

[54] CONTAINER AND SAFETY CAP

[76] Inventor: Edward G. Akers, 3177 Park Ln.,
Apt. 239, Dallas, Tex. 75220

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[51] Int. Cl. B65d 55/02; B65d 85/56; A61j 1/00

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Primary Examiner—George T. Hall

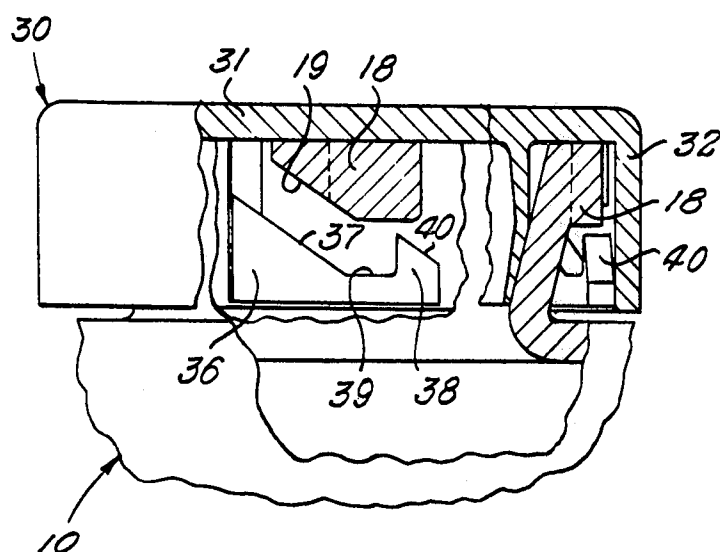
Attorney, Agent, or Firm—Peter J. Murphy

[57] ABSTRACT

A container has a neck defined by a cylindrical wall

having a planar lip and a frusto-conical interior surface, with the neck opening reducing in diameter toward the interior of the container. The safety cap is cup-shaped having a planar top wall and cylindrical side wall, and having an inner dependent cylindrical skirt concentric with the side wall, the skirt being resilient and disposed to engage the container conical wall in assembled relation. Coacting ratchet lugs extend from the external surface of the container wall and the internal surface of the cap side wall, and are normally urged into engagement to prevent relative rotation of the container and cap by the spring action of the cap skirt and container conical wall. The ratchet lugs have coacting inclined cam surfaces which, in response to rotation of the cap in one direction, force axial inward movement of the cap to move its top wall contiguous to the container lip; and the container wall and cap have interfering latch means which inhibit reverse rotation from this contiguous position.

9 Claims, 6 Drawing Figures



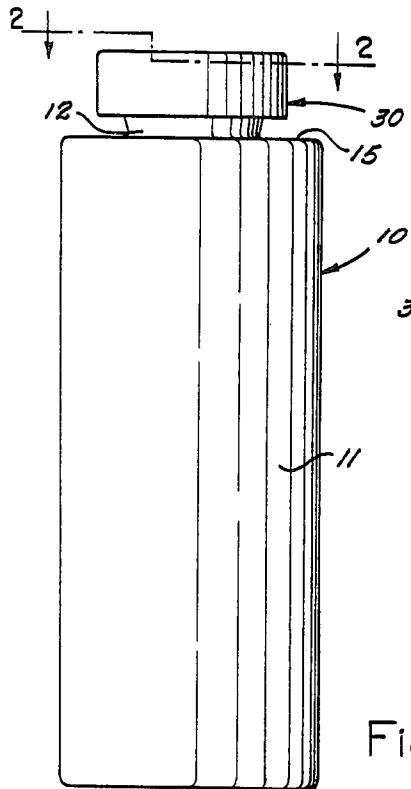


Fig. 1

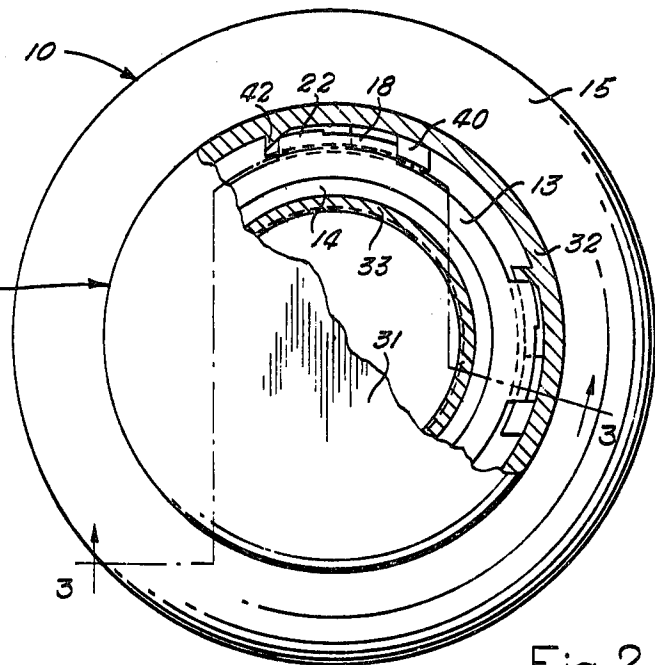


Fig. 2

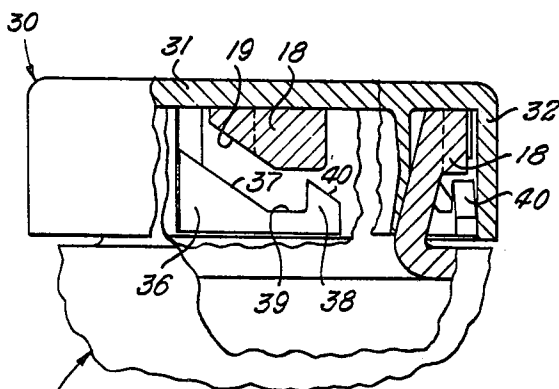


Fig. 4

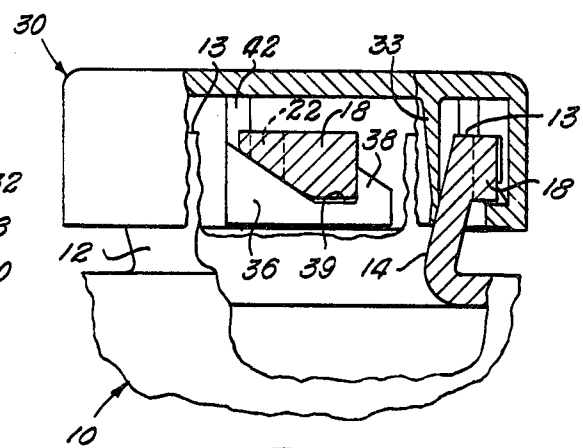


Fig. 3

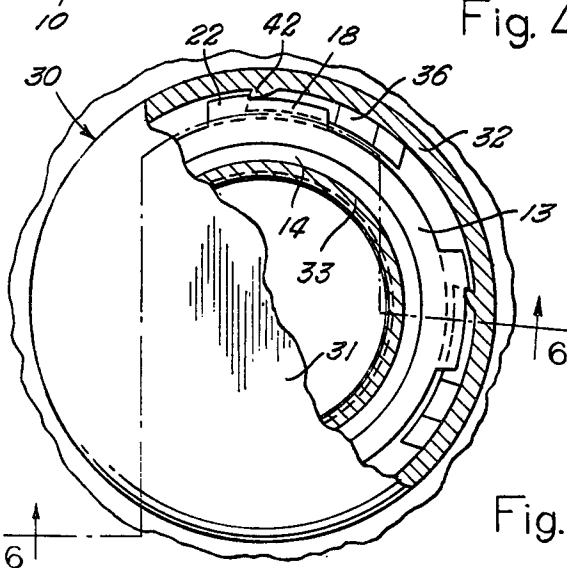


Fig. 5

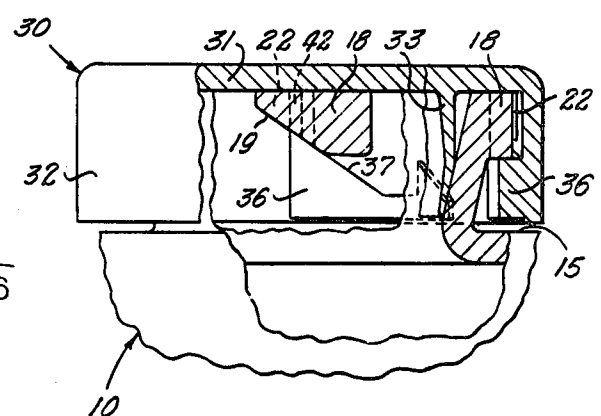


Fig. 6

CONTAINER AND SAFETY CAP

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to a container and safety cap designed to prevent inadvertent opening of a container for items such as dangerous drugs, and primarily to prevent or inhibit the opening of such containers by young children.

This invention is an improvement of the safety cap and container which is the subject of my copending patent application Ser. No. 710,032 filed Mar. 4, 1968. In the assembly described in that application, when the cap is in the "secured" condition on the container, the cap top wall is necessarily spaced from the container lip; and, while the cap is secured against inadvertent removal by a child, the cap is relatively loose on the container in the sense that it may rock relative to the container lip. This relatively loose fit of the cap and container is a disadvantage in connection with packaging and shipping of filled containers, and also in connection with the storage of the containers on shelves at distributions outlets. In connection with the packaging, where the containers are stacked in end-to-end relation, these container assemblies will occupy more space and require a larger package. In connection with shelf storage, where it is desired to stack container assemblies in end-to-end relation, the tendency of the cap to rock will make such stacking difficult and prevent the maximum use of storage space. It is desirable then, to lock the cap in a rigid "storage" condition with the container for more efficient packaging and storage.

An object of this invention therefore is to provide an improved container and safety cap assembly which inhibits inadvertent opening of the assembly by small children.

Another object of this invention is to provide an improved container and safety cap assembly which enables assembly of the cap to the container in a rigid manner to facilitate packaging for shipping and efficient storage.

A further object of this invention is to provide such improved container and safety cap assembly wherein the parts can be manufactured efficiently and economically using relatively high speed inexpensive injection molding techniques.

Still another object of this invention is to provide an improved container and safety cap assembly wherein the assembly is adequately sealed both in the "secured" condition and in the "storage" condition.

These objects are accomplished in a combination container and safety cap therefor, wherein the container has a top opening defined by a generally cylindrical wall having a planar outer lip.

The cap has a generally planar top wall and a dependent generally cylindrical side wall. Coacting ratchet means are provided on the external surface of the container wall and on the internal surface of the cap side wall. These ratchet means are normally engaged when the cap is positioned on the container so as to prevent relative rotation; with the ratchet means being normally maintained in engagement through spring means associated with the cap and coacting with the container. The improvement consists in the coacting ratchet means including coacting cam surfaces which are inclined relative to a plane perpendicular to the axis of rotation. These cam surfaces, in response to relative

rotation of the cap and container in one direction, effect movement of the cap axially to position the cap top wall contiguous to the container lip. Additional coacting interfering latch means are provided on the cap and on the container to inhibit reverse rotation of the cap from the contiguous position.

The novel features and the advantages of the invention, as well as additional objects thereof, will be understood more fully from the following description when read in connection with the accompanying drawings.

DRAWINGS

FIG. 1 is an elevation view of a container and cap assembly;

FIG. 2 is a plan view of the assembly with the cap partially broken away to show the relationship of parts in the "secured" condition;

FIG. 3 is a partial elevation and sectional view, with the sectional portion viewed along the line 3—3 of FIG. 2;

FIG. 4 is a partial elevation and sectional view, similar to FIG. 3, showing a relationship of the container and cap during assembly and disassembly;

FIG. 5 is a plan view of the assembly with the cap partially broken away to show the relationship of parts in the storage or shipping condition; and

FIG. 6 is a partial elevation and sectional view, similar to FIG. 3, with the sectional portion viewed along the line 6—6 of FIG. 5.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The drawings illustrate an assembly of a container 10 and safety cap 30. Both the container and cap may conveniently be manufactured out of various commonplace polymers or plastic, such as are commonly used in the manufacture of various other related containers and closures. It is preferred that the container be manufactured out of a comparatively rigid material. If desired this container can be manufactured of glass or various other similar material. It is preferred to manufacture the cap 30 as a unitary article out of a somewhat resilient material such as various grades of polyethylene or polypropylene, for example, in order to achieve the desired coacting operation of the container and safety cap assembly.

The container 10 is shown in FIG. 1 as having a generally cylindrical body 11 with a flat bottom; however the shape of the body is of no importance except in regard to the stacking of container assemblies as will be described. The container is shown as having a reduced diameter neck portion 12 defined by a generally cylindrical wall; however the so-called neck 12 could actually be an extension of the body 11. The upper or outer lip 13 of the wall 12 lies in a plane perpendicular to the longitudinal axis of the container; and the interior surface 14 of the wall 12 is frusto-conical defining a neck opening which is larger in diameter adjacent to the lip 13 and reduces to a smaller diameter towards the interior of the container.

The exterior surface of the wall 12 is provided with four ratchet lugs 18 which project radially outward from the wall adjacent to the lip 13. These lugs are spaced from each other a sufficient distance to accommodate coacting ratchet lugs of the cap, to be described; and the lugs are spaced axially on the wall 12 a sufficient distance from the body shoulder 15 for co-

action with the cap lugs as will be described. The ratchet lugs 18 are peripherally elongated and each includes, at its leading end, an inclined cam surface 19 facing toward the interior of the container. The leading ends of the lugs, then, are wedge-shaped. The references to leading and trailing ends of the lugs 18, and of the cap lugs to be described, are made with respect to relative clockwise rotation of the parts.

The safety cap 30 is generally cup-shaped, defined by a flat top wall 31 and a generally cylindrical side wall 32. The cap is also provided with a dependent generally cylindrical interior wall or skirt 33 which is spaced from the side wall 32 and concentric therewith. The skirt 33 is relatively thin in cross-section and may taper to a thinner section toward the lip thereof so as to be relatively flexible and yielding.

The cap 30 is provided with four ratchet lugs 36 which project radially inward from the side wall and are equally spaced about the periphery of the side wall. These lugs 36 are peripherally elongated, and are disposed adjacent to the lip of the side wall and axially spaced from the top wall 31. Each lug 36 includes at its leading end a pawl tip 38 directed toward the top wall 31, and extends toward the top wall at its trailing end to define an inclined cam surface 37 facing the top wall for coacting engagement with the container lug cam surface 19. The pawl tip 38 and cam surface 37 define a recess 39 for receiving and rotationally confining the coacting ratchet lug 18 of the container. The cam surfaces 37 and the top wall 31 define wedge shaped recesses for limiting relative rotation of the parts as will be described. The pawl tip 38 is provided with an additional upward facing cam surface 40 in a plane generally parallel to the cam surface 37, the cam surface 40 also coacting with a container cam surface 19.

In assembling the cap 30 to the container 10, the cap is placed axially over the wall or neck 12 with the skirt 33 being received within the wall lip 13, and with the cap lugs 36 being positioned to move into the spaces between the container lugs 18. The parts are dimensioned so that when the lower lip of the cap skirt 33 initially engages the container surface 14, the container and cap lugs are located in generally side-by-side relation around the periphery with the cap lug cam surfaces 40 positioned to engage the container lug cam surfaces 19.

To attain the "secured" condition, the cap must be urged axially toward the container and simultaneously rotated clockwise. This further inward movement of the cap is resisted by a spring action of the skirt 33, which occurs because the skirt is necessarily deflected radially inward by the tapered wall surface 14; and this spring action then normally urges the cap away from the container. The above mentioned axial force may be applied manually by hand or finger pressure; and FIG. 4 illustrates the condition where the cap has been urged forcefully toward the container and rotated clockwise partially wherein the pawl tip 38 clears the lower face of the container lug 18. Alternatively, with simple clockwise rotation, the tip cam surfaces 40 engaging and coacting with the container cam surfaces 19 will provide the necessary axial force to permit the rotation to the "secured" condition. This "secured" condition is illustrated in FIGS. 2 and 3 wherein the cap is released to permit engagement of the lugs 18 within the cap lug recesses 39. In this condition, counter-clockwise rotation is prevented by the locking engage-

ment of the vertical surfaces of the lugs 18 and pawl tips 38. Excess clockwise rotation is limited by the fact that the container lugs 18 will become wedged in recesses defined between the cap lug surfaces 36 and the top wall 31. It will be noted that, with the skirt 33 being continuous and imperforate as illustrated, a tight seal is defined between the skirt and the frusto-conical surface 14.

To disengage the cap from the "secured" condition, the cap must be urged toward the container with considerable force by hand pressure and simultaneously rotated counter-clockwise to disengage the pawl tips 38 from the container lugs 18, again as illustrated in FIG. 4. The design of the parts is such that young children will normally not be able to exert the required axial force to disengage the lugs; and therefore will not be able to remove the cap from the container.

As seen in FIG. 3, in this "secured" condition of the assembly the top wall 31 of the cap is spaced from the container lip 13; and the cap 30 is therefore somewhat loosely retained on the container, in a relative sense, even though the cap is secured against rotation and the skirt 33 defines the full seal with the wall surface 14. The cap is loose in the sense that it is relatively easy to deflect or rock the cap relative to the container by pressing on one side of the cap top surface. This rocking is undesirable from the standpoint of stacking container assemblies one on top of the other for shelf storage. Additionally, in this secured condition, the assembly of container and cap occupies more axial space than it would occupy were the cap top wall secured contiguous to the container lip; and therefore a larger package is required for shipping container assemblies in axially stacked relation.

According to the invention the container and cap include coacting latching means for securing the parts in a "storage" condition, illustrated in FIGS. 5 and 6, wherein the cap top wall 31 is positioned contiguous to the container lip 13. For moving the cap to the "storage" condition the cap is rotated clockwise from the "secured" condition of FIG. 2 and 3; and the coacting ratchet lug cam surfaces 19 and 37 will effect axial movement of the cap toward the container lip to bring the members into the contiguous relation. When this occurs, of course, the skirt 33 is deflected to a greater extent opposing this axial movement. This rotational movement is limited by wedging engagement of the lugs 18 in the confining recesses defined by the cap cam surfaces 37 and the top wall, as best seen in FIG. 6; and in this condition the container lug leading ends extend beyond the cap lug trailing ends.

To lock the cap in this position, the bottle lugs 18 are provided with radially projecting bosses 22, best seen in FIGS. 2 and 5, at the leading ends which project beyond the cap lugs 36. The cap 30 is provided with axial ribs 42 which extend between the lugs 36 and the cap top wall 31 at the trailing ends of the lugs. The parts are dimensioned so that bosses 22 and ribs 42 interfere radially with each other and, when the cap is rotated to the "storage" condition relative to the container, the ribs 42 move past the bosses 22 and lock behind the bosses so to speak. This interfering relation of the bosses and ribs then inhibits the reverse or counter-clockwise rotation of the cap relative to the container which is urged by the spring action of the skirt 33. Since the cap, at least, is fabricated of a relatively resilient plastic material, counter-clockwise rotation of the

cap to release it from the storage condition is accomplished merely by forcing the ribs 42 over and past the bosses 22.

What has been described is an improved assembly of container and safety cap having the feature of inhibiting removal of the cap from the container to prevent opening of the container by young children, and having the further feature of enabling further closure of the cap to a "storage" condition to facilitate shipping and storage of filled containers.

In the "storage condition" the imperforate skirt is urged more tightly into sealing relation with the frusto-conical neck surface, and an additional seal is provided at the contiguous planar surfaces of the container top and cap wall.

While the skirt 33 has been described as a continuous imperforate wall to perform a sealing function with the conical surface 14, it will be apparent that this skirt could be divided into radial segments and perform the described spring function without the sealing function.

While the preferred embodiment of the invention has been illustrated and described, it will be understood by those skilled in the art that changes and modifications may be resorted to without departing from the spirit and scope of the invention.

What is claimed is:

1. A container and safety cap therefore; said container having a top opening defined by a generally cylindrical wall having a planar outer lip; said cap having a generally planar top wall and a dependent generally cylindrical side wall; and coacting ratchet means on the external surface of said container wall and on the internal surface of said cap side wall respectively, being normally engaged when said cap is positioned on said container and rotated in one direction so as to prevent relative rotation in the other direction; said ratchet means being normally maintained in engagement by spring means associated with said cap coacting with said container; wherein the improvement comprises:

said coacting ratchet means including coacting cam surfaces inclined relative to a plane perpendicular to the axis of relative rotation; said cam surfaces, responsive to further rotation of the cap in said one direction, effecting movement of said cap axially to position said cap top wall contiguous to said container lip; and coacting interfering latch means disposed on a cap wall interior surface and said container wall exterior surface respectively to inhibit reverse rotation of said cap from said contiguous position.

2. A container and safety cap as set forth in claim 1

said coacting latch means comprising radially interfering members disposed on said cap side wall interior surface and said container wall exterior surface respectively.

3. A container and safety cap as set forth in claim 1 said cap being a unitary member.

4. A container and safety cap as set forth in claim 1 said cap being a unitary member fabricated from a relatively rigid, resilient plastic material.

5. A container and safety cap as set forth in claim 1 said coacting ratchet means comprising a plurality of peripherally spaced radially projecting lugs disposed on the external surface of the container cylindrical wall adjacent to the lip thereof, and a corresponding plurality of peripherally spaced radially projecting locking lugs disposed on the internal surface of said cap side wall and axially spaced from the top wall thereof;

said cap lugs each forming a recess facing the top wall thereof, said recess being defined by said inclined cam surface and a pawl tip; and the respective container lugs being urged into said cap lug recesses to inhibit relative rotation of the cap and container.

6. A container and safety cap as set forth in claim 5 said coacting latch means comprising radially interfering members consisting of an axial rib associated with each cap lug and extending between said lug and the cap top wall, and a boss projecting radially from each container lug in interfering relation with a respective cap rib.

7. A container and safety cap as set forth in claim 5 said cap lug cam surfaces and said top wall defining recesses limiting movement of the container lugs in said one direction.

8. A container and safety cap as set forth in claim 1 said wall having an internal frusto-conical surface adjacent said outer lip and defining an opening which reduces in diameter from said lip toward the interior of said container;

means defining a dependent generally cylindrical resilient inner skirt concentric with the cap side wall; said skirt means being engageable with said frusto-conical surface and being deflected inwardly thereby to define said spring means.

9. A container and safety cap as set forth in claim 8 said inner skirt means being defined by a resilient thin imperforate cylindrical wall; and said skirt means defining a continuous peripheral seal between said container opening and said cap.

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