CLOSURE WITH FRACTURABLE AUXILIARY CONTAINER

Inventors: Antonio Lanfranconi, Milan; Wolfgang Schafer, Königswinter; Franco Testaguzza, Bonn-Bad Godesberg; Franco Zanibelli, Milan, all of Italy

Assignee: Doll Gesellschaft Mit Beschrankter Haftung, Bonn, Germany

Filed: Feb. 2, 1973

Appl. No.: 329,021

Foreign Application Priority Data
Apr. 18, 1973 Italy

U.S. Cl. 215/6, 215/46 A, 215/DIG. 8, 206/47 A, 222/83.5
Int. Cl. B65d 1/04

Field of Search 215/6, 46; 220/23; 206/47 A; 222/80, 81, 83, 83.5, 88, 129, 145; 128/272

References Cited

UNITED STATES PATENTS
2,765,945 10/1956 Hassed 215/73 X
2,941,689 6/1960 Black 215/6
3,073,472 1/1963 Williams 215/31 X
3,517,847 6/1970 Guala 215/46 A

FOREIGN PATENTS OR APPLICATIONS
699,868 12/1965 Italy
244,119 3/1963 Australia

Primary Examiner—Herbert F. Ross
Attorney, Agent, or Firm—Diller, Brown, Ramik & Wight

ABSTRACT

This disclosure relates to a closure for hermetically sealing bottles, flasks and the like having a peripheral skirt and an end panel, and an auxiliary container internally of the peripheral skirt in generally suspended relationship from the end panel, a product and a cutter housed within the auxiliary container whereby upon the depression of the cutter a bottom closed wall of the auxiliary container is ruptured and the product therewithin is dispensed into a main container carrying the closure, and the auxiliary container being further so constructed as to provide hermetic sealing of both the main or auxiliary containers for separate storage of a product in each, further providing a hermetic seal during the admixture of the products, and finally maintaining a hermetic seal during repeated reclosures.

4 Claims, 10 Drawing Figures
CLOSURE WITH FRACTURABLE AUXILIARY CONTAINER

The present invention is primarily directed to closures for hermetically sealing bottles, flasks and the like, and is essentially directed to the packaging of products which must be maintained separated from each other until substantially just prior to the use of the admixture upon the combination of the products. As an example, one product could be a solvent or a dispersing liquid where at least another product might be a solid substance in granular or pulverulent condition. Of course, both products could be solid or both products could be liquid but in all cases the major desire is to maintain the same separate from each other until just prior to use.

It is conventional to provide a dual container structure with the inner container being foreshortened and with both containers closed by individual caps or closures. A single closure may as well be employed. In the case of a single closure the closure is removed, the inner and smaller auxiliary container is removed and thereby the larger principal or outer container is completely open. The product of the inner container may then be poured into and admixed with the product of the outer container. Container and closure combinations of this type are largely employed in the packaging of drugs and other products in general, such as lyophilized and vitaminic products, etc. By maintaining the active fraction of the two products separate from the excipient fraction longer storage life is achieved and such phenomena as coagulation, precipitation, and others is precluded.

The difficulty with known dual containers and similar structures is not so much maintaining hermetic seals after packaging but the difficulty arises once the main container has been opened by the removal of the closure.

With the foregoing in mind, it is a primary object of the present invention to provide a novel closure which is in effect an “auxiliary” container and in conjunction with the novel construction of three body portions thereof can insure the hermetic sealing of the main or outer container and the auxiliary or inner container when the components are separate, retains the hermetic sealing of the main container during the admixture of the components or products, and finally provides repeated hermetic sealing of the main container during repetitive reclosures.

Essentially, in accordance with the present invention the closure includes a peripheral skirt and an end panel, the latter of which in part defines the auxiliary container which is constructed from frangible, rupturable, severable or like material, and a cutter within the auxiliary container whereby upon depressing the cutter of the closure the cutter severs a terminal wall of the auxiliary container and permits the admixture of the product within the auxiliary container with the product within the main container.

A further object of this invention is to provide a novel closure of the type aforesaid wherein the auxiliary container includes a body in hermetic sealing engagement with the interior finish of the main container, and further includes a readial seal in hermetic sealing engagement with the main container lip.

A further object of this invention is to provide a novel closure of the type heretofore set forth wherein the auxiliary container further includes a peripheral flange having a tubular extension thereabove, the flange serving as a stop whereby over-application of the closure upon the main container will not render the cutter operative.

A further object of this invention is to provide a novel closure wherein an upper tubular extension of the auxiliary container is dimensioned to provide a hermetic seal against the inner finish of the outer container upon the admixture of the products and the removal of a portion of the auxiliary container.

In keeping with a further object of this invention the novel closure as heretofore defined further includes internal threads cooperative with threads upon the outer container finish, and the outer container finish and an extension of the closure peripheral skirt include means for rupturing the extension relative to the peripheral skirt to indicate that the closure and container were subjected to tampering.

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 drawings.

In the drawings:

FIG. 1 is a view partly in cross-section illustrating a closure applied to a finish of the container with the auxiliary or inner container housing therewithin a cutter.

FIG. 2 is an exploded view of the components of FIG. 1, and visually illustrates the manner in which the same are assembled to the position of FIG. 1.

FIG. 3 is a partial fragmentary and cross-sectional view of a portion of the entire inner or auxiliary container, and illustrates a peripheral sealing flange thereof.

FIG. 4 is a fragmentary sectional view of the components of FIG. 1 after the cutter has been depressed resulting in the severance of a bottom wall of the inner container by the cutter resulting in the admixture of separately packaged products in the two containers.

FIG. 5 is a view similar to FIG. 1 and illustrates the manner in which a tubular extension of the auxiliary container forms a hermetic seal with the interior finish of the outer container neck.

FIG. 6 is a view similar to FIG. 5 but illustrates the components prior to being assembled.

FIG. 7 is another view of a closure and outer container partly in side elevation and partly in cross-section, and illustrates in addition to the components of FIG. 1 a collar forming an extension of the closure skirt joined thereto by frangible ribs which fracture upon removal of the closure thereby providing the combination with a tamper-proof feature.

FIG. 8 illustrates the manner in which the collar of the closure peripheral skirt remains upon the outer container upon the removal of the closure.

FIG. 9 is a view similar to FIG. 7, but illustrates the manner in which the extension of the closure forms a hermetic seal with an inner surface of the outer container neck.

FIG. 10 is cross sectional view taken generally along the line X—X of FIGS. 8 and 9, and illustrates the manner in which the collar is connected to the closure peripheral skirt by ribs and the manner in which the ribs
are fractured by projections and teeth of the collar and the outer container exterior finish, respectively.

A bottle or flask includes a neck or finish having exterior threads, a lip and an inner surface or finish. The interior surface is cylindrical and has an inside diameter generally designated by the reference character D (FIG. 6). The container is constructed from glass, plastic or similar material and in the latter case it may be injection, blow or otherwise molded.

A closure in part defines a flanged cup-shaped body, an inner or auxiliary container (unnumbered) which houses a cutting element or cutter within the manner best illustrated in FIGS. 1 and 4.

The cup-shaped body includes a circular bottom which may be weakened along its juncture with a sidewall and is provided with an enlarged portion adjacent a peripheral flange having at its undersurface a pair of annular sealing ribs. The interior of the cup-shaped body includes an annular bead and a slightly recessed wall. The exterior dimension of the portion is such that it fits tightly within and forms a hermetic seal against the inner surface of the outer container in the manner best illustrated in FIG. 4. The portion is reduced as compared to the portion in diameter in order that the cup-shaped body may be readily inserted within the mouth of the bottle as defined by the inner diameter of the surface. This construction automatically absorbs any errors in internal diameter of the finish as might occur when tolerances are not what they should be. The pair of ribs additionally form a hermetic seal against the lip of the container when the cup-shaped body is inserted sufficiently within the bottle neck to depress the ribs into intimate hermetic sealing engagement with the lip. The cup-shaped body may be modified somewhat, and one example thereof is shown in FIG. 3 which illustrates another cup-shaped body whose like structure has been designated with reference numerals corresponding to those of FIGS. 1 and 2 except the same have been primed. In the embodiment illustrated in FIG. 3 the portion of a diameter slightly less than the inside diameter of the finish and accordingly to maintain a seal the latter is provided with an annular sealing rib which functions to provide a hermetic seal against the finish. Furthermore, in accordance with the embodiment of the invention shown in FIG. 3 the cup-shaped body is devoid of ribs corresponding to the ribs of the cup-shaped body.

The cutter is a generally cup-shaped member having a body whose open end portion is reduced in size and whose opposite end terminates in a bottom having an outwardly directed peripheral rib. The cutter includes a cutting edge which spans more than 180° of the portion and at its midpoint terminates in a puncturing point. The reduced end portion provides ease of insertion of the cutter into the cup-shaped body while the point serves to initiate a cutting action as is most evident from FIG. 4.

The inner auxiliary container (unnumbered) is defined in part by a tubular extension depending from an end panel of the closure which in turn includes a peripheral skirt having internal threads.

The tubular extension has an inside diameter designated by the reference character D in FIG. 2 which is slightly larger than the maximum dimension of the cutter defined by the annular rib thereof to permit the insertion of the upper portion of the cutter within the tubular extension, as is best shown in FIG. 1. The tubular extension further includes a conical portion terminating in an end face which is cemented or otherwise adhered to an end face of the cup-shaped body in the manner illustrated best in FIG. 1. The portion is tapered to permit ease of insertion of the extension into the mouth of the container so that the exterior surface of the extension forms a hermetic seal against the surface as will be described more fully hereinafter with respect to FIG. 5 of the drawings.

Reference is made to FIG. 1 which illustrates an axial dimension which is the distance between the interface of the surfaces and the uppermost surface of the flange. The distance shown in FIG. 1 represents the distance between the interface of the surfaces and the innermost end surface (unnumbered) of the end panel. As is apparent from FIG. 1 the latter-described dimension produces a slight gap (unnumbered) between the rib and the end panel and the cutter will therefore not accidentally sever the bottom of the cup-shaped body.

The components are assembled in any one of a variety of fashions as, for example, depositing a product within the outer container, inserting thereinto the cup-shaped body, packaging a product in the latter, inserting the cutter therein, and finally screwing the closure upon the container neck with or without adhesive on the surfaces. If an adhesive is not used the surfaces provide a hermetic seal against each other whereas if an adhesive or sealing compound is employed the bond is sufficiently weak to rupture as the closure is unthreaded without drawing the cup-shaped body outwardly of the neck due to the high frictional purchase of the portion thereof.

When it is desired to gain access and admixture of the products the closure is rotated and removed with a parting occurring between the surfaces. After the closure has been removed the bottle is fully exposed and manual pressure may be applied against the bottom or the flange in the direction of the arrow in FIG. 4 resulting in the cutting of the bottom without, it will be noted, complete severance. Upon the bottom opening the product within the cup-shaped portion falls or flows by gravity into the main container and may therein be admixed. It will be noted that during the admixture there still remains a hermetic seal between the cup-shaped body and the surfaces.

Reference is now made to FIGS. 7-10 which illustrate the closure provided with a tamper indicating mechanism which includes a collar secured to the peripheral skirt by a plurality of ribs spaced from one another by arcuate openings. The inner portion...
of the collar 64 carries a plurality of projections 68 which are elastically deformable so that rotation in the direction indicated by the arrow B in FIG. 10 is possible without impairing the integrity of the construction. However, the ribs 72 will fracture when rotation is imparted to the closure 50 in the direction opposite (direction of closure removal) that indicated by the reference character B and thus the collar 64 is separated from the peripheral skirt 54 indicating that tampering may have occurred. The collar 64 may remain in place or it may be removed and destroyed.

The collar 64 does not impair the subsequent resealing of the outer container 10 by the tubular extension 58 so long as the collar 64 is properly dimensioned i.e., the distance A (FIG. 7) is greater than the axial loss in distance between the first sealed condition (FIG. 7) and the reclosed position (FIG. 9) of the closure 50. The difference in axial dimension is essentially the axial width of the flange 28. The finish of the bottle is, of course, similarly constructed so that the uppermost surface 76 of the teeth 66 is spaced at least a like distance A from the lower terminal edge 74 of the peripheral skirt 54.

It is to be particularly noted that in both embodiments of the invention the cutter 20 is spaced from the end panel 52 due to the dimensioning S and h heretofore described. The latter constitutes an important aspect of the invention as well as the manner in which the same is achieved, namely, by the axial length of the tubular extension 58 and the abutment of its end face 60 against the face 62 of the cup-shaped portion 26. As the closure is rotated the face 60 approaches the face 62 and contacts the latter resulting in the prevention of further rotation of the closure and the maintenance of the gap between the cutter 20 and the end panel 52 of the closure 50.

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

We claim:

1. A closure for bottles, flasks and the like designed for the extended storage of separate products comprising a generally cup-shaped container, said container having an abutment surface axially spaced from a bottom wall, a closure, said closure having an end panel and a depending peripheral skirt with means on the latter for securing to a main container, means carried by said closure for limiting axial motion of said closure relative to said cup-shaped container by contacting said abutment surface during the application of the closure to a main container whereby a cutter adapted to be housed within said cup-shaped container is incapable of severing said bottom wall, said axial motion limiting means being a sealing member depending from and integral with said end panel and adapted for insertion into a container neck, said cup-shaped container including a radially outwardly directed flange means for abutting an outer container lip, said flange having axially spaced surfaces, one of said surfaces remote from said bottom wall is said abutment surface, a collar forming an extension of said peripheral skirt, said collar being connected to said peripheral skirt by breakable connections, inwardly directed projections on said collar, an outer container having a neck housing said cup-shaped container with said flange on a lip thereof, radially outwardly directed projections on said outer container neck for cooperating with said collar projections to rupture said breakable connections upon removal of said closure, and the axial length of said collar and the minimum axial spacing of said container projections from said peripheral skirt is greater than the axial distance between said flange surfaces.

2. The closure as defined in claim 1 wherein said closure projections are elastically deformable and extend circumferentially obliquely in the direction of closure removal rotation.

3. A closure for bottles, flasks and the like designed for extended storage of separate products comprising a generally cup-shaped container, said cup-shaped container having a generally tubular body closed at one end by a bottom wall and provided opposite thereto with a radially outwardly directed peripheral flange adapted to seat upon the lip of a container or the like, a tubular rupturing element housed within said cup-shaped container, a cap, said cap including an end panel and an internally threaded peripheral skirt, a tubular extension depending from said end panel in exterior telescopic relationship to said rupturing element, said rupturing tubular element having a cutting end adjacent said bottom wall and a force applying end remote therefrom, a space between said end panel and said force applying end, said space being normally maintained by said tubular extension extending upon said flange, and said tubular extension being externally dimensioned to form a seal with the interior of said cup-shaped container.

4. The closure as defined in claim 3 wherein said tubular body includes upper and lower generally cylindrical portions with a conical portion therebetween, a radially inwardly directed peripheral seat carried by said upper cylindrical portion, and said rupturing element being externally dimensioned so as to form a seal with said peripheral seal.