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(72) Inventor: **Giles, Stuart**
Langley, Oldbury B69 4PY (GB)

(74) Representative: **Suèr, Steven Johannes et al**
Ablett & Stebbing,
Caparo House,
101-103 Baker Street
London W1U 6FQ (GB)

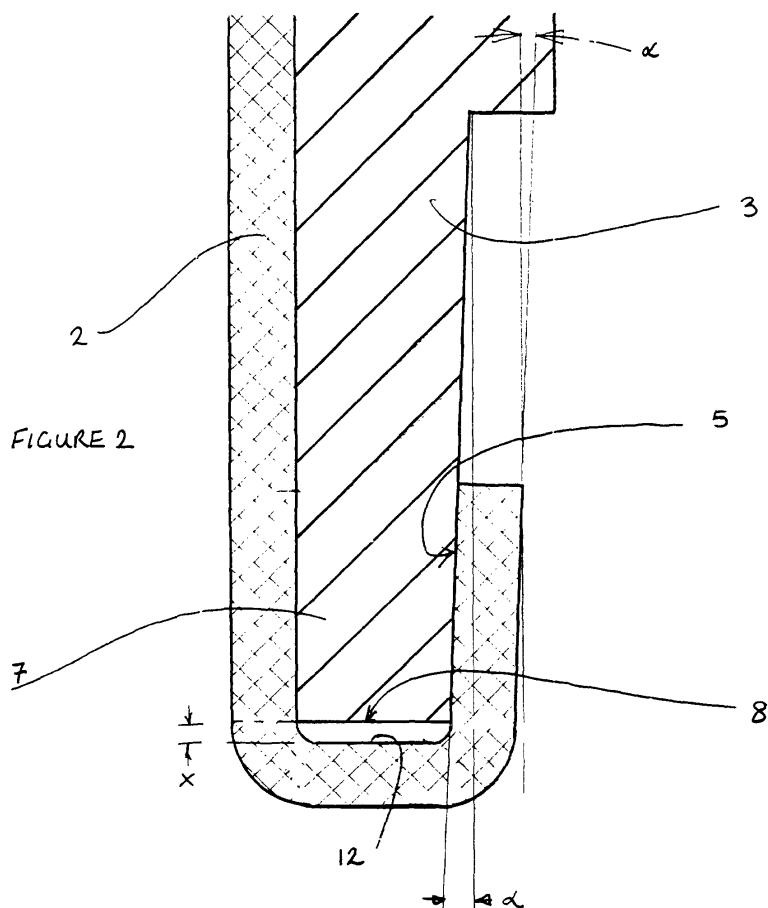
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(71) Applicant: **Metal Closures Limited**
West Bromwich West Midlands B70 7HY (GB)

(54) **Sealing metal cap with plastic insert**

(57) The present invention concerns a closure (1) for a container. The closure (1) comprises an outer shell (2) and an insert (3). The outer shell is formed to clamp

around a lower edge portion (7) of the insert (3), a radially inward surface of the lower edge portion (7) of the insert (3) being inclined relative to the axis of the closure (1) for enhancing contact with the outer shell (2).



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Description

[0001] The present invention relates to a closure for a container and it has special, though not exclusive, application to closures for bottles. Typically, bottles are formed with screw threaded necks and the closure is correspondingly threaded, allowing the closure to be removed and replaced.

[0002] Such bottles when used to contain certain high quality/high cost products such as for example spirits, are often provided with metallic cap-like closures. Such closures generally take the form of an outer metallic shell, enclosing an inner plastics insert. The outer shell provides both strength to the closure as well as an attractive outer surface whereas the insert provides the profile for sealing and attaching the closure to a bottle neck.

[0003] A problem experienced by known closures of this type is that on attempted removal of the closure from the bottle, the outer shell can become free of the plastics insert, and "spins" when further rotational force is applied thereto. In this scenario, since the outer shell presents the only available surface for removal of the closure, it has to be damaged to allow access to the plastics insert and hence the interior of the bottle.

[0004] UK patent 727 529 describes a closure where an outer metal cap is curled around a lower edge of an insert. However, the outer cap requires bonding to the insert using an adhesive coating.

[0005] It is an object of this invention to provide a closure that seeks to overcome problems with known arrangements.

[0006] According to the invention there is provided a closure for a container, the closure comprising:-

an outer shell; and
an insert;

wherein the outer shell is formed to clamp around a lower edge portion of the insert, a radially inward surface of the lower edge portion of the insert being inclined relative to the axis of the closure for enhancing contact with the outer shell.

[0007] Clamping of the shell to the insert significantly reduces the likelihood of the insert becoming free of the shell.

[0008] Conveniently, the lower edge portion of the insert tapers in a direction away from a crown of the closure. Tapering the lower edge portion of the insert provides an inclined surface which assists in the optimisation of the contact characteristics between the shell and the insert.

[0009] Preferably, the outer shell is configured to wrap around a lower edge of the insert. By wrapping the shell around the insert, no adhesives are required, simplifying the manufacturing process.

[0010] In preferred embodiments, a lower portion of an edge of the outer shell is formed to be re-entrant into

the closure. This presents an aesthetically pleasing and safe edge at the lower portion of the closure.

[0011] Preferably, a lower portion of an edge of the outer shell forms a substantially U-shaped groove in cross-section. The provision of a U-shaped groove affords a large and thus secure contact surface area between the insert and the shell.

[0012] Preferably, the outer shell is coated with a flexible and high scratch resistant clear lacquer. In preferred embodiments, the lacquer is an Epoxy-Amino based product. Conveniently, the shell is formed of an aluminium alloy.

[0013] An example of the present invention will now be described with reference to the accompanying drawings, of which:-

Figure 1 shows in cross-section a view of a closure of the present invention; and

Figure 2 shows an enlarged view of a portion of the closure of Figure 1.

[0014] As shown in Figure 1 a closure 1 takes the form of a cap-like member. The closure comprises an outer shell 2 formed of aluminium alloy and a plastics insert 3. The plastics material used for the insert is polypropylene which affords suitable stiffness and strength characteristics. Other suitable materials may be used such as polyethylene.

[0015] A liner 4 is seated within the closure for enhancing the sealing properties thereof. The liner is formed of EPE (expanded polyethylene).

[0016] The insert 3 is provided with an internal threaded portion comprising ridges 10 and grooves 11, which will interengage with corresponding ridges and grooves on a bottle neck.

[0017] Referring to Figure 2, it will be seen that the lower edge of the outer shell 2 is formed to be re-entrant into the closure so as to make a "U" shaped groove or lip 5. In this connection, a lower edge portion 7 of the plastics insert 3 is provided within this groove and is clamped there in position.

[0018] A plurality of passages 14 (shown in Figure 1) are provided between the insert 3 and outer shell 2, by channels formed in the insert. These passages allow escape of air from between the shell and insert as the shell is applied over the insert.

[0019] The lower edge portion 7 of the plastics insert is formed by first stepping down the insert's thickness from where the threaded portion ends. This stepped down lower edge portion 7 is then tapered by providing an inclined inner surface thereon (at angle α) towards its end 8.

[0020] This angle is preferably between 1 and 3° and more preferably 2°. The taper is provided so as to enhance the contact of the inner surfaces of the groove with the edge portion 7 and also to ensure that the combined thickness of the insert and outer shell at the lower

edge of the closure is such so as not to interfere with the contacting ridges 10 and grooves 11 of the closure and bottle neck (shown in respect of the closure only).

[0021] The end 8 of the plastic insert edge 7 is spaced from the adjacent bottom inner surface 12 of the groove 5 to form a gap X. This gap ensures the corners at the bottom of the closure are aesthetically and safely radiussed.

[0022] The lower edge configuration shown in the Figures is formed in three main steps.

[0023] In a first step, the outer shell 2 is placed over the plastics insert 3 with its lower edge or skirt projecting downwardly past the insert. Suitable first tooling then curls or bends the edge or skirt inwardly by 30°.

[0024] In the second step, second tooling bends the skirt so that it projects inwardly at 90° to the axis of the closure.

[0025] Finally, in a third step, third tooling bends the skirt round by around a further 90° so that it clamps around the lower edge portion 7 of the insert 3. The skirt has in effect been bent around 180° at this point.

[0026] Three steps are required to avoid undesirably distorting or otherwise damaging the outer shell.

[0027] Further it has been found that in contrast with earlier closures, the thickness of the outer shell needs to be increased to around 3 mm to ensure there is sufficient material to allow for the stretching that occurs in the forming process. The outer shell may in this respect be slightly thickened just in the region of the groove 5 to afford such extra material.

[0028] By providing the lower edge portion of the insert with an inclined surface, the shell can more readily be formed into enhanced close contact with the insert without distorting the material of the shell. As a result, the extent to which the shell is re-entrant into the interior of the closure can be minimised. Further the provision of an inclined surface onto which the shell is clamped facilitates manufacture of the closure in that withdrawal of the third tooling following its forming step, is less likely to damage the closure as the aperture into which the third tooling is inserted in effect widens in its direction of withdrawal.

edge portion of the insert tapers in a direction away from a crown of the closure.

3. A closure according to claim 1 or 2, wherein the outer shell is configured to wrap around a lower edge of the insert.
4. A closure according to any preceding claim, wherein a lower portion of an edge of the outer shell is formed to be re-entrant into the closure.
5. A closure according to any preceding claim, wherein a lower portion of an edge of the outer shell forms a generally U-shaped groove in cross-section.
6. A closure according to any preceding claim, wherein the outer metal shell is coated with a flexible and high scratch resistant clear lacquer.
7. A closure according to claim 6, wherein the lacquer is an Epoxy-Amino based product.
8. A closure according to any preceding claim, wherein a bottom surface of the plastic insert is spaced from an adjacent bottom inner surface of the outer shell to form a gap.

Claims

1. A closure for a container, the closure comprising:-

an outer shell; and
an insert;

wherein the outer shell is formed to clamp around a lower edge portion of the insert, a radially inward surface of the lower edge portion of the insert being inclined relative to the axis of the closure for enhancing contact with the outer shell.

2. A closure according to claim 1, wherein the lower

