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INSERT MOLDED TAMPER EVIDENT POURING SPOUT

This is a continuation-in-part application of copending U.S. Patent Application No. 08/906,282 filed on August 5, 1997.

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BACKGROUND OF THE INVENTION**I. Field of the Invention**

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This invention relates to pouring spouts for material containers and, in particular, to a flexible pouring spout having a container cover molded around the peripheral edge of the spout with its tamper-evident ring to provide dual evidence of tampering with the container closure.

II. Description of the Prior Art

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For many years, flexible pouring spouts have been used on industrial containers to facilitate repeated closure of the container using a cap member while also providing means for pouring material from the container. The spout is nested within the closure to form a low profile allowing stacking of the containers. As necessary, the spout may be pulled out to create a pouring spout for the container.

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One widely known spout is constructed of a low density polyethylene (LDPE) providing flexibility while the cap member threadably secured to the spout is constructed of a high density polyethylene (HDPE).

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While the closure members have been regularly improved to incorporate new features, mounting of the closure within the container lid has posed problems related to quality control and product integrity. In one well-known method, a metal ring is used to secure the spout within the container lid. The spout is positioned within an opening in the container cover. The metal ring is crimped over the outer peripheral flange of the spout to hold the spout within the cover. However, the

integrity of the container is left to speculation because the closure can be removed and replaced without detection. Efforts to overcome this disadvantage have included ultrasonically welding the closure within the container cover. Although essentially bonding the closure to the lid, this product has not been widely accepted

5 because of problems with the repeatability of the process, high capital expenditures, maintenance on the tooling and product limitations. Both of these methods for securing a closure within a container cover have additional disadvantages associated with added material costs, capital expenditures for insertion machinery, and recovery or recycling costs of multiple component

10 containers.

SUMMARY OF THE INVENTION

The present invention overcomes the disadvantages of the prior known container closures by providing a pouring spout with an outer tamper evident ring which are
5 both integrally molded within the container cover during molding of the cover.

The closure spout of the present invention generally includes a flexible spout, a cap member removably threadably mounted to the spout, and an integrally molded tamper-evident ring removably secured to the cap member. The spout is preferably molded of a synthetic material such as low density polyethylene (LDPE) which allows
10 the spout to be repeatedly extended and nested within the closure. An internal tamper evident diaphragm is molded within the spout for removal upon use of the spout. The cap and tamper evident ring are molded of a synthetic material such as high density polyethylene (HDPE). A series of frangible elements connect the tamper ring to the cap. Upon threadably connecting the cap with the tamper ring to the spout, outer
15 peripheral flanges of the spout and tamper ring are flushly engaged.

The closure is integrally molded within the container lid upon molding of the lid itself creating a permanent bond between the lid and the closure. Specifically, the container lid is molded to the peripheral flange of the spout and tamper ring. The closure is inserted within the mold for the container cover such that the peripheral
20 flange of the spout and tamper evident ring extend into the mold cavity. As a result, upon molding the container lid, the heat and pressure of the resin creating the lid will envelope and bond to the peripheral flange of the tamper ring and spout. The integrally molded closure cannot be removed from the container cover without clearly damaging the container and/or the closure itself includes dual evidence of tampering:
25 the internal diaphragm of the spout and the external tamper ring of the cap member.

A unique mold structure is utilized to mold the closure within the container cover while preventing the molten plastic from flowing past the mold walls over the closure. Additionally, the closure flange incorporates structural features which, in connection with the mold, slow the flow of the molten plastic against the inserted
30 closure to prevent deformation during molding of the container cover. The mold cavity includes a diverter bead disposed outside the periphery of the closure to reduce

the flow and pressure of the molten plastic at the interface with the flange while also ensuring uniform flow of molten plastic around the closure. Also incorporated into the mold are pinch beads which provide localized clamping against the inserted closure to prevent distortion and movement of the closure. The prior molded closure
5 includes structural components to prevent distortion during insert molding including a flow wall formed at the peripheral edge of the closure flange to prevent the flow of molten plastic between the flanges for the spout and tamper ring. Also molded into the outer periphery of the flange for the spout is a skirt support, a mass of plastic material to restrict movement and distortion of the outermost edge of the closure
10 under the clamping forces of the mold. Each of these features prevent deformation and distortion of the closure as the container cover is integrally molded therewith.

An additional feature of the present invention are improved bail tabs for removal of the cap member. The tabs are extended and include an undercut for easier access by the user.

15 Other objects, features and advantages of the invention will be apparent from the following detailed description taken in connection with the accompanying drawings.

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BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be more fully understood by reference to the
5 following detailed description of a preferred embodiment of the present invention
when read in conjunction with the accompanying drawing, in which like reference
characters refer to like parts throughout the views and in which:

Figure 1 is a perspective view of a portion of a container with a container
cover having a closure embodying the present invention;

10 Figure 2 is a perspective view of the closure;

Figure 3 is a cross-sectional view of the closure within the container cover;

Figure 4 is an enlarged cross-sectional view of the peripheral flange of the
closure being molded to the container cover;

Figure 5 is an enlarged cross-sectional view of the closure molded within
15 the container cover;

Figure 6 is a cross-sectional view of the closure within a mold for the
container cover; and

Figure 7 is an enlarged cross-sectional view of the closure within the mold
for the container cover.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE PRESENT INVENTION

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Referring first to Figure 1, there is shown an upper portion of a container 10 having a container cover or lid 12 to maintain the material within the container 10. In a well known manner, the cover 12 is secured to the container 10 along a lip 14 of the container 10 after filling of the container 10. Typically, the container 10 and container cover 12 are molded of a plastic material preferably a high density polyethylene (HDPE). In order to facilitate removal of the material from the container 10, a closure 20 is formed in the container cover 12 which allows the material to be poured or pumped from the container 10. The present invention will be described in conjunction with a pouring spout closure 20 although it is to be understood that the specific type of closure may be interchanged in accordance with the present invention.

Referring now to Figures 2 and 3, the closure 20 is shown molded directly within the container cover 12. The closure 20 generally includes a nestable spout 22 and a cap member 24 having a tamper-evident ring 26. The spout 22 and the cap member 24 with its tamper ring 26 are typically molded separately. Preferably, the spout 22 is molded of a low density polyethylene (LDPE) to provide flexibility while the cap 24 and ring 26 are molded of a high density polyethylene (HDPE). Prior to insertion within the cover 12, the cap member 24 is threadably attached to the flexible spout 22.

The flexible spout 22 has a throat portion 28, which includes external threads 30, a flexible neck portion 32 and an outer peripheral flange 34. Molded within the throat portion 28 of the spout 22 is a removable diaphragm 36 which provides internal tamper evidence for the closure 20. The diaphragm 36 has a pull ring 38 or other grasping means which allows it to be torn out of the spout 22 by the user. In the event the diaphragm 36 is missing or partially torn from the interior of the spout 22, this provides a visual indication to the user that the

material within the container 10 may have been tampered with. The flexible neck portion 32 allows the spout 22 to be selectively moved between the nested position shown in Figure 2 and an extended position whereby the spout 22 extends beyond the lane of the cover 12 to facilitate the pouring of material from the container 10.

5 The cap 24 comprises a planar top 40 having a cylindrical portion 42 extending therefrom. The cylindrical portion 42 has internal threads 44 to cooperate with the threads 30 of the spout 22. In a preferred embodiment, the cap 24 includes bail handles 46 with bail tabs 48 to facilitate removal of the cap 24 from the spout 22 by forming a handle for rotation of the cap 24. The bail tabs 48
10 extend outwardly and include an angled undercut 50 to allow easier access to the bail handles 46. The extended and undercut bail tabs 48 allow the user to position their fingers beneath the bail tabs 48 to lift the bail handles 46 so that the cap 24 may be rotated off of and on to the spout 22 as necessary.

 Molded as part of the cap member 24 is the tamper evident ring 26. The
15 tamper ring 26 is connected to the cap 24, specifically the bail handles 46 by a plurality of frangible elements 52 circumferentially spaced about the cap 24. The tamper ring 26 includes an annular ring 54 and a peripheral flange 56, the annular ring 54 having the frangible elements 52. Upon assembly of the cap 24 with the tamper ring 26 to the spout 22, the peripheral flange 56 of the tamper ring 26 lies
20 in flush engagement with the peripheral flange 34 of the spout 22 as best shown in Figures 4 and 5. The tamper ring 26 provides an external visual indicator of removal of the cap 24. Raising the bail handles 46 to remove the cap 24 will cause the frangible elements 52 to break providing a clear indicator that the cap 24 may have been removed.

25 In a preferred embodiment of the present invention, the assembled closure 20, comprising the spout 22, the cap 24 and tamper evident ring 26, is molded directly within the container cover 12. The cover 12 is molded such that it envelopes the peripheral flanges 34, 56 of the closure 20 to integrally combine the spout 22, tamper ring 26 and cover 12 as shown in Figs. 4 and 5. During molding
30 of the cover 12, the assembled closure 20 is positioned within the mold 100 for the cover 12 such that the closure 20 forms a barrier for one portion of the mold 100.

The mold 100 is sealed off against the peripheral flange 34, 56 of the closure 20. As the molding material is injected into the cover mold 100, the molten material will flow over and around the flanges 34, 56 to encapsulate the flanges of the closure 20 and permanently join the spout 22, tamper ring 26 and cover 12. The
5 heat and pressure of the resin as the cover 12 is molded creates an integral bond at a molecular level with the flanges 34, 56.

Figures 6 and 7 disclose a specific mold and closure configuration which maintains the integrity of the premolded closure 20 under the pressure and temperature extremes of the injection molding process for the container cover 12.
10 Prior to molding the cover 12, the closure 20, combining the flexible spout 22, the tamper ring 26, and the cap 24, is positioned within the mold 100 for the container cover. The mold 100 preferably includes an upper mold 102 and a lower mold 104 which combine to form an inner cavity 106 within which the closure 20 is positioned and an outer cavity 108 defining the configuration of the cover 12. The
15 inner cavity 106 and outer cavity 108 are separated by the inserted closure 20 which is clamped into position by the mold portions 102, 104. With the closure 20 clamped within the mold 100, molten plastic may be injected into the cavity 108 to integrally bond the closure 20 within the container cover 12.

In order to ensure that the plastic is injected into the cavity 108 of the mold
20 100 and does not flow past the clamped closure 20 or otherwise deform the premolded closure 20, specific features have been incorporated into both the mold 100 and the inserted closure 20. The mold 100 includes an annular diverter flange 110 which forms a restricted passageway 112 around the outer periphery of the closure 20 to slow and spread the flow of molten plastic around the mold cavity
25 108. As molten plastic fills the portion of the cavity 108 peripherally outside of the diverter flange 110 increased pressure forces the plastic through the passageway 112 such that the resin comes in contact with the entire circumference of the closure 20 simultaneously. It has been found that without the diverter flange 110, the plastic resin engages the closure 20 closest to the mold inlet and localizes heat and pressure in one area of the closure. The diverter flange 110 ensures
30 substantially uniform enveloping of the flanges 34, 56 of the closure 20.

The mold 100 also includes opposing clamp flanges 114, 116 to positionally capture the inserted closure 20 between the mold halves 102, 104. Each of the clamp flanges 114, 116 is provided with at least one pinch bead 118 extending annularly along the flanges 34, 56. The pinch beads 118 localize the clamping pressure in order to maintain the closure 20 in place reducing the tendency to distort is a result of pressures from the molten resin. These pinch beads 118 will "bite" into the flanges 34, 56 to retard movement.

The closure 20 itself is provided with features designed to overcome the distortion affects associated with the pressures and temperatures of the injected molten plastic. Formed at the outer periphery of the spout flange 34 is an annular blocker bead 120 extending upwardly to essentially block the seam between the flanges 34, 56 preventing resin from flowing between the spout 22 and the ring 26. It has been determined that as the molten plastic flows toward the closure 20, it tends to separate the two pieces. The blocker bead 120 blocks the initial blast of resin reducing the force of the gap between the flanges 34, 56. Also formed at the outer periphery of the spout flange 34 is a skirt mass 122 which provides additional material to the peripheral edge. This skirt 122 restricts movement and distortion of the edge of the closure 20 under the clamping forces of the mold 100 and the injected molten resin.

In order to prevent movement of the tamper ring flange 56 relative to the spout flange 34, an annular tongue 124 is provided on flange 34. Upon joining the flanges 56, 34, the annular tongue 124 will engage or bite into the flange 56. This reduces lateral movement between the components. Furthermore, because the tongue 124 and groove 126 are formed proximate the pinch beads 118, clamping of the components is to prevent relative movement of the components while also preventing molten plastic from flowing between the flanges 34, 56.

Thus, the present invention integrally combines the tamper evident ring 26 with the container cover 12 providing an end product for the user which has dual tamper evidence. The removable tear-out diaphragm 36 of the spout 24 provides internal tamper evidence while the molded-in tamper evident ring 26 provides visual external tamper evidence. The integral bond formed by the inset molding

process creates a leak-proof cover 12 for the container 10 which is simpler and less expensive to manufacture since the closure 20 is inserted during molding of the cover 12.

5 The foregoing detailed description has been given for clearness of understanding only and no unnecessary limitations should be understood therefrom as some modifications will be obvious to those skilled in the art without departing from the scope and spirit of the appended claims.



What is claimed is:

1. In an integrally formed component of a container which includes a spout member forming a passageway and having a peripheral flange, a tamper-evident ring having a peripheral flange disposed in adjoining flush engagement with said peripheral flange of said spout member so as to define a seam between said two peripheral flanges, and a component body integrally bonded to said adjoining flanges of said spout member and said tamper-evident ring, said component body encapsulating outer end portions of said adjoining flanges wherein the improvement comprises:

said spout member peripheral flange including a blocker bead formed at an annular edge of said peripheral flange, said blocker bead extending upwardly to obstruct the seam between said adjoining flanges.

2. The improvement of claim 1 wherein said peripheral flange of said spout member includes a peripheral skirt mass.

3. The improvement of claim 2 wherein one of said adjoining flanges includes an annular tongue extending therebetween.

4. The improvement of claim 3 wherein said annular tongue extending between said adjoining flanges is formed radially inwardly from the annular edge of the peripheral flange of said spout member.

5. The improvement of claim 1 wherein one of said adjoining flanges includes an annular tongue extending therebetween.

6. The improvement of claim 5 wherein said annular tongue extending between said adjoining flanges is formed radially inwardly from the annular edge of the peripheral flange of said spout member.

7. In an integrally formed component of a container which includes a spout member forming a passageway and having a peripheral flange, a tamper-evident ring having a peripheral flange disposed in adjoining flush engagement with said peripheral flange of said spout member so as to define a seam between said two peripheral flanges, and a component body integrally bonded to said adjoining flanges of said spout member and said tamper-evident ring, said



component body encapsulating outer end portions of said adjoining flanges,
wherein the improvement comprises:

said spout member peripheral flange including a peripheral skirt mass.

8. The improvement of claim 7 wherein one of said adjoining flanges
5 includes an annular tongue extending therebetween.

9. The improvement of claim 8 wherein wherein said annular tongue
extending between said adjoining flanges is formed radially inwardly from the
outer end portions of said adjoining flanges.

10. In an integrally formed component of a container which includes a
10 spout member forming a passageway and having a peripheral flange, a tamper-
evident ring having a peripheral flange disposed in adjoining flush engagement
with said peripheral flange of said spout member so as to define a seam between
said two peripheral flanges, and a component body integrally bonded to said
adjoining flanges of said spout member and said tamper-evident ring, said
15 component body encapsulating outer end portions of said adjoining flanges,
wherein the improvement comprises:

one of said adjoining flanges includes an annular tongue extending
therebetween.

11. The improvement of claim 10 wherein said annular tongue
20 extending between said adjoining flanges is formed radially inwardly from the
outer end portions of said adjoining flanges.