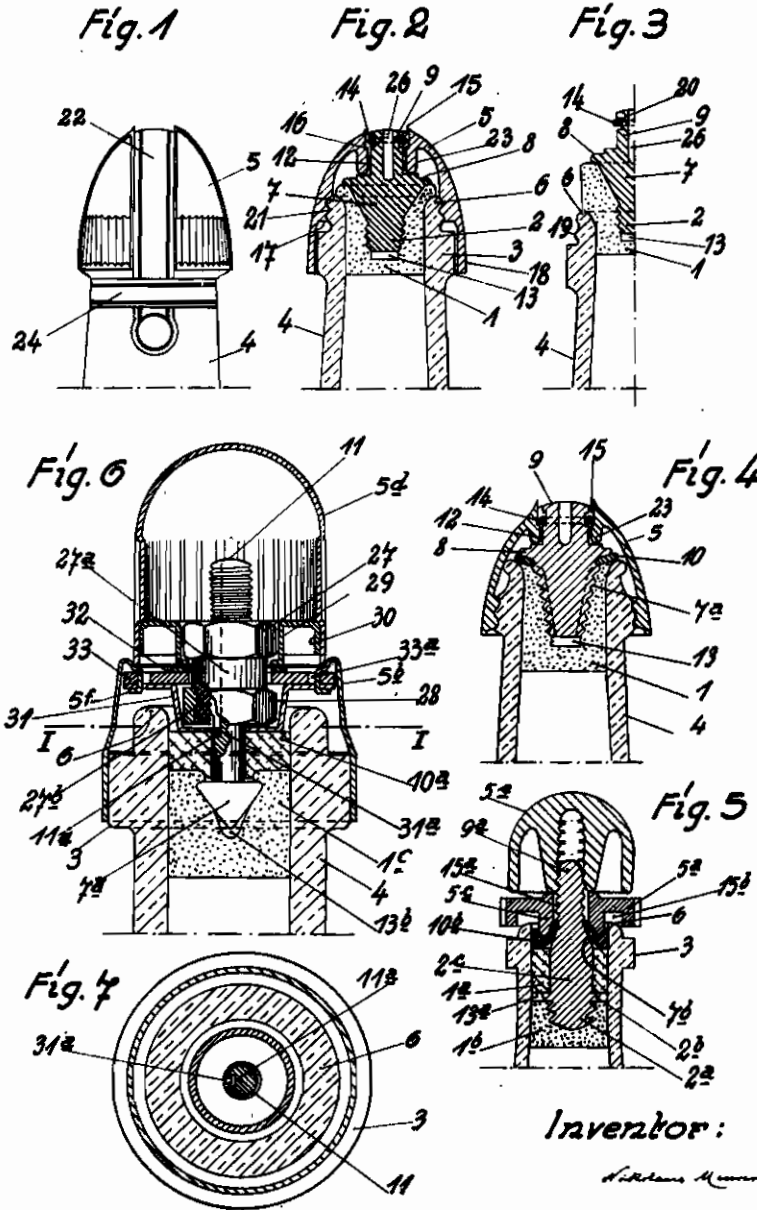


PUBLISHED  
MAY 25, 1943.  
BY A. P. C.

N. MEURER  
BOTTLE CLOSING DEVICE  
Filed May 23, 1939

Serial No.  
275,201



Inventor:

*N. Meurer*

*John A. ...*

*for Attorney*

# ALIEN PROPERTY CUSTODIAN

## BOTTLE CLOSING DEVICE

Nikolaus Meurer, Cologne, Germany; vested in  
the Alien Property Custodian

Application filed May 23, 1939

Bottle closing devices are known, especially for liquids containing large quantities of gas such as mineral waters, which consist of a rigid carrier core for the stopper made for example of rubber, whereas the upper end of the carrier core is surrounded by a body such as a cap freely rotatable relatively to the core and which serves for gripping.

When this body is turned, the carrier core and stopper moves upwards and is radially expanded or stretched for the purpose of closing the bottle or is contracted, that is its diameter is reduced to less than that of the bore of the bottle neck for the purpose of opening the bottle. Rubber plugs cannot, however, be used for many beverages for numerous reasons.

The bottle closing device according to the invention enables the use of cork as a stopper mounted on the rigid carrier core without the cork being excessively stressed. This object is attained by constructing the carrier core so that, during the closing operation, it deforms the cork more strongly at its upper end than at its lower end, that is the upper end is radially distended and at least the longer lower portion of the cork protects the material against fatigue which is soon caused by repeatedly overstressing its elastic properties and leads to a deterioration of its tight closing properties.

Generally this special construction of the carrier core can be attained by tapering at least a portion of the carrier core, which may be either within the cork or within an elastic second packing member covering the upper end face of the cork. Therefore, in cases in which it appears particularly necessary to produce a packing resisting strong gas pressures, a second packing member of rubber is according to the invention arranged on the carrier core above the cork and, during the closing movement, is caused to bear tightly against the upper end face of the cork on the one hand and against the bottle mouth on the other hand, so that not only resistance against strong gas pressures in the contents of the bottle is ensured but also an undesirable too great deformation of the upper end of the cork is prevented without the upper packing member on the cork coming into contact with the contents of the bottle.

Several embodiments of the invention are illustrated by way of example in the accompanying drawing, in which:

Fig. 1 shows in elevation and in closed state the upper end of a bottle fitted with the closing device,

Fig. 2 is a longitudinal section of Fig. 1,

Fig. 3 is a part longitudinal section of the device without outer cap,

Fig. 4 is a longitudinal section of a modified form of construction,

Fig. 5 shows a third form of construction in longitudinal section,

Fig. 6 shows a fourth form of construction in longitudinal section,

Fig. 7 is a cross-section on line I—I of Fig. 6.

The closing device comprises a cork 1 which, before being assembled with other closing parts, is cylindrical along its entire length, a carrier core 2 for the cork 1, which carrier core in the construction illustrated in Figs. 1 to 3 has a few screw thread turns only at its lower end and is made for example of porcelain, glass or artificial resin, a reinforcing collar 3 formed on the upper end of the bottle neck 4, and a cap 5 for example of bell shape, having an internal screw thread 21 (Fig. 2) and serving as gripping means. The upper edge of the bottle neck is designated by 6; 7 is a tapered middle portion of the core widening in upward direction, 8 is a flange or collar plate formed at the upper end of the tapered portion 7, and 9 is a cylindrical head piece of the carrier core extending upwards from the flange plate 8 and having a central bore 26. The cap 5 has at its upper end a boss 23 with a central bore 12 (Fig. 2) for the reception of the head piece 9 of the core. In the examples illustrated in Figs. 1 to 4 and 6 the cork 1 has a central bore 13 extending partly through the cork from the upper end thereof, which bore tapers from its upper end into a cylindrical portion at its lower end, the tapered portion of the bore being of smaller diameter than the tapered portion 7 of the core 2, 7, 8, 9 before the core is screwed into the bore. 14 is a spring ring slipped over the rounded end face of the core head piece 9 and fitting in an annular groove 20 in the periphery of this head piece. This ring 14 is of slightly larger diameter than the bore 12 in the hub 23 of cap 5 and engages in a widened portion 15 at the upper end of this bore, the ring 14 being supported by a shoulder formed between the widened portion 15 and the bore 12. A shoulder 17 is formed at the lower end of the screw thread 21 in the cap 5 between this thread and a smooth skirt 19 at the lower end of the cap, the bottle neck 19 extending upwards from the collar 3 to the upper edge 6. A strip 22 of paper or the like straddles the cap 5, its ends being stuck tightly on the

bottle neck and secured by a closing strip 24 of paper pasted around the bottle neck.

It is evident that the hub bore 15 must be so dimensioned that the spring ring 14 can easily be slipped on to the head piece 9 into the groove 20 and can be slipped off the head piece with the aid of a hook-shaped tool.

As the cork bore 13 enables the insertion of the carrier core 2, 7, 8, 9, by screwing the thread on the lower end of the core 2 into the cork with the aid of a key inserted in the bore 29 which is preferably of angular cross-section, the cork is forced outwards merely on the tapered portion, the displacement gradually increasing towards the upper end of the cork. Consequently, before the device is inserted in the bottle neck the upper portion of the cork 1 influenced by the tapered portion of the core is given a conical shape widening towards the bottle neck bore. This portion is therefore made conical without being cut in conical shape, with the result that the production is cheaper, and it need only have a portion which is slightly, say one millimeter, thicker than the width of the bottle mouth. Thus, the introduction and removal of the cork is very considerably simplified but nevertheless an absolutely tight closure is obtained, because, as can be seen from Fig. 3, the conical thickening of the cork only commences at the base of the tapered portion 7. The lower end of the cork 1 can be easily inserted into the bottle neck when closing the bottle, by exerting a downward pressure on the cap 5 held in the hand. A greater resistance on the conically widening portion is easily overcome by subsequently screwing the cap 5 by means of the screw threads 19, 21, so that the leverage of the screw thread assists the pressure exerted on the cap. At the same time the skirt 19 of the cap bearing against the periphery of the reinforcing collar 3 centres the vertical movement.

The upper edge portion of the cork 1 at the end of the downward movement bulges under the influence of the tapered portion 7 and the flange 8 in the manner illustrated in Fig. 2 with the result that a sufficiently tight closure for all liquids not under tension is obtained.

In the second form of construction shown in Fig. 4 the screw thread 21 is arranged in the reinforcing collar, and the female screw thread in the cap 5 is arranged in the lower end of the cap.

The cork 1 in this form of construction is covered at its upper end by a rubber disc 10 which engages in an annular groove-like bearing above the screw thread of the carrier core 7a which here extends conically along the entire length engaging the cork and has a screw thread along the whole of this length. The screw threaded conical portion 7a is consequently not stepped; the thread cuts tightly into the flesh of the cork when the carrier core is screwed during the assembly of the device.

The cork bore 13 in the previously described examples is shown not entirely filled by the core screwed therein. The portion of the bore remaining free enables liquid from the bottle to enter this bore when the bottle is in horizontal position. The liquid entering therein wets the cork from the inner side even when the bottle is temporarily stood upright. Thus, a hardening of the material at the mouth of the cork is avoided. The closing device can be opened with very little exertion by unscrewing the cap 5, because the first and greatest resistance is overcome by turning the cap 5. During this turning movement the

cap 5 pulls the cork with the core out of the bottle neck until the cap thread leaves the screw thread on the bottle neck. A pull is then exerted using the cap as a gripping means. As has been mentioned already, the cork 1, before being fitted, is made only slightly thicker than the mouth of the bottle, it widens only slightly after the insertion of the core because, even in the construction illustrated in Fig. 4, the core 1 remaining cylindrical at its lower end only commences to taper appreciably from about half its length by the portion of the conical portion 7a of the carrier core which is here of larger diameter.

The cap 5e is, in the third form of construction shown in Fig. 5 also in closed position and consists of a nut which is screwed on to the screw threaded head piece 9a of the core 2a, 2b, 7b, 9a and bears against a guide element 5a which loosely surrounds the head piece.

This core carries three closing parts arranged one above the other, namely the cork 1b, a cork ring 1a and a rubber ring 10b. The cork ring 1a is mounted on a cylindrical portion 2c, and the cork 1b which has a bore, which does not extend right through, is screwed on to the foot portion 2a of the core. A flange 2b between the portions 2a and 2c serves as support for the cork ring 1a and for forming a collecting space 13a for accommodating liquid.

The soft rubber ring 10b mounted on a conical portion 7b of the carrier core may be omitted for bottles for liquids which do not contain gas or are only slightly alcoholic.

The lower surface of the gripping cap rests on the ring-shaped guide element 5a whose periphery is roughened or fluted. The guide element 5a has a bore giving free access to the carrier core portion 9a. The annular space 15b cooperates with the outer side of the mouth 8 or reinforcing collar 3 and forms a guide during the vertical displacement of the core, to ensure the coaxial movement of the parts of the closing body.

Before commencing the closing operation, the cap 5e is screwed on to the head portion 9a as far as possible without its hub exerting pressure on the guide element 5a so that this element cannot exert any pressure on the packing ring 10b. The ring 10b and the cork ring 1a are therefore not stressed and, as the cork ring 1a and the cork 1b are of only slightly larger diameter than the aperture of the bottle mouth, both corks and the ring 10b mounted on the cone 7a can be pressed into the bottle neck until the guide element 5a rests on the mouth 8 of the bottle. The guide element 5a is then gripped and held tightly in one hand and the cap 5e is turned with the other hand with the result that the carrier core 2a, 6, 7b, 9a is pulled upwards into the cap. During this movement the inwardly bevelled lower end of the hub 5c of the guide element 5a squeezes the ring 10b both against the wall of the bottle and against the cone 7b. This hub 5c at the same time presses the ring 10b against the cork ring 1a with the result that this ring 1a is compressed and resting against the flange 7b is pressed radially against the wall of the flange neck so that in conjunction with the ring 10b a liquid and gas-tight closure is produced.

During the opening operation the guide element 5a is relieved by unscrewing the cap 5e and no longer exerts pressure on the rings 10b and 1a with the result that the core can easily be pulled out of the bottle neck with the closing elements 1a, 1b and 10b.

The last form of construction, illustrated in longitudinal section in Fig. 6 and in cross section on line I—I of Fig. 6 in Fig. 5. A cylindrical cork 1c forms the closing element and has an axial bore 13b extending through part of its length, in which bore a conical foot piece 7a on a spindle-shaped carrier core 11 engages. The foot piece 7d of the core 11 might be provided with screw threads and screwed into the flesh of the cork instead of being smooth and conical.

The spindle 11 has at its upper end a screw thread engaging a nut sleeve 27, whose middle portion 27a has a smooth cylindrical periphery. The head of the sleeve 27 is hexagonal whereas the lower end has an external thread engaging a nut 28. The head of the sleeve 27 fits in a recess 29 adapted to its shape and formed in a bottom plate 30 fitted in the cap 5d. By turning the cap 5d the parts 27, 27a, 27b, 28 and 29 are also rotated but the spindle 7d, 11 is only axially displaced because the spindle 11 has a longitudinal groove 11a in which a projection 31a on the base 5b serving as guide engages. The under surface of the wall surrounding the recess 29 in the cap bottom plate 30 rests on a cover plate 32 of the base 5b. The plate 32 is reinforced by a ring 33 and by a cup-shaped structure 31 accommodating the nut 28. The above mentioned projection 31a is formed on the periphery of a bore in the bottom of the cup for the passage of the spindle 11. The cap 5d, its bottom 29, 30, the parts 33 and 31 and also the spindle 7d, 11 with the parts 27, 27a, 27b and 28 mounted thereon, are assembled to form a constructional unit in that the discs 31, 33 have three or four uniformly distributed slots 3a through which flaps 5/ on the cover plate 32 of the base 5b extend and are bent

over on to the under side of the disc 31 and thus unite the parts 31, 33. When the cap 5d is turned, the nut 28 prevents it from becoming detached from its base 5b without preventing its movement relatively thereto but, as the base rests on the bottle, it must be held firmly with one hand. The parts 5b, 5d, 29, 30, 31, 32 and 33 may be made of sheet metal. The spindle 7d, 11 may be made of metal or artificial resin. The space 13b not filled at the bottom by the cone 7a enables the collection of liquid from the bottle for the purpose of moistening the cork 1c from the interior.

By pressing the spindle foot 7d into the bore in the cork 1c the material of the cork at the mouth of the bore spreads inwards over the upper surface of the foot 7d. Before this takes place, a rubber ring 10a must be slipped over the conical foot until it bears against the under surface of the cup bottom 31.

For the purpose of closing the bottle, the closing elements 1c and 10a mounted on the spindle 11 of the closing element thus assembled are introduced into the bottle neck. The base 5b is then gripped and tightly held in one hand while the cap 5d is turned with the other hand. The spindle 11 then moves upwards and the ring 10a is compressed. Under the pressure exerted by the under surface of the part 31 against the top surfaces of the closing elements 10a and 1c, the material of the ring 10a is also pressed against the cylindrical portion of the spindle and into the space above the conical portion 7a, the cork 1c being forced inwards at its upper end like a collar so that the cork 1c and the conical portion 7a of the spindle are firmly connected, and the two closing elements 10a and 1c are at the same time pressed against the wall of the bottle neck.

NIKOLAUS MEURER.