CHILD-RESISTANT CLOSURE AND CONTAINER

This invention relates to child-resistant closures and containers and more particularly to threaded closures which require squeezing to permit unthreading movement.

A variety of child-resistant closures have been provided in which deflection of the cylindrical wall or skirt of the closure deforms the skirt opening into an oval so that the lock elements on the skirt move radially outwardly to disengage from the complementary lock member on the container. Such squeeze and turn closures are popular and are widely used but have objectionable features or limitations. By way of example, the engagement and disengagement of the lock mechanism is dependent on the flexibility of the skirt of the closure so that careful control of the wall thicknesses is required. Also, it has been found that the amount of movement of the lock elements radially outwardly on the major axis of the oval is substantially less than the movement resulting from squeezing inwardly on the minor axis of the oval. In some instances the difference or loss of movement is as much as thirty percent. It is desirable to make more effective use of the squeezing movement so that an increment of squeezing movement will result in an equal increment of unlocking movement.

It is an object of the invention to provide a child-resistant package in which one of two action's required to open the package is a squeezing action on the skirt of the closure during which the squeezing force is applied substantially in line with the required movement to achieve disengagement of the locking mechanism preventing unthreading movement.

It is a further object of the invention to provide such a child-resistant package in which the squeezing movement and unlocking movement are substantially equal.

The purposes of the invention are achieved by a package in which the closure is formed with deflectable tabs in the skirt of the closure such that, in the undeflected condition of the tabs, lock members on the container are engaged to stop unthreading movement. Deflection of the tab or tabs, radially inwardly move the deflectable tabs out of the path of the lock member on the container to permit unthreading action of the closure and opening of the package. In one embodiment of the invention, the tab or tabs extend axially of the closure and are moveable relative to the skirt and to the lip at the bottom of the skirt. In another embodiment of the invention, the tabs are formed to terminate adjacent to the lip so that the lip remains continuous to reinforce the closure. Still another embodiment of the invention contemplates the addition of a tamper-indicating feature by which prior efforts to open the closure can be detected.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a elevation view of the closure forming part of the child-resistant closure and container package of the present invention;

FIG. **2** is a bottom view of the closure seen in FIG. **1**;

FIG. **3** is a cross-sectional view of the closure and container with the closure shown in cross-section taken on line **3**—**3** in FIG. **2**;

FIG. **4** is a cross-sectional view taken on line **4**—**4** in FIG. **3**;

FIG. **5** is a perspective view of a second embodiment of the invention;

FIG. **6** is a cross-sectional view at an enlarged scale of the closure seen in FIG. **5** in association with the neck of a container with the closure shown in cross-section; and

FIG. **7** is a perspective view similar to FIG. **5** of still another embodiment of the invention having tamper-indicating features.

DETAILED DESCRIPTION

Referring to the drawings and particularly to FIG. **3**, the child-resistant closure and container package is referred to generally at **10** and includes a closure **12** and the container **14**.

The container **14** has a body portion **16** for holding the contents of the container and a cylindrical neck **18** having a lip **20** surrounding an opening through which the contents of the container can be discharged. Closure receiving threads **22** are formed on the neck **18** adjacent to the lip **20**.

Closure **12** has a cylindrical wall or skirt **24**, the upper end of which is closed by a top wall **26**. The lower end of the cylindrical wall **24** forms an opening defined by an annular lip **28** which receives the neck **18** of the container **14**. Threads **30** complementary to the threads **22** on the neck **18** are formed adjacent to the top **26** of the closure **12**.

In the closed condition of the package seen in FIG. **3**, the threads **22** and **30** are engaged with each other to hold the closure **12** in a closed condition on the container. In that condition, the cylindrical wall **24** below the threads **30** is spaced from the outer wall of the neck **18**.

Push tabs **34** are formed in the cylindrical wall **24** by axially extending, spaced slots **36** which begin below the closure threads **30** and extend through the lip **28**. Push tabs **34** are deflectable relative to the remainder of the cylindrical wall or skirt **24**. For that purpose, push tabs or pressure pads **37** are provided as indicated in FIG. **1** so that the application of finger pressure at this point will cause the lower end of the tab **34** to move radially inwardly toward the neck **18** and relative to the adjacent wall or skirt **24**.

The lower ends of the push tabs **34** are provided with lock elements **38** which are located on the inner wall surface of tabs **34** and project axially below the lid **28**. In the normally closed condition of the container, lock elements **38** engage lock members **40** molded integrally with the container body **16** on a shoulder adjacent to the neck **18**.

As best seen in FIG. **4**, the lock elements are arranged in diametrically opposed relationship to each other and each includes a lock surface **42**. The lock surfaces **42** are engaged by the lock elements **38** to prevent unthreading rotation of the closure **12** relative to the container **14**. Upon pressing the pressure points **37** radially inwardly the tabs **34** together with the lock elements **38** swing radially inwardly to the unlocked position indicated at **38***a* in FIG. **4**. While the tabs **34** are depressed simultaneously rotation or unthreading movement of the closure **12** is permitted and the closure can be completely removed from the container **14**.

Replacement of the closure **12** on the container **14** is facilitated by cam surfaces **44** formed on the lock members **40**. The cam surfaces **44** are so positioned that in the normal undetected condition of the tabs **34** relative to the skirt **24**, closing rotation of the closure **12** causes the lock elements **38** to come into engagement with the cam surfaces **44**. Continued rotation causes the tabs **34** to be deflected radially inwardly together with the lock elements **38** so that the latter are guided to pass around the lock members **40** to permit the closure to reach a fully closed position on the container **14**. Upon release of pressure from the tabs **34**, the closure is in a locked condition.

The lock members **40** are each provided with a guard portion or walls **46** which extends circumferentially from the