Jan. 16, 1962 J. L. POWELL 3,017,049

SAFETY CLOSURE FOR CONTAINERS

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Fig. 1

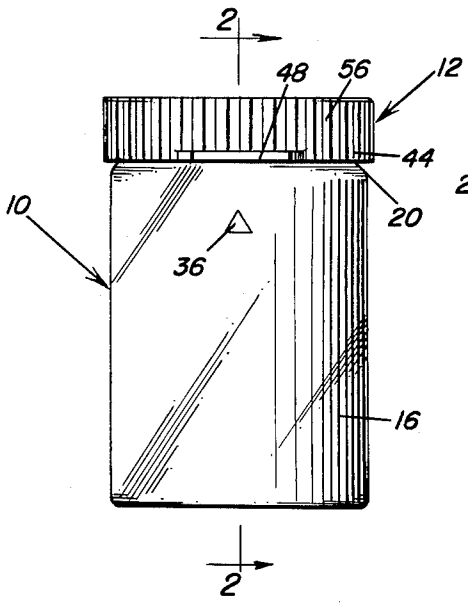


Fig. 2

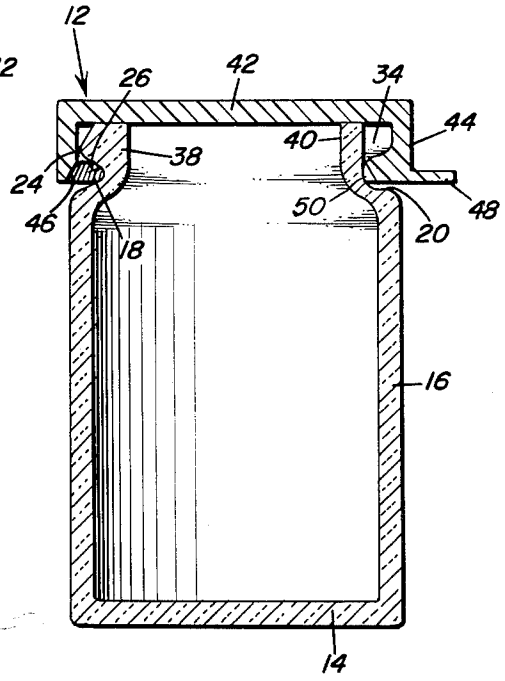


Fig. 3

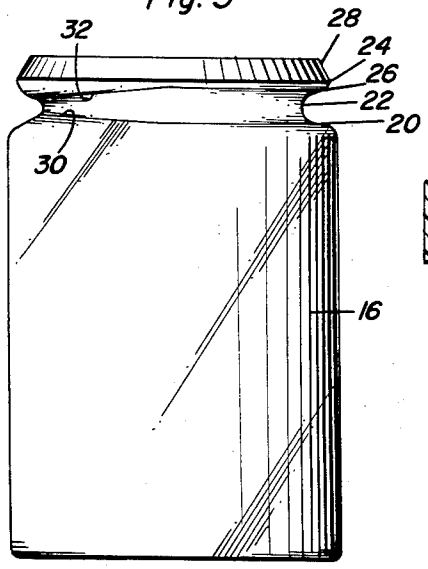
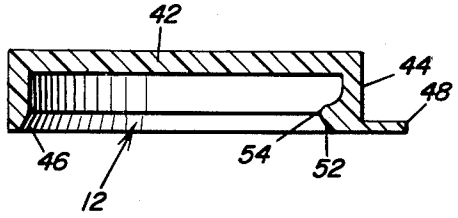


Fig. 4



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SAFETY CLOSURE FOR CONTAINERS

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Fig. 5

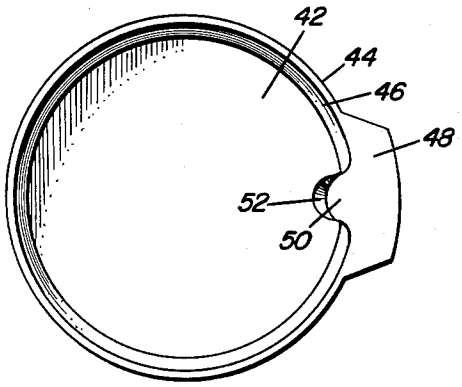


Fig. 6

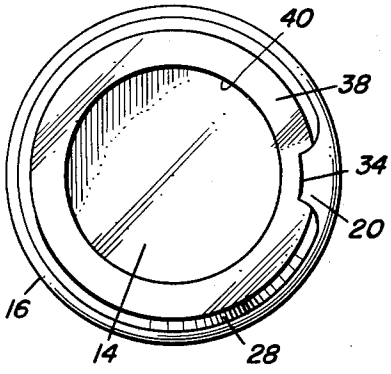


Fig. 7

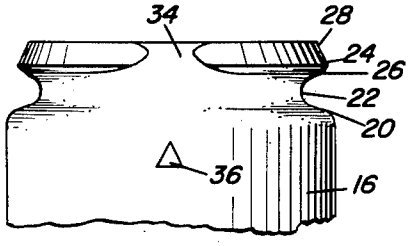


Fig. 8

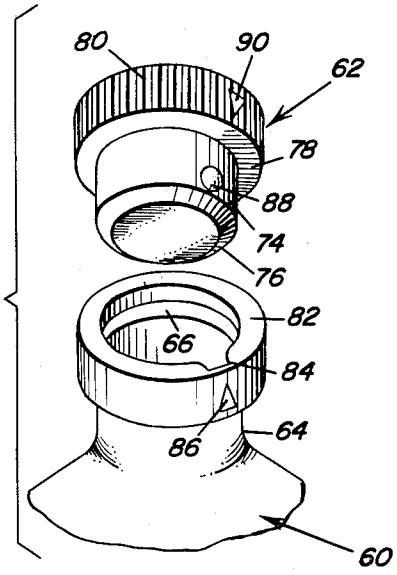
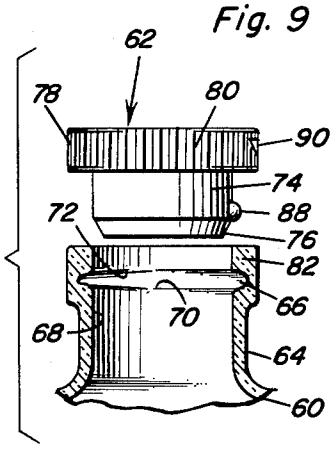


Fig. 9



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3,017,049

SAFETY CLOSURE FOR CONTAINERS

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Filed Feb. 19, 1959, Ser. No. 794,397
3 Claims. (Cl. 215—44)

The present invention generally relates to closures for containers and more particularly safety closures for containers which contain harmful substances such as poisons, drugs or the like.

One of the major causes of death and serious illness of children is the consumption of harmful substances such as poisons, drugs, overdosage of various types of pills and medicines and similar materials. Children, of course, are notoriously inquisitive and parents quite frequently store harmful substances where children can have access to the containers. Presently, such containers are closed by a screw threaded cap or a press-on frictionally held type of plastic top. Both of these closures contain only a single operation which is readily solved even by a small child. Therefore, it is the primary object of the present invention to provide a safety closure which is based on a combination of safety features which requires that enough physical strength must be used to turn the cap, the cap must then be stopped in an exact spot and the cap then must be pushed up and removed thus requiring a combination of movements any one of which may be sufficient but the combination of all three providing a highly successful safety closure which will thwart the most diligent child in his attempt to have access to the contents of the container.

Another object of the present invention is to provide a safety closure cap which may be employed on and in conjunction with various types of automatic machinery for capping the containers when they are initially filled thus retaining the cost of the safety closures to a desirable minimum.

Another important object of the present invention is to provide a safety closure for containers which may be in the form of a cap which telescopes over the neck of the container or a stopper which telescopes into the neck of the container with the principles of operation remaining substantially the same.

The present invention incorporates a container having a neck with a peripheral projecting flange thereon with the flange having an interrupted portion and with the groove below the flange having tapering or converging walls. The cap or stopper is provided with a projecting lug or tab which is movable vertically in relation to the omitted part of the flange by overcoming the frictional engagement between the remainder of the cap or stopper and the flange such as the type of force required to remove a conventional press-on plastic top or stopper. When the lug has passed through the omitted part of the flange, the cap or stopper may be rotated a portion of a turn until such time as the converging walls of the groove frictionally bind the lug to prevent further rotation thereof and to prevent reverse rotation towards an unlocked position unless a considerable physical force is exerted thereon.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a side elevation of a container with the safety closure cap of the present invention disposed thereon;

FIGURE 2 is a vertical sectional view, on an enlarged scale, taken substantially upon a plane passing along section line 2—2 of FIGURE 1;

FIGURE 3 is a side elevation of the container illustrating the convergence of the walls of the groove;

FIGURE 4 is a sectional view of the safety cap illustrating the construction thereof;

FIGURE 5 is a bottom plan view of the closure cap;

FIGURE 6 is a top plan view of the container;

FIGURE 7 is a partial side elevation of the container illustrating the omitted portion of the peripheral flange;

FIGURE 8 is an exploded group perspective view illustrating a modified form of the invention in which a stopper is used for closing the neck or a bottle by insertion into the neck; and

FIGURE 9 is an exploded side elevation of the container and stopper assembly of FIGURE 8 with the neck of the container in section and the stopper in elevation.

Referring now specifically to the drawings, the numeral 10 generally relates to a container and the numeral 12 generally relates to a closure cap therefor.

The container 10 includes a circular bottom 14 and a cylindrical peripheral wall 16. Adjacent the upper end of the cylindrical wall 16, the wall flares inwardly as indicated by the numeral 18 thus forming a shoulder or lower edge 20 for a peripheral groove 22. Above the groove 22, there is a peripheral flange 24 having an inwardly flared curved portion 26 forming the top edge of the groove 22 with the upper portion of the flange 24 tapering inwardly as at 28 generally in a frusto-conical shape.

As illustrated in FIGURE 3, the edges or walls 20 and 26 of the groove 22 converge towards each other slightly with the converging walls being designated by the numerals 30 and 32 respectively. The convergence of walls 30 and 32 occurs on both sides of the container 10 and is generally equally spaced from a vertical groove or slot 34 formed by an omission of the flange 24 whereby the bottom of the groove 22 continues vertically upward to the top edge of the container 10. The wall 16 is provided with a generally triangular shaped projection 36 immediately below the slot or groove 34 and generally has a pointed corner directed towards the slot or groove 34 for indicating this area of the flange 24. The end edges of the flange which form the slot or groove 34 are tapered and rounded as clearly illustrated in FIGURE 7 and also in FIGURE 6. The portion of the wall 16 above the inwardly flared shoulder 18 is also cylindrical as designated by the numeral 38 and this portion of the container has the flange mounted thereon. Further, while the container 10 has been described as being cylindrical, it is pointed out that the same may have any configuration as far as the bottom 14 and wall 16 is concerned but the opening 40 and adjacent flange 24, groove 22 and shoulders 20 and 26 are necessarily circular in cross-sectional area.

The cap 12 includes a circular top plate 42 and a depending cylindrical flange 44 integral therewith. The lower end of the flange 44 terminates in a tapered edge 46 which is generally frusto-conical in shape. Also, there is provided a laterally extending pull tab or finger tab 48 integral with the lower edge of the flange 44 at one edge thereof.

The flange 44 is provided with an inwardly extending lug 50 at the lower edge thereof which also extends inwardly from the area having the pull tab 48 thereon. The tab or lug 50 is integral with the flange 44 and has a taper 52 similar to the taper 46 and also has a rounded upper corner 54 which will project into the groove 22. The size of the cap 12 is such that when it is forced onto the neck of the container 10, the same will be pressed on and off by overcoming friction. Thus, with the lug 50 aligned with the slot or groove 34, the cap 12 may be

moved vertically onto or off of the container by exerting considerable upward force thus pressing the cap on or off depending upon the direction of force. After the cap has been pressed on, the same may be rotated in either direction which rotation requires the exertion of considerable force due to the frictional engagement between the cap and the container. The lug 50 will then engage with the converging walls or edges 32 and 30 of the groove 22 thus becoming securely and frictional locked to prevent reverse rotation to a position with the lug 50 in alignment with the slot or groove 34. The cap 12 may be constructed of plastic material and provided with knurling 56 on the outer surface thereof for facilitating gripping engagement therewith.

Thus, when the cap 12 is in locked position, it is necessary to initially exert considerable rotational force to rotate the cap 12 to a position with the lug 50 in alignment with the slot or groove 34 and this must be an accurate positioning since the width of the lug 50 is close to the width or distance between the edges of the slot or groove 34. The pointer 36 is to enable adults or those authorized to use the contents of the bottle to readily locate the container closure with respect to the container for ease of removal thereof. After the lug 50 has been located in relation to the slot or groove 34, upward force exerted on the pull tab or push tab 48 will cause removal of the closure from the container. Of course, a reverse procedure is necessary when the cap is locked onto the container. In view of the requirement for the various step-by-step procedures each of which is quite difficult, the device will be effectively locked so that a child cannot remove the cap by any single movement since it requires a combination of movements to remove the cap and considerable physical strength to accomplish each movement.

FIGURES 8 and 9 illustrate a modified form of the invention in which the container is generally designated by the numeral 60 and the closure generally designated by the numeral 62. The container 60 includes a generally cylindrical neck 64 having a groove 66 formed in the inner surface thereof with the inner surface of the neck 65 otherwise being cylindrical as designated by the numeral 68. The groove 66 is provided with converging wall portions 70 and 72 which are similar in purpose and function to the converging walls 30 and 32 in the device of FIGURES 1–7.

The closure 62 is in the form of a stopper having a generally cylindrical portion 74 having a tapered lower edge 76 and a peripheral upper flange 78 which is knurled as at 80 for facilitating the inward telescoping movement of the cylindrical stud 74 into the cylindrical interior 63 of the neck 64. That area of the neck 64 above the groove 66 may be termed an inwardly extending peripheral flange 82 and the flange 82 is provided with a slot or groove 84 extending vertically therethrough. Exteriorly of the neck 64 and immediately below the slot or groove 84 is a generally triangular shaped pointer 86 for indicating the position of the slot or groove 84.

The cylindrical stud 74 of the stopper 62 is provided with a laterally projecting stud or lug 88 which is rounded on the outer surface thereof for frictional engagement with the inner surface of the neck 64 and particularly the slot or groove 84 during vertical movement of the stopper into the neck. A pointer 90 on surface 80 is aligned with lug 88 for alignment thereof with groove 84. Subsequently, the lug 88 frictionally engages the walls of the grooves 66 during rotation thereof and will be securely and positively locked by the converging portions 70 and 72 when the converging portions engage opposite sides of the lug 88 thus locking the same in position.

In this form of the invention as in the other forms, it requires three separate movements and three separate physical exertions to remove the cap when it is fully closed and locked. This includes the initial physical force in rotation of the stopper 62 to unlock the lug from the converging walls 70 and 72. Continuous physical exertion is required in rotating the stopper so that the lug 88 may be aligned with the slot or groove 84. Then, upward force is exerted on the stopper 62 without rotating the same for removing the stopper 62 from the neck 64.

The tab on the cap in the device of FIGURES 1–7 is not only for convenience in the use of removing the cap from the container but is also located directly adjacent the lug so as to act as a pointer to show when the stop or lug on the cap and the notch in the lip or flange of the container are opposite to each other so that the cap can then be removed. The safety features of the present invention have been so constructed that the simplicity and ease of operation will present no difficulty in uncapping a container by qualified persons. However, with the immature mind of a small child, the combination of first turning the cap to an exact location on the container and then with the cap still in this position pushing it up, presents an operation which is one of pure chance or governed by the law of averages.

Excluding the protection offered by locking the ball or lug in a tapered groove and using as an example a standard one-inch diameter container, the law of averages will be as follows. The rim of the neck of the container has a circumference of approximately three and one-eight inches and the notch in the rim or flange is approximately one-eighth inch wide or one twenty-fifth of the circumference of the rim. The law of averages is thus 25 to 1 on stopping the lug of the cap exactly opposite the notch in the rim of the container. With the combination of pushing the cap up at this exact location, the law of averages becomes 25 to 1 squared or 625 to 1. Thus, the safety factor of this invention is 625 times greater than the standard one inch diameter container presently used in the drug trade which requires but one operation to open and that is to twist or press the cap up from any position.

Although the drawings and description have been for one tab or lug on the cap and one notch in the rim or flange of the container, the present invention includes the use of more than one lug and notch in conjunction with each other. Also, a gasket of suitable material may be provided in the top of the cap for a seal when liquid is used. The material for the container may be plastic, glass, metal or any other suitable material while the cap is preferably constructed of a plastic material which is in itself non-toxic and which is impervious to various drugs with which it may be used.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A safety closure assembly for containers comprising a container having a peripheral rim projecting outwardly at the upper end thereof with a groove being defined immediately below the rim with the rim forming the upper wall of the groove and a shoulder defining the lower wall of the groove, said rim having a notch therein defined by an omitted portion of the rim, a cap for said container including a depending peripheral flange for telescopic movement over the rim, said flange including an inwardly projecting lug for passage through the notch into the groove whereby the cap may then be rotated for misaligning the lug with the notch for preventing withdrawal of the cap from the container, said flange on the cap being frictionally engaged with the rim and constructed of a resilient material for snapping engagement with

the container, said lug frictionally engaged with the groove for resistance to rotation thus requiring that the lug be stopped in exact alignment with the notch and the cap then pushed upwardly for removing the cap, the walls of said grooves converging towards each other at a point remote from the notch in the rim, said lug extending into the groove and being constructed of resilient material for frictionally binding in the groove for locking the cap against rotation thereby preventing rotation thereof unless considerable physical force is exerted.

2. A safety closure assembly for containers comprising a container neck of cylindrical construction and having an internal peripheral groove therein with the upper wall defining a flange, said flange having a vertical notch therein, a stopper insertible into said neck, said stopper having a projecting lug thereon for passage through the notch and rotation into misalignment therewith, said stopper and lug being frictionally engaged with the interior of the neck of the bottle for frictional locking engagement therewith, the frictional engagement between the stopper and bottle continuously resisting rotation of the stopper in the neck and also resisting movement of the stopper into and out of the neck thereby providing a plurality of deterrents to removal of the stopper, the walls of said grooves converging towards each other at a point remote from the notch in the rim, said lug extending into the groove and being constructed of resilient material for frictionally binding in the groove when misaligned with the

notch for locking the cap against rotation thereby preventing rotation thereof unless considerable physical force is exerted.

3. A safety closure for containers comprising a container having a peripheral laterally extending flange on the upper end thereof, said flange having a vertical extending notch extending therethrough, and a closure member having a periphery telescopically engaged with the flange, said periphery having a laterally extending lug for passage through the notch whereby the lug may be misaligned with the notch and disposed below the flange for preventing removal of the closure member until the same is rotated to align the lug with the notch, said container including a peripheral groove with the flange forming the upper wall of the groove, said groove receiving said lug during rotation of the closure member, the walls of said groove being disposed in converging relation at a point remote from the notch for frictional binding engagement with the lug thereby releasably preventing rotation of the closure member.

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