Dec. 30, 1952 J. W. THOMAS 2,623,674

METHOD OF APPLYING CLOSURES TO CONTAINERS AND CLOSURE BLANKS THEREFOR

Filed Jan. 15, 1947

3 Sheets-Sheet 1

Fig. 1

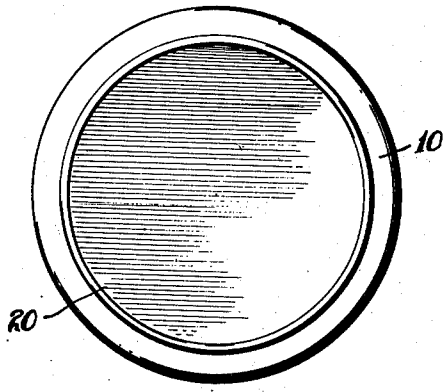


Fig. 2

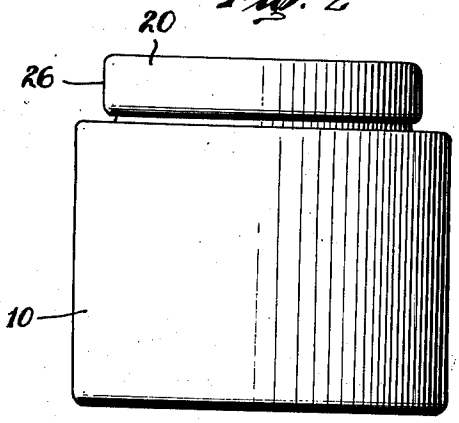


Fig. 3

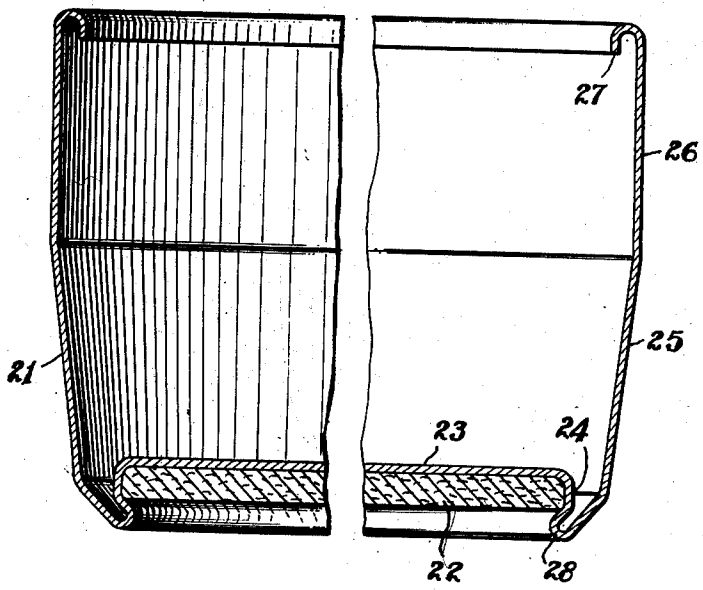


Fig. 4

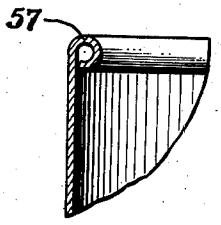


Fig. 5

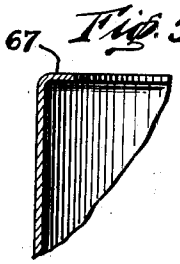


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Fig. 6

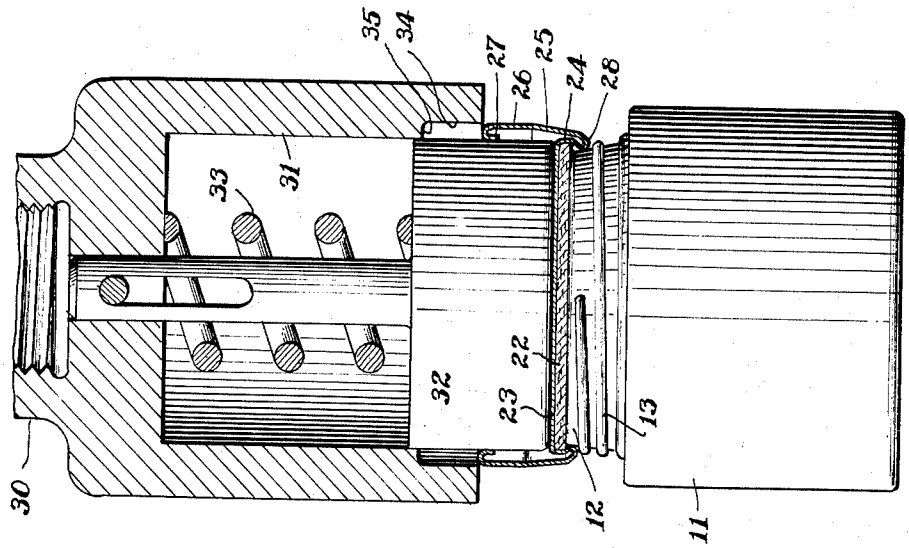


Fig. 7

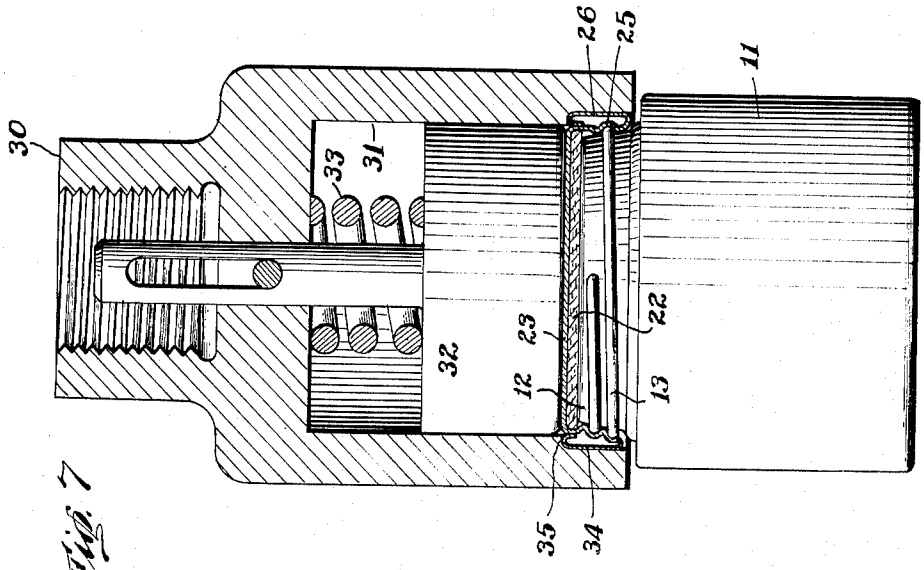


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Fig. 8

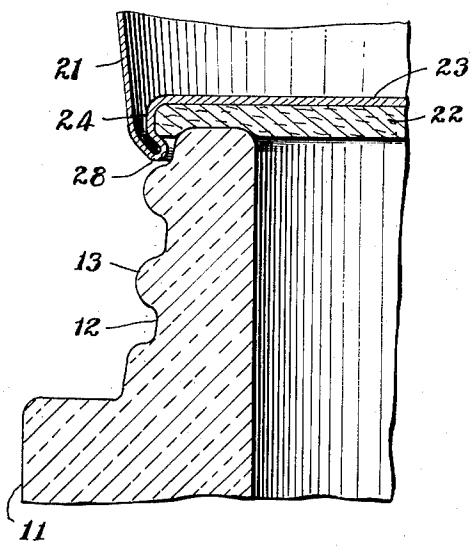



Fig. 9

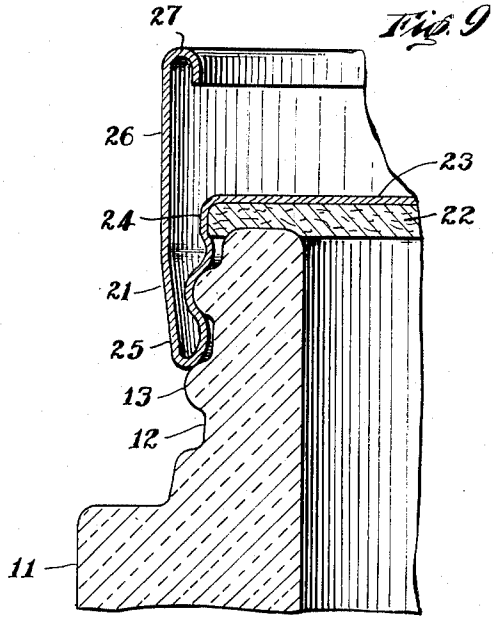



Fig. 10

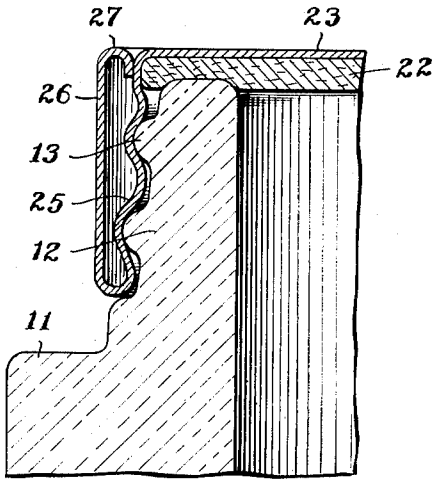
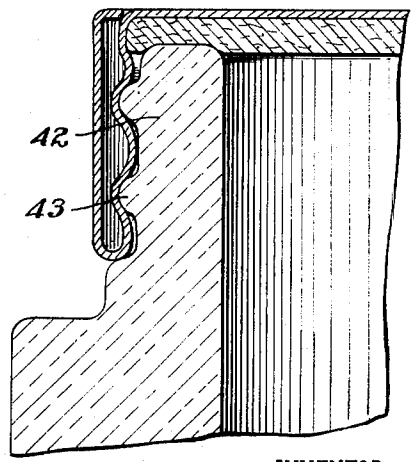



Fig. 11

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# UNITED STATES PATENT OFFICE

2,623,674

## METHOD OF APPLYING CLOSURES TO CONTAINERS AND CLOSURE BLANKS THEREFOR

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Application January 15, 1947, Serial No. 722,162

13 Claims. (Cl. 226—84)

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This invention relates to the application of closures to containers and particularly to a means and a method for forming a closure on a container to form a package.

In packages of the type to which my invention relates, closures are held in place by means of cooperating formations, such as complementary screw threads, on the container and closure. In many cases, it is desirable that the cooperating closure retaining means be concealed to provide a more attractive or more sanitary package, and exhibit a substantially smooth and unbroken exterior surface.

One type of closure which has been used for this purpose is that in which a metal blank is formed, for example, by upsetting or drawing, with inner and outer skirts spaced apart and thereafter the inner skirt is formed as required by means of a tool to provide a thread or other suitable closure securing means. Another known closure is that in which the cap skirt is formed of moldable material, the required formation being provided on the inner wall of the skirt in the molding operation. Both types are relatively expensive, the former because of the several forming operations required, and the latter because of both the material employed and the molding operation. In either case, the cooperating means being completely and separately formed in the container and closure, special closure applying equipment is required. Cooperating screw threads, for example, require either a revolving head or a revolving stage in the closure applying machine.

An object of this invention is an economical method of providing a package with concealed closure retaining means. To this end, the specific objects of the invention are an improved method of forming a metal closure cap with concealed container engaging means and an improved closure blank particularly adapted to that purpose. Other and further objects will appear from the following description, with reference to the accompanying drawings, in which:

Fig. 1 is a top plan view of a closure and contained assembled in accordance with my invention;

Fig. 2 is a view of the assembled closure and container in elevation;

Fig. 3 is an enlarged vertical sectional view, partially cut away, showing the preferred form of closure blank of my invention;

Figs. 4 and 5 are fragmentary views showing modifications of the closure blank of Fig. 3;

Fig. 6 is a vertical sectional view, partially in elevation, of a container and closure blank in

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position under a sealing head at the beginning of a closure forming and applying operation;

Fig. 7 is a vertical sectional view, partially in elevation, of the parts at the completion of the closure forming and applying operation;

Fig. 8 is an enlarged fragmentary vertical sectional view through parts of the preferred forms of container and closure blank at the beginning of the closure forming and applying operation;

Fig. 9 is a view similar to Fig. 8 but showing the parts at an intermediate position in the operation;

Fig. 10 is a view similar to Figs. 8 and 9 but showing the parts at the completion of the operation; and

Fig. 11 is a view similar to Fig. 10 but showing a modified form of closure applied to an alternative container finish.

The package provided by my novel closure blank and method of application is shown in Figs. 1 and 2 and comprises a container 10 and a closure 20, in which, as shown in Fig. 2, the closure retaining means is concealed by a straight, smooth skirt 26.

The preferred form of closure blank shown in Fig. 3 includes a metal shell 21 and a liner 22. The shell is formed from a cup shaped blank and has a recessed panel or diaphragm 23, a skirt portion 24 depending from the panel 23, and a main skirt portion extending upwardly and having a downwardly tapered or upwardly flared portion 25 and a cylindrical portion 26 terminating in an open bead 27. The lower ends of skirt portions 24 and 25 are spun or otherwise formed inwardly as at 28 to retain the liner 22.

This type of closure blank is particularly adapted for application to a container having a tapered finish, such as that shown in Figs. 6, 7, 8, 9 and 10. This container has a body 11 and a finish 12 tapered toward the mouth of the container and characterized by a screw thread formation 13.

A sealing head suitable for applying the closure blank to such a container is shown in Figs. 6 and 7 and generally designated 30. The head is recessed at 31 to receive a resiliently mounted center block 32 and its spring 33, and has a counterbored recess 34 providing a shoulder 35 at its entrance to the recess 31.

In an applying and forming operation, the closure blank 21 is placed on the container by any suitable means with the liner 22 resting on the mouth of the container, as shown most clearly in the fragmentary enlarged view of Fig. 8, and the assembled container and closure blank are positioned beneath the closure-applying head 30.

As the head descends, the center block 32 enters the skirt of the blank and bears on diaphragm 23, as shown in Fig. 6. On continued downward movement of the head, the shoulder 35 engages and presses upon the bead 27 of the closure blank, causing the metal of skirt portion 25 to bend inwardly and progressively and into substantial conformation with the container finish and the closure retaining means projecting thereon. The flared skirt portion 25 is thus inverted and made to conform to the screw thread formation 13 as most clearly shown in the fragmentary enlarged views of Figs. 9 and 10. The resistance of the spring 33, urging the center block 32 against the panel or diaphragm 23, assures sealing contact of the liner 22 on the container mouth. A sealing machine in which the head is stationary and the container support is raised to present the container and closure blank to the head may, of course, be substituted for that described.

This operation provides a closure as shown in Fig. 10 having a top panel and a depending hollow skirt of which the inner wall is threaded and the outer wall smooth. The diaphragm 23 of the closure blank becomes the top panel, the skirt portion 25 provides the threaded inner wall, and the skirt portion 26 retains its initial formation and overlies and conceals the threaded interior wall. It will be understood that by reason of the screw threads, the closure may be easily removed and replaced.

I do not wish to be limited by any theory with regard to the action which takes place within the collapsing skirt of the closure blank during its application to a container, but it is to be presumed that the metal follows the contour of the screw thread formation on the container finish by reason of its resistance to deformation by bending moment, the result being that, at all points, the metal will bend about the largest unrestricted bending radius. The circular form of the collapsing skirt in cross section apparently resists outward collapse, and I have carried out the operation successfully with a flat faced sealing head. I prefer, however, to recess the head, as at 34, so that the wall of this recess will not only serve as a guide, but will also further assure against any tendency to outward collapse, as when the closure blank is made of very thin pliable metal. Limits on the material and thickness of the shell 21 have not been fully determined, but satisfactory closures have been made from commercial aluminum sheet of 29, 30 and 31 gauge and gauges above and below that range should be permissible and are contemplated within the scope of the invention. Other factors, such as the material of the container, presumably would have greater effect than the particular metal or exact form of the closure blank.

I have chosen for description a form of my invention adapted for application to a tapered container finish. This type of finish is frequently preferred for easy removal of the closure, since it minimizes binding, but my invention is not limited to such container finishes. When the container has a straight finish, the portion 25 of the closure blank skirt need not be flared and the entire upstanding main skirt portion is preferably cylindrical. Fig. 11 shows a closure formed from a straight skirted blank on a container with a straight finish 42 provided with a parallel screw thread formation 43.

Other modifications will be apparent. A closed bead 57, Fig. 4, or a flange 67, Fig. 5, may be substituted for the open bead 27. Retaining means other than a screw thread may be of advantage, as where the closure need not provide a tight reseal, or where it need not be replaceable on the container, and my invention is adaptable to such alternative closure retaining means, as will be apparent to those skilled in this art.



It will also be appreciated that the closure blank forming a part of my invention may be conformed to a member having a closure retaining surface provided thereon, which is a duplicate or master of a container finish with which a completed closure may be used to form a package. In such an instance the closure blank is fabricated in the form illustrated in Fig. 3 and is thereafter applied to a die member, or master finish, in the same manner as hereinabove described for the application of the closure blank to the closure retaining finish of a receptacle or container. In this way a preformed closure is provided for subsequent application to a container.

The above described and other modifications and embodiments are contemplated within the scope of my invention, and the invention is not to be limited to the exact disclosure herein except as it has been defined in the appended claims.

What is claimed is:

1. A method of forming a closure on a container, comprising the steps of forming a closure blank having a diaphragm, a relatively short skirt portion depending from said diaphragm and a relatively long skirt portion extending immediately upwardly from said relatively short skirt portion, placing said closure blank on a container, and applying pressure means against the free edge of said upwardly extending skirt portion to displace said edge axially to substantially the plane of said diaphragm.

2. A method of forming a closure upon a container having closure retaining means thereon, comprising the steps of forming a closure blank having a diaphragm, a relatively short skirt portion depending from said diaphragm and a relatively long skirt portion extending immediately upwardly from said relatively short skirt portion, placing said closure blank on a container with said skirt portions above said closure retaining means, and applying pressure against the free edge of said upwardly extending skirt portion to displace said edge axially to substantially the plane of said diaphragm.

3. A method of forming a closure on a container having closure retaining means thereon, comprising the steps of forming a closure blank having a diaphragm, a relatively short skirt portion depending from said diaphragm, a relatively long skirt portion extending immediately upwardly from said relatively short skirt portion, and a liner retained within said relatively short skirt portion, placing said closure blank on the container with said skirt portions above said closure retaining means, and applying pressure against the free upper edge of said upwardly extending skirt portion to displace said edge axially to substantially the plane of said diaphragm.

4. A method of forming a closure on a container having closure retaining means thereon, comprising the steps of forming a closure blank having a diaphragm, a relatively short skirt portion depending from said diaphragm, a skirt portion flaring immediately upwardly from said depending skirt portion, a straight skirt portion extending upwardly from said flaring skirt por-

tion and ending in a bead, and a liner retained within said depending skirt portion, placing said closure blank on the container with said skirt portions above said closure retaining means, and applying pressure against said bead to displace said bead axially to substantially the plane of said diaphragm.

5. A method of closing containers having an external closure retaining formation with a metallic closure blank having a diaphragm, a relatively short skirt portion depending from said diaphragm and a relatively long skirt portion extending immediately upwardly from said relatively short skirt portion, comprising inverting part of the upwardly extending skirt portion and pressing it against the closure retaining means by displacing another part of said upwardly extending skirt portion downwardly past the retaining means.

6. In a method of forming a closure on a container, the steps comprising, providing a closure blank having a diaphragm, a relatively short skirt portion depending from said diaphragm, and an integral relatively long skirt portion extending immediately upwardly from said short skirt portion, positioning said closure blank on the mouth of a container with its relatively long skirt portion directed upwardly, instigating relative movement between said upwardly extending skirt and said container, whereby said relatively long skirt portion is progressively turned inwardly into substantial conformity with a closure retaining finish on the container, and interrupting said relative movement to leave a portion of the relatively long skirt portion in enclosing relationship to that portion of the skirt which has been conformed to the container finish.

7. In a method of conforming a closure blank to a closure retaining member, the steps comprising, forming a cup like closure blank having a diaphragm and a relatively short inwardly directed depending skirt portion in combination with an upwardly extending integral skirt portion of a length substantially twice as long as the closure retaining member, placing said closure blank on an upper surface of the closure retaining member with its inwardly directed depending skirt portion surrounding and extending below said upper surface, and applying a downward pressure on the upper edge of said upwardly extending, relatively long skirt portion to progressively turn the skirt into substantial conformity with the closure retaining member until the upper edge of the aforesaid relatively long skirt portion is substantially in the plane of the closure blank diaphragm.

8. As a closure blank for affixation to a container, a metal shell having a diaphragm, a relatively short skirt portion depending from said diaphragm and a relatively long skirt portion including a container engaging portion extending immediately upwardly from said relatively short skirt portion.

9. As a closure blank for affixation to a container having closure retaining means thereon, a metal shell having a diaphragm, a relatively short skirt portion depending from said diaphragm, a skirt portion flaring upwardly from said relatively short skirt portion, and a straight skirt portion extending upwardly from said flaring skirt portion ending in a bead.



10. As a closure blank for affixation to a container having closure retaining means thereon, a metal shell having a diaphragm, a relatively short skirt portion depending from said diaphragm, a relatively long skirt portion including a portion adapted to engage said closure retaining means extending circumferentially upwardly from said diaphragm and immediately surrounding said depending skirt portion, and a liner retained within said relatively short skirt portion.

11. As an article of manufacture, a closure blank for affixation to a container having closure retaining means thereon, comprising a metal shell having a diaphragm, a relatively short skirt portion depending from said diaphragm, a relatively long skirt portion flaring upwardly from said relatively short skirt portion, and a relatively long straight skirt portion extending upwardly from said flaring skirt portion, and a liner retained within said relatively short skirt portion.

12. A closure blank suitable for conformation to a closure retaining member, said blank comprising a diaphragm having a relatively short depending skirt forming a recess with said diaphragm for receiving a liner, and a relatively long skirt coextensive with and immediately surrounding said short depending skirt and extending upwardly from said diaphragm, said relatively long skirt including a container engaging portion.

13. A closure blank suitable for conformation to a member having closure retaining instrumentalities thereon, said blank comprising a diaphragm having a relatively short inwardly directed skirt portion forming a recess with said diaphragm for receiving and retaining a liner, and a relatively long skirt coextensive with said short depending skirt and extending upwardly from said diaphragm, said relatively long skirt including a container engaging portion.

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