July 8, 1958 W. GEISLER 2,841,863

RUBBER LINED BOTTLE CAPS

Filed June 15, 1954 3 Sheets-Sheet 1

FIG. 1

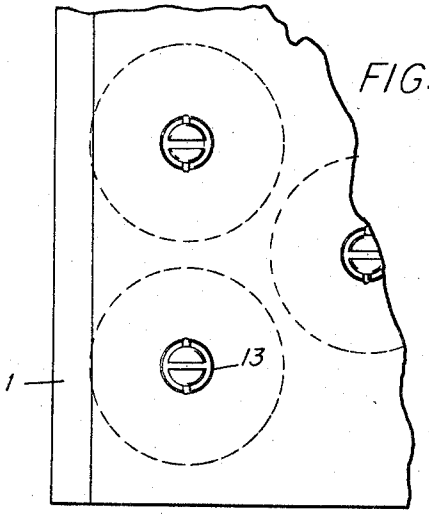


FIG. 2

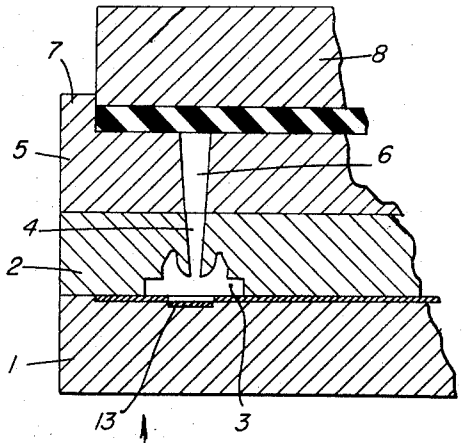


FIG. 3

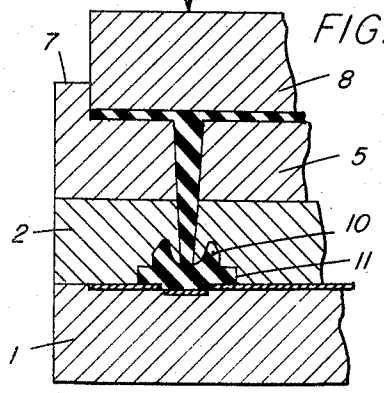


FIG. 4

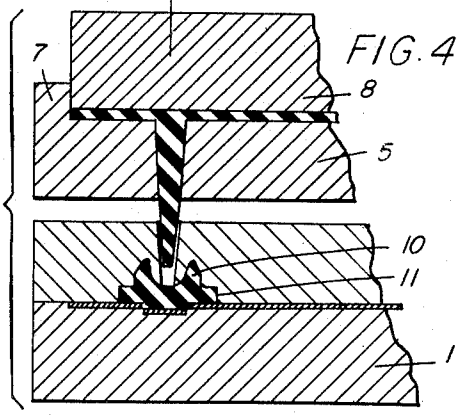


FIG. 5

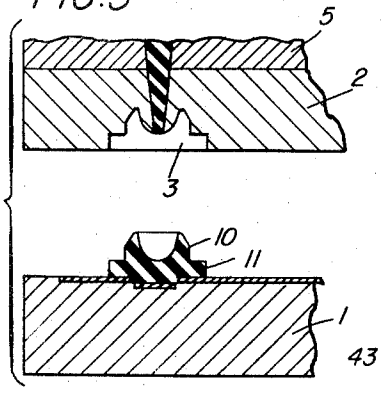


FIG. 6

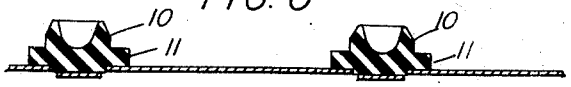


FIG. 19

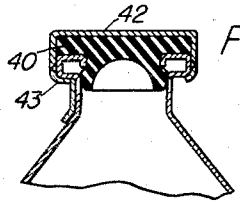


FIG. 20

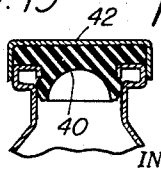
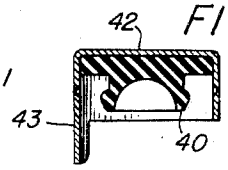


FIG. 21



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RUBBER LINED BOTTLE CAPS

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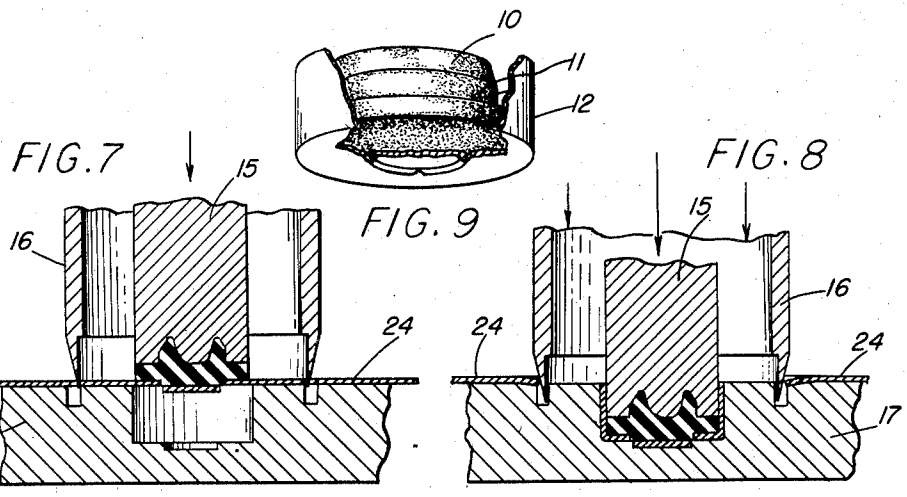


FIG. 7

FIG. 9

FIG. 8

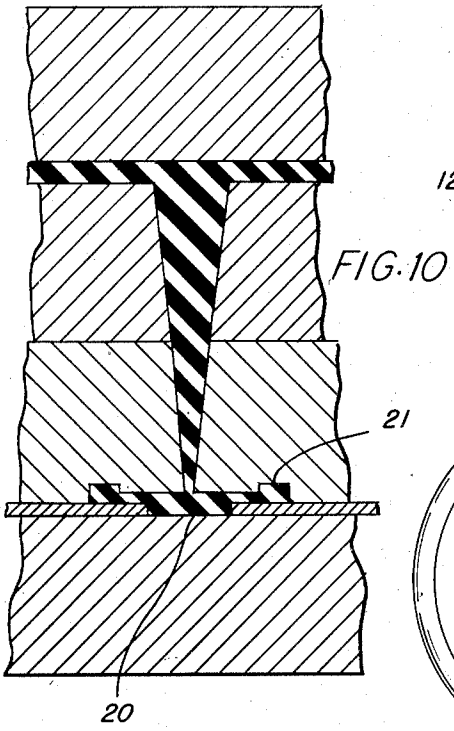


FIG. 10

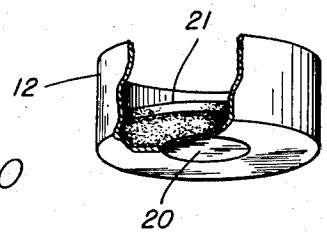


FIG. 11

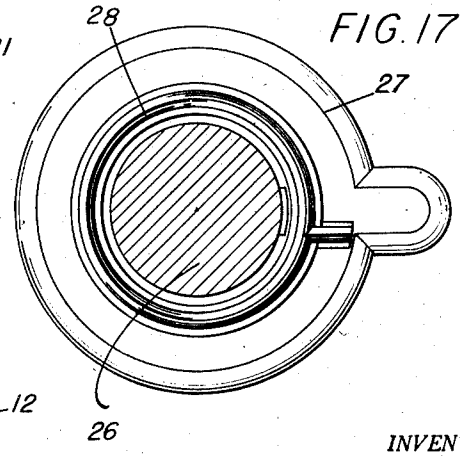


FIG. 17

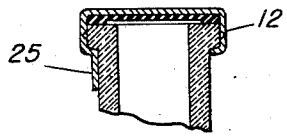


FIG. 18

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FIG. 12

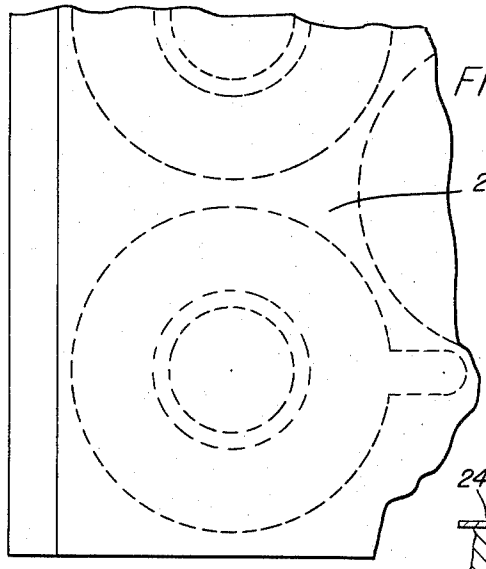


FIG. 14

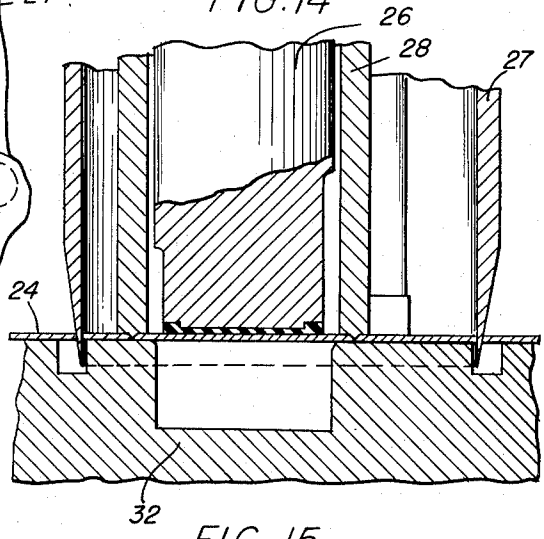


FIG. 13

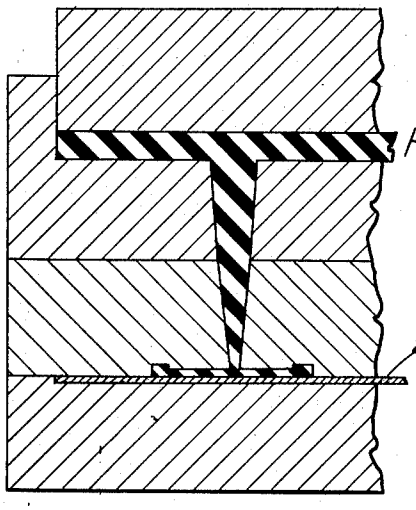
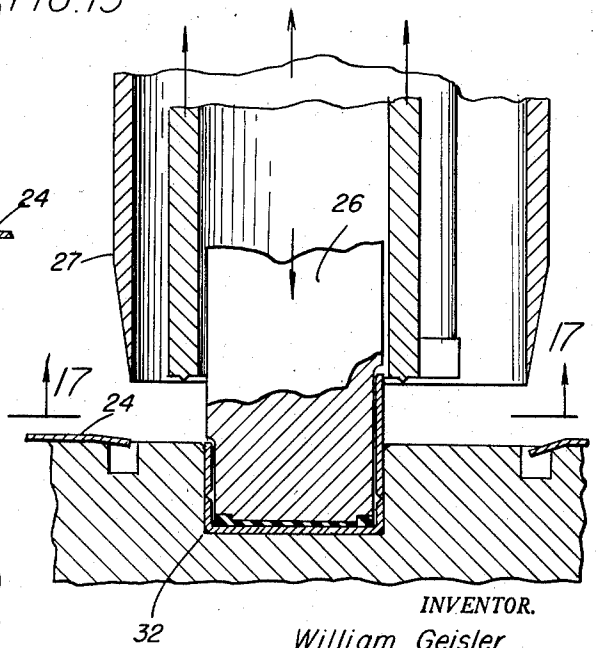


FIG. 15



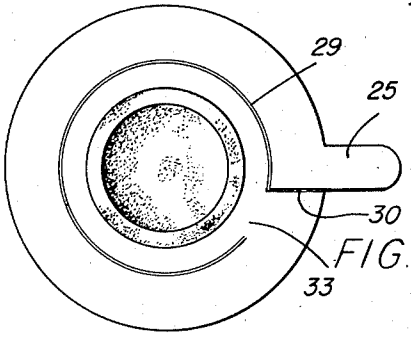


FIG. 16

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United States Patent Office 2,841,863 Patented July 8, 1958

2,841,863

RUBBER LINED BOTTLE CAPS

William Geisler, Tenafly, N. J., assignor to Wilbro Corporation, Maywood, N. J., a corporation of New Jersey

Application June 15, 1954, Serial No. 436,822

4 Claims. (Cl. 29—413)

This invention relates to a method for making bottle caps, and more particularly to improvements in the method described in my co-pending application Ser. No. 410,584, filed February 16, 1954, now Patent No. 2,777,411.

In the above mentioned application I have disclosed a method and apparatus for making the conventional "crown" caps which are used extensively for closures for bottles containing beer and other carbonated beverages.

The invention of the present application relates to the application of the process and method therein generically disclosed for the manufacture of different types of bottle closures, particularly those used for bottles containing solutions for hypodermic administration for which the conventional closure consists of a rubber stopper with an overlying metal cap scored to be partly removable to thereby expose the underlying rubber through which the physician sticks his hypodermic needle in order to utilize the contents of the bottle.

Bottle closures of this character as now manufactured are expensive to make and expensive to apply. The rubber stopper is separate from the metal cap and has to be applied by hand to the bottles to maintain complete sterility, and after being so stoppered by hand the bottles must then be sealed with the metal cap, which may be done by bottle capping machines. The procedure thus involves four steps: the making of the bottle cap, the making of the rubber stopper, the application of the rubber stopper by hand under sterile conditions, and finally the bottle capping operation. By the improved procedure constituting the invention of this application the combined rubber and metal closure is made at one operation by fully automatic machines, the combined stopper being of such character that its application to the bottle may be carried out by conventional automatic bottle capping machinery.

My improved procedure makes a much tighter and safer seal for the bottle for the reason that the rubber stopper is securely vulcanized to the inner face of the metal cap and is applied to the bottle under the pressure of the capping machine instead of by hand.

My invention also involves a modified form of closure for bottles for fluids for hypodermic administration which is both cheaper and better than the conventional closure.

My invention also embodies a modification of my prior process wherein the metal portion of the cap is so constructed that the cap, although applied in such manner as to provide a tight seal for carbonated beverages, may be readily removed by hand without the conventional bottle opener. This modified form of closure is also made by completely automatic machinery and is of a character to be applied by conventional bottle capping machines.

In the accompanying drawings I have illustrated the successive steps performed in carrying out each of the three modified procedures, and in the said drawings:

Fig. 1 is a plan view of a portion of the metal sheet from which the metal caps for the conventional stopper for bottles for fluids for hypodermic administration are made.

Fig. 2 is a section of a portion of the extrusion press with the parts assembled ready for the extrusion operation;

Figs. 3, 4 and 5 are similar views showing the successive steps of the extrusion operation;

Fig. 6 is a sectional view of a section of the metal sheet with the stoppers vulcanized thereto;

Figs. 7 and 8 are diagrammatic views in section showing the shaping of the metal cap;

Fig. 9 is a perspective view partly broken away showing the finished cap;

Fig. 10 is a sectional view similar to Fig. 2 but showing the mold for making a modified form of the closure of Fig. 9;

Fig. 11 is a perspective view partially broken away of the modified form of closure;

Fig. 12 is a plan view of the sheet used for making a "tear-strip" closure for carbonated beverages;

Fig. 13 is a sectional view similar to Fig. 2 showing the shape of the mold for the tear-strip closure;

Figs. 14 and 15 are diagrammatic views in section showing the cutting, scoring and shaping operations;

Fig. 16 is a plan view of the closure after the cutting and scoring operations but before the shaping operation;

Fig. 17 is a section on line 17—17 of Fig. 15;

Fig. 18 is an elevational view partly in section showing the closure applied to the bottle; and

Figs. 19, 20 and 21 are detail views showing a modified form of tear-strip closure.

Referring to the drawings, particularly to Figs. 1 to 5, 1 indicates the bottom plate of the molding press which is similar to the press described in my abovementioned co-pending application except in minor particulars which will be later described. 2 represents the upper plate of the press wherein cavities 3 are formed of the shape desired for the molded rubber stopper and entrance ports 4 for the rubber to the molds, said ports being of the same tapered configuration as the ports in my previously filed application with the smallest diameter of the taper at the top wall of the cavity 3, whereby, when the stripper plate 5 which overlies the die-forming plate 2 is elevated, the rubber compound will break away from the rubber in the mold at the junction of the mold and the entrance port.

The stripper plate 5 forms the bottom plate of the extrusion press, which plate is formed with ports 6 registering with the ports 4 in the upper mold plate. The upper face of the stripper plate 5 is provided around its perimeter with upstanding flanges 7 to confine the sheet of rubber or other molding compound which is forced by the press member 8 through the registering ports 4 and 6 into the molds.

The molded stopper here shown is of the same shape as the conventional separate rubber stopper used for closures of this kind, that is to say, it has a portion 10 which projects into the neck of the bottle when the stopper is applied and a head 11 which covers the neck of the bottle and fills the metal cap 12 when the latter is applied. The neck portion of the stopper is recessed on the under side to reduce the thickness of the middle portion of the stopper through which the physician thrusts his needle. The cap 12 is the conventional cap of sheet aluminum which is in the present day procedure applied to the stoppered bottles in a sealing machine, which spins the downwardly projecting margin of the stopper under the flange at the top of neck of the bottle in the usual manner.

To facilitate the use of the bottle by the physician the

middle portion of the cap is cut and scored in the manner shown so that the physician may without tools bend up an edge of the cut and scored central part and detach it from the bottle, leaving a small portion of the rubber stopper exposed so that the hypodermic needle may be thrust through the rubber stopper without removing the rest of the closure from the bottle.

In adapting the method of manufacture described in my prior application to the manufacture of this type of bottle closure, the bottom plate **1** of the mold is provided with spaced circular recesses **13** of a size to receive the central cut and scored portion of the cap so that the scored portion will not be flattened down by the pressure of the rubber against the area surrounding the central portion. By providing these recesses **13** in the bottom plate of the mold the flat metal of the plate surrounding the central scored portion lies flat against the metal of the mold and consequently prevents any extrusion of rubber through the slits in the scored portion and between the metal of the cap and the face of the mold. As stated in my above-mentioned application, the rubber forming the bottle closure is vulcanized firmly to the face of the metal plate at the same time that the rubber compound itself is vulcanized. This may be done by placing the sheets, after they are removed from the press in the usual manner in an oven or tunnel at vulcanizing temperatures for the required period of time.

The usual procedure as shown in Figs. 7 and 8 is followed in making the bottle caps from the sheets to which the stoppers are applied as above described. The shaping plunger **15** is shaped at its end to fit the upper face of the bottle stopper and its extending flange. The pressure required for shaping the aluminum disk is such that the rubber stopper will transmit the force of the plunger necessary to shape the cap without significant compression.

The plunger **15** is surrounded by a cylindrical knife **16** which cuts out the disks of aluminum in advance of the shaping operation so that when the plunger thrusts a cap and attached metal disk into the die **17** a bottle closure will be formed of the conventional shape now employed but with rubber portion held in place by the adhesion of the molded rubber to the metal.

It will be understood that in practice the presses used are gang presses which at one operation shape as many caps as can be made of a single sheet.

The bottle closures so made may be applied to the bottles by the same machine as now used for placing the aluminum caps over the previously stoppered bottles and spinning the flange beneath the flange of the neck of the bottle. The exterior dimensions of the caps with the rubber stoppers inside are the same as the caps without such stoppers and as the caps are placed over the stoppers by a downward movement of the cap, the same movement will, in placing the stoppers over the bottle necks, cause the middle stopper portion of the rubber to enter the neck of the bottle into which it is forced by the plunger which holds the cap on the bottle during the spinning operation.

In Figs. 10 and 11 I have shown a modified form of closure for bottles containing fluids for hypodermic administration wherein the metal cap, instead of having a middle portion cut and scored for easy removal, is formed with a central hole of approximately the same diameter as the removable piece. These holes **20** are punched in the aluminum sheet before the rubber cap is applied so that when the rubber portion is molded onto the face of the sheet the rubber will extend into the hole as shown more particularly in Fig. 10. The rubber portion may on its exposed side be of the same shape as in the previously described structure wherein a stopper to project the neck of the bottle is provided. Instead, an entirely satisfactory seal is obtained with less rubber by providing the rubber closure with a marginal flange **21** which is pressed against the neck of the bottle by the bottle cap machine and there held when the lower edge of the cap is spun beneath the flange on the bottle neck.

As the top surface of the bottle cap when so made is flat with the exposed rubber flush with the surrounding metal it can be rendered sterile by wiping off with alcohol or otherwise when used by the physician more readily than the conventional closure where the surrounding metal overlies the exposed face of the rubber but is not attached to it so that there are unsterile surfaces of the metal and rubber surrounding the exposed portion of the rubber, which surfaces are difficult to sterilize.

In Figs. 12–18, inclusive, I have shown a modification of the process as adapted to the manufacture of caps for beverage bottles and cans of the so-called "tear-strip" type. For making such closures a sheet of aluminum **24** is employed of the same character as used in making the previously described closure. The portions of the sheet which form the tops of the bottle closures may be previously embossed or otherwise marked with the name of the beverage or other desired legend. The extrusion press used for molding the rubber disks onto the face of the plate is of the same structure as that shown in Fig. 10, but with the individual molds somewhat more widely spaced to provide a flange of metal of greater diameter around the rubber disks as necessary to fit over the flanges of the conventional beverage bottles and cans. The molds are also spaced to provide for the projecting end **25** of the "tear-strip" to be cut from the metal between the closures.

After the rubber disks are molded onto the face of the aluminum sheet the sheet is placed in a gang punch for simultaneously cutting out the metal for the caps and shaping them around the rubber disk for application to the bottle neck. One of the punches used for this purpose is diagrammatically shown in Figs. 14 and 15 and comprises in addition to the shaping plunger **26**, a cutting knife **27** and intermediate scoring knife **28** which operates simultaneously with the cutting knife **27** to score a ring almost completely around the rubber disk, as indicated at **29**, Fig. 16, and also a short connecting score line **30** between the annular score line **29** and one edge of the tear strip extension **25**. After the disks are cut and scored as indicated, the forming plunger **31** whose end is shaped to conform with the rubber disk forces the metal disk with the attached rubber disk into the die **32** to shape the cap in the manner shown.

In Fig. 18 the tear strip cap is shown as applied to the conventional beverage bottle. The lower edge of the metal flange surrounding the rubber gasket is spun under the flange on the bottle neck with the extension **25** of the tear strip extending downwardly along the neck of the bottle where it may be readily grasped with the fingers and pulled away from the bottle neck, which movement causes the cap to tear along the score line **29**, thereby detaching the closure from the bottle neck. As shown, the score line **29** does not extend quite all the way around the cap, but a short portion is left unscored as indicated at **33** adjacent the juncture of the score lines **29** and **30**. When the score line **29** is torn throughout more than three-quarters the circumference of the bottle the cap as a whole may be readily dislodged, whereas if the score line is torn throughout the entire circumference, as it might be with a quick jerk on the tear strip extension, the middle part of the cap will be blown off the bottle by the force of the carbonated beverage.

In Figs. 19, 20 and 21 I have illustrated a somewhat modified form of closure wherein the rubber stopper feature of the closure shown in Figs. 1 to 9, inclusive, is combined with the tear strip feature of the stopper shown in Figs. 12 to 18, inclusive, to provide a replaceable stopper for use as a closure for the bottle or can should the contents be not consumed at one time. As shown here, the rubber stopper **40** which is extrusion molded and vulcanized to the base sheet **42** is generally of the

shape shown in Fig. 9, the stopper portion being somewhat extended to fully close the neck of the bottle and fit tightly enough to serve as a leak-proof stopper for the bottle after the removable portion **43** of the cap is detached. The metal portion of the cap is of the same shape as that shown in Fig. 4 except that the score line **29** extends throughout the entire circumference of the cap so that when the bottle is opened by pulling on the tear strip the lower portion of the metal cap will be entirely removed, leaving the rubber stopper in place with its upper portion covered by a tightly fitting metal cap firmly vulcanized thereto.

The stopper of this construction may be used for all manner of liquids. It provides a tight seal which cannot be opened in the first instance without destroying the seal but at the same time provides after the seal is broken a neat, tightly fitting, easily removable stopper for retaining the contents of the bottle until consumed.

A stopper of this form is particularly useful in connection with cans of the type which are now sealed with the conventional Crown cap. The internal pressure of the contents tends to expand the depending flange of the stopper outwardly beneath the bottom edge of the neck in such manner as to increase the resistance of the stopper to withdrawal so that the re-stoppered can will remain tight even though the contained liquid has a substantial degree of remaining effervescence.

In the foregoing specification I have described several modifications of my method of making bottle caps and the resulting caps, but it is to be understood that my invention is not limited to the procedures and structures disclosed except insofar as recited in the appended claims.

I claim:

1. The method of making a bottle closure which consists in scoring a thin metal sheet with a series of scored areas spaced from each other to provide a surrounding metal area greater than the overall area of the bottle closure, placing said sheet in a mold member, placing over said mold member a second mold member having recesses registering with said scored areas and shaped to form a bottle closure having an annular outer portion of a diameter to fit against the neck of the bottle, said mold member having a passage extending from the mold cavity to the upper surface of the mold member for the passage of molding compound to be molded therein, placing a third member over said second-mentioned member, said third member having passages registering with the first-mentioned passages, forcing the molding composition through said passage while retaining said three mold members against relative movement, elevating said third mold member to separate the molding composition in said passage from the molded bottle closure, and thereafter cutting from said sheet disks of metal with the molded bottle closure attached thereto and shaping said disks to provide metal flanges of a width to be spun under the flange on the neck of the bottle to be closed.

2. The method of claim 1 wherein the first-mentioned mold member has recesses positioned to underlie the scored areas of said sheet.

3. The method of claim 1 wherein the cavities in the second mold member are shaped to provide a stopper portion to fit within the neck of the bottle.

4. The method of claim 1 wherein the scoring consists of a circular line and a radial line extending from the circular line and the subsequently cut disk is concentric with said circular line with a radial tab having one edge aligned with said radial line.

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