April 29, 1952 W. E. AMBERG 2,595,046

METHOD OF FORMING PAPER CLOSURE MEMBERS FOR PAPER CONTAINERS

Original Filed Sept. 24, 1948

Fig. 1

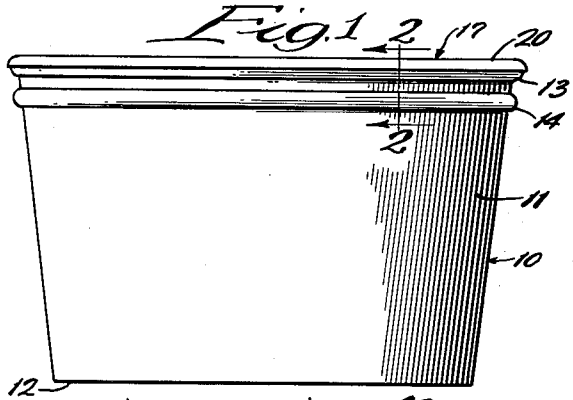


Fig. 2

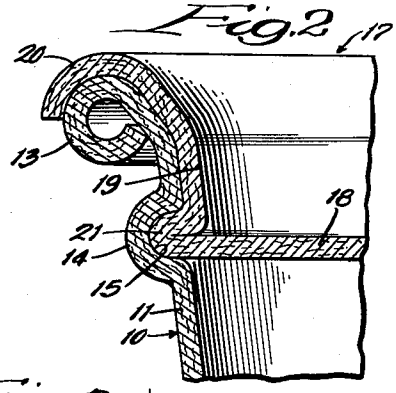


Fig. 3

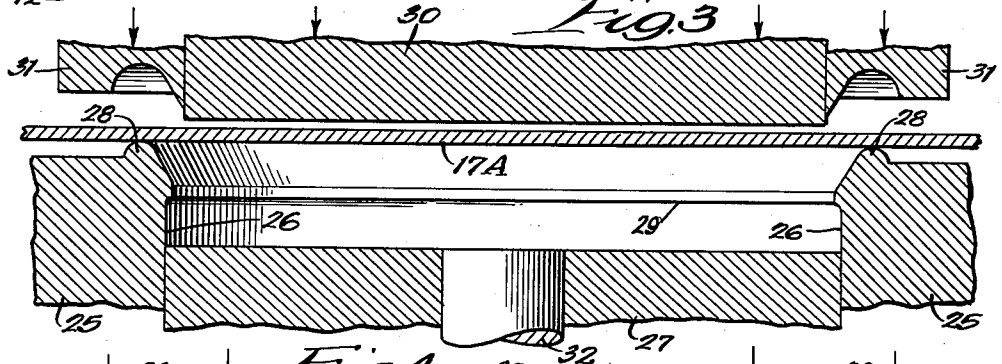


Fig. 4

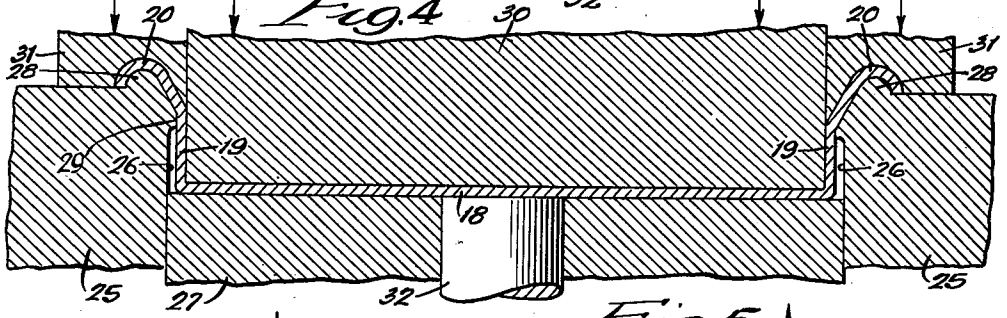
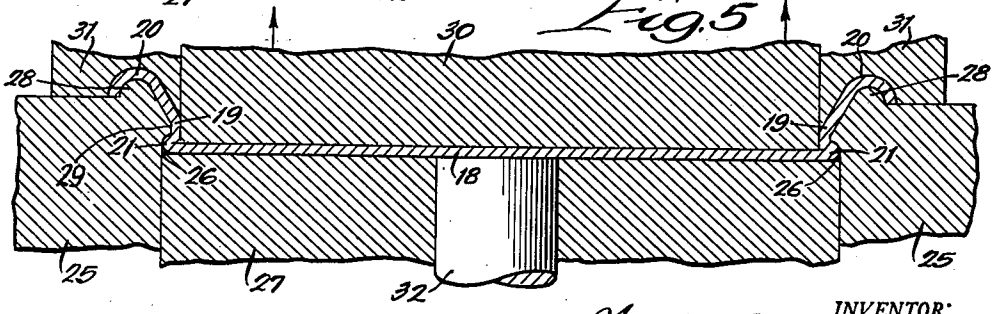


Fig. 5



INVENTOR:
Walter E. Amberg,

BY Dawson, Orrick, Britt and Spangenberg,
ATTORNEYS.

Patented Apr. 29, 1952 2,595,046

UNITED STATES PATENT OFFICE

2,595,046

METHOD OF FORMING PAPER CLOSURE MEMBERS FOR PAPER CONTAINERS

Walter E. Amberg, Beverly Shores, Ind., assignor to Lily-Tulip Cup Corporation, Chicago, Ill., a corporation of Delaware

Original application September 24, 1948, Serial No. 51,043, now Patent No. 2,568,697, dated September 25, 1951. Divided and this application October 12, 1949, Serial No. 120,965

2 Claims. (Cl. 93—1.3)

1

This invention is directed to the method of forming paper closure members for paper containers, and this application is a division of my co-pending application Serial Number 51,043 filed September 24, 1948. The subject matter disclosed but not claimed herein is disclosed and claimed in my copending applications Serial No. 51,043, filed September 24, 1948, now U. S. Letters Patent No. 2,568,697, issued on September 25, 1951, and Serial No. 120,966, filed October 12, 1949, now U. S. Letters Patent No. 2,568,698, issued on September 25, 1951, the said latter application also being a division of the former application.

Heretofore, various types of paper closure members for paper containers have been proposed and utilized but they have all, for various reasons, failed to produce satisfactory results. Open-ended paper containers to be closed by paper closure members are usually provided with an external rim at the open end thereof and an internal groove adjacent thereto. Paper closure members for such paper containers have been generally of three types, a stiff paper disc adapted to fit in the internal groove of the paper container, or a paper cover having a flange frictionally received in the open end of the paper container and overlying the rim thereof, or a paper cover having a depending flange adapted to snap over the external rim of the paper container.

In the first type of paper closure member, the stiff paper disc is difficult to insert into the annular groove of the paper container. Extreme care in application is required for any tilting of the paper disc or any application of uneven pressure usually results in plunging the paper disc into the contents of the paper container with consequent spilling and contamination of the contents. The fit of the paper disc in the annular groove is also critical for, if the fit is too tight, the paper disc is too difficult to apply, and if the fit is too loose leakage will occur. Extremely close tolerances must be maintained and this is difficult and expensive to do with formed paper. After the paper discs are applied they are extremely difficult to remove and in this connection it is necessary to provide removing tabs or the like to the paper discs to assist in removing the same from the paper container. Quite often these removing devices tear off from the paper discs during the removing operation. Further, the rims of the paper containers are not protected by the paper discs and they become dirty and contaminated and result in contamination of the contents when poured from the paper container.

Some of the foregoing difficulties encountered with the use of the stiff paper discs are overcome by the use of the second type of paper closure member, but here other difficulties are encountered. Since the paper cover having a flange received in the open end of the paper container and overlying the rim thereof is merely frictionally held in place on the container, it may be readily dislodged causing spilling of the contents of the container. Substantially any upward force applied to the flange, as during handling or packing the containers, will operate to dislodge the cover. It has been found that the use of friction alone for retaining the paper cover in place on the paper container is wholly inadequate. Here, also, tolerances are quite critical for if the fit is too loose leakage is bound to occur.

2

As a result of the foregoing difficulties, great efforts have been made toward the third type of closure member, but here again inherent difficulties have been encountered. The paper cover having a depending flange adapted to snap over the external rim of the paper container must, of necessity, project beyond and below the rim of the paper container. This requires extra space for the packing of the closed containers and also requires extreme care in handling and packing. If the projecting edge of the depending flange of the paper closure member is severely bumped or is hung up on the top of an adjacent container during packing, the closure member is almost invariably dislodged resulting in spilling and contamination of the contents of the container. Here, also, the tolerances are quite critical for, if the fit between the closure member and the container is too tight, the application and removal of the closure member becomes difficult and, if too loose, leakage will occur. Since the gripping action of the closure member takes place at the extremity thereof, it may be readily diminished by rough handling.

The principal object of this invention is to provide a suitable method for satisfactorily producing an improved paper closure member free from the difficulties above referred to and providing the advantages of easy insertion into and removal from the container, secure engagement against dislodgement during handling and packing, not requiring critical fit tolerances while at the same time providing a leak-proof seal with the container and serving to protect the rim or lip of the container from dirt and contamination.

The paper closure made in accordance with this invention is adapted for use with a paper container having an external rim at the open end thereof and an internal groove adjacent thereto, the closure being made from a single sheet of paper board, and including a closure end wall portion and an integral side flange portion extending upwardly therefrom throughout the periphery thereof. The juncture of the end wall

portion and the side flange portion consists of a compressed solid peripheral bead in alignment with the end wall portion and extending beyond the upwardly extending flange portion to form a reinforced peripheral extension of the end wall portion. The side flange portion lies adjacent the open end of the paper container and the compressed solid peripheral bead, forming an extension of the end wall portion, snaps into the internal groove of the paper container and is held firmly therein. Thus, the paper closure member is positively retained in the paper container by the compressed solid peripheral bead.

Preferably, the upper edge of the side flange portion is formed outwardly into an external reentrant flange portion to overlie the rim of the paper container to protect the same from dirt and contamination. The side flange portion also operates to prevent plunging of the paper closure member into the contents of the paper container during application of the closure member and provides a strong and readily accessible means for removing the closure member from the paper container. Any application of force to the external reentrant flange portion of the paper closure member during handling or packing will not dislodge the closure member for it is firmly held in place by the external compressed peripheral bead engaging in the internal groove. Because of the seal formed by the side flange portion and external bead of the paper closure member leakage of the contents of the paper container is effectively prevented and close-fit tolerances are not required.

Other objects and advantages will become apparent to those skilled in the art upon reference to the accompanying specification, claims and drawing, in which:

Figure 1 is a side elevational view of a paper container with the paper closure member made in accordance with this invention applied thereto;

Fig. 2 is an enlarged partial sectional view taken substantially along the line 2—2 of Fig. 1 illustrating the cooperative relationship between the paper container and the paper closure member;

Fig. 3 is a cross-sectional view of suitable apparatus for carrying out the method of this invention, with certain portions of the apparatus broken away and with the parts in a position at the start of the forming cycle;

Fig. 4 is a view similar to Fig. 3 but showing the parts midway in the cycle of operation;

Fig. 5 is a view similar to Figs. 3 and 4 but showing the parts at the completion of the cycle of operation;

Referring first to Figs. 1 and 2 the paper container is generally designated at 10 and includes a side wall 11 which may be frusto-conical in contour for stacking purposes and provided at its bottom 12 with a bottom wall. The upper open end of the paper container is provided with an external rim 13 and adjacent the upper open end of the paper container it is indented outwardly at 14 to form an internal groove 15.

The paper closure member adapted to be made by the method of this invention is generally designated at 17 and it includes a closure end wall portion 18 and an upwardly extending side flange portion 19. The upper edge of the side flange portion 19 is provided with an external reentrant flange portion 20. The juncture of the closure end wall portion 18 and side flange portion 19 is deformed outwardly to form an external compressed solid peripheral bead 21 at the juncture, the bead being in substantial alignment with the end wall portion 18 and extending beyond the side flange portion 19.

The paper closure member 17 is adapted to be received in the open end of the paper container 10. The external bead 21, forming a reinforced extension of the closure end wall portion 18, is received in the annular groove 15 of the paper container and the side flange portion 19 may frictionally engage the side wall 11 of the paper container adjacent its open end. The external reentrant flange portion 20 overlies the rim 13 to protect the same from dirt and contamination.

To apply the paper closure member to the paper container all that is necessary is to insert it in the open end of the paper container, whereupon the external compressed peripheral bead 21 snaps into and engages in the internal groove 15 and the side flange portion may frictionally engage the side wall of the paper container. The side flange portion 19 and the external reentrant flange portion 20 operate during application of the closure member to prevent plunging of the same into the contents of the paper container. Because the external compressed peripheral bead 21 is a continuation of the closure end wall portion 18 it is firmly held in engagement with the internal groove 15. This firm engagement, especially when taken in conjunction with the frictional engagement of the side flange portion 19, prevents the paper closure member from being dislodged during handling or packing, also provides an effective seal between the paper closure member and the paper container and eliminates the necessity for extremely close-fit tolerances as heretofore required.

In order to remove the paper closure member from the paper container, all that is necessary is to uncurl a portion of the external reentrant flange portion 20 so that it may be firmly grasped to pull the closure member from the container. Upon such pulling the external compressed peripheral bead 21 of the paper closure member is snapped out of the internal groove 15.

Referring more particularly to Figs. 3–5: suitable apparatus for carrying out the method includes a female die 25 having a bottom wall member 27 which is movable between a retracted position illustrated in Figs. 3 and 4 and an advance position illustrated in Fig. 5; a male die 30 movable relative to said female die from a retracted position illustrated in Fig. 3 to an advance position illustrated in Fig. 4; and a die ring 31 surrounding said male die 30 and movable with and relative thereto. The female die 25 is undercut or recessed at 26 to provide an opening into which the bottom member 27 is slidably disposed and to provide a lip 29 defining a smaller opening for receiving the male die 30. The male die 30 and female die 25 being of complementary shape and of such relative dimensions as to provide, between the male die 30 and lip 29 on female die 25, a peripheral space approximately equal in width to the thickness of the paper board to be operated upon (said thickness hereinafter being referred to as "paper board thickness") and so as to provide between the plunger 30 and peripheral wall of recess 26 a peripheral space whose width is substantially greater than one paper board thickness and preferably less than two paper board thicknesses.

The female die 25 is preferably provided with an upwardly extending shoulder 28 constituting a male rim die cooperatively disposed with respect to a complementary groove, provided in the

ring 31, constituting a female rim die, which surrounds the male die 30. The ring 31 is movable from a retracted position as illustrated in Fig. 3 to an advance position as illustrated in Figs. 4 and 5 and together with the complementary portion 28 of die 25 provides die means for forming the closure rim 20 and serves for confining or clamping the partially formed article during the latter part of the cycle of operations.

Fig. 3 illustrates the parts of the machine at the start of the forming cycle. A paper board blank 17A, circular in configuration for forming the paper closure member 17, is inserted on the top of the female die 25 as illustrated in Fig. 3. The male die 30 is then advanced to carry the paper board blank with it into engagement with the movable bottom wall 27 of the female die when the bottom wall is in its retracted position. This operation forms the paper board blank into a closure end wall portion 18 and a side flange portion 19. At this time the end wall portion 18 is confined or clamped between the male die 30 and bottom wall member 27 and the upper margin of the flange 19 above the recess 26 is confined or clamped between the ring 31 and female die 25, with the intermediate zone of flange 19 relatively unconfined because of the recess 26.

The ring 31 is then advanced and cooperates with the shoulder 28 on die 25 to form the external reentrant flange portion 20 on the upper edge of the side flange portion 19. At the end of these operations the machine parts take the positions illustrated in Fig. 4 wherein the paper board blank is formed into a closure end wall portion 18, a side flange portion 19, and an external reentrant flange portion 20.

After the parts are in the position illustrated in Fig. 4 the end wall portion 18, the external reentrant flange portion 20 and the side flange portion 19 remote from the juncture of the end wall and flange portions are confined by the dies. Then the movable bottom wall 27 is advanced simultaneously with retraction of the male die 30 to the positions illustrated in Fig. 5. This simultaneous movement of the movable wall 27 and the male die 30 operates to deform and compress the side flange portion adjacent the juncture of the closure end wall portion and side flange portion of the paper closure member outwardly into the annular recess 26 to form the solid compressed external peripheral bead 21. The simultaneous movement of the bottom wall 27 of die 25 and the male die 30 is such as to compress the deformed external peripheral bead 21 in a vertical direction, between the shoulder 29 and bottom wall 27, while restraining it in a lateral direction, between the exterior wall of male die 30 and the surrounding wall of recess 26, so that it becomes a solid compressed external peripheral bead which permanently holds its shape.

To remove the formed paper closure member from the machine the bottom wall 27 of the female die, the male die 30, and the female rim die 31 are retracted and a plunger 32 is moved upwardly against the center of the closure wall 18 to snap the paper closure member from the annular recess 26. The parts are then in the position to repeat the cycle of operation. If desired, the female die 25 may be radially severed into a plurality of segments and they may be moved outwardly for the purpose of clearing the external peripheral bead 21 of the paper closure member to provide for ready removal of the paper

closure member from the machine in the event that snap removal is not desired.

Thus, the method of forming the paper closure member includes forming a paper board blank into a closure end wall portion and a side flange portion, forming the edge of the side flange portion into an external reentrant flange portion, and outwardly deforming the juncture of the closure end wall portion and side flange portion into a compressed solid peripheral external bead 21 in substantial alignment with the end wall portion 18 to produce a reinforced peripheral extension of the end wall portion.

While for purposes of illustration one form of this invention has been disclosed, other forms thereof may become apparent to those skilled in the art upon reference to this disclosure and therefore this invention is to be limited only by the scope of the appended claims.

I claim as my invention:

1. The method of making a paper closure member for a paper container comprising the steps of forming a paper board blank into a closure end wall portion and an integral peripheral side flange portion, confining the end wall portion and a part of the flange portion remote from the juncture of the end wall and flange portions so as to leave an intermediate zone of said flange portion relatively unconfined, restraining said intermediate flange zone against inward radial movement while providing for limited restricted outward radial movement, and moving the confined end wall portion and the confined part of the flange portion toward each other to compress the material of the intermediate zone of said flange portion into a solid compressed external peripheral bead in substantial alignment with the end wall portion to produce a reinforced peripheral extension of the end wall portion.

2. The method of making a paper closure member for a paper container comprising the steps of forming a paper board blank into a closure end wall portion and an integral peripheral side flange portion, forming a part of the side flange portion remote from the juncture of the end wall and flange portions into an external reentrant portion, confining the end wall portion and the remote part of the flange portion so as to leave an intermediate zone of said flange portion relatively unconfined, restraining said intermediate flange zone against inward radial movement while providing for limited restricted outward radial movement, and moving the confined end wall portion and the confined part of the flange portion toward each other to compress the material of the intermediate zone of said flange portion into a solid compressed external peripheral bead in substantial alignment with the end wall portion to produce a reinforced peripheral extension of the end wall portion.

WALTER E. AMBERG.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,482,732	Calleson	Feb. 5, 1924
1,575,300	Weeks	Mar. 2, 1926
2,017,460	Hothershall	Oct. 15, 1935
2,051,235	Willis	Aug. 18, 1936
2,403,042	Bogoslowsky	July 2, 1946
2,407,465	Zesbaugh	Sept. 10, 1946