

June 3, 1969

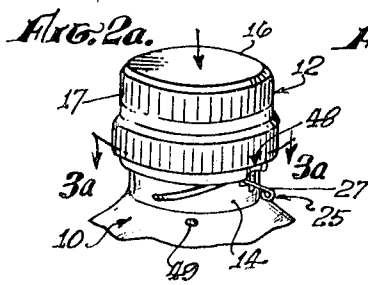
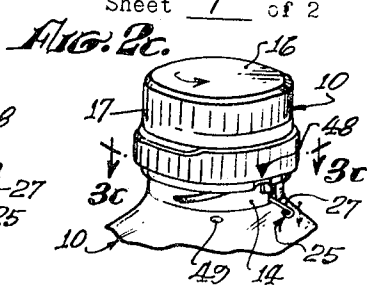
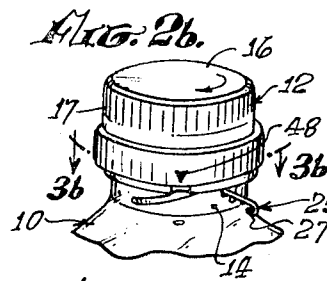
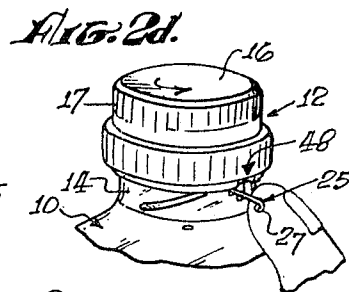
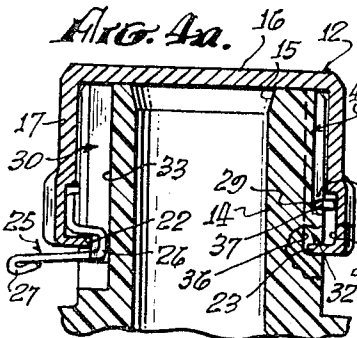
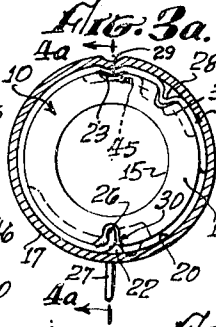
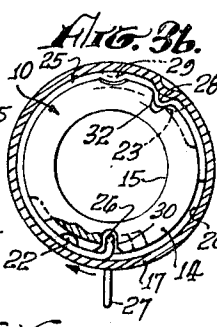
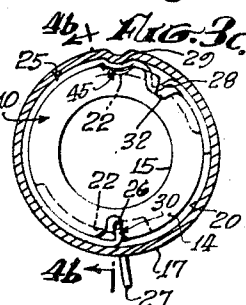
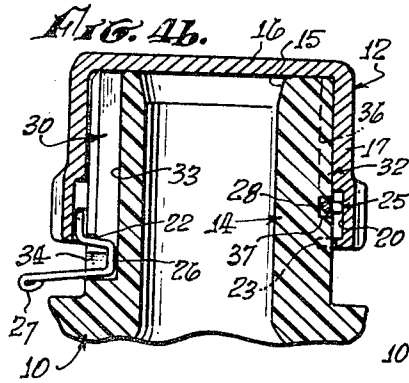
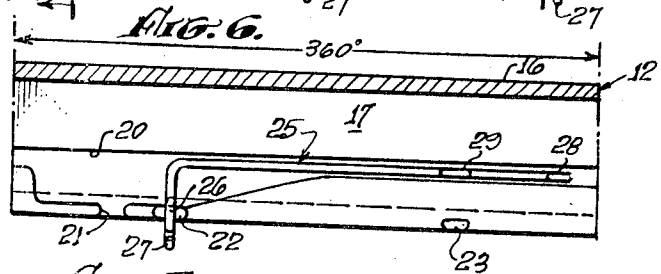
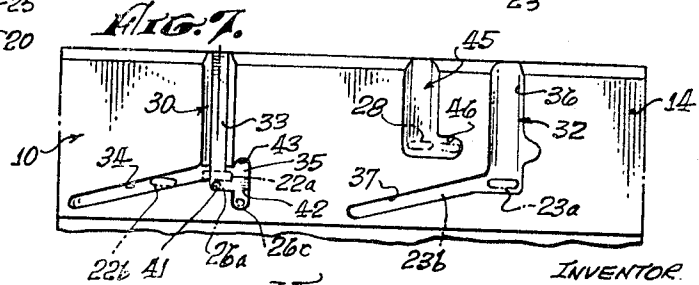
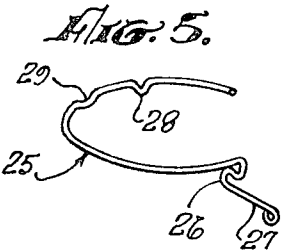
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3,447,709

LOCKING CAP FOR BOTTLES AND THE LIKE

Filed June 14, 1967

Sheet 1 of 2



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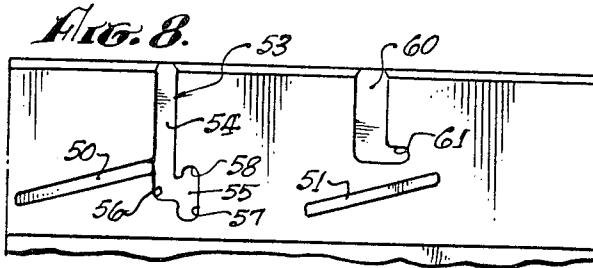
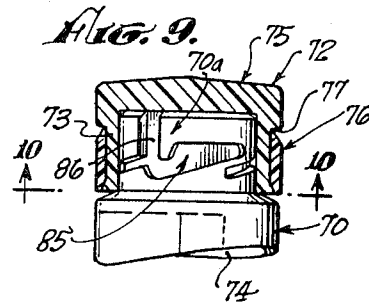
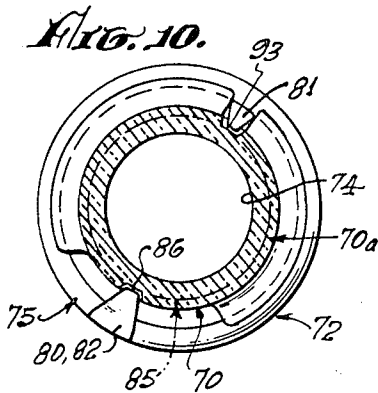
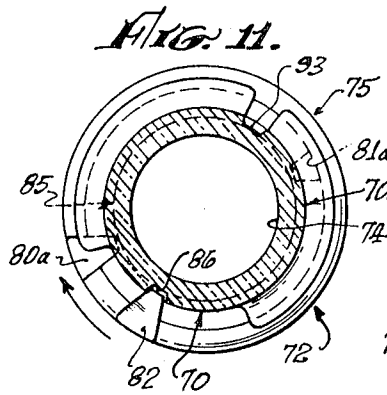
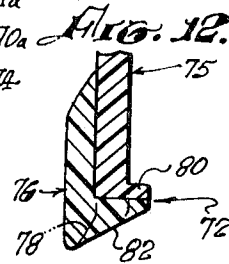
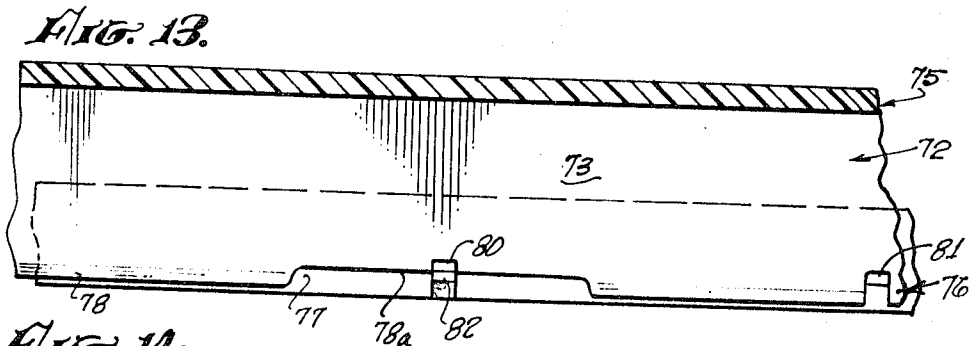
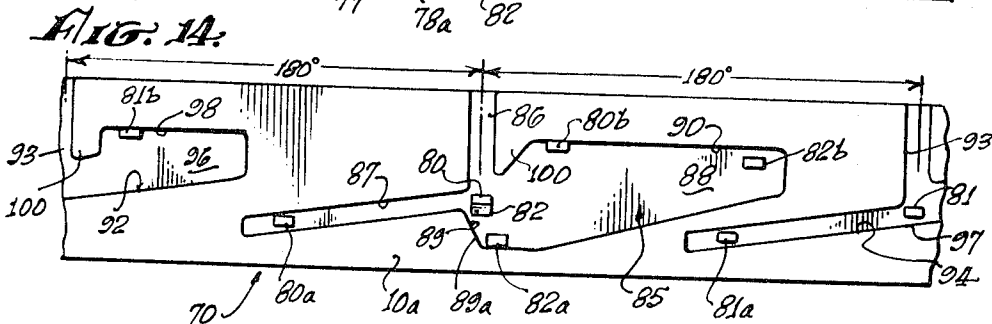
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LOCKING CAP FOR BOTTLES AND THE LIKE

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Sheet 2 of 2



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3,447,709

LOCKING CAP FOR BOTTLES AND THE LIKE

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13 Claims

ABSTRACT OF THE DISCLOSURE

A safety cap for an aspirin bottle or the like is provided with a relatively rotatable locking member that, unless manually held, is rotated with the cap and moved into a recess in the bottle neck, thereby preventing removal of the cap. When the locking member is properly manipulated, that is, held against this rotation by the cap, the cap can be removed in the usual manner. The safety cap is designed to deny young children access to drugs when packaged in conventional bottles of glass or plastic.

Background of the invention

The general field of the present invention is closures for containers; but it is more particularly concerned with a safety cap of the locking type for a bottle or similar container having a discharge neck open at one end and through which the contents of the bottle are discharged.

The present invention is designed particularly for bottles and similar containers having contents of such a nature that access thereto should be limited or made difficult for persons who might be injured by consuming the contents of the bottle without being fully aware of the consequences. An example, without implying any particular limitation on the invention, is a bottle of the familiar aspirin tablets. Aspirin is a common remedy for headaches and colds and is found in almost every household. While there is little danger to an adult from a substantial dose of several tablets, yet this very commonly found drug can be dangerous, if not lethal, to very young children when taken in large quantities.

Not infrequently, a curious child will take off the cap of an aspirin bottle, empty out the contents, and swallow a substantial number of the tablets. This is a more frequent or likely occurrence now that aspirin tablets have been especially sweetened or otherwise flavored to make them more palatable to children. Also, the children are conditioned to taking these tablets and the bitter taste of the aspirin itself has been eliminated so that it is no longer a deterrent to consumption of a substantial number of tablets. As a consequence of this childish curiosity, a large number of children have had to have their stomachs pumped out at the emergency hospital; and, upon occasion, such an accidental ingestion of the pills have resulted in death of the child.

There is also substantial danger, even to adults, with some of the less frequently encountered drugs, such as sleeping pills. A person getting up at night and wishing not to turn on the light in the bathroom can inadvertently take pills from a wrong bottle, sometimes with serious consequences. This could be prevented if the bottle were made sufficiently difficult to open that it was necessary to turn on a light, thus revealing the nature of the contents. It can also be prevented by the simple expedient of making the bottle sufficiently difficult to open that a drowsy or careless person is alerted to possible danger from the contents.

For these reasons, it is a general object of the present invention to provide a simple closure for containers, such as bottles and the like, that cannot be opened accidentally

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by a young child, or even by an adult unless special attention is paid to opening the container.

More particularly, it is an object of the present invention to provide a closure for bottles and the like that is novel, simple in construction and operation, and which requires a sufficient degree of attention and intelligence to manipulate the parts in order to open the bottle and discharge its contents that access to the contents can be denied to young children and careless persons.

Summary of the invention

The various objects of the present invention have been achieved by providing a container having a hollow discharge neck with a locking closure, such closure comprising a removable cap closing the open end of the neck and held in place or released by a twisting motion relative to the neck. The cap has at least one inwardly projecting lug, and preferably two lugs that are diametrically spaced apart engaging shoulder means on the bottle neck. A locking member is carried by the cap and is rotatable relative to the cap. The locking member has an inwardly projecting lug that can be moved into registration with one of the lugs on the cap, in which position the cap can be placed on the bottle neck. The neck on the bottle is provided with added shoulder means which cooperate with the lug on the locking member to prevent removal of the cap by twisting motion when the locking member is not properly restrained. Such shoulder means may typically be provided by the side of a recess or, under some circumstances, by a projecting ridge on the neck of the bottle.

In one typical embodiment of the invention illustrated, a pair of recesses are disposed at opposite sides of the neck, each recess having an axially extending entrance section and a pair of lateral sections which extend away from opposite sides of the axial entrance section. One of these laterally extending sections is adapted to receive the lug on the cap and is preferably inclined to the axis of the neck so that the cap is drawn on by cam action against the open end of the neck as the cap is twisted or rotated on the neck.

Other shoulder means provided by the recess engage the lug on the locking member to hold it against rotation as the cap is twisted to lock it in place. However, upon relative rotation in the reverse direction, the cap and the locking member have sufficient frictional engagement that they both move together, unless the locking member is manually restrained, so that the lug on the locking member moves ahead of the lug on the cap. Thus the lug on the locking member enters a portion of the recess where shoulder means are engaged that now hold the cap against removal.

Starting with the normal locking position, removal of the cap can be accomplished easily by holding the locking member stationary so that the lug on the cap is returned to the position in which it is aligned with the lug on the locking member, thus permitting removal of the two lugs through the axial section of the recess.

Description of the drawings

The present invention and its objects and advantages, as well as others not specifically mentioned herein, will be more readily understood by reference to the following description and to the annexed drawing, in which:

FIG. 1 is an exploded perspective view of a bottle having a neck and a locking cap embodying the present invention.

FIGS. 2a, 2b, 2c and 2d are enlarged fragmentary perspective views showing the locking cap in place on the bottle neck and illustrating the various rotational positions of the locking cap.

FIGS. 3a, 3b and 3c are transverse cross-sections as indicated by the section lines 3a—3a, 3b—3b, and 3c—3c

in FIGS. 2a, 2b and 2c respectively, illustrating the corresponding positions of the cap and locking member.

FIGS. 4a and 4b are enlarged longitudinal sections through the safety cap in place on the bottle neck, on lines 4a—4a and 4b—4b in FIGS. 3a and 3c respectively, illustrating two different positions of the locking member.

FIG. 5 is an enlarged perspective of the locking member alone.

FIG. 6 is a developed view of the inside surface of the cap and locking member, the locking member having its lug in alignment with the lug on the cap in position for placing the cap on the bottle neck.

FIG. 7 is a developed view of the exterior surface of the discharge neck of the bottle illustrating the recesses therein.

FIG. 8 is a view similar to FIG. 7 of a variational formation of the surface of the bottle neck.

FIG. 9 is a fragmentary side elevation of a variational form of the invention, a portion of the safety cap being broken away to show the configuration of the surface of the bottle neck.

FIG. 10 is a transverse section through the bottle neck and cap on line 10—10 of FIG. 9.

FIG. 11 is a view similar to FIG. 10 with the parts in an alternate position.

FIG. 12 is an enlarged fragmentary vertical section through the wall of the cap and locking member.

FIG. 13 is a developed view of the inside surface of the cap and locking member of FIG. 9.

FIG. 14 is an enlarged developed view of the exterior surface of the discharge neck of the bottle of FIG. 9 showing the recesses therein.

Description of a preferred embodiment of the invention

Referring now to the drawing, there is shown in FIGS. 1-7 a preferred embodiment of the invention which is considered to be typical of but not limitative upon constructions which embody the present invention. In FIG. 1 there is shown in side elevation a bottle 10 provided with a closure means indicated generally at 12 which is rotatably mounted upon the hollow discharge neck or spout 14 with which the bottle, or any similar container, is commonly provided. It may be assumed that the container is a moulded glass bottle or a plastic container, either of which materials are well known in the art; but it will be understood that the material of the container and its contents are not limitative upon the present invention. As may be seen from the drawing, and particularly FIG. 1, the discharge neck 14 has a generally cylindrical external surface in which are certain recesses, as will be further described. The neck is hollow to provide a discharge opening 15 at one end of the neck; and it is the purpose of closure 12 to seal the opening 15 to prevent discharge through the neck of the contents of the bottle. Such contents are typically tablets, granular material, or a liquid.

Closure 12 has preferably a cup-shaped cap having an end wall 16 and an annular side wall 17, the diameter of wall 17 being such that the cap can slide over the end of neck 14 to bring end wall 16 into contact with the end of the spout to close the discharge opening 15, as shown in FIG. 4. The bottle neck and closure 12 are so constructed that the cap is capable of limited angular rotational movement on the neck.

The inner face of annular wall 17 is provided with an annular groove 20. As may be seen particularly in FIG. 6, groove 20 is relatively narrow and has parallel side walls for a portion of its length; but it also has a wider section or bay 20a at which is located a notch 21 where the groove opens to the lower edge of cap 12. Adjacent to the lower edge of the cap and projecting radially inwardly from wall 17 is at least fixed one lug 22, a second similar lug 23 preferably being on the opposite side of the cap. These two lugs on the cap are parts of cooperating

holding means on the neck and on the cap which are engageable by relative turning movement of the cap on the neck to secure the cap in place, as in FIG. 4a closing the open end of the neck. Lug 22, which may be regarded as the primary lug, is located adjacent notch 21.

A locking member is rotatably mounted upon the cap. In this embodiment of the invention, this locking member is the spring wire member 25 illustrated in FIG. 5, this member being normally retained in groove 20. Locking member 25 can rotate within the groove relative to the cap, but frictionally engages the cap so that when unrestrained it turns with the cap. The top and bottom walls of groove 20 confine locking member 25 to prevent relative axial movement of the locking member and the cap, such restraint serving, as will become apparent, to hold the cap against removal under certain conditions.

Referring now to FIG. 5, it will be seen that the locking member has at one end inwardly extending projection 26 which projects inwardly beyond the inner surface of annular wall 17 (FIG. 4). Being located at the end of the arcuate portion of the locking member and formed as the small bight in the wire, projection 26 is so located that it extends around lug 22 and the narrowed cap wall at the lower edge of bay 20a. The wire then projects outwardly from the cap to provide a handle 27 by which movement of the locking member can be controlled in the manner which will be described later.

At another position, the locking member is provided with the second inwardly extending projection 28 which is likewise formed by a small bight in the wire, but this one is maintained at the same general level as the groove 20. Optionally, but preferably, a third small projection or bump 29 is provided which cooperates with a correspondingly shaped indentation in the annular wall of the cap to act as detent means restraining movement of the locking member. Locking wire 25 is made of spring wire and, although not shown in FIG. 6 for reasons of simplicity, wire 25 has a slight spiral configuration which causes the free end with projection 26 and handle 27 to be biased downwardly.

When projection 26 on the locking member is aligned with lug 22 on the cap, as shown in FIGS 4a and 6, the free exterior end of the locking member is held upwardly by engagement with cap lug 22 and the wall at the lower edge of groove 20. However, when the end of the locking member is at notch 21 the resilient nature of the locking member causes the end of the member to drop downwardly through the notch, assuming the position shown in FIG. 4b. The locking member can of course be returned to the raised position (FIG. 4a) by upward pressure applied manually to the end 27 of the locking member.

The bottleneck is provided with one or more recesses a collective purpose of which is to provide various shoulder means which cooperate with elements on the locking cap to perform two functions. In the first place the cap is held on the neck by relative twisting movement of the cap in order to hold in wall 16 of the cap over discharge opening 15 to retain the contents in the bottle. The second function is to cooperate with locking member 25 in a manner to prevent what may be termed inadvertent removal, that is, removal by a careless or uninformed person or by someone not an adult. By reference to FIG. 1 and FIG. 7, it will be seen that the neck has a pair of more or less similar major recesses indicated generally at 30 and 32. Recess 30 has an axially extending entrance section 33 which extends to the end of the bottleneck to admit elements on the cap, as will become apparent. At the other or inner end, recess 30 has a pair of lateral sections 34 and 35 which are oppositely disposed with respect to each other as they are largely at opposite sides of the entrance section 33.

The other recess 32 has an axially extending entrance section 36 which also extends to the end of the bottleneck to admit elements on the cap. At the inner end, recess 32 has a laterally disposed section 37 which is

similar in shape and extent to the section 34. The size of the recesses is determined to a large extent by the size of lugs 22 and 23 on the cap. The upper sides of the two lateral sections 34 and 37 provide means on the neck cooperating with means on the cap to hold the cap in place to close the neck and for this reason the two sections are inclined or helically arranged with respect to the neck axis.

Recess 30 is designed to provide other shoulder means at three different positions. These shoulder means are indicated at 41, 42 and 43.

The central portion of entrance groove 33 is illustrated as being deeper than remainder of the groove to accommodate projection 26; and this depth of cut is extended below the entrance to lateral 34, thereby providing shoulder 41 at the base of axial groove 33. Lateral section 35 is cut to the same depth to provide at two sides shoulders 42 and 43 engageable by projection 26. While in detail this is an optional design, the arrangement serves to distinguish the different functions of the recess shoulders.

The bottleneck also has a third recess 45 which extends inwardly from the end of the bottleneck for a distance somewhat less than the other two recesses and has a single lateral or offset section which provides a shoulder 46.

Having described the construction of the improved locking closure, its operation will now be set forth. In order to place the closure on the bottleneck, the cap and locking member are rotated relative to each other to bring the parts into the relative position shown in FIG. 6 in which the bight 26 on the locking member is aligned with and passes around fixed lug 22 on the cap. In this position, detent hump 29 on the locking member is opposite an inwardly convex surface on the cap to hold the locking member and the cap against accidental movement.

With the parts in this alignment, the closure can be placed on the bottleneck by axial movement, bringing the cap to the position of FIG. 2a. Lug 22 and bight 26 enter recess 30; lug 23 and hump 29 being mutually aligned enter recess 32; and locking bight 28 enters recess 45. In viewing FIGS. 6 and 7 it will be remembered that the figures represent the inside and outside developed surfaces of two cooperating elements so that bight 28 and groove 45 appear in the drawing on opposite sides of an axis through lug 23 and recess 32 in these two figures.

The cap can move downwardly on the bottleneck until locking lugs 22 and 23 reach the inner or base ends of their recesses, as indicated at 22a and 23a respectively in FIG. 7. One or both of the two lugs may bottom at the end of axial grooves 33 and 36 to locate them opposite the entrance to the inclined lateral sections 34 and 37 of the two recesses. Now by relative rotation of the cap on the neck, the locking lugs 22 and 23 enter and pass along recesses 34 and 37 respectively. The upper helical surface of each of these two recesses provides a shoulder means which engages and cooperates with the associated locking lug on the cap to draw the cap down tightly by cam action against the open end 15 of the discharge opening in the neck, thereby securely closing the bottle.

At the end of this inward movement of the cap the projecting handle portion 27 of the locking member is just below the entrance to lateral recess section 34 and in engagement with shoulder 41. This engagement with the shoulder on the bottle holds the locking member against rotation so that the locking member remains stationary with respect to the bottleneck as the cap is twisted toward the left in FIG. 7 into the locked position. As a result there is angular movement between the cap and the locking member, the parts now being advanced to the positions shown in FIG. 2b and 3b with the cap lugs at 22b and 23b in FIG. 7. To assist in orienting the parts properly and manipulating the cap, it is preferred to place on the outside of the cap an index marking as at 48 and to place a second index marking 49 on the bottle. The marking 48 is aligned with cap lug 22; and index 49 on the

bottle is opposite the position which should be occupied by index 48 when the closure is tightly in place. Consequently comparison of the relative positions of these indices in FIGS. 2a and 2b indicate the extent of the angular movement of the cap to move it to the locked position.

Locking lug 28, being part of the locking member, remains at the base of groove 45 in its original position.

Removal of the cap by knowledgeable person is simple. One finger of the hand holding bottle 10 is pressed against projecting handle 27, as shown in FIG. 2d to hold the locking member in place in contact with shoulder 41. With the other hand, cap 12 is twisted relative to the bottle-neck in the opposite direction to that required to lock it, as is well known in the art. With the design as shown, that direction is counterclockwise, viewed from above.

This counterclockwise motion of cap 12 moves locking lugs 22 and 23 outwardly of recess sections 34 and 37 respectively into alignment with the axial grooves 33 and 34. This movement, combined with holding the locking members stationary, returns the parts to the positions shown in FIG. 7 and the cap can be removed from the bottle by straight axial movement along the bottleneck.

However, should a person unaware of the nature of the locking member simply try to open the bottle by twisting the cap and without holding the locking member in place, then the locking member comes into action. The counterclockwise movement of the cap in a direction to open it carries with it locking member 25 because of the frictional engagement between the locking member and the cap. This moves handle 27 to the right in FIG. 7 and it springs from the base of groove 33 into a trap at position 26c in the lateral offset 35. One side of this trap is shoulder 42 which limits the counterclockwise movement of the locking member. The resilient nature of the locking member causes the handle end 27 to snap downwardly through notch 21 so that the handle reaches the bottom of the trap at the position 26c shown in FIG. 4b. This same movement carries locking bight 28 into the laterally offset portion of recess 45. The result is that when the normal locking lugs 22 and 23 are freed of engagement with inclined grooves 34 and 37, the cap is restrained against axial movement since bight 26 is carried into contact with shoulder 43 and bight 28 is carried into contact with shoulder 46. These shoulders are both disposed in substantially a common radial plane so that axial removal of the cap is prevented.

The relatively depressed end of recess 35 provides a trap which holds handle portion 27 of the locking member against any but very limited angular movement. This makes it impossible for the locking member and the cap lug 22 to become again aligned with each other simply by twisting the cap, a condition which would permit a child working the cap back and forth to move the parts into position by chance at which the cap could be removed. In other words, this trap at the base of recess 35 is an additional safeguard to prevent accidental removal of the bottle cap.

To place the closure elements in position for removal of the cap now requires positive action. This can be accomplished by lifting upwardly on the end of handle 27 to elevate the handle and the bottom of bight 26 to the level of the base end of groove 33, and then moving the handle to the left in FIG. 7 to return bight 26 to the position 26a. Here the bight is in contact with shoulder 41 at the base of groove 33. At the same time cap 12 is rotated clockwise to return cap lugs 22 and 23 to the holding positions indicated at 22b and 23b respectively. Now with the parts in the normal closed position, the cap can be removed by properly restraining the locking member against angular movement with, and as a result of turning, the cap, by engaging the end of handle 27 with the forefinger of the hand holding the bottle, as described above and shown in FIG. 2d.

Description of variational forms

Various departures from the structure as so far de-

scribed can be made. Without attempting to exhaust all of the possible variations, a few of the possible changes will be mentioned as indicative and illustrative of such changes. One such deals with the small bend or hump 29 in the locking member. This is intended to cooperate with a similar hump or convexity in the face of groove 20 to hold the locking member in the position illustrated in FIG. 6, which is the position for placing the closure on or removing it from bottleneck 14. This detent means can be eliminated entirely; or the detent function can be combined with locking bight 28 by repositioning the hump in the face of groove 20.

This latter arrangement would have the effect of eliminating detent 29 as a separate member and combining it with bight 28, thereby eliminating the need for a separate groove 45. As a result the bottleneck would be the same as illustrated in FIG. 7 with respect to recesses 30 and 32 but the recess 45 would be eliminated and the shoulder means 46 would then be provided by a laterally offset portion of groove 32.

As already mentioned, the closure means embodies elements performing two functions. The cap closes the end of the neck by a relative twisting movement. For this purpose it is provided with two fixed lugs 22, 23 which cooperate with shoulder means provided by the sides of grooves 34 and 37. There being two such lugs, there are two recesses, each with an entry section and lateral sections. If the number of locking lugs is changed, the number of cooperating recesses is changed equally.

The second function is to lock the cap in place against casual or inadvertent removal. This is performed by a locking member engageable with suitably designed shoulder means on the bottleneck. This requires recesses on the bottleneck which can be combined to a greater or lesser extent with the recesses provided as above described to receive and cooperate with lugs 22 and 23.

A closure 12 as already described can perform these same functions with a slight modification of the surface configuration of the bottleneck, as illustrated in FIG. 8. It will be seen from the immediately following description that the bottleneck illustrated therein is generally the surface that would be produced on the bottleneck by reducing the external diameter of the neck by the depth of the inclined grooves 34 and 37 but still retaining as ridges 50 and 51 a narrow strip of the bottleneck along the upper faces of grooves 34 and 37. Thus the ridges 50 and 51 provide on their lower sides shoulder means corresponding to the upper faces of grooves 34 and 37. Recess 53 corresponds to the central deeper section of recess 30, it being provided with an axial entrance section 54 and a laterally offset section 55 at its inner end. At the inner end or base of section 54 is shoulder 56 while the lateral offset 55 provides shoulders at 57 and 58. These three shoulders correspond in placement and function to shoulders 41, 42, 43 respectively already described. Recess 60 now corresponds to recess 45 and has shoulder means 61 in its laterally offset inner end 62.

The operation of the closure with a bottleneck of this configuration is the same as already described. The bight 26 is aligned with lug 22 and the cap is placed on the bottleneck by axial movement, bringing the bight 26 along recess 54. After lug 22 passes ridge 50, the corresponding lug 23 at the opposite side of the cap is then underneath ridge 51. Relative axial movement of the cap on the bottleneck engages these lugs with the shoulder means provided by ridges 50 and 51 to hold the cap in closed position while bight 26 is held fixed by engagement with shoulder 56. It will be apparent without further description that the cap can be removed in the same manner already described above.

In the event that the cap is twisted reversely in a direction to loosen it but without restraining the locking member by engaging handle 27, then the bight 26 and handle 27 move into recess 55, the handle snapping down into the trap at the base of recess 55 and holding the cap

against axial removal. The locking hump 28 at the opposite side of the neck is at the same time moved into the laterally offset end of recess 60 where, by engagement with shoulder 61, the hump holds the cap against axial removal.

Referring now to FIG. 9, there is shown in side elevation the neck of a bottle 70 which is provided with closure means indicated generally at 72, such closure means being rotatably mounted upon the hollow discharge neck or spout 70a. As is apparent from FIGS. 10 and 11, neck 70a of the bottle has a generally cylindrical external surface and is hollow to provide a discharge passage 74 which opens to the outer end of the neck. It is the purpose of closure 12 to seal the open end of discharge passage 74.

The closure 72 comprises a one-piece, cup-like cap 75 on which is rotatably mounted for limited angular movement the external locking ring 76. Cap 75 has an end wall which is adapted to bear against the end of neck 70a to close discharge passage 74, as shown in FIG. 9. The annular wall 73 of cap 75 fits over and around the bottleneck, being rotatable with respect to the exterior surface of the neck.

The ring and cap are held together against relative axial displacement in any suitable manner. Typically, such means may include annular shoulder 77 formed externally on the cap and against which the upper end of ring 76 bears, while the lower end of the cap is spun outwardly as at 78 against portions of the lower end of the ring to provide a shoulder engaging the lower end of ring 76. The ring is confined thus against endwise or axial movement relative to the cap but is free to turn through a substantial angle relative to the cap.

In order to lock the closure means on the container, cap 75 is provided at its lower or inner end with at least one and preferably two inwardly turned lugs 80 and 81. While the locking means becomes fully operative with only one lug 80, it is obviously preferable to provide two such lugs at opposite sides of the cap in order to provide a better locking action and a tighter seal at the end of discharge passage 74. Locking ring 76 is also provided with a single inwardly projecting lug 82 which, by rotation of the ring relative to the cap, can be brought into registration with cap lug 80 as shown in FIG. 13.

The exterior peripheral surface of neck 70a is provided with one or more recesses, the number of these recesses being equal to the number of lugs 80 and 81 on the cap. There being two such lugs disposed at substantially opposite sides of the cap, there are two such recesses also disclosed at opposite sides of the neck, in this case 180° apart. There would be three such recesses if it were decided to employ three lugs on the cap, and so on. One of these recesses is shown at 85 in FIG. 9 while both of the recesses 85 and 92 are shown in the developed view FIG. 14.

Considering first recess 85 which cooperates with cap lug 80, the recess includes an axially extending entrance groove 86 which opens to the end of bottleneck 70a and has a minimum width as may be required to receive the two lugs 80 and 82 when axially aligned. Near the inner end of entrance section 86, the recess extends laterally in both directions. One of these lateral extensions is a relatively narrow groove of uniform width indicated at 87 while the extension at the opposite side of the entrance section is wider and of irregular shape as indicated at 88. To provide a cam action which draws the cap down against the mouth of discharge passage 74, recess section 87 is inclined to the axis of the bottleneck, that is it is inclined downwardly away from the entrance end adjoining axial section 86 of the recess.

The laterally extending recess section 88 at the opposite side of entrance section 86 is wider than section 87 and is dimensioned both circumferentially and axially to receive both lugs 80 and 82, particularly after the lugs have been angularly spaced apart in a manner which will be described. At one side of the entrance groove 86 is

shoulder 89 which is so located as to engage lug 82 on the ring and hold the ring against rotation in one direction relative to the cap, although it will be seen in FIG. 14 that lug 82 is free to move in the opposite direction of rotation into lateral recess section 88. There is also provided by a wall of the recess lying in a transverse plane shoulder means 90 at the upper side of lateral extension 88. This shoulder means is engageable by lug 80 on the cap to hold the cap against being removed axially from the container.

The other major recess 92 which cooperates with lug 81, also includes an axially extending entrance groove or section 93. The two entrance grooves 86 and 93 are spaced around neck 70a according to the spacing between cap lugs 80 and 81, typically 180° apart. However, this spacing may be varied within limits. One of the entrance grooves, as for example groove 93, is preferably made wider than the other groove 86 in order that the cap can be put on the bottle only when oriented in one position relative to the neck. By making lug 81 wider than the other lug 80, lug 81 cannot be passed through entrance groove 86. Another way of accomplishing the same result is to space lugs 80 and 81, and also grooves 86 and 93, by an interval of other than 180°.

Like the recess first described, recess 92 has a lateral extension 94, shaped and inclined similar to lateral extension 87, because this extension is designed to receive and cooperate with the second cap lug 81 to tighten the cap on the bottleneck with the same twisting motion as described. Thus the upper surfaces of both inclined grooves 94 and 87 act as camming surfaces to draw the cap down against the end of neck 70a in a well known manner.

At the side opposite to entrance groove 93 this recess has an enlarged lateral extension 96, but this extension may be somewhat smaller than lateral section 88 already described. It can be of lesser circumferential extent, since it is not necessarily designed to receive more than the one lug 81 on the cap. Also, the lower or inner edge of the recess may be at the level of the corresponding edge or wall of lateral extension 94, thus providing at the end of entrance groove 93 stop means at 97 which limits the inward travel of cap lug 81 through the entrance passage to a position in which the cap lug is positioned opposite the entrance to lateral extension 94. Since the two cap lugs 80 and 81 are at the same level, the other lug 80 is likewise positioned opposite the entrance to lateral extension 87. One side of recess 96 is in the plane of recess wall 90 and provides a stop 98 which, like shoulder 90, is engageable by a cap lug to prevent removal of the cap when the lug is in the lateral extension 96 and is not aligned with entrance groove 93.

Having described the construction of the second embodiment of the invention, its operation will now be described. To permit placing the closure on the neck of the bottle, the cap and ring are rotated relative to each other to bring lug 82 on the outside ring into registration with one lug 80 on the cap (FIGS. 10 and 13). Ordinarily, it will always be the same lug on the cap since with the construction illustrated the rotational movement of the ring relative to the cap is limited to the range of travel of lug 82 in the space 78a between two successive flanges 78; however, other constructions are possible in which the locking ring has a full 360° freedom of movement. With the lugs aligned as shown in FIG. 13, the closure can now be applied to the end of the container neck by inserting aligned lugs 80 and 82 in entrance groove 86 and lug 81 in entrance groove 93. The closure is now moved axially inwardly along neck 70a until one lug 81 reaches the inner wall of 97 of recess 96, as illustrated in FIG. 14.

At this position, both cap lugs are positioned opposite the entrance end to one of the lateral recess sections 87 or 94, as shown at 80 and 81 in FIG. 14. The ring lug 82 is opposite recess wall at 89 which prevents circumferential movement of the ring with the cap as the cap

is rotated clockwise, or to be left as the elements are viewed in FIG. 14. This carries the cap lugs into the lateral extensions 87 and 94. This rotational movement of the cap is continued until the end wall of the cap is in firm engagement with the end of neck 70a by the camming action produced by inclination of the shoulders provided by the upper sides of recess extensions 87 and 94.

At the end of this movement, lugs 80 and 81 have been moved to the positions 80a and 81a in FIGS. 11 and 14, while ring lug 82 has been moved inwardly and is within recess 85 at the position 82a. This referred to as the sealing position in which discharge passage 74 is closed and the cap is tightly held in place. It will be noted that lugs 80 and 82 have now become angularly spaced since engagement with wall 89 has held the locking ring against rotational movement with the cap as the cap was moved clockwise.

It is preferred, but optional, to incline recess wall 89 away from an axial plane. The result is to force lug 82 toward the right as the closure is moved into sealing position; and as a result it is no longer aligned at the position 82a with the entrance groove 86. The advantage is that the closure is less easily removable, as will become more readily apparent.

When a person not familiar with the proper manipulation of the closure means attempts to open the bottle the first action is usually simply to rotate the entire cap and ring in a counterclockwise direction. Since the cap and ring frictionally engage each other, the turning movement of the cap carries with it the locking ring and the result is that both lugs 80 and 82 are moved into recess 88 while maintaining their angularly spaced relationship. At the same time cap lug 81 is moved into lateral recess 96. The cap is now loosened on the bottleneck but it cannot be removed since relative axial movement of the cap with respect to the neck brings lugs 80 and 81 into engagement respectively with shoulders 90 and 98 as shown by the lug positions 80b and 81b in FIG. 14. Lug 82 on the locking ring is now in the position 82b making chance removal of the cap more difficult. It is preferable that shoulders 90 and 98 be separated from their respective associated entrance grooves 86 and 93 by a short downwardly projecting barrier, as indicated at 100. These projections 100 reduce the size of the access opening to entrance grooves 86 and 93 and consequently make less likely the possibility of opening the bottle by chance as a result of working the cap back and forth.

The proper procedure for preparing the closure means for removal is first to bring lugs 80 and 82 into registration. This can be accomplished easily by referring to index markings on the cap and ring respectively. The user merely aligns these index marks, thereby knowing that the lugs 80 and 82 are in registration. By rotating the cap and ring to bring the registered lugs opposite the inner end of entrance groove 86, they have been returned to the initial position as shown in FIG. 14 and previously described. All of the lugs are now opposite the entrance grooves and are free to move axially outward, allowing the cap to be freely removed from the container.

This last operation requires the use of two hands when the inclined section 89 of the recess wall is provided. The circumferential offset it provides makes necessary simultaneously manipulation of both cap and ring to bring about registration as the closure is simultaneously pulled axially off the neck. The two-handed manipulation is simple for an adult who understands the operation but it is a complete mystery to a young child; and even an adult will probably require enough light to align the index marks and to properly manipulate the bottle top to disclose the nature of the contents, thereby providing a safeguard against an inadvertent dose of a dangerous medication.

From the foregoing description, it will be apparent that various changes in the detailed construction and arrangement of the elements of the improved closure means may

be made by persons skilled in the art without departing from the spirit and scope of the present invention. Accordingly, it is to be understood that the foregoing description is considered as being illustrative of, rather than limitative upon, the invention.

I claim:

1. The combination of a hollow discharge neck on a container and open at one end, and a removable cap fitting over the neck to close the open end thereof, characterized by

cooperating holding means on the neck and on the cap engageable by relative twisting movement of the cap and neck in one direction to secure the cap on the neck in a position sealing the open end thereof;

a locking member rotatably mounted upon the cap and having a projection extending inwardly from the cap;

said neck having external shoulder means in addition to said holding means providing a first stop engaged by said projection upon said relative twisting movement and a second stop engaged by the projection to prevent axial removal of the cap when the projection is in a position spaced from the first stop and reached by relative twisting movement in a direction to disengage said holding means;

and means accessible externally of the cap for manual engagement to hold the locking member against rotation by the cap.

2. The combination as in claim 1 in which the neck has an external recess the side walls of which form said shoulder means, the recess extending along the neck inwardly from the open end of the neck and having an enlargement at its inner end.

3. The combination as in claim 2 in which the external recess has a helically directed section of which one side-wall is a part of the holding means.

4. The combination as in claim 2 in which the cap and locking member each have inwardly extending projections that are movable into alignment to enter the recess and are movable out of alignment respectively to hold the cap on the neck in sealing position and to prevent removal of the cap from the neck.

5. The combination as in claim 1 in which an element of the holding means on the cap and said projection are arranged when in mutual alignment to be movable into engagement respectively with a cooperating element of the holding means on the neck and the first stop and then when rotated out of mutual alignment to bring the projection of the locking member into engagement with the second stop.

6. A container as claimed in claim 1 in which the locking member is a resilient wire of which a terminal portion projects outwardly of and beneath the cap, the cap having a notch at which the terminal portion of the wire is free of axial restraint by the cap.

7. A container as claimed in claim 1 in which the locking member is externally mounted on the cap.

8. The combination comprising:

a hollow discharge neck on a container having an external surface with a recess therein;

and a removable cap closing one end of the neck and rotatable relative to the neck, said cap having a fixed inwardly projecting lug, and a locking member on the cap and angularly movable relative thereto, said locking member having a second lug projecting inwardly of the cap and registrable with the fixed lug on the cap;

said neck recess having an axially extending entrance groove adapted to receive the lugs on the cap when in mutual registration and a lateral section extending away from the entrance groove at each of two opposite sides thereof;

said neck recess providing shoulder means engaging the second lug to hold the second lug against rotation on the neck while the cap is rotated in one direction to move the fixed lug thereon into one of said lateral sections of the recess;

and said locking member frictionally engaging the cap to be turned thereby and having at least a portion of the member externally accessible whereby the locking member can be manually engaged and held against turning with the cap.

9. The combination as claimed in claim 8 in which said one of the lateral sections of the recess is inclined with respect to a radial plane whereby the cap is drawn against the end of the neck by rotation of the cap with the fixed lug in engagement with a side of the inclined lateral section.

10. The combination as claimed in claim 8 in which said one of the lateral sections is of a width to receive only the fixed lug on the cap and the lateral section on the opposite side of the entrance groove is dimensioned to receive both lugs.

11. The combination as claimed in claim 10 in which the last-mentioned lateral section provides a shoulder engageable by one of said lugs to prevent removal of the cap, and said last-mentioned recess has sufficient circumferential extent to receive the fixed lug and the movable lug when angularly spaced apart.

12. The combination of a hollow discharge neck on a container and open at one end, and a removable cap fitting over the neck to close the open end thereof, characterized by

cooperating holding means on the neck and on the cap engageable by relative twisting movement of the cap and neck in one direction to secure the cap on the neck in a position closing the open end thereof;

said holding means including fixed mating surfaces on the neck and cap of which a surface on the neck has a helical configuration;

and a single locking member mounted on the cap for angular movement relative thereto and having a projection extending inwardly from the cap;

said neck having an external recess including a relatively narrow, elongated first section extending axially of the neck from the open end thereof adapted to pass the projection and a second section circumferentially offset from the first section, and providing angularly disposed shoulder means engageable by the projection when in the second section to prevent axial removal of the cap from the neck and to hinder free return of the projection to the first section.

13. The combination as in claim 12 that also includes means accessible externally of the cap for manual engagement to hold the locking member against rotation by the cap.

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