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R. R. AMESBURY ET AL

3,279,643

CLOSURE MEMBER

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Fig. 1.

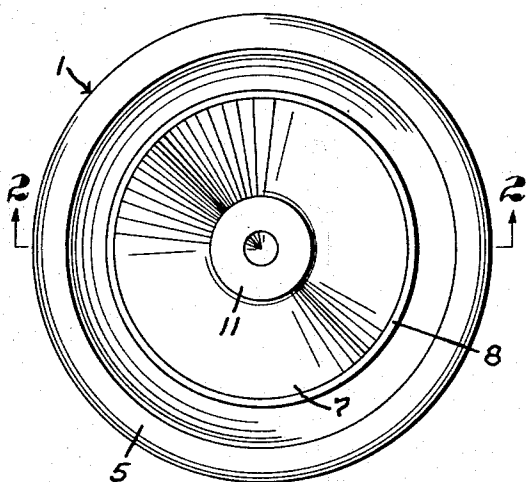


Fig. 2.

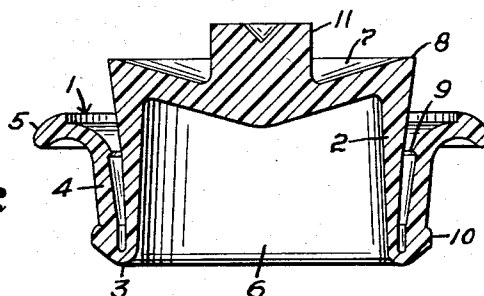


Fig. 3.

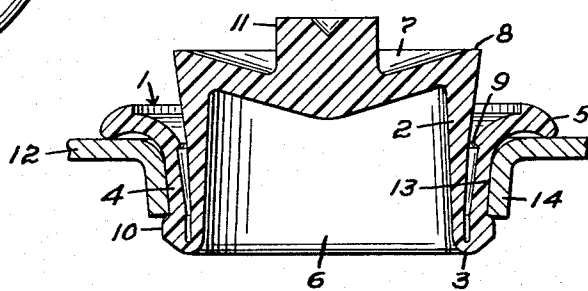


Fig. 4.

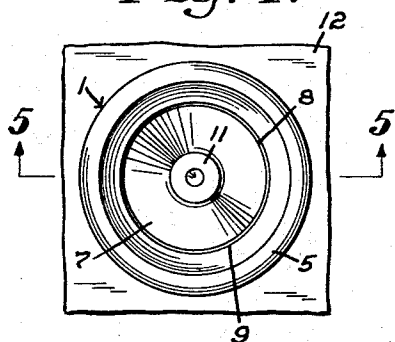
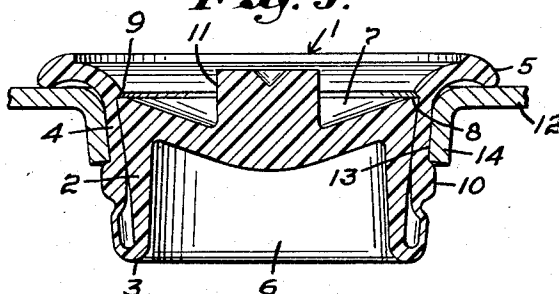


Fig. 5.



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CLOSURE MEMBER

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The invention relates generally to plug members adapted to provide a seal closure in an apertured workpiece and more specifically to provide a plug or closure member for sealing an opening in gas and/or liquid-carrying containers.

While it is envisioned that the invention might be employed in numerous diverse applications, the design disclosed herein was motivated principally by the need of the brewing and beverage industries for an improved plug for use in containers for malt or carbonated beverages. Thus for purposes of illustration only the invention will hereinafter be described with reference to its application as a closure member for a beer container.

Those familiar with the brewing art will appreciate that metal containers used therein require a relatively large access opening to facilitate draining and cleaning of such containers to render the same reusable.

The same persons will likewise be familiar with the filling procedure which generally includes the steps of purging the container of air utilizing carbon dioxide (CO₂) gas under pressure, adding beer under pressure while simultaneously bleeding off the gas and thereafter capping the beer-filled container.

Shortly after the container is capped CO₂ gas comes out of the beer solution and, in effect, forms a head on the beer under a very low pressure, on the order of 5 p.s.i. at 35° F. So long as this condition continues the beer is protected and will retain its freshness and effervescence until the container is tapped. However, should the CO₂ gas leak from the container and air leak in, the beer will become stale and flat, in a comparatively short period of time. In addition, should the container be stored at room or higher temperatures the pressure exerted by the CO₂ will increase substantially.

Consideration of the foregoing remarks makes it quite evident that a closure member for any access opening in the container must hermetically seal said opening to prevent the escape of the CO₂ and prohibit the entrance of air into the container. Further any design for a closure member should incorporate a locking feature in order that the member will be capable of withstanding relatively high internal pressure from the contents of a container without becoming dislodged. On the latter point it would be well to consider that a spontaneous blow-out of a closure member due to a pressure build-up in the container, while undoubtedly resulting in a loss of the beer, might also cause injuries to persons or other objects located in the vicinity thereof.

Tests conducted utilizing the present invention have indicated that it will withstand pressures of up to 160 p.s.i. before blowing out or becoming dislodged.

In the past access holes in beer containers, which are usually made of aluminum or in some instances stainless steel, have been secured by driving tapered wooden plugs into the opening. This method has in most instances required that a heavy metal plate be welded to the container adjacent the opening in order that the container will not be damaged by the force of a blow(s) necessary to seat the wooden plug. While the last mentioned requirement of course increases the cost of a container which is passed on from manufacturer to brewer and ultimately the consumer, the most notable deficiency has been the all too frequent loss of contents because the CO₂

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has escaped and air has entered the container. Investigations have shown that the loss has occurred for a number of reasons including improper seating of the wooden plug, warped plugs leaving small voids at the edges of the access hole, and cracked plugs providing a convenient avenue of escape for the CO₂. In connection with the cost of protective metal plates it should also be noted that the brewing industry is currently considering marketing smaller containers (on order of one gallon) of beer for home consumption, in which instance the availability of a plug such as that disclosed herein takes on added significance.

The presently disclosed device is seen to constitute a unique and welcome solution to each of the problems recited above and thus its objectives are as follows:

(a) To provide a simple, efficient and inexpensive closure member for use in an apertured workpiece;

(b) To provide a closure member which will hermetically seal an opening in a liquid and/or gas carrying container;

(c) To provide a closure member which possesses a locking feature rendering the member capable of withstanding considerable pressure from the contents of a container;

(d) To provide a closure member which can be installed by the uniform application of pressure from a press or other appropriate tool, thereby reducing the possibility of damage to the container and obviating the need for protective plates, etc.; and

(e) To provide a closure member which possesses all the above-mentioned characteristics and yet can be removed to obtain access to the container.

Other objects and advantages of the novel closure member will become evident from a reading of the following detailed description in conjunction with a viewing of the accompanying drawings in which:

FIG. 1 is a top plan view of the novel closure member;

FIG. 2 is a section taken on line 2—2 of FIG. 1;

FIG. 3 is a sectional view of an installation depicting the closure member partially seated in an apertured workpiece;

FIG. 4 is a top plan view of an installation depicting the closure member fully seated and locked in an apertured workpiece; and

FIG. 5 is a section taken on line 5—5 of FIG. 4.

As shown in FIGS. 1 and 2 the closure member 1 includes an inner barrel portion 2 having one end reversely bent at 3 to provide an outer peripheral wall 4 which in turn terminates in an outwardly and downwardly extending peripheral flange 5.

The inner barrel portion 2 defines an internal cavity 6 and extends upwardly in an outwardly flared configuration to its free end 7. The latter being dished downwardly and inwardly and presenting an abrupt peripheral edge 8.

The outer wall 4 which is circumferentially spaced from the barrel portion 2 has an upwardly and inwardly extending circumferential shoulder 9 opposite said barrel portion and an outwardly and downwardly projecting peripheral shoulder 10 adjacent the reverse bend 3.

A solid, circular stud 11 is molded integral with and extends upwardly from the center of said barrel portion 2 adjacent the inwardly dished free end 7. The purpose of stud 11 will be considered in detail hereinafter.

FIGS. 3, 4, and 5 depict the closure member 1 in conjunction with a supporting workpiece 12, for example, an aluminum container. The workpiece is provided with an extruded access hole 13 which is defined by a downwardly (inwardly) extending flange 14.

FIG. 3 depicts the initial step in securing the closure member 1 which is to force the member into the opening

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13 using the flange 5 as a work surface until the outwardly projecting peripheral shoulder 10 engages beneath the lower (inner) end of the extruded flange 14. In this position the outer peripheral wall 4 circumferentially abuts the longitudinal edge of the flange 14 and is compressed slightly inwardly towards the inner barrel portion 2.

The full seating and locking of the closure member in the workpiece as shown in FIGS. 4 and 5 is accomplished by axially depressing the inner barrel portion 2 until the upper peripheral edge 8 engages beneath the inwardly projecting shoulder 9.

In the locked position the outer peripheral wall 4 is in effect squeezed between the flange 14 and the inner barrel portion 2 due to the outwardly flared configuration of the latter. Further, the peripheral flange 5 is drawn tightly against the surfaces of the workpiece adjacent the aperture 13 and the projecting shoulder 10 is rolled outwardly to more firmly engage the free end of the flange 14. Each of the aforementioned factors co-operatively contribute to the effective hermetic sealing of the opening in the workpiece.

In carrying out the axial depression of the inner barrel 2 the stud 11 serves mainly as a reference for properly orienting the tool (not shown) employed. Since it is desirable that the barrel be depressed uniformly in a vertical direction, best results have been obtained utilizing a press having a hollow tool of internal diameter slightly larger than the stud 11. As the press is lowered the tool envelops the stud 11 and engages the dished portion 7 of the barrel adjacent the base of the stud and thence continues downward until the position of FIG. 5 is reached. The stud 11 also serves as a convenient means for grasping the closure member with a pulling tool when the occasion to remove same from the workpiece arises. Further the same stud serves to strengthen the center of the barrel portion to prevent reverse buckling when the closure member is subjected to pressure from the contents of a container.

The locking capabilities of the invention cannot be too highly emphasized. To that end it would be well to point out that it is, for all practical purposes, impossible to manually remove the closure member from the workpiece. Further the locking is so effective that crude attempts to remove the member by gripping and pulling on the stud 11 will in many instances cause a severing of the dished end of the barrel portion before the remainder of the closure member withdraws from the opening. Moreover, tests conducted under severe and highly unrealistic conditions have proved that the device provides an absolutely positive seal at the opening 13.

With reference to the foregoing description it is to be

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clearly understood that what has been disclosed herein represents only a single embodiment of the invention and is to be construed as illustrative rather than restrictive or limiting in nature; the scope of the invention being best defined by the following claims.

What is claimed:

1. An installation comprising in combination a workpiece having an internal wall defining an aperture therein and a closure member seated in said aperture, said closure member including a barrel portion having one end reversely bent to form an outer wall, said outer wall having an outwardly extending flange at one end thereof overlying portions of said workpiece adjacent said aperture and an inwardly projecting shoulder adjacent said flange, said barrel portion having an outwardly and upwardly flared configuration terminating in a free end having an edge in abutting engagement with said inwardly projecting shoulder such that portions of said outer wall are compressed against portions of said wall defining said aperture, said inwardly projecting shoulder extending inwardly over the edge of said free end to lock said member in said workpiece.

2. An installation according to claim 1 wherein said outer wall has an outwardly projecting shoulder engaging portions of said workpiece adjacent said internal wall defining an aperture therein.

3. An installation according to claim 1 wherein said barrel portion has a solid, operating stud extending upwardly from the free end thereof to provide a convenient means for removing said closure member from said workpiece.

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