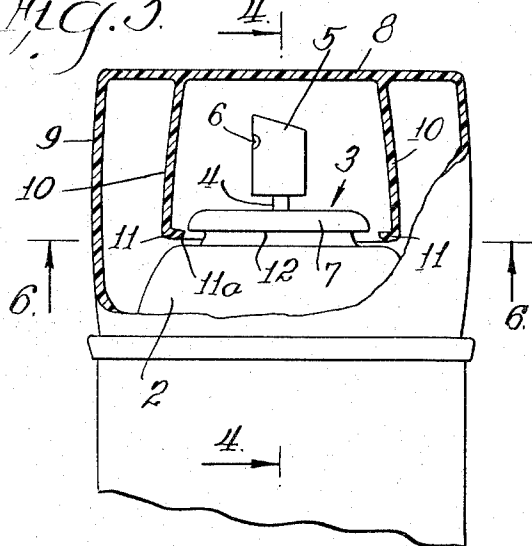


Fig. 4

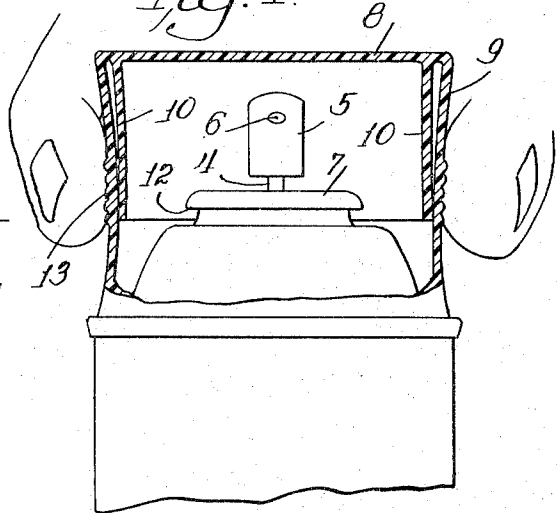


Fig. 5

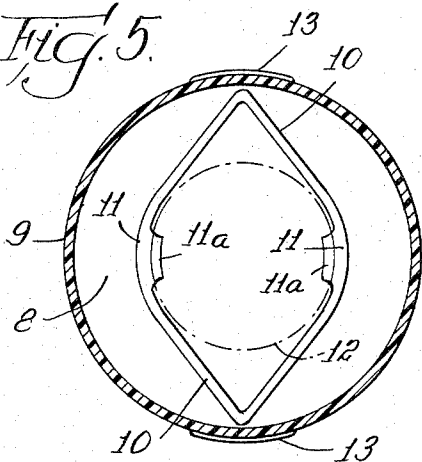


Fig. 6

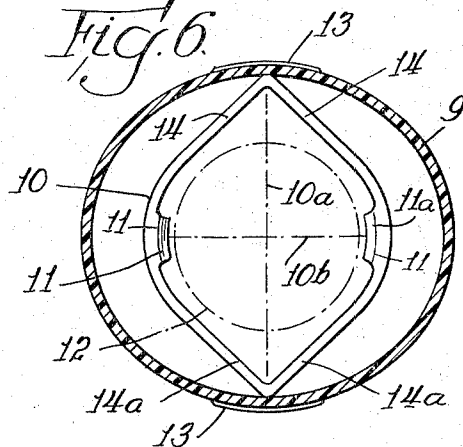


Fig. 8.

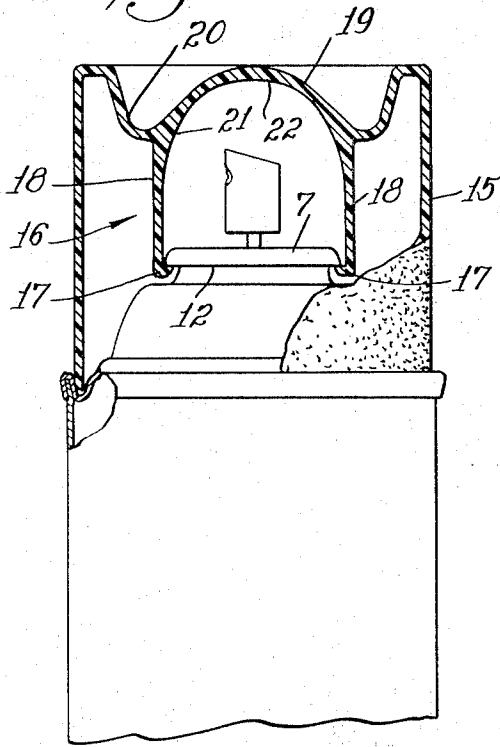


Fig. 9.

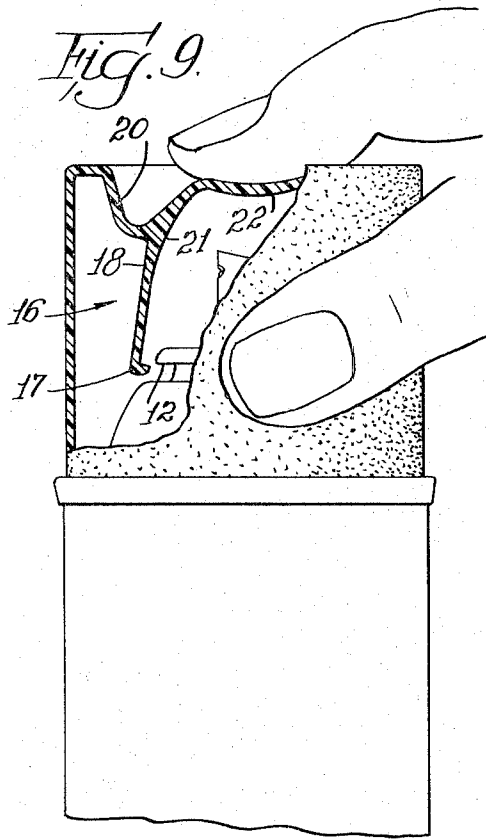


Fig. 7.

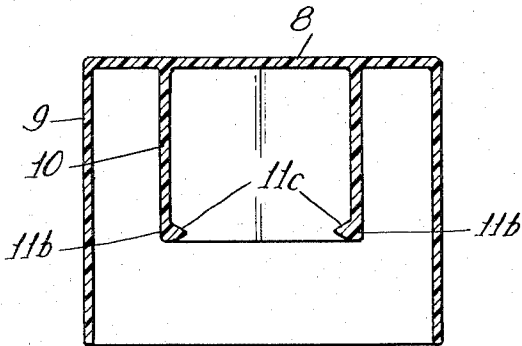
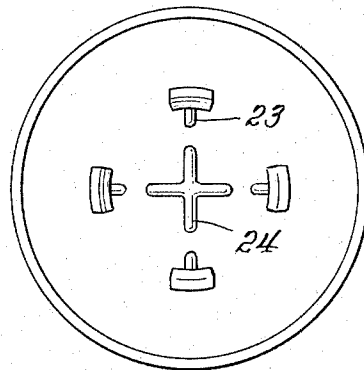


Fig. 10.



SPRAY CAN SAFETY CAP

BACKGROUND AND SUMMARY OF THE INVENTION

To protect the spray nozzle and control button which project from the top of aerosol spray cans, it is necessary and customary to provide a cover or cap which encloses at least the spray nozzle button and usually the entire top of the can. Detent or simple friction means are provided to retain the cap in its position on the can subject to removal by the manual application of relatively very small lifting force. The cap may be replaced upon the can by pressing it down with sufficient force to overcome the resistance of the detent or friction retaining means.

Since aerosol cans are attractive as playthings for small children and because the spraying of the various types of liquids which are packaged in aerosol cans can cause considerable damage and sometimes personal injury, it is almost always desirable, and in many cases absolutely necessary, that children be denied access to the spray cans with the operating button accessible for operation. This can be accomplished by providing caps which can be removed by adults but not by children.

Accordingly, it is a principal object of this invention to provide a spray cap for aerosol cans which are readily removable by normal adults but which cannot be removed by small children. More specifically, the invention provides such a cap which requires both know how and more strength than a small child possesses for removal. Another object of the invention is to provide a spray can cap having internal detent means releasable by the manual application of pressure at, and only at, particular locations on the external surfaces of the cap.

A further object is to provide a cap for spray cans having detent means which include compound leaf spring structures for dependably holding the detent latch elements in locking or holding position.

DESCRIPTION OF THE DRAWING

In the accompanying drawing,

FIG. 1 is a cross-sectional view of the top portion of a typical aerosol spray can with a safety cap of the invention locked into position thereon;

FIG. 2 is a cross-sectional view taken at the line 2—2 of FIG. 1;

FIG. 3 is a cross-sectional view similar to that of FIG. 1 but showing the detent in release position;

FIG. 4 is a cross-sectional view taken at the line 4—4 of FIG. 3;

FIG. 5 is a bottom plan view of the safety cap in normal locked-on configuration;

FIG. 6 is a view similar to that of FIG. 5 but showing the detent in release position;

FIG. 7 is a cross-sectional view of a spray can cap having snap-on rather than lock-on detent means;

FIG. 8 is a side view, partly in section, showing an alternative form of safety cap in locked-on position on a spray can;

FIG. 9 is a view similar to that of FIG. 8 but showing the detent structure in release position, and

FIG. 10 is a bottom plan view of the safety cap of FIGS. 8 and 9 in normal state and alternate stiffening structure.

DESCRIPTION OF SPECIFIC EMBODIMENTS

The aerosol spray can caps of the invention are designed and adapted for use with cans of almost universally standard top construction. The can shown by way of example in the drawings comprises can body 1 having a top 2 crimped thereon and a sprayer assembly 3 axially mounted in the can top. The sprayer comprises a tubular valve stem 4 having an operating button 5 containing a nozzle 6 mounted in supported structure which includes a collar 7.

The can cap illustrated in FIGS. 1—6 is a safety cap designed to be removable only by an adult. In FIGS. 1 and 2, it is shown in normal locked-on position and in FIGS. 3 and 4 it is shown with the detent held in retracted position for removal of the cap from the can. The cap, preferably molded as a unit from a suitable plastic material, has a generally flat top 8 and cylindrical side portion 9. In accordance with the invention, an inner skirt 10, generally oval in cross section (FIG. 5), depends axially from top 8 and is provided with a pair of in-turned detent catches 11. These catches are located at the location of the ends of the minor axis 10b of the oval skirt. As is shown in FIG. 1, the length of skirt 10 is such that the catches engage the under shoulder 12 of collar 7 when the cap is in closure position upon the can; that is, when the bottom edge of side portion 9 of the cap engages, or nearly engages, the top 2 of the can.

The plastic material used in molding the spray can cap is one which provided relatively stiff flexibility in the top, sides and inner skirt of the can. With such physical characteristics, skirt 10 is capable of functioning as a leaf spring in that when it is flexed by the application of manual force in the manner and for the purposes hereinafter described, the stresses established in the body of the skirt urge the structure back toward its normal configuration shown in FIGS. 1 and 5. Thus, the catches 11 are held in under collar 7 to lock the cap upon the can. If desired, the normal, unstressed, configuration of the inner skirt 10 may be such that the detent catches 11 are somewhat closer together than is shown in FIG. 1 to insure secure and dependable locking engagement. To the same end, the surfaces of catches 11 which engage the under shoulder 12 of collar 7 are inwardly inclined as may be seen in FIG. 1.

To remove the cap from the aerosol spray can, pressure is manually applied, as indicated in FIG. 4, to distort inner skirt 10 from the normal, locked-on configuration shown in FIGS. 1, 2 and 5 to the release position shown in FIGS. 3, 4 and 6. The cap releasing pressure is applied inwardly along major axis 10a (FIG. 6), resulting in a decrease in the length of the major axis and, due to the stiffness of the material, an increase in the length of minor axis 10b sufficiently to withdraw catches 11 from under shoulder 12, whereupon the cap may be lifted off of the top of the can.

The optimum locations for the application of the squeezing forces to release the locking catches may advantageously be indicated on the external surfaces of the side portion of the cap by roughened areas 13.

To replace the cap upon the can, it is only necessary to press the cap downwardly with sufficient force to move catches 11 apart as cam surfaces 11a slide downwardly and outwardly over and past collar 7 to snap into locking position.

The spring action of inner skirt 10 insures the dependable retention of catches 11 in locking position under collar 7. The configuration of the inner skirt is such that it acts as a compound leaf spring. When the releasing pressure is applied, as shown in FIG. 4, the side portions of inner skirt 10; that is to say, the portions shown in cross section in FIG. 3, having catches 11 at the bottoms thereof, are stressed outwardly by increasing the angular relationship of these opposed portions in a vertical plane, while, as is shown in FIG. 6, the portions 14 and 14a are forced apart, increasing the included general angles in horizontal plane. Thus, the catches are held in normal locking position as though they were controlled by simple leg elements depending from the top of the can (as suggested in the illustration in FIG. 3) and also by the oval shaped spring elements as suggested in FIGS. 5 and 6. The inner skirt compound leaf spring configuration supplies maximum locking security with a minimum of releasing movement necessary to disengage the catches.

The amount of force necessary to release the cap from the can is that which is beyond the strength of a child to apply but within the capability of an adult. The amount of force necessary to release the catches, and thus the cap, is determined by the nature of the plastic material of which the cap is composed and by such dimensions of the various elements of the cap such as the wall thicknesses of the inner skirt and of the side portion of the cap, the depth of the skirt, etc. It will be understood that dimensions and material flexibility and stiffness characteristics must be correlated to provide the desired degree of difficulty of releasing the cap.

Although, as is shown in FIGS. 2 and 5, inner skirt 10 depends from top 8 of the cap without connection of the skirt with the side portion 9 of the cap, bridging webs may be provided, if desired, between the major axis extremities of the skirt and the adjoining portions of the side of the cap. Such bridging elements would complicate production problems, somewhat, but would eliminate the slight lost motion in pressing the sides of the cap to engage the inner skirt and release the locking catches.

In, by way of example, showing and designating inner skirt 10 as generally oval in cross section, it is not intended to imply that the skirt must have this configuration. It may be, for example, substantially round, the important considerations being proximity to the side portion of the cap for effective application of the releasing forces and clearance from the collar 7 to permit the necessary inner movement to bring about withdrawal of the catches for release of the cap. The term "oval" is broadly used to designate the cross-sectional configuration of such operative inner skirts.

To avoid the lifting of the safety cap from the can without first positively withdrawing the locking catches from under collar 7, the upper surfaces of catches 11 which engage under shoulder 12 should be either horizontal or somewhat inclined inwardly, as shown.

To provide an aerosol can cap which is not intended to be locked on as a safety cap, (See FIG. 7) but which may be snapped on and pulled off with catches 11b serving only as friction detents, it is only necessary to provide inwardly declining cam surfaces 11c as shown. Just as the forcing of the cap downwardly onto the can forces detents 11b apart to slide over and snap under collar 7 of the can, pulling the cap upwardly forces the detents apart as cam surfaces 11c slide along the pe-

riphery of collar 7. Thus, the same cap construction, with only the minor change described, may be used as either a safety cap or a simple snap-on cap.

ALTERNATIVE EMBODIMENT

An alternative form of aerosol spray can cap is illustrated in FIGS. 8-10. This form of cap is similar to that above described in that it has a cylindrical side portion 15 and an inner structure 16 with catches 17 arranged to engage under shoulder 12 of collar 7 to lock the cap upon the can. Instead of the oval compound leaf spring inner skirt, however, four stiff legs 18 extend downwardly from domed top 19 of the cap, preferably integral therewith. Although any plurality of legs, e.g., two, three or four, may be employed in the provision of a safety cap, four are shown by way of example. The upper surfaces of catches 17 of all of the legs lie in the same horizontal plane whereby they will simultaneously engage under shoulder 12 of collar 7 in the locked-on position of the cap. As is previously described with reference to the cap of FIGS. 1-6, these upper surfaces are either horizontal or somewhat inclined inwardly to insure against removal of the cap without positive prior withdrawal of the catches.

To release the safety cap of this alternative form of the invention, pressure is manually applied downwardly upon the center, domed portion of the top 19 of the cap. Since each of the legs comprises a lever fulcrummed about the juncture of web portion 20 of the top of the cap, downward movement of the upper extremities, collectively joined at the domed portion 19 of the top of the cap, results in both slight downward movement of the legs and also rotation of each leg about its lever fulcrum to withdraw catches 17 from their locking-on position shown in FIG. 8 to the release position shown in FIG. 9. To effect such withdrawal upon the application of such downward movement of the center portion of the top of the cap, legs 18 must be quite stiff to resist bending. Advantageously, portions 21 are relatively thick. If desired, the top of domed portion 19 of the cap may also be stiffened by providing increased thickness, as is shown at 22, to more effectively transmit the downward movement resulting from the application of manual pressure to the middle of the top of the cap. Web portion 20 of the top serves as a leaf spring urging the legs inwardly to the locked position shown in FIG. 8 and flexing under stress when the releasing pressure is applied to remove the cap.

As is previously described with reference to the cap of FIGS. 1-6, the cap may be replaced in locked-on position upon the top of the can by merely pressing it downwardly until the catches snap into position under collar 7. If desired, the normal, unstressed configuration of the cap may be such that the bottom edge of the wall portion 15 of the cap engages the top of the can before catches 17 have moved down sufficiently to snap under the collar so that in order to lock the cap into position it is necessary to apply downward force to the legs, themselves, as by pressing downwardly at the thickened annulus 21. With this construction, upward, as well as inward pressures are continuously applied to the catches 17 to thereby enhance the security of the locking arrangement.

If desired, stiffening ribs 23 (FIG. 10) may be provided to stiffen the legs-levers 18 instead of providing the thickened sections 21, and stiffening ribs 24 may be

5

6

provided to stiffen the center portion of the domed top of the cap.

I claim:

1. A cap for a spray can having a top and a sprayer assembly including a horizontal collar having an under shoulder mounted centrally in said top, said cap being inverted cup-shaped having a generally flat top and cylindrical side wall and having an inner skirt extending downwardly from said cap top integrally therewith to a level just below that of the sprayer assembly collar when said cap is in closure position upon a spray can, said skirt being generally oval in cross section, detent catches extending inwardly from the bottom of said skirt at the locations of the extremities of the minor axis of said oval skirt, said skirt being resiliently flexible to act as a leaf spring normally urging said catches inwardly to locking position under the sprayer assembly collar of a spray can, said cylindrical side wall of said cap being resiliently flexible and the portions of the oval skirt located at the extremities of the major axis thereof being so arranged that inward flexing of said

cap side wall at approximately the locations of said oval skirt major axis extended moves said portions of said skirt inwardly causing the portions of said skirt located at the extremities of the minor axis thereof to move outwardly to withdraw the catches from under the sprayer assembly collar and thus release said cap from the spray can.

2. A cap in accordance with claim 1 wherein the bottom surfaces of the detent catches are inwardly inclined to provide cam surfaces causing said catches to spread apart as said cap is pressed down toward closure position upon a spray can and said catches engage the spray assembly collar.

3. A cap in accordance with claim 1 wherein the top surfaces of the detent catches are horizontal or slightly inwardly inclined.

4. A cap in accordance with claim 1 wherein the portions of the oval skirt located at the extremities of the major axis thereof are separate from but in close proximity to the side wall of said cap.

* * * * *

25

30

35

40

45

50

55

60

65

Notice of Adverse Decision in Interference

In Interference No. 99,084 involving Patent No. 3,820,683, A. S. Jasinski, SPRAY CAN SAFETY CAP, final judgment adverse to the patentee was rendered Dec. 23, 1975, as to claims 1 and 3.

[Official Gazette March 23, 1976.]