Aug. 8, 1939. J. C. GIBBS 2,168,565

CLOSURE CAP AND METHOD OF MAKING

Filed March 17, 1936

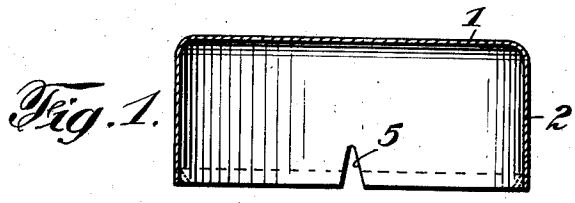


Fig. 1.

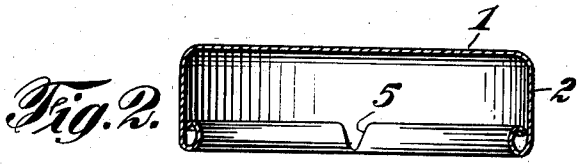


Fig. 2.

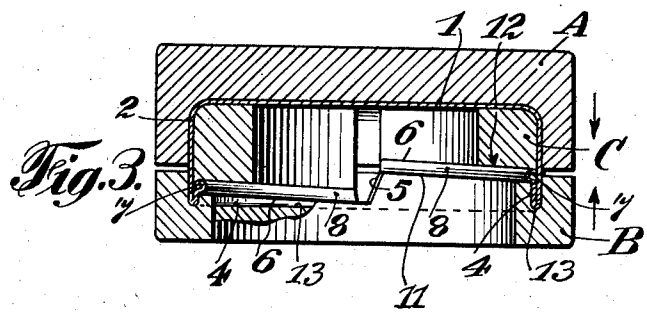


Fig. 3.

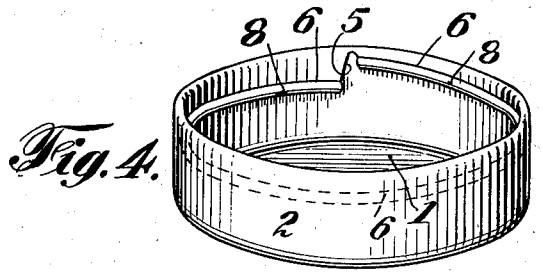


Fig. 4.

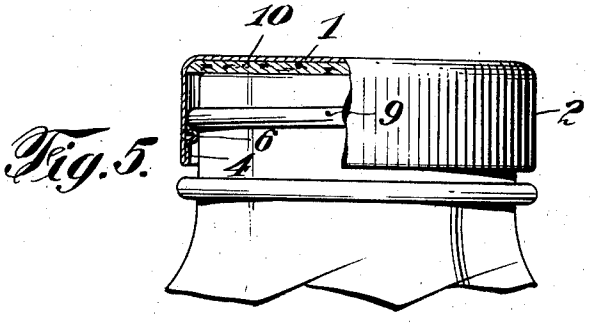


Fig. 5.

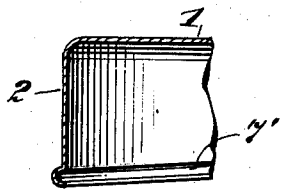


Fig. 6.

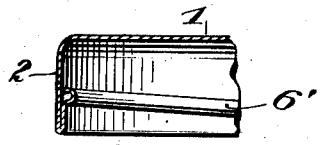


Fig. 7.

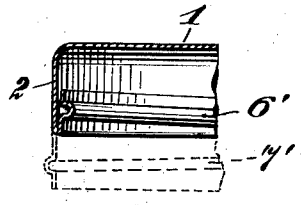


Fig. 8.

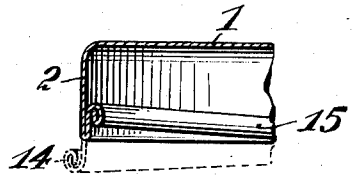


Fig. 9.

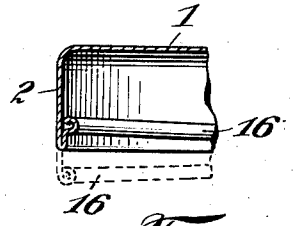


Fig. 10.

INVENTOR
John C. Gibbs
BY
Norman V. Holland
his ATTORNEY

Patented Aug. 8, 1939 2,168,565

UNITED STATES PATENT OFFICE

2,168,565

CLOSURE CAP AND METHOD OF MAKING

John C. Gibbs, Brooklyn, N. Y., assignor to Anchor Cap & Closure Corporation, Long Island City, N. Y., a corporation of New York

Application March 17, 1936, Serial No. 69,286

3 Claims. (Cl. 113—121)

The present invention relates to the production of closure caps and more particularly to screw closure caps and an improved method of making such caps.

Packers and bottlers are greatly interested in the appearance of their packages, which may be impaired or enhanced by the closure cap used for sealing the packages. Packages, are, for the most part, purchased by housewives, who are guided in their purchases to a considerable extent by the attractiveness or beauty of the package. Various attempts have been made to obtain caps which are attractive in appearance. Closure caps molded of phenolic condensation products and other synthetic resins or molding compounds have become quite popular due to their attractiveness. This popularity was attained in spite of the fact that the closures do not form a better seal, are more expensive, and are subject to breakage because of their frangible nature. Various attempts have been made to make metal caps which would have the attractiveness of molded caps without the disadvantages. One solution was to utilize two nested metal caps, the inner cap serving as the sealing cap and the outer cap as a cover cap or shell to conceal the screw threads or container engaging means and other irregularities of the inner cap. Such caps are subject to the objection of increased cost, due to the extra closure or cover cap, and due to the extra operations necessary in manufacturing and assembling the caps. In addition, occasionally the two closures rotate with respect to each other, which prevents the cap from being unscrewed from a container and properly applied to form a seal. Plain skirted caps have also been made by turning the edge of the cap inwardly and forming lugs or short thread projections from the inturned edge or bead. The method of manufacturing such caps increases the cost. In addition, such caps cannot be applied to a container provided with a continuous thread finish. The latter finish is more prevalent and is frequently demanded by the packer or bottler for certain types of packages.

The present invention aims to provide an inexpensive closure cap adapted to fit on a continuous thread finish having the advantages of molded and double shell caps without having the disadvantages of either. The invention aims further to provide an inexpensive practical method of making the caps, which decreases their cost and improves their appearance by eliminating excessive strains and drawing operations on the metal in forming the cap.

An object of the present invention is to provide an improved method of making screw caps.

Another object of the invention is to provide an inexpensive metal cap having a plain skirt with concealed threads on the interior thereof.

Another object of the invention is to provide an improved method for forming thread engaging means on the inside of the cap without reforming the exterior thereof.

Another object of the invention is to reduce the cost of manufacturing metal screw caps having a plain skirt.

Another object of the invention is to provide a practical method of making screw caps having a concealed thread.

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 drawing, forming a part of the specification, wherein—

Fig. 1 is a sectional view illustrating a blank after it is stamped from a sheet of metal, which is the first step of forming the cap;

Fig. 2 is a sectional view illustrating the second step of a method of forming the cap;

Fig. 3 is a sectional view illustrating the third step in forming the cap;

Fig. 4 is a perspective view illustrating a completed cap;

Fig. 5 is a fragmentary side elevational view, partly in section, of a glass container with the cap shown in Fig. 4 sealed thereon;

Fig. 6 is a sectional view illustrating the second step in another method of forming a cap;

Fig. 7 is a fragmentary sectional view of a cap finished from the blank shown in Fig. 6;

Fig. 8 is a fragmentary sectional view of a finished cap, the shape of the blank after the second step of manufacture being indicated in dotted lines;

Fig. 9 is a fragmentary sectional view of a cap illustrating another embodiment of the invention, the shape of the blank after the second step of manufacture being indicated in dotted lines; and

Fig. 10 is a fragmentary sectional view of a cap illustrating still another embodiment of the invention, the shape of the blank after the second step being shown in dotted lines.

Referring again to the drawing, and more particularly to Figs. 4 and 5 thereof, there is shown a closure cap made of sheet metal such as tinplate, aluminum or the like, having a cover portion 1 and a depending skirt or flange 2. The lower edge of the skirt has a slit or slot 5 therein and is turned inwardly and upwardly, as shown at 4. The slot 5 is provided to facilitate the formation of the skirt of the cap and particularly the folding of the lower edge thereof. A screw

thread 6 is formed in the inturned part 4 of the skirt by a groove 7 having a convex surface 8 facing inwardly toward the center of the cap. It will be understood, of course, that the thread can also be made by having the concave surface of the groove on the interior of the cap. Preferably, the thread 6 begins and ends at the slot 5. In other words, the end of the thread nearest the bottom of the skirt 2 is on one side of the slot 5 and the end of the thread furthest from the bottom of the skirt is on the other side of the slot 5. Preferably, the slot 5 is of sufficient depth to facilitate the manufacturing operation in turning the skirt part 4 into the cap but not sufficient to be visible from the exterior of the cap. In this way, the raw edge formed by cutting the slot is concealed within the skirt of the cap and the lower edge of the skirt of the finished cap is smooth and unmarked.

In Fig. 5 the cap illustrated in Fig. 4 is shown sealed to a container having a continuous thread 9. The thread 6 of the cap fits under the thread 9 of the container to hold the cap on the container and to compress a sealing liner 10 between the cover of the cap and the rim of the container. The liner is usually assembled with the cap and may be made of cardboard, cork, rubber, or the various other types of sealing material. It may also be in the form of a ring of similar material, if desired, the function thereof being to form a liquid-tight or hermetic seal. The cap is screwed on the container in the same manner as other types of screw caps. The exterior of the cap, however, is preferably plain, with the screw thread 6 invisible, as shown. It will be understood, however, that the cover of the cap or skirt may be shaped to conform to the taste of the purchaser or manufacturer. Such shaping of the skirt may be independent of and free from the deformation necessary in the formation of the thread.

A method of forming the closure described above is illustrated in Figs. 1 to 4. The blank shown in Fig. 1 may be stamped from a sheet of decorated metal and the slot 5 may be formed simultaneously therein by the same operation. The length of the skirt may be uniform throughout the circumference or as in the embodiment described hereinafter it may be of a varying length. In the second step, the lower portion of the skirt is turned upwardly and inwardly into the cap to form a hollow bead, as shown in Fig. 2. This may be accomplished in any suitable manner, for example, by a curling or a rolling operation, but the former is preferred. If desired, the lower edge of the skirt may be bent inwardly slightly prior to the second operation as shown in dotted lines in Fig. 1 to facilitate the rolling or curling operation. Thereafter, in the third step, as shown in Fig. 3, the bottom portion 4 of the skirt 2 forming the bead is reformed to provide the groove 7. The die members in Fig. 3 are shown applied to a cap with the cap in its upright position. In normal manufacturing operations, the cap would preferably be in inverted or edgewise position and the position of the dies changed accordingly. Preferably, the third step is performed by placing the cap blank into a cup-shaped die A conforming to the outer contour of the cap and engaging die B having a helical portion 11 thereon adapted to push portions of the bead upwardly and outwardly against the skirt to reform the bead into a thread. While the die B is applied to the bead, a suitable anvil member C is held in the upper part of the cap to support the upper convex edge 8 of the bead. The anvil C preferably is in the form of an expandible chuck comprising several segments adapted to be expanded against the inner walls of the skirt and to be contracted for inserting and withdrawing the chuck past the thread portions. The lower edge of the anvil chuck C is provided with helical portions 12 corresponding to the helical thread forming portions of the die member B. The helical portions of the dies B and C determine the inclination of the thread and the position of the thread with respect to the lower edge of the skirt. The die B preferably has a groove 13 therein adapted to receive the lower edge of the skirt to maintain the shape of the lower edge and press the lower portions of the upwardly folded bead against the inner side of the skirt. In this manner both the outer skirt portion and the inturned part 4 are rigidly supported and reinforced and the groove 7 is positioned in the interior of the skirt to provide the thread 6.

The slit 5 plays an important function in the method and in the resulting cap in that it permits the inturned portion 4 to be folded inwardly and upwardly by a bending or folding operation. Without the slit 5, it would be necessary for the lower edge of the cap to be compressed during the reforming operation. During such compression there is a tendency for the metal to wrinkle and the operation is otherwise difficult and expensive. The present closure may be formed by a simple bending operation which minimizes the strain on the metal and which does not impair the lacquer. The operation is sufficiently simple so that the groove or thread, if desired, may be formed in the blank before the metal is turned inwardly, as illustrated in Figs. 6 to 10. While the die members A and B and the chuck C are illustrated diagrammatically, it will be understood that they may be in any desired form and are adapted to be associated with any desired automatic cap fabricating machine.

The cap shown in Fig. 7 is similar to the one shown in Fig. 4 and may be made by a similar method. The helix angle of the thread 6 is obtained by making the skirt of the blank of uneven length, preferably the bottom of the skirt being in the form of a spiral conforming to the helix angle of the thread desired. A groove 7' is then formed, as shown in Fig. 6 at the bottom of the skirt which has a spiral formation so that the convex side of the groove, when turned into the cap as shown in Fig. 7 will form a thread 6' of the proper helix angle. Preferably, the formation of the groove 7' is uniform throughout its length. In Fig. 7 the lower edge of the skirt is shown folded into the cap so that the thread extends radially inwardly from the inner side of the skirt. This operation may be accomplished by a suitable curling die B while a chuck C is utilized to support the upper edge of the thread. This last step is very desirable to control the accuracy of the thread and insure formation of a thread within prescribed tolerances, but may be omitted. It will be understood also that the cap shown in Fig. 7 may be made by the method illustrated in Figs. 1, 2 and 3.

The cap shown in Fig. 8 may be formed from a blank of uniform length and the groove 7' may be rolled into the blank as shown in dotted lines in Fig. 8 before the edge is folded inwardly and upwardly. The groove, at the time of the formation, has the proper helix angle to form a suitable thread 6' when it is turned in.

The cap shown in Fig. 9 is preferably formed from a blank having a skirt cut at a helix angle corresponding substantially to the helix angle of the thread on the container, and the lower edge of the skirt of the blank is rolled outwardly and upwardly into a wire edge 14, as shown in dotted lines in Fig. 9. Thereafter, the bottom of the skirt is folded inwardly as shown at 15, with the wire edge 14 forming the thread for the cap. With the aid of the notch or slit 5 in the skirt of the cap, the lower edge of the skirt having the wire edge formed on it may be folded into the interior of the skirt without difficulty. It will be understood that the plurality of notches similar to the notch 5 may be utilized, if desired.

In Fig. 10 the formation of the cap is similar to that in Fig. 9 except that the lower edge of the blank is rolled inwardly into a bead 16 on a helix angle and thereafter the entire bottom part 4 of the skirt is folded upwardly into the cap to provide a thread. The rolling inwardly of the bead is a more difficult operation than rolling outwardly, but it may be advantageous in certain cases. In the formation of the caps of Figs. 9 and 10, the skirt of the blank may, if desired, be of uniform length and the helix angle may be obtained by rolling the rolled edge on the blank more at one point than at another to obtain the helix angle and thereafter turning the bottom of the skirt inwardly and upwardly to complete the cap as described above.

It will be understood, of course, that in the formation of the present cap it may be desirable, in some instances, to perform certain of the operations after the lower edge of the metal has been folded inwardly. For example, it may be desirable to roll or otherwise further compress the bottom edge of the skirt so that the infolded bottom portion 4 will be in closer contact with the skirt 2.

In the manufacture and sealing of metal closure caps, the caps are made in a cap factory and the containers in a glass factory. Preferably, the liner 10 is assembled in the cap by automatic machinery and shipped in assembled state. The packer may dump the caps into the hopper of an automatic machine, which will apply them to the containers or he may screw the caps on the containers by hand. The housewife removes the cap manually by unscrewing it. The construction of the cap is such that a wide range of variations in the size of the glass container can be accommodated without the cap being difficult to apply or remove. The formation of the thread gives greater resiliency and more holding power than is present in the ordinary types of screw caps. The thread by being an integral part of the skirt, eliminates relative movement between it and the skirt and by being formed by metal turned inwardly and upwardly, provides a support for the liner 10 and prevents it from falling out of the cap.

It will be seen that the present invention provides an improved and inexpensive method of making closure caps. The thread of the cap is concealed within the skirt and the outer contour and shape of the cap is independent of the thread. In addition, the cap is made of a single piece of metal, reducing materially the cost of the cap and improving its operation on containers. The thread projection is ample to secure perfect sealing results and has sufficient resiliency and flexibility to accommodate the variations in the size of glass containers. The slot in the bottom of the skirt blank permits the metal to be folded inwardly without material strains on the metal or marring the lacquer or coating. The slot also permits the end of the container thread to pass between the respective ends of the cap thread so that the cap thread may be screwed under the container thread. The cap has all the advantages in appearance of a molded or a double shell cap and eliminates the disadvantages of each.

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 making closure caps, which method comprises forming a blank having a cover portion and a depending skirt, slitting the lower edge of the skirt, folding the lower portion of the skirt inwardly and upwardly to form a bead interrupted at one point by said slit, and compressing said bead by means of two dies having opposed complementary helical surfaces designed to engage the bead, thereby to form a helical thread, the relative positions of the dies and the slit in the cap being such that the thread in the cap begins and ends on the respective sides of the slit.

2. The method of making closure caps, which method comprises forming a blank having a cover portion and a depending skirt, slitting the lower edge of the skirt, folding the lower portion of the skirt inwardly and upwardly to form an inturned bead interrupted at one point by said slit and compressing said bead by means of two dies having opposed complementary helical surfaces designed to engage the bead thereby to force certain portions of the bead outwardly against the wall of the closure to form a helical thread from other portions thereof, the relative positions of the dies and the slit in the cap being such that the thread in the cap begins and ends on the respective sides of the slit.

3. A closure cap having a cover portion and a depending skirt of uniform length having a smooth cylindrical outer surface, the bottom of said skirt having an inturned bead at the lower edge thereof, said inturned bead having one vertical slit therein concealed from view by the skirt of the cap when viewed from the exterior, the lower portion of said inturned bead being flattened against the skirt of the cap throughout the circumference of the skirt to provide a continuous thread in the cap by a fold of metal in the inturned bead, said fold being compressed to provide a helical thread adapted to engage a thread on the container which extends substantially entirely about the skirt of the cap, commencing at one side of said slit and terminating at the other side of said slit, thereby facilitating entry of a container thread between the ends of said cap thread at said slit, said thread having a substantially constant width and depth throughout its length.

JOHN C. GIBBS.