Aug. 16, 1966 H. LÖHRER 3,266,652

CLOSURE FOR BOTTLES AND LIKE CONTAINERS

Filed Jan 12, 1965 3 Sheets-Sheet 1

Fig. 1

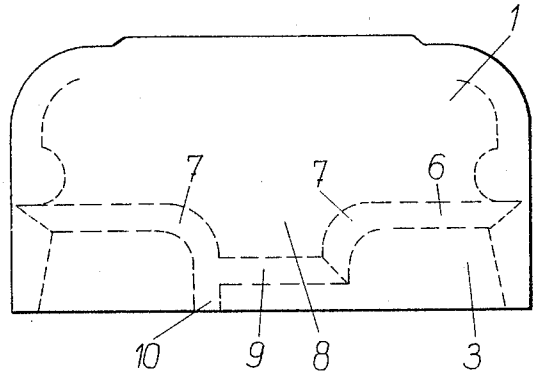

Fig. 2

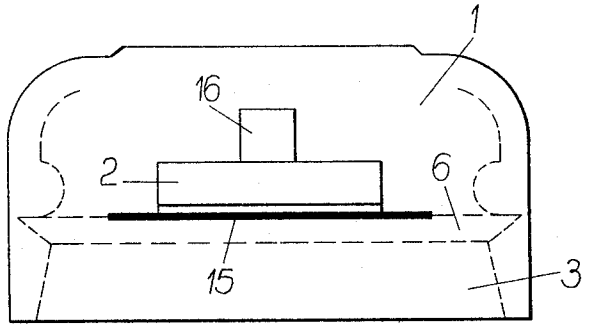

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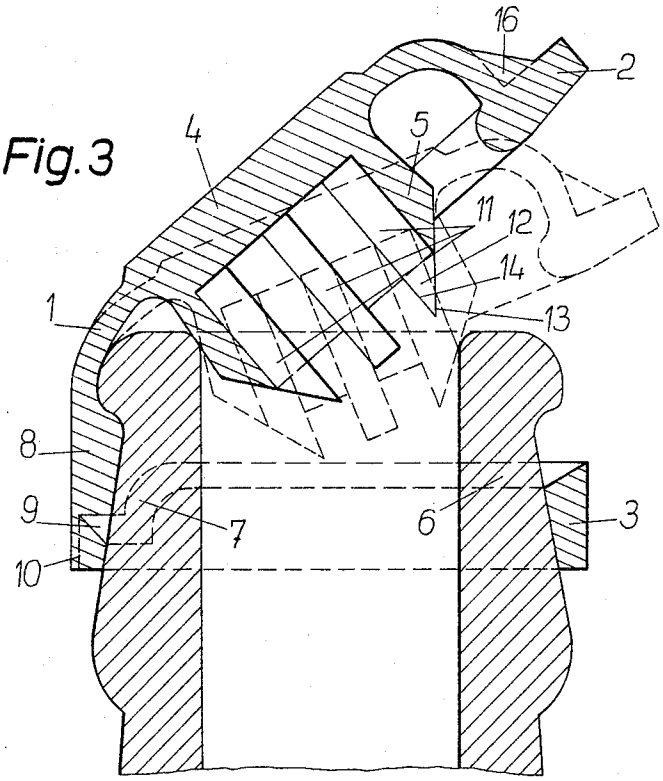
Fig.3



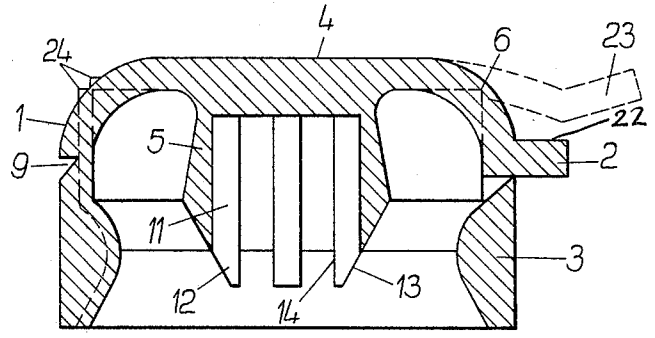


Fig.6

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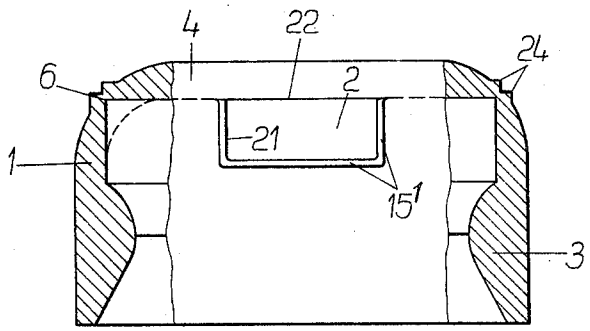
Fig. 4



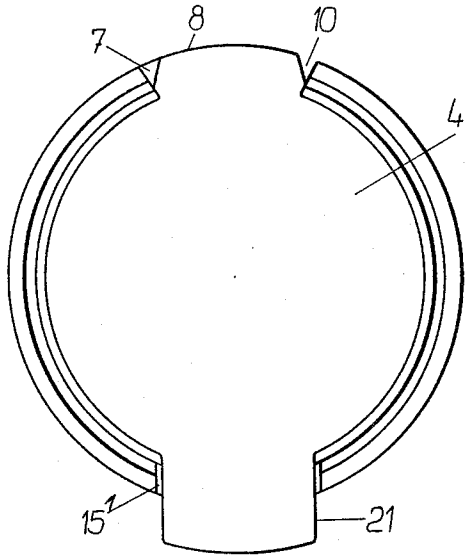


Fig. 5

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3,266,652
CLOSURE FOR BOTTLES AND LIKE CONTAINERS

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12 Claims. (Cl. 215—41)

This invention relates to closures, and more specifically to a closure of plastic material, especially for bottles and like containers with an internal overpressure, and comprising an external cap with a nose on one side and a depending lower skirt and an internal hollow open-bottomed plug extending downwardly from the external cap for engagement in the mouth of the container. The external cap engages over the mouth of the container, for example a bottle, covers the outer projecting rim on the mouth of the bottle and engages with an internal bulbous ring in an annular recess on the bottleneck. The opening of the bottle and its horizontally extending edge are covered by the top portion of the external cap and the plug engaging in the bottleneck has a relatively thin-walled neck which is externally coned to form a thickened portion tapering downwardly into a sharp-edged lip.

The known wire bow closures with porcelain plug and rubber ring do permit the bottles to be easily opened and closed again so as to be completely gastight, but these closures are expensive to manufacture and suitable only for such bottles which have two recesses on the neck for engagement of the wire bow. Moreover, complicated closing machines are necessary and also a complicated maintenance and frequent renewal of the rubber rings.

Further, a closure is known which is provided with a strip that can be torn off and with a lug serving as a handle and the strip, as long as it is undamaged, is intended to ensure that the original filling is not adulterated. After the tear off lug has been removed the bottle can be opened but it can be closed again only when the closure is within reach.

Finally, a closure is also known which is provided with a retaining ring arranged below the projecting rim on the mouth of the bottle and connected to the cap through a curved link or hinge so that the cap cannot be lost after the closure has been opened.

The two aforementioned types of closures are pressed by the closing machines in a vertical position downwardly onto the bottle with the closing plug entering the mouth of the bottle vertically. The curved links connecting the retaining ring with the closure or the aforementioned hinges in most cases do not permit the plug to be introduced vertically when the bottles are to be closed again. Rather, when a bottle is to be closed again the plug will assume an inclined position relative to the mouth of the bottle so that it is then necessary to exert force and consequently the plug will be crushed at least on one side and then it will by no means be certain that the closure is still tight against liquid and gas.

The foaming contents of bottles, such as champagne, but also beverages artificially mixed with large quantities of carbonic acid easily become stale in this case and flow out although they develop considerable pressure in the bottle before the closure is opened. At work it is common to drink straight from the bottle without using glasses. It is therefore essential that the cap should be at any time within easy reach for closing the bottle again and that it should be possible to close the bottle easily without any risk of damage to the plug even if the link, the band or the hinge leave only little play.

The ever increasing consumption of fruit juices more and more frequently renders a heat treatment of the filled bottles necessary. Therefore, a material must be used for the closure, which is adapted to the heat treatment, has a certain hardness and is not completely plastic. Such a closure must be capable of bridging the usual tolerances of the mouth of the bottle, of withstanding the treatment temperatures and of ensuring a perfect sealing also in the case of bottles the liquid contents of which have a certain content of carbonic acid. Then, however, it is impossible to remove the closure easily and without effort by hand from the mouth of the bottle without using a tool.

According to the invention the closure of plastic material comprises an external cap for closing the mouth of the container and having a downwardly extending band on one side and, diametrically opposed, a nose for lifting the cap, an internal hollow open-bottomed plug extending downwardly from the external cap for engagement in the mouth of the container, a lower skirt depending from the external cap and separated therefrom by a weakening line permitting the closure to be easily opened, closed again and completely removed and having two ends extending downwardly toward the lower edge of the skirt and enclosing therebetween the downwardly extending band of the external cap, and a plurality of reinforcing ribs arranged on the inside of said plug and having guide wedges below the edge of said plug.

The weakening line, between its ends enclosing the downwardly extending band of the external cap, may extend horizontally around the closure and may be pressed in particularly deep below the lifting nose so that only a very thin bridge of material remains or the weakening line may be interrupted below the lifting nose by an incision severing the material of the closure.

According to another embodiment of the invention and when using a material withstanding the treatment temperatures, the incision severing the material of the closure may extend below as well as on the side surfaces of the lifting nose upwardly up to the weakening line which extends around the closure up to the band of the external cap. In this case the incisions disposed laterally of the lifting nose may extend up to the upper surface of the lifting nose, this surface being level with the weakening line.

According to another embodiment of the invention the incisions disposed laterally of the lifting nose may extend upwardly beyond the upper surface of the lifting nose, this surface extending below the level of the weakening line so that the lifting nose acts as a tear off lug.

This latter embodiment is particularly suitable for fruit juice bottles, especially such the contents of which are drunk during a meal in a restaurant, in a canteen, in a dining-car and the like, i.e. such bottles that are not closed again. Since these beverages contain no carbonic acid and a partially emptied bottle is not to be closed again it is in these cases possible to dispense with the plug member. Thus, the closure is of very simple construction, only a very small quantity of material and very simple equipment is required for its manufacture and consequently it is inexpensive and can be rapidly produced in large quantities.

The combined features of the closure proposed by the invention afford the following advantages:

The closure is of compact, robust and rigid construction and has no projecting parts except the lifting nose.

The closure ensures an absolutely reliable sealing against liquid and gas even with a high internal overpressure and also overlong periods of time and also in cases of extremely unsuitable storing in great heat or in cases of permanent severe precussions during transportation.

The closure can be easily closed and opened and repeatedly closed again and is adapted to bridge easily relatively large tolerances without any damage to the plug so that an absolutely tight sealing is ensured.

The closure can be easily opened without the necessity of using a tool, the weakening line tearing open up to its ends at the first attempt of opening so that the undamaged weakening line can be taken as a guarantee that the original filling has not been adulterated.

Special embodiments of the closure permit it to be safely used for bottles the contents of which have no or only a certain content of carbonic acid and which must be subjected to a heat treatment.

The selection of the embodiments depends on various aspects. In this connection the pressure and the temperature to which the closure is subjected and the tolerances to be bridged must be taken into consideration, the selection of a suitable material for the closure being dependent on the tolerances. The requirements of the bottling firms have to be mentioned in this respect just as the habits and wishes of the ultimate consumers.

The individual features of the closure proposed by the invention, when taken together, represent a new, advantageous and progressive combination and thus a particular enrichment of the art.

Some embodiments of the invention will now be described by way of example and with reference to the accompanying drawings, in which:

FIG. 1 is an elevational view of a closure according to the invention, showing the side of the closure with the band;

FIG. 2 is an elevational view of the closure, showing the side with the lifting nose;

FIG. 3 is a section through the closure in open condition, the section being taken through the band and the lifting nose;

FIG. 4 is a section through another embodiment of the closure according to the invention, partly in elevation on the lifting nose;

FIG. 5 is a top plan view of the closure of FIG. 4, and

FIG. 6 is a section through a further embodiment of the closure according to the invention.

FIGS. 1 to 3 show a closure which comprises an external cap **1** provided with a lifting nose **2** and a lower skirt **3**. The external cap **1** has a relatively thick and rigid top **4** which covers the mouth of the bottle. Below the top **4** the cap **1** is provided with an internal hollow open-bottomed plug **5**.

A weakening line **6** extends horizontally around the closure and has two ends **7** extending downwardly toward the edge of the skirt **3** and enclosing a band **8** connected to the cap **1**. These ends **7** of the weakening line **6** expediently extend in a curved line and terminate above the lower free edge of the skirt **3** as shown in FIG. 1. The band **8** has an indentation **9** extending preferably horizontally and connecting the two ends **7** of the weakening line **6** with each other. A vertical extension **10** of the indentation **9** extends beyond the one end of the weakening line **6** up to the free end of the skirt **3**.

As shown in FIG. 3, a plurality of reinforcing ribs **11** are arranged on the inside of the plug **5** and extend from the top **4** of the cap **1** downwardly and each have a vertically extending inner surface **14** and, below the end of the plug **5**, a guide wedge **12** with an inclined surface **13** forming an uninterrupted extension of the known conical form of the end of the plug **5**.

On the side of the closure diametrically opposed to the band **8** one of the reinforcing ribs **11** is arranged on the inside of the plug **5** and the lifting nose **2** is disposed on the outside of the cap **1** directly above the weakening line **6** and opposite the band **8**.

Below the lifting nose **2** the weakening line **6** is pressed in particularly deep over about 90° of the circumference of the closure so that only a very thin bridge of material remains which will immediately tear open when first fitting the closure in position or when a slight force is exerted on the lifting nose **2**. Instead of this very thin bridge of material, according to another embodiment of the invention, an incision **15** (FIG. 2) severing the material may be provided below the lifting nose **2** and extend over about 45° of the circumference of the closure.

The underside of the lifting nose **2** is slightly inclined outwardly and upwardly and its upper surface is connected to the cap **1** through a roof-like reinforcement **16** so that the force applied during the opening operation is reliably transmitted to the cap **1** and the lifting nose **2** cannot bend.

The operation of the closure is as follows:

The closure is applied to the filled bottle by a bottle closing machine. Under the action of the guide wedges **12** of the reinforcing ribs **11** the plug **5** can be easily introduced into the mouth of the bottle even when the mouth has relatively large tolerances. For opening the bottle the lifting nose **2** is pressed upwardly with the thumb, the top **4** of the closure being prevented from bending since it is relatively thick. The thin bridge of material or the incision **15** disposed below the lifting nose **2** facilitates tearing through of the weakening line **6** up to its ends **7** enclosing the band **8**. Whereas the skirt **3** continues to embrace the bottleneck the cap **1** can be bent downwardly toward the bottleneck about the indentation **9** with the thumb so that the contents of the bottle can be poured out into glasses or drunk from the bottle.

When the bottle is to be closed again the cap **1** with the plug **5** initially assumes an inclined position relative to the mouth of the bottle. On moving the cap further toward the mouth of the bottle the reinforcing rib **11** opposite the band **8** will engage with the inclined surface **13** of its guide wedge **12** the inner edge of the mouth of the bottle. When now a slight downward pressure is exerted on the cap **1** the reinforcing ribs **11** ensure through their guide wedges **12** a slight bending of the thin neck of the plug **5** so that the plug **5** can be easily moved from its position into the vertical position in the bottleneck. In FIG. 3 it is indicated in dash lines how the plug **5** is introduced into the mouth of the bottle when the latter is being closed again and it will be evident from this figure that the plug **5** is not tilted by force during its introduction. After the plug **5** has been completely inserted the bottle will be closed again so as to be completely tight against liquid and gas.

When the closure is to be completely removed from the bottle the cap **1** with the band **8** is pulled downwardly with the result that the outwardly conical mouth of the bottle will break the vertical extension **10** of the indentation **9**, which leads to the lower edge of the skirt **3**, so that the closure with the skirt **3** will be detached from the bottleneck. Since the edge of the skirt **3** breaks only in one place, i.e. at the extension **10**, the skirt **3** remains connected with the rest of the closure through the band **8** so that the closure is completely removed from the bottleneck and the bottle can be readily cleaned and used again.

In another embodiment of the invention, shown in FIGS. 4 and 5, the incision **15¹** severing the material of the closure extends not only below the lifting nose **2** but also on the two side surfaces **21** thereof upwardly up to the weakening line **6** which extends around the closure up to the band **8**. The parts of the incision **15¹** which extend laterally of the lifting nose **2** preferably extend up to the upper surface **22** of the lifting nose **2**, the upper surface **22** being level with the weakening line **6**. It will be understood that the top **4** of the cap **1** carries the depending plug **5** as in FIG. 3.

In a further embodiment of the invention, shown in FIG. 6, the parts of the incision which are disposed laterally of the lifting nose **2** extend upwardly beyond the upper surface **22** of the lifting nose **2** and in this case the upper surface **22** of the lifting nose **2** extends

below the level of the weakening line 6. After the nose has been torn up it will assume the position indicated in dash lines in FIG. 6 and act as a tear off lug 23. In this form of the invention there are also embodied the band 8 and plug 5 as in FIG. 3.

As shown in FIGS. 4 and 6, reinforced edges 24 are arranged on both sides of the closure above and below the weakening line 6 between the lifting nose 2 and the band 8. These reinforced edges 24 ensure that the closure will be torn up with absolute certainty along the weakening line 6.

In the embodiment according to FIG. 6 the lifting nose 2 is no longer a lifting or pressing-off nose in the proper sense of the word but when first tearing at the nose 2 a tear off lug 23 is formed with which the weakening line 6 is severed and the plug 5 is pulled out of the mouth of the bottle.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

I claim:

1. A closure of plastic material, especially for containers with an internal overpressure, comprising an external cap for closing the mouth of the container and having a downwardly extending band on one side and, diametrically opposed, a nose for lifting the cap, an internal hollow open-bottomed plug extending downwardly from the external cap for engagement in the mouth of the container, a lower skirt depending from the external cap and separated therefrom by a weakening line permitting the closure to be easily opened, closed again and completely removed and having two ends extending downwardly toward the lower edge of the skirt and enclosing therebetween the downwardly extending band of the external cap, and a plurality of reinforcing ribs arranged on the inside of said plug and having guide wedges below the edge of said plug.

2. A closure as claimed in claim 1, wherein the ends of the weakening line extend in curves and the band extending downwardly from the external cap is provided between the curved ends of the weakening line with an indentation connecting the ends of the weakening line.

3. A closure as claimed in claim 1, wherein the band extending downwardly from the external cap is provided between the ends of the weakening line with an indentation extending horizontally in the band and having an extension extending vertically beyond the one end of the weakening line up to the free edge of the skirt.

4. A closure as claimed in claim 1, wherein each of the guide wedges has an inclined surface forming an uninterrupted extension of the known conical form of the end of the plug.

5. A closure as claimed in claim 1, wherein one of the reinforcing ribs is arranged on the side of the closure diametrically opposed to the downwardly extending band on the inside of the plug and the lifting nose is disposed on the outside of the cap directly above the weakening line and opposite the downwardly extending band.

6. A closure as claimed in claim 1, wherein the weakening line, between its ends enclosing the downwardly extending band of the external cap, extends horizontally around the closure and is pressed in particularly deep below the lifting nose so that only a very thin bridge of material remains.

7. A closure as claimed in claim 1, wherein the weakening line is interrupted below the lifting nose by an incision severing the material of the closure.

8. A closure as claimed in claim 7, wherein the incision severing the material of the closure extends below as well as on the side surfaces of the lifting nose upwardly up to the weakening line.

9. A closure as claimed in claim 8, wherein the incisions disposed laterally of the lifting nose extend up to the upper surface of the lifting nose and this surface is level with the weakening line.

10. A closure as claimed in claim 8, wherein the incisions disposed laterally of the lifting nose extend upwardly beyond the upper surface of the lifting nose and this surface extends below the level of the weakening line so that the lifting nose acts as a tear off lug.

11. A closure as claimed in claim 8, wherein reinforced edges are arranged above and below the weakening line between the lifting nose and the downwardly extending band of the external cap.

12. A closure as claimed in claim 8, wherein the underside of the lifting nose is slightly inclined outwardly and upwardly and a roof-like reinforcement is provided for connection of the upper surface of the lifting nose with the external cap.

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