

BRIEF DESCRIPTION OF THE DRAWINGS

The invention, together with additional objects, features and advantages thereof, will be best understood from the following description, the appended claims and the accompanying drawings in which:

FIG. 1 is an elevational view of a closure and container package in accordance with one presently preferred embodiment of the invention;

FIG. 2 is a fragmentary exploded perspective view of the package illustrated in FIG. 1;

FIG. 3 is a bottom perspective view of the closure in FIGS. 1 and 2, being taken substantially from the direction 3 in FIG. 2;

FIGS. 4 and 5 are sectional views of the closure and container finish in accordance with the present invention taken at differing angular orientations;

FIG. 6 is a sectional view taken substantially along the line 6—6 in FIG. 5; and

FIG. 7 is a sectional view taken substantially along the line 7—7 in FIG. 6.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The drawings illustrate a package 10 in accordance with one presently preferred embodiment of the invention as comprising a container 12 and a squeeze-and-turn child-resistant closure 14. Container 12, which is preferably of molded plastic construction, includes a body 16 having a shoulder 18 from which a finish 20 axially extends. A helical external thread 22 is formed on the outer surface of finish 20 for securement of a closure. A pair of lugs 24 extend axially from shoulder 18 on diametrically opposed sides of finish 20. Each lug 24 has a flat clockwise-oriented radially extending face 26, a convex counterclockwise-oriented and radially inwardly oriented face 28, and an arcuate radially outwardly oriented face 30. Container 12 may be of any suitable molded plastic composition.

Closure 14 is preferably of one-piece molded plastic composition such as polypropylene. Closure 14 has a flat base wall 32, a circumferentially discontinuous outer wall 34 extending from the periphery of base wall 32, and a circumferentially continuous inner wall 36 spaced radially inwardly from outer wall 34. Inner wall 36 has an internal thread 37 for engagement with external thread 22 on container finish 20 to secure the closure on the container. An annular lip 38 extends axially from base wall 32 and is spaced radially inwardly from inner wall 36 for plug-type sealing engagement with the inside diameter of container finish 20, as best seen in FIGS. 4, 5 and 7. Other seal designs such as a top or side seal can be employed with or without a liner within the scope of the present invention.

Outer wall 34 has a pair of diametrically opposed gaps defined by circumferentially opposed straight parallel outer wall edges 40. As best seen in FIGS. 1–3, the gaps in outer wall 34 extend for the entire length of outer wall 34 from base wall 32 to the axial free edge of outer wall 34. A pair of diametrically opposed tabs 42 extend from inner wall 36 as an integral axial extension of the inner wall in radial alignment with and spaced radially inwardly from the diametrically opposed gaps in outer wall 34. Tabs 42 have arcuate thickened regions at the free ends of the tabs for engagement by the fingers of a user. The axial dimension of tabs 42 is such that the axial free edges of the tabs are substantially co-planar with the axial free edge of outer wall 34, as best seen in FIGS. 4–5. Tabs 42 are spaced from the

axis of closure 14 for circumferential engagement with lugs 24 on container shoulder 18, as will be described. Radial webs 44 integrally interconnect inner wall 36 with outer wall 34 adjacent to closure base wall 32, while tabs 34 spaced from base wall 32 are disconnected from outer wall 34 and free to flex radially inwardly during application and removal of closure 14 to and from container 12. As best seen in FIG. 6, the circumferential edges 40 of outer wall 34 that define the gaps in the outer wall radially overlap the corresponding straight parallel circumferentially opposed edges 45 of tabs 42, which helps protect tabs 42 from inadvertent deflection. In the illustrated preferred embodiment of the invention, the gaps defined between edges 40 of outer wall 34 having a chordal dimension sufficient to accommodate finger access to tabs 42. This dimension is typically in the range of about one-half to about three-quarters of an inch, and this dimension would generally remain substantially constant for closures with larger or smaller diameters.

To apply closure 14 to container 12, inner wall 36 is positioned over container finish 20 and rotated in a clockwise direction to engage external finish thread 22 with internal thread 37 on closure wall 36. As the closure advances onto the container finish, rotation of the closure brings flexible tabs 42 into clockwise abutment with surfaces 28 on lugs 24. Surfaces 28 are angulated to cam the opposing edges of tabs 42 radially inwardly, so that the tabs ride along the inner edges of lugs 24, and then snap back radially outwardly after clearing the lugs (FIG. 6). If it is then attempted to remove closure 14 by simply grasping outer wall 34 and rotating counterclockwise, tabs 42 will be brought into circumferential abutment with flat faces 26 of lugs 24. This abutment resists removal of closure 14 from container 12. The flexible free edges of tabs 42 must be flexed and deflected radially inwardly so as to clear abutment faces 26 of lugs 24, which then permits counterclockwise unthreading of closure 14 with respect to container 12.

It will be noted that recession of tabs 42 with respect to outer wall 34 provides a number of significant advantages. For example, tabs 42 are effectively protected by being recessed with respect to outer wall 34, which resists application of a planer force to remove the closure, such as by a child biting outer wall 34. The fact that tabs 42 are freely deflectable with respect to inner wall 36 reduces actuation force. Furthermore, the modified dual-wall design of the present invention is usable in conjunction with all finish sizes, and particularly readily accommodates manufacture in small sizes for fitment to containers having small finish diameters. The gaps in the outer wall inherently tend to guide the fingers of a user to tabs 42, which must be depressed and deflected to facilitate removal. Lugs 24 are disposed radially inwardly of outer wall 34, and protect the outer wall from distortion during application of incorrect removal force. There has thus been disclosed a closure, a container/closure package and a method of closure manufacture that fully satisfy all of the objects and aims previously set forth. The closure, package and method have been disclosed in conjunction with presently preferred embodiments thereof. Alternatives and modifications will readily suggest themselves to persons of ordinary skill in the art. The present invention is intended to embrace all such alternatives and modifications as fall within the spirit and broad scope of the appended claims.

What is claimed is:

1. A child-resistant closure for a container having a finish with an external thread and an axial lug on a shoulder spaced from the thread, said closure being of integrally molded plastic construction and comprising: