Aug. 28, 1962 E. I. PAPPAS 3,051,343

BOTTLE CLOSURES

Filed Nov. 7, 1960 3 Sheets-Sheet 1

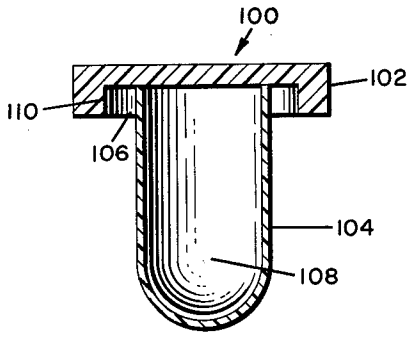


FIG. 1

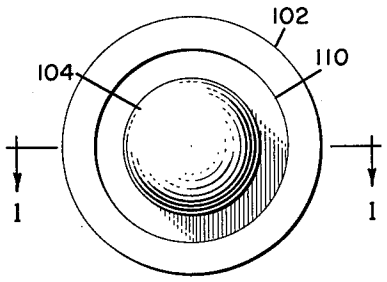


FIG. 2

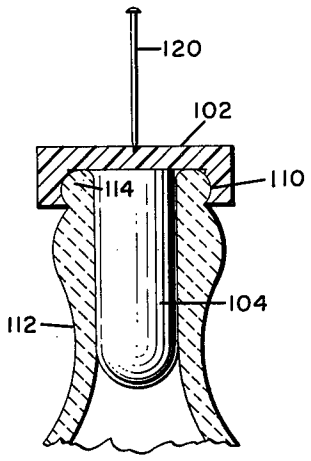


FIG. 3

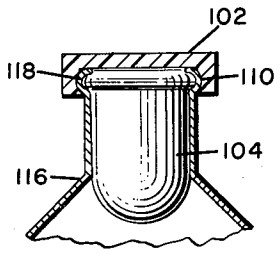


FIG. 4

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Aug. 28, 1962 E. I. PAPPAS 3,051,343

BOTTLE CLOSURES

Filed Nov. 7, 1960 3 Sheets-Sheet 2

FIG. 5

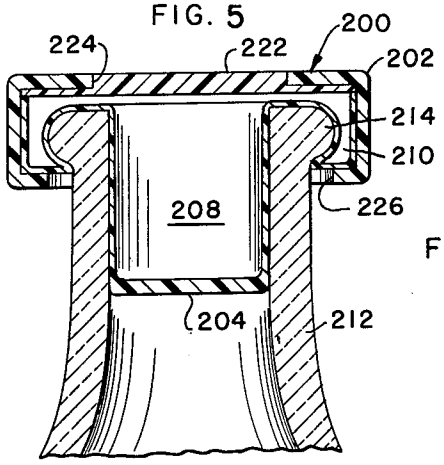


FIG. 6

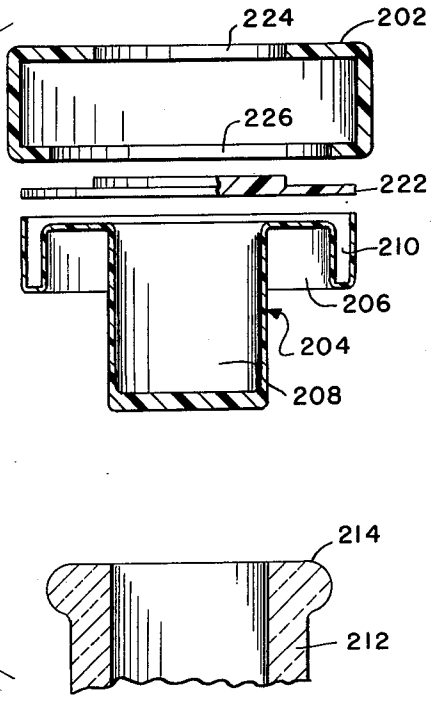


FIG. 7

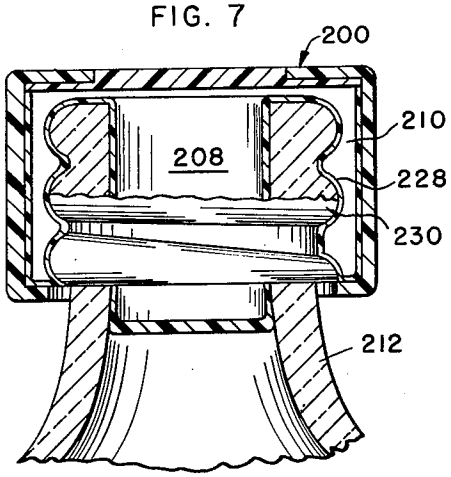


FIG. 8

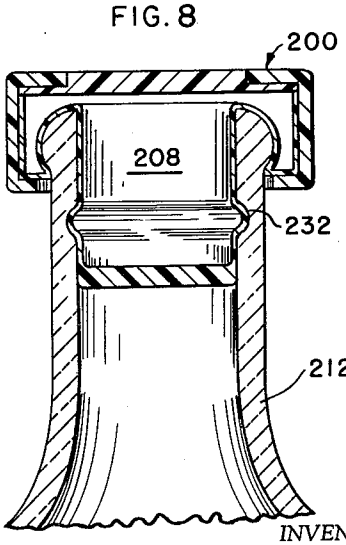
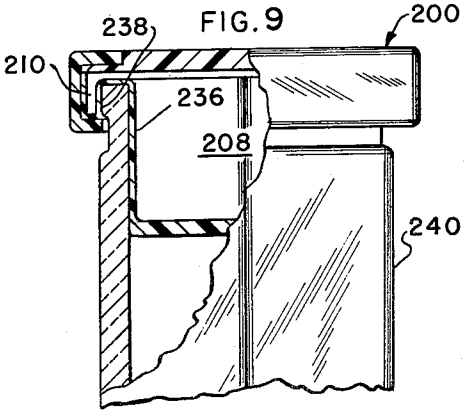


FIG. 9



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Aug. 28, 1962 E. I. PAPPAS 3,051,343

BOTTLE CLOSURES

Filed Nov. 7, 1960 3 Sheets-Sheet 3

FIG. 10

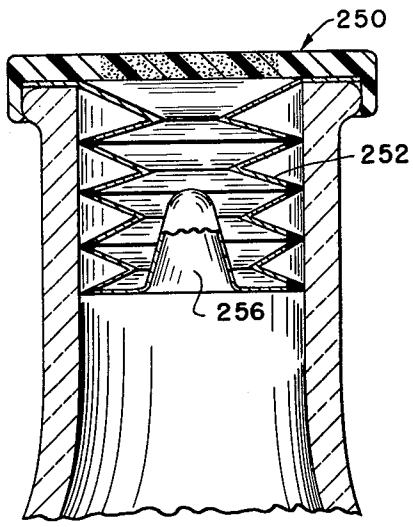


FIG. 11

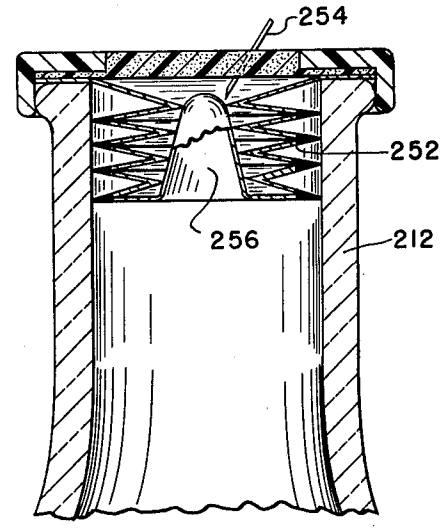
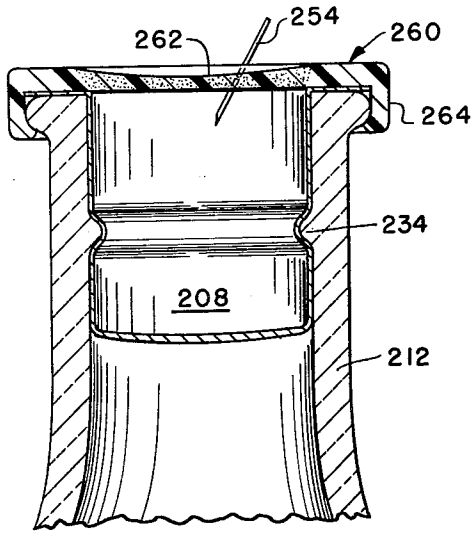


FIG. 12



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3,051,343

BOTTLE CLOSURES

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3 Claims. (Cl. 215—52)

This invention relates generally to bottle stoppers, and more particularly it relates to expansion type closure seals for narrow neck containers. This application is a continuation-in-part of U.S. patent application Serial Number 715,330, filed February 14, 1958, for "Bottle Closure," now abandoned.

In the practice of bottle sealing with the customary crown type metallic caps, considerable effort is made to provide a non-corrosive, non-taste imparting closure. To this end, various resilient disks are used together with foil or other material in continuation as a liner. The metal cap is pressed to the bottle top compressing the resilient disks and crimped around a bead lip to retain the pressure seal. An objection to this type of seal is that the seal proper is confined to but a small circular area along the top rim. Furthermore, the crimping of the cap sides provides no seal therealong and often results in broken bottles. And again the crimped sides provide no sanitary protection to the outside of the bottle lip.

It is, therefore, an object of this invention to provide an improved container stopper.

Another object of this invention is to provide a container stopper with an extended sealing area.

Still another object of this invention is to provide a container cap or closure which can be made easily removable.

Even yet another object of this invention is to provide a bottle capping means having outside sealing and protecting features.

These and other objects and attendant advantages of this invention will become more readily apparent and understood from the accompanying specifications and drawings in which:

FIG. 1 is a longitudinal section of the stopper embodying the features of this invention taken along line 1—1 of FIG. 2;

FIG. 2 is a bottom plan view of the stopper of FIG. 1;

FIG. 3 is a side section view showing the installed stopper on a bottle together with a puncturing means therefor;

FIG. 4 is a section view of the stopper in place on a can;

FIG. 5 is a longitudinal section of another embodiment of an inflated closure;

FIG. 6 is an exploded view in vertical section of the components of the closure shown in FIG. 5;

FIG. 7 is a longitudinal section similar to FIG. 5 illustrating the conformation of an inflatable rim to the external thread of a bottle neck;

FIG. 8 is a longitudinal section similar to FIG. 5 illustrating the conformation of an inflatable plug to internal sealing grooves in a bottle neck;

FIG. 9 is a vertical section, partly broken away, of a stopper for rectangular mouthed containers, the view being taken in a plane extending between diagonally opposite corners;

FIG. 10 is a longitudinal section of the embodiment of the invention showing a bottle cap incorporating novel negative pressure sealing features and illustrating the cap in the unsealed condition;

FIG. 11 is a longitudinal section of the cap of FIG. 10 in the process of being sealed; and

FIG. 12 is a longitudinal section of a pneumatic bottle stopper with added pressurizing and sealing features.

Referring now to FIG. 1, the reference numeral **100** designates a stopper in general, constructed entirely of a resilient plastic. This stopper **100** consists of a top **102** having a circular recess defined by an inner wall **110** and having a space **106** for the lip of a bottleneck **112**, shown in FIG. 3. An insert **104** is centrally attached therein and has a hollow inside **108** which is subsequently filled with a gas such as air under pressure. The cap top **102** and insert **104** are dimensioned to fit tightly inside and out of the bottleneck **112** having a lip **114**, as illustrated in FIG. 3. The invention is shown in FIG. 4 alternatively attached to a can **116** having a lip **118**.

In FIGS. 3 and 4, there are illustrated how closely the inner wall **110** wraps itself around the bottle lips **114** and **118**, and how the gas-filled insert **104** contacts the inside of bottlenecks **112** or **116**, respectively, over a relatively large area when inserted therein. It is intended that a pin **120**, or other sharp object be used to puncture the cap top **102** to release the gas and thus facilitates the removal of the stopper **100**.

The insert **104** is filled with a gas under pressure by conventional means. For example, a hot needle having a passageway therein and connected to a suitable source of air pressure can be used. The hot needle is passed through the top **102** of the stopper **100** into the space **106** after the uninflated stopper has been placed on the bottleneck **112** or can **116**. After sufficient air under pressure has been introduced into the space **106**, the hot needle is withdrawn and the material of the stopper **100** is chilled to seal the small opening formed by the needle in the top **102** of the stopper. It is to be pointed out that there may be some loss of gas pressure from the space **106** during the sealing of the opening in the top **102** of the stopper **100**. However, sufficient gas will be introduced into the space **106**, of the stopper **100** so that the desired pressure is obtained even though there is a small loss of air pressure due to leakage.

In addition to the large sealing area possessed by stopper **100**, a further advantage can be seen in which the inner wall **110** of the stopper or cap protects the bottle lip **114** from contamination when the bottle is used directly as a drinking vessel. Furthermore, the resilient character of the stopper **100** protects against bottle top breakage.

Referring now to FIG. 5, the reference numeral **200** designates a stopper in general constructed partly of resilient plastic and partly of a hard plastic. This stopper essentially consists of a hard cap **202** and a soft insert **204**. The hard cap **202** is made in the form of a hollow ring having a top center aperture **224** and a bottom center aperture **226**. The latter aperture **226** of the cap **202** is dimensioned to pass easily over the lip **214** of a bottleneck **212**.

For purposes of easy fabrication, the soft insert **204** is made in two parts as shown in the exploded view of FIG. 6. The lower portion of the insert **204** is formed to provide an inflatable center plug **208** and a coaxially surrounding inflatable rim **210** so as to define a perimetral space **206** for the top lip **214** of the bottle **212**. A flat cemented-on puncturable top **222** makes the entire assembled insert **204** a pneumatically tight single chamber.

Since the insert **204** as a whole is soft and easily deformable, it can be pressed through the lower aperture **226** to rest within the hard top **202**, with its top **222** exposed through the top aperture **226** of cap **202** as shown in FIG. 5. In place on the bottleneck **212** and inflated with a hollow needle, the inflatable plug **208** expands to tightly hug the inside of the bottleneck **212**. The inflatable rim **210** being confined in the hard cap **202**, can expand only inwardly around the lip **214** of the bottleneck **212** tightly conforming thereto.

If the bottle has cap threads **230**, as shown in FIG. 7,

the inflated inner wall **228** of the rim **210** takes on the matching conformation with perfect thread fit. If the bottleneck **212** is provided with an inner peripheral groove **232**, as shown in FIG. 8 or an inner circumferential head **234**, as shown in FIG. 12, the inflated plug **208** will conform thereto and provide additional sealing and holding qualities therearound. Thus, it can be seen that the important feature of the novel inflatable cap principle is the ability to conform to shape and even to fill non-circular pouring spouts and the corners of rectangular-mouthed containers.

An example of the latter application is illustrated in FIG. 9 where there is shown a square-mouthed container **240** with one side corner broken away. It is apparent how the inflatable plug **208** expands into an inside vertical corner **236** and how tightly the inflatable rim **210** hugs the outside vertical corner **238** of the container **240**. For this application the general shape of the stopper **200** may be square instead of cylindrical although perfect fit in the uninflated condition is unnecessary. The actuating force for stopping of stopper may be provided by negative pressure.

In the embodiment of the closure **250** shown in FIGS. 10 and 11, the plug member **208** previously described is replaced by a plastic bellows **252**. Negative pressure introduced by means of a hollow needle **254** will cause the bellows **252** to shorten as shown in FIG. 11 with consequent gross peripheral enlargement.

The bellows **252** can be made to even more firmly contact the inside of bottleneck **212** by constructing its bottom end with a re-entrant wedge or cone member **256**. This member **256** when drawn up by negative pressure introduced by needle **254** will force the folds of the bellows **252** outwardly providing multiple annular contact with the inside of the bottleneck **212**.

To make the wedging force distribute more effectively, the inside of the bellows **252** may be made in corresponding taper to that of the cone member **256** as illustrated. In some sizes of bottle caps, the cone **256** may be caused to form automatically from the sucked-in bottom of the bellows **252**.

As will now occur to those skilled in the art, the bottom of the previously mentioned plug **208**, can be thickened as shown in FIG. 8, or dished as shown in FIG. 12 to act as a piston head for augmenting the side wall flow and fit of the plug **208** within the bottleneck **212** by stretching or constricting the plastic material thereof.

As depicted in FIG. 12, the puncturable top may consist of a soft area **262** in a hard-rimmed cap **264** fused

or otherwise blended-in during the casting thereof. With the inflatable plug **208** secured directly to the inside of the cap **264** a simple yet effective puncturable stopper **260** results.

Obviously, many other modifications and variations of the present invention are possible in the light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. In combination, a container having an annular lip defining an opening, and a stopper closure for closing said opening in said container, said closure consisting of a resilient structure of a permeable elastic material defining a top having an annular flange extending outwardly and substantially angularly therefrom at substantially the edge periphery thereof, and deformable insert consisting of an inflatable center plug for closing said opening and a spaced coaxially surrounding inflatable rim defining a perimetral space for said annular lip of said container, said inflatable plug forming a closed chamber with said top.

2. A stopper closure for a container having an annular lip enclosing an opening therein, comprising, a resilient structure defining a substantially hard top with a permeable elastic portion positioned therein and having an annular flange extending outwardly and substantially angularly therefrom at substantially the edge periphery thereof, and a deformable insert consisting of an inflatable center plug for closing said opening and a spaced coaxially surrounding inflatable rim defining a perimetral space for said annular lip of said container, said inflatable plug forming a closed chamber with said top.

3. A stopper closure for a container having an annular lip enclosing an opening therein, comprising, a resilient structure defining a top having at least a portion thereof formed of a permeable elastic material and having an annular flange extending outwardly and substantially angularly therefrom at substantially the edge periphery thereof, and a deformable insert consisting of a deflatable bellows shaped center plug for closing said opening and sealing the inner surface of said opening at a plurality of spaced intervals, said deflatable plug forming a closed chamber with said top.

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