

[54] **CONTAINER AND CLOSURE COMBINATION**

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[51] Int. Cl. **B65d 43/10**

[58] Field of Search **220/59, 60 R, 46 R; 150/5; 215/41**

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[57] **ABSTRACT**

This disclosure relates to a novel container and closure combination in which a body of the container at its open end includes a radially outwardly and downwardly directed peripheral skirt portion having a terminal edge defining cam means for facilitating the latching of the closure upon the container, the closure likewise including a peripheral skirt portion having joined thereto by integral flexible hinge walls a plurality of latch members which have cam follower means for automatically drawing the closure downwardly into seated relationship upon the container body as the cam follower means move along the cam means during hinging motion of the latch member in a direction toward the container body. A periphery of the closure includes two downwardly opening annular channels, an innermost one of which conformably receives an end portion of the container body and an outermost one of which receives a compressible seal with means being provided to limit the compressive forces applied to the seal during a latching operation. The container body further includes a peripheral skirt between axially opposite ends thereof defining a finger-grip lifting and bail attaching area.

15 Claims, 4 Drawing Figures

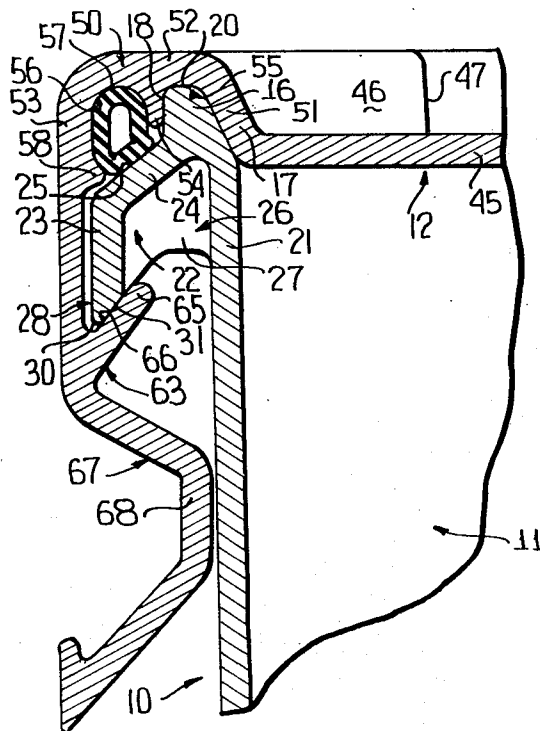


FIG. 1

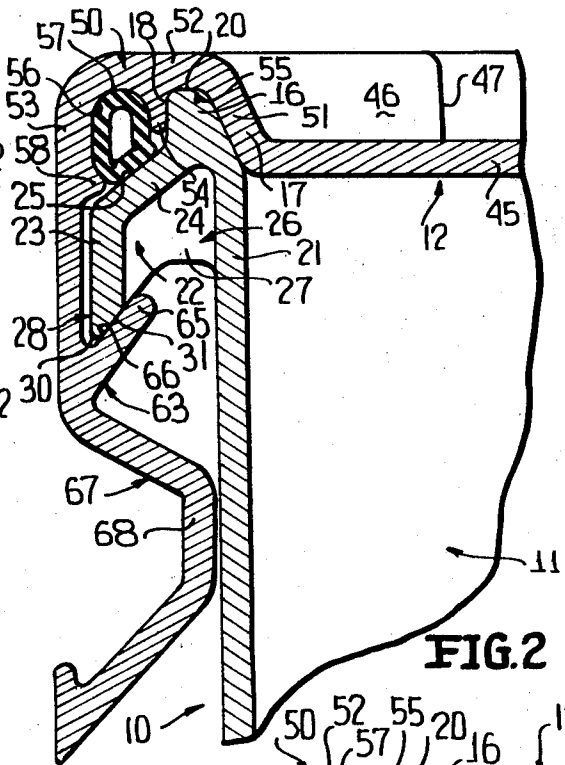
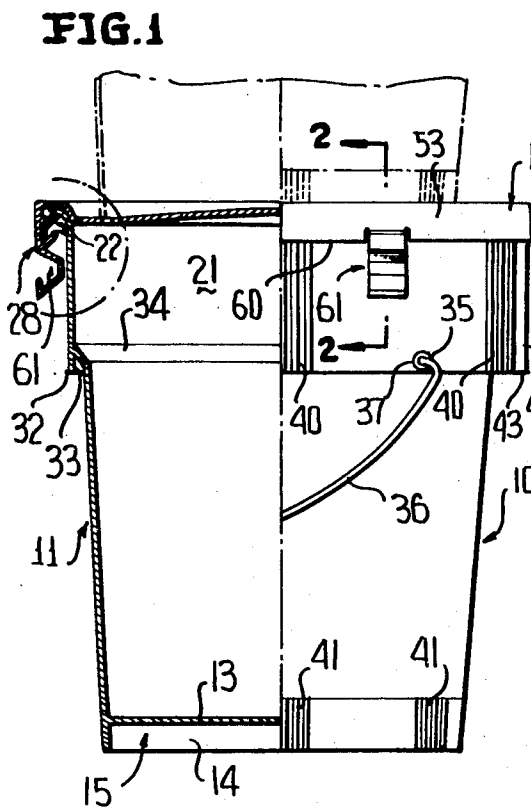


FIG. 2

FIG. 3

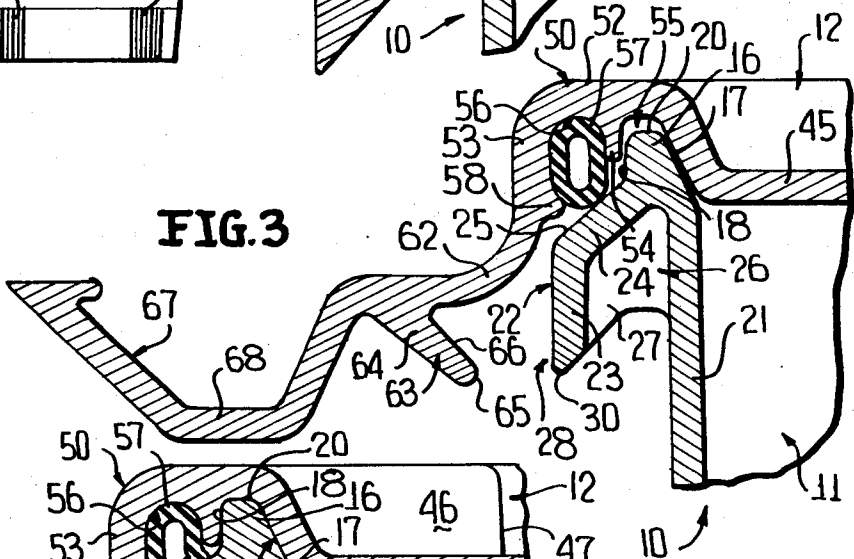
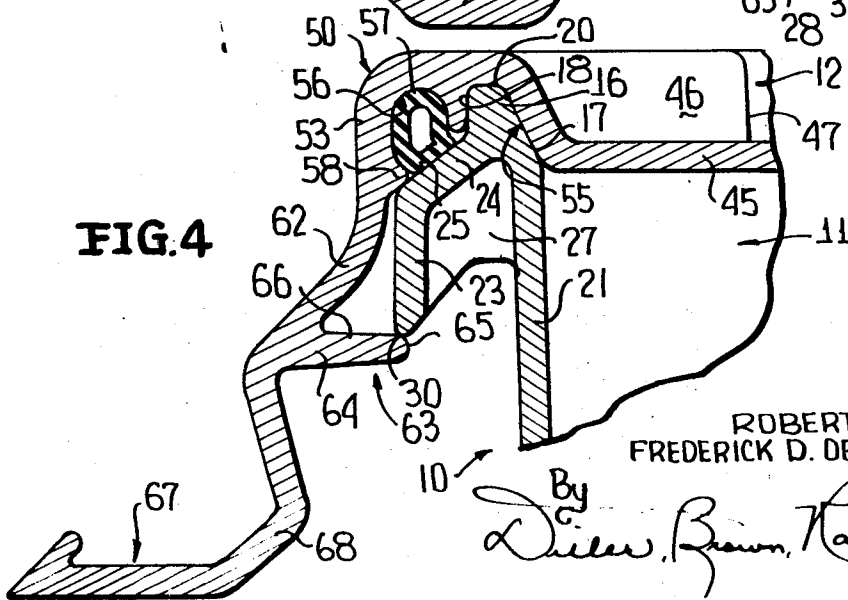


FIG. 4



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CONTAINER AND CLOSURE COMBINATION

A primary object of this invention is to provide a novel container and closure combination wherein a container body is closed at one end by a bottom wall and terminates at an opposite end in a radially outwardly and downwardly directed peripheral skirt portion having a terminal edge defining cam means for facilitating latching of the closure and container, the closure likewise including a peripheral skirt portion, at least one latch member joined by an integral flexible hinge wall to the closure peripheral skirt portion, and cam follower means carried by the latch member for automatically drawing the closure downwardly toward the bottom wall as the cam follower means moves along the cam means during hinging motion of the latch member in a direction toward the container body.

A further object of this invention is to provide a novel container and closure combination of the type aforesaid wherein a compressible seal is disposed between the peripheral skirt portions which is subject to compressive forces during the movement of the closure downwardly toward the bottom wall, and means are provided between the peripheral skirt portions for limiting the movement of the closure toward the bottom wall to thereby limit the compressive forces applied to the seal.

Still another object of this invention is to provide a novel container and closure of the type heretofore set forth wherein the cam follower means is an integral radially inwardly directed projection of each latch member.

Yet another object of this invention is to provide a novel container and closure wherein the closure peripheral skirt portion is defined by a downwardly opening annular bead formed by a pair of inner and outer spaced annular walls and a bight wall therebetween, the bight wall including a downwardly axially directed bead cooperating to define with the spaced inner and outer annular walls inner and outer downwardly opening annular chambers, the seal being disposed in the outermost of the annular chambers, and the innermost of the annular chambers conformably receiving an axially upwardly directed projection of the container body.

Still another object of this invention is to provide a novel container and closure of the type heretofore set forth wherein each latch member includes a finger-grip extension, and each finger-grip extension is of a generally radially outwardly opening U-shaped configuration for receiving a seal band in the latched condition of the latch members.

A final object of this invention is to provide a novel container and closure combination of the type set forth wherein an end panel of the closure is recessed and carries about its periphery a plurality of circumferentially spaced radially inwardly directed stacking ribs, and the inner annular wall terminates in another peripheral skirt defining a downwardly opening finger-grip lift and bail attachment area.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claimed subject matter, and the several views illustrated in the accompanying drawing.

IN THE DRAWING:

FIG. 1 is a side elevational view of the container and closure of this invention with one side of an axial center line being broken away and shown in cross section for clarity, and illustrates the closure in its latched position relative to the container and another container in phantom outline stacked upon the closure.

FIG. 2 is a highly enlarged fragmentary sectional view of the encircled portion of FIG. 1, and more clearly illustrates the latched position of the container and closure including such details as an axial projection of the container body conformably received in a channel of the closure and an annular seal in its compressed sealed condition in another and outermost channel of the closure with means in the form of a radially inwardly directed annular bead limiting the compressive forces applied to the seal.

FIG. 3 is a fragmentary sectional view of the container and closure of FIG. 2, but illustrates the unlatched position thereof.

FIG. 4 is a fragmentary sectional view similar to FIGS. 2 and 3, and illustrates the manner in which a radially inwardly directed cam follower carried by each latch engages an associated cam of the container body to progressively draw the closure downwardly to its fully seated and latched position (FIG. 2).

A novel container and closure combination constructed in accordance with this invention is generally designated by the reference numeral 10 and includes a container body 11 and a closure 12, both of which are preferably constructed from synthetic polymeric or copolymeric plastic material, such as polyethylene, by conventional injection molding techniques.

The container body 11 includes a recessed bottom wall 13 which in combination with a lowermost edge 14 defines a 360 degree finger-grip lifting area or chamber 15 which may be advantageously used when the contents (not shown) of the container 11 are to be poured or dumped therefrom.

An upper end portion (unnumbered) of the container body 11 terminates in an axially projecting annular rib or bead 16 which is defined by an innermost radially outwardly and upwardly inclined frusto-conical surface 17, an outermost generally cylindrical surface 18, and a peripheral surface 20 therebetween which is substantially in a plane normal to the container body axis. The surfaces 17, 20 and 18, 20 are joined to each other by smoothly rounded radiuses (unnumbered). The projection 16 is formed at the merging point of an innermost annular or peripheral wall 21 of a peripheral skirt portion, generally designated by the reference numeral 22, which includes an outer annular or peripheral wall 23 and a radially upwardly and inwardly inclined bight wall 24 having an outer surface 25. The radially spaced walls 21, 23 in conjunction with the bight wall 24 define a downwardly opening generally U-shaped channel 26 which extends about the entire periphery of the container body 11. However, at selected locations the channel 26 is bridged by a plurality of circumferentially spaced radial webs or ribs 27 which function to strengthen or reinforce the upper end portion of the container body 11.

The outer wall 23 includes a terminal edge 28 (FIG. 1) which includes cam follower means in the form of a rounded surface 30 which in turn merges with a radially upwardly and inwardly inclined surface 31. The cam means 30 functions in conjunction with the closure 12

in a manner which will be described more fully hereinafter.

The inner wall 21 likewise includes a free terminal edge 32 (FIG. 1) which defines a downwardly opening annular chamber 33 in conjunction with a stepped wall or shoulder 34. The chamber 33 is of sufficient depth and width to receive one's fingers for lifting the container body 11, particularly when filled. Moreover, the chamber 33 also provides an area into which end portions 35 of a handle or bail 36 can be inserted through apertures 37. In this manner the extension of the wall 21 beyond the wall 34 functions as a point of bail attachment as well as a lift area.

In order to further reinforce the container body 11 at both its upper and lowermost ends, the same is provided with a plurality of axially extending groups of ribs 40, 41 which are spaced about the circumference of the container body 11. Moreover, for interlocking a plurality of the container bodies 11, the wall 21 is provided with three additional axially directed radially outwardly projecting nesting ribs 42, of which only one is illustrated in FIG. 1. However, the ribs 42 are spaced 120 degrees from each other such that upon inserting one container body into another in the absence of the closures 12 the surface 20 of the projection 16 of a lowermost container body will contact a lowermost face 43 of each of the nesting ribs 42. This permits the stacking of virtually as many of the container bodies 11 as would normally be desired without fear of collapse, and at the same time the nesting is achieved in a loose manner so that the container bodies can be unnested without difficulty.

The closure 12 includes a recessed end panel 45 which has a slightly raised (unnumbered) central portion, and at its periphery includes a plurality of radially inwardly directed circumferentially spaced stacking ribs 46 (only one of which is illustrated) having innermost generally axially disposed terminal faces 47. The faces 47 are in a common circular plane which is slightly of a larger diameter than the outer surface of the wall 14 and thus function to locate stacked closures and containers 10 in the manner clearly evident from the container illustrated in phantom outline in FIG. 1.

The panel 45 merges at a radius (unnumbered) with an inverted generally U-shaped annular bead 50 defined by an upwardly and outwardly inclined wall 51, a bight wall 52, and an outer peripheral wall or skirt 53. Substantially medially of the walls 51, 53 is an axially downwardly directed annular bead or projection 54 which defines with a portion of the bight wall 52 and the wall 51 an innermost downwardly opening channel 55 as well as an outermost downwardly opening channel 56 with the remaining portion of the bight wall 52 and the peripheral skirt 53. The channel 55 has surfaces (unnumbered) contoured in conformity with the surfaces 17, 18 and 20, as is most readily apparent in FIG. 2. The outermost channel 56 is generally of a rounded contour of a generally part oval configuration to receive a tubular seal or gasket member 57 which is normally perfectly circular in cross section but is deformed to the oval configuration when inserted into the channel 56.

The seal or gasket 57 is preferably constructed from rubber or similar compressible though reboundable material and though shown to be of a hollow construc-

tion the same may be, of course, completely solid so long as it has sufficient resilience to be deformed into general conformity with the surface 25, as shown best in FIG. 2, to maintain a hermetic seal between the closure 12 and the container body 11.

Means generally designated by the reference numeral 58 is provided in the form of a peripheral bead projecting radially inwardly from the inner surface (unnumbered) of the peripheral skirt 53 for limiting the downward movement of the closure 12 by contacting the surface 25 to thereby limit the amount of compressive force applied to the seal 57 during the latching of the closure 12 upon the container body 11, as will be described more fully hereinafter. Though the bead 58 is of a continuous uninterrupted construction, it is to be further understood that the same may be formed as a plurality of circumferentially spaced part-beads or projections although the latter is a less desirable construction since the continuous bead 58 forms a seal with the surface 25 which prevents exterior contaminants from reaching the gasket or seal 57.

The bead 58 is preferably located immediately adjacent a terminal edge 60 of the peripheral skirt portion 53.

In order to firmly latch the closure 12 upon the container body 11 the closure 12 is provided with six equally spaced latching members, generally designated by the reference numeral 61 which are each joined to the peripheral skirt 53 adjacent the terminal edge 60 thereof by a flexible hinge wall 62 which though shown in FIG. 3 as subtending an arc of 90 degrees is preferably constructed to subtend an arc of 75 degrees in the normal nonlatched position thereof. Each latching member 61 further includes cam follower means, generally designated by the reference numeral 63, in the form of an inwardly and upwardly directed (as viewed in FIG. 2) projection or nose 64 having a rounded end 65 and an inclined surface 66. As is best illustrated by a comparison between FIGS. 3 and 4, as each latch member 61 is hinged from the position shown in FIG. 3 to that shown in FIG. 4, the nose 65 of the cam follower means 63 first contacts the cam means 30 and rides therealong to progressively draw the closure 12 downwardly during which time the seal 57 is progressively compressed until such time as the projection 16 is fully seated within the channel 55 and the bead 58 rests upon the surface 25 which precludes further downward movement of the closure 12. This camming action produces maximum compressive or closing forces at a point approximately midway along the surface 66 and during further hinging movement to the final position shown in FIG. 2 there is a slight reduction in the compressive forces to preclude undesired deformation of the projection 16, the bead 58, the wall 24, the cam and cam follower means 30, 63, respectively, and the seal 57.

Each latch 61 further includes a hand-grip portion 67 in the form of a generally radially outwardly opening U-shaped cross section including a bight wall 68 which is contiguous the annular wall 21 in the latched position (FIG. 2) to permit an exterior seal band to be applied across the exterior of the six bight walls 68 to augment the latching already afforded by the engagement of the surfaces 31, 66 (FIG. 2).

The foregoing advantages are provided by the structure of the container and closure 10 heretofore described during storage, stacking, nesting, opening, closing, latching and/or combinations thereof.

Due to the recessed bottom 13 and the stepped wall 34, the container body 11, with or without the closure 12 applied thereto, can be readily lifted for carrying or pouring purposes in the manner heretofore noted, and moreover the chamber 33 provides an access area into which the bail ends 35 may be secured.

The three ribs spaced 120 degrees apart and extending axially substantially the height of the annular wall 21 function as nesting points and moreover provide peripheral stiffening of the wall 21 and thus the upper end portion (unnumbered) of the container body 11.

The radial downward and outward slope of the wall 24 likewise provides peripheral stiffening of the container body upright portion and moreover the surface 25 thereof provides a shaped sealing area for the gasket to seal firmly upon because of the relatively nonflexible nature of the wall 24 due to the webs or stiffeners 27.

Insofar as the closure 12 is concerned, the six locking latches 61 spaced 60 degrees apart permit the closure 12 to be removed from the container body 11 only upon the sequenced opening of three adjacent latches, thereby rendering inadvertent or accidental unlatching of the closure 12 virtually impossible. To unlatch the closure 12 is a relatively simple operation requiring only two separate hand motions, namely, the unlocking of two adjacent latches, one with each hand, and thereafter the unlocking of a third adjacent latch. Also, the closure 12 may be automatically locked by a vertical downward force on all six latches simultaneously, and conversely, unlocked with a like simultaneous upward force.

The stacking or nesting ribs 46 also function to strengthen the outer top periphery of the closure 12 and to thus prevent an out-of-round condition, particularly after long extended use.

Each of the latches 61 is also so molded that there are two stop points to prevent over-closing, the first being the bead 58 which contacts the surface 25 of the wall 24, as well as the bight wall 68 which in the fully latched position contacts the annular wall 21. Moreover, the depression provided by the bight wall 68 forms an area for a seal band to be wrapped around the latches when locked, thereby providing a tamper-proof construction until the seal band is broken and/or removed.

The structure heretofore described also provides novel interaction between the container and closure 10. Of importance is the conformed mating of the axial projection 16 and the channel 55 such that the projection 16 serves as a stop under vertical or column loading so that with control tolerances the latches can never be over-stressed and unlocked, even though the gasket may be further compressed to the limit of the vertical-load stop or projection 16.

Since the latches 61 are cammed to the latch position by the movement of the surfaces 65, 66 over the surface 30, a minimal force is required both to lock and unlock the closure 12. This force is furthermore completely predictable and controllable by dimensional and tolerance allowances due to the vertical load-stop or projection 16, the resiliency of the material, and the seal or gasket specifications.

While preferred forms and arrangements of parts have been shown in illustrating the invention, it is to be clearly understood that various changes in details and arrangement of parts may be made without departing from the spirit and scope of this disclosure.

We claim:

1. A container and closure combination comprising a container body closed at one end by a bottom wall and terminating at an opposite end in a radially outwardly and downwardly directed peripheral skirt portion, said peripheral skirt portion having a terminal edge defining cam means for facilitating the latching of the closure and container, said closure likewise including a peripheral skirt portion, at least one latch member joined by an integral flexible hinge wall to said closure peripheral skirt portion, cam follower means carried by said latch member for automatically drawing the closure downwardly toward said bottom wall as said cam follower means moves along said cam means during hinging motion of said latch member in a direction toward said container body, said opposite container body end including an axially upwardly projecting peripheral bead, said closure including a downwardly opening channel conformably receiving said bead, and a compressible seal disposed between said peripheral skirt portions and radially outwardly of said bead and channel which is subject to compressive forces limited by the bottoming of said bead in said channel during the movement of said closure toward said bottom wall.

2. The combination as defined in claim 1 including means between said peripheral skirt portions for additionally limiting the movement of said closure toward said bottom wall.

3. The combination as defined in claim 1 wherein said cam follower means is an integral radially inwardly directed projection of said latch member.

4. The combination as defined in claim 1 wherein said container body peripheral skirt portion is defined by a radially disposed bight wall portion and a depending wall portion, and said closure peripheral skirt portion includes radially inwardly directed wall means in overlying relationship to said bight wall portion for additionally limiting the movement of said closure toward said bottom wall.

5. The combination as defined in claim 1 wherein said closure peripheral skirt portion defines said first mentioned and another downwardly opening channel formed by inner and outer radially spaced annular walls joined by a bight wall including a downwardly axially directed annular wall, said another channel receives said seal, and means directed inwardly from said outer annular wall in axial overlying relationship to said container body peripheral skirt portion for additionally limiting the movement of said closure toward said bottom wall.

6. The combination as defined in claim 1 wherein said downwardly opening annular channel is formed by inner and outer radially spaced annular walls joined by a bight wall, said inner and outer annular walls each having a free terminal edge with the terminal edge of said inner annular wall being disposed closer to said bottom wall than the free terminal edge of said outer annular wall, and a portion of said container body between said one and opposite ends is joined to said inner annular wall by a shoulder at a point above said inner annular wall terminal edge to define a second

downwardly opening annular channel forming a finger-gripping area.

7. The combination as defined in claim 5 wherein said cam follower means is an integral radially inwardly directed projection of said latch member.

8. A one-piece closure comprising an end panel terminating at a downwardly opening annular bead defined by a pair of radially spaced inner and outer annular walls joined by a bight wall, means projecting axially downwardly from said bight wall in an area between said annular walls to define therewith a pair of downwardly opening annular channels adapted to receive a portion of an associated container and an annular seal with the latter disposed in the radially outermost of the channels, said outer annular wall having a free terminal edge, means carried by said outer annular wall adjacent said free terminal edge and projecting radially inwardly for contacting an associated container to limit compression forces applied to the associated seal, a plurality of spaced latch members each joined by an integral flexible hinge wall to said outer annular wall adjacent the terminal edge thereof, cam follower means carried by each latch member for automatically drawing the closure into seating relationship with the associated container, said cam follower means being an integral radially inwardly directed projection of each latch member, and a hand-grip extension beyond each cam follower means for manually operating the latch members.

9. The closure as defined in claim 8 including a plurality of circumferentially spaced radially inwardly directed stacking ribs on said end panel.

10. The closure as defined in claim 8 wherein said flexible hinge wall subtends an arc of approximately 75°.

11. The closure as defined in claim 8 wherein each hand-grip extension is of a generally radially outwardly opening U-shaped configuration thereby defining an area adapted to receive a seal band when the closure has been latched to an associated container.

12. A container and closure combination comprising a container body closed at one end by a bottom wall

and terminating at an opposite end in an axially upwardly directed annular bead, a radially outwardly and downwardly inclined annular sealing wall adjacent said bead, said closure includes a pair of downwardly opening annular channels formed by inner and outer radially spaced annular walls joined by a bight wall including a downwardly axially directed annular projection, an innermost one of said channels conformably receiving said closure bead, and an outermost one of said channels receiving an annular gasket in sealing relationship upon said sealing wall.

13. The combination as defined in claim 12 including means carried by said outer annular wall projecting radially inwardly above said sealing wall for contact therewith in the closed position of said container and closure.

14. The combination as defined in claim 13 including means for releaseably cam-latching said closure to said container.

15. A container and closure combination comprising a container body closed at one end by a bottom wall and terminating in an opposite end in a radially outwardly and downwardly directed peripheral skirt portion, said closure likewise including a peripheral skirt portion, at least one latch member joined to said closure peripheral skirt portion for securing said closure to said container body, said opposite container body and including an axially upwardly projecting peripheral bead, said closure including a downwardly opening channel conformably receiving said bead, a compressible seal disposed between said peripheral skirt portions and radially outwardly of said bead and channel which is subject to compressive forces, said closure peripheral skirt portion defines said first mentioned and another downwardly opening channel formed by inner and outer radially spaced annular walls joined by a bight wall including a downwardly axially directed annular wall, and means directed inwardly from said outer annular wall in axial overlying relationship to said container body peripheral skirt portion for limiting the movement of said closure toward said bottom wall.

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