

July 17, 1962

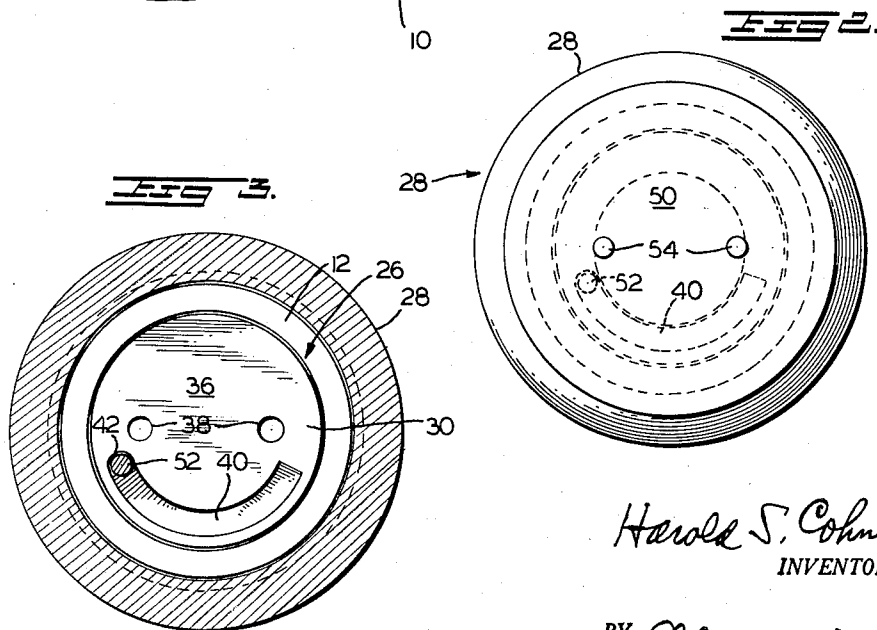
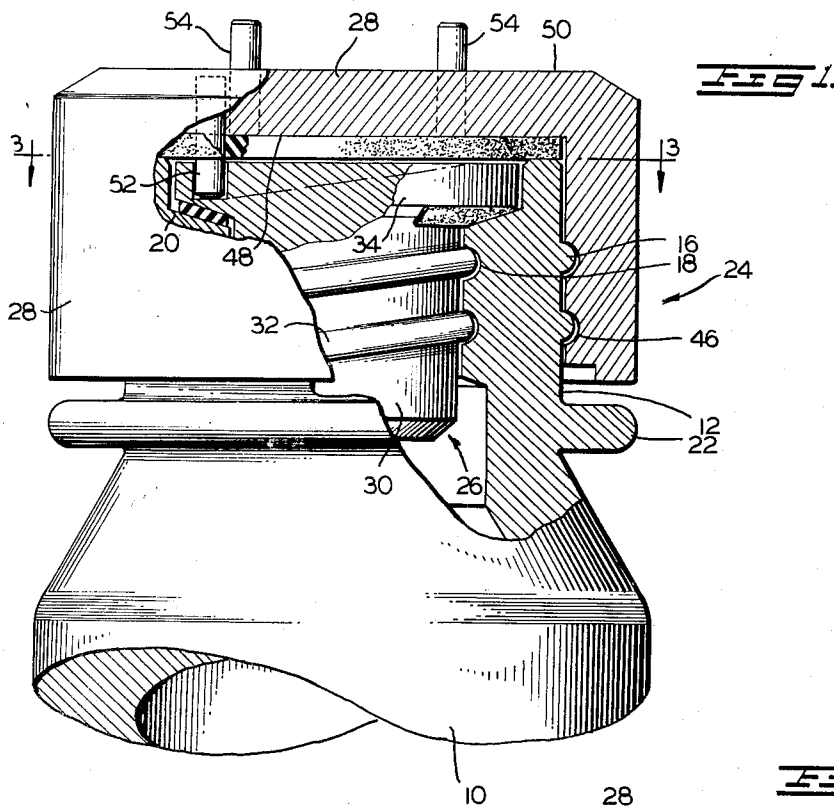
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3,044,648

SAFETY CLOSURE FOR BOTTLES AND THE LIKE

Filed Jan. 11, 1962

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

FIG 4.

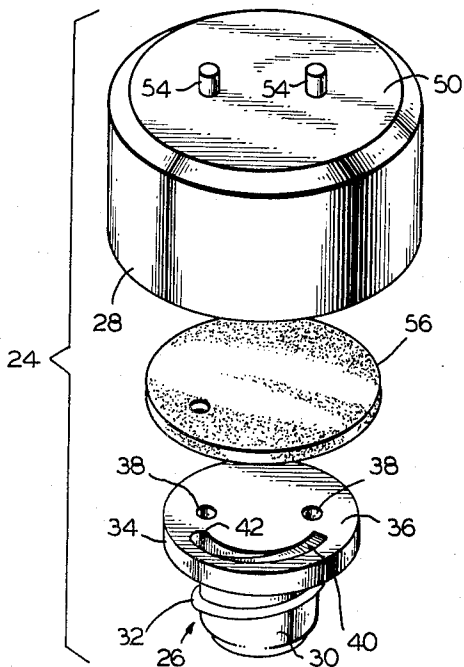


FIG 5.

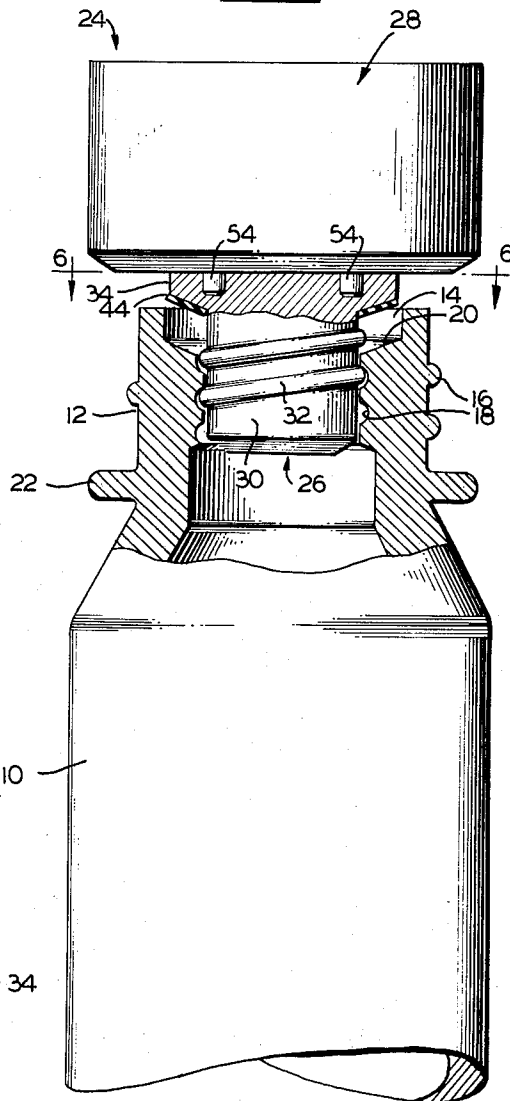
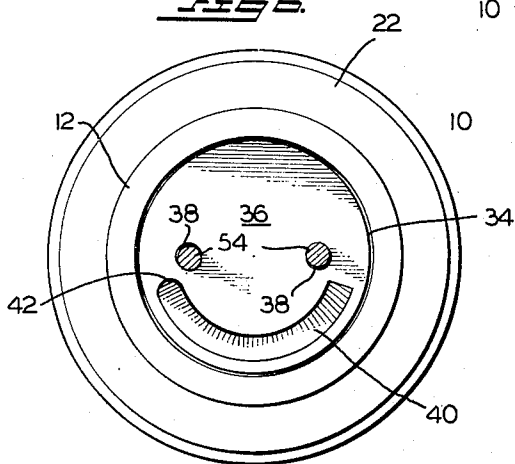


FIG 6.



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SAFETY CLOSURE FOR BOTTLES AND THE LIKE

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12 Claims. (Cl. 215-9)

The present invention relates to safety closures for bottles and equivalent or similar containers such as jars, and its principal object is to provide a closure structure which will provide substantial protection against opening by young children and other irresponsible persons and against opening by anyone unintentionally and without full realization of the fact that the container being opened is a very special one particularly designed to prevent accidental, unintended, or unwitting access to the container contents.

The invention is particularly, although not necessarily exclusively, intended for embodiment in bottle or jar type receptacles for such potentially dangerous substances as poisons, caustics, certain medicines and the like which are commonly required to be kept in a household medicine cabinet, or on a kitchen shelf or analogous location with-in ready access by substantially all ambulatory members of a family. Such substances, generally liquids although in some cases comprising powders, tablets and other solid forms, present constant grave danger of being accidentally taken orally under the misapprehension that they are something other than what they actually are, as by an adult or other generally responsible person groping in the dark for some innocuous preparation like an aspirin tablet, cough syrup, mouthwash or the like, or of being orally taken by immature or irresponsible persons particularly small children. It is well known that extremely serious effects, amounting to death in an alarming number of instances, result annually from such errors in opening the wrong bottle.

It is a primary object of the present invention to safeguard the storage of dangerous liquids and solids, particularly in living quarters such as family households but also in any other environment where any similar condition obtains, such for example as hospital and laboratory supply rooms, by providing a type of container that (1) is substantially proof against being opened by a child below the age of discretion, and (2) cannot be opened by anyone except by a deliberate practice of a sequence of particular manipulative operations requiring a modicum of skill and generating full appreciation of the fact that the container is a very special one protected by a unique type of closure that was probably adopted for a purpose.

A more specific object is to provide a screwthreaded closure for a bottle type of container that comprises a two-part combination of inner plug and outer cap which can be installed in closing position on the container by a single simple continuous rotation of the assembly of plug and cap, but which requires, for opening the container, a more complex sequence of rotation of the cap, then inversion thereof and application to the plug, and finally rotation of the cap and plug together.

An incidental object is to provide a closure of the type indicated which will effect a double seal of the container, formed by two separate gaskets, each being sealingly compressed between separate spaced surfaces surrounding the container orifice and corresponding surfaces formed on different parts of the closure.

Other objects and advantages of the invention will be apparent from the following description of a preferred embodiment of the inventive concept which is depicted in the accompanying drawings, wherein:

FIGURE 1 is an elevational view, partly in axial cross section, of the upper portion of a glass bottle specially constructed to receive the new closure, and of the closure applied thereto in closed relationship;

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FIG. 2 is a top plan view of the closure;

FIG. 3 is a radial cross sectional view of the closure, taken on the line 3-3 of FIG. 1;

FIG. 4 is an exploded perspective view of the closure per se;

FIG. 5 is an elevational view, partly in axial cross section, of the upper portion of a bottle, as in FIG. 1, but showing the parts in the relation in which they are put to remove the closure and thereby open the bottle; and

FIG. 6 is a top plan view of the plug portion of the closure, taken on the line 6-6 of FIG. 5.

In these FIGURES the reference numeral 10 designates generally the body of the container to be closed by the structure comprising the invention. As shown, this container in the embodiment selected to illustrate the invention is a glass bottle, but within the broad scope of the inventive concept the container could be any of a wide variety of specifically different kinds of receptacles, such as jars for example, and of course the material can be of any suitable kind, such as hard or flexible plastic, metal, etc.

The container is provided with an orifice in its upper portion, hereinafter and in the appended claims broadly designated the neck of the bottle, without, however, necessarily implying any constriction in the cross sectional area of the container body. This neck is designated 12 in the drawings and it surrounds the orifice 14. Whatever may be the cross sectional shape of the container body 10, the neck is of overall cylindrical form and the orifice is circular. The neck is provided with an external screwthread 16 and an internal screwthread 18, both preferably quite coarse, half-round in section, and of steep pitch. It is convenient to make the external thread 16 in the form of a projecting spiral rib and the internal thread 18 in the form of a complementary spiral groove. Both should be of the same pitch.

The orifice 14 is countersunk to provide a shoulder 20 just below the upper end of the neck which surrounds the inner bore of the neck and preferably slopes thereinto, as best shown in FIG. 5. Optionally the container may have a radially outstanding circumferential rib 22 at the juncture of the neck and body as is customary in bottles having externally threaded necks, and which serves to trim the adjacent lower edge of the applied closure, hereinafter to be described, and to provide some protection to the closure.

It will be recognized that the bottle construction as thus described readily lends itself to molding my automatic machinery of well known type and presents no problem and involves no cost over those of ordinary threaded neck bottles.

The closure provided by the invention to cooperate with the externally and internally threaded bottle is designated generally 24 and comprises essentially the combination of an inner plug 26 and an outer cap 28.

The inner plug 26 is complementary in shape to the threaded bore and the countersunk orifice of the bottle neck and hence comprises essentially a lower portion 30 which is generally cylindrical but provided with an externally projecting screwthread 32 complementary to and of the same pitch as the internal screwthread 18 of the neck, and an upper portion 34 which is radially enlarged and shaped to fit the counterbore of the neck and seat on the shoulder 20 thereof. The upper or top end of the plug 26 is a generally plane surface 36 which is broken by two round holes 38 forming sockets extending into the plug equidistantly from and parallel to the plug-axis, and broken also by an arcuate groove 40 of substantially 180° in length which descends slopingly into the body of the plug and is formed with the axis of the plug as its center and is set radially farther out from the axis than the

sockets 38. The groove 40 is of the same pitch as the threads 16 and 18 and terminates abruptly at its deep end in a pronounced shoulder 42.

The proportions of the plug 26 and the inner surfaces of the bottle neck 12 are such that the plug can be screwed down into the neck by engagement of the plug thread with the internal thread of the neck and so that when screwed fully down the sloping under surface of the upper portion 34 of the plug will seat on the shoulder 20 at the bottom of the countersunk portion of the neck, and the top, generally flat and plane surface 36 of the plug will be flush with, or slightly below, the plane of the top surface of the neck, as clearly appears in FIG. 1. To enhance the seal of the plug against the shoulder 20 a conventional type of annular gasket 44 of rubber or the equivalent may be provided on the under surface of the plug enlargement 34, as shown in FIGS. 1 and 5.

The cap 28 is generally of inverted cup shape in form. Its inner cylindrical surface is formed with a screwthread 46 which is complementary to and adapted to mesh with the external thread 16 of the bottle neck. The outer cylindrical surface of the cap is unthreaded and may be quite plain and smooth as shown, or it may be milled or ribbed if desired.

The base of the cup-shaped cap, i.e., that part that would constitute the bottom of the cup if the cap were disposed with its cylindrical part uppermost, has of course an inner surface 48 (facing the thread 46) and an outer surface 50 (comprising the top surface of the cap when the cap is installed in closing relation on the container as shown in FIG. 1). The inner surface 48 of the cap is provided with a single downwardly projecting pin 52 set at the same distance from the axis of the cap as the radius of the groove 40 in the plug 26 and of no greater length than the depth of the deep end of the groove, at the shoulder 42. The outer surface 50 of the cap is provided with two outwardly projecting pins 54, both set on the same diameter of the cap surface and at the same radial distance from the cap axis as that of the sockets 38 from the axis of the plug 26.

The inner surface 48 of the cap is best provided with a sealing gasket of rubber or equivalent resilient material. This gasket may be annular in shape, like the gasket 44, or it may be a circular disc such as is shown at 56 in FIG. 4.

It will be evident from the foregoing description of the shape and structure of the plug and cap that both may be molded, by the use of well known die and pressing apparatus, out of any of the numerous plastic compositions that are commonly used for analogous elements, e.g., such substituted resins as Bakelite, or polyvinyl chloride, polyethylene, nylon, etc.

In use, the container is closed by first starting the plug 26 into the inner bore of the neck 12. This is easily done by holding the enlarged upper portion 34 of the plug and screwing the plug down partially into the neck. The cap 24 is then applied to the neck and started down thereon by rotating it with its thread 46 meshed with the outer thread 16 of the neck. The pitch of all four threads of the several members is such that as the cap descends onto the plug the pin 52 of the cap will enter the arcuate groove 40 and on further rotation of the cap will abut the shoulder 42 at the deep end of the groove. Thereupon further rotation of the cap will clutch the plug to the cap and cause the plug also to rotate, and both the cap and the plug will become finally screwed down into tight sealing engagement with the container neck, the gasket 44 of the plug bearing on the shoulder 20 of the counterbore of the neck and the gasket 56 of the cap bearing on the upper end of the neck. Thus the parts are in the relationship shown in FIG. 1 and the container is doubly sealed.

To open the container the cap 24 is first unscrewed. Reverse rotation of the cap has no effect on the plug since the cap pin 52 simply rises out of the plug groove 40. The container of course remains completely sealed by the plug 26, and it will be noted that the plug cannot be removed by ordinary manipulation because it is completely

depressed below the upper end of the container neck, or at least the top surface of the plug is flush with the upper end of the neck, so that no part of the plug is accessible to be gripped by the hand or fingers. Hence, while the initial step of cap removal was not different from the complete operation of opening any conventional screw capped bottle, and hence might very well be performed by an irresponsible child, or by an adult in the dark, or by anyone under conditions conducive to an unawareness of the actual dangerous contents of the bottle, the bottle still remains completely closed and its contents (and the person too) fully protected. Completion of the opening operation requires a further sequence of steps, and it is of the essence of the invention that these steps are capable of being performed only with some difficulty, or at least require deliberate and conscious attention, so that they are incapable of being performed by small children or are at least highly unlikely to be performed by them, and so that it is quite impossible for an adult to perform them without being fully aware that he is doing something very different from opening an ordinary bottle. Thus the closure is substantially proof against removal by the immature and accidentally or unintentionally by the fully competent.

Completion of the opening operation is practiced in the manner illustrated by FIG. 5 and consists in inverting the removed cap 28, seating its two pins 54 in the holes or sockets 38 in the top surface 36 of the plug, and then rotating the cap counterclockwise to unscrew the plug from the neck.

It is believed that the foregoing brief explanation of the presently preferred embodiment of the inventive concept will make it clear to those skilled in the art that the invention satisfactorily accomplishes the objects hereinabove summarized.

It is to be understood that various details of the exemplary structures chosen to illustrate the invention are capable of being modified, and in some cases omitted, without departure from the broad principles of the invention as defined by the more broadly worded of the appended claims.

Thus, for example, it will be recognized that the pin and socket combination 54, 38 is merely one of many possible torque-transmitting expedients. The specific shape of the pins and sockets can be varied, as for example by making both frusto-conical, or the disclosed spanner wrench type of cooperating parts might be replaced by a slot and blade coupling of conventional screwdriver type, or by a single square or hex socket wrench coupling, etc. Again, the sealing finish of the plug might be located at its bottom rather than its top end, etc. Many other changes and substitutions of equivalents are possible, and accordingly it is the appended claims, rather than the specification and drawings, that are to be looked to for an understanding of the scope of the inventive novelty and of the protection therefor sought by this application.

I claim:

1. A safety closure for a bottle or the like having an orifice-topped neck provided with inner and outer screwthreads, some closure comprising a plug having an external screwthread for meshing with the inner thread of the neck, a generally cup-shaped cap having an internal screwthread for meshing with the outer thread of the neck, and elements formed on portions of the cap and plug for mutual engagement in clutching relation when the cap and plug are engaged with the respective threads of the neck and the cap is rotated into closing relation with the orifice.

2. The safety closure defined by claim 1, in which said elements are separable into declutching relation upon rotation of the cap into opening relation with the orifice.

3. The safety closure defined by claim 1, in which said elements comprise a projection and a recess formed respectively on the plug and the cap.

4. The safety closure defined by claim 1, in which said

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elements comprise a projection formed on the inner surface of the base of the cup-shaped cap and a recess formed in the top surface of the plug.

5. The safety closure defined by claim 1, in which said elements comprise a pin projecting from the inner surface of the base of the cup-shaped cap and a shoulder formed at the end of an arcuate groove slopingly indented in the top surface of the plug.

6. The safety closure defined by claim 1, including projecting means formed on the outer surface of the base of the cup-shaped cap and socket means formed on the top surface of the plug for engagement by said projecting means in torque-transmitting relation for unscrewing the plug from the neck.

7. The safety closure defined by claim 1, including a pair of sockets formed on the top surface of the plug and a pair of pins formed on the outer surface of the base of the cup-shaped cap and insertible into said sockets upon removal of the cap and inversion onto the plug for establishing torque-transmitting relationship of the cap to the plug in unscrewing the plug from the neck.

8. The safety closure defined by claim 1, in which the plug includes an upper portion of larger diameter and a lower portion of smaller diameter, with a downwardly facing shoulder intervening between the two portions, and a sealing gasket formed on said shoulder seating on a complemental shoulder formed on the bottle neck surrounding the orifice therein.

9. The safety closure defined by claim 1, including a sealing gasket carried by the inner surface of the cup-shaped cap seating on the top of the neck surrounding the orifice therein.

10. The safety closure defined by claim 1, including a sealing gasket carried by the inner surface of the cup-shaped cap seating on the top of the neck surrounding the orifice therein, and in which the plug includes an upper portion of larger diameter and a lower portion of

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smaller diameter, with a downwardly facing shoulder intervening between the two portions, and a sealing gasket formed on said shoulder seating on a complemental shoulder formed on the bottle neck surrounding said orifice.

11. The safety closure defined by claim 1, in which the plug is provided with a radially extending circumferential shoulder adapted to make sealing engagement with a complemental shoulder formed on the bottle neck surrounding the orifice therein and below the upper end of the neck, and in which the neck, plug and cap are so proportioned that the top surface of the plug does not project above the upper end of the neck when said shoulders are in sealing engagement.

12. The safety closure defined by claim 1, in which said elements comprise a pin projecting from the inner surface of the base of the cup-shaped cap and a shoulder formed at the end of an arcuate groove slopingly indented in the top surface of the plug, and including a pair of sockets formed on the top surface of the plug and a pair of pins formed on the outer surface of the base of the cup-shaped cap and insertible into said sockets upon removal of the cap and inversion onto the plug for establishing torque-transmitting relationship of the cap to the plug in unscrewing the plug from the neck, said arcuate groove being circular and having as its center the axis of the plug, said first named pin being positioned at the same radial distance from said axis as the groove, and said sockets and second named pins being positioned an equal distance from said axis which is different from said first named distance.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,044,648

July 17, 1962

Harold S. Cohn

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 60, for "some" read -- said --.

Signed and sealed this 30th day of October 1962.

(SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents