A child-resistant package includes a plastic container having a body, an externally threaded finish, and a shoulder coupling the finish to the body and having an outer axially facing surface. A deflectable release element is integrally cantilevered from an exterior surface of the finish adjacent to the outer axially facing surface of the container shoulder, and a locking lug is provided on the release element. A plastic closure has an internally threaded skirt for receipt over the externally threaded finish and a locking lug on the skirt for engagement with the locking lug on the release element to prevent unthreading of the closure from the finish. Manual flexure of the release element moves the locking lug on the release element out of engagement with the locking lug on the skirt to permit removal of the closure. The release element on the container finish is positioned with respect to the container shoulder such that abutment of the release element against the external surface of the shoulder prevents over-flexing of the release element away from the closure.
CLOSURE AND CONTAINER PACKAGE HAVING CHILD-RESISTANT AND NON-CHILD-RESISTANT MODES OF OPERATION

[0001] The present invention relates to child-resistant closure and container packages, such as medicinal packages for example, to closures and containers for such packages, and to methods of making such packages.

[0002] Reference is made to U.S. application Ser. No. _______ (Dockets 17794, 17795, 17796, 17926 and 17953) assigned to the assignee of the present application.

BACKGROUND AND SUMMARY OF THE INVENTION

[0003] U.S. Pat. Nos. 5,889,348, 6,039,195 and 6,327,770 disclose closure and container packages that are particularly well suited for prescription applications. The container includes a sidewall with an externally threaded finish and a deflectable release element cantilevered from the finish on a side of the threads remote from the open mouth of the container. The closure includes a base wall with an internally threaded peripheral skirt having a locking lug at the edge of the skirt remote from the base wall. This locking lug on the skirt cooperates with a locking lug on the deflectable release element of the container for securing the closure to the container in a child-resistant mode of operation. To release the closure, the release element is deflected downwardly toward the container sidewall to move the locking lug on the release element out of engagement with the locking lug on the closure. A dome extends from the internal periphery of the base wall and has external threads that are adapted to be received within the open mouth of the container in an inverted non-child-resistant mode of operation of the closure. In some embodiments disclosed in the noted patents, tab feet extend from the lower edge of the deflectable release element and cooperate with the opposing sidewall of the container to limit deflection of the release element and thereby prevent distortion of the release element beyond its elastic limit, which would prevent proper child-resistant operation and potentially fracture the release element from the container sidewall. Although the packages disclosed in the noted patents have enjoyed substantial commercial acceptance and success, improvements remain desirable. In particular, it is desirable to provide a package of this general type in which the overall height and weight of the finish portion of the container is reduced as compared with the height of the container body.

[0004] The present invention embodies a number of aspects that can be implemented separately from or, more preferably, in combination with each other.

[0005] A child-resistant package in accordance with one aspect of the present invention includes a plastic container having a body, an externally threaded finish, and a shoulder coupling the finish to the body and having an outer axially facing surface. A deflectable release element is integrally cantilevered from an exterior surface of the finish adjacent to the outer axially facing surface of the container shoulder and a locking lug is provided on the release element. A plastic closure has an internally threaded skirt for receipt over the externally threaded finish and a locking lug on the skirt for engagement with the locking lug on the release element to prevent unthreading of the closure from the finish. Manual flexure of the release element moves the locking lug on the release element out of engagement with the locking lug on the skirt to permit removal of the closure. The release element on the container finish is positioned with respect to the container shoulder such that abutment of the release element against the external surface of the shoulder prevents over-flexing of the release element away from the closure.

[0006] A package in accordance with another aspect of the present invention has both child-resistant and non-child-resistant modes of operation. The package includes a plastic container having a body, an externally threaded finish with a lesser lateral dimension than the body, and a radially extending shoulder integrally connecting the finish to the body and having a surface facing axially outwardly from the body. A resiliently deflectable release element is integrally cantilevered radially outwardly from an exterior surface of the finish adjacent to the shoulder, and a first locking lug is disposed on the release element. A plastic closure has a base wall, an internally threaded skirt extending from an outer periphery of the base wall, and at least one second locking lug on the skirt. An annular wall extends from the base wall in a direction opposite from the skirt. The closure is adapted to be secured to the container finish in a child-resistant mode of operation with the skirt threaded onto the finish and the second locking lug on the closure in engagement with the first locking lug on the release element. Flexure of the release element away from the closure and toward the shoulder releases the first locking lug from engagement with the second locking lug and permits unthreading of the closure from the finish. Axial abutment of the release element with the shoulder prevents over-flexure of the release element with respect to the finish beyond an elastic limit of the connection of the release element to the finish. The closure is adapted to be inverted and secured to the container finish in a non-child-resistant mode of operation with the annular wall secured to the container finish.

[0007] A plastic container in accordance with a further aspect of the invention includes a body with an externally threaded finish having a lesser lateral dimension than the body, and a radially extending shoulder integrally connecting the finish to the body. A resilient deflectable release element is integrally cantilevered radially outwardly from the finish adjacent to but spaced from an external axially outwardly facing surface of the shoulder. A locking lug on the release element is for locking engagement with a skirt of a closure secured to the container finish. The spacing between the release element and the external surface of the closure is such that flexure of the release element toward the shoulder to release engagement with a closure skirt is limited by abutting engagement with the shoulder external surface to less than the elastic limit of the cantilever connection of the release element to the finish. This helps prevent fracture or permanent distortion of the release element. A closure in accordance with yet another aspect of the present invention includes an annular wall opposite from the closure skirt with an internal bead or thread for receipt over an external bead or thread on the finish for securing the closure to the finish in an inverted non-child-resistant mode of operation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The invention, together with additional objects, features, advantages and aspects thereof, will be best under-
stood from the following description, the appended claims and the accompanying drawings in which:

[FIG. 1] FIG. 1 is an elevational view of a closure and container package in a child-resistant mode of operation in accordance with one exemplary but presently preferred embodiment of the invention;

[FIG. 2] FIG. 2 is a fragmentary sectional view of the package illustrated in FIG. 1;

[FIG. 3] FIG. 3 is a fragmentary sectional view on an enlarged scale of the portion of FIG. 2 within the area 3;

[FIG. 4] FIG. 4 is a fragmentary sectional view of the package in FIG. 1 in a non-child-resistant mode of operation;

[FIG. 5] FIG. 5 is a fragmentary sectional view on an enlarged scale of the portion of FIG. 4 within the area 5;

[FIG. 6] FIG. 6 is a fragmentary elevational view of the container in the package of FIGS. 1-4;

[FIG. 7] FIG. 7 is a fragmentary top plan view of the container in FIG. 6;

[FIG. 8] FIG. 8 is a fragmentary sectional view taken substantially along the line 8-8 in FIG. 6;

[FIG. 9] FIG. 9 is a partially sectioned elevational view of the closure in the package of FIGS. 1-4;

[FIG. 10] FIG. 10 is a fragmentary sectional view on an enlarged scale of the portion of FIG. 9 within the area 10;

[FIG. 11] FIG. 11 is a fragmentary elevational view of a container in accordance with a modified embodiment of the invention; and

[FIG. 12] FIG. 12 is a fragmentary sectional view of a closure for the container in FIG. 11.

DETAIL DESCRIPTION OF PREFERRED EMBODIMENTS

[FIGS. 1-4] FIGS. 1-4 illustrate a package 30 in accordance with one exemplary but presently preferred embodiment of the invention as including a container 32 and a closure 34. Container 32 is of one-piece molded construction of a suitable plastic, such as polypropylene for example. Likewise, closure 34 is of one-piece plastic construction of suitable resin material, such as polypropylene for example. However, description of package 30 as comprising a one-piece container and a one-piece closure does not preclude inclusion of other elements in the package, such as a sealing liner secured over the container mouth that must be removed to dispense product from the container, devices to hold-down pelleted products such as vitamin tablets within the container, etc. The package can also be employed for dispensing prepackaged medical products or prescriptions, with the package being assembled by the drug packager or by a pharmacist.

[FIGS. 1-8] FIGS. 1-8 includes a hollow body 36 from which a finish 38 integrally extends. Finish 38 is of lesser lateral dimension than body 36, being integrally connected to the body by a shoulder 40. Body 36 may be cylindrical or non-cylindrical. Shoulder 40 extends substantially radially outwardly from the lower end of finish 38, at least adjacent to the finish, and then may curve into connection with body 36. (Directional words such as “upper” and “lower” are employed by way of description and not limitation with respect to the upright orientation of the container and package illustrated in the drawings, and the child-resistant orientation of the closure illustrated in FIGS. 1-3 and 9-10. Directional words such as “radial” and “circumferential” are employed by way of description and not limitation with respect to the central axis of the container finish or the closure as appropriate.)

[FIG 123] Finish 38 has one or more external threads 42 that extend around the outer surface of the finish. A release element 44 is cantilevered from finish 38 beneath threads 42, and extends radially outwardly from finish 38 adjacent to but axially spaced from the opposing outer surface 46 of shoulder 40. A locking lug 48 is carried by release element 44. Release element 44 and locking lug 48 preferably are as disclosed in above-noted U.S. Pat. Nos. 5,899,348, 6,039, 195 and 6,327,770. The release element and locking lug, alternatively but less preferably may be as disclosed in U.S. Pat. No. 5,711,442. The disclosures of these patents are incorporated herein by reference. An external circumferential bead 50 extends radially outwardly from finish 38 around the mouth of the finish. Bead 50 preferably is formed at the axial end of the finish above threads 42 as illustrated in the drawings, or may be spaced axially from the end of the finish. The outer diameter of bead 50 is less than the thread diameter of threads 42.

[FIGS. 1-4 and 9-10] FIGS. 1-4 and 9-10) includes a base wall 52 and a peripheral skirt 54 with internal threads 56. A flange 58 extends radially outwardly from the lower edge of skirt 54 remote from base wall 52 in the illustrated embodiment of the invention, and an outer skirt 60 extends from the outer peripheral edge of flange 58. Skirts 54, 60 preferably are cylindrical and concentric with the axis of the closure. At least one locking lug 62 (FIGS. 4 and 9) is disposed on the internal surface of outer skirt 60. An annular wall 64 extends axially from base wall 52 in a direction opposite from skirt 54. Annular wall 64 is disposed radially inwardly from skirt 54, and preferably is coaxial with skirt 54. A circumferential bead 66 extends radially inwardly from the inner surface of annular wall 64 at a position spaced from base wall 52. A seal rib 68 is disposed on the undersurface of base wall 52 radially inwardly of skirt 54. In the preferred embodiments of the closure illustrated in the drawings, base wall 52 is of flat planar annular construction, having concentric circular inner and outer peripheral edges. Internally threaded skirt 54 extends from the outer peripheral edge of base wall 52. A projection or lug 69 preferably extends from the inner peripheral edge of base wall 52 in a direction opposite from skirt 54, and is disposed radially inwardly from annular wall 64. Projection 68 has a flat upper surface on which printing may be molded or otherwise provided to advise a user how to open the package in the child-resistant mode of operation (FIG. 2), or that the package is non-child-resistant in that mode of operation (FIG. 4). Projection 69 preferably is cylindrical, and may be solid or, more preferably, hollow as shown in the drawings.

In the child-resistant mode of operation illustrated in FIGS. 1-3, closure skirt 54 is threaded clockwise over container finish 38 until one of the internal locking lugs 62 on closure 34 rides over locking lug 48 on the container finish. Abutment of the locking lugs prevents counterclockwise rotation of the closure with respect to the finish, and
thus prevents removal of the closure from the container in the child-resistant mode of operation. Seal bead 68 on the underside of base wall 52 is in engagement with and compressed by the axial end of container finish 38, as best seen in FIGS. 2 and 3, to seal the package. To remove the closure in the child-resistant mode of operation, release element 44 is pushed downwardly away from the closure skirt. Locking lug 48 on release element 44 is thus moved downwardly with the release element out of locking engagement with lug 62 on closure 34, so that the closure can now be rotated counterclockwise and unthreaded from the container finish. Downward flexure of release element 44 is limited by abutting engagement of the release element with upper axially facing surface 46 of shoulder 40. This prevents over-flexure of release element 44, and possible permanent distortion of the release element or fracture of the release element from the container finish, either of which will defeat the child-resistance function of the package.

[0026] To use the closure in a non-child-resistant mode of operation, such as for elderly persons with impaired manual dexterity for whom child-resistance is not needed, the closure is inverted to the orientation of FIG. 4. The closure is then pressed downwardly onto the finish of the container so that internal bead 66 on closure annular wall 64 is received by snap-fit over external bead 50 on container finish 38. Bead 66 preferably is rounded or has axially facing sloping cam surfaces to assure securement of the closure to the container in a non-child-resistant mode of operation, and to assist removal of the closure from the container. Beads 66, 50 preferably are dimensioned so that securement of the closure to the container in the non-child-resistant mode of FIG. 4 brings the upper end of the container into facing engagement with the opposing surface of closure base wall 52. Such abutting engagement cooperates with the engaged beads to seal the package in the non-child-resistant mode of operation.

[0027] FIGS. 11 and 12 respectively illustrate a container 70 and a closure 72 that form a package in accordance with a modified embodiment of the invention. The difference between container 70 and closure 72 in FIGS. 11 and 12, and container 32 and closure 34 in FIGS. 1-10, is that external bead 50 on the container finish is replaced by one or more external threads 74, and internal bead 66 on closure annular wall 64 is replaced by one or more internal threads 76. Thus, closure 72 threads onto container 70 in the non-child-resistant mode of operation. Otherwise, the containers and closures are identical.

[0028] There have thus been disclosed a closure and container package, a closure, a container, and a method of making a closure and container package that fully satisfy all of the objects and aims previously set forth. The invention has been disclosed in conjunction with two exemplary but presently preferred embodiments thereof, and a number of modifications and variations have been described. Other modifications and variations will readily suggest themselves to persons of ordinary skill in the art. The invention is intended to embrace all such modifications and variations as fall within the spirit and broad scope of the appended claims.

1. A child-resistant package that includes:

- a plastic container having a body, an externally threaded finish, a shoulder coupling said finish to said body and having an outer axially facing surface, a deflectable release element integrally cantilevered from an exterior surface of said finish adjacent to said outer axially facing surface of said shoulder, and a locking lug on said release element, and

- a plastic closure having an internally threaded skirt for receipt over said externally threaded finish and a locking lug on said skirt for engagement with said locking lug on said release element to prevent unthreading of said closure from said finish,

- manual flexure of said release element moving said locking lug on said release element away from said locking lug on said skirt,

- said release element on said finish being positioned with respect to said shoulder such that abutment of said release element against said external surface of said shoulder prevents over-flexing of said release element away from said closure.

2. The package set forth in claim 1 wherein said closure includes a base wall with an external periphery coupled to said skirt, and an annular wall extending from said base wall in a direction opposite from said skirt for securement to said container finish in an inverted non-child-resistant mode of operation of said closure.

3. The package set forth in claim 2 wherein said finish has a first circumferential bead and said annular wall has a second circumferential bead adapted to be received by snap fit over said first bead in said non-child-resistant mode of operation.

4. The package set forth in claim 3 wherein said first bead on said finish is an external circumferential bead and said second bead on said annular wall is an internal circumferential bead.

5. The package set forth in claim 4 wherein snap fit of said second bead over said first bead brings said base wall into engagement with an end of said finish to seal said package.

6. The package set forth in claim 2 wherein said finish includes at least one second external thread adjacent to an open end of said finish, and said closure includes at least one second internal thread on said annular wall for receipt over said second external thread on said finish in a non-child-resistant mode of operation of said package.

7. A package having child-resistant and non-child-resistant modes of operation, which includes:

- a plastic container having a body, an externally threaded finish having a lesser lateral dimension than said body, a radially extending shoulder integrally connecting said finish to said body, and having a surface facing axially outwardly from said body, a resiliently deflectable release element integrally cantilevered radially outwardly from an exterior surface of said finish adjacent to said shoulder, and a first locking lug on said release element, and

- a plastic closure having a base wall, an internally threaded skirt extending from an outer periphery of said base wall, at least one second locking lug on said skirt, and an annular wall extending from said base wall in a direction opposite from said skirt,

- said closure being adapted to be secured to said container finish in a child-resistant mode of operation with said skirt threaded onto said finish and said at least one
second locking lug in engagement with said first locking lug on said release element,
flexure of said release element away from said closure and toward said shoulder releasing said first locking lug from engagement with said second locking lug and permitting unthreading of said closure from said finish,
axial abutment of said release element with said shoulder preventing over-flexure of said release element with respect to said finish beyond an elastic limit of connection of said release element to said finish,
said closure being adapted to be inverted and secured to said container finish in a non-child-resistant mode of operation with said annular wall secured to said container finish.
8. The package set forth in claim 7 wherein said finish has a first circumferential bead and said annular wall has a second circumferential bead adapted to be received by snap fit over said first bead in said non-child-resistant mode of operation.
9. The package set forth in claim 8 wherein said first bead on said finish is an external circumferential bead and said second bead on said annular wall is an internal circumferential bead.
10. The package set forth in claim 9 wherein snap fit of said second bead over said first bead brings said base wall into engagement with an end of said finish to seal said package.
11. The package set forth in claim 7 wherein said finish includes at least one second external thread adjacent to an open end of said finish, and said closure includes at least one second internal thread on said annular wall for receipt over said second external thread on said finish in a non-child-resistant mode of operation of said package.
12. A plastic container that includes:
a body,
an externally threaded finish having a lesser lateral dimension than said body,
a radially extending shoulder integrally connecting said finish to said body, said shoulder having an external surface facing axially outwardly from said body,
a resilient deflected release element integrally cantilevered radially outwardly from said body adjacent to but spaced from said shoulder, and
a locking lug on said release element for locking engagement with a skirt of a closure secured to said finish,
spacing between said release element and said external surface of said closure being such that flexure of said release element toward said shoulder to release engagement with a closure skirt is limited by abutting engagement with said external surface to less than an elastic limit of the cantilever connection of said release element to said finish.
13. The container set forth in claim 12 wherein said finish has an open mouth and an external bead adjacent to said mouth.
14. The container set forth in claim 12 wherein said finish has an open mouth and at least one second external thread around said mouth.
15. A closure for receipt on a container in child-resistant and non-child-resistant modes of operation, which includes:
a base wall having a peripheral internally threaded skirt,
at least one locking lug at an edge of said skirt remote from said base wall for locking engagement with a release element on a container in a child-resistant mode of operation,
an annular wall extending from said base wall in a direction opposite from said skirt, and
an internal circumferential bead or thread extending around said annular wall for receipt over a complementary external bead or thread on a container finish in an inverted non-child-resistant mode of operation of said closure.
16. The closure set forth in claim 15 including a seal bead on said base wall within said annular wall for sealing engagement with an end of the container finish.
17. A method of making a package having child-resistant and non-child-resistant modes of operation, which includes the steps of:
(a) providing a container having a body, an externally threaded finish having a lesser lateral dimension than said body, a radially extending shoulder integrally connecting said finish to said body, and having a surface facing axially outwardly from said body, a resiliently deflectable release element integrally cantilevered radially outwardly from an exterior surface of said finish adjacent to said shoulder, and a first locking lug on said release element, and
(b) providing a closure having a base wall, an internally threaded skirt extending from an outer periphery of said base wall, at least one second locking lug on said skirt, and an annular wall extending from said base wall in a direction opposite from said skirt,
said closure being adapted to be secured to said container finish in a child-resistant mode of operation with said skirt threaded onto said finish and said at least one second locking lug in engagement with said first locking lug on said release element,
flexure of said release element away from said closure and toward said shoulder releasing said first locking lug from engagement with said second locking lug and permitting unthreading of said closure from said finish,
axial abutment of said release element with said shoulder preventing over-flexure of said release element with respect to said finish beyond an elastic limit of connection of said release element to said finish,
said closure being adapted to be inverted and secured to said container in a non-child-resistant mode of operation with said annular wall secured to said container finish.

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