

- [54] **TAMPERPROOF CLOSURES FOR CONTAINERS**
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- [58] Field of Search 215/250, 252, 253, 254, 215/272, 274; 292/256.6, 299; 220/55 AN

2,864,521	12/1958	Kundert.....	215/252
3,310,191	3/1967	Kern.....	215/252
3,464,576	9/1969	Rohde.....	215/252
3,532,244	10/1970	Yates.....	215/272

Primary Examiner—Donald F. Norton
Attorney, Agent, or Firm—Wolf, Greenfield & Sacks

- [56] **References Cited**
UNITED STATES PATENTS

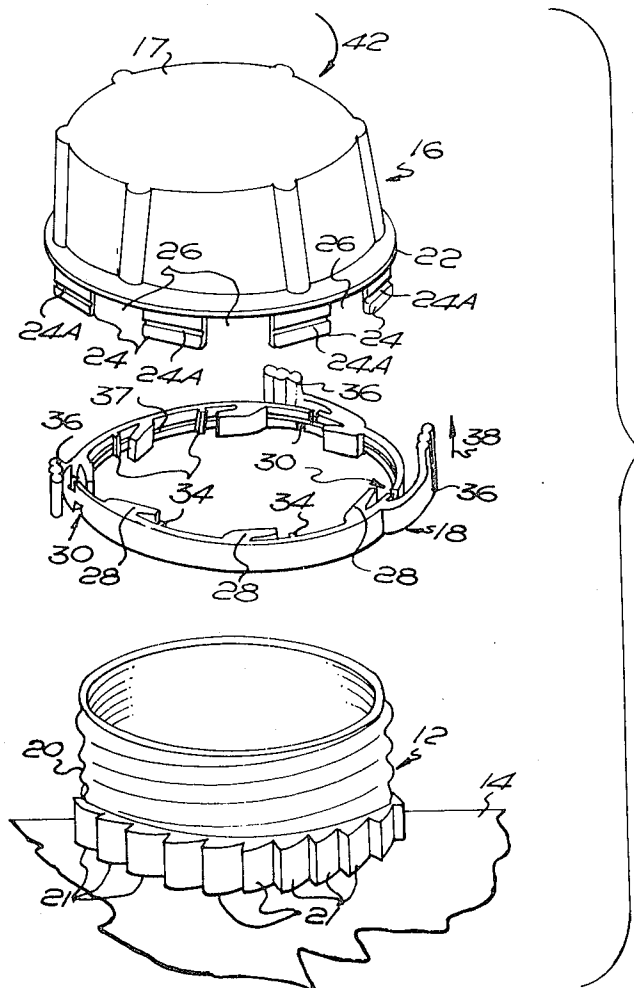
1,545,227	7/1925	Baltzley	215/272
2,134,178	10/1938	Esposito.....	215/252
2,162,754	6/1939	Schauer.....	215/252
2,421,356	5/1947	Saffady.....	215/272 X

[57] **ABSTRACT**

A tamperproof closure for a screw neck container which comprises a closure cap carrying a catch ring which can be separated from the cap. The catch ring is located on spaced support ledges of the cap defining a support ring and inwardly directed projections of the ring extend between the ledges and engage, ratchet-fashion, a ring of teeth on the container neck preventing the cap from being unscrewed.

The ring has weakening points at which it can be broken so that it can be removed from the cap and the cap unscrewed. The ring is located so that its axial movement is limited and it is preferably of a colour different from the cap for distinction purposes.

14 Claims, 6 Drawing Figures



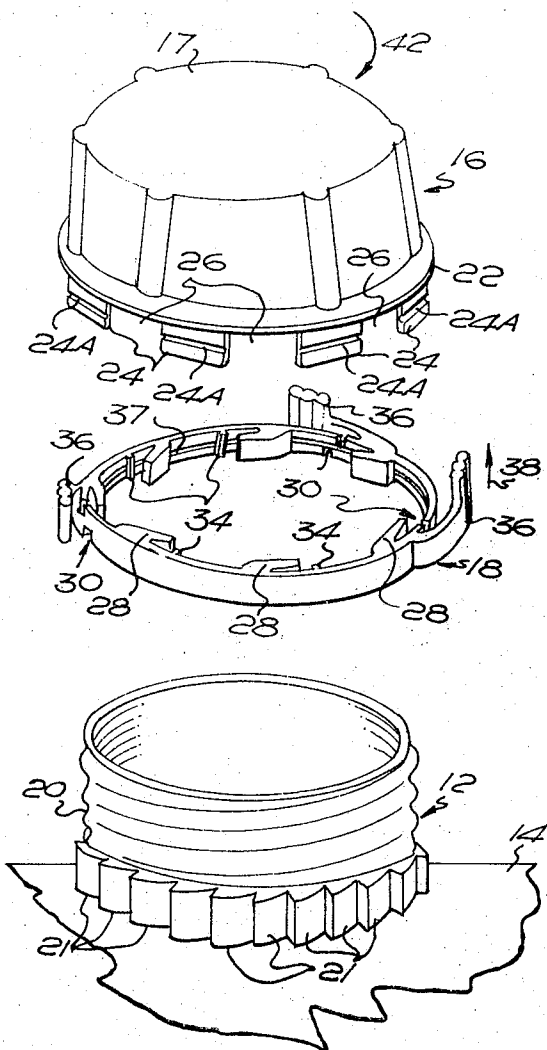


FIG. 1

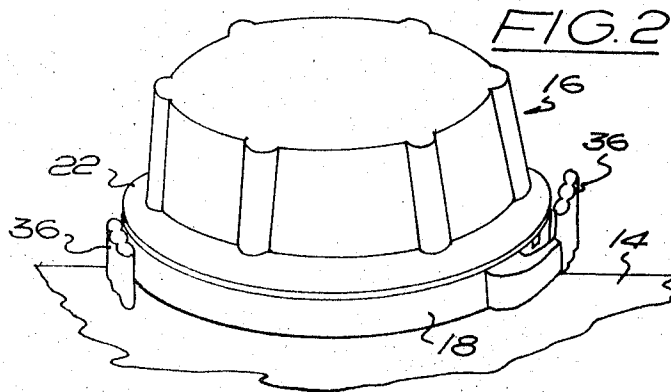


FIG. 2

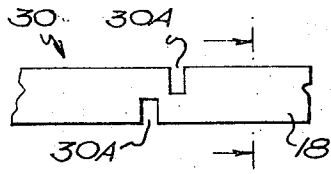


FIG. 5

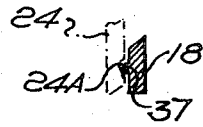


FIG. 6

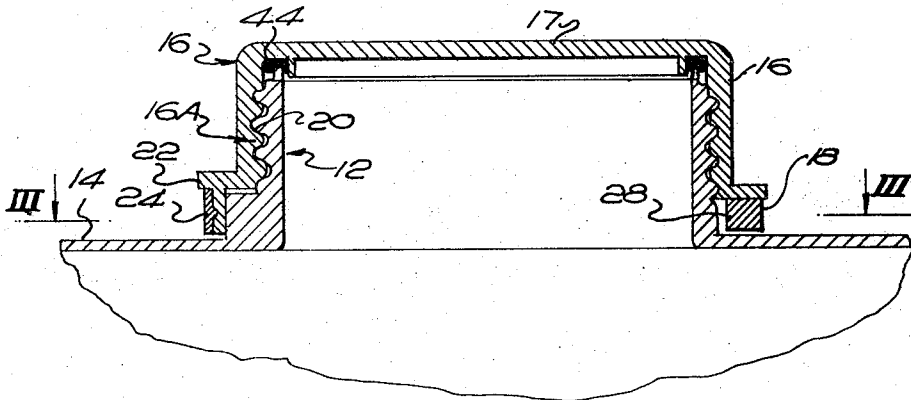


FIG. 3

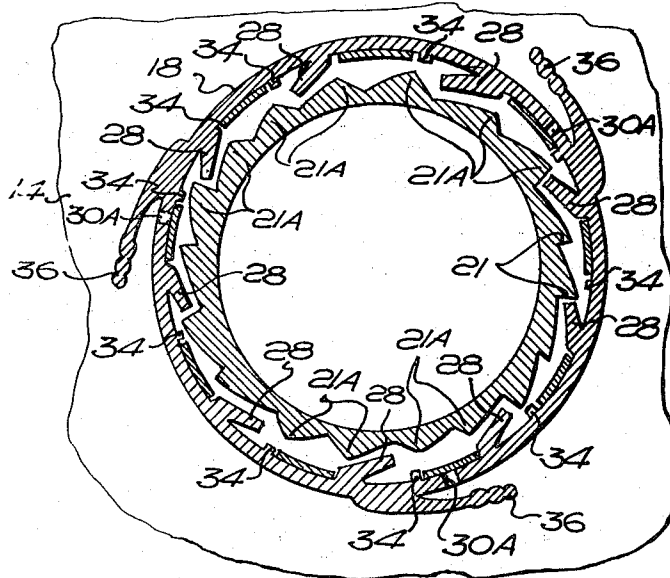


FIG. 4

TAMPERPROOF CLOSURES FOR CONTAINERS

This invention relates to the tamperproof closing of containers wherein a closure cap is screwed to a corresponding neck or top of a container to effect the closing of the latter.

At present it is desirable to have, and in many cases there is, a tamperproofing arrangement for such closures for ensuring that tampering with the container contents will not go undetected.

In one known arrangement, a closure cap is provided with a catch ring which is located under the cap when the latter closes the container. The ring has a plurality of ratchet projections which extend radially inwards of the ring and engage a ring of ratchet teeth on a peripheral region of the container. The catch ring is connected to the cap by means of fracture bridges which fracture when the cap is unscrewed with sufficient effort, the catch ring being prevented from rotating by virtue of ratchet projections engaging said ratchet teeth. The fracturing of the said bridges is a clear indication that the cap has been unscrewed, intentionally or unintentionally. The said projections and ratchet teeth are arranged so that upon screwing on of the cap, the projections tend to ride over the teeth when in radial overlapping relationship therewith. Caps and their catch rings are usually moulded integrally in plastics material in order that the bridges can yield resiliently as the projections ride over the ratchet teeth.

As we see it, there are several drawbacks with the known closure arrangement. One such drawback is that the cap and its ring, being integral, most of necessity be of the same coloured material. Another drawback is that once the ring has been severed from the cap, neither cap nor ring can be used again. A third drawback is that, in our view, the design of the bridges is critical in that on the one hand they must be sufficiently strong as not to fracture when the cap is being screwed onto the container, and on the other hand, the bridges must be sufficiently weak so that the cap can be unscrewed and the bridges broken without difficulty. A fourth drawback is that if the cap is unscrewed by a person who does not realise that it is a tamperproof closure, then the bridges can be accidentally broken.

Our invention relates to a closing arrangement having similarities with the known arrangement, but which, at least in its preferred form, does not suffer from the aforesaid drawbacks.

According to a first aspect of the present invention, there is provided a tamperproof closure which comprises a closure cap and a separate catch ring and which is for the tamperproof closing of a container having a screw threaded region to which the cap may be screwed to close the container and a peripheral region adjacent the screw threaded region which has one or more teeth or recesses, said cap having means defining a support ring over which there is or may be placed the catch ring, and said catch ring having one or more inwardly directed projections which extends or extend through the support ring so as to ride along the peripheral region of the container as the cap is being screwed thereto but to engage said tooth or teeth or recess or recesses of the container when the cap closes same to prevent the cap from being unscrewed, and said catch ring further being adapted to be broken so that it can be removed prior to and enabling the cap to be unscrewed from the container.

Thus, the presence or absence of the catch ring is used as a means of indicating if the container cap has been removed, although clearly the presence of a broken catch ring on a closed container would also indicate tampering.

The catch ring may be adapted to be broken by being weakened along a line extending from edge to edge of the ring or by being slotted to provide a region of reduced section and a tear tab may be provided as an integral part of the ring adjacent to where it is weakened to facilitate fracture and removal of the catch ring.

The cap preferably has an outwardly directed flange ring adjacent the means defining the support ring to prevent the catch ring from being moved axially of the cap and out of engagement with said teeth.

The invention in another aspect provides the container having a cylindrical outlet neck which is closed by a tamperproof closure as aforesaid, said outlet having an external threaded portion to which the closure cap is screwed, and an external peripheral region having one or more projections or recesses engaged by the projections of the catch ring, said catch ring being sufficiently restrained from axial movement relative to the cap and outlet so that the only method of removing same from engagement with the teeth is by breaking same.

It will be appreciated that the cap can be used again with another catch ring and the cap and catch ring are quite separate parts capable of manufacture by separate manufacturers. Each part is novel in itself and the invention also provides therefore third and fourth aspects and according to the third aspect there is provided a closure cap for use in the tamperproof closure as aforesaid, said cap comprising a top from which depends a circular sectioned skirt and at the bottom of the skirt there is a means forming an extension of the skirt and defining the support ring and having a circumferential slot or space of the or each inwardly directed proportion of a catch ring so that the catch ring can be slipped over the said means, and the cap further has a surface extending radially outwards of said means against which the catch ring abuts in being slipped over said means. The fourth aspect of the invention provides a one-piece catch ring which has a one or more inwardly directed projections and is adapted to be broken at a particular location and subsequently uncoiled.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, wherein;

FIG. 1 is an exploded perspective view showing a container catch ring and closure cap;

FIG. 2 is a perspective view of the components of FIG. 1 when in assembled condition;

FIG. 3 is a sectional side view to an enlarged scale showing the container neck when tamperproof closed by the cap and ring of FIG. 1;

FIG. 4 is a sectional elevation to an enlarged scale and taken on line III—III of FIG. 3; and

FIGS. 5 and 6 are respectively a side elevation and a sectional elevation on line VI—VI of FIG. 5 of part of the clamping ring.

Referring to the drawings, the closure arrangement for the neck 12 of a container 14 comprises basically a closure cap 16 and a catch ring 18. The closure cap 16 is adapted to be screw-threaded to a threaded region 20 for the container neck to close the container. The

interior of cap 16 is provided with corresponding screw threads 16A (FIG. 3) for this purpose.

The cap 16 is generally thimble shaped insofar as it has a top 17 and a skirt and at the bottom of the skirt there is a radially outwardly extending flange 22 under which is means defining a support ring for supporting the catch ring 18. Such means on the cap 10 comprises arcuate seat ledges 24 with spaces 26 therebetween. Each ledge 24 has a groove 24A which extends peripherally of the cap.

The catch ring 18 is of flexible material and is provided with a plurality of inwardly and obliquely directed projections 28 which correspond in number and position to the spaces 26 in the cap support ring.

Additionally, the catch ring 18 has three weakened regions 30 (see FIG. 5) defined by slots 30A extending into the ring but staggered circumferentially of the ring. Associated with each projection 28 there is a rib 34 which is located to the inside of the ring and extends axially of the ring. Associated with each weakened region 30 is a finger pull tab 36 which is located to the outside of the ring. The inner surface of the ring is provided with a peripheral rib 37 for engaging the grooves 24A on ledges 24 as shown in FIG. 6. The ring is preferably moulded as a one piece unit. Although three weakened regions 30 have been shown, it is to be appreciated that any desired number in any desired distribution may be employed.

In use, the ring 18 slips over the support ring 24 as illustrated by arrows 38 in FIG. 1, so that the projections 28 are located in spaces 26 and extend inwardly of the support ring of the cap 16. The meeting edges of ring 18 and the ledges 24 are chamfered (as shown in FIG. 6) or rounded to facilitate slipping of the ring over the ledges. The cap and its associated catch ring 18 can now be screwed onto the threaded portion 20 of the container 12.

Below this threaded portion 20, the container 12 is provided with a plurality of ratchet teeth 21 which are spaced round a peripheral region located under threaded portion 20. It is to be noted that some 21A (FIG. 4) of the teeth are only partially formed or stunted. This is because the container is moulded in a split mould and if the teeth were all fully formed, difficulty could be experienced in opening the mould. The region of ratchet teeth is bounded at the opposite side from threaded portion 20 by the shoulder of the container 14.

When the cap and its associated catch ring 18 are screwed fully home on threaded portion 20 of the container as shown in FIGS. 2, 3 and 4, the projections 28 are in axial overlap with the teeth 21. The cap 16 is adapted to be screwed onto container 12 by turning same in the direction indicated by arrow 42 in FIG. 1 and it will be noticed that the inclined faces of the ratchet teeth 21 are presented to the projections 28 so that when the cap is being screwed on in the direction of arrow 42 the projections 28 ride over the teeth and do not impede the screwing on the cap. If an attempt is made to unscrew the cap after the projections have started to ride over teeth 21, then the projections 28 engage behind the ratchet teeth 21 and prevent unscrewing movement.

FIGS. 2, 3 and 4 show the cap 16 screwed fully home on the container 12 with the catch ring 18 trapped between flange 22 and the container shoulder so that it cannot be moved axially relative to the ratchet teeth 21

in either direction. This is a substantial advantage of the embodiment of the invention because it makes tampering without breaking the catch ring effectively impossible. Instead of using the container shoulder as an abutment to the ring 18, or where the container has no shoulder, e.g. in a conical container, the container neck would be provided with an abutment flange. It will be noted that a sealing gasket 44 inside and carried by cap 16 seals against the top of neck 20. The gasket may be used for example of rubber or similar material.

To open the container it is necessary first of all to break and remove the catch ring 18 by pulling of any of tabs 34, 36. When the ring is broken at a weakened region 30, and the ring is such that this can be done without excessive manual effort, the projections 28 can be moved radially outwards of their respective spaces 26 and the support ring removed whereby the restraint placed on the unscrewing of the cap is removed as the projections 28 leave engagement with ratchet teeth 21.

The ribs 34 serve the function of accurately locating the ring 18 relative to the ledges 24 as shown clearly in FIG. 4.

It is to be noted that if an attempt is made to unscrew the cap 16 when the catch ring 18 is still present, the forces resisting unscrewing are forces set up by compression of projections 28 and not by tension on the weak regions 30. In fact, by suitable dimensioning of the cap and ring, under such unscrewing effort, the cap can be made to burst before the ring 16 yields.

The described construction has a number of advantages particularly as compared with the prior art arrangement previously described. In particular, ring 18 can be of a different colour from cap 16 making the arrangement more readily obvious that ring 18 is a tamperproof device. Secondly, because in normal use there is no rupturing in any way whatsoever of the cap 16, it can be used again with an unbroken catch ring 18.

The separating completely of the ring 18 and cap 16 obviates the need for any bridges connecting these two pieces and therefore the previously mentioned disadvantages of the known arrangement as relates to the bridge pieces is obviated.

Finally, the cap 16 is positively locked from being unscrewed from the container by the projections 28 engaging the teeth 21. This overcomes the risk of the seal being broken accidentally, for example, by someone trying to unscrew the cap before they appreciate that the arrangement is intended to be tamperproof. The positive engagement further helps in preventing the cap from unscrewing due to vibration such as may be met when the container is being transported. This advantage is considered to be of considerable importance because many troubles arise because plastic caps work loose in transportation particularly when they are screwed to plastics containers because of the low coefficient of friction between plastics material and plastics material.

It is preferred that the cap ring and container be constructed in plastics material although this is not absolutely essential. The component parts could, for example, be constructed from metal such as tin plate, but in a preferred case, the cap is of high density polythene and the ring is of low density polythene.

Although we have referred to items 28 of the drawings as projections and items 21 as teeth, it is appreciated that these descriptions and, indeed, their construc-

tions could be reversed as concerns what is formed on the inside of ring 18 and on the outside of the container neck below the threaded portion.

Furthermore, in a very simple arrangement, the catch ring could have a single projection and the peripheral region could have a single tooth engageable with such projection to lock the cap in position. Moreover, instead of the one or more teeth on the peripheral region of the container, it may have one or more recesses into which the one or more projections can engage to lock the cap in position casing the container.

Tamperproof closures of the type to which the invention relates are used in many industries. The main field of application can be summarized as the transportation of valuable, corrosive and expensive liquid materials in containers.

I claim

1. A tamperproof closure which comprises a closure cap and a separate catch ring and which is for the tamperproof closing of a container having a screw threaded region to which the cap may be screwed to close the container and a peripheral region adjacent the screw threaded region which has at least one abutment, said cap having means defining a support ring over which the catch ring is adapted to be placed and said catch ring having at least one inwardly directed projection which extends through the support ring so as to ride along the peripheral region of the container as the cap is being screwed thereto but to engage said abutment of the container when the cap closes same to prevent the cap from being unscrewed, and said catch ring further being adapted to be broken so that it can be removed prior to and enabling the cap to be unscrewed from the container.

2. A tamperproof closure according to claim 1, wherein the catch ring has a plurality of spaced, inwardly directed projections.

3. A tamperproof closure according to claim 2, wherein the cap has a top and a skirt portion and the means defining the support ring comprises a plurality of arcuate ledges at the edge of the skirt between which the projections of the catch ring may pass.

4. A tamperproof closure according to claim 3, wherein the closure has a flange adjacent the means defining the support ring limiting the axial position of the catch ring relative to the closure cap.

5. A tamperproof closure according to claim 4, wherein the catch ring has a circumferential, internal rib and the ledges have an external groove in which said internal rib engages.

6. A tamperproof closure according to claim 1, wherein the ring is weakened by means of transverse slots therein.

7. A tamperproof closure according to claim 6, wherein the catch ring has a finger pull tab adjacent the weakening whereby the ring may be broken at such weakening by manual pulling of the finger pull.

8. A tamperproof closure according to claim 1, wherein the catch ring is a one piece moulding in plastics material.

9. A tamperproof closure according to claim 1, wherein the cap is a one-piece moulding in plastics material.

10. The combination of a container having a cylindrical outlet neck which is closed by a tamperproof closure which comprises a screw closure cap and a separate catch ring, said cap having means defining a support ring over which the catch ring is placed, and said catch ring having at least one inwardly directed projection which extends through the support ring, the outlet neck of the container having an external threaded portion to which the closure cap is screwed, and an external peripheral region having at least one abutment which is engaged by a projection of the catch ring, preventing unscrewing of the cap, said catch ring being adapted to be broken so that it can be removed prior to and enabling the cap to be unscrewed from the container, and further being sufficiently restrained from axial movement relative to the cap and outlet that the only method of removing the ring from engagement with the abutment is by breaking the ring.

11. The combination according to claim 10, wherein the outlet neck has a plurality of spaced abutments defined by teeth on said peripheral region, and the catch ring has a plurality of projections each engaging one of said teeth.

12. A one-piece catch ring for a tamperproof closure which has a plurality of inwardly directed projections and which is adapted to be broken at a particular location and wherein a weakening of the ring at said location is created by two axial slots extending partially across the width of the ring, said slots being circumferentially staggered.

13. A catch ring according to claim 12, wherein said ring is weakened at three equi-angularly spaced locations.

14. A catch ring according to claim 12, wherein there is an external finger tab at each weakened location.

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