Oct. 24, 1967 M. M. STERNAU 3,348,358

METHOD OF SEALING A CONTAINER

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FIG. 1

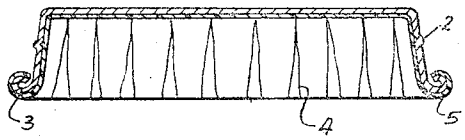


FIG. 6

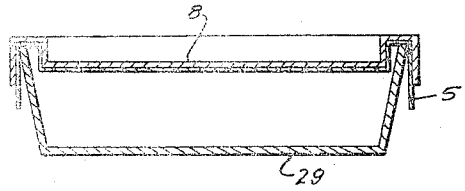


FIG. 2

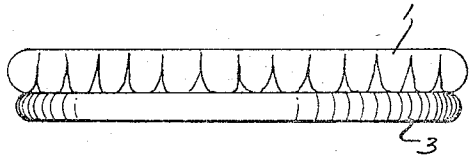


FIG. 5

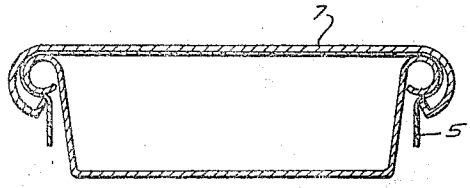


FIG. 3

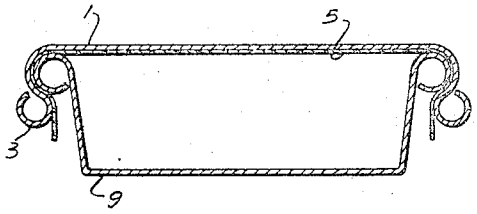
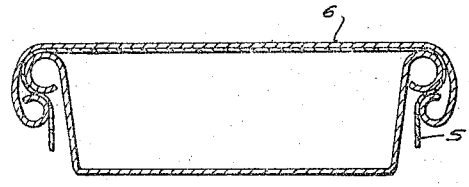


FIG. 4



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FIG. 7

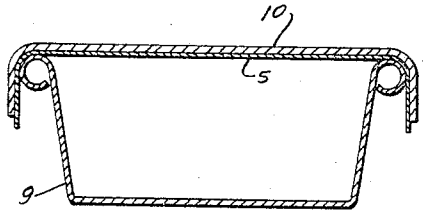


FIG. 10

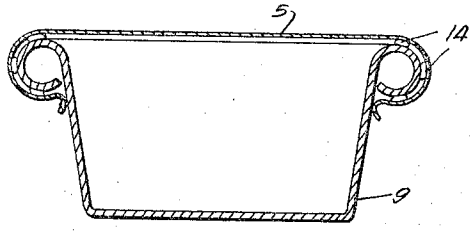


FIG. 7A

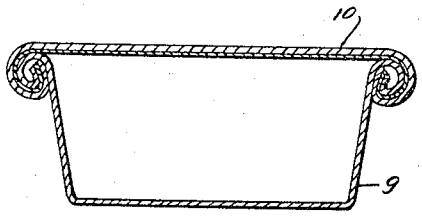


FIG. 9

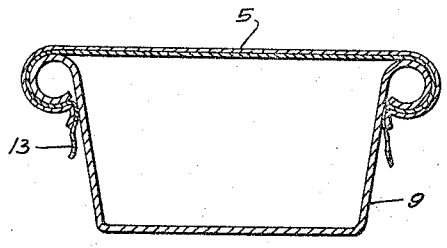


FIG. 8

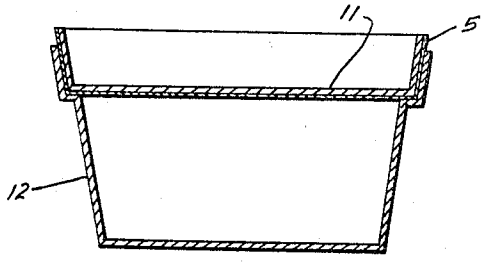
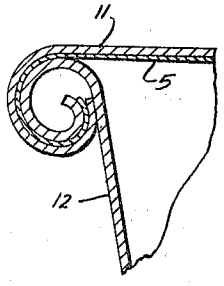


FIG. 8A



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FIG. 11

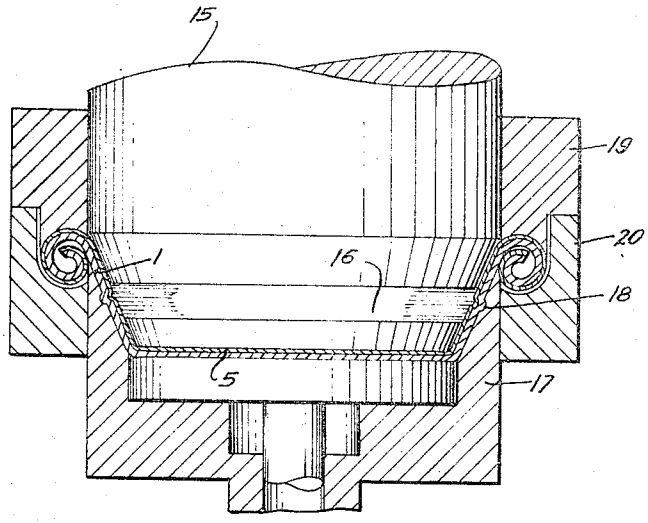


FIG. 11A

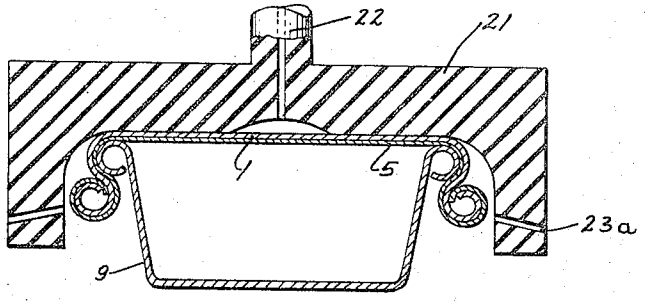
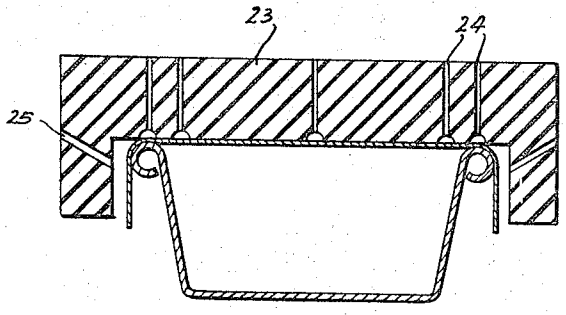


FIG. 12



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FIG. 13

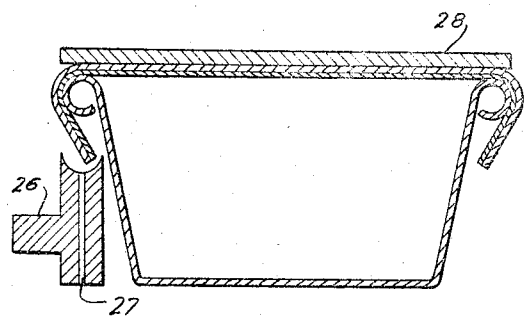
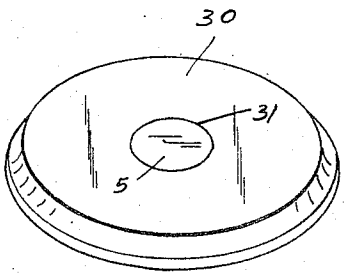


FIG. 14



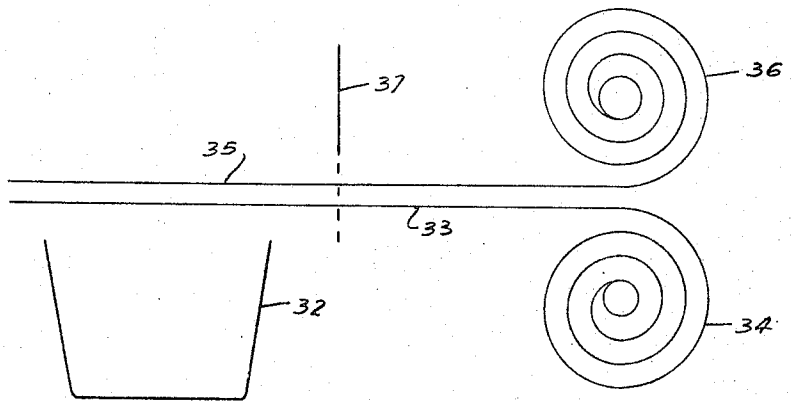


FIG. 15

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United States Patent Office 3,348,358 Patented Oct. 24, 1967

3,348,358

METHOD OF SEALING A CONTAINER

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Filed June 15, 1956, Ser. No. 591,628
9 Claims. (Cl. 53—42)

One of the objects of my invention is to provide a closure which is an inexpensive, simple hermetic seal for a container irrespective of whether the container is made of paper, plastic, aluminum, steel, etc.

Another object of my invention is to provide a hermetic seal for a container irrespective of whether the container is made of paper, plastic, glass, aluminum, steel, etc.

Another object of my invention is to provide a 2-part closure comprising an inner sealing closure and an outer protective closure.

Another object of my invention is to provide a closure formed from a transparent oriented plastic sheet alone, or from two dissimilar materials, the inner component being formed of a transparent oriented plastic sheet and the outer component being formed of a semirigid, moldable material.

Another object of my invention is to provide a sealing closure that will permit removal and replacement of the outer cover whereby inspection of the contents of the container may be had without breaking the seal of the inner component, thereby eliminating the danger of contamination.

Another object of my invention is to provide a closure which will enclose the rim of the container in a sanitary manner.

Another object of my invention is to provide a closure which will reduce the cost of manufacture of the container by reducing the amount of container material required.

One of the aspects of this invention is a closure made of flexible and moldable material, and particularly a closure having a beaded and expansible rim.

One of the objects of my invention is to make an improved closure, with or without an inside cover of plastic material, in which the rim is pleated before being formed or rolled in such a manner that expansion and contraction at the rim area may occur to receive and to hold the slightly larger bead on the mouth of a container by locking the rim of the closure below the bead of the container.

Another object of my invention is to provide a method and apparatus for forming the cover and for positioning the cover on a container.

Another obejct of my invention is to provide a method of holding or retaining transparent, oriented plastic sheet material during conversion into a hermetic sealing cover on a container.

Another object of my invention is to provide a method of sealing a plastic sheet closure on a container.

Another object of my invention is to provide a method of manufacturing a hermetically sealing cover from basic raw sheet materials directly upon the container upon which it shall be used and at the time of closure of the container, using the container as the male forming component of the closure.

Another object of my invention is to provide a heat sealing closure for a container.

Another object of my invention is to provide a construction of materials that may be manufactured into a hermetic closure prior to or during application on the container.

A still further object of my invention is to provide a cord to tear open either the plastic film or both covers when a two part closure is used.

A still further object of my invention is to provide additional sealing means in case additional sealing insurance is desirable.

With the foregoing and other objects in view as will appear from a reading of the following specification and claims, the invention resides in the novel arrangement and combination of parts and in the details of construction and process of manufacture hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention may be made within the scope of what is claimed without departing from the spirit of the invention. It will be further understood that the invention is susceptible of embodiment in many and various forms, some of which are illustrated in the accompanying drawing, and that the structural details or particular steps of the method herein set forth may be varied to suit particular purposes and still remain within the inventive concept.

Referring briefly to the figures:

FIG. 1 illustrates a 2-ply closure in a vertical sectional view;

FIG. 2 shows a 2-ply closure according to the invention ready for use;

FIGS. 3, 4, 5 and 6 show various types of protective covers which shield the inside sealing cover on different type containers;

FIGS. 7 and 7*a* show another type closure before and after crimping is accomplished;

FIGS. 8 and 8*a* show a similar type of 2-part closure before and after beading same together with container;

FIG. 9 shows a single cover which has an opening string beneath it;

FIG. 10 shows additional sealing cement beneath the sealing cover;

FIG. 11 illustrates a forming apparatus with curling rings, a male die having a resilient ring in it (which may be omitted) to form a peripheral crease or indentation in the sidewall of the closure and a peripheral groove in the female die for providing said indentation;

FIG. 11*a* shows a capping and sealing tool for snapping the cover over a receptacle and retaining it while heat is applied to seal the inner cover;

FIG. 12 shows a suction head which carries the shrinkable film and seals it to the receptacle;

FIG. 13 shows a different type apparatus for applying heat to the closure to seal the inner layer after crimping;

FIG. 14 illustrates a 2-ply closure with an inspection hole in the outer layer;

FIG. 15 illustrates a straight sided container **32** with a modified 2-part closure formed from two rolls.

This invention is for a system providing a closure of circular, rectangular, hexagonal, or any other shape for a receptacle. The closure consists of a combination, lamination or otherwise physically held in approximately uniform parallel position (of an inner or underside cover of a shrinkable and clear, translucent, or opaque, film or sheet, and an outer cover of a moldable, rigid or semirigid, and clear, translucent, or opaque material, such as, aluminum, paper, plastic, glass, steel, etc. The inner cover is to provide a seal for the container on which the closure is used, and the outer cover is to provide a mold or retaining form or device for the former during the sealing operation and to provide an ultimate protecting cover for the former and for the container upon which this closure is used.

As one example, the outer cover of the closure possesses a peripheral flange formed prior to, or during, the operation affixing the closure cover or covers to the container and having applied at its outer rim or edge means wherein both components of the closure are rolled, curled, bent or otherwise temporarily or permanently held together so that the inner component of the closure is held or retained by or within the rim of the outer component. The securing

together of the two covers or components is done prior to, during, or after the sealing operation.

There are several possibilities by which a closure as outlined above may be put into a practical form:

(1) A closure may be made as shown in FIG. 2 comprising plies of a dissimilar material, the inner layer consisting of a transparent film shrinkable under heat application, the outer layer made of aluminum sheet or any other moldable material. Both components are formed into a cover having, as one example, a circular top portion and an integral peripheral flange and a beaded rim. If this type closure is snapped onto a container with a beaded or a plain edge, the bead of the closure will be locked circumferentially below the rim of the container. When heat is applied selectively to the rim of the closure or the container, the following takes place:

(a) The film will shrink a maximum distance circumferentially around the rim of the container with the result that:

(b) It will pull the beaded rim of the outer layer of the closure tighter around the circumference below the bead of the container. This occurs because both elements are engaged thereby making the outer cover tighter on the container.

(c) The shrunken film will conform to the shape and irregularities of the container rim creating an additional seal around the rim of the container.

(d) Due to this local, circumferential shrinkage the remainder of the film under the outer layer will be pulled tightly across the mouth of the container, still further improving the seal at the mouth of the container.

(e) Should wax or a heat sensitive cement be applied to the rim of the container before attaching the cover, an additional seal will be formed at the time of heat application.

Similarly, the above function takes place with different type closures used on different type containers.

(2) A cover may be made as shown in FIG. 1, for example. This cover has a peripheral crease to facilitate the formation of a peripheral bulge (FIG. 2) before the closure is snapped onto the container. A closure as shown in FIG. 1 has the advantage of economical space saving stacking for packaging.

(3) A closure may be made using an outer single-ply cover of aluminum, or paper, etc. as a retainer for a shrinkable plastic sheet, which is substantially larger than the mouth of the container. The plastic sheet is placed on top of the container, and the cover snapped onto the container. This will create the essential condition that the film is held flat across the mouth of the container, while the rim of the film is arranged around the rim of the container in pleats protruding beyond the outer cover. Thus, when heat is applied to the rim, the protruding film will shrink, conforming to the shape of the rim of the container and forming therewith a tight seal around said rim, while the remainder of the film is pulled tightly across the mouth of the container. This third method has the advantage that the outer cover can be removed without disturbing the seal of the film portion of the closure. This process has the additional advantage that the outer cover can be repeatedly taken off and snapped back onto the container without losing its original efficiency of snapping onto the container, and locking below its rim due to its expandable pleated rim.

(4) A closure may be made as shown generally in FIG. 1 or FIG. 2 but with the outer cover **30** having a hole **31** in the center for visual inspection through the transparent inner cover **5** without removing the cover or breaking the seal, all as shown specifically in FIG. 14.

It is not necessary, but if desired, as shown in FIG. 10 a wax cement, etc. **14** may be applied prior to or during the sealing operation at the point of seal upon the container, and said material will adhere to the shrinking or shrunken film during the sealing operation and thereby provide double protection against leakage. Also, any of the covers may have incorporated a means of tearing, or otherwise removing said sealed film cover by means of a string, band, etc. **13** by having this device incorporated into the cover construction prior to or during the sealing operation as shown in FIG. 9.

Since the rim of the plastic film portion is rolled into the rim of the aluminum portion of the closure, it is locked and retained by the aluminum portion of the cover. Consequently, when this cover as snapped on an aluminum container, and heat is selectively and circumferentially applied to the cover, the plastic film portion will shrink a maximum circumferentially around the rim of the container at the point of the application of heat due to its inherent characteristics. Thus it will take the shape and configuration of the rim of the circular, rectangular, or other shape of the container, and create therewith a leakproof seal around the rim of the container.

It is a novel feature to place a sheet of shrinkable, oriented plastic film on top of a paper, plastic or aluminum sheet or foil container to hold it by any outer cover and by subjecting it selectively to heat, to shrink it around the mouth of the closure, thereby forming a leakproof seal.

FIG. 1 shows an outside cover somewhat similar to the cap illustrated in my previous invention, Ser No. 289,032, Patent No. 2,756,921, granted July 31, 1956, upon which this is, in certain respects, an improvement. Among other things, the invention as illustrated in FIG. 1 is directed to a more or less loose roll or double fold of the rim whereby the pleated area in the rim is freely able to expand and contract as the cover is slipped over the mouth of the container. Also, a thin plastic film cover may be applied, if desired, in connection with the outer cover.

Numeral **1** represents the rigid cover made of flexible, moldable material, such as aluminum, paper or plastic, while **2** indicates the crease formed in the flange of the cover and **3** indicates the more or less loose roll of the rim. Obviously, edge **3** may be formed with a double fold rather than a loose roll, the main consideration being that the edge be expansible and lock beneath the edge of the container. Numeral **4** indicates the pleats which are formed in the flange of the cover and **5**, if a liner is used, illustrates such liner or inside cover.

Upon the application of pressure as the cap is being secured to the container, due to the crease, the bulge will be formed, as clearly indicated in FIG. 2.

FIGS. 3 to 6 indicate various types of closures, in which numeral **5** illustrates the inside plastic cover with various types of outside protective covers such as cover **1** in FIG. 3; cover **6** in FIG. 4; cover **7** in FIG. 5, and cover **8** with a central depressed portion in FIG. 6. These covers may be placed on dissimilar type containers **9**, **29**, etc. Clearly, the two covers may be laid flat over a straight sided container as shown in FIG. 15.

FIGS. 7 and 7*a* illustrate a plastic film cover **5** and protective cover **10** placed over container **9**. Subsequently these covers are crimped around to make a tight closure, as illustrated in FIG. 7*a*, and heat is then applied selectively around the rim.

FIGS. 8 and 8*a* depict a straight edge container **12** having an inside plastic cover **5** and a recessed closure **11** applied over the top of the inside cover, both before and after the rolling, beading or crimping and heat sealing operation.

FIG. 9 shows the container **9**, in which only a 1-part closure or transparent plastic cover **5** is applied to the container, and secured thereto is an opening string **13**. This type closure is ideally suited, in a circular container, for bakery goods, such as, cakes and pastries or, in a rectangular package, for food products.

FIG. 10 shows a plastic sheet **5** secured to container **9** with additional sealing cement **14** at various spots, or completely around the edge of the rim. Obviously, the

opening means of FIG. 9 could be applied to the closure FIG. 10 or any other figures, with or without the outside cover, and likewise, the sealing cement **14** of FIG. 10 could be applied to the other constructions.

FIGS. 11, 11*a*, 12 and 13 illustrate the dies which can be used in making the cover and in sealing the container as set forth in applicant's invention.

FIG. 11 shows a male die **15** having a resilient ring **16** therein. Female die **17** has a groove **18** opposite the resilient ring **16** in the male die. Upon pressure being applied by the male or forcing die, the closure being formed is forced into the groove by means of the elasticity of the resilient material to form the crease. At the same time, curling rings **19** and **20** form the rim of the cover. The resilient ring **16** may be omitted if desired, but then a less pronounced crease will be formed.

The 2-part closure is then picked up by the suction in the capping and sealing tool **21** (FIG. 11*a*) which has a suction line **22** therein, and as the container **9** is snapped beneath the formed cap, or vice versa, heat is applied to the rim of the closure through apertures **23***a*. The heat may be applied by hot air, hot water, steam, electricity, or even by an open flame. The application of heat will cause the oriented plastic film to shrink around the rim of the container and therefore form a tight, leakproof seal. Tools **21**, **23** are of asbestos, hard rubber, etc., either entirely, or around heat passageways.

FIG. 12 shows a different type of suction sealing disc **23** having suction lines and positioning line **24** in it. While FIG. 12 shows only a shrinkable film being placed over the receptacle and sealed by means of hot air or steam passing through apertures **25**, it is clear that a 2-part closure could be just as easily used.

FIG. 13 shows a different type of crimping and sealing device **26** having hot air apertures **27** therein and a hold-down plate **28**.

FIG. 14 illustrates my invention with a different type closure having a body portion **30** with an opening **31** in the center by means of which the contents of the container may be seen through the plastic inner cover **5**.

FIG. 15 shows a roll **36** of outer protective material **35**, and a roll **34** of inner transparent material **33**, both of which are positioned over a straight, non-beaded, circular or rectangular container **32**. A shears **37** cuts both layers of the material in cooperation with a heat sealing and crimping device; for example, as shown in FIG. 11*a*. The shears may be combined with the heat sealing and crimping device if desired so as to provide a one-motion operation for sealing a container from basic sheet material. Similarly, the two components of the closure may be fed from one roll, having been re-rolled onto the single roll in a prior operation.

It is therefore clearly apparent that I have invented a sanitary cover which will decrease the quantity of, for example, aluminum, to pack a certain amount of goods. This is true because in the ordinary inside friction closure sealed on an inwardly extending rib from the top, approximately 8% of the normal capacity of the container is wasted. With this flexible, transparent film across the very top, the entire container may be utilized. This is particularly so in aluminum packaging which is becoming so common today. Also connected with this sanitary feature is the sales appeal of transparent closures in which the public demands to see that which they are purchasing, especially in the food field.

My invention may be used either as a 1-stage or a 2-stage operation. In other words, the transparent film may be used alone or the outside cover may be used alone, or if the combination closure is used, the inside cover may be first applied and then the outside cover applied later, or in a more practical way, the two covers may be formed together and applied as a laminated unitary closure.

It is therefore seen that there has been provided a leakproof and moisture proof closure which is easy to manufacture and is inexpensive. While the invention is particularly adapted for outside covers and containers of aluminum, the invention is equally effective for paper, plastic, steel, etc.

Other modifications of the principal items of this invention are clearly apparent, and I do not desire to be limited in my invention except as set forth in the claims.

A continuation-in-part application covering among others the subject matter of original claims **1–14**, i.e., article claims, was filed Apr. 16, 1957 as application Ser. No. 653,227, now abandoned.

What is claimed is:

1. A method for capping and sealing a closure having a protective cover and a heat shrinkable film using a capping and sealing die, comprising the steps of holding the closure by suction in the capping die, subsequently snapping the closure onto the receptacle, and retaining the closure on top of the receptacle while directing a heating agent through nozzles toward the rim of the closure and thus shrinking the film and closing and hermetically sealing the receptacle.

2. A method for hermetically sealing a container comprising the steps of draping a fragile, transparent, thin, flexible oriented plastic film cover over an aluminum container to be sealed, placing an opaque protective aluminum cover over said fragile plastic cover, crimping the edges of both covers and at the same time applying heat to the edges of said covers whereby the oriented plastic film will contract and form an airtight cover for the container.

3. A method for forming a closure and sealing a container in a continuous operation, utilizing a roll of transparent shrinkable film, and a second roll of moldable, flexible material, comprising the steps of unrolling and superimposing webs from both rolls of said material over a container to be closed, positioning said transparent shrinkable web intermediate the container and the moldable web, shearing a predetermined length from said superimposed webs of material to drape over said container and subsequently capping said container by crimping said length into a closure and selectively heat sealing said shrinkable component of said closure to form an airtight closure.

4. A method of providing a two part closure for a container, said closure comprising an inner sealing cover for the container and an outer protective cover for the sealing cover, said method comprising the steps of placing a sheet of transparent, heat shrinkable, oriented, plastic film upon the mouth of a container, said sheet being susbtantially larger than the mouth of the container, placing an outer cover of a different material upon said sheet to retain said sheet across the mouth of the container and to cause the peripheral portion of said sheet to drape substantially downward around the rim of the container, and applying heat to said sheet to obtain shrinkage of said sheet and formation of a sealing cover, said shrinkage locking said sealing cover below the rim of the container to render said sealing cover capable of retaining its seal when the outer cover is removed.

5. A method of sealing a container comprising the steps of applying to said container a two-ply cover having one ply of heat shrinkable oriented film and one ply of a dissimilar material, said film and said material being previously joined at their rim areas, and applying heat to said cover to obtain shrinkage of the film and sealing of the container.

6. A method of sealing a container having an opening at its top forming a mouth comprising the steps of placing a sheet of fragile, transparent, thin, flexible, heat shrinkable, oriented plastic film on top of a container to be sealed and over said mouth, said sheet being substantially larger than the mouth of the container and extending beyond said mouth circumferentially, arranging the edge portion of the film which extends beyond said mouth into depending pleats, retaining said sheet in a position above and across the mouth of the container,

and applying heat to said pleats to obtain shrinkage of said pleats only and sealing of the container.

7. A method of sealing a cover upon a fragile container and simultaneously strengthening the container comprising the steps of placing a sheet of heat shrinkable oriented plastic film over the mouth of the container, said sheet being substantially larger than the opening of the mouth of the container, arranging the edge portion of said sheet into depending pleats, retaining said sheet over the mouth of the container and applying sufficient heat to said pleats to obtain shrinkage of said pleats to engage and seal the container and cause the resultant radial compressive forces at the rim area of the container to impart additional strength and rigidity to the rim area of the container.

8. A method of sealing a container comprising the steps of placing a sheet of heat shrinkable plastic film over the mouth of a container, said sheet being substantially larger than the opening of the mouth of said container, gathering the edge portion of said film into depending pleats, shielding said sheet across the mouth of said container and simultaneously applying heat to the rim area of said sheet to shrink said sheet selectively primarily at its rim area to seal the container.

9. A method of sealing a container comprising the steps of placing a sheet of heat shrinkable, oriented, plastic film over the mouth of a container, said sheet being substantially larger than the opening of the mouth of the container, arranging the rim of said sheet into downwardly depending pleats, retaining said sheet upon said

mouth of said container by placing a shield of rigid material above said sheet and in proximity to said sheet across the mouth of the container leaving said pleats in exposed position, and applying heat to at least the rim area of said sheet to obtain shrinkage of said sheet at said rim area, said shrinkage causing said sheet to form a cover and to seal the container.

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2,409,788	10/1946	Osborne	53—42
2,447,855	8/1948	Goodwin et al.	93—1.3
2,447,983	8/1948	Little	215—38
2,595,046	4/1952	Amberg	93—1.3
2,608,334	7/1952	Knocke.	
2,707,588	5/1955	Amberg	229—43
2,732,116	1/1956	Merrill	53—42

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