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E. T. ALDINGTON
REINFORCED CONTAINER CLOSURE

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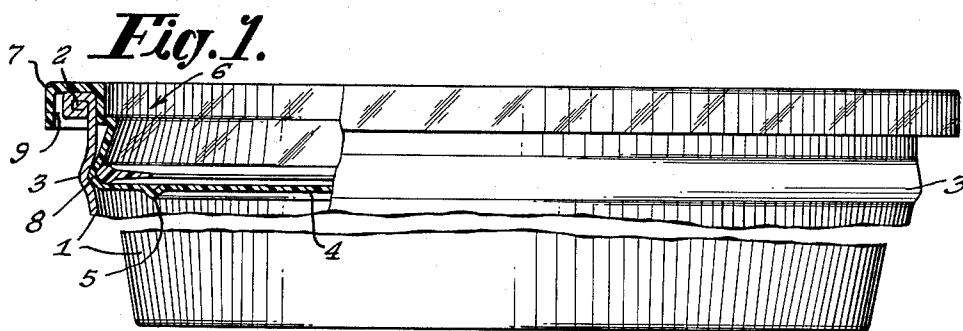


Fig. 2

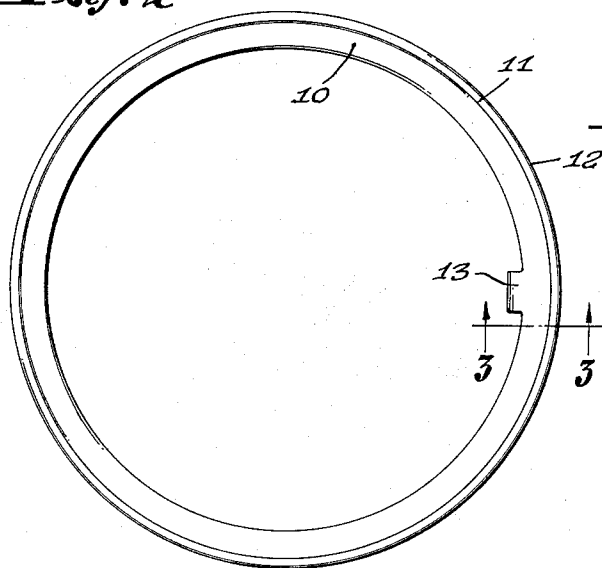


Fig. 4

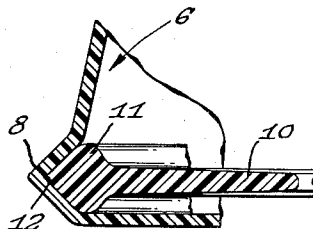


Fig. 5

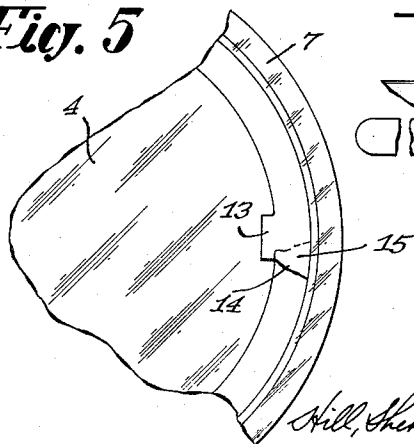
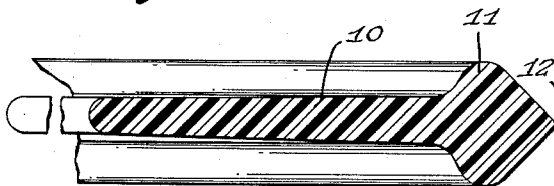


Fig. 3



INVENTOR.
Elmer T. Aldington
BY

Hill, Sherman, Meroni, Chao & Vinpore

ATTYS.

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REINFORCED CONTAINER CLOSURE

Elmer T. Aldington, Avon, Conn., assignor to American Can Company, New York, N.Y., a corporation of New Jersey

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This invention relates to improvements in a reinforced container closure, and more particularly to a container closure of the so-called "coverall" type which is inserted within the mouth of a container and has a formation to overlie and cover the rim bead of the container, the cover being such as to seat within a seating groove formed below the rim bead inside the container, and thus maintain the contents of the container pure and clean until consumption thereof, although the invention may have other uses and purposes as will be apparent to one skilled in the art.

The instant application is a continuation-in-part of my application entitled "Reinforced Container Closure and Method of Making Same," filed November 27, 1956, Serial No. 624,585, now abandoned.

Covers of the type of the instant invention are most frequently used with relatively thin walled plastic containers, or heavy duty or semi-heavy duty paper containers for the packaging of various food commodities such as ice cream, potato salad, cottage cheese, and may also be utilized for the covering of containers containing liquids, whether or not the contents of the container be hot or cold. One frequent use for such covers is for the so-called carry-out service, wherein the consumer purchases a quantity of a commodity and watches the same packed in the container and then closed with a cover. Of course, the containers may be prepacked by the manufacturer and shipped to the retailer with the covers already thereon, if so desired.

In the past, many and various types of covers for containers have been developed, and it has been found that a cover made of a thin film of thermoplastic material is desirable, particularly so if the film is transparent so that the contents of the container are readily visible. Considerable difficulty has been experienced, however, with covers made heretofore in the initial application of the cover, in the removal of the cover without spilling any of the contents of the container, and in replacing the cover on the container in the event all of the contents had not been removed at the first usage. Insofar as the packager of the commodity is concerned, whether it be a manufacturer or a retailer, both the container and the cover are single use items, wherefore economy in manufacture is essential. Permissible economy does not allow extremely fine tolerances in the making of the containers, particularly if they are made of paper, and the cover should be capable of accommodating itself to the various container dimensions permitted by the relatively wide tolerance range.

Heretofore, thermoplastic covers have been molded in various ways but when made economically thin, they did not possess sufficient strength and rigidity for ready removal application to the container either by hand or by machine. Further, when molded of economically thin material the cover sometimes became distorted prior to cooling and ultimately presented an ill fit when applied to a container. In most instances, covers of this type possess an annular sealing bead and retention and leakproofness are mainly obtained by a compression fit of the sealing bead in an annular seating groove in the container wall, and the necessary compression of the fit in the seating groove must be provided by the cover itself while that cover compensates for manufacturing variances in container size. With certain types of molding used heretofore, the

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cover was inherently thinnest at the seating bead, and the only way to increase the tightness of the fit and the strength of the cover was to increase the thickness of the material used, which proved economically unsound.

It might be noted that when molding a cover from a thermoplastic material and providing that cover with an annular seating bead, the bead cannot practically be formed with a sharp or angular external profile, but the molding process requires the use of a small radius causing a bending or curvature in the external portion of the seating bead. That radius formation frequently resulted in a loose fit with the container, especially with a container which ran a trifle large or otherwise out of round during manufacture.

With the foregoing in mind, it is an important object of the instant invention to provide a cover which may be formed of extremely thin material and which is provided with an added reinforcing means which permits the cover to receive compressive forces several times what it would otherwise stand without buckling.

Another object of the invention is the provision of a thin molded thermoplastic container cover having an added reinforcing ring of thicker material frictionally united therewith, so that the ring may take the normal strain that would otherwise be put upon the cover when attaching the same to a container.

Also a feature of the invention resides in the provision of a reinforced container closure comprising a cover made of molded and thin thermoplastic material, with a resilient reinforcing ring engaged with the cover in a manner to strengthen the same and give the cover the efficiency of a much thicker cover.

It is also a feature of this invention to provide a reinforced container cover, wherein a dished cover has inserted therein a reinforcing ring, both the cover and ring being flexible, whereby the cover is given added strength, and the entire assembly may readily conform to all manufacturing tolerances for paper containers and the like.

The invention also contemplates a reinforced closure for containers, comprising a cover molded of thin thermoplastic material and provided with an inwardly hollow seating bead, there being an added reinforcing ring having a relatively sharp bounding edge engaged with the cover inside the seating bead in such a manner as to distort that bead and sharpen its profile for better engagement with the container.

Still a further object of the instant invention is the provision of a reinforced closure for a container comprising a cover with a reinforcing ring so associated with the cover as to materially strengthen the same and render its engagement with the container much more secure, the ring being frangible so that it may readily be broken by hand to facilitate removal of the cover from the container when desired.

It is also a feature of this invention to provide a container cover equipped with a reinforcing ring which is frangible and may readily be broken by hand to facilitate removal of the cover from the container when desired, the cover itself having a formation to facilitate easy and ready removal without danger of spilling the contents of the container.

While some of the more salient features, characteristics and advantages of the instant invention have been above pointed out, others will become apparent from the following disclosures taken in conjunction with the accompanying drawing, in which:

FIGURE 1 is a fragmentary elevational view, with parts broken away and parts in section, showing a reinforced closure embodying principles of the instant invention in operative association with a container;

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FIGURE 2 is a plan view of the reinforcing ring alone, shown removed from the container cover of FIGURE 1;

FIGURE 3 is a greatly magnified fragmentary vertical sectional view through the ring, taken substantially as indicated by the line III—III of FIGURE 2, looking in the direction of the arrows;

FIGURE 4 is a greatly magnified fragmentary vertical sectional view showing the ring associated with the cover, and illustrating how the ring provides a beneficial distortion of the cover; and

FIGURE 5 is a fragmentary plan view of the ring and cover assembly illustrating the breaking of the ring to facilitate removal of the cover from the container.

As shown on the drawings:

In FIGURE 1, the illustrated embodiment of the instant invention is shown associated with a container 1 which may be made of thin plastic material or of paper or equivalent material, waxed, plastic lined, or otherwise treated to render the same liquidproof. The illustrated container is generally frusto-conical in shape and is provided with a body part sloping outwardly toward the mouth of the container and terminating in an outwardly extending or outwardly turned annular rim bead 2 circumscribing the container mouth. A short distance below the rim bead the container wall is provided with an inwardly open annular bead formation 3 to provide a seating groove for the intimate reception of a part of the container cover.

The illustrated cover is preferably molded in one piece from a suitable thermoplastic material and is shaped while at an elevated temperature from a film of such material. A number of materials are satisfactory for this purpose, among which is polystyrene film.

The cover or lid comprises a diaphragm 4 which is preferably substantially flat except for an annular groove 5 therein which permits the central portion of the cover to readily expand in keeping with expansion of the contents of the container or in the event of an overfilled container. Outside the groove 5, the diaphragm 4 joins an upstanding annular wall portion generally indicated by numeral 6 which in turn merges in an outer annular top portion 7 in the form of an inverted channel defining a groove for the reception of the container bead 2.

The wall portion 6 of the cover is deviated so as to provide a relatively sharp annular seating bead formation 8 at the junction between the wall 6 and the diaphragm 4. This seating bead is snapped into the container seating groove 3 when the cover is placed on the container, the inner part of the channel formation 7 also contacting the inner wall of the container adjacent its mouth, and the channel portion extending over the rim bead of the container. Looking at FIGURE 1, it will be noted that the channel portion 7 of the cover is preferably wider than the container rim bead so that the depending outer wall of the formation 7 is spaced from the rim bead annularly therearound as indicated at 9. With the space 9 present, it is an easy expedient for an operator to insert the tips of a thumb or finger at spaced locations underneath the depending skirt of the channel formation 7 and easily distort the cover and remove it from the container after the frangible ring to be later described has been broken. One the other hand, if the container rim bead is pinched or firmly gripped by both sides of the formation 7, difficulty may be experienced in removing the cover even after the breaking of the ring, coupled with danger of spilling the contents of the container.

A preferable way of forming the cover is to heat a sheet of the thermoplastic material, place it in position over an open mold, and by a differential in air pressure, vacuum or compressed air, force the hot sheet into the mold to form the cover above described. Such a method of molding obviously provides a definite radius at the seating bead 8 (such radius not being illustrated in the drawings) and in most cases the cover will be thinnest at the seating bead. To overcome the adverse effects of

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such thinness at that point by increasing the thickness of the film is economically impractical. Further, it is extremely difficult, due to the flexibility of the cover, to force it alone into positive engagement over the open mouth end of the container and insure adequate compensation for manufacturing variances in the container and effect a positive seal with the formation 3 in the container wall, as well as a seal with the inside of the container wall immediately adjacent the mouth end.

To overcome these difficulties, an economical reinforcing ring 10 is associated with the cover to give it the desired strength in a most inexpensive manner. The reinforcing ring 10 may be injection molded or suitably formed from a thermoplastic material that may be the same material as the cover, but the ring is preferably thicker than the cover diaphragm 4.

With reference now more particularly to FIGURES 2 and 3, it will be seen that the ring 10 is provided with a thicker outer margin 11 that slopes in both directions toward a bounding sharp edge 12. The ring is preferably molded or formed in one integral piece, and as aforesaid is preferably frangible, wherefore it may well be provided with an inwardly extending tab 13 beneath which the user may insert a knife blade, his thumbnail, or some other instrumentality and by a quick upward pressure fracture the ring. While intact, the reinforcing ring is sufficiently strong to give more than adequate strength to the cover when joined therewith, but at the same time it is also flexible. The initial application of the cover forcefully over the container will cause a bellling or upward distortion of the ring due to a slight diametral reduction in its outside diameter which increases the sealing effect of the cover with the container.

With reference more particularly to FIGURE 4, it will be noted that the seating bead 8 of the cover is given an increased angular or relatively sharp external profile by virtue of distortion caused by the insertion of the ring in the cover. The ring possesses an outside diameter at least equal to the largest diameter of any portion of the cover adjacent the diaphragm 4 and thus eliminates much of the initial and unwanted radius effect at the bead 8. The sharp profile of the seating bead is extremely desirable in that it affords far better retention and sealing with the seating groove 3 in the container wall than did such seating beads heretofore known with a definite curvature. Better compensation is thus had for the wide tolerance range of paper containers or containers of equivalent material.

While it is possible, due to the resiliency of the cover to snap the ring in position after the cover is completely formed, the preferable method is to associate the ring with the cover during the forming operation of the cover. This method of procedure insures more positive frictional engagement between the ring and cover and causes a better distortion of the cover to more effectively sharpen the seating head 8. Accordingly, immediately after the hot thermoplastic film is forced into the open die to make the cover, the ring, having previously been formed is put in position inside the cover. At that time, the cover may be approximately .035 inch over its normal diameter, and when the cover cools it actually shrinks onto the ring thereby causing a firm union between the ring and the cover and effectively distorting the cover to provide the sharp seating bead. At the same time, the ring maintains the diaphragm 4 of the cover substantially flat during cooling.

In operation, it is a simple expedient to force the closure assembly into the mouth end of a container, either by hand, or by machine, the ring providing more than adequate strength for such forcing on of the cover and the cover is not distorted or injured sufficiently to cause a bad fit. The assembly will immediately compensate for variances in the containers, and there will be a positive and effective seating of the sharp seating bead 8 into the seating groove of the container. The engagement of the

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cover with the container is so tight that it may be objectionably difficult to remove by hand. Therefore, the operator may, as above described, insert some implement beneath the tab 13, and by pulling upwardly on the tab fracture the ring as indicated at 14 in FIGURE 5. Usually the quick fracture of the ring results in an overlapping of the marginal portions adjacent the fracture as indicated at 15 in FIGURE 5, thus reducing the over-all diameter of the ring, and facilitating removal of the cover since the effectiveness of the ring is now lost. It will also be noted that the ring is sufficiently narrow that it will permit the central portion of the diaphragm 4 to bell upwardly in the event there is an expansion of the contents of the container, this fluctuating movement of the diaphragm being enhanced by virtue of the annular groove 5 in the diaphragm of the cover, and it will be seen from the disclosure in FIGURE 1 that the inner edge of the ring is adjacent this groove, but the ring preferably does not extend entirely over the groove.

With the instant invention, the cover itself may be made of material just thick enough to resist skirt fracture during handling but need not be made of thicker material owing to the strength imparted to it by the reinforcing ring.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

The method of making the instant invention is set forth, described and claimed in my copending application entitled "Method of Making a Reinforced Container Closure," filed August 20, 1963, Serial No. 303,326, a division of the instant application.

I claim as my invention:

1. In combination, a container having an open mouth, a rim bead on said container around the mouth thereof, said container having an inwardly open seating groove in the wall thereof below said rim bead, and a coverall type of closure for said container, said closure being attachable by hand as a unit and comprising a cover of thin sheet material including a diaphragm, an upstanding wall around said diaphragm, a formation in the form of an inverted channel at the top of said wall to receive said rim bead, said formation being wider than said rim bead whereby the outer depending portion of said formation is radially spaced from the container rim bead when the closure is on the container, an inwardly hollow annular seating bead adjacent the junction of the wall and the diaphragm to fit in said seating groove, and a frangible reinforcing ring more rigid than said cover engaged in

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said seating bead to hold the bead tightly in said seating groove and prevent removal of the closure except by first breaking said ring.

2. A reinforced temporary container closure attachable as a unit by hand, comprising a cover made of a thin thermoplastic material including an annular part to overlie a container rim, a skirt depending from said part to enter the container mouth and having an inner annular groove therein, and a diaphragm on said skirt below said groove, a frangible reinforcing ring of plastic material thicker and more rigid than said cover, an integral thicker circumferential margin on said ring tapering to a bounding relatively sharp knife edge engaged in said cover groove in a manner to distort the cover at the groove to a complementary sharp configuration and prevent removal of the cover except by first breaking said ring.

3. A reinforced temporary container closure attachable as a unit by hand, comprising a cover of thin flexible material including an annular part to overlie a container rim, a skirt depending from said part to enter the container mouth and having an annular groove therein, a diaphragm on said skirt below said groove, a frangible endless reinforcing ring thicker and more rigid than said cover having a sharp edge seated in said groove under radially inwardly directed stress from said cover in a manner to distort said cover to a complementary sharp configuration at the line of contact therewith to insure tight sealing engagement between the cover and a container and prevent removal of the cover from the container except by first breaking said ring.

References Cited in the file of this patent

UNITED STATES PATENTS

67,278	Everett	July 30, 1867
1,123,733	Grunwald	Jan. 5, 1915
1,455,068	Bjorkquist	May 15, 1923
1,644,542	Pease	Oct. 4, 1927
1,824,733	Rollason	Sept. 22, 1931
2,128,239	Ferngren	Aug. 30, 1938
2,487,400	Tupper	Nov. 8, 1949
2,547,871	Dirk	Apr. 3, 1951
2,568,697	Amberg	Sept. 25, 1951
2,657,431	Slaughter	Nov. 3, 1953
2,694,501	Johansen	Nov. 16, 1954
2,887,240	Deussen	May 19, 1959

FOREIGN PATENTS

1,067,312	France	Jan. 27, 1954
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