CHILD-RESISTANT SQUEEZE-AND-TURN CLOSURE, PACKAGE AND METHOD OF MANUFACTURING

The present invention is directed to squeeze-and-turn child-resistant closures, to packages embodying such closures and to methods of manufacturing such closures.

BACKGROUND AND OBJECTS OF THE INVENTION

In squeeze-and-turn child-resistant closures, there are a pair of tabs on the closure that are disposed for engagement with a pair of lugs molded into a container, either on the container finish or on the shoulder of the container immediately beneath the container finish. The closure tabs are normally disposed at a position for circumferential engagement with the lugs on the container. If the closure is squeezed from opposed sides, the closure skirt is distorted sufficiently to permit the tabs to clear the lugs, and the closure to be unthreaded from the container finish. When the closure is threaded onto the container, the tabs on the closure ride over the lugs on the container, usually facilitated by angulated cam surfaces on the container lugs. The need to squeeze and distort the closure sidewall provides a child-resistant feature, whereby it is difficult for a child to remove the closure from the container and thereby obtain access to the contents of the container.

Squeeze-and-turn child-resistant closures of the described type are conventionally provided in single-wall designs and dual-wall designs. U.S. Pat. Nos. 3,917,097 and 3,941,268 illustrate single-wall designs, in which a single wall or skirt extends from the periphery of the closure base wall, with the closure internal threads being formed at the upper portion of the skirt and the lug-abutment tabs being formed at the lower periphery of the skirt. U.S. Pat. Nos. 4,117,945, 4,410,097, 5,687,863 and 5,915,576 illustrate dual-wall squeeze-and-turn closures, in which the closure internal thread is formed on the inner wall or skirt of the closure, and the tabs for abutting the container lugs are formed on the outer wall or skirt. In dual-wall closures of this character, the inner wall is spaced radially inwardly from the outer wall, and only the outer wall is distorted to remove the closure from a container. A problem with dual-wall squeeze-and-turn closures of this type is that they cannot readily be made of small size for use on small container finish sizes.

It is a general object of the present invention to provide a squeeze-and-turn child-resistant closure having a modified dual-wall construction that accommodates fabrication in all finish sizes, and that readily permits manufacture in small sizes suitable for use in conjunction with containers having reduced finish diameters. Another object of the present invention is to provide a closure of the described character in which the outer closure wall is configured to protect the force-application area for removing the closure, thereby resisting removal of the closure by application of planer force, such as by a child biting the external periphery of the closure. Yet another object of the invention is to provide a closure of the described character that requires reduced actuation force. A further object of the present invention is to provide a package that comprises a container and a squeeze-and-turn child-resistant closure of the described character, in which the lugs on the container not only resist removal of the closure in the absence of application of squeezing force to the proper areas of the closure, but also resist distortion of the outer wall of the closure. Yet another object of the invention is to provide a method of making or fabricating a squeeze-and-turn child-resistant closure of the described character.

SUMMARY OF THE INVENTION

A child-resistant closure in accordance with a presently preferred embodiment of the invention includes a base wall, a peripheral outer wall extending from the base wall, and an inner wall spaced radially inwardly from the outer wall and having an internal thread for securement to a container finish. The outer wall of the closure has diametrically opposed circumferential gaps, and the inner wall extends axially in radial alignment with the gaps in the outer wall for circumferential abutment with lugs on a shoulder of the container. The inner wall is flexible inwardly for clearing the container lugs and permitting removal of the closure from the container finish. The outer wall thus protects the force application area of the inner wall by reason of the fact that such force application area is recessed inwardly with respect to the circumference of the outer wall. The closure resists application of planer force to the removal area of the inner wall, such as by a child biting the closure. Furthermore, the modified dual-wall construction of the present invention may be constructed in small sizes suitable for use in conjunction with containers having small finish diameters.

In the preferred embodiment of the invention, the inner wall has diametrically opposed circumferentially spaced tabs that extend axially in radial alignment with the gaps in the outer wall. The gaps in the outer wall extend axially from the base wall to the axial edge of the outer wall, and the circumferential edges of the outer wall radially overlap the circumferential edges of the tabs at the gaps for enhanced protection of the tabs from inadvertent application of removal force. Radial webs connect the inner wall to the outer wall at the gaps in the region of the internal thread on the inner wall, thereby rigidifying the closure structure while leaving the tabs free to flex in the radial direction during application and removal of the closure from a container. The combination of the gaps in the outer wall and the tabs that extend axially from the inner wall form depressions that naturally guide the fingers of a user to the inner wall tabs that must be depressed in order to remove the closure from a container.

In accordance with another aspect of the present invention, there is provided a child-resistant package that comprises a closure of the described character in combination with a container having a finish with an external thread and at least one axial lug on the shoulder spaced from the thread. In the preferred embodiment of the invention, the container has diametrically opposed lugs on the shoulder of the container with clockwise-oriented radial faces disposed for abutment with the flexible lugs on the closure in an undeflected position of the tabs, thereby resisting removal of the closure. The container lugs have counterclockwise-oriented faces for camming the tabs radially inwardly as the closure is threaded onto the container finish. The radially outwardly oriented faces of the lugs are disposed radially inwardly of the outer wall for supporting the outer wall against radially inward movement or deflection.

In accordance with a third aspect of the present invention, a method of making a child-resistant closure includes a step of molding a closure of plastic construction having a base wall, a peripheral outer wall, and an inner wall spaced from the outer wall and having an internal thread. Diametrically opposed circumferential gaps are formed in the outer wall, and diametrically opposed flexible tabs are formed to extend axially from the inner wall in radial alignment with the gaps in the outer wall.