

April 14, 1970

R. L. LA BARGE

3,506,151

CRIMPED CAP

Filed Feb. 7, 1969

2 Sheets-Sheet 1

FIG. 1.

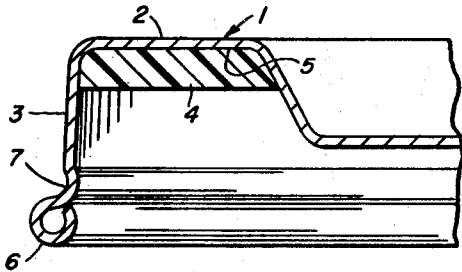


FIG. 2.

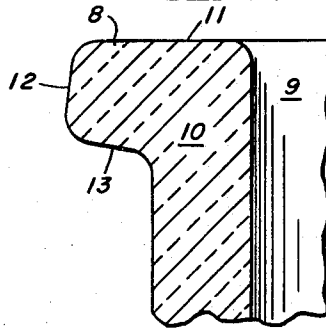


FIG. 3.

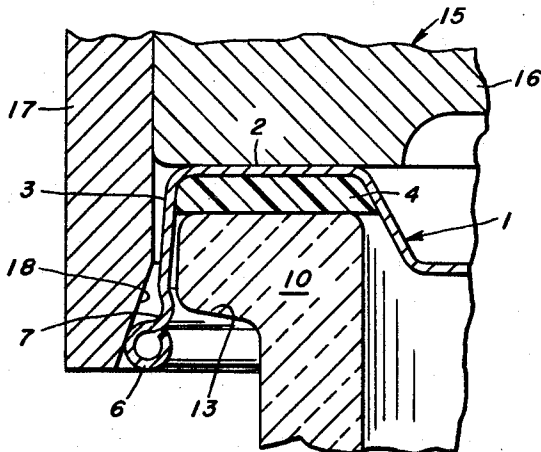


FIG. 4.

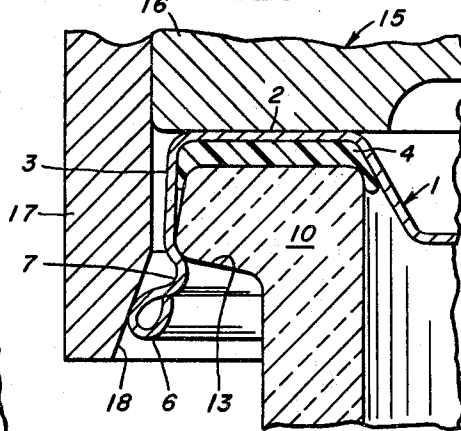
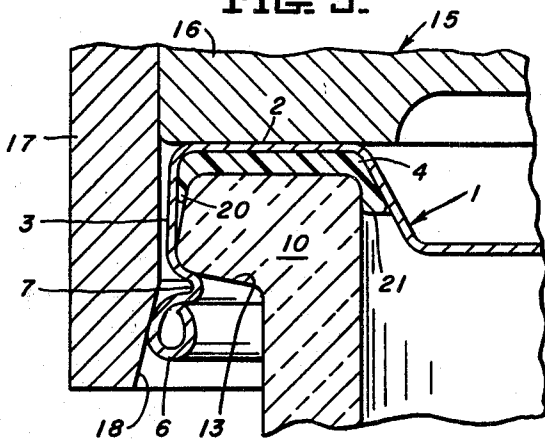


FIG. 5.



INVENTOR.
ROBERT L. LaBARGE
By David W. Browalle

Attorney

April 14, 1970

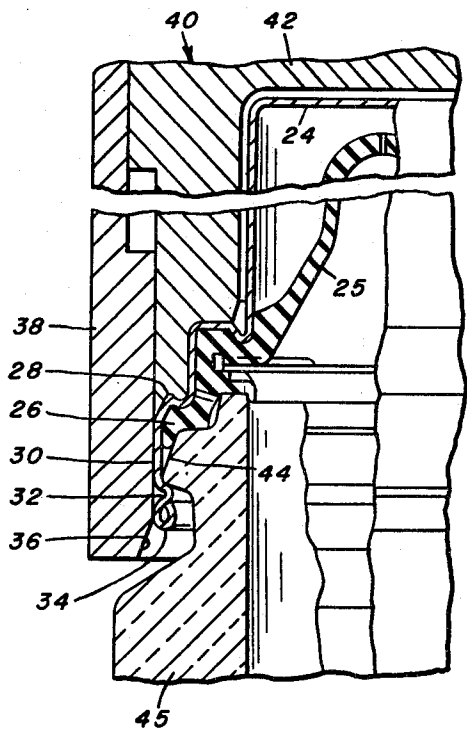
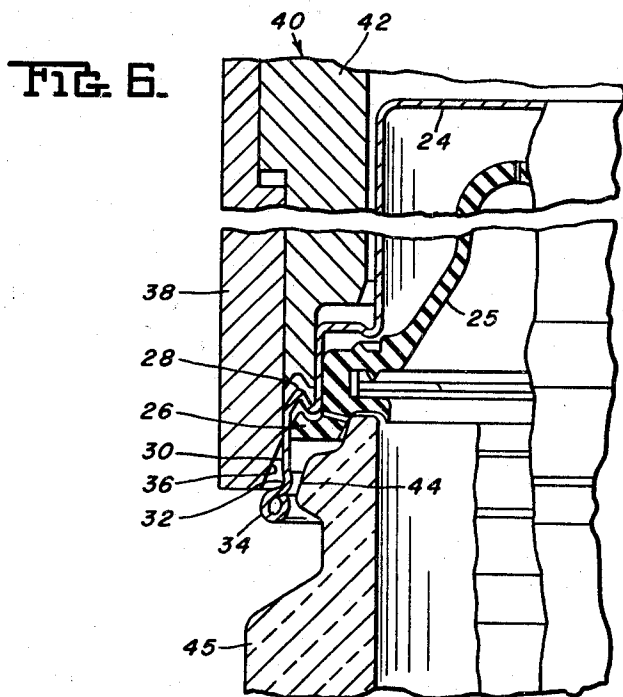
R. L. LA BARGE

3,506,151

CRIMPED CAP

Filed Feb. 7, 1969

2 Sheets-Sheet 2



INVENTOR.
ROBERT L. LaBARGE
By *David W. Brownlee*
Attorney

1

3,506,151

CRIMPED CAP

Robert L. La Barge, Pittsburgh, Pa., assignor to Aluminum Company of America, Pittsburgh, Pa., a corporation of Pennsylvania

Original application Nov. 14, 1967, Ser. No. 682,898. Divided and this application Feb. 7, 1969, Ser. No. 797,516

Int. Cl. B65d 41/10

U.S. Cl. 215—39

7 Claims

2

ABSTRACT OF THE DISCLOSURE

A method is provided of securing a closure to a container by inward deformation of a circumferential bead of a metallic closure shell skirt through pressure applied simultaneously around the bead to move inwardly a substantially circumferential portion of the skirt of the closure shell located above the bead into secure closure affixation on the container so that such closure affixation is thereafter maintained by the inwardly deformed and constricted closure bead. A closure fitment or closure is also provided that is adapted to be securely affixed to the container by a partially preformed inwardly directed skirt portion in securement relation to a suitable container bead and to be maintained in secure closure affixation on the container by a deformed and constricted lower skirt bead of the closure.

This is a divisional application of my copending application, Ser. No. 682,898, filed Nov. 14, 1967.

The invention relates generally to a method of securing closures to containers, to a closure fitment and to resulting closure-container assemblies. The closure fitment as used herein and in the appended claims, may have both a complete top and depending skirt, or may have an interior portion of the top removed so that the fitment serves as a top flanged retaining band. More specifically, the invention relates to a method of securing closures which are deformed into secure closure affixation on containers so that removal requires either rupture or elongation beyond the elastic limit of the material of the closures.

It is known to secure a closure to a container having an externally beaded mouth configuration in which a depending skirt of the closure is deformed beneath a container bead in response to inwardly directed and applied pressure against the closure skirt in substantially the area or areas of deformation thereof adjacent and below the container bead against the resistance of the container bead.

The present closure method contemplates the inward deformation of a circumferentially outwardly projecting configuration or bead of a closure or closure fitment skirt by means of force applied simultaneously around the configuration or bead to cause substantial inward movement of a circumferential inwardly preformed portion or band area of the skirt of the closure or fitment disposed above the circumferentially projecting configuration or bead thereof into secure closure affixation on the container. The outwardly projecting circumferential closure bead or configuration is reformed beyond its elastic limit and serves to restrain the overlying inwardly disposed portion of the closure skirt in secure closure affixation on the container. The restraint thus provided by the permanently deformed annular bead or outwardly projecting configuration of the closure eliminates the need

for placing complete reliance upon the bending strength of the skirt material in the deformed portion thereof above the bead. With this method, effective closure affixation and restraint thereof obtains without positively engaging the circumferential bead of the skirt of the closure with a retaining configuration of the container.

It is an object of this invention to provide a method of effecting secure closure affixation on a container by inward permanent deformation of an outwardly projecting circumferential bead, or equivalent configuration, of a closure skirt to cause substantial radial inward movement of a circumferential inwardly preformed portion of the closure skirt disposed thereabove and located below a closure securing bead on the container.

It is another object of this invention to provide a method of permanently inwardly deforming a substantially circumferentially disposed portion of a closure skirt beyond its elastic limit by force applied simultaneously about the circumference of an outwardly projecting bead configuration contiguous therewith located below the inwardly deformed portion of the closure skirt to provide effective restraint of the closure on an underlying container.

It is a further object of this invention to provide both a sealed container-closure assembly, or package, and a closure (or fitment) in which the closure is provided with a continuous annular bead at the lower extremity of its closure skirt restraining an inwardly directed skirt portion disposed above the annular bead in secure closure affixation on the container.

These and other objects will be more fully understood and appreciated from the following description, and reference to the illustrations appended hereto, in which:

FIG. 1 is an enlarged fragmentary sectional elevation of a type of closure suitable for use in the practice of the invention;

FIG. 2 is an enlarged fragmentary sectional elevation of a type of container finish adaptable for use with the invention;

FIG. 3 represents the loosely assembled closure and container of FIGS. 1 and 2 within a closure-applying head prior to initiation of a closure-affixing operation;

FIG. 4 represents the closure-container assembly of FIG. 3 in some intermediate assembly thereof;

FIG. 5 represents the closure-container assembly of FIG. 4 with closure-affixation completely effected;

FIG. 6 represents an enlarged fragmentary partial sectional elevation of another embodiment of a unitary closure assembly prior to affixation on an underlying container; and

FIG. 7 represents the closure assembly of FIG. 6 with closure-affixation on its underlying container completely effected in unitary package form.

Referring now to the drawings, in greater detail, FIGS. 1 and 2 illustrate a basic embodiment of a closure and container finish contemplated by this invention. The closure 1 has a top portion 2 and a depending skirt 3. The particular form of closure illustrated has a compressible gasket 4 disposed in the gasket receiving channel 5, which is defined within the upper portion 2 of the closure shell. The closure skirt terminates in a continuous circumferentially outwardly projecting shoulder configuration, which in this instance is shown as a hollow bead 6 which is of substantially uniform cross-sectional diameter throughout its circumference. An inwardly directed preformed annular rib or groove 7, which is preferably, but not necessarily, continuous, is disposed above the hollow bead 6.

3

Rib 7 and the hollow bead 6 may be made by various practices. A convenient manufacturing procedure is that of first forming an outwardly stepped shell for fitment with a bend of relatively small radius at the junction of the skirt 3 and the outwardly stepped portion that is to be formed into the bead 6, next forming the bead 6 by known simultaneously circumferential curling practice, and then forming the rib 7 by axial compression of the shell to set inwardly the aforementioned bend.

The container, which may be of conventional plastic, glass or other suitable material, preferably has mouth 8 defining an orifice 9, the outwardly exposed configuration of which provides a circumferential bead or lip 10. The bead or lip 10 provides an upper entrance mouth sealing surface 11, a lateral or outer sealing surface 12, and a lower underlying shoulder surface 13.

In effecting a closure-container assembly, the closure 1 is placed on the container with the hollow bead 6 adjacent the container bead 10. The relative diameters of the closure and container may be such that, in initial disposition of the closure on the container, either or both of the inwardly directed rib 7 and bead 6 of the depending closure skirt 3 is or are flexed outwardly by contact against the outer or lateral sealing surface 12 of the container, or alternatively, the relative diameters of the closure and container may be such that the inner diameters of the inwardly directed rib 7 and bead 6 are somewhat greater than the diameter of any portion of the container to be admitted into the closure, and in such case the oversize is preferably slight. In any event, it is not intended that the relative diameters be such that the closure is a "snap-on" closure in the sense that the initial relative diametric dimensions serve to retain the closure in effective sealing relationship to the container.

Practice of the method of the invention is described in reference to FIGS. 3 through 5. Therein equipment in the form of a closure-affixing head 15 is illustrated as having a centrally disposed top pressure block 16 and a surrounding relatively movable pressure-applying sleeve 17.

In the practice of the method of the invention, a closure preferably supported over the mouth of a container, is presented in vertically aligned disposition within the sealing head 15 of FIG. 3. Top pressure is applied against the upwardly facing outer surface of the closure 1, by the pressure block 16 in abutting engagement thereagainst, to compress the gasket 4 and lower or advance the closure skirt 3, and its terminal bead 7, from the positions thereof illustrated in FIG. 3. With the pressure exerted by the pressure block 16 maintained, relative downward axial travel of the surrounding sleeve 17 of sealing head 15, and circumferential engagement of an upwardly converging throat surface 18 of the sealing head sleeve 17 in progressive tangential bearing circumferential contact against the outer periphery of bead 6 of closure 1, results in radial inward permanent deformation and reduction in the circumference of the closure bead 6, with attendant inward movement of the inner surface of the closure skirt 3 resisted by the lower portion of container bead 10 adjacent the inwardly depressed rib 7 of closure skirt 3, and preferably immediately above the rib 7, to thereby cause further permanent deformation and radial inward deepening of the inwardly directed rib 7 in underlying relationship to the shoulder surface 13 of the container bead 10.

FIGS. 4 and 5 depict progressive inwardly directed permanent deformation and transformation of the circumferential closure bead 6 and inwardly directed rib 7 above the same in response to progressive axial movement of the closure bead 6 into the converging throat 18 of the sealing head 15, with an intermediate and final reduced thickness relationship of the compressible gasket 4 illustrated in FIGS. 4 and 5, respectively. In this regard inner and outer peripheral side sealing between the compressed gasket 4 and the container will be observed at

4

20 and 21 (FIG. 5), respectively, as well as across the upper sealing surface 11 of the container.

It will be observed that the inwardly directed rib 7 located above the closure skirt bead 6 has been illustrated in the permanently affixed and secured unitary closure-container package of FIG. 5 as being of appreciably greater depth than in the initial and intermediate preformed depths thereof illustrated in FIGS. 3 and 4, respectively. This increased depth of the depressed circumferential area identifying the rib 7 in final permanently deformed condition, as well as the permanent inwardly deformed and constricted condition of the closure skirt bead 6 below the same (FIG. 5), has insured a permanently sealed and affixed unitary container-closure package requiring subsequent peripheral rupture or distortion of the closure, as performed by a closure-removing tool, to permit removal of the closure 1 from its complementary underlying container. Preferably, the final circumferential inward disposition of the closure skirt bead 6 remains out of contact with the container below its bead configuration 10 but in any event provides and maintains an inward circumferential contracting force and restraint of the inwardly depressed permanently deformed rib 7 in securing engagement against the underside closure engaging surface 13 of the container.

For purposes of illustration, the annular or circumferential restraining bead 6, which provides the aforementioned restraint, has been shown as a single curl hollow bead. While it is by no means essential that the bead 6 be hollow, if this form is employed, it is preferred that it be curled inwardly, as illustrated, since it thereby reduces the likelihood of undesired bead uncurling during the sealing operation. Prevention of such uncurling may be further assured, as well as providing further stiffening of the bead 6, if that should be desired, by extending the curl of the hollow bead somewhat beyond the single curl that has been illustrated. It will be appreciated, however, that other forms of circumferential outwardly projecting configuration may be substituted for the bead 6 so long as they serve as a means of tool engagement for applying pressure simultaneously around the outwardly extending configuration represented by the bead 6 to facilitate permanent inward deformation of the securing rib 7 in the practice of the invention. It is only essential that bead 6, or its equivalent configuration, serves to provide effective tool engagement with the sealing head sleeve beveled throat 18 in order to downwardly and inwardly permanently reform the rib 7 thereabove into locking affixation against the underside surface 13 of the container bead 10 in FIG. 5. The inwardly contracted condition of the bead 6, or its equivalent configuration, thereafter serves to maintain the permanent securement of the closure performed by the inwardly projected rib 7.

The rib 7, while preferably circumferentially continuous, as illustrated, may, if desired, be segmented or peripherally interrupted providing the interruptions are not too numerous and the depressed ribs therebetween exceed the circumferential length of the interruptions. Accordingly, the word "rib" is used hereinabove and in the claims in the sense of both a continuous structure and an interrupted structure. The inwardly directed rib 7 has been shown for purposes of illustration prior to deepening in affixation of the closure as being of substantial depth, but in fact such rib, at least when continuous, may be quite shallow. It is requisite, however, that the inwardly directed rib 7 be located above the closure bead 6, and preferably adjoining the closure bead 6.

FIGS. 6 and 7 are representative of another embodiment of a closure assembly responding to the method of application described above in conjunction with FIGS. 1 through 5. A unitized closure assembly is illustrated in FIGS. 6 and 7 as comprising a metallic shroud 24 encasing an elastomeric baby feeding nipple 25 of the general type described and illustrated in United States Letters Patent No. 3,335,890, granted Aug. 15, 1967.

5

Distinguishing from the first described embodiment of the invention (FIGS. 1-5), the lower peripheral flange 26 of the elastomeric nipple 25 is engaged by a lower preferably configured flange 28 of the shroud 24 and the depending skirt 30 therebelow is circumferentially inwardly ribbed at 32 above an outwardly projecting configuration or circumferential terminal bead 34 of the shroud 24. Simultaneously, inwardly and downwardly applied circumferential pressure exerted against the outwardly directed bead 34 (FIG. 6) by the upwardly converging throat entrance 36 of the outer reciprocal sleeve 38 of a pressure applying head 40, following downwardly exerted pressure of the central pressure block 42 thereof, performs in the same manner described for FIGS. 4 and 5 to circumferentially contract the terminal bead 34, of the shroud 24, and direct the circumferential rib 32 above the same against the resistance of the outer face or side sealing surface of the container bead 44 into underlying restraining engagement of the shroud 24 and its encased nipple 25 in unitary assembly on its underlying container 45, with the nipple flange 26 in compressed sealing attitude against the upwardly directed sealing surface of the container bead 44.

Authorized exposure of the nipple 25 is accomplished by fracture of the shroud 24 peripherally above the nipple flange 26, as described in the aforementioned United States Letters Patent No. 3,335,890.

It will be appreciated that, unlike prior sealing systems which employed circumferential application, as by rolling or otherwise deforming the lower skirt portion of a closure or closure fitment under a container bead, the method of this invention facilitates rapid simultaneous application and sealing affixation of closures on containers, which is highly advantageous with respect to modern high speed unitary package production, since a single downward stroke of a sealing head effects a complete and secure unitary sealed container-closure package.

Wherever particular embodiments of the invention have been described for purposes of illustration, it will be apparent to those skilled in the art that numerous variations of the details may be made without departing from the appended claims. Exemplary of such variations are closure fitments and assemblies with containers that are provided with liner or gasket constructions affording side sealing with or without top sealing. Also the liner may have a top and skirt and be adapted to serve as a reclosure. In further exemplary manner, the closure fitments may be manually rupturable by means well known in the art such as an appropriately weakened tear strip having associated with it a grasping tab that may be integral with the fitment and tear strip or affixed to the tear strip. In the latter case, the tab may be of lever type affixed as by a rivet all in the manner now well known in regard to can ends.

What is claimed is:

1. A closure fitment for securing affixation on a container having an outwardly projecting closure fitment retaining bead adjacent an entrance mouth to said container, said closure fitment comprising:

(a) a top portion for overlying disposition to the entrance mouth of the container and a depending skirt having an inwardly directed circumferential rib disposed above an outwardly disposed circumferential configuration of said skirt, and

(b) said closure fitment, on disposition over the entrance mouth to said container, being responsive to pressure applied against its top portion and pressure applied simultaneously around its outwardly disposed circumferential configuration to effect permanent in-

6

ward deformation of the initially inwardly directed rib further inwardly below the outwardly projecting closure fitment retaining bead of the container for securing affixation of the closure fitment on said container.

2. The closure fitment of claim 1 in which the inwardly directed rib is circumferentially continuous.

3. The closure fitment of claim 1 in which the outwardly disposed configuration of said skirt is circumferentially continuous.

4. The closure fitment of claim 1 in which the outwardly disposed configuration of said skirt is an inwardly curled hollow bead.

5. A unitary closure fitment for securing affixation on a container having an outwardly projecting closure fitment retaining bead adjacent an entrance mouth to said container, said unitary closure fitment comprising:

(a) a fitment having a top portion for overlying disposition to the entrance mouth of the container and a depending skirt having an inwardly directed circumferential rib disposed above an outwardly disposed circumferential configuration of said skirt,

(b) a compressible sealing liner within said fitment and located above said inwardly directed rib of the fitment skirt, and

(c) said fitment and compressible liner, on disposition over the entrance mouth to said container, being responsive to pressure applied against the top portion of the fitment and pressure applied simultaneously around the outwardly disposed circumferential configuration thereof to effect permanent inward deformation of the initially inwardly directed rib further inwardly below the outwardly projecting fitment retaining bead of the container for compressive sealing of the liner against the container and securing affixation of the fitment and liner on said container.

6. A unitary sealed package comprising:

(a) a container having a mouth entrance defined by an upwardly facing sealing surface and an outwardly projecting closure fitment retaining bead adjacent thereto,

(b) a closure fitment secured to said container having a top portion and a depending skirt secured in overlying relationship to said upwardly facing sealing surface and outwardly projecting closure fitment retaining head.

(c) a permanently deformed circumferential rib in said depending closure fitment skirt extending inwardly and below the container head in secure closure fitment affixation therewith, and

(d) a circumferential permanently deformed and inwardly displaced closure fitment skirt configuration below said rib restrainedly maintaining securement and affixation by said rib of said closure fitment on said container.

7. The unitary sealed package of claim 6 having a resiliently compressed elastomeric gasket interposed at least between the container upwardly facing sealing surface and inwardly directed top portion of said closure fitment.

References Cited

UNITED STATES PATENTS

3,374,913 3/1968 Zipper 215-39

FOREIGN PATENTS

635,458 7/1963 Belgium.

GEORGE T. HALL, Primary Examiner