April 22, 1930. E. L. GREENEWALD 1,755,597

BOTTLE CAP, CONTAINER, AND OTHER REENFORCED PRODUCT

Filed March 17, 1924

FIG. 1

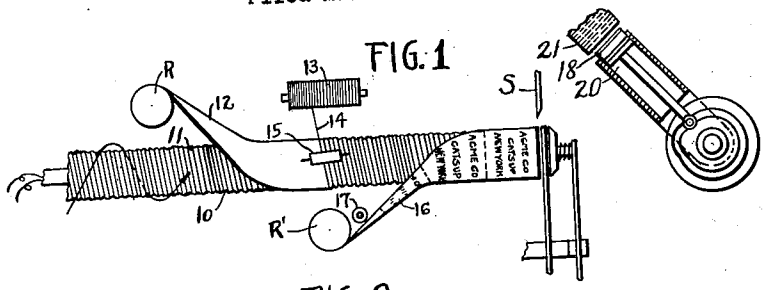


FIG. 9

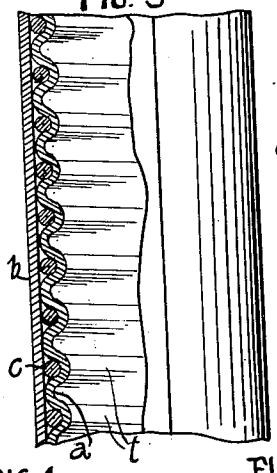


FIG. 2

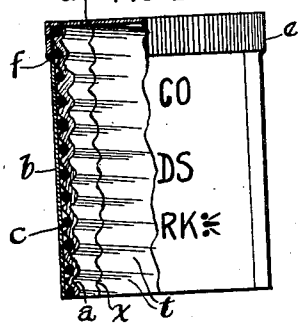


FIG. 3

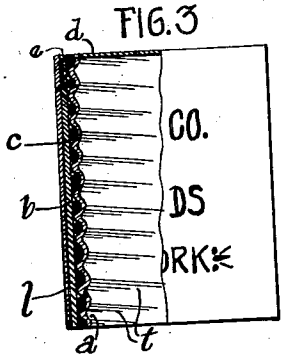


FIG. 4

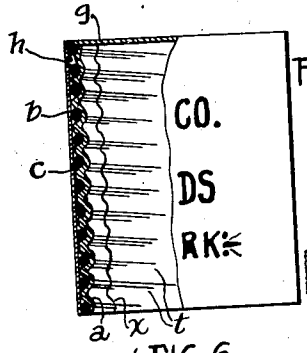


FIG. 5

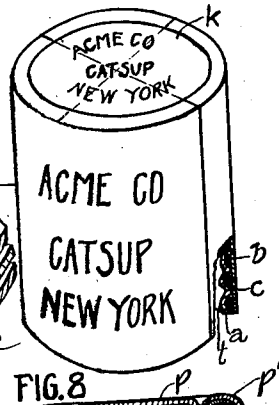


FIG. 11.

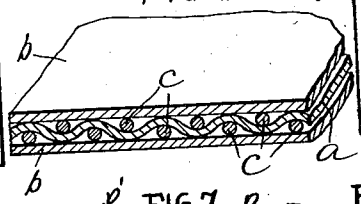


FIG. 6

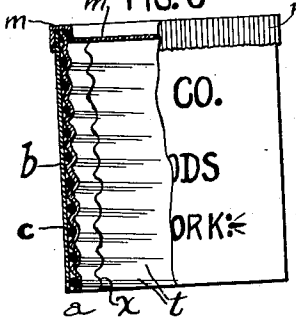


FIG. 7

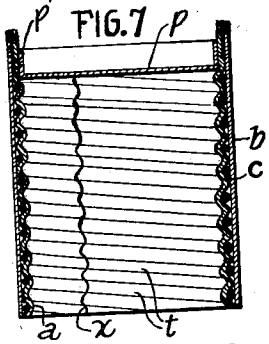
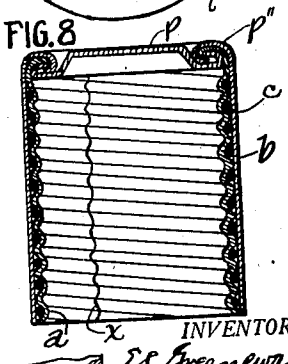
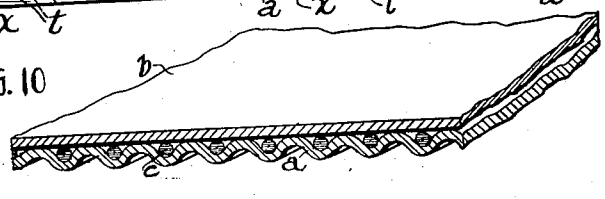


FIG. 8



INVENTOR.
E L Greenewald

FIG. 10



Patented Apr. 22, 1930 1,755,597

UNITED STATES PATENT OFFICE

EUGENE L. GREENEWALD, OF FLUSHING, NEW YORK

BOTTLE CAP, CONTAINER, AND OTHER REENFORCED PRODUCT

Application filed March 17, 1924. Serial No. 699,846.

This invention relates to closures, containers, tubing and the like, the principles of the invention being also applicable to other reenforced products, such as composite sheet material. This application is, in part, a division of my application Serial No. 263,327, filed Nov. 27, 1918; certain of the subject matter and claims herein being divided out of the said copending application.

One of the objects of this invention is to economically produce a satisfactory deep-skirt bottle cap made principally of paper that shall have a rigid interiorly threaded skirt or flange portion for engaging the usual thread on the neck of a bottle but that shall have a plain or substantially smooth outer cylindrical surface to present a pleasing appearance and adapted to carry printing or advertising.

Other important objects of this invention are to produce double corrugated and reenforced flat and tubular multi-play material, adapted for use as a container wall and for numerous other purposes.

Heretofore, deep-skirt bottle caps or closures, such as those employed on catsup and similar bottles, have been drawn from a single metal blank or formed from two metal blanks, and the container-engaging means or thread thereof has been rolled in the skirt or flange, leaving an exterior groove, which is somewhat unsightly and precludes printing matter on the exterior wall of the cap or closure, such as the name of the manufacturing company, its trade-mark, the name of the product and similar advertising, because the drawing and threading operations distort printing that is applied to the flat blanks. As herein disclosed, comparatively inexpensive closures may be made in which such printing may be applied to and effectively displayed by the vertical outer surface of the closure. The tubular wall of the closure and the interior thread thereof are greatly reenforced so that cheaper material, such as paper and thinner sheet metal, may be employed in the manufacture of the closure body without detracting from its effectiveness. The same principles may of course be applied to reenforcing tubular bodies generally, and may also be applied to the reenforcement of a continuous web or flexible sheet material, such as paper, fabric or thin metal, to provide single or multi-ply flat material having a permanently incorporated reenforcement, adapted for a variety of purposes.

The above and other objects and the novel features of the invention will be apparent from the following description taken in connection with the drawing, in which Fig. 1 is a diagrammatic view of one type of mechanism for making products such as bottle closures or containers embodying this invention; Figs. 2 to 8 are views illustrating bottle closures embodying this invention; Fig. 9 is a view of tubing embodying this invention; and Figs. 10 and 11 illustrate flat reenforced products embodying this invention.

The method and mechanism for making the improved products embodying this invention are more fully disclosed in application Serial No. 263,327, mentioned above. In the diagram of the machine in Fig. 1, the corrugated web-supporting surface comprises a rotatable mandrel 10 that has an exterior helical groove 11 of the same pitch as the threads of the bottles for which the closures are intended. The threaded tubular bodies of the closures may be made on the mandrel 10 in the form of a continuous internally threaded tube. A web 12 of paper or other suitable material may be drawn longitudinally from a roll R through a suitable former which forms the web into a tube around the mandrel in a well known manner. The web 12 is of sufficient width to completely encircle the mandrel and the edges thereof may overlap thus forming a longitudinally-seamed inner wall for the closure body. A spool 13 of flexible cord, wire or thread-forming member 14 is mounted so as to be bodily revoluble around the mandrel 10. The cord or member 14 is held under tension and laid on the web covering the mandrel as the spool revolves, thereby forcing portions of the plain tube into the helical thread-groove on the mandrel and forming a threaded tube which is fed axially toward the right as the mandrel rotates. The inner surface of the web 12 may be coated with paraffin and the mandrel may be heated to soften the par-

affin and reduce friction between the mandrel and tube as the latter is advanced. The mandrel is also tapered slightly toward its discharge end to lessen the tendency of the tube to stick. The cord may be further pressed into the groove by a roller 15.

A web 16 of paper or the like feeds from the roll R′ through a suitable former onto the inner tube to conceal the latter and the exterior threads and the cord or wire, which is preferably left in the groove formed thereby. The cord or member 14 thus initially forms an interior thread in the inner tube or wall and, when confined between the inner and outer walls, reenforces the multiple wall and also reenforces and sustains the interior threads of the tube and makes them more rigid and durable.

A suitable device 17 applies adhesive material to the inner surface of the web 16 to unite the inner and outer tubular walls and to fill the portions of the exterior groove not occupied by the cord 14. The longitudinal seam of the web 16 is desirably disposed opposite to the one of the web 12. The web 16 provides a smooth outer surface for the interiorly-threaded body and may carry printing or other decoration to enhance the appearance of the tube, closure or container made therefrom. The roll R′ may be printed or lithographed as desired before being applied to the inner wall 12. To produce a closure, a top or cover 18 of paper or metal may be made separately and applied at the proper time onto the end of the tube on the mandrel, as by a cam-operated plunger 20 that receives such tops from a magazine 21. After the top has been applied, the tube may be advanced a distance about equal to the depth of the closure or receptacle and then cut off by suitable severing means S. More than one web may be applied to form the inner or outer walls, depending on the thickness and rigidity desired. Other types of machines and methods for making tubing, closures or receptacles embodying this invention may be employed, as indicated in my aforesaid application.

A finished paper cap is illustrated in Fig. 2. The inner wall *a* has a longitudinal seam *x* and is threaded as at *t*. The cord or wire *c* lies in the exterior groove of the wall *a* and between the latter and the exterior wall *b* which is plane and smooth and lithographed to advertise the goods, as shown. The top *d* closes one end and has a depending flange *e* that is slightly knurled and inserted or squeezed into the outer wall *b* as at *f*. Sufficient pressure may be applied against the flange *e* to force it flush with the outer wall *b*.

The paper cap shown in Fig. 3 is similar in all essential respects to the one shown in Fig. 2, except that the strip forming the wall *b* is not lithographed but instead a lithographed or printed label *l* of the same height as the cap is pasted on the outside thereof to conceal the flange *e* of the cover part and increase the thickness of the flange of the cap. The printing on the caps will, of course, face the same direction as the labels on the bottles to which the caps are fitted.

Figure 4 illustrates still another cap embodying my invention in which the flange *h* of the top *g* is disposed between the inside and outside walls *a* and *b*, thereby forming a multiple-wall cap having a smooth exterior surface. Otherwise, this cap is similar to those shown in Figs. 2 and 3. In each of the caps the groove containing the cord is bridged by the wall adjacent thereto, thereby reenforcing the thread *t* in the inner wall. The cord *c* may also be of slightly greater diameter than the groove and sufficiently soft to be flattened out by the wall surrounding the same to more completely fill said groove.

Fig. 5 illustrates another form of closure or container embodying this invention. The body of this closure or container is formed as those already described and consists of two walls of paper, having non-coincident longitudinal seams, the inner wall having an interior thread reenforced by a winding of cord or wire that is confined between the two walls. The exterior wall is adhesively or otherwise secured to the inner wall and is substantially cylindrical and smooth and its outer surface carries printing or other suitable decoration. The end of the cap or container is closed by the folded portions at the ends of the tubular body. The overlapping folded portions may be adhesively or otherwise secured together or they may be covered by an adhesively coated disk *k* that has printing or decorating thereon for advertising.

As illustrated in Fig. 6, the end of a body threaded according to this invention may also be closed by securing or crimping a metal top part to an interiorly threaded tubular paper or metal body part. In this way a closure or container may be constructed which has a rigid metal head *m*, that may be provided with a depressed center *m′* and a knurled gripping edge *m″* thereby providing a more rigid cylindrical structure.

In another type of closure or container shown in Figs. 7 and 8, the same type of tubular body as shown in Fig. 9, may be employed and a cup-shaped metal head *p* may be inserted in one end of the body, with its upper edge *p′* slightly within the upper edge of the plies of the body. Both upper edges may then be spun inwardly, causing the metal edge to grip the upper edge of the body, as clearly shown in Fig. 8. The central portion of the top *p* may be forced outwardly flush with the upper roll edge *p″* thus produced.

It will be understood that the thread or bead may be rolled in the inner tubular body

a, in the known manner of rolling threads in metal tubes. The cord, wire or other reenforcement may then be wound or inserted in the exterior groove, after which the outer surface and reenforcement may be covered by another layer of paper, fibrous or other material, which may be secured to said outer surface adhesively or otherwise. For some purposes, the reenforcement may be omitted entirely, and after the thread has been formed or rolled in the tubular body, the outer wall may be cemented or otherwise secured to the apexes or crests of the exterior threads on the inner wall, thereby bridging the helical exterior groove that corresponds to the interior helical thread, thus forming struts which reenforce the multiply wall of the tubular body. The principles of this invention may be applied to the manufacture of flat composite and reenforced web or sheet material, as illustrated in Figs. 10 and 11, for example. The layers of flexible sheet material and the reenforcement therebetween may be of any desired composition and, as shown, desirably comprise an inner corrugated layer *a* of paper, cord or metal wire *c* in such corrugations and an outer layer *b* of flexible material, such as paper, covering such corrugations and the reenforcement therein.

I have also shown in Fig. 9 how tubular bodies may be helically corrugated or threaded and reenforced by a flexible strip or device such as a fibrous cord or metal wire *c* wound helically around one wall *a* and completely confined or embedded between two walls or plies *a* and *b* of the tube. Circular beads may be similarly formed in tubes and the like and reenforced by the bead-forming member that is embedded or confined in the body coextensive with the bead. In the manufacture of bottle caps and other reenforced products, the materials used for the plies and top may be paper or any suitable fibrous material, and, for some purposes, thin metal may be employed. As indicated, paper may be employed for the body of a cap and metal for the top; or the wall *a* may be of thin metal threaded and reenforced by a light wire, while the outer wall united thereto may be of paper carrying printing, and a top of metal or paper, desirably also printed, may be secured to the body. Heavier tubing of metal and other materials may be reenforced by winding wire or cable of any suitable size, helically around the outside thereof at a sufficient tension to force such wire or cable into the exterior surface of the tube while the same is supported on and moving along an exteriorly threaded mandrel. Such wire or cable reenforcement may be forced into the exterior wall of the tube by a pressure roller acting alone, or by both pressure roller and tension on the cable or wire, as indicated in Fig. 1, and an outer wall may be united thereto if desired to cover the threaded body and reenforcement. Such circumferentially reenforced metal tubing is useful in the manufacture of concrete piles, and has various other uses. The methods and means herein disclosed may likewise be employed for threading or beading tubes and rods, and, in its broader aspects, the threading or beading may be accomplished by moving the flexible cord or wire and the tube or rod relatively to one another, either being stationary or both being movable.

In its broader sense also, the principles of this invention may be advantageously applied to the manufacture of composite reenforced flat or curved material generally, in which a layer of sheet material such as a paper, fabric, or thin metal as a web is applied onto a stationary or movable and flat or curved corrugating support; whereupon such web is corrugated transversely of its length to produce corrugations in both of its faces, such web being simultaneously reenforced by permanently disposing a cord-like reenforcement in corrugations formed in the outer face of the web. Thereupon, a web or layer of paper or other material may be continuously applied to the said face and united thereto to conceal said reenforcement, further reenforce said material as a whole, and provide as substantially plain or smooth exterior surface thereon, which may carry printing or decorating. Such cord-like, metal wire or other reenforcement may, of course, be disposed lengthwise in part or all of the corrugations in both faces of the double-corrugated paper or sheet material layer *a* of Figs. 10 and 11, for example, to partially or entirely fill such corrugations as desired; and thereupon plain, smooth or other layers of paper or other sheet material may be cemented or otherwise secured to the opposite corrugated faces of the layer *a* to conceal the reenforcements in the corrugations as well as the latter, and further stiffen and reenforce the layer *a* and the resulting product. Other changes in materials and forms may be adopted without departing from the principles of the inventions herein disclosed or sacrificing the advantages thereof.

I claim:

1. A tubular body having corrugations extending circumferentially thereof, and sheet material permanently united to the crests of said corrugations and reenforcing the latter.

2. A tubular body having circumferentially extending corrugations and a winding permanently united to and reenforcing said corrugations.

3. A tubular body comprising adjoining layers of sheet material permanently secured together, one of said layers having a helical corrugation, and a continuous reenforcement winding in said corrugation and confined between said layers.

4. A corrugated tubular body of fibrous

material having its corrugations occupied by reenforcing means and bridged by a reenforcing member permanently united to the crests of said corrugations.

5. A multi-ply tubular body comprising concentric plies of permanently united sheet material, one of which is corrugated, and reenforcing means in corrugations of such corrugated ply and confined between the latter and an adjacent ply.

6. A device comprising a tubular wall having a bead reenforced by a winding permanently confined between the inside and outside faces of said wall and coextensive with said bead.

7. A device comprising a tubular body of paper or fibrous material having a thread reenforced by means confined within the wall of said body.

8. A receptacle, closure or the like having a threaded tubular wall comprising multiply fibrous material having a reenforcement embedded therein and coextensive with the thread on said wall.

9. A container closure having a cylindrical wall of fibrous material formed to provide integral container-engaging means on one face of said wall, and means embedded within said wall and reenforcing said container-engaging means.

10. A receptacle, closure or the like having a tubular wall of fibrous material provided with an interior thread and a substantially plain exterior surface adapted to carry printing.

11. A bottle cap comprising a cylindrical inner paper wall provided with an interior thread, a cylindrical outer wall of sheet material permanently secured to the outer side of the inner wall and reenforcing the thread thereof.

12. A closure comprising a tubular body having an inner wall of fibrous material provided with an interior helical thread and an exterior groove corresponding to said thread, reenforcing means disposed in said groove, a wall of fibrous material secured to the outside of said inner wall to cover said groove and the reenforcing means therein; and means closing one end of said body.

13. A bottle cap comprising a cylindrical paper body part having an inner wall provided with a helical groove an interior screw thread, and a plain outer wall surrounding the screw-threaded portion of said inner wall and reenforcing the same, and reenforcing material confined in the helical groove between the inner and outer walls.

14. A receptacle, closure or the like having a cylindrical multi-ply body of fibrous material provided with a reenforced screw-threaded portion.

15. A bottle cap comprising a body having an interiorly-threaded tubular inner wall, a winding disposed in the exterior groove corresponding to said interior thread, an outer wall covering the exterior surface of said inner wall and the winding surrounding the same, and means closing one end of the body.

16. A bottle closure comprising a cylindrical body part having an inner wall of sheet material provided with container-engaging means and an outer wall of sheet material surrounding the inner wall and having a plain exterior surface, the inner surface of the outer wall being permanently united to the inner wall.

17. A bottle cap comprising a cylindrical body consisting of a plurality of thicknesses of sheet material permanently united together, container-engaging means adjacent one end of said body, and a separately formed cover part secured to and closing the opposite end of said body.

18. A bottle cap of fibrous material comprising a cylindrical inner wall of paper or fibrous material having an interior helical thread and an exterior groove corresponding to said thread, a fibrous reenforcing member disposed in said groove, an outer wall of paper or fibrous material secured to the outside of said inner wall and bridging the said groove therein and covering said reenforcing member whereby said thread and the cap are reenforced, and fibrous means closing one end of the body of the cap.

19. A closure comprising an interiorly threaded self-sustaining tubular body of fibrous material, and a separately-formed metallic top part permanently secured to said body.

20. A closure comprising an interiorly threaded tubular body part having a top comprising inwardly-folded portions integral with and substantially closing one end of said body.

21. A paper closure for containers comprising a skirt having a substantially plain cylindrical exterior surface adapted to carry printing or advertising, and means whereby said closure may be readily secured to and readily detached from a container.

22. A closure comprising a cylindrical body of fibrous material provided with a reenforced screw-threaded portion and also having a top part secured to said body and provided with a corrugated portion forming a grip on said closure.

23. A closure for containers having a top and a depending threaded skirt and carrying printing or advertising on the exterior surfaces of both the top and skirt.

24. An internally threaded bottle cap having a plain cylindrical exterior surface carrying printing or advertising.

25. A composite body comprising a corrugated layer of sheet material, reenforcing means in corrugations of said layer, and a layer of sheet material secured to said cor-

rugated layer and covering said reenforcing means.

26. A composite body comprising a corrugated layer of flexible material, cord like reenforcing means in corrugations of said layer, and a layer of flexible material secured to said corrugated layer and covering said reenforcing means.

27. A composite body comprising a corrugated layer of paper, flexible reenforcing means in the corrugations of said layer, and a layer of fibrous material secured to said corrugated layer and concealing said reenforcing means.

28. A composite body comprising a layer of corrugated paper, fibrous reenforcing means in the corrugations of said layer, and a layer of paper secured to such corrugated layer and concealing said reenforcing means.

29. A composite tubular body comprising a helically corrugated layer of sheet material, reenforcing means extending helically of said body and disposed in such helical corrugation, and a layer of sheet material secured to said corrugated layer and covering said reenforcing means.

30. A composite tubular body comprising a helically corrugated layer of paper, a fibrous cord extending helically of said body and disposed in such helical corrugation, and a layer of paper secured to said corrugated layer and covering said cord.

31. A closure or receptacle comprising a tubular body consisting of a helically corrugated layer of sheet material, a cord-like reenforcing member disposed in such helical corrugation, and a layer of sheet material secured to said corrugated layer and covering said reenforcing member.

32. A reenforced product comprising a layer of flexible sheet material corrugated to provide corrugations in both of its faces, and cord-like reenforcement means disposed in and extending lengthwise of the corrugations in one of said faces.

33. A reenforced product comprising a layer of sheet material corrugated to provide corrugations in both of its faces, and cord-like reenforcement means disposed in and extending lengthwise of corrugations in both of said faces.

34. A reenforced product comprising a layer of sheet material corrugated to provide corrugations in both of said faces, reenforcements in said corrugations and layers of sheet material secured to the opposite faces of such corrugated layer to conceal such reenforcements and further reenforce said product.

35. A reenforced product comprising a layer of paper corrugated to provide corrugations in both of its faces, cord-like reenforcement means disposed in and extending lengthwise of corrugations in both of said faces, and layers of sheet material secured to the opposite faces of such corrugated layer to conceal such reenforcements and further reenforce said product.

36. A composite reenforced product comprising a layer of sheet material corrugated to provide corrugations in both of its faces, a layer of sheet material permanently secured to one face of said corrugated layer, and reenforcing means disposed in the corrugations of said face between said layers.

37. A composite reenforced product comprising a corrugated layer of sheet material having corrugations in both of its faces, a plain layer of sheet material secured to one face of said corrugated layer, and strip reenforcing means disposed in the corrugations of said face between said layers.

38. A composite reenforced product comprising a corrugated layer of paper having corrugations in both of its faces, a plain layer of paper secured to one face of said corrugated layer, and cord-like reenforcing means disposed in the corrugations of said face between said layers.

39. A composite reenforced product comprising a layer of sheet material corrugated to provide corrugations in both of its faces, reenforcing wires disposed in and extending lengthwise of corrugations in at least one of said faces, and layers of sheet material secured to the opposite faces of such corrugated layer to conceal such wires and further reenforce said product.

40. A container closure having a skirt comprising a substantially plain exterior surface carrying printing or advertising, and means on said closure for coupling the same to a container.

41. A sheet of material having corrugations in its opposite faces, and cord-like means disposed in and extending lengthwise of corrugations in both faces to reenforce said sheet.

42. A sheet of paper having corrugations in its opposite faces, and cord-like means disposed in and extending lengthwise of corrugations in both of said faces to reenforce said sheet.

43. A container closure having a skirt comprising a substantially plain cylindrical exterior surface carrying undistorted printing, said closure being readily attachable to and readily detachable from a container, and such printing being visible when said closure is attached to a container.

In testimony whereof, I affix my signature.

EUGENE L. GREENEWALD.