Nov. 6, 1951 L. S. BELL 2,574,239

SCREW CAP WITH LOCKING MEANS

Filed Jan. 24, 1951 2 SHEETS--SHEET 1

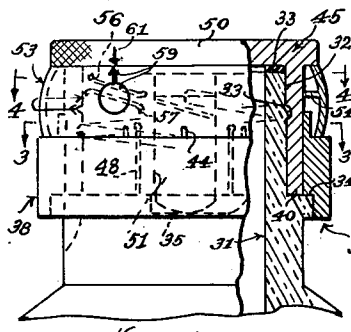


Fig. 1

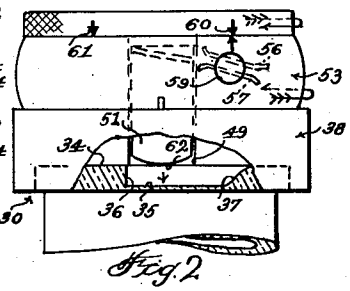


Fig. 2

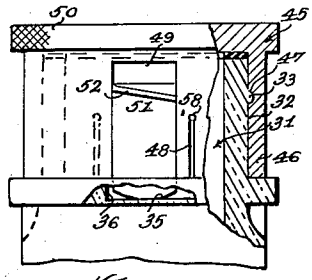


Fig. 5

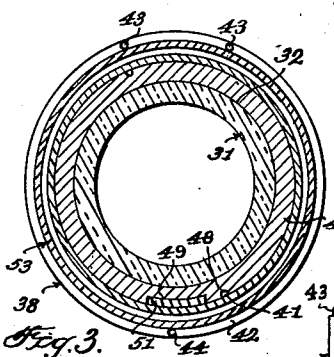


Fig. 3

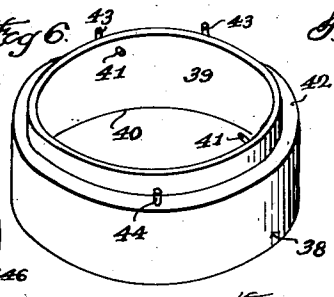


Fig. 6

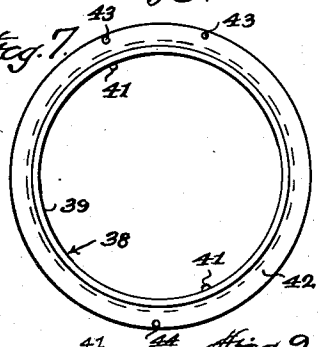


Fig. 7

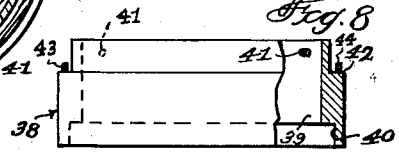


Fig. 8

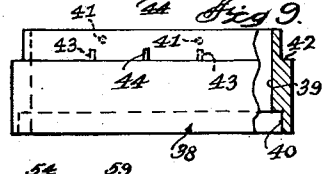


Fig. 9

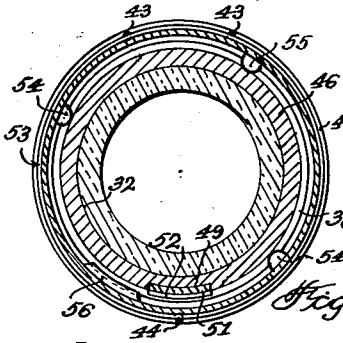


Fig. 4

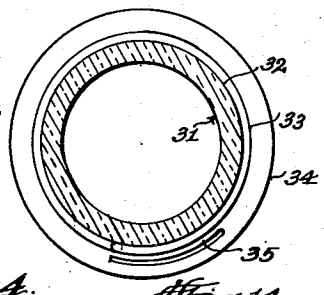


Fig. 14

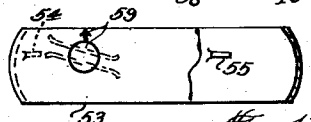


Fig. 11

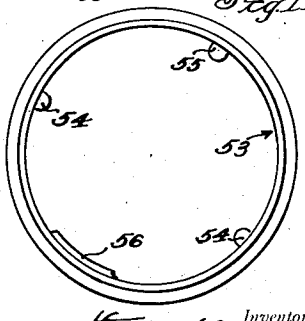


Fig. 10

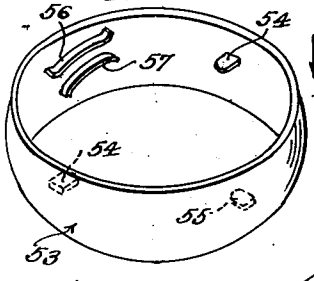


Fig. 12

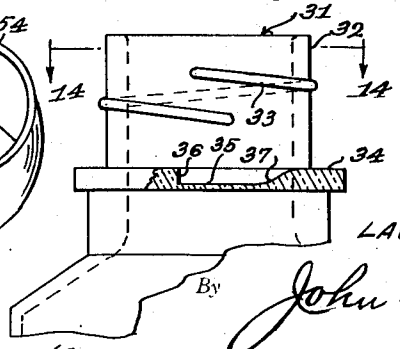


Fig. 13

Inventor

LAWRENCE S. BELL

By John N. Randolph

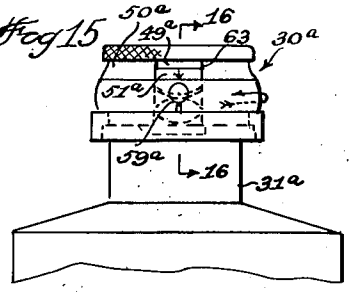
Attorney

Nov. 6, 1951 L. S. BELL 2,574,239

SCREW CAP WITH LOCKING MEANS

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Fig 15



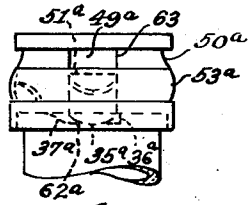


Fig 27

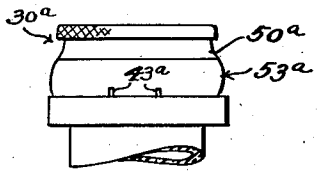


Fig 18.

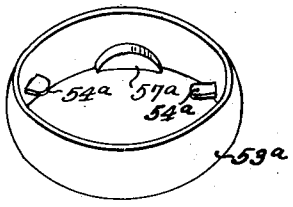


Fig 24

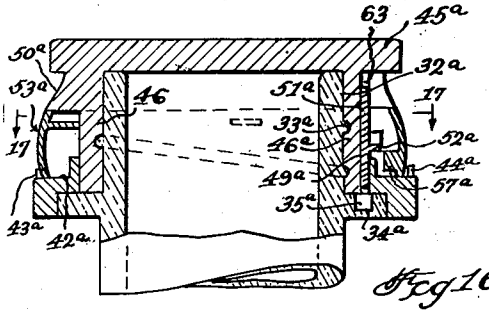


Fig 16.

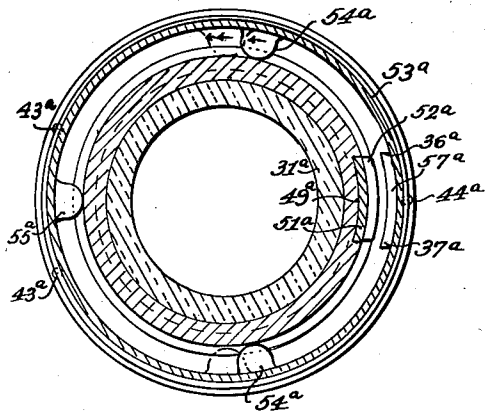


Fig 17.

Fig 19.

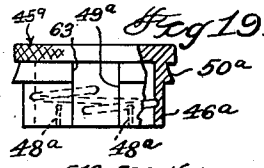


Fig 20

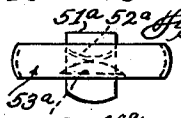


Fig 22.

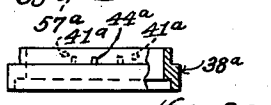


Fig 21.

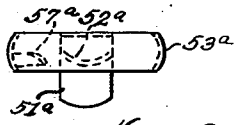


Fig 23.



Fig 25.

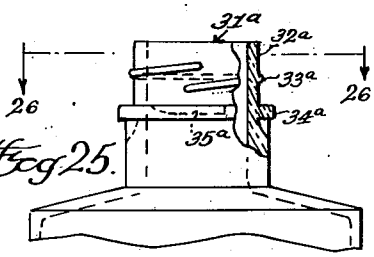
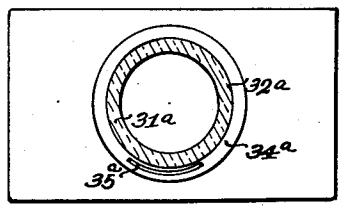


Fig 26.



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Attorney

Patented Nov. 6, 1951 2,574,239

UNITED STATES PATENT OFFICE

2,574,239

SCREW CAP WITH LOCKING MEANS

Lawrence S. Bell, Owings Mills, Md.

Application January 24, 1951, Serial No. 207,640

8 Claims. (Cl. 215—82)

1

This invention relates to an improved construction of closure cap for use with bottles, jars, tubes or other containers and has for its primary object to provide a cap of the screw type which may be effectively locked in an applied position to prevent removal of the cap without first actuating an unlocking mechanism to thereby provide an effective closure which will not be removed by mistake.

Many serious mishaps have occurred by a person accidently, as for example in the dark, removing a cap from one container, mistaking the container for another container and then applying or taking internally the contents of the mistaken container which might be of a poisonous character or otherwise harmful. Accordingly, it is an object of the present invention to provide a cap which may not be removed for exposing the contents of the container which it closes until a locking mechanism has first been operated thus serving as a warning to the user or potential user to carefully check the container before using any of the contents thereof.

Another object of the invention is to provide a locking mechanism which will be very difficult to unlock in the dark thus practically requiring the use of illumination for unlocking the cap or closure thus giving the user an opportunity to carefully inspect the container.

A further object of the invention is to provide a locking cap which may be readily locked or unlocked by any one familiar with the use thereof but which is rather difficult to unlock by one inexperienced with the device or by a child thereby making it substantially impossible for a child to unlock or obtain access to containers the contents of which are poisonous or otherwise harmful.

A further object of the invention is to provide a locking cap of extremely simple construction which is capable of being very economically manufactured and sold, which will be extremely efficient and durable for accomplishing its intended purpose and the operation of which may be readily accomplished by one familiar with the use thereof.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating preferred embodiments thereof, and wherein:

Figure 1 is a side elevational view, partly in vertical section showing the invention applied to a bottle or jar neck and disposed in a locked position;

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Figure 2 is a side elevational view, partly in vertical section showing the invention in an unlocked position;

Figures 3 and 4 are horizontal sectional views taken substantially along planes as indicated by the lines 3—3 and 4—4, respectively, of Figure 1;

Figure 5 is a side elevational view, partly in vertical section of the invention with certain of the parts omitted to illustrate details;

Figure 6 is a perspective view of one element of the invention;

Figure 7 is a top plan view thereof;

Figure 8 is a side elevational view, partly in vertical section of the same;

Figure 9 is a view similar to Figure 8 but showing a different portion of said element;

Figure 10 is a plan view of another element of the invention;

Figure 11 is a side elevational view, partly in section thereof;

Figure 12 is a perspective view of the same;

Figure 13 is a fragmentary side elevational view, partly in vertical section of the container neck with the other parts of the invention removed therefrom;

Figure 14 is a horizontal sectional view thereof taken substantially along a plane as indicated by the line 14—14 of Figure 13;

Figure 15 is an elevational view of a modified form of the invention showing the parts in an unlocked position;

Figure 16 is an enlarged vertical sectional view, partly in side elevation thereof taken substantially along a plane as indicated by the line 16—16 of Figure 15, on an enlarged scale;

Figure 17 is a horizontal sectional view on an enlarged scale taken substantially along a plane as indicated by the line 17—17 of Figure 16;

Figure 18 is a side elevational view looking in the opposite direction to Figure 15;

Figure 19 is a side elevational view, partly in section of one element of the invention;

Figure 20 is a side elevational view showing other elements thereof removed from the assembly;

Figure 21 is a view similar to Figure 20 showing the locking element in a locking position;

Figure 22 is a view similar to Figure 19 of another element of the assembly;

Figure 23 is a perspective view of the locking element;

Figure 24 is a perspective view of the locking ring;

Figure 25 is a side elevational view, partly in vertical section of the container neck;

Figure 26 is a horizontal sectional view thereof taken substantially along a plane as indicated by the line 26—26 of Figure 25, and

Figure 27 is a side elevational view similar to Figure 15 showing the parts in a locked position.

Referring more specifically to the drawings, and first with reference to the embodiment of the invention as illustrated in Figures 1 to 14, the novel locking cap in its entirety comprising the invention is designated generally 30 and includes a receptacle or container neck, designated generally 31 which may form a part of any suitable container such as a bottle, jar or collapsible tube. The neck 31 includes an upper externally restricted portion 32 provided with an external left-hand thread 33. The neck 31 is provided with an externally enlarged upwardly facing annular flange defining an upwardly facing annular shoulder 34 at the lower end of the neck portion 32 which is provided with an upwardly facing groove 35, as best seen in Figure 2, having an upstanding shoulder 36 at one end thereof and an inclined surface 37 at its opposite end.

A collar, designated generally 38, has an upper bore portion 39 sized to be loosely disposed around and spaced from the neck portion 32 and is provided with an internally enlarged lower portion 40 which engages on the shoulder 34 and around the flange forming said shoulder and which is rotatably supported thereon. The bore portion 39 adjacent its upper end is provided with a pair of inwardly projecting pins or studs 41. The collar 38 is provided with an externally recessed upper portion 42. The externally recessed portion 42 defines an upwardly facing shoulder which is provided with a pair of spaced upstanding pins 43 which are located adjacent the periphery of the collar 38 and in relatively close proximity to one another and a single upstanding pin 44 is disposed diametrically opposite the space between the pins 43.

A cap, designated generally 45, has an annular portion 46 sized to engage around the neck portion 32 and within the collar bore 39. The portion 46 is provided with an internal thread 47 to engage the thread 33 and is provided with longitudinally extending external grooves 48 which open outwardly of its free end to receive the pins 41 for keying the cap 45 to the collar 38 for rotation of the cap and collar as a unit. The cap portion 46 is provided with a relatively wide groove 49 which opens outwardly of its free end and which opens into the groove 35 when the cap 45 is in an applied position, as illustrated in Figures 2 and 5. The cap 45 at its upper end is provided with an externally enlarged knurled head 50 defining a downwardly facing shoulder surrounding the upper end of the cap portion 46.

A locking strip 51 is slidably disposed in the groove 49 and is of a length slightly less than the length of said groove to be disposed completely therein when in a raised position as seen in Fig. 2. The strip 51 is transversely bowed as seen in Figure 4 to conform to the curvature of the cap portion 46 and is retained in the groove 49 by the collar 38 which surounds the lower portion thereof. The strip 51 is provided adjacent its upper end and on its outer side with an outwardly projecting inclined lip 52 which extends transversely thereof.

A locking and unlocking ring 53 is rotatably

disposed around the upper portion of the cap 45, said ring being outwardly bowed between its upper and lower edges. The upper edge of the ring 53 engages under the enlarged head 50 and the lower edge of said ring is turnably supported on the upwardly facing shoulder of the collar recessed portion 42. The lower portion of the ring 53 is disposed inwardly of the pins 43 and 44 which thus retain the ring 53 normally concentric about the cap portion 46, as best seen in Figure 3. The locking and unlocking ring 53 is provided with a pair of spaced ears 54 which project inwardly thereof and which bear against the cap portion 46 above the collar 38, as illustrated in Figure 1. A single ear 55 projects inwardly from the ring 53 and is equally spaced from the ears 54. The ears 54 are each spaced a distance slightly greater than an arc of 90° from the ear 55 so that the ears 54 are not disposed in diametrical alignment, as illustrated in Figure 4, for a purpose which will hereinafter become apparent. A pair of top and bottom cam strips 56 and 57, respectively, project from the inner side of the ring 53, as best seen in Figure 12 and extend generally circumferentially thereof and are each inclined in the same direction. The terminals of the cam strips 56 and 57 are flared in directions away from one another. The cam strips 56 and 57 are disposed opposite the ear 55 and equally spaced from the ears 54.

To assemble the locking cap 30, the locking strip 51 is initially inserted into the groove 49 with its lower end above the lower end of said groove and the cap portion 46 is then inserted through the ring 53 and into the collar 38. The collar 38 is positioned so that its pins 41 will be received in the grooves 48 as the cap is inserted into the collar and the upper or closed ends of said grooves 48 may be deepened, as indicated at 58 in Figure 5, to releasably latch the collar to the cap and the ring on the cap and collar by a snap fit connection. The assembled parts 38, 45 and 53 are then attached to the neck 31 by threading the cap 45 on the neck portion 32 to engage the thread portions 33 and 47 constituting a left-hand thread and which is accomplished by turning the cap counterclockwise as seen in Figures 3 and 4 to apply it. When the cap is fully applied the groove 49 will open into the groove 35. The ears 54 and 55 will cooperate with the pins 43 and 44 to maintain the locking ring 53 normally concentric about the cap 45 and when thus disposed the cam strips 56 and 57 will be spaced outwardly from the lip 52 so that the ring 53 may be revolved relatively to the cap 45 and collar 38 without effecting any movement of the locking strip 51. The ring 53 is provided with indicia 59 disposed directly outwardly of the cam strips 56 and 57 to be aligned with a designating marker 60 on the cap flange 50 to indicate the proper initial position of the ring 53 to lock the closure 30 in an applied position. With the ring 53 positioned as seen in Figure 2 and with the indicia 59 and 60 in alignment, the thumb is pressed against the indicia 59 of the ring 53 to displace the cam strips 56 and 57 inwardly. The ring 53 is formed of a sufficiently resilient material so that when this occurs it can yield inwardly and the ears 54 will ride over the cap portion 46 toward diametrically aligned positions to thereby spread the ring 53 and allow the strips 56 and 57 to more readily be displaced inwardly. The portion of the ring 53 adjacent the ear 55 will be prevented

from moving away from the cap portion 46 by one or both of the pins 43. After the strips 56 and 57 have thus been displaced inwardly the ring 53 is turned clockwise from its position of Figure 2 to its position of Figure 1 and in so moving the cam strips straddle the lip 52 and the upper cam strip 56 will displace the lip 52 and the locking strip 51 downwardly to its locked position of Figure 5 with its lower end in the groove 35 to thus prevent the cap 45 from being turned clockwise as seen in Figures 3 and 4 to remove it from the neck 31. Thereafter with the ring 53 released, it may be revolved without the cam strips 56 and 57 engaging the lip 52 so that the locking strip 51 will be retained in a locked position and will abut against the shoulder 36 to effectively prevent the cap 45 from being unscrewed. However, to unlock the cap for removal, the indicia 59 is aligned with another marking 61 on the cap portion 50 and the indicia portion 59 is then pressed inwardly and the ring 53 thereafter turned counterclockwise as seen in Figures 3 and 4. The inward displacement will distort the ring 53 in the same manner as previously described so that when the ring is turned counterclockwise the low end of the bottom cam strip 57 will engage under the high end of the lip 52 and in riding under said lip will displace the locking strip 51 upwardly and back to its position of Figure 2 when the ring 53 has thus been moved counterclockwise from its position of Figure 1 to its position of Figure 2 to thus enable the cap 45 with the collar 38 and ring 53 carried thereby to be unscrewed clockwise as seen in Figures 3 and 4 to expose the open upper end of the neck 31. The lower end of the strip 51 is rounded as seen at 62 so that in the event that it drops downwardly while the cap is being applied and thus enters the groove 35 it will be cammed upwardly by an end of its bottom edge 62 engaging the inclined end 37 of the groove 35 and thus will not prevent the cap 45 being screwed onto the neck 31.

Figures 15 to 27, inclusive, disclose a slightly modified embodiment of the locking closure, designated generally 30*a*, including a receptacle or container neck 31*a* having an externally restricted upper portion 32*a* provided with an externally disposed right-hand thread 33*a*. The neck is provided with an external enlargement 34*a* below its portion 32*a* defining an upwardly facing annular shoulder provided with a groove 35*a* having an upright end wall 36*a* and an inclined end wall 37*a*. The parts 31*a* to 37*a* correspond with the parts 31 to 37 except that the thread 33*a* is a right-hand instead of a left-hand thread and the ends 36*a* and 37*a* of the groove 35*a* are reversed relatively to the groove ends 36 and 37. A collar 38*a* of the same general construction but of a reduced height is rotatably mounted on the enlargement 34*a* and turnably engages around the restricted annular portion 46*a* of the cap 45*a*. The collar 38*a* is provided with inwardly projecting pins 41*a* which engage grooves 48*a* on the exterior of the cap portion 46*a* in the same manner and for the same purpose as the pins 41 engage the grooves 48. A locking ring 53*a* is rotatably mounted around the cap portion 46*a* between its head portion 50*a* and the upwardly facing shoulder of the external recessed portion 42*a* of the collar 38*a*. Said shoulder 42*a* is provided with pins 43*a* and a pin 44*a* corresponding to and performing the same function as the pins 43 and 44. The ring 53*a* is provided with a pair of internally disposed ears 54*a* and an ear 55*a* corresponding to the ears 54 and 55 and disposed in the same relationship to one another as said ears, as best illustrated in Figure 17. The cap portion 46*a* is provided with an external longitudinally extending groove 49*a*, corresponding to the groove 49, for receiving a locking strip 51*a* corresponding to the strip 51 except that its outwardly projecting lip 52*a*, which extends transversely thereof is downwardly bowed, as best seen in Figure 23. The locking ring 53*a* is provided with a single cam member 57*a* disposed opposite the ear 55*a* having an upwardly arced upper surface, as best seen in Figure 24 for engaging under the lip 52*a* to displace the locking strip 51*a* upwardly to its unlocked position of Figures 15 and 16. In lieu of the upper cam strip 56, the cap portion 50*a* is provided with an outwardly opening recess 63 which communicates with the upper portion of the slot 49*a* so that the upper end of the strip 51*a* will be exposed, when in an unlocked position, to enable the user to insert a fingernail into the recess 63 against the upper edge of the locking strip 51*a* to displace said locking strip downwardly to engage its arcuate lower end 62*a* in the groove 35*a* for locking the cap 45*a* in an applied position, as illustrated in Figure 27. When thus locked, the upper edge of the strip 51*a* may not be manually engaged to elevate said strip and unlock the cap but by pressing inwardly on the portion 59*a*, corresponding to the indicia 59 and which is located outwardly of the cam 57*a*, said cam will be displaced inwardly by distortion of the ring 53*a*, in the same manner as previously described in reference to the ring 53, so that by turning the ring 53*a* in either direction one end of the cam strip 57*a* will engage under an end of the lip 52*a* and continued movement of the ring 53*a* will result in the lip 52*a* and strip 51*a* being displaced upwardly to the unlocked position of Figure 16.

In view of the detailed description of the locking closure 30, a further description of the operation and use of the locking closure 30*a* is considered unnecessary since the parts of the closure 30*a* correspond to parts of the closure 30 which have been described in detail and function in the same manner and the primary difference between the closures resides in the fact that the closure 30*a* is locked by engaging and manually displacing the locking strip 51*a* downwardly thereby eliminating the need for a second upper cam strip to displace the locking strip downwardly to a locked position.

Likewise, in the closure 30*a* a right-hand thread is provided so that the cap 45*a* is applied by a clockwise turning movement as seen in Figure 17 and removed by a counterclockwise turning movement as is conventional. However, by providing the left-hand thread for the closure 30 the tendency of an unauthorized or unfamiliar user to attempt to forcibly unscrew the cap cannot result in injury to the locking strip 51 since such party would normally try to unscrew the cap counterclockwise as is required for a right-hang thread and therefore would merely displace the cap more firmly against the shoulder 34. However, either the closure 30 or 30*a* may be provided with either a right or left-hand thread. The various parts of the closures 30 and 30*a* may be formed of any suitable material including certain metals or plastics, it being understood that the locking rings 53 and 53*a* will be formed of materials having sufficient resiliency to enable them to be distorted as previously described.

Various other modifications and changes are

likewise contemplated and may obviously be resorted to, without departing from the spirit or scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:

1. A locking closure for containers comprising a container neck having an externally threaded outer end, said neck having an annular external enlargement adjacent its outer end defining an annular shoulder facing toward said externally threaded portion, a closure cap including an annular internally threaded portion threadedly connected to the externally threaded neck portion and a head defining an annular flange extending outwardly from said annular portion, a collar turnably supported on the annular enlargement of the neck and supported by the shoulder thereof and surrounding a part of the annular cap portion, a ring disposed around the annular portion of said cap between the collar and annular flange of the cap and rotatable relatively to the cap and collar, said annular enlargement of the neck having a groove opening outwardly of the shoulder thereof, said annular portion of the cap having a longitudinally extending recess opening at its lower end into the groove when the cap is in a fully applied position, a locking strip disposed in the recess of said annular cap portion between said annular cap portion and the collar and ring, said locking strip being displaceable downwardly into the groove of the shoulder, said shoulder groove having an end wall forming an abutment for the locking strip to prevent unscrewing of the cap from the neck when the locking strip is in engagement with said groove, said locking strip having an outwardly extending lip, and said ring having a cam strip projecting from its inner side to engage under said lip to displace the locking strip upwardly out of engagement with the groove when the ring is rotated to move the cam strip across the locking strip.

2. A locking closure as in claim 1, said lip being inclined from end-to-end thereof, a second upper cam strip disposed on the inner side of said ring above and substantially parallel to the first mentioned cam strip, said cam strips being inclined from end-to-end thereof, said lower cam strip engaging under the lip to displace the locking strip upwardly to an unlocked position when the ring is revolved in one direction, and said upper cam strip engaging over the lip to displace the locking strip downwardly into a locked position when the ring is turned in the opposite direction.

3. A locking closure as in claim 1, said lip being inclined from end-to-end thereof, a second upper cam strip disposed on the inner side of said ring above and substantially parallel to the first mentioned cam strip, said cam strips being inclined from end-to-end thereof, said lower cam strip engaging under the lip to displace the locking strip upwardly to an unlocked position when the ring is revolved in one direction, and said upper cam strip engaging over the lip to displace the locking strip downwardly into a locked position when the ring is turned in the opposite direction, said ring having an inwardly extending ear disposed opposite to the cam strips and engaging the annular portion of the cap, a pair of ears extending inwardly from the ring and engaging the annular portion of the cap, the ears of said pair of ears being disposed nearer the cam strips than to the first mentioned ear to combine with the first mentioned ear to normally maintain the ring concentrically around said annular cap portion and for spacing the cam strips outwardly thereof whereby said cam strips are spaced outwardly from the locking strip lip, said ring being formed of a resilient material whereby the portion of the ring provided with the cam strips may be displaced inwardly and the ears of said pair of ears moved toward diametrically opposed positions for distorting the ring and for positioning the cam strips to engage the locking strip lip when the cam strips are moved across the locking strip.

4. A locking closure as in claim 1, said lip being inclined from end-to-end thereof, a second upper cam strip disposed on the inner side of said ring above and substantially parallel to the first mentioned cam strip, said cam strips being inclined from end-to-end thereof, said lower cam strip engaging under the lip to displace the locking strip upwardly to an unlocked position when the ring is revolved in one direction, and said upper cam strip engaging over the lip to displace the locking strip downwardly into a locked position when the ring is turned in the opposite direction, said ring having an inwardly extending ear disposed opposite to the cam strips and engaging the annular portion of the cap, a pair of ears extending inwardly from the ring and engaging the annular portion of the cap, the ears of said pair of ears being disposed nearer the cam strips than to the first mentioned ear to combine with the first mentioned ear to normally maintain the ring concentrically around said annular cap portion and for spacing the cam strips outwardly thereof whereby said cam strips are spaced outwardly from the locking strip lip, said ring being formed of a resilient material whereby the portion of the ring provided with the cam strips may be displaced inwardly and the ears of said pair of ears moved toward diametrically opposed positions for distorting the ring and for positioning the cam strips to engage the locking strip lip when the cam strips are moved across the locking strip, the shoulder of the annular enlarged portion of the neck having upstanding pins disposed adjacent the groove thereof and opposite thereto engaging the outer side of the ring and cooperating with said ears for normally positioning the ring concentrically around the neck.

5. A locking closure as in claim 1, and pin and groove means detachably keying the cap to said collar and forming a sliding connection between the collar and cap.

6. A locking closure as in claim 1, the annular flange of said cap having a recessed portion opening into the upper portion of the locking strip receiving recess for exposing the upper end of the locking strip when in an unlocked position whereby the locking strip may be manually displaced downwardly into a locked position with its upper edge below the upper edge of said ring.

7. A locking closure as in claim 1, the annular flange of said cap having a recessed portion opening into the upper portion of the locking strip receiving recess for exposing the upper end of the locking strip when in an unlocked position whereby the locking strip may be manually displaced downwardly into a locked position with its upper edge below the upper edge of said ring, said lip extending transversely of the locking strip and being downwardly bowed from end-to-end thereof, said cam strip having a circumferentially extending upwardly arced upper surface for engaging under said lip to displace the locking strip upwardly from a locked position to an

unlocked position when the ring is rotated in either direction.

8. A locking closure as in claim 1, the annular flange of said cap having a recessed portion opening into the upper portion of the locking strip receiving recess for exposing the upper end of the locking strip when in an unlocked position whereby the locking strip may be manually displaced downwardly into a locked position with its upper edge below the upper edge of said ring, said lip extending transversely of the locking strip and being downwardly bowed from end-to-end thereof, said cam strip having a circumferentially extending upwardly arced upper surface for engaging under said lip to displace the locking strip upwardly from a locked position to an unlocked position when the ring is rotated in either direction, said ring being formed of a resilient material and having inwardly projecting circumferentially spaced ears engaging the annular portion of the cap for positioning the ring concentrically therearound and with the cam strip spaced outwardly relatively to the lip whereby the locking strip may rotate around the lip in radially spaced relationship thereto, said ring being displaceable inwardly by a manual force exerted thereon outwardly of the cam strip for moving two of said ears toward diametrically aligned positions to distort the ring and position the cam strip for engagement under the lip when the locking strip is in a locked position.

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No references cited.