United States Patent

[11] 3,608,763

[72] Inventors **Mollie L. Smith;**
John A. Smith, both of Lexington, Ky.

[21] Appl. No. **6,381**
[22] Filed **Jan. 28, 1970**
[45] Patented **Sept. 28, 1971**

[73] Assignee **Lok-A-Away, Inc.**
Columbus, Ohio

---

[54] **CONTAINER AND SAFETY CLOSURE THEREFOR**
9 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **215/9**
[51] **Int. Cl.** **B65d 41/06**
[50] **Field of Search** 215/9, 43

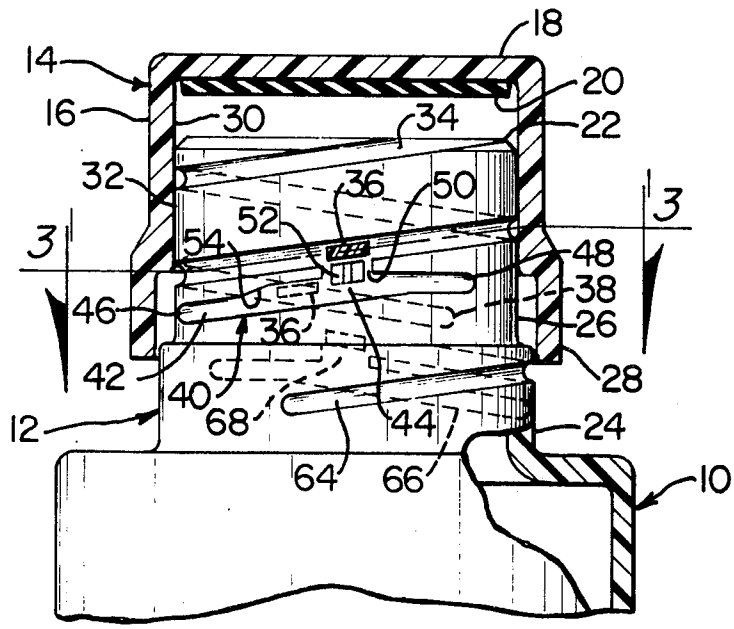
[56] **References Cited**

UNITED STATES PATENTS

3,435,978	4/1969	Wittwer	215/9 X
3,451,576	6/1969	Lewis	215/9
3,497,096	2/1970	Smith et al.	215/9

Primary Examiner—George T. Hall
Attorney—Sheridan, Ross and Burton

ABSTRACT: Container has annular neck provided with helical guide track and closure has lug to engage guide track and advance closure toward sealing position. Safety locking track axially inward of guide track is connected to guide track by axial passage. When lug reaches passageway closure is pushed axially to cause lug to move through passageway and engage locking track. Lug is rotated away from passageway to lock closure against inadvertent release. Detent in passageway requires recess in lug to pass over it. This demands very exact registry calling for knowledge of arrangement and careful manipulation. Second lug at opposite side of closure and axially spaced engages second guide track to produce balanced force and avoid rocking of seal. Second lug engages similar locking track to produce dual locking effect. Closure may be plug or cap. Lugs and tracks may be on either member. Tracks may be beads or grooves.



PATENTED SEP 28 1971

3,608,763

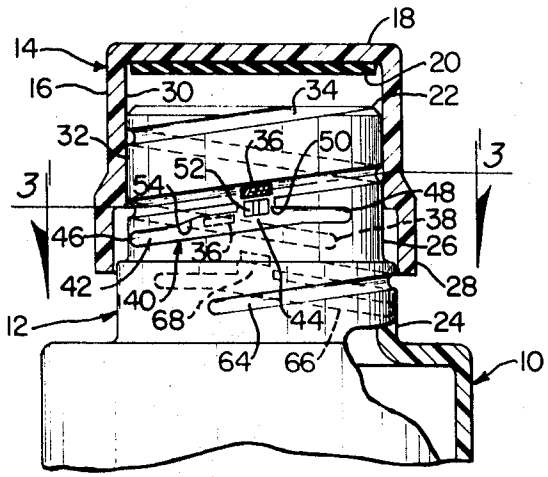


FIG. 1

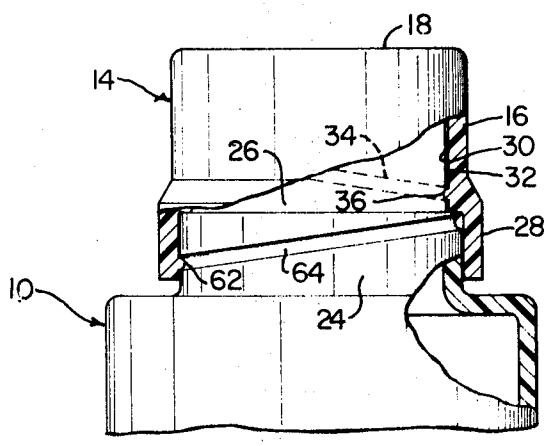


FIG. 2

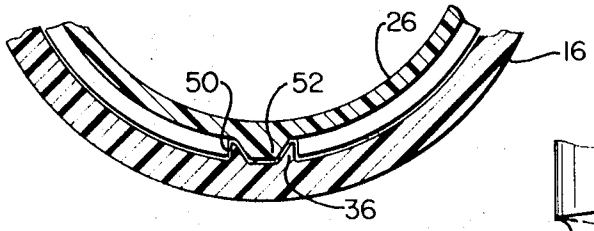


FIG. 3

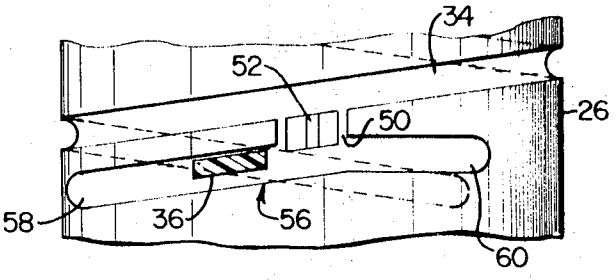


FIG. 4

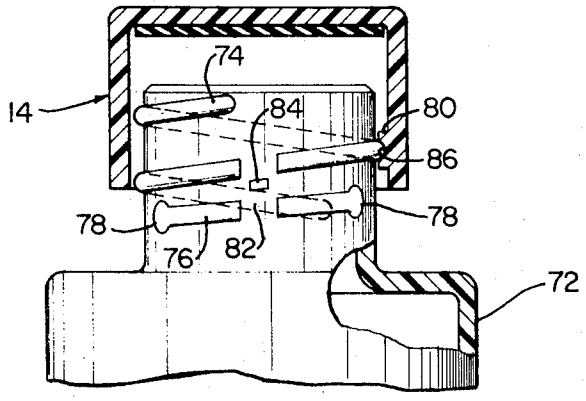


FIG. 5

INVENTORS
MOLLIE L. SMITH
JOHN A. SMITH
BY Sheridan, Ross & Burton
ATTORNEYS

CONTAINER AND SAFETY CLOSURE THEREFOR

BACKGROUND OF THE INVENTION

In the art of packaging of materials in containers, many closures have been devised, varying in construction in accordance with their intended class of use. In one class, for example, the container contents are normally consumed within a short period of time after opening; hence they are constructed to be expendable. The well-known crimped type crown cap for beverage bottles or the paper disc closure for milk and other beverage bottles are typical of this class. In another class, the contents are intended to be consumed over a longer period of time and the closures are thus designed to be repeatedly removed and replaced, usually reestablishing the original seal to prevent entry of moisture in the air. Threaded container access openings or mouths with mating internally threaded caps are typical of this class and have long been in widespread use. Right-hand threads have been substantially universally employed since the consuming public has learned that most closures of this type may be removed by twisting same, always in the same direction.

The screw-type closure has probably been used too indiscriminately when considered in respect to the container contents. No serious problems exist when such type of closure is employed for edible materials, such as those normally stores in the household kitchen, since inadvertent access to such materials is not likely to result in serious bodily harm. The household medicine cabinet or other place of storage for medicines, drugs and the like presents an entirely different problem. Most materials of this class are harmless if consumed as prescribed but if consumed in excessive amounts may produce serious illness or death. Well-known sleep-inducing pills and many other normally harmless medicines fall within this class. Another class of materials packaged in the same way include certain poisons not intended for human consumption. The ordinary prudent adult normally stores such dangerous materials in a place of difficult access out of reach of children and the still more prudent adult stores them in locked compartments. Unfortunately, not all adults exercise prudence, and sometimes even poisons are stored with medicines and the like. It thus becomes apparent that many materials, regardless of where stored, should be safeguarded in some way from inadvertent consumption which would result in bodily harm. This applies principally to children of tender years but also to the careless adult.

The problems aforesaid have long been recognized and safeguards have been in use. Probably one of the oldest safeguards is the provision of a conspicuous label which warns of the dangerous contents. This is normally sufficient for the prudent adult, but as is obvious, is meaningless to children who have not yet learned of the meaning of a written or pictorial warning. It has therefore been recognized that a warning, other than a label, is desired and one of the early proposals in this connection is exemplified by the patent to Howell U.S. Pat. No. 334,865, wherein a closure may be removed from a container only by an abnormal manipulation of the closure. This was intended, however, to be used by a druggist or the like for dispensing from his store supply and warning him that he was handling dangerous material. In this case a warning to a prudent adult should suffice but this would not necessarily prevent a child from opening the same container if, by some chance, it were in his possession.

Subsequent to the early concept aforesaid, certain safety closures were devised which operated on the principle that they could not be removed without knowledge of their mode of removal. They thus had what might be termed a "secret" mode of operation, this, in effect, constituting inability to open the container by one not in possession of the secret as distinguished from a mere warning that the container stored dangerous material. The patent to Webb U.S. Pat. No. 3,212,662, is exemplary of a closure intended to defeat the attempt of a child to remove it by providing a labyrinth through which a locking element must move which could not be readily mastered by a child. One of its disadvantages, in addition to being somewhat complicated in construction, appears to be that a number of secret moves are involved which might even defeat an adult from removing it if his recollection of the mode of operation had become somewhat hazy.

Another type which is relatively simple and effective includes a cup-shaped closure provided with a single internal protuberance or lug which follows along a helical groove or track in the container neck in conventional manner toward a position in which the closure hermetically seals the container. At a rotary position short of the sealing position, the lug may optionally pass through an opening or passageway into a locking groove or track, the passageway communicating at a point intermediate the ends of the locking groove. When the lug is disposed in the locking groove, the closure may normally be rotated between the ends of the groove without discovery of the passageway through which the lug must pass to remove the closure. While this type is quite simple it has the disadvantage that it is somewhat too easy to remove. Also the single lug tends to put an eccentric load on the cap which may result in unsatisfactory sealing.

SUMMARY OF THE INVENTION

The present invention overcomes these difficulties while maintaining the mechanical simplicity of construction which makes this last type relatively desirable. Generally stated, the invention includes a container having a neck, and a closure adapted to fit the neck and be screwed into place. The closure may be a cap or a plug, and the threads or helical guide track and locking track may be on either member. A lug corresponding to the one described above functions in the same general way, moving axially through a passageway to engage the locking track. However, the entry and removal are made more difficult by providing a detent in the passageway. The lug must now be provided with an axially extending recess to allow it to pass over the detent. The recess is made to exactly fit the contour of the detent and the lug is also dimensioned to just pass through the passageway. The effect is that of a key fitting in a lock and thus the operation requires more care than that likely to be exercised by a child and yet it does not call for more dexterity than an adult would be likely to have.

In addition, the closure is provided with a second lug diametrically opposite to the first lug and axially spaced therefrom to engage a second guide track so that axial forces are applied at opposite sides to avoid cocking or rocking the closure seal. If the second lug were located directly opposite to the first lug, it would require a double thread which is normally too steep for effecting a good closure. Instead, the second thread is located beyond the first one and is preferably on a larger diameter of the neck so that the second lug will not have to engage the first thread.

BRIEF DESCRIPTION OF THE DRAWINGS

Various other advantages and features of novelty will become apparent as the description proceeds in conjunction with the accompanying drawings, in which:

FIG. 1 is an elevational view, partly in section showing the closure partially mounted on the container neck;

FIG. 2 is a view similar to FIG. 1 with the closure fully secured;

FIG. 3 is a partial sectional view taken on line 3—3 of FIG. 1;

FIG. 4 is an elevational view of the container neck with a modified form of locking track; and

FIG. 5 is a view similar to FIG. 1 showing further modified tracks. DESCRIPTION OF PREFERRED EMBODIMENTS

The total combination is best illustrated in FIG. 1, in which a container 10 such as a bottle is provided with a neck 12 in the form of an annular wall defining an opening into the container. The container is adapted to be hermetically sealed by a closure 14 which may be an internal corklike plug ut is preferably, as shown, in the form of a cap having an annular

wall 16 and an end wall 18 within which is located a resilient sealing disk 20 to engage the margin of the open end 22 of neck 12. Neck 12 has a first annular section 24 adjacent the main body of the container and a second annular section 26 of smaller diameter outward of section 24. The annular wall 16 of the closure fits snugly over section 26 and its extension wall 28 of larger diameter fits snugly over section 24. Thus the confronting surfaces 30 and 32 of the closure and the neck are adapted for relative rotation and translation to accomplish a complete seal.

The closure is shown in FIG. 1 as partially assembled and in a position to apply the safety locking feature. Wall 26 is provided on its confronting surface 32 with a helical guide track 34 in the form of a screw thread which is produced by molding a groove in surface 32. The confronting surface 30 of wall 16 is provided with a lug 36 preferably integrally molded with the wall and shape to fit in and move slidably along the guide track. For ordinary nonsafety operation the closure is rotated until lug 36 progresses to the end 38 of the guide track, at which point the closure has rotated and translated sufficiently to bring disk 20 into pressure-sealing contact with margin 22.

For safety locking purposes a safety locking track 40 is provided and is located axially beyond the guide track toward the main body of the container. This track may lie in a plane perpendicular to the axis of the neck and closure at such position that disk 20 will be engaged in sealing relation with margin 22 when lug 36 is engaged at any position in the length of the locking track. However, it is shown as being so arranged that at least one section 42 from an intermediate point 44 to an end 46 is in spaced parallelism with a corresponding portion of guide track 34. End 46 is axially approximately even with end 38 of the guide track so that when lug 36 reaches end 46 the container will be sealed. The other section 48 of the locking track may be parallel to the guide track or in a plane perpendicular to the axis of the neck and closure as shown.

In the relation shown in FIG. 1, lug 36 has just reached the point where a generally axially directed passageway 50 communicates between the guide track and the locking track at intermediate point 44. To use the safety locking feature, the closure is pushed forward toward the main body of the container and lug 36 moves axially through passageway 50 into track 40. The closure is then rotated to cause the lug to advance along section 42 to end 46, moving the closure forward to sealing position. If the closure is later rotated in the opposite direction, lug 46 will be moved to section 48 of the locking track and the closure will still be locked even though it is loose.

The construction and operation described above represent the prior art system which is generally satisfactory but has the disadvantage that the "secret" may be solved too readily even by a child, by mere accident. If tension is exerted on the closure as it is rotated in the locking track the lug 36 may well enter the passageway 50 and be released to the guide track where it can be withdrawn.

This disadvantage is overcome by the provision of a "lock and key" system. A detent 52 is located in the passageway and is preferably molded integral with wall 26. As shown in FIG. 3 the detent has a trapezoidal shape in cross section. As shown in the same figure, lug 36 must be formed to match this cross section and is made to fit very accurately over the detent and also to exactly match the walls of the passageway. Therefore, a casual or careless movement of the lug along the locking track will not result in registry and the lug will not be released. Registry will be obtained only by careful manipulation with the knowledge that the lug, detent, and passageway must be accurately aligned before axial tension is applied.

Removal may be made more difficult by shaping section 42 of the locking track as shown in FIG. 1 where it will be seen that the portion of section 42 adjacent to detent 52 is recessed at 54 toward the guide track to permit a slight axial translation of lug 36 toward the guide track as indicated in broken lines. Thus, if tension is exerted on the closure as it is rotated, the lug will enter the recess and strike the edge of detent 52, interfering with its movement to registry position. If the closure is then rotated to move the lug back to end 46 and pressed forward and reversely rotated, it will ride along the forward edge of the locking track and pass over into section 48.

A slightly modified arrangement is shown in FIG. 4, where the track 56 is similar to track 40 but is of substantially uniform width and slightly wider than the axial dimension of lug 36. The detent 52 has a slightly greater axial extent than in FIG. 1, so that it protrudes beyond the adjacent wall of track 56. With this arrangement it will be seen that if the lug is in section 58 or 60 it will abut the detent if it is moved toward registry position while tension is applied to the closure. Therefore it is necessary to push the closure axially forward or inward before it can be rotated into registry with the detent from either section of the locking track.

This form may be made particularly effective if track 56 is located entirely in a plane perpendicular to the axis of the neck and closure at such distance inward from margin 22 that disk 20 will be held in sealing contact regardless of the position of the lug in track 56. The disk 20 is made resilient enough so that it will allow lug 36 to move axially inward beyond detent 52 and will hold the lug resiliently against the edge of track 56 adjacent to the guide track. With this arrangement it will be seen that if the lug is at either end of the locking track and is rotated toward the intermediate point with no axial force applied in either direction it will abut the detent laterally and will be prevented from registering with it axially.

If lug 36 is used alone as in the prior art construction, its axial force is eccentrically applied and the closure has some tendency to cock or rock which could result in unsatisfactory sealing. This problem is overcome in the present construction by the provision of a second lug 62 formed on the inner surface 64 of wall 28. It is located diametrically opposite to lug 36 to apply an equal parallel pull or axial force with a resultant centralized force drawing the disk 20 into perfect sealing engagement with margin 22. If lug 62 were located at the same axial distance from end wall 18 as lug 36, it would require a second thread or guide track in the same area, and a double thread would tend to be too steep for satisfactory sealing. Also the second guide track would require an interruption or passage similar to passage 50 and also a locking track, so that lug 62 could move in conformity with lug 36. Such construction would break into the construction of the first guide track and would not be satisfactory.

Instead, a guide track 64 is provided on section 24 of the neck or wall of the container, and it includes a locking track 66 and passageway 68, all similar to the first tracks and passageway but rotated 180°. Lug 62 is axially forward of lug 36 so that it will engage its tracks properly. Since walls 24 and 28 are larger in diameter than walls 26 and 16, lug 62 will pass freely over wall 26 without contact with track 34. It will be apparent that whether the closure is secured in the nonsafety or the safety locking position both lugs will properly ride their respective tracks and apply equal and parallel forces to seat the closure properly. The fully secured position of the closure is illustrated in FIG. 2.

As mentioned previously, the closure may be a cap as shown or a plug fitting within the container neck, and the tracks and lugs may be on either the closure or the container wall, the form shown being presently considered the most desirable. It is also pointed out that the guide tracks may be in the form of grooves or they may be beads upstanding from the wall surface as schematically shown in FIG. 5. Here the neck 70 of container 72 is provided with a bead-type guide track 74 and a bead-type locking track 76. The latter is provided with abutments 78 at its ends to limit movement of lug 80. A passageway 82 is formed by the breaks in the longitudinal extent of the guide tracks, and a detent 84 is centered in the passageway. Lug 80 is formed as a saddle with a recess 86 to slidably fit the tracks. A second recess, not shown, extends in an axial direction to permit the lug to slide axially across detent 84. The operation is the same as that previously

described. The second lug and tracks are not shown for simplicity but they would be the same as those previously described.

It will be apparent that a safety closure construction has been disclosed which requires the skill of an adult to release but without need for special dexterity, and which also ensures a well centered axial force on the closure to produce satisfactory sealing, while at the same time it is simple enough for easy and economical mass production.

We claim:

1. Securing means for a container having an annular wall defining an opening into the container and a closure having an annular wall, with a confronting surface of each wall adapted for rotatable and translatable securing movement with respect to each other, comprising: a helical guide track in the form of a screw thread on the first one of the confronting surfaces; a lug on the second confronting surface formed to engage said guide track and move therealong in a helical path to advance the closure toward sealing position with respect to the container; a safety locking track located axially beyond said guide track; a passageway for said lug extending generally axially between the guide track and an intermediate point of the locking track for axial translation of the lug to the locking track for further rotation to a safety locking position; and a detent in said passageway; said lug having an axially directed recess formed therein conforming to the shape of said detent to slide over the detent and permit the lug to pass selectively to the locking track or the guide track.

2. Securing means as claimed in claim 1; said guide track and locking track being in the form of beads upstanding from the surface of the annular wall.

3. Securing means as claimed in claim 1; said guide track and locking track being in the form of grooves recessed into the annular wall.

4. Securing means as claimed in claim 3; at least one portion of the locking track groove from the detent location to the end of the groove advancing helically generally parallel to the guide track to cause the closure to move to sealing position in response to movement of the lug to said end; a section of said portion adjacent to the detent being recessed toward the guide track to a position in which the detent interferes with further rotational movement of the lug and requires reverse translation of the lug before rotation thereof to a position in registry with the detent for axial unlocking movement.

5. Securing means as claimed in claim 3; the detent extending axially beyond the wall of the locking track groove adjacent to the guide track to block movement of the lug along said wall from end to end of the locking track groove and to require axial translation of the lug away from the guide track before rotation thereof to a position in registry with the detent for axial unlocking movement; said locking track groove being sufficiently wider than the lug to facilitate such translation.

6. Securing means as claimed in claim 1; and a second lug on said second confronting surface at the diametrically opposite side thereof and axially spaced therefrom; said second lug being adapted to engage a guide track to advance the closure toward sealing position together with the first lug to apply diametrically opposite parallel axial forces to the closure to insure accurate seating thereof.

7. Securing means for a container having an annular wall defining an opening into the container and a closure having an annular wall, with a confronting surface of each wall adapted for rotatable and translatable securing movement with respect to each other, comprising: a helical guide track in the form of a screw thread on the first one of the confronting surfaces; a first lug on the second confronting surface formed to engage said guide track and move therealong in a helical path to advance the closure toward sealing position with respect to the container; a safety locking track located axially beyond said guide track; a passageway for said lug extending generally axially between the guide track and an intermediate point of the locking track for axial translation of the lug to the locking track for further rotation to a safety locking position; said lug being selectively reversely movable to the guide track for release or for nonlocking sealing operation; a second lug on said second confronting surface at the diametrically opposite side thereof and axially spaced therefrom; and a second guide track on the first confronting surface; said second lug engaging said second guide track to advance the closure toward sealing position together with the first lug to apply diametrically opposite parallel axial forces to the closure to insure accurate seating thereof.

8. Securing means as claimed in claim 7; and a second locking track and second passage way in conjunction with the second guide track and arranged in the same relation as the first said guide track, locking track, and passageway; the second lug coacting with said second tracks and passageway in the same manner to produce a dual locking function.

9. Securing means as claimed in claim 8; said closure comprising a cap having a closed end and surrounding the annular wall of said container; said annular wall including a first, end section of predetermined diameter and a second, inner section of larger diameter; the first guide track being on the first section and the second guide track being on the second section; the first lug engaging the first guide track and the second lug engaging the second guide track.