Jan. 4, 1938. R. D. HEYMANN 2,104,344

CLOSURE FOR FIBER CONTAINERS

Filed Feb. 2, 1935

Fig. 1

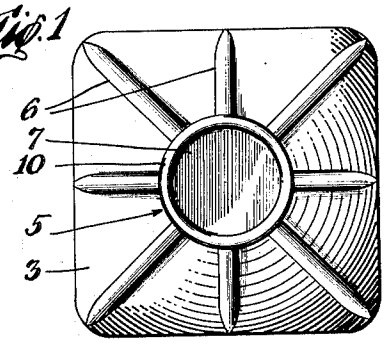


Fig. 3

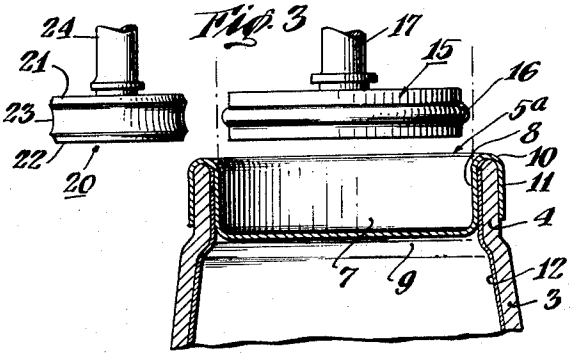


Fig. 2

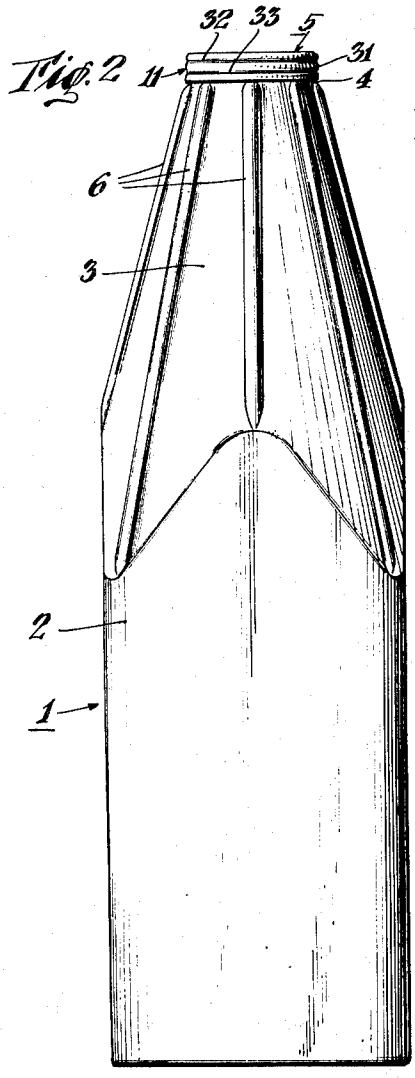


Fig. 4

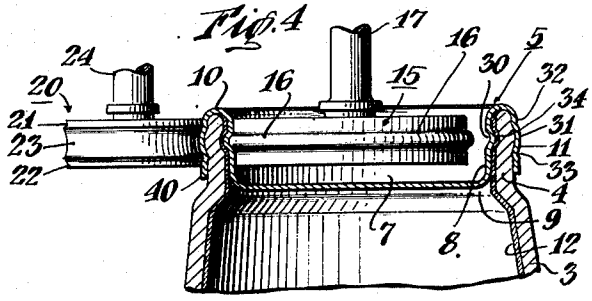


Fig. 5

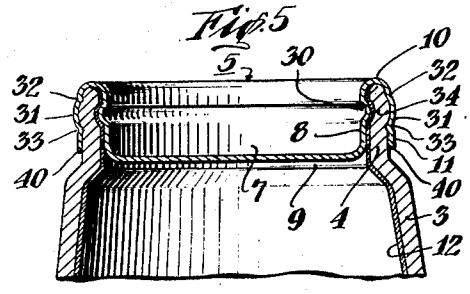
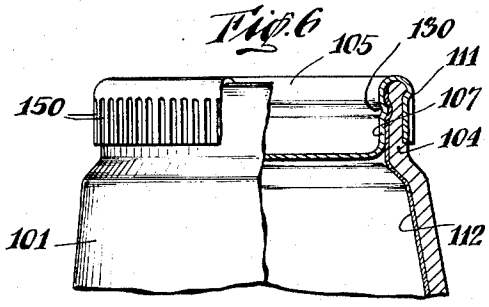


Fig. 6



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CLOSURE FOR FIBER CONTAINERS

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Application February 2, 1935, Serial No. 4,688

3 Claims. (Cl. 229—5.5)

This invention relates to closures and particularly to metallic, sealing closures for fibrous receptacles. More specifically, the invention relates to a one-piece metallic cap for a moulded pulp receptacle, so secured on the receptacle that it cannot be removed therefrom without substantial destruction of the receptacle.

Where materials are dispensed in portable receptacles, it is often desirable to close such receptacles with a non-replaceable, sealing closure which is easily and inexpensively secured on the receptacle by a simple machine operation which simultaneously secures the closure to the receptacle and forms a liquid-tight seal for preventing the escape of the material contained therein. The use of such a closure for all practical purposes prevents the refilling of the receptacle and insures against its unauthorized use in the dispensing of substitute materials. This type of receptacle is in considerable demand in the distribution of commodities, such as motor oils, prepared for retail sales in relatively small containers. As is well known, there is an increasing tendency of dishonest persons to supply substitute and adulterated brands in receptacles which originally contained genuine brands.

The present invention contemplates a sealing closure for the mouth of a fibrous receptacle, which closure takes the form of a one-piece metal cap formed by a simple machine operation, as for example, die pressing or stamping and is secured to the receptacle by a forming operation, or operations, such as spinning, crimping, knurling, die pressing or the like to squeeze the wall of the receptacle between cooperating portions of the cap which are distorted to indent the wall of the receptacle and constitute a liquid-tight seal without cutting into the wall. The cap has a channel or groove adapted to receive the lips of the receptacle mouth and the walls of this channel are pinched against the adjacent portion of the receptacle in such a manner that the indenting of the wall of the receptacle by the cap locks the cap on and thus prevents removal of the cap from the receptacle, except by destruction of the portion of the receptacle engaged by the cap.

Thus the invention provides a simple and inexpensive sealing closure for a fibrous receptacle, which closure can be readily secured in position on the receptacle, but cannot be removed without mutilating the receptacle to a degree which renders it unfit for further practical use; and, hence, lends itself admirably in checking the undesirable practices heretofore mentioned.

Although the novel features which are believed to be characteristic of this invention will be particularly pointed out in the claims appended hereto, the invention itself, as to its objects and advantages, and the manner in which it may be carried out, may be better understood by referring to the following description taken in connection with the accompanying drawing forming a part thereof, in which

Figs. 1 and 2 are top plan and elevational views respectively showing a receptacle constructed according to the teachings of the present invention;

Fig. 3 is an enlarged fragmentary view partially in cross-section, showing the blank cap in position on the receptacle, and the forming apparatus in preliminary position;

Fig. 4 is a view similar to Fig. 2 showing the position assumed by members of the forming apparatus during the sealing operation;

Fig. 5 is a view showing the cap sealed on the receptacle; and

Fig. 6 is a view, partially in cross-section, showing a modified form of sealing the cap.

Referring now to the drawing, there is shown in Fig. 1 a receptacle or bottle 1, formed of moulded pulp and having a body portion 2 of rectangular cross-section, a reduced portion or neck 3 having the form of a truncated cone, and a substantially cylindrical portion or spout 4 provided with an open mouth 9. A metal closure or cap 5 is disposed on the spout 4 and secured thereto in a manner hereinafter described. The neck 3 is formed with a plurality of strengthening ribs 6 formed integrally with the neck 3 extending longitudinally thereof. When the receptacle 1 is to be used to contain liquids, a suitable liquid-impervious coating may be applied to the inner faces of the receptacle wall, as indicated at 12 (see Fig. 5).

In the assembly operation, the cap 5, in its preliminary form, hereinafter referred to as the "blank 5a", is inserted into the mouth of the receptacle 1, as shown in Fig. 3. The blank 5a has a cupped portion 7 with a side wall portion 8 snugly fitted in the mouth 9 of the receptacle, a reversely bent rim portion 10 turned over the lip of the spout 4, and a depending skirt portion 11, extending along the outer face of the spout 4. The side wall portion 8, the rim portion 10 and the skirt portion 11 thus constitute a channel which receives the lip portion of the spout 4.

For the purpose of facilitating description of the manner in which the blank 5a is given a forming operation to secure it in the receptacle,

the spinning or crimping apparatus is shown more or less diagrammatically. A roller 15 having a peripheral bead or flange 16, and suitably supported by a spindle 17, is arranged in alignment with the cap 5 and adapted for insertion in the cupped portion 7 of the cap 5. As indicated by the dotted lines, the external diameter of the flange 16 is slightly less (for example, one-sixteenth of an inch) than the internal diameter of the side portion 8 of the blank cap in order to permit the roller 15 to be withdrawn from the cap 5 after the forming operation has been completed. A second roller 20 having a pair of spaced beads or flanges 21, 22 and a groove 23 between the flanges 21, 22 is suitably supported adjacent the first roller 15 by a spindle 24 and is adapted to engage the skirt portion 11 when the other roller 15 is in the cupped portion 7 to cooperate with the latter in spinning the blank 5a into the receptacle.

The blank 5a is simultaneously given its final form and secured in sealing relation to the receptacle by a crimping operation, which, in the embodiment of the invention illustrated in Figs. 1–4, is accomplished by spinning the metal from which the cap is formed. In this operation the roller 15 is introduced into the cupped portion of the blank 5a, and the rollers 15 and 20 moved toward one another by a suitable mechanism (not shown) to engage respectively the side wall portion 8 and the skirt portion 11. The rollers 15, 20 are then simultaneously rotated and further moved toward one another to squeeze the spout 4 of the receptacle between the side portion wall 8 and the skirt portion 11, and simultaneously to impart to the blank 5a and the receptacle 1 the shapes shown in Fig. 4. The rotation of the rollers in engagement with the blank 5a is in effect a spinning operation wherein the rollers 15, 20 effect a cold-working of the blank 5a and impart to it the final shape shown in Fig. 5.

This operation forms an outwardly convex corrugation 30 or bead in the side wall portion 8, and a corresponding outwardly convex corrugation 31 in the skirt portion 11 which latter corrugation 31 is in nesting alignment with the corrugation 30. This operation also forms in the skirt two inwardly convex corrugations or ribs 32, 33, lying on either side of the corrugation 31.

The spinning operation causes the material of the side wall 8 and the skirt portion 11 to be indented into the material of the spout 4 to distort the material without breaking the surface of the latter, thus a corrugation 34 is formed in the material of the spout 4 which serves to securely lock the cap on the receptacle, and at the same time to provide a liquid-tight seal therebetween.

Flange 22 of the roller 20 is so shaped and positioned that it spins the edge portion 40 of the skirt portion 11 flat against the outer wall of the spout 4, and hence the roller 20 does not force the edge portion 40 into the material of the spout 4 and the surface thereof is not cut into or broken by the edge 40 of the skirt portion 11. The cutting of the wall of the spout 4 by the edge of the skirt may be further prevented by providing a slight outward roll, or burr, on the edge of the skirt portion when the blank is formed.

The crimping apparatus (shown in part only) is adapted to force the cap down against the receptacle so that the lip of the spout portion of the receptacle fills the channel of the cap. When the cap is spun the spout is squeezed between the side wall and the skirt and completely fills and is compressed by the walls bounding the channel, thus the locking of the cap onto the receptacle is further insured.

It will be understood that the crimping or rolling apparatus hereinbefore described is set forth by way of description and not limitation, as it will become apparent that other forms of apparatus may be adapted to perform the sealing operations.

In Fig. 6 a modified form of the invention is shown illustrating another way of crimping the skirt. In this modification the internal rib 130 is formed in the side wall 107, to indent the spout 104 of the receptacle 101 in a manner similar to that heretofore described. The crimping of the skirt 111 is effected by a knurling operation which provides a series of circumferentially disposed vertical corrugations or ribs 150 which indent the material of the spout 103 without breaking the surface of the same.

Other styles of crimping the skirt portion of the cap can be employed without departing from the spirit of the invention. It is within the contemplation of the invention to crimp or roll the skirt of the cap in any suitable manner such that the crimping of the skirt cooperates with the internal corrugation of the cap to pinch the material of the spout between the side wall of the cap and the skirt portion of the cap without causing a breaking of the surface of the material.

In selecting a metal for forming the cap, the proper thickness of sheet metal must be determined because if the sheet is too heavy too much temper is imparted to the metal by the crimping or rolling action. Hence, unless the metal is of proper thickness, difficulty arises in practice in crimping the cap, inasmuch as a splitting is likely to result if the metal is too heavy and, if too thin, the cap will not be sufficiently rigid. One form of cap which is suitable for an oil bottle may be of bright iron plate approximately 0.007 inch in thickness. This has been found suitable for a cap having the following specifications: a cup portion measuring $\frac{5}{16}$ inch from the inside bottom of the cup to the uppermost portion of the rim 10, and an outside diameter of 1.394 inches–1.400 inches; the distance from the uppermost portion of the rim to the end of the skirt 11 measures ¼ inch. Such a cap has the proper temper for crimping, produces a rigid structure when sealed on the bottle, and does not crack or split.

After the cap has been secured to the receptacle it can be removed by simply tearing the neck of the receptacle adjacent the juncture of the neck and the spout. The cap cannot, however, be removed without causing substantial mutilation of the receptacle. Referring to Fig. 4, it will be seen that the external diameter of the corrugation 30 is greater than the diameter of the portion of the side wall 8 lying above the corrugation and that the diameter of the portion of the skirt portion 11 lying below the corrugation 31 is less than the external diameter of the corrugation 31. Thus the cap 5 is locked against displacement in a direction parallel to the axis of the spout portion 4 and thus cannot be removed without causing destruction of the material of the receptacle. The ribs 6 provide sufficient reinforcing of the neck so that the receptacle will normally tear only at the spout

portion, thus a small and substantially smooth edged orifice will be provided for pouring from the receptacle the material contained therein.

Although the neck may readily be torn to permit the contents of the receptacle to be expelled, the portion of the spout engaged by the cap is actually strengthened and supported thus permitting the receptacle to be picked up and carried about by the neck or spout without damage to or distortion thereof.

It will be seen from the foregoing that the present invention provides a simple, inexpensive and positive means for closing a receptacle formed of compressible material, which closure is self-securing, and cannot be removed without mutilation of the receptacle and which is so secured to the receptacle that it strengthens and supports that portion of the receptacle to which it is secured.

While certain novel features of the invention have been disclosed and are pointed out in the annexed claims, it will be understood that various omissions, substitutions and changes may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. The combination with a moulded pulp container having an open mouth, a metal closure comprising a cupped portion fitted in the mouth of the receptacle with the side wall of the cupped portion engaging the inner face of the receptacle, a rim overlying the edge of the mouth, and a flange extending from said rim and engaging the outer face of the receptacle and forming a channel with said side wall and rim portions, said side wall of the cupped portion and said flange having outwardly convex, continuous corrugations arranged in nesting alignment and indenting the adjacent wall of the receptacle outwardly, the corrugation in the flange having the greater cross-sectional radius whereby the material forming the wall of the container is stressed uniformly between said side wall and flange.

2. The combination with a moulded pulp container having an open mouth, of a cupped metal closure therefor comprising a cupped portion snugly fitted in the mouth, a rim portion overlying the edge of the mouth, and a skirt extending from said rim and lying against the outside of the receptacle, the side wall of the cupped portion and the skirt having outwardly convex, continuous corrugations engaging and distorting the inner and outer faces of the receptacle respectively, said side wall and skirt having corrugations similar and approximately concentric as to said cross-sectional radius, the corrugation in said skirt having the greater radius whereby said side wall and skirt grip the container wall to lock the closure on the receptacle with substantially uniform compression thereon.

3. The combination with a moulded pulp container having an open mouth, of a metal closure comprising a cupped portion fitted in the mouth of the receptacle with the side wall of the cupped portion engaging the inner face of the receptacle, a rim overlying the edge of the mouth, and a flange extending from said rim and engaging the outer face of the receptacle, said side wall having an outwardly convex, continuous corrugation indenting the adjacent wall of the receptacle outwardly and said flange having a corrugation similar to but of greater cross-sectional radius than said first corrugation, said second corrugation being approximately concentric as to said cross-sectional radius with said first corrugation, whereby to lock the closure on the receptacle with substantially uniform compression on the portion engaged by said side wall and said flange.

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