Jan. 25, 1955 H. E. STOVER 2,700,186

METHOD OF MAKING CLOSURE CAPS

Filed June 15, 1949

Fig. 1

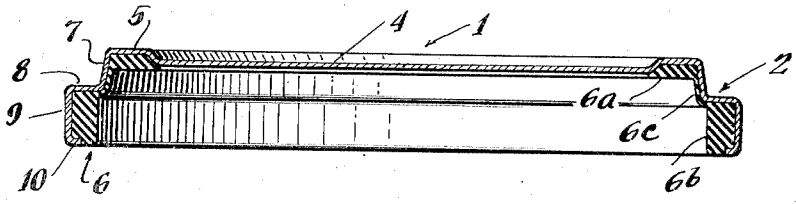


Fig. 2

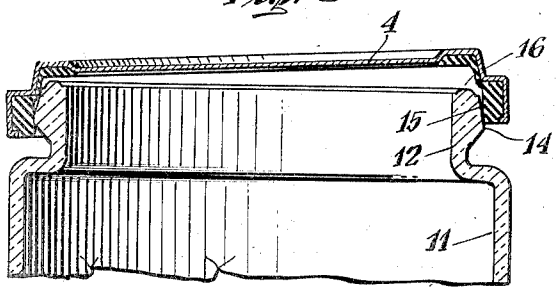


Fig. 3

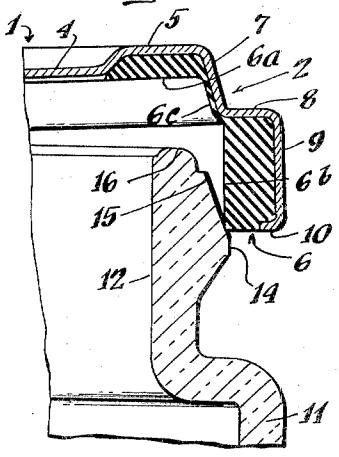


Fig. 4

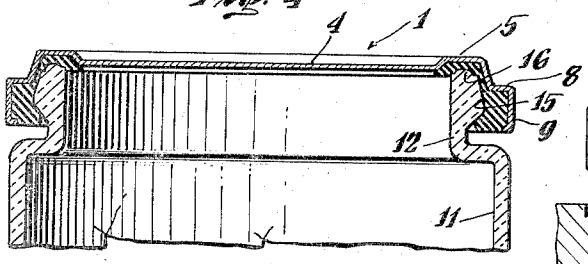


Fig. 5

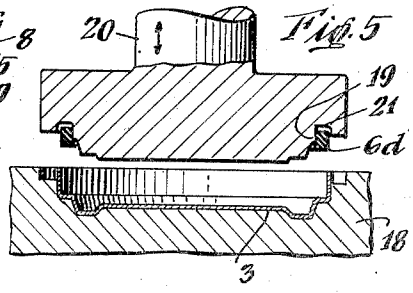


Fig. 7

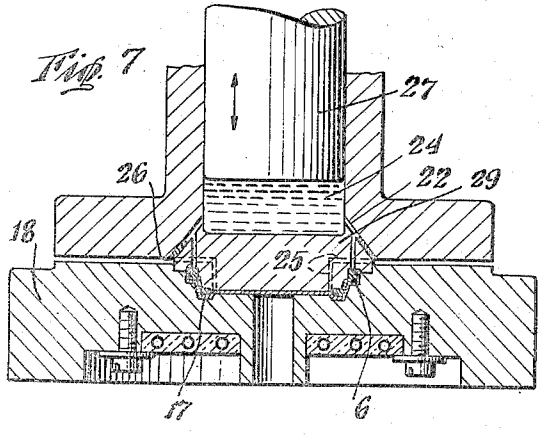
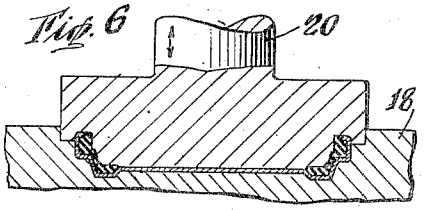


Fig. 6



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METHOD OF MAKING CLOSURE CAPS

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Application June 15, 1949, Serial No. 99,148

2 Claims. (Cl. 18—59)

The present invention relates to the sealing art, and more particularly to an improvement upon the closure illustrated in Patent No. 2,308,126, granted to Louis A. Von Till and myself on January 12, 1943, and in the method of making a closure.

Closure caps of the type illustrated in the Norman N. Holland Patent No. 1,909,406 are being sold in quantities by the assignee of the present application, but such closures and their method of manufacture are subject to certain difficulties, some of which the invention in said Patent No. 2,308,126 aims to overcome.

In the manufacture of closure caps of the general type illustrated in said Holland Patent No. 1,909,406, the metal part of the cap is made by a cap manufacturer. The gasket is cut from a vulcanized rubber tube by a rubber manufacturer and then has to be packaged and shipped to the closure manufacturer for assembly with the metal part of the closure. The gaskets become twisted and intertwined in shipment and have to be removed from shipping cartons and straightened. Many are broken in the machines used for assembling the gaskets with closures. These separate operations by separate companies, the constant interchange of technical information, and the transportation of engineers back and forth between the companies increase the cost of the cap and generally complicate the manufacture.

In the drawing or forming of the metal portion of the cap, the lacquer and the tin coating are strained so that objectionable pin holes result from contact with the product sealed. These pin holes are most likely to occur adjacent the portion subjected to the drawing operation. In addition, the scraping of the inside of the closure against the rim of the container may mar the lacquer or the tin coating, which again may lead to "pin holding." Where a gasket is adapted to engage either the side or the top of a container, the failure of the seal means the loss of the product in the container. The gasket has to form a seal with the container and also with the inside of the closure. The loss of the product is, of course, many times the cost of the closure or the container.

The prior Patent No. 2,308,126, issued to Louis A. Von Till and myself, is directed to the use of a double seal, one on the side of the container and the other on the top of the container, in order to minimize the failure of the seal and to facilitate sealing operations. The two separate gaskets and two separate assembling operations required in the manufacture of the closure increase the cost to a point where the cap has not been commercialized.

The present invention aims to overcome the above difficulties by providing an improved closure which will form a better seal and minimize or eliminate pin holding and by providing an improved method of manufacture which will reduce materially the cost of the closure.

An object of the present invention is to provide an improved closure and an improved method of making the closure.

Another object of the invention is to provide an improved seal which will minimize or eliminate the failure of the closures to form a hermetic seal.

Another object of the invention is to provide an improved closure which will minimize or eliminate pin holding.

Another object of the invention is to provide an improved closure which will eliminate the turning or "rolling" of the gasket within the closure during the sealing operation.

Another object of the invention is to provide a closure which is easier to seal with automatic machinery.

Another object of the invention is to eliminate the loss or displacement within the closure of gaskets during shipping and handling.

Another object of the invention is to provide a closure which eliminates scraping away of a protective coating on the closure skirt during the sealing operation.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawings, forming a part of the specification, wherein:

Fig. 1 is a cross-sectional view of a preferred embodiment of the closure;

Fig. 2 illustrates a closure being applied to a preferred construction of container;

Fig. 3 is an enlarged fragmentary view of a portion of the closure and container shown in Fig. 2;

Fig. 4 illustrates the closure sealed to the container shown in Fig. 2;

Figs. 5 and 6 illustrate one way of applying the gasket to the closure, Fig. 5 illustrating the inserting means in one position and Fig. 6 illustrating it in its final position; and

Fig. 7 illustrates another way of applying the gasket to the closure.

Referring again to the drawings, and more particularly to Fig. 1 thereof, there is shown a closure having a cover part **1** and a depending skirt **2**. The cover part preferably has a depressed center **4** with an annular channel **5** adjacent its periphery. The depressed panel **4** may serve to seat the bottom of a container to facilitate stacking, and the annular channel **5**, in addition to forming the outer periphery of the panel **4**, also serves as a channel in the cover part for receiving the upper part **6***a* of a gasket **6**. The skirt of the closure preferably has a flared upper portion **7**, and an annular offset portion **8** with a downwardly depending part **9**. The annular parts **8** and **9** are at substantially right angles to each other and form a seat for the main portion of the gasket **6***b*. The bottom of the skirt of the cap is turned inwardly as shown at **10** to conceal the raw edge of the closure, to strengthen the skirt, and to support the gasket in cases where the gasket is not vulcanized to the closure.

The gasket **6** comprises an annular portion **6***b* substantially rectangular in cross-section. Extending inwardly from the upper inner corner of the part **6***b* is a thin sheet of rubber **6***c* leading to the upper annular part **6***a* of the gasket which fits into the channel **5** of the cover portion of the closure.

A preferred embodiment of container is illustrated in Fig. 2 in the form of a small jar suitable for containing baby foods or the like having a body part **11** terminating in a neck portion **12** having an annular bead **14** adapted to be embedded in the main part **6***b* of the gasket. A suitable curved or tapered portion **15** leads to the rim of the container **16** which is adapted to engage and be embedded in the upper portion **6***a* of the gasket.

A popular method of applying the present closure to a container is partly illustrated in Fig. 2 and is fully shown in my prior application Ser. No. 579,671, filed February 24, 1945. The container moves along a conveyor belt (not shown) and engages a tilted closure at one side to move it out of a chute by engagement with the inside of the tilted closure. As the closure is moved out of the chute, the raised side is forced down over the other side of the container, as shown in Fig. 2, to form a seal on it. In this movement any part of the side of the cap may contact with the rim of the container. As a result, the lacquer or other coating may be fractured, which weakens the resistance of the closure to acids, moisture and other elements likely to rust or to "pin hole" the metal. This disadvantage is particularly objectionable where a closure cap of minimum tolerances happens to be applied to a container of maximum tolerances, for

in such instances the relatively small dimension between the container mouth outer diameter and the closure skirt inner diameter frequently results in undesirable scraping of the skirt coating during the sealing operation. The present gasket **6**, and particularly the portion **6***c* thereof (Fig. 3), protects the metal of the closure side from contact with the rim of the container during application of the closure and hence eliminates any damage to or scraping of the lacquer on the inside during application. Secondly, the gasket covers any weakened portions of the metal occasioned by the drawing operations necessary in forming the channel **5** and the various portions of the skirt **2**; hence the danger from pin holes in this portion of the closure, most likely to have pin holes, is eliminated.

When the closure is sealed on a container, the bead **14** is embedded in the main portion **6***b* of the gasket to form a secure seal at this point. In addition, the rim **16** of the container is embedded into the upper portion of the gasket **6***a* to form a second seal. Products of the type packed under the present closure are ordinarily sealed under a vacuum; hence the external pressure of the atmosphere on the cover part of the closure forces the cap down on the rim of the container to maintain a secure seal at this point.

Defective seals are a serious problem with packers. Some packers go to the trouble of holding their packages for a period of time and then checking each package individually to be sure that the seal is perfect. Each package that has to be thrown out is a substantial loss to the packer. The losses in recent years by some of the large packers have been staggering. Even more important is the fact that a defective package reaches the housewife with the contents spoiled. The loss of good will resulting from this is many times the cost of the package and is one of the main reasons why certain packers allow their packages to stand for a period of time and then test the seals.

With the present closure if the side seal should fail once in a hundred times, for illustrative purposes, and the top seal also failed once in a hundred times, the odds against the two seals failing on the same package would be one in 10,000; hence by simple arithmetic there should be 100 times less failures of seals with the present closure than with closures now being used commercially.

While various methods may be utilized for making the present closure, the closure blank **3** is shown in Fig. 5 seated in a suitable die or holder **18**. A potential gasket **6***d* substantially rectangular in cross section formed from an unvulcanized rubber compound is shown seated on the cylindrical portion **19** of a member **20**. As the member **20** is forced into the blank 3, the potential gasket **6***d* is compressed into the final gasket shape illustrated in the finished closure shown in Fig. 1. The shape of the compression member **20** conforms generally to the shape of the interior of the closure. An annular groove **21** with its outer side curved slightly engages the bottom edge of the gasket and forces inwardly the flange **10** shown in Fig. 1. The position of the parts of Fig. 5 when the gasket is compressed into its final form is shown in Fig. 6.

After the closure is removed from the holder, it may be passed through a suitable oven where the unvulcanized rubber becomes vulcanized, or if desired infrared lamps may be utilized for the vulcanizing operation, the essential requirements being to maintain the rubber at the proper temperature for a period depending upon the composition of the rubber and the accelerators used therein. This is known in the vulcanizing art and details of it are not necessary herein.

The resulting gasket fits closely with the metal cap and the subsequent vulcanization effectively secures the gasket to the metal cap so that all parts of the gasket are held against objectionable shifting at any time.

Another method of forming the gasket in the closure is illustrated in Fig. 7 of the drawings. In this instance the closure is held by a lower closing member **18** with a gasket-forming member **29** fitting into the closure blank and leaving an annular space about the skirt for the formation of the gasket **6**. Suitable ducts **22** lead from a reservoir **24** of liquid rubber composition to the space left for the gasket **6**. Preferably one or more ducts **25** are provided leading from the inner side of the channel **17** to the atmosphere at **26** to prevent the trapping of air as the rubber composition enters the space left for the gasket. Any suitable means may be utilized for forcing the rubber composition through the ducts **22**. As illustrated herein, a piston **27** is effective in the reservoir **24** for this purpose.

Preferably the holding member **18** carries a suitable disc or plate type electric heater for heating and partially vulcanizing the rubber composition. The liquid is such that it will hold its form in the closure as a result of the initial heating and when the inserting member is removed the closure may be passed to a suitable oven or other means for further vulcanization.

Excellent results have been obtained by utilizing rubber compounds in the manufacture of the gaskets used for the closure described herein. Preferably the gasket material is vulcanized after application to the closure caps. It will be understood that synthetic rubber compounds may be utilized either in whole or in part and the use of the term "rubber" herein is intended to include synthetic as well as natural rubber compounds. In certain applications vulcanization is not required. This is particularly true with certain types of synthetic materials which do not require vulcanization and which are ready for use on application to the closures.

It will be seen that the present invention provides a closure adapted to form a better seal than closures now in use. In addition, pin holes are eliminated in the portions of the closure subjected to the severest strain in the manufacture thereof and most likely to have fractures in the tin and lacquer coatings on the metal. In addition, dual safety is provided by a seal on the side of the container where defects are less likely to occur and by a further seal on the rim of the container where the vacuum is most effective in holding the seal.

The cost of the closure is greatly reduced by the elimination of the usual steps of vulcanizing rubber tubes, cutting the gaskets from the tubes, shipping the finished gaskets to the closure company, and then assembling the cut gaskets into closures. These steps are now eliminated by shaping the gasket in the closure and thereafter vulcanizing the gasket while in the closure. In addition to reducing the cost, this method provides a closure where the gasket is rigidly held to the closure at all points of contact with it and hence is not subject to the so-called "rolling" during application to a container and is not subject to loss or displacement in handling or shipment of the closure. The improved closures may be formed by simple machinery and are fully capable of withstanding the rough usage to which they may be subjected.

As various changes may be made in the form, construction and arrangement of the parts herein without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. The method of providing a gasket in a closure cap blank, having a cover portion and a depending skirt, which comprises supporting said blank about the exterior thereof, inserting a member having an outside diameter less than the inside diameter of the skirt into the blank against the underside of said cover portion to prevent flow of material over the center of said portion to thereby provide an annular space between said member and the skirt portion of the blank and subsequently forcing a liquid rubber composition through ducts into said annular space to form a sealing gasket in said blank.

2. The method of providing a gasket in a closure cap blank, having a cover portion and a depending skirt, which comprises supporting said blank about the exterior thereof, inserting a member having an outside diameter less than the inside diameter of the skirt against the underside of said cover portion to prevent flow of material over the center part of said cover portion to thereby provide an annular space between said member and the skirt portion of the blank, subsequently forcing a liquid rubber composition through at least one duct into said annular space adjacent the periphery thereof to form a sealing gasket in said blank and venting said annular space through a duct leading to a point adjacent the inner periphery of said annular space.

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