

[54] SAFETY CAP FOR AEROSOL SPRAY CANS

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Related U.S. Application Data

[63] Continuation of Ser. No. 290,824, Sept. 21, 1972,
abandoned, which is a continuation-in-part of Ser.
No. 118,875, Feb. 25, 1971, abandoned.

[52] U.S. Cl..... 222/182; 222/402.13

[51] Int. Cl..... B65d 83/14

[58] Field of Search..... 222/182, 402.13

References Cited

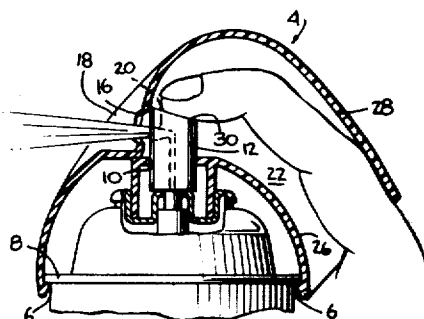
UNITED STATES PATENTS

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[57] ABSTRACT

A safety cap for aerosol spray cans having a passage to afford access by an adult's index or middle finger to the aerosol can actuation valve. A specially configured opening to afford discharge of the aerosol spray can contents and means to retain the actuation valve discharge opening in alignment with the safety cap discharge opening are also provided. Means to permanently fix the safety cap to an aerosol spray can is also provided.

7 Claims, 9 Drawing Figures



SHEET 2 OF 2

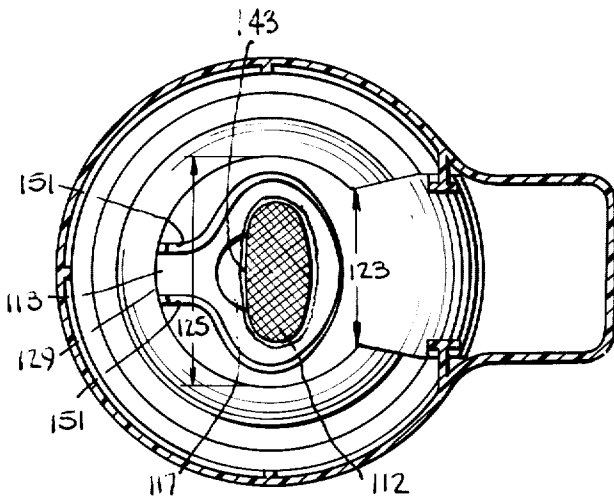
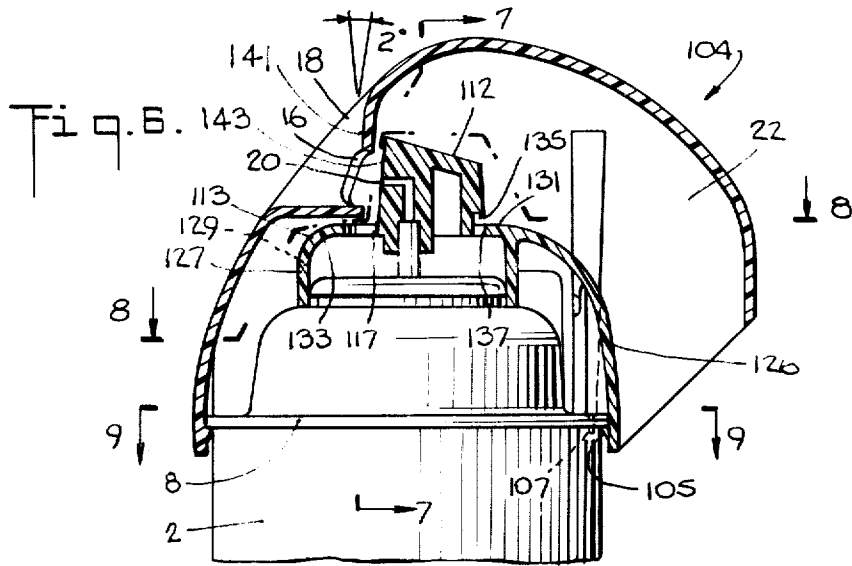


Fig. 6.

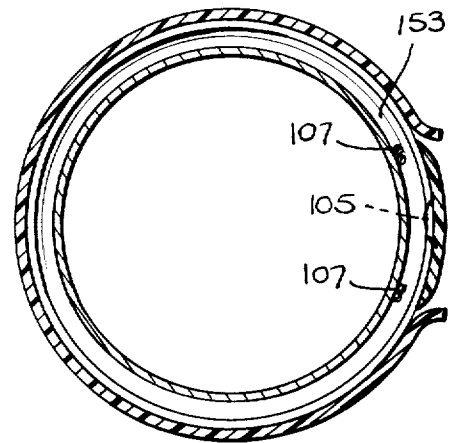


Fig. 9.

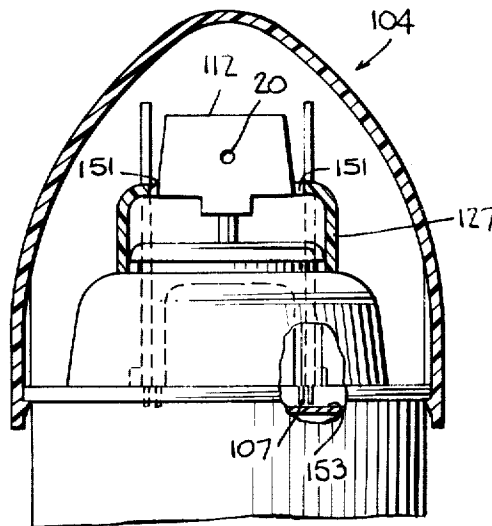


Fig. 7.

SAFETY CAP FOR AEROSOL SPRAY CANS

This is a continuation of application Ser. No. 290,824, filed Sept. 21, 1972, now abandoned, which in turn is a continuation-in-part of application Ser. No. 118,875 filed Feb. 25, 1971, now abandoned.

CROSS REFERENCE TO RELATED APPLICATION

This application is related to U.S. Pat. No. 3,698,543 issued on Oct. 17, 1972 to Frank A. Trotta.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This application relates to a safety device for preventing infants and young children from using potentially dangerous articles. In particular, this invention is directed to a safety device for preventing infants and young children from using aerosol cans.

2. Description of the Prior Art

The past twenty years have evidenced a dramatic increase in the fatality and injury rate among children due to accidental poisoning. In many cases, the poisoning was caused by inhalation or ingestion of commercial products marketed in aerosol cans.

To date, many efforts have been made to design and develop devices that will prevent children from gaining access to potentially dangerous products. One effort can be characterized as the intellectually oriented solution. Essentially, the intellectually oriented solution provides locking devices which allegedly can only be understood by adults. The fallacy in these devices resides in the fact that some children are intellectually more advanced than some adults. In addition, the intellectually oriented solutions stimulate the inquisitive nature of children and encourage rather than discourage a child's interest in a potentially dangerous product container.

Another attempt at solving the problem is a snap-on safety cap. Essentially, the snap-on safety caps are simply a device which relies on a force-fit with the aerosol can. Theoretically, the cap can only be removed by the exertion of a relatively strong force.

Various other closure type devices have been advanced to solve the problem. In this category are the closures which require an alignment of parts fixed in a particular registry to afford separation. Other illustrative safety cap devices are the press and release cap and the mechanical release type. In operation, the press and release cap requires that pressure to be applied at the top or sides to remove the cap. The mechanical release closures require the introduction of a separate removal part such as a ratchet or key piece which becomes part of the cap.

Each of the closure type devices suffer from the defect that they are inconvenient to use. In addition to the requirement that a function be performed before the user can actually use the aerosol can, the user must also replace the closure after he has finished using the aerosol spray can. Thus, the tendency in many cases is to simply ignore the replacement function if the removal function was troublesome.

These prior art devices, in addition to being generally unsuitable, are particularly unsuitable for use in the aerosol spray can application. Thus, the applicant has devised a safety cap for aerosol cans which would be fixed to the can until the contents of the can were spent. One aspect of the applicant's invention is the use

of a passage to afford access by an adult to the aerosol spray can valve but prevent access thereof by a child. Previously, structures for actuating match boxes (Berry, U.S. Pat. No. 1,828,698) and switch structures (Van Hook, U.S. Pat. No. 3,109,900) have employed access passages for fingers. These devices are neither suitable nor could they be modified to function as a safety cap for an aerosol can.

SUMMARY OF THE INVENTION

The invention of the subject application resides in a safety cap configured to attach substantially permanently to an aerosol spray can. The safety cap is provided with a passage which extends from the aerosol valve actuator button to a finite remote location. The length of the passage is sized in accordance with an adult's index or middle finger. The cross-sectional area of the passage is also determined by the size of the adult's finger. The safety cap is provided with a discharge opening at an elevation in line with the discharge opening in the aerosol can valve. Means in the safety cap are also provided to align the actuator valve discharge opening during the operative periods. The safety cap includes several embodiments each of which are provided with various structural means for preventing actuation of the actuator valve due to frontal opening access. The safety cap is also provided with attachment means to fixedly secure the cap to an aerosol spray can.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the safety cap of the subject invention attached to an aerosol spray can;

FIG. 2 is a sectional elevational view of the safety cap taken through line 2—2 of FIG. 1;

FIG. 3 is the safety cap of FIG. 2 in the valve-actuated operative position;

FIG. 4 is a sectional plan view of line 4—4 of FIG. 2; and

FIG. 5 is a sectional elevational view of a modified embodiment of the safety cap of the subject invention.

FIG. 6 is a sectional elevational view of an alternative embodiment of the subject safety cap;

FIG. 7 is a sectional elevational view of the safety cap of FIG. 6 taken through line 7—7;

FIG. 8 is a plan view of the safety cap of FIG. 6 taken through line 8—8 of FIG. 6; and

FIG. 9 is a plan view of the safety cap of FIG. 6 taken through line 9—9 of FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The safety cap 4 of the present invention is uniquely suitable for use with aerosol spray cans 2 such as shown in FIG. 1. The safety cap 4 fits directly on the aerosol spray can 2 and can either be permanently attached or attach in a manner that prevents removal thereof until the contents of the aerosol spray can 2 are spent.

As best seen in FIGS. 2 and 3, the aerosol spray safety cap 4 is provided with an internal flange 6 adapted to cooperate with the rim 8 on a conventional aerosol spray can 2. The flange 6 is sized to grip the rim 8 with sufficient force to prevent hand removal. Practice has taught that an internal flange 6 of approximately one-sixteenth of an inch will provide the desired permanent attachment to a conventional aerosol can 2 if the cap 4 and flange 6 are formed of polyethylene.

Thus, the safety cap 4 will be permanently fixed to the aerosol can unless reuse is desired. If reuse is desired, a tool such as a screwdriver will be needed to remove the safety cap 4 from the aerosol spray can 2.

The safety cap 4 is also provided with a frontal discharge opening 16 for the passage of the aerosol spray can contents therethrough. The opening 16 is located in a frontal indentation 18 in the safety cap 4. The indentation 18 serves to locate the discharge opening 16 in proximity to the opening in the aerosol spray valve and to provide a surface to protect the spray valve from frontal access.

A centrally disposed opening 10, best seen in FIG. 4, having an asymmetrical configuration is arranged within the safety cap 4. The opening 10 is configured to slidably accommodate a valve actuation button 12 on the aerosol spray can. The actuation button 12 is configured in a cross section essentially the same as the opening 10, as best seen in FIG. 4. For aerosol spray cans having actuator valve buttons 12 of an asymmetrical cross section, the safety cap 4 can be provided with an opening 10 configured to conveniently accommodate the actuator valve button 12. Otherwise, it will be required that a special actuator valve button be provided to replace the circular cross-sectional actuator button valve found in many conventional aerosol cans. The top 30 of actuator valve button 12 extends above the discharge opening 16 in the safety cap 4 and the leading edge 32 abuts the inner surface 34 of the safety cap indentation 18. Thus, actuation of the valve 12 from the front is prevented since a probe entering the safety cap interior through the frontal discharge opening 16 will not be able to reach the top surface 30. The configuration of the button is critical only to insure alignment of the valve opening 20 with the discharge opening 16 in the safety cap 4. Although it has been found that the opening 10 is the most preferable alignment device for the actuator valve button 12, a spline, key or similar device can be used.

A passage 22 is provided in the safety cap 4 to allow access to the actuator valve button 12 by an adult's index or middle finger. The passage 22 is especially configured to accommodate an adult's index or middle finger but prevent access to the actuator valve button 12 by a child. The passage 22 extends from the area of the actuator valve button 12 to a finite remote location at the rear of the safety cap 4. It is preferable to align the passage 22 with the frontal discharge opening 16 in the safety cap to facilitate accurate spray direction. However, applications may arise wherein the passage 22 can be offset from direct alignment with the discharge opening 16. The passage 22 is defined by side walls 24, a lower surface 26 and an upper surface 28. Practice has taught that the lower surface 26 need not be continuous. The cross-sectional area of the passage 22 is three-fourths to 1½ sq. in. and the length to the actuation device is approximately 2 to 2½ inches. Data has shown that the adult's index and middle finger are in the range of 2% to 3¾ inches and has an effective cross-sectional area of .10 to .59 inch. A young child's finger (5 years old) or infant's finger seldom reaches a length greater than 1¾ inches. The passage 22 is provided with a curved contour to prevent access by any rigid objects. An arc of 40° has been found suitable for the contour of the passage 22.

A variation of the safety cap is seen in FIG. 5 wherein the indentation 18' in the safety cap is made larger to

provide an interior surface 34' thereof with a flat configuration in the area above the discharge opening 16. In the embodiment of FIG. 5, the actuator valve button 12' is somewhat larger than the actuator valve button 12 of the embodiment of FIGS. 1-4 and the valve discharge opening 20' is located at a higher elevation. During the inoperative periods the actuator valve button 12' nests against the surface 34' with the valve discharge completely covered by the surface 34'. The actuator valve of the actuator valve button 12' is designed to remain closed until the button has been depressed to the elevation wherein the valve discharge opening 20' is in alignment with the discharge opening 16 in the safety cap 4. Thus, the valve discharge opening 20' is eliminated as a pressure surface against which a probe entering through discharge opening 16 might be passed.

In operation, the safety cap 4 is first securely attached to the aerosol can 2. The opening 10 in the center of the safety cap 4 is placed around the actuator valve button 12 to provide unimpeded vertical sliding movement thereof. Actuation of the actuator valve button 12 is achieved by insertion of an adult's middle or index finger into the passage 22 such that the tip of the finger reaches the top surface 30 of the actuator valve button 12.

With the safety cap 4 of the present invention, actuation of the actuator valve button 12 by a child is virtually impossible. Firstly, the safety cap 4 cannot be removed from the spray can 2 by a child. Secondly, a child's finger cannot traverse the passage 22 since the passage 22 is longer than any one of the child's fingers. Nor can a child's hand fit into the passage 22 since the edge openings of the passage 22 will obstruct penetration of anything as wide as a child's hand. Finally, the passage 22 is provided with a curved orientation to prevent insertion of any rigid object. The curved contour is uniquely suitable for insertion of only an articulated object such as a finger.

The safety cap 104 of the embodiment shown in FIGS. 6-9 provides another structural embodiment of the safety cap of the subject invention. The safety cap 104, best seen in FIG. 6, is provided with the same access channel or passage 22 as the embodiment shown in FIGS. 1-5 except for the configuration of a constriction 123 slightly to the rear of the actuator button. The constriction 123 is best seen in FIG. 8. Channel 22 is again sized to accommodate an adult's finger but to avoid the insertion of a plurality of fingers of an infant, i.e., a child less than 5 years old. The channel in the area 125 in front of the constriction 123 is approximately 1½ times as wide as the width of the constriction 123. The channel 22 is approximately 2 to 2½ inches long and has a cross-sectional area that varies from three-fourths to 1½ square inch. In practice, it has been found that the constriction 123 should be in the range of 1 inch in width and the opening 125 should be 1½ times as wide as the constriction or about 1½ inches. The design facilitates the arrangement of an actuator button 112 which is approximately twice the size of the width of the tip of an adult's finger.

The frontal opening 16 and the front indentation 18 are essentially the same as in the embodiment of FIGS. 1-4. The actuator button 112 is aligned with the frontal opening 16 and has provided therein a channel 20 through which the contents of the can 2 can exhaust.

The opening 20 in the actuator button 112 is aligned with the center of the frontal opening 16.

The most desirable means for aligning the opening 20 in the actuator with the opening 16 in the cap 104 is by mounting the actuator 112 by means of a membrane 113 to the cap structure. The cap structure is provided with a passage floor 126 which is elevated from the aerosol can 2 and maintained in the raised position by an annular platform structure 127 which surrounds the aerosol can valve stem 155. The membrane 113 is attached to the structure 127 at point 129. This point is approximately one-fourth to one-half inch below the upper elevation 131 on top of the floor passage 126. The membrane 113 is configured with a contour that follows and fits into the contour of the structure 127. It extends from the point 129 to the actuator button 112. In practice it has been found that the membrane should be integrally formed with the floor passage structure 126 with cut-outs or openings 151 provided to allow deflection of the membrane 113 and actuator cap 112 with respect to the floor passage structure 126.

The actuator cap 112 is also formed with a rear undercut or notch 135. The actuator is designed to travel vertically in the opening 137 formed in the structure 127 and floor passage 126. The notch 135 is sized to clear the edge of the opening 137 when moved vertically. However, any horizontal force imposed on the actuator button 112 from the front such as the imposition of a force by a probe through opening 116 will cause the notch 135 to interfere with the edge of the opening 137, thereby preventing vertical travel of the actuator button 112 and actuation of the aerosol valve. The actuator frontal indentation 18 in which the access opening 16 is formed is essentially vertical. Similarly, the face of the actuator button 112 is also essentially vertical. Practice has taught that an angle of 2° with the vertical can be tolerated for the face 141 and the face 143 of the actuator button 112. With the face 141 and the face 143 essentially vertical, any force imposed on the face 143 by a probe through opening 16 will be reacted horizontally with a minimal vertical force vector. Thus, actuation of the button from the front is effectively obviated.

The membrane 113 mounting the actuator button 112 is also provided with an opening 117. As best seen in FIG. 6, the opening 117 is located directly below the vertical plane of opening 16. The area described by the opening 16 in vertical plan view is aligned with the center of the hole 117. Preferably, the hole 117 will be sized one-eighth of an inch greater in diameter than the area described by the vertical plan of hole 16. This further contributes to obviating frontal actuation of the button 112 by virtue of the fact that any probe inserted vertically through opening 16 will also pass through the opening 117, thereby avoiding the imposition of any vertical force directly on the membrane 113 and directly on the button 112.

The cap 104 is attached to the aerosol can 2 by strategically located cut-outs or indentations 105 which are located immediately under the flange 8 of a conventional aerosol can 2. In addition, posts 107 are formed in the lower surface of the passage floor 126 and depend downwardly therefrom in the area of the rearward termination of the passage 22. The posts 107 extend into the annular recess 153 typically found in aerosol cans immediately inside the top of the flange 8.

The posts 107 and the cut-out or indentation 105 located in alignment with the rear termination of the passage 22 and intermediately between the posts 107 coact to provide a scissors effect to enhance the grip of the safety cap 104 to the aerosol can 2.

The safety cap of the present invention can also be integrally formed or manufactured with an aerosol spray can. Thus, means to attach the safety cap to the aerosol spray can is not needed.

In addition to the safety features of the safety cap, the safety cap eliminates the need for the conventional removable aerosol can cap, provides a shield against sprayback and avoids the need for examination of the actuator button to find the spray opening.

I claim:

1. In a safety cap for an aerosol can having a body section with a frontal opening for the discharge of fluid from the aerosol can and an access passage sized to allow access by an adult's finger and prevent access of a child's finger to the aerosol spray can actuator mechanism, the improvement comprising

an actuator valve button mounted on the aerosol spray can actuator mechanism which actuator button has an internal channel terminating in a fluid opening which is aligned with the frontal opening; a flexible membrane attaching the actuator valve button to the safety cap;

an elevated platform structure surrounding the actuator valve stem of the actuator mechanism, said elevated platform having a centrally disposed opening to allow vertical travel of the actuator valve button and wherein said flexible membrane attaching the actuator valve button to the safety cap extends from the elevated platform; and

means for preventing actuating of the valve stem of the aerosol can actuator mechanism by access through the frontal opening in the safety cap comprising a frontal indentation in the safety cap centrally formed around the discharge opening in the safety cap, which frontal indentation is inclined at an angle of no more than about 2° rearwardly of the vertical plane and the face of the actuator valve button being configured with the same rearward inclination to the vertical plane as the frontal indentation and further includes a hole in the flexible membrane below the frontal opening in the safety cap, said hole having an area larger than the area described by the vertical plan of the frontal opening in the safety cap.

2. A safety cap as in claim 1 wherein the aligning of the discharge fluid opening of the internal channel of the actuator valve button is achieved by providing an actuator valve button of asymmetrical cross-section and an opening in the safety cap of the same asymmetrical cross-section, which opening slidably accommodates the actuator valve button when the safety cap is attached to the aerosol spray can.

3. A safety cap as in claim 1 wherein the flexible membrane extends from the elevated platform structure to the actuator button in alignment with the frontal opening in the safety cap.

4. A safety cap as in claim 1 wherein the means to attach the safety cap to the aerosol spray can is an inwardly extending flange of approximately one-sixteenth of an inch.

5. A safety cap as in claim 4 wherein the access passage is 2 to 2½ inches long, three-fourths to 1½ inches

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in cross-sectional area and is provided with a contour greater than 40°.

6. A safety cap as in claim 1 wherein the opening in the elevated structure to allow vertical travel of the actuator button is slightly larger than the actuator button and further includes a notch on the rear of the actuator button which will engage the rear edge of the opening in the elevated structure when a force is imposed on the

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face of the actuator button.

7. A safety cap as in claim 6 wherein the flexible membrane is attached to the elevated structure surrounding the actuator button at an elevation below the top of the elevated structure and further includes a radius in the flexible membrane.

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