Title: TAMPER INDICATIVE CLOSURE

Abstract: A moulded closure for a blow moulded bottle of the type in which drinks, sauces and shampoos are sold has two parts. The screw cap (14) has an integral nozzle and a tamper proof band (24) connecting it to the bottle neck. The nozzle is covered by a cover (36) hinged to a ring (38) which is captive to the screw cap. The ring is free to rotate beneath a projecting bead (32) on the screw cap and the hinge (46, 48) flexes to allow arcuate displacement of the cover to one side of the nozzle and an integral tongue (46) allows the user to park the cover at 120° to the nozzle. Tongue (46) arrests the cover at 160° to the nozzle when the user tilts the cover further open and tongue (46) snaps over the bead (32). The cover (36) is attached to the ring (38) initially by frangible bridges (42) so that the ring acts as a second tamper proof band.
TITLE: TAMPER INDICATIVE CLOSURE

FIELD OF THE INVENTION

5 This invention concerns tamper indicative closures for bottles, squeeze packs and similar moulded containers capable of dispensing liquids and gels.

BACKGROUND OF THE INVENTION

10 Retail outlets such as supermarkets must give the shopping public access to products on
the shelf. It is common for shoppers to sample liquid products to test their smell or other characteristics. In such instances, the next shopper who buys the unit bears the loss. A more serious possibility is that someone introduces an injurious substance into the bottle contents which another person subsequently buys and uses. To counteract this risk, bottles and small moulded containers are closed by caps which indicate whether tampering has occurred. While some shapes of bottleneck are easily protected by moulded tamper-indicative closures, some bottles and containers, for example beverage containers or liquid detergent dispensers with push down/pull up release valves present special technical difficulties.

Prior Art

US Patent 4,043,475 describes a childproof moulded closure which is also tamper proof having a cap connected by hinges to an anchor band which fits permanently under the bead of a bottle neck. The anchor band remains in position on the neck and resists rotation in order to defeat unauthorised opening.

US Patent 6,152,320 describes a captive nozzle cap for a drink bottle provided with a nozzle. The cap is connected to a captive band by a first and second hinge which combine to permit articulation of the cap through 180°.

SUMMARY OF THE INVENTION

The apparatus aspect of this invention provides a moulded closure for a bottle, the closure being of the type having a nozzle defining an outlet comprising a neck adjacent the outlet, a captive ring engaging the neck, the ring circumference defining a major arc and a minor arc, a nozzle cover connected to the captive ring, a hinge connecting the nozzle cover to the captive ring over the minor arc and frangible bridges connecting the nozzle cover to the captive ring over the major arc.

The nozzle may be part of a conventional screw cap. The screw cap may in turn be attached to the bottle neck by frangible bridges or a tear strip.
The screw cap may be joined by frangible bridges or tear strip to a tamper band which engages a flange or bead on the bottle or container. The skirt may be crimped or otherwise fixed to the bottle or container to resist rotation or removal when the screw cap is turned by the user in the act of opening the bottle.

Another aspect of the invention provides the combination of a bottle or moulded container and a tamper indicative closure as described above.

It is convenient to mould the nozzle as part of the screw cap, presenting a unitary closure comprising the joined screw cap and nozzle cover which the bottler can apply to a filling line in a factory. In this way the screw cap retains the tamper proof band depending from the skirt of the cap. It is usual for the bottle neck to have a circumferential flange near to the moulded bottle thread and for the tamper proof band to embrace the bottle flange being connected to the screw cap by a tear strip or frangible bridges. In the closure field frangible bridges are used between closure parts which separate due to screw action of one of the parts and tear strips for parts which do not unscrew but clearly in this specification they are equivalent.

The tamper proof band may be crimped or otherwise made to clamp the flange to resist removal or rotation when the cap is turned by the user in the act of opening the bottle. It is usual in drink bottles with nozzles for the cap to remain undisturbed throughout its use because the user has need only to free the nozzle cover from the captive ring to be able to drink from the bottle. Unscrewing the cap is only necessary if the bottle is to be filled for re-use or if a foil seal needs to be removed before drinking.

It is a feature of the invention that the bottler who applies the closure to a bottle is able at the same time to seal the contents without applying a disc seal to the bottle lip. This is made possible in two ways. The screw cap may have an internal annular seal which is capable of supporting a diaphragm seal to exclude contamination such as spores from the bottle contents. Instead the nozzle may stand superimposed on the screw cap integral therewith and project into the screw cap creating a coaxial protruding collar lying in use, inside the bottle lip, presenting an annular support surface for receiving a diaphragm seal.
Thus the bottler is able to pass the inverted closures through a disc seal applicator which prepares the closures for the capping machine.

The nozzle cover may have an integral stopper which is a push fit in the nozzle outlet. The stopper may be a circular, downwardly depending flange which extends from the interior face of the nozzle. Alternatively the cover may have a recess moulded therein which is a push fit in the nozzle outlet.

The nozzle cover and the captive ring remain with the closure even when the bottle and its closure are discarded.

The captive ring is a sufficiently loose fit on the neck of the nozzle to permit rotation with the finger on the chin. This feature reduces the likelihood of damage to the hinge connecting the nozzle cover to the captive ring. Strips may be thinner or the same thickness as the nozzle cover depending on the performance expected.

The captive ring and the nozzle cover together may define an aperture which is spanned by a pair of flexible hinge strips which connect the cover to the ring. The strips are linked at or near their mid point so as to create a common hinge axis for the cover. The strips flex in use and impose bistable condition on the released cover. When the user flicks the cover away from the captive ring with a finger, the strips both bend in one direction causing the cover to lie at approximately 120° to the plane of the nozzle. A tongue extends from the cover across the aperture toward the captive ring. The purpose of the tongue is to slide over the surface of the nozzle neck until it abuts the bead defining the boundary between the nozzle neck and the nozzle proper. Here it lodges inclining the cover at 120° to the plane of the screw cap until a further flick springs the tongue over the bead increasing the angle of the cover to a wider 150°-160°.

This type of closure is suited to bottles and packs for beverages, sauces, shampoos and body gels.
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BRIEF DESCRIPTION OF THE DRAWINGS

Certain embodiments of the invention are now described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a sectional view of a bottle neck and closure.

Figure 2 is a side view of the closure of Figure 1.

Figure 3 is a side view of the closure of Figure 2 rotated through 90°.

Figure 4 is a side view of a closure with the cover tilted to the drink position.

Figure 5 is a side view of a closure with the cover tilted to the parked position.

Figure 6 is a sectional view a variant closure showing how a seal is accommodated.

Figure 7 is a side view of a variant with a single hinge.

Figure 8 is a side view of the variant of Figure 7 at 90° to Figure 7.

Figure 9 is a side view of Figure 8 with the cover tilted open.

Figure 10 is a section through the variant of Figure 7.

DETAILED DESCRIPTION WITH RESPECT TO THE DRAWINGS

The bottle neck 6 has a lip 8 and a retaining flange 10 close to the shoulder of the bottle. Between the lip 8 and the flange 10 is bottle thread 12. The bottle is typically a blow moulding made of PET. The closure is typically made of injection mouldings.

Screw cap 14 has a skirt 16 with a milled cylindrical surface 18 (see Figure 2). The
interior face of the skirt has an internal helical cap thread 20 which engages the thread 12 on the bottle neck. The upper part of the skirt has a shoulder 22 which overlies the bottle lip.

The skirt 16 is joined to a tamper band 24 by frangible bridges 26 (see Figure 3). The band underlies retaining flange 10 so that when the cap is unscrewed and the bridges break, the tamper band remains in place. The screw cap is integral with the nozzle 28.

The lower circular edge of the nozzle projects inside the bottle lip and acts as a site for an optional stick-on foil seal 30 for protecting bottle contents from contamination by organisms such as spores. The nozzle has a circumferential retaining bead 32. The top of the nozzle has an outlet 34.

A separate moulded nozzle cover 36 provides a second tamper evident structure and has two parts. The lower part is a nozzle ring 38 which has uniform profile and engages the underside of the circumferential bead 32. Nozzle cover 36 is joined to the nozzle ring 38 by frangible bridges 42 which extend around a major part of the circumference. The remaining minor part of the circumference is occupied by a hinge assembly. The assembly consists of a window 44 interrupted by a resilient tongue 46. Hinge strips 48 on both sides of the tongue allow the lid to open and close once the user has broken the bridge tags or the tear strip has separated the cover from the ring.

The cover has a finger ledge 50 for flicking the cover open. The lid also has a stopper 52 which enters the outlet 32 when the cover 36 is pressed down on so as to engage the nozzle. The hinge strips are of lesser thickness (0.2mm) than the nozzle cover (1.00mm) and have a moulded kink 54 which allows the strips to elongate slightly during the flexing movements shown in Figures 4 and 5. The hinge strips 48 are long enough to allow the lid to describe an opening arc when flicked up. The tongue rises up the curve of the circumferential bead and parks against the bead so that the cover lies at an angle of typically 120-130° to the plane of the nozzle outlet.

Nozzle ring 38 is free to rotate on the nozzle and abuts the underside of bead 32. Nozzle
cover 36 is joined to the nozzle ring by hinge strips 48 which allow flexure to the position in Figure 4. In this position, tongue 46 lodges beneath the bead 32. Nozzle ring 38 tilts slightly in response to the lodgement. The cover 36 lies at 120° to the plane of the nozzle. If the drinker depresses the nozzle cover further, tongue 46 springs over bead 32 tilting nearly 180° as shown in Figure 5 and lies at 160° to the nozzle plane. The tongue exerts a downward force on the cover which lies well clear of the nozzle but remains free to flex on the hinge strips.

When the user drinks from the bottle with a free hand and flicks off the cover to expose the nozzle, it is possible if the cap impedes drinking to rotate the cover and nozzle ring to a desired position using finger or chin. For this purpose, the nozzle ring is a loose fit on the nozzle.

Referring now to Figures 7-10, the hinge assembly is modified by substitution of the pair of hinges by a single hinge 60 with a flexible live hinge line 62 connecting the cover to the ring. Such hinges are described in US Patent 6,152,320. The edges 64 of the aperture act in the same way as the tongue 46 and allow the cover to adopt a parked position against the nozzle.

We have found the advantages of the above embodiment to be:

1. When the intact lower line of weakness is unbroken the consumer knows the bottle is unopened.

2. When the intact upper line of weakness is unbroken the consumer knows no contents have left the bottle.

3. The lid is attached to the closure and cannot be lost no matter how many times it is removed to allow the consumer to take a drink or otherwise use the bottle contents.

4. The closure can be made in two contrasting colours.
5. Rotation of the cover allows one handed operation.

6. Making one hinge strip thicker than the other controls the life expectation of the closure.

7. The hinge assembly allows a manufacturer to vary the opening angle of the cover by changing the hinge and tongue length.

8. Tooling is less complicated and moulding is easier.

It is to be understood that the word "comprising" as used throughout the specification is to be interpreted in its inclusive form, ie. use of the word "comprising" does not exclude the addition of other elements.

It is to be understood that various modifications of and/or additions to the invention can be made without departing from the basic nature of the invention. These modifications and/or additions are therefore considered to fall within the scope of the invention.
THE CLAIMS DEFining THE INVENTION ARE AS FOLLOWS:

1. A moulded closure for a bottle, the closure being of the type having a nozzle defining an outlet comprising a neck adjacent the outlet, a captive ring engaging the neck, the ring circumference defining a major arc and a minor arc, a nozzle cover connected to the captive ring, a hinge connecting the nozzle cover to the captive ring over the minor arc and frangible bridges connecting the nozzle cover to the captive ring over the major arc.

2. A moulded closure as claimed in Claim 1, wherein the nozzle is integral with a screw cap for the bottle.

3. A moulded closure as claimed in Claim 2, wherein the screw cap has a skirt with a tamper proof band depending from the skirt and frangible bridges connecting the skirt to the tamper proof band.

4. A moulded closure as claimed in Claim 2, wherein the nozzle cover has an integral stopper which is a push fit in the nozzle outlet.

5. A moulded closure as claimed in Claim 1, wherein the captive ring and attached nozzle cover are free to rotate on the nozzle neck.

6. A moulded closure as claimed in Claim 1, wherein the captive ring and the nozzle cover together define an aperture, a pair of flexible hinge members bridge the aperture and a tongue intermediate the hinge members extends from the nozzle cover at least part way across the aperture.

7. A moulded closure as claimed in Claim 6, wherein the nozzle neck is divided from the nozzle cover by a circumferential bead over which the captive ring is a snap fit.

8. A moulded closure as claimed in Claim 6, wherein the hinge members have a
common hinge axis about which the members flex to allow the nozzle cover to
tilt clear of the nozzle outlet.

9. A moulded closure as claimed in Claim 6, wherein the hinge members are kinked
so that when the hinge members flex they adopt bistable positions in which the
cover firstly overlies the nozzle outlet and secondly lies clear of the nozzle outlet.

10. A moulded closure as claimed in Claim 7, wherein the hinge affords two nozzle
cover positions, the first in which the tongue abuts the retaining bead holding the
nozzle cover away from the nozzle outlet to allow drinking, the second in which
the tongue springs over the retaining bead requiring the user to apply force to the
nozzle cover to return the cover to the first position.

11. A moulded closure as claimed in Claim 6, wherein the captive ring and a nozzle
cover are of substantially equal thickness and the hinge members are thinner.

12. A moulded closure as claimed in Claim 1, wherein one of the pair of hinge
members is thicker than the other in order to determine the working life of the
member.

13. A moulded closure as claimed in Claim 1, wherein the cover defines a recess
extending over the minor arc with a pair of recess corners, a single hinge spans
the recess with a live hinge axis and the corners act as reaction surfaces
restraining the cover in the open position as they lie abutting the nozzle cover.

14. A moulded cover having a circular edge, a tamper indicative ring connected to the
circular edge part way round by frangible bridges and part way round by a hinge
allowing the ring to be snap fitted to a moulded bottle closure with a nozzle.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. 7: B65D 41/34, B65D 51/08, B65D 101/00, B65D 43/14, B65D 47/08, B65D 55/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documented searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI - IPC: A61J or B65D and Keywords: (clos+, hing+, frangible, tamper+, nozzle) and like terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Date of the actual completion of the international search: 5 October 2005

Date of mailing of the international search report: 18 OCT 2005

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