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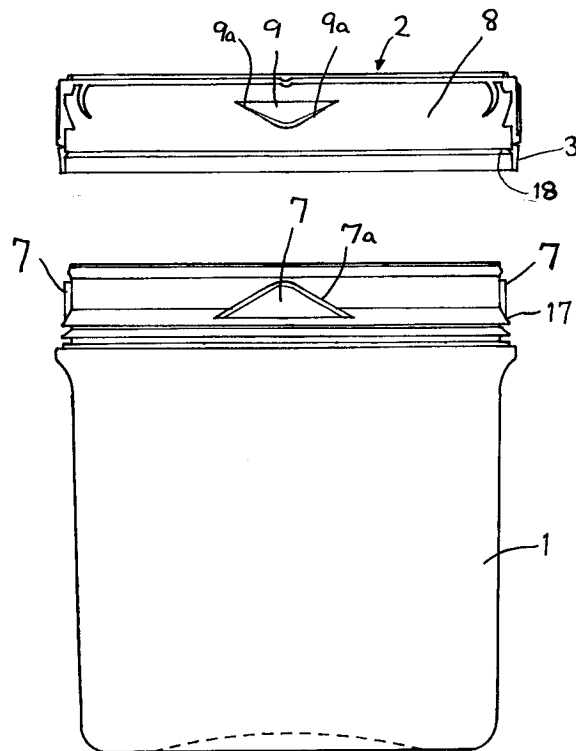
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Container and closure.

A container (1) is of the type having a neck portion with a circular opening, and a co-operating closure (2) therefor, the container and closure having interengaging formations to hold the closure on the container when the closure is pressed onto the neck portion. The neck portion has spaced around the opening thereof a plurality of guide/cam members (7), each having two oppositely-directed oblique faces (7a) together defining a V-shape with its point directed outwardly of the container, and the closure has spaced therearound a plurality of corresponding V-shaped guide/cam members (9) such that, when the closure is pressed onto the neck portion, the guide/cam members (7 and 9) can co-operate to ensure that the guide/cam members (9) on the closure always lie between those (7) of the container, and the closure can be disengaged from the container by rotating the closure in either direction relative thereto to produce a camming action between the adjacent guide/cam members.

Fig 2



Field of the Invention

This invention relates to a container having a co-operating closure. The invention is particularly applicable to closures having tamper-evident bands.

Background to the Invention

Containers such as jars or tubs, for example for holding foodstuffs, cosmetics or pharmaceutical materials are typically provided with closures having "tamper-evident" bands which secure the closures on to the containers in such a manner that the closure cannot be removed from the container without first detaching the tamper-evident band therefrom. Thus, it will be obvious that any container lacking the tamper-evident band may already have been opened, with the possibility of some of the contents having been removed, contaminated or perhaps adulterated. After the product has been introduced into the container, the closure is typically pressed onto the container until a circumferential rib on the tamper-evident band engages beneath an opposite rib on the container, the ribs presenting opposed shoulders which resist the removal of the closure from the container.

For re-sealing of the container after opening, two main approaches are known. Snap-fit involves the interengagement of a circumferential bead on the closure with a similar bead on the container. To achieve an acceptable seal, an inner seal has to be incorporated into the closure to engage the inner surface of the container. It is desirable to form the closure of a relatively thin flexible material such as a plastics material. This is advantageous both in ensuring a satisfactory seal and in fitting and removal of the closure, whilst minimising the material costs. However, when such a seal is incorporated into a snap-fit closure, removing the lid becomes difficult, because such closures are usually pulled upwards, distorting one edge only in the first instance, and this tends to trap the opposite side of the container wall between the inner seal and the outer skirt of the lid. Although this effect can be reduced by employing a less flexible plastics material, the seal is not so good, and the snap arrangement is less easy to operate.

The other approach uses continuous or discontinuous threads. This makes the use of inner seals practical, because the whole closure or lid is lifted upwards simultaneously when unscrewed, thus withdrawing the inner seal evenly at all points around the circumference, and thereby avoiding entrapment. However, if the lids are to be applied automatically by the filling machine using a downwardly-pressing plunger only (this is the quickest method and is preferred), there will always be

at least one point where the threads on the lid are identically oriented to those on the container when the lid is applied. When this happens, the threads will sit exactly on top of one another at the point where the tamper-evident tear-off snap beads engage and the lid is secured. This causes the lid skirt to be distorted outwardly at each such point, which is almost certain to affect the seal adversely and to make it difficult to remove the lid in the first instance. When automatically capping containers, lids are randomly oriented in relation to the containers, so it is inevitable that some of the containers will be so affected.

EP-A-0 351 656 discloses a container having a generally elliptical opening, and with a corresponding closure. Rotation of the closure relative to the container deforms the skirt of the closure to disengage clips on the closure from a continuous rib around the exterior of the rim.

The tamper-evident bands are typically formed by defining a lower peripheral strip of the closure by a thin readily tearable section of the plastics material. A pull tag is provided, and pulling on this tag initiates the tearing action to remove the strip from the remainder of the closure. Conventionally, these pull tags are formed as a member upstanding from one end of the strip, which is initially coupled to the closure by the thin tearable portion of plastics over its whole length. Thus, the pull tag is required to be a substantial enough structure to permit the application of enough force to commence the tearing action. The problem with this type of pull tag is that where the closure is pressed onto the container during the manufacturing process by an automatic machine, provision may need to be made in the pressing tool to accommodate the pull tag without risk of damaging it or of affecting the alignment of the closure within the tool. This may require accurate positioning of the closure relative to the fitting tool, and this increases the complexity of the machinery and may reduce the speed of the operation.

WO 91/18801 discloses a plastics screw closure with a tamper-evident band whose pull-tab can press into an aperture in the band to avoid problems during manufacture, but which is resiliently sprung to stand clear of the aperture at all other times so as to be readily pulled by the fingers. Unfortunately, this means that it stands clear of the aperture and is vulnerable to damage.

As mentioned hereinbefore, it is desirable to be able to form the closures from thin flexible plastics material, and this is typically achieved by a moulding process, with the closures leaving the moulding machine at an elevated temperature, and therefore softer and more readily deformable than at room temperature. It is conventional simply to allow the closures to fall into a box in a random fashion for

storage before use. Such an arrangement may result in distortion of the closures, which would render their subsequent fitting onto the containers more difficult. For this reason, the thickness of the plastics material has to be maintained sufficient to avoid this distortion, and this not only uses additional plastics material in their manufacture, but also results in a more rigid closure which may require a greater force to fit initially and which may be more difficult to use subsequently.

These difficulties are overcome by various aspects of the container and closure of the present invention.

Summary of the Invention

According to a first aspect of the invention, there is provided a container having a neck portion with a circular opening, and a co-operating closure therefor, the container and closure having interengaging formations to hold the closure on the container when the closure is pressed onto the neck portion, the neck portion having spaced around the opening thereof a plurality of guide/cam members, each having two oppositely-directed oblique faces together defining a V-shape with its point directed outwardly of the container, and the closure having spaced therearound a plurality of corresponding v-shaped guide/cam members such that, when the closure is pressed onto the neck portion, the guide/cam members can co-operate to ensure that the guide/cam members on the closure always lie between those of the container, and the closure can be disengaged from the container by rotating the closure in either direction relative thereto to produce a camming action between the adjacent guide/cam members.

Preferably, the container is provided with a rib around the opening thereof engageable by a corresponding rib on a separable portion, or tamper-evident band, of the closure in such a manner that the closure cannot be removed from the container without separating the band from the remainder of the closure.

A second aspect of the invention provides a container having a neck portion with an opening and a co-operating closure therefor, the closure having a projecting seal therearound which engages the inner surface of the neck portion, the inner surface being provided with detent means co-operable with the seal temporarily to hold the closure on the container.

Preferably, the seal is so shaped as to provide a circumferential groove engageable by one or more detent members around the inner surface. Preferably, the detent member or members may be an inwardly projecting circumferential rib on the rim of the opening. The rib is preferably discontinu-

ous to provide a path for escape of excess pressure accumulated when the closure is pressed onto the container.

A third aspect of the invention provides a container having a co-operating closure with a tamper-evident band which, when the closure is first engaged on the container, engages the container in such a manner that the closure cannot be removed from the container without first separating the tamper-evident band from the remainder of the closure, the band having a pull tab which may be pulled to tear the band from the remainder of the closure, the pull tab being formed so as to project from the surrounding surface of the closure sufficiently to be engageable by a fingernail, but to be resiliently depressible to lie flush with the surrounding surface.

Preferably the pull tab has a leading edge undercut to facilitate engagement by a fingernail.

Yet another aspect of the invention provides a container closure comprising a top portion and a circumferential portion depending downwardly therefrom, the top portion being shaped to engage with the lowermost part of the circumferential portion, whereby the closures may be stacked one upon another before use.

The closure is preferably of the type having a detachable tamper-evident band around the lowermost part of the circumferential portion. Preferably, the top portion is provided with a rib therearound set in from the edge thereof by a distance sufficient to accommodate the thickness of the circumferential portion. The closure of the invention is readily fitted onto the container, provides a satisfactory seal, and is easy to fit and remove subsequently.

Brief Description of the Drawings

In the drawings, which illustrate a preferred embodiment of the invention:

Figure 1 is a side elevation of a container with the closure fitted thereon;

Figure 2 is a side elevation of the container shown in Figure 1, with the closure shown sectioned and before fitting onto the container; and

Figure 3 is an enlarged sectional view of a portion of the container and closure shown in Figures 1 and 2.

Detailed Description of the Illustrated Embodiment

The container 1 is formed as a plastics moulding and is suitable for containing a wide variety of different products. The closure 2 has a tamper-evident band 3 along the lower edge thereof, the band having a pull tag 4 at its end to facilitate its removal. The closure 2 has a side wall whose

exterior 5 is vertically ribbed to improve grip when being removed from the container. A stacking rib 6 is provided around the upper surface of the closure 2 stepped in from the edge thereof by a distance sufficient to permit one closure to be stacked upon another.

The container is provided with four inverted V-shaped ramp members 7 equally spaced therearound. It will be appreciated, however, that fewer or more such members could be used. The ramp members 7 present opposed circumferentially directed faces 7a. The closure 2 has on the inner wall 8 thereof four corresponding downwardly directed V-shape ramp members 9 with opposed circumferentially directed edges 9a (Figure 2). In use, after removal of the tamper-evident band 3, the closure 2 can be pressed onto the container 1 and can be removed therefrom by rotating the closure until one edge 9a of each member 9 engages an edge 7a of each of the formations 7. A camming action then results which urges the closure 2 upwardly relative to the container 1 assisting in its disengagement.

Referring particularly to Figure 3, the closure has around its underside a circumferential seal 10 which in cross section is of tapering generally arcuate form, providing between the seal 10 and the outer edge 11 of the closure a circumferential undercut groove 12. The upper end of the neck 13 of the container 2 has around its outer edge a rib 14 formed to engage with the inner rim 11 of the container to assist in sealing, while the seal 10 bears against the inner face of the neck 13 to complete the seal. A discontinuous circumferential rib 15 is provided around the inner surface of the neck portion 13 adjacent to its upper end and when the closure is pressed firmly onto the container, this rib 15 engages in the undercut 12 against the seal 10 to provide a snap-fit for the closure on the container. The rib 15 is made discontinuous so that, while the inner seal 10 is being pushed over this rib, air can escape, thus making the closure easier to fit and more secure, as build up of internal pressure, which might tend to push the closure off, is reduced. Because the rib 15 is inwardly directed, pressure inwardly of the closure when it is grasped by a hand for removal does not increase its resistance to removal.

The tamper-evident band 3 is formed in the lower part of the closure in conventional manner by moulding into the closure V-shaped grooves 16 which leave only a fine web of plastics material connecting the band 3 from the remainder of the closure. The container is provided, in conventional manner, with a rib 17 which tapers gently downwards, but presents a perpendicular shoulder on its underside. Similarly, the tamper-evident band 3 is provided with an oppositely sloping rib 18 present-

ing an opposed perpendicular face which engages that on the rib 17. Thus, in fitting of the closure onto the container, the gently sloping surfaces interact so that the tamper-evident band is urged outwardly and over the rib 17, the opposed perpendicular faces then preventing removal, other than by separation of the tamper-evident band 3. The internal diameter of the rib 18 is greater than the maximum external diameter of the ramp members 7 to enable the tamper-evident band 3 to drop over the ramp members on first application and to allow the ramp members 7 and 9 to self-locate the lid on to the container during initial fitting of the closure.

The pull tag 4 of the tamper-evident band is formed with its edges completely detached from the surrounding faces of the closure and with its leading edge 4a undercut. An aperture 19 is left adjacent to the leading edge 4a so that, for example, a fingernail can be inserted to lift the pull tag outwardly so that it can be grasped between fingers and pulled to tear the band free from the closure. The pull tag 4 is formed so that its leading edge 4a stands slightly clear of the surrounding closure, but sufficient clearance is provided behind the tag, and its connection to the remainder of the tamper-evident band 3 is sufficiently flexible that the pull tag may be depressed, for example by the automatic machinery fitting the closure onto the container so as to lie flush with the closure and thus not interfere with the operation of the machinery. Additionally, the resultant closure is more pleasing in appearance, and there is no risk that the pull tags can become accidentally engaged together or by some protrusion on some adjacent surface, causing tearing of the tamper-evident band, and thus rendering the product unsaleable.

Claims

1. A container having a neck portion with a circular opening, and a co-operating closure therefor, the container (1) and closure (2) having interengaging formations (10, 12, 15) to hold the closure on the container when the closure is pressed onto the neck portion, characterised in that the neck portion has spaced around the opening thereof a plurality of guide/cam members (7), each having two oppositely-directed oblique faces (7a) together defining a V-shape with its point directed outwardly of the container, and the closure (2) has spaced therearound a plurality of corresponding V-shaped guide/cam members (9) such that, when the closure is pressed onto the neck portion, the guide/cam members (7 and 9) can co-operate to ensure that the guide/cam members (9) on the closure always lie between

those (7) of the container, and the closure can be disengaged from the container by rotating the closure in either direction relative thereto to produce a camming action between the adjacent guide/cam members (7 and 9).

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2. A container according to Claim 1, provided with a rib (17) around the opening thereof engageable by a corresponding rib (18) on a tamper-evident band (3) of the closure in such a manner that the closure cannot be removed from the container without separating the band (3) from the remainder of the closure.

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3. A container according to Claim 1 or 2, wherein the closure has a projecting seal (10) therearound which engages the inner surface of the neck portion, characterised in that the inner surface is provided with detent means (15) co-operable with the seal temporarily to hold the closure on the container.

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4. A container according to any preceding claim, comprising a tamper-evident band (3) which, when the closure is first engaged on the container, engages the container in such a manner that the closure cannot be removed from the container without first separating the band (3) from the remainder of the closure, the band (3) having a pull tab (4) which may be pulled to tear the band from the remainder of the closure, characterised in that the pull tab (4) is formed so as to project from the surrounding surface of the closure sufficiently to be engageable by a fingernail, but to be resiliently depressible to lie flush with the surrounding surface.

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5. A container (1) having a neck portion with an opening and a cooperating closure (2) therefor, the closure having a projecting seal (10) therearound which engages the inner surface of the neck portion, characterised in that the inner surface is provided with detent means (15) co-operable with the seal temporarily to hold the closure on the container.

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6. A container according to Claim 5, wherein the seal (10) is so shaped as to provide a circumferential groove (12) engageable by one or more detent members (15) around the inner surface.

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7. A container according to Claim 5 or 6, wherein the or each detent member comprises an inwardly projecting circumferential rib (15) on the rim of the opening.

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8. A container according to Claim 7, wherein the rib (15) is discontinuous to provide a path for escape of excess pressure accumulated when the closure is pressed onto the container.

9. A container (1) having a co-operating closure (2) with a tamper-evident band (3) which, when the closure is first engaged on the container, engages the container in such a manner that the closure cannot be removed from the container without first separating the band (3) from the remainder of the closure, the band (3) having a pull tab (4) which may be pulled to tear the band from the remainder of the closure, characterised in that the pull tab (4) is formed so as to project from the surrounding surface of the closure sufficiently to be engageable by a fingernail, but to be resiliently depressible to lie flush with the surrounding surface.

10. A container according to Claim 9, wherein the pull tab (4) has a leading edge (4a) undercut to facilitate engagement by a fingernail.

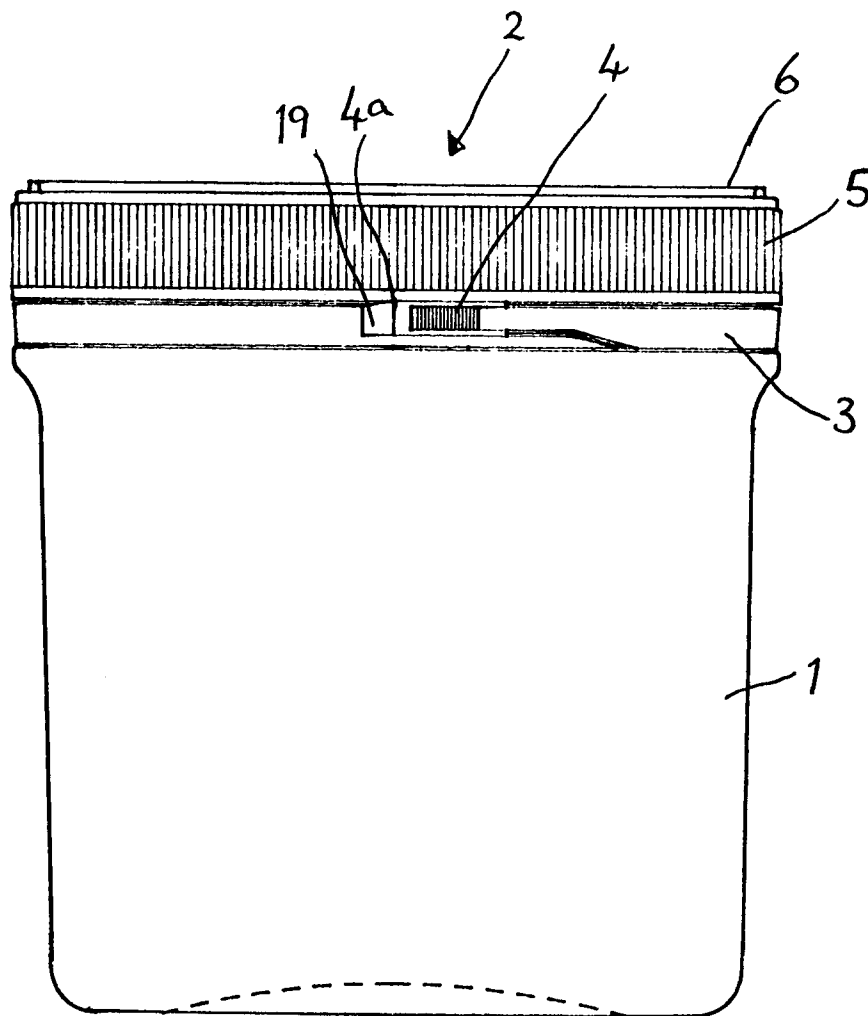


Fig 1

Fig 2

