

[54] SAFETY VIAL AND CAP THEREFOR

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[52] U.S. Cl. .... 215/211; 215/216; 215/224

[51] Int. Cl.<sup>2</sup> ..... B65D 55/02

[58] Field of Search ..... 215/9, 211-216, 215/206, 355, 224

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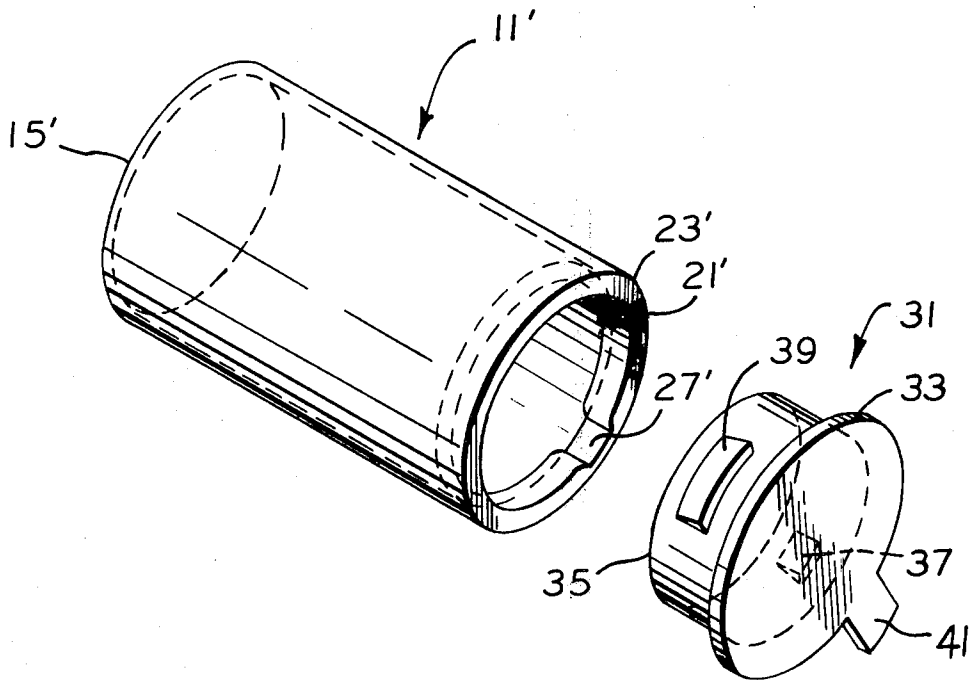
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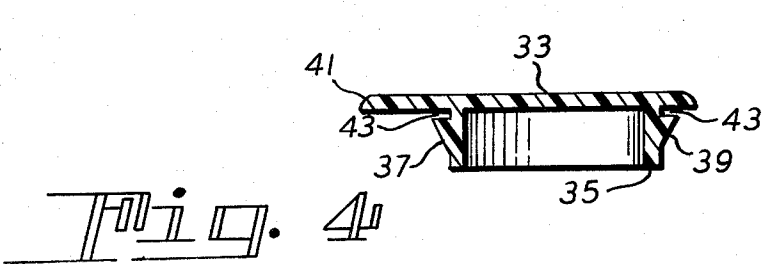
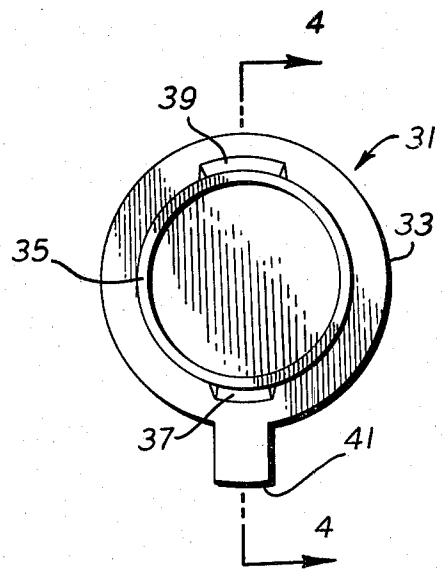
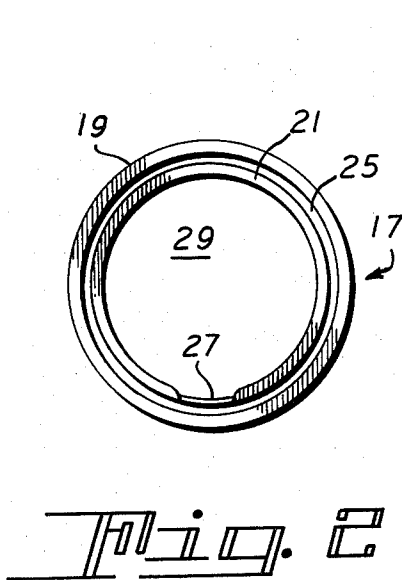
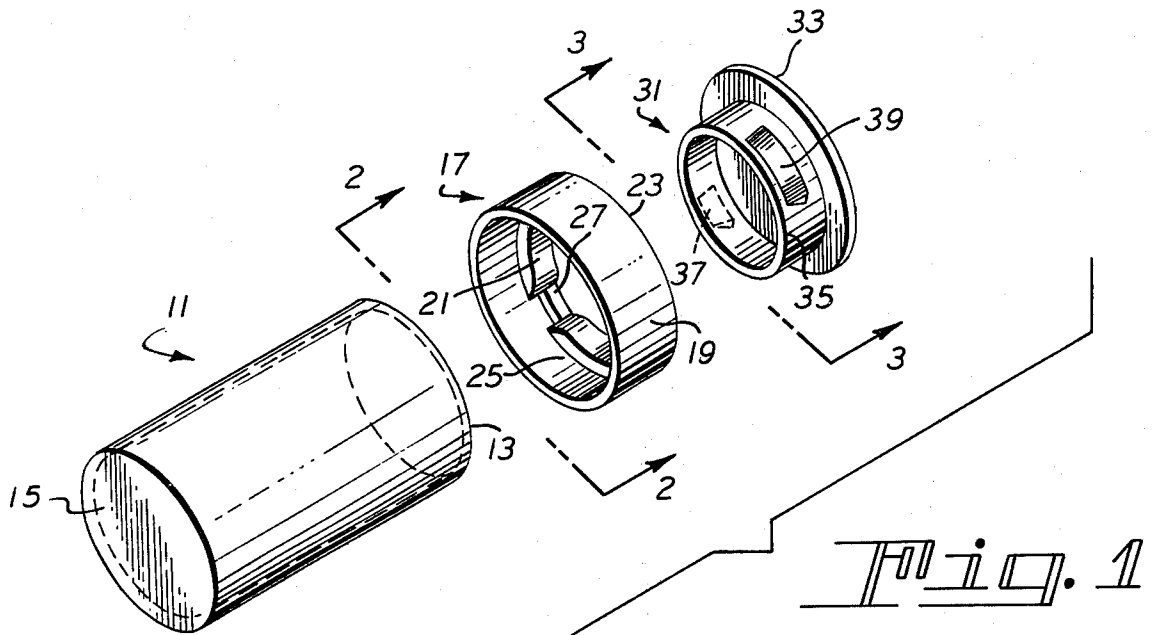
[57] ABSTRACT

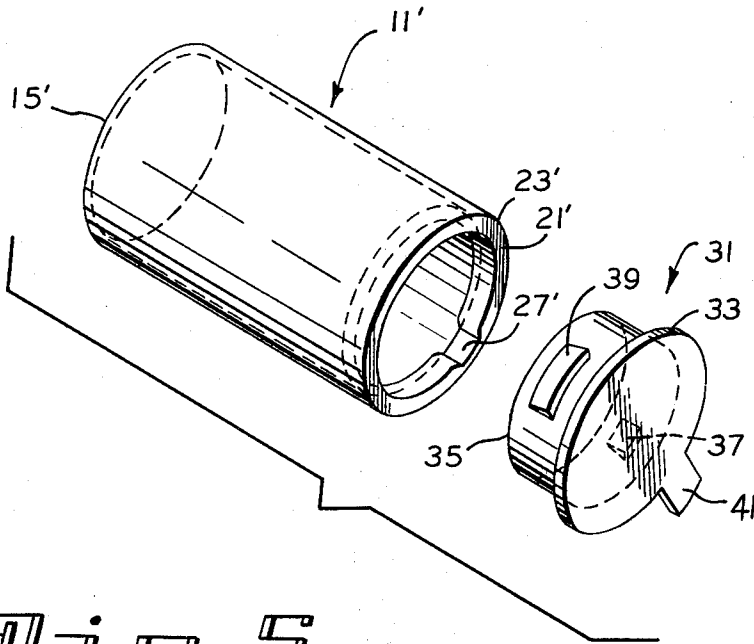
A safety vial and cap therefor, preferably of resilient

plastic material, designed to prevent the inadvertent opening and usage of stored medicines by, for example, young children. The cap has a radially outward projecting cammed locking surface over a portion of its radius, the cap being substantially of a plug type. The cap further has an additional outwardly extending locking lug portion of small angular dimension opposed to the aforementioned outwardly projecting cammed surface. The top of the vial includes an inwardly projecting ribbed section extending around the inner circumference thereof, with a slotted opening therein of substantially the same dimension as the second outwardly projecting locking member of the plug-in cap. Once the cap is inserted into the vial it is necessary to bring the second outwardly projecting locking lug into registry with the slot in the top rib of the vial to permit upward movement of the cap through the slot therein. This will, in addition to locking the cap on the vial to prevent inadvertent opening thereof, further require that the cap be moved into exact registry to permit desired opening. Furthermore, once the cap is inserted onto the vial, except for the slightly extended tab, there are no projections outside the circumference of the cap which would make it possible for someone to forcibly remove the cap from the vial.

3 Claims, 5 Drawing Figures







*Fig. 5*

## SAFETY VIAL AND CAP THEREFOR

### CROSS REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of application Ser. No. 413,922, filed Nov. 8, 1973, now U.S. Pat. No. 3,845,874.

### BACKGROUND OF THE INVENTION

This invention relates generally to safety enclosures and more particularly to a new and improved safety vial with a plug type cap which is particularly adapted to prevent inadvertent opening of the vial by young children.

Numerous safety vials and caps therefor have been generated in the past few years, especially in view of the requirement to avoid having medicines, pills and the like inadvertently taken by younger children. While these types of structures have gone a long ways toward the accomplishment of this objective, they have not been totally successful because of the fact that in almost all causes the bottom portion of the cap has extended outward beyond the sides of the vial container, thereby providing a surface against which pressure can be exerted, such as for example, by a bottle opener, knife and the like, to permit a relatively easy forced opening of the vial. That is, most of the prior art safety caps and vials have been of the snap on type cap closure, and of necessity being constructed of a resilient material, have thereby been susceptible to being opened by the exertion of relatively minor amounts of force, such as could easily be exerted by a young child.

### OBJECTS AND SUMMARY OF THE INVENTION

Therefore, it is a principal object of this invention to provide a safety vial with a snap cap which overcomes the aforementioned disadvantages of prior art devices.

A further object of the invention is to provide a safety vial with a cap having proscribed safety features, yet which may be easily opened by proper manipulation thereof.

Yet another object of the invention is to provide a safety vial with a plug type cap of relatively economic design.

The foregoing and other objects and advantages of the invention are accomplished according to one embodiment by providing a vial the top of which has an inwardly projecting annular ring with a slot cut in a small angular portion thereof. The plug type cap has an annular cammed surface outwardly projecting from one portion thereof, and a small annular outwardly projecting second cammed surface opposed thereto, the second cammed surface adapted to be aligned with the slot cut in the ring at the top of the vial. The top of the cap is spaced slightly apart from the outwardly extending cammed surfaces to thereby provide a closure seal when the cap is snapped into engagement with the ring extending inwardly on the top of the vial. A small locating tab is spaced on the outer circumference of the cap to facilitate alignment of the opening in the annular ring of the vial.

### DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded perspective view of a safety vial and plug-in type closure cap in accordance with the present invention;

FIG. 2 is a bottom plan view of the double ring shaped member 17 taken along lines 2—2 of FIG. 1;

FIG. 3 is a bottom plan view of the plug type cap taken along lines 3—3 of FIG. 1;

FIG. 4 is a side view of the plug type cap taken along lines 4—4 of FIG. 3; and

FIG. 5 is an exploded perspective view of an alternate embodiment of a safety-vial and plug-in type cap in accordance with the present invention.

### DESCRIPTION OF THE PREFERRED EMBODIMENT

For a better understanding of the present invention, together with other and further objects and advantages thereof, reference is made to the following detailed description taken in conjunction with the above-described drawings.

Referring first to FIG. 1, the improved safety vial and cap therefor includes a generally cylindrical container 11 open at the top 13 and closed at the bottom 15. The container 11 is preferably made of a transparent generally rigid plastic material. A double ring shaped member 17 is adapted to be fitted over the top of the container and has an outer depending ring shaped portion 19, the inner diameter of which is approximately equal to the outer diameter of the container 11. The member 17 also includes an inner depending ring shaped portion 21 which has an outer diameter approximately equal to the inner diameter of the container 11. The two ring portions 19 and 21 are joined at the top 23 to form therebetween a groove 25 into which the top 13 of the container 11 may be inserted and properly affixed, such as by sonic or spin welding, gluing, etc. The double ring shaped member is preferably made of a moldable plastic material and should be of a material that readily bonds or adheres to the material of the container 11.

The inner ring section 21 has a portion 27 removed therefrom or a gap therein, the purpose of which will become readily apparent in the subsequent description of the cap adapted to be inserted in the opening 29 in the top of the member 17. Referring to the bottom view in FIG. 2 of the member 17 taken along the axis 2—2 of FIG. 1, there is shown more clearly the relationship between the outer depending ring shaped portion 19 and the inner depending ring shaped portion 21 defining therebetween the groove 25 into which the top 31 of the container 11 is adapted to be inserted.

As shown in FIG. 1, the depth of the inner depending ring member 21 is less than that of the outer depending ring shaped member 19. In an alternate configuration (not shown) the inner depending ring shaped member 19 can be eliminated so long as the top 23 of the member 17 extends inwardly of the top edge 13 of the container 11. In this alternate embodiment, the gap 27 would be in a portion of the top 23 extending inwardly of the top edge 13 of the container 11.

Continuing to refer to FIG. 1, the cap 31, preferably made of resilient plastic material for the container includes a generally circular top portion 33 having an outer diameter approximately equal to the outer diameter of the outer depending ring shaped portion 19 of member 17. Depending from the bottom of the top 33 is a generally ring shaped or hollow cylindrical member 35 having an outer diameter of the ring shaped portion 21 of member 17. Extending outwardly from the outer wall of the member 35 are first and second tabs 37 and 39 respectively, being approximately oppositely disposed on the outer wall of the member 35. The tab 37

has an angular displacement approximately equal to the notch or opening 27 in the top of the member 17. The tab 39 preferably encompasses an angular displacement of between 90° and 180°, although other angular displacements may be used depending upon the resiliency of the material of which the cap 31 is made. Referring to the view of FIG. 3, it is seen that the cap 31 additionally has a protuberance or locator tab 41 extending outwardly from the top 33, which locator tab has an angular relationship approximately equal to that of tab portion 37. This locator tab 41, of course, extends beyond the outer diameter of member 17 when the cap is inserted in the opening 29 in member 17.

Referring next to FIG. 4, according to a preferred embodiment of the invention, the tabs 37 and 39 are angled inwardly from top to bottom to facilitate insertion of the cap in the opening even though tab 37 may not be in alignment with the slot 27 in member 17. Also, as illustrated in FIG. 4, there exists a spacing 43 between the top of tab members 37, 39 and the top portion 33 of the cap 31. This spacing 43 should be approximately equal to the depth of the inner depending ring shaped portion 21 of member 17.

In operation, as previously mentioned the member 17 is suitably affixed to the top of the container 11, leaving an opening 29 into the container adapted to receive the cap 31. The cap is inserted into the opening 29 by placing the downward portion of member 35 into the opening and applying pressure to the top of the cap 33. Because of the tapered configuration of the tabs 37, 39 and the generally resilient material of the cap, only a moderate pressure or force is required to insert the cap into the container to suitably seal it. Once inserted, the tops of the tabs 37, 39 become disposed beneath the bottom of the inner depending ring shaped portion 21 of member 17, thus making it virtually impossible without the exertion of considerable force to remove the cap from the container so long as the tab 37 is not in alignment with the notch 27 in member 17. However, if the tab 37 is in alignment with the notch 27 only a moderate upward pressure is required to remove the cap from the container since the tab 37 passes through the slot 27 and the resiliency of the cap material permits an inward compression of the walls of the cylindrical portion 35 of the cap 31.

According to an alternate embodiment of the invention, as illustrated in FIG. 5, the inner ring shaped portion 21' can be formed as an integral part of the top of the cylindrical vial 11', that is, it can be formed in the same mold and at the same time as the vial body 11' is formed. When an injection molding process is used, it may be desirable to add the bottom 15' to the cylindrical vial 11' in a step after the vial and inner depending ring 21' are formed. In this manner a suitable opening is provided in the bottom to facilitate removal of the mold. Alternatively, if a blow molding technique is used, it is, of course, possible to form the entire vial 11', inner depending ring 21' and bottom 15' in a single

step.

It should be noted that the embodiment of FIG. 5 is functionally equivalent to the embodiment shown in FIGS. 1-4. Physically the embodiment of FIG. 5 differs from that in FIGS. 1-4 only in that the outer depending ring portion 19 of FIGS. 1-4 is unnecessary in the embodiment of FIG. 5. Also, the outer diameter 33 of the cap 31 of FIG. 5 will be approximately equal to the outer diameter 23' of the vial 11'.

It will also be apparent to those skilled in the art that the shape of the vial 11 (and cap 31) need not be restricted to the generally circular cross-section shown in FIGS. 1-5. The shape could be oval or even square or rectangular should the need or design preference arise.

Therefore, while the invention has been shown and described in conjunction with the description of a preferred embodiment, it is not intended that the invention be limited to the specifics thereof, but rather is to embrace the full scope of the appended claims.

What is claimed is:

1. A safety vial and cap therefor, comprising in combination:

a hollow container having generally uniform wall thickness, the top of said container being open and including an inner depending rim shaped portion of a given depth around the inner diameter thereof, said inner depending rim shaped portion having a slot therein;

a plug type cap comprising an upper portion having a diameter approximately equal to the outer diameter of said container and a lower portion depending from said top portion and having an outer diameter approximately equal to the inner diameter of the inner depending rim shaped portion of said container, further including a first protuberance on the outside of the lower portion of said plug type cap, said first protuberance having a dimension equal to or less than the dimension of the slot in said inner depending rim shaped portion of said container, and a second protuberance on the lower portion of said plug type cap, oppositely disposed with respect to said first protuberance and having a dimension greater than the dimension of the slot in said inner depending rim shaped portion of said container.

2. The invention according to claim 1 wherein said protuberances are tapered so that at the bottom thereof, the protuberances merge into the bottom of the lower portion of said plug type cap and wherein the space between the top of each protuberance and the bottom of the upper portion of said plug type cap is approximately equal to the depth of the inner depending rim shaped portion of said container.

3. The invention according to claim 1 wherein said container is closed at the bottom and wherein said container including its bottom and the inner depending rim shaped portion thereof are formed as an integral unit.

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