

[54] **CHILD RESISTANT CLOSURE WITH CAM MECHANISM**

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[58] Field of Search 222/534, 536, 538, 535, 222/533, 556, 153, 532; 215/9, 505, 531, 540

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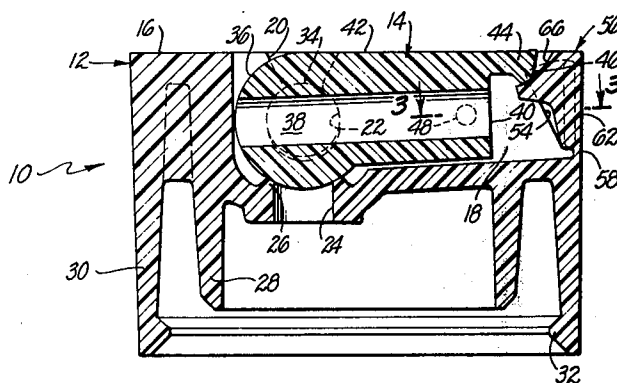
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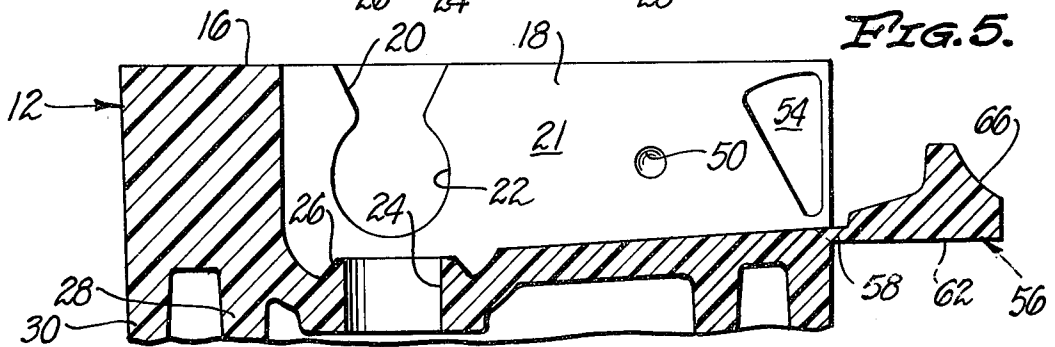
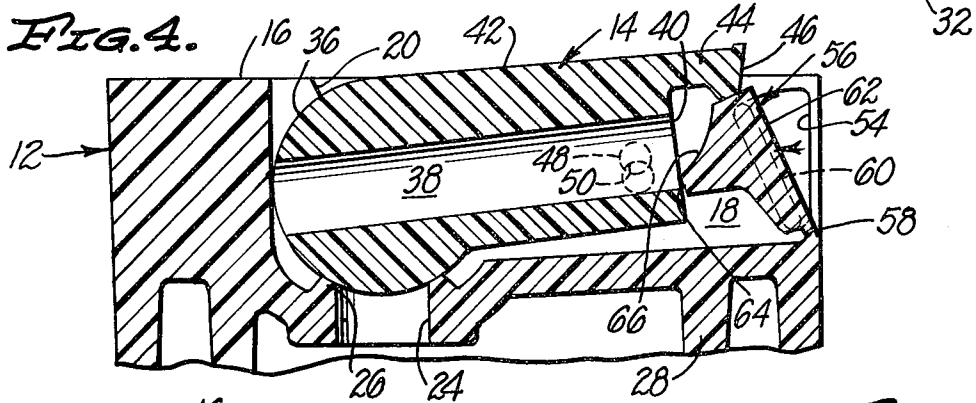
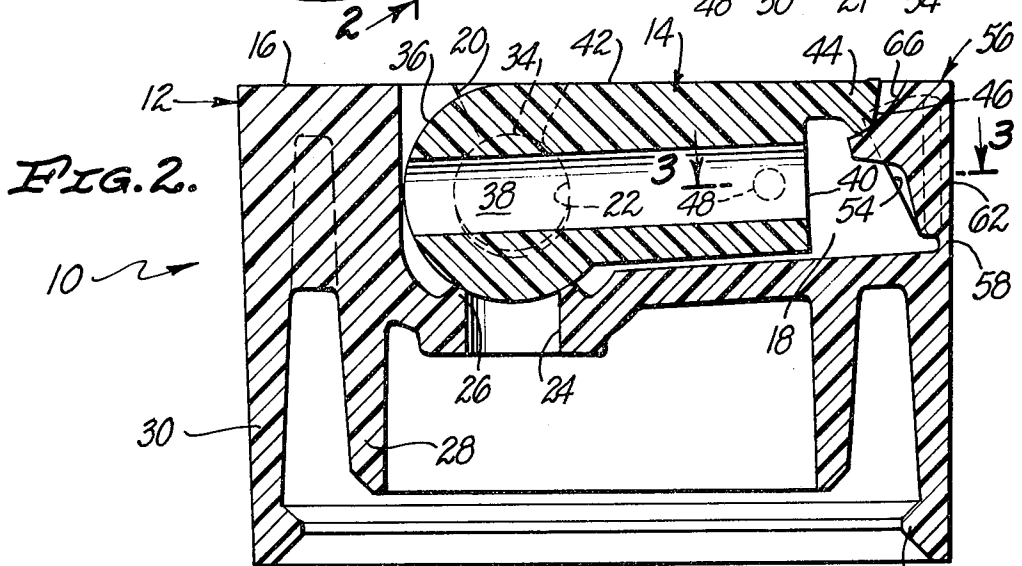
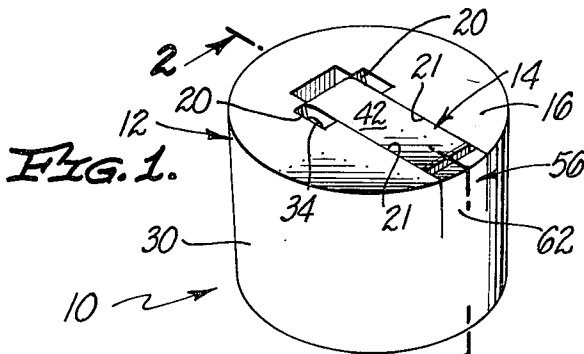
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[57] ABSTRACT

A child resistant dispensing closure having a cap which is adapted to be secured to a container and which has an opening extending therethrough and also having a spout rotatably mounted on the cap so as to be capable of being rotated between a closed and an open position relative to the opening of the cap can be constructed using a cam movably mounted on the cap. Preferably the cap has an internal groove into which the spout fits when it is in the closed position and preferably the cam is a second order lever having a cam surface rotatably mounted on the cap so as to be adjacent to the end of the spout when the spout is in the closed position. With this structure a part of the spout serving as a cam follower is engaged by the cam surface during the movement of the cam so as to rotate the spout to a position in which the spout may be separately engaged to be rotated to an open position.

8 Claims, 5 Drawing Figures





CHILD RESISTANT CLOSURE WITH CAM MECHANISM

CROSS REFERENCE TO RELATED APPLICATIONS

This application is related to the co-pending U.S. Pat. application by LaVange and Hazard entitled "Child Resistant Closures With Lever Opening" filed Nov. 2, 1973 Ser. No. 412,158 (Attorney's Docket No. 3384). The entire disclosure of this co-pending application is incorporated herein by reference.

REFERENCE TO RELATED PATENTS

The subject matter of this specification is considered to be primarily related to the Hazard U.S. Pat. No. 3,477,618 issued Nov. 11, 1969, entitled "Dispensing Closure" and the Wilson, et al., U.S. Pat. No. 3,718,238 issued Feb. 27, 1973, entitled "Safety Dispensing Closures." The entire disclosures of these patents are incorporated herein by reference.

BACKGROUND OF THE INVENTION

The invention set forth in this specification pertains to the field of child resistant closures.

The term or expression "child resistant closures" is not considered to have a precise definition. In general this term is used to designate a closure which is constructed in such a way that it is relatively difficult for a child or a person with less than normal intelligence to open but which is of such a character as to be capable of being opened by comparatively infirm individuals. Frequently a closure is considered child resistant if it passes a standardized testing procedure or protocol involving the ability of children to open such a closure. Many of such closures have in the past been referred to as safety closures.

The term or expression "dispensing closure" is commonly employed to designate a closure structure which is adapted to be mounted on a container and which contains a structure such as a spout capable of being moved between opened and closed positions. In such an opened position the contents of the container may be dispensed through the closure while in such a closed position the closure seals off the contents of the container. One manner of constructing a dispensing closure of this type is indicated in the Wilson, et al., U.S. Pat. No. 2,793,795 issued May 28, 1957, entitled "Dispensing Closures." The entire disclosure of this Wilson, et al. patent is incorporated herein by reference. Dispensing closures may, however, be constructed in other manners than are indicated in this patent.

To a large extent the basic features or principles of such dispensing closures were developed before there was a recognition of the need for child resistant closures. Since the widespread recognition of this need those in the dispensing closure field have done a great deal of work towards the development of specialized dispensing closures of a child resistant character. An understanding of the subject matter of this specification does not require a detailed review of all of such activities. Although the results of many such activities are considered to be desirable structures of a child resistant character, there remains a need for improvement in this field of child resistant dispensing closures.

To an extent this need is related to various items such as costs, ease of assembly, ease of manufacture, reliability of performance, relative ease of use and the like.

In part it is considered that this need is also related to the fact that many customers for dispensing closures want differently appearing and differently constructed closures for different commercial purposes.

SUMMARY OF THE INVENTION

An objective of the present invention is to provide a new type of child resistant dispensing closure which will fill this need. Other more specific objectives of the invention are to provide closures of the type indicated which are relatively easy to manufacture and assemble, which may be produced at a comparatively nominal cost and which are constructed in such a manner that they can be opened with a desired degree of difficulty. This latter is quite important to this invention since if a child resistant closure is too difficult to open it is unsatisfactory for use by infirm persons while if it is too easy to open it is not child resistant in character.

In accordance with this invention the noted objectives are achieved by providing in a dispensing closure having a cap which is adapted to be secured to a container and which has an opening extending there-through and also having a spout rotatably mounted on the cap so as to be capable of being rotated between a closed position in which the spout seals off the opening and an opened position in which the spout is in alignment with the opening the improvement which comprises: a cam means movably mounted on said cap so as to be capable of being moved relative to said spout when said spout is in said closed position, a cam follower located on said spout so as to be engaged by said cam means when said spout is in said closed position, said cam means being shaped so that when it is moved as said spout is in said closed position said cam follower will be engaged so as to rotate said spout from said closed position.

BRIEF DESCRIPTION OF THE DRAWING

Further details of a closure in accordance with this invention and further advantages of such a closure are best explained with reference to the accompanying drawing in which:

FIG. 1 is an isometric view of a presently preferred embodiment or form of a closure in accordance with this invention with the spout in the closure in a closed position;

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

FIG. 3 is a partial cross-sectional view taken at line 3—3 of FIG. 2;

FIG. 4 is a partial cross-sectional view corresponding to FIG. 2 illustrating an action as the closure is in the process of being opened; and

FIG. 5 is a partial cross-sectional view of the cap part of the closure shown corresponding to a cross-sectional view shown in FIG. 2 illustrating the configuration of the cam means used with the cap as the illustrated structure is molded.

The particular structure illustrated in the drawing utilizes certain essentially intangible principles or features as are set forth in the appended claims. These features or principles may be easily used in a number of differently appearing and differently constructed closures through the exercise of routine design or engineering skill in the closure field.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In the drawing there is shown a closure 10 in accordance with this invention which includes a cap 12 and a spout 14. Preferably both of these parts are formed of a somewhat resilient material such as polyethylene so that they may be snapped together by a mechanism involving temporary material deformation. As formed the cap 12 includes a generally flat top 16 containing a downwardly extending groove 18. Restricted entrances 20 lead from the top 16 adjacent to opposed sides 21 of the groove 18 into enlarged bearing openings 22.

Generally beneath the bearing openings 22 at the bottom of the groove 18 a passage or opening 24 extends through the cap 12. A known deformable sealing ring 26 is located around this opening 24 so as to extend upwardly in the direction of the top 16. Dependent from this top 16 is a known type of plug 28 appearing essentially as an annular flange. Also depending from the top 16 is a downwardly extending skirt 30 located concentrically about the plug 28. This skirt 30 carries an inwardly directed annular flange or bead 32. This structure of the plug 28, the skirt 30 and the bead 32 is of a conventional type adapted to be utilized in mounting the closure 10 upon a container. Various known or conventional type equivalents can, of course, be employed.

The spout 14 is an elongated structure having opposed trunions 34 located within the bearing openings 22 so that a curved, cylindrical end surface 36 on the spout 14 bears against the sealing ring 26 at all times so as to seal against leakage past the sealing ring 26. This spout 14 also includes an elongated internal passage 38 extending between the cylindrical end surface 36 and another end 40 of the spout 14. With this structure the end surface 36 closes off the opening 24 when the spout 14 is in a closed position as shown in FIGS. 1 and 2 and exposes or opens the opening 24 when the spout 14 is rotated so as to extend substantially vertically.

It will be recognized that so much of the closure 10 as described in the preceding is of a known design. With the present invention the spout 14 is dimensioned so as to have what may be termed a top surface 42 which lies substantially flush and flat with the top 16 of the cap 12 of the closure 10 when the spout 14 is in a closed position. This is so as to make it substantially impossible for any portion of this spout 14 to be directly grasped with the fingers so as to move the spout 14 from a closed position as indicated. This spout 14 also includes a small extension 44 projecting from the end 40 within the groove 18 when the spout 14 is in a closed position. It will be noted that the extension 44 is located so that the top of it constitutes and is the same as a portion of the surface 42.

Adjacent to the end of the extension 44 remote from the end 40 there is located what may be termed as cam follower ridge 46 which extends generally parallel to the end 40. The spout 14 also includes small side rounded, detent like buttons 48 which are adapted to be temporarily popped into correspondingly shaped cavities 50 at the sides 21 of the groove 18. These sides 21 also include generally triangular retainer cavities 54 located adjacent to the periphery of the cap 12.

As formed the cap 12 includes a cam member 56 which is attached to the body of the cap 12 by means of a comparatively thin web 58 of material capable of resiliently supporting the cam member 56 in such a manner that this cam member may be rotated or pivoted in a lever like manner. As formed the cam member 56 will normally extend from the skirt 30 as shown in FIG. 5. It may be pivoted and popped into an operative position in which side ridges 60 fit within the cavities 54 with a minimum of difficulty. When these side ridges 60 fit within these cavities 54 the cam member 56 can be rotated from a position as shown in FIG. 2 in which an external surface 62 on this cam member 56 appears essentially as a part of or an extension of the skirt 30 to an inward position as indicated in FIG. 4 in which an extremity 64 of the cam member 56 abuts against the end 40.

When the cam member 56 is rotated from a position as shown in FIG. 2 to a position as indicated in FIG. 4 the ridge 46 serving as a cam follower will ride up on a cam surface 66 on the cam member 56 so as to displace the extension 44 from within the groove 18 and so as to rotate the spout 14 to a limited extent from within this groove 18 to a position as shown in FIG. 4 in which the extension 44 may be conveniently engaged manually to rotate the spout 14 to a completely open position as indicated. The buttons 48 and the cavities 50 cooperate with one another so that such movement of the cam member 56 causing limiting movement to the spout 14 has to be caused by a distinct pushing action. This is considered desirable in preventing accidental or undesired actuation of the cam member 56.

After the cam member 56 has been actuated in the manner indicated the inherent resiliency of the web 58 can return the cam member 56 to a position as indicated in FIG. 2. In such position the cam member 56 will not interfere with the spout 14 being rotated from an opened position to a closed position. If for any reason the web 58 should not return the cam member 56 as indicated pressure exerted upon the spout 14 in returning the spout to a closed position will normally cause the ridge 46 to engage the cam surface 66 so as to cause the cam member 56 to pivot to a position in which the spout 14 is located as shown in FIGS. 1 and 2 of the drawing.

From this it will be seen that in the closure 10 the cam member 56 is used essentially as a second order lever and that in a sense the web 58 acts as a fulcrum for the cam member 56. The purpose of this structure is to enable the cam member 56 to be rotated so that engagement of it with the spout 14 will move this spout 14 from an entirely unaccessible location in the groove 18 to a position in which this spout 14 may be engaged so as to be further rotated to a completely open position. In order to make the closure 10 as child proof as reasonably possible the space between the extension 44 and the cam surface 66 should be minimized to as great a degree as reasonably possible so as to make it virtually impossible for the spout to be engaged directly in such a manner that it can be opened when it is in a closed position.

One feature of the closure 10 which is considered important relates to the fact that when the spout 14 is being closed the normal tendency will be to push this spout to a completely closed position within the groove 18. This will of course render the spout 14 relatively inaccessible and will place the various parts in a position

as indicated where it is necessary to push on the cam member 56 so as to open the closure 10. If desired this cam member 56 can be to a degree rendered significantly unapparent by using a pattern of lines extending vertically around the skirt 30 which blend in with the side edges 68 of the cam member 56.

We claim:

1. In a dispensing closure having a cap which is adapted to be secured to a container and which has an opening extending therethrough and also having a spout rotatably mounted on the cap so as to be capable of being rotated between a closed position in which the spout seals off the opening and an opened position in which the spout is in alignment with the opening, the improvement which comprises:

a cam means movably mounted on said cap so as to be capable of being moved relative to said spout when said spout is in said closed position,

a cam follower means located on said spout so as to be engaged by said cam means when said spout is in said closed position,

said cam means being shaped so that when it is moved as said spout is in said closed position said cam follower means will be engaged by said cam means so as to rotate said spout from said closed position.

2. A dispensing closure as claimed in claim 1 wherein:

said cam means is a second order lever having a cam surface adapted to engage said spout movably mounted on said cap.

3. A dispensing closure as claimed in claim 2 wherein:

said cam means is integral with said cap and is connected to said cap by a flexible web.

4. A dispensing closure as claimed in claim 1 wherein:

said cap has a top formed with a groove therein, said spout fits entirely within said groove when said spout is in said closed position,

said cam means is positioned so as to engage an end of said spout so as to rotate said spout from said closed position so that said spout projects partially out of said groove when said cam means is actuated with said spout being in said closed position.

5. A dispensing closure as claimed in claim 1 wherein:

said cap has a top formed with a groove therein, said spout fits entirely within said groove when said spout is in said closed position,

said cam means is positioned so as to engage an end of said spout so as to rotate said spout from said closed position so that said spout projects partially out of said groove when said cam means is actuated with said spout being in said closed position,

said cam means is a second order lever having a cam surface adapted to engage said spout movably mounted on said cap,

said cam means is integral with said cap and is connected to said cap by a flexible web.

6. A dispensing closure as claimed in claim 1 wherein:

said cap has a top formed with a groove therein, said spout is mounted on said cap so as to fit entirely within said groove when said spout is in said closed position,

said cap includes a skirt which is dependent from said top,

said groove extends from the center of said top to said skirt,

said cam means is integral with said cap and is connected to said cap by a flexible web which extends upwardly from the bottom of said groove adjacent to said skirt,

said cap and said cam means include cooperating retainer means holding said cam means within said groove adjacent to said skirt so that said cam means is capable of being rotated about said web means,

said spout includes an extension and a cam follower means is located on said extension,

said cam follower means engaging said cam means when said spout is in said closed position and being capable of transmitting motion to said spout so as to rotate said spout so that it extends above said top to a sufficient extent so that it can be manually engaged to be rotated to an open position by movement of said cam means towards said spout within said groove.

7. A dispensing closure as claimed in claim 6 including:

detent means on said spout and in said groove for holding said spout within said groove in said closed position against movement of said spout caused by inadvertent movement of said cam means.

8. A dispensing closure having a cap with an opening extending therethrough and means for securing said cap to a container located around said opening and having a spout rotatably mounted thereon so as to be capable of being rotated between an opened position in which said spout is in alignment with said opening and a closed position in which said spout seals off said opening in which the improvement comprises:

said spout being located on said cap so as to be normally incapable of being manually engaged so as to be rotated from said closed position to said open position,

a cam means movably mounted on said cap so as to be capable of being moved relative to said spout when said spout is in said closed position,

said cam means having a cam surface thereon which engages said spout when said spout is in said closed position and when said cam means is moved towards said spout so as to rotate said spout so that said spout is moved from said closed position to project from said cap to a sufficient extent that it can be manually engaged so as to be rotated to said open position.

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