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(54) Improved pressure release closure.

(57) An improved pressure release for use in containers for pressurised liquid in which the closure is formed partly within a pouring closure and partly outside the pouring closure whereby the pressure releasing closure is permanently opened by the opening of said pouring closure to create an air vent or liquid draining opening outside the pouring closure.

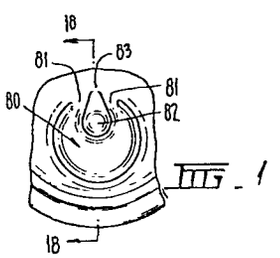

Fig. 1

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IMPROVED PRESSURE RELEASE CLOSURE

This invention relates to improvements in push-in easy opening closures, particularly, but not exclusively, pressure releasing vent closures, and to container members incorporating such closures.

In our Application No.78300012.8, from which the present application is divided, we disclose several different closure arrangements as applied to can ends for containers for highly carbonated beverages. The problems of the prior art and the solutions provided by the invention described and claimed in this application are discussed in detail in the specification of our earlier application and the disclosure of this specification is hereby incorporated into the present application by cross-reference.

In certain circumstances it may be desirable for resealable closures of the general type described in the above specification to be permanently opened when a pouring or drinking closure associated with the pressure releasing closure has been opened so that the pressure releasing closure acts to vent air into the container during pouring or drinking.

It is therefore an object of the present invention to provide an improved push-in closure arrangement in which the pressure releasing closure is permanently

opened by the opening of the pouring or drinking closure, hereinafter called the "pouring" closure.

The invention therefore provides a container member for use in a container for pressurized liquid, said container member including a push-in easy opening pouring closure defined by at least a weakening line, and a smaller pressure releasing closure defined by at least a weakening line and capable of being opened by a push-in force, characterised by said pressure releasing closure being formed partly within said pouring closure and partly outside said pouring closure, said pressure releasing closure being arranged so as to be permanently opened by the opening of said pouring closure to create an air venting passageway to assist in the venting of the contents of the container during pouring or drinking therefrom.

In another aspect, the invention provides a container end for use in a container for pressurized liquid, said container end including a push-in easy opening pouring closure defined by at least a weakening line, and a smaller pressure releasing closure defined by at least a weakening line and capable of being opened by a push-in force, said pressure releasing closure being formed partly within said pouring closure and partly outside said pouring closure, said pressure releasing closure being arranged so as to be permanently opened when said pouring closure is opened, said closures being integrally connected to said container end at a position adjacent the periphery of the end whereby said permanently opened pressure releasing closure creates a liquid draining opening which facilitates substantially complete draining of the contents of a liquid filled container having said container end.

In order that the invention may be more readily understood, several preferred embodiments of the

invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a plan view of one embodiment of the invention;

Figure 2 is an enlarged sectional elevation along the line 18-18 in Figure 1;

Figure 3 is a view similar to Figure 2 showing the closures in the open position; and

Figures 4, 5, 6 and 7 are plan views of modifications of the embodiment of Figure 1.

Referring firstly to Figures 1 to 3 of the drawings, a first embodiment of the closure is shown formed within a depressed region of a can end, the general method of formation thereof being substantially as described in the earlier application referred to above.

The embodiment of Figures 1 to 3 includes a fully sheared closure member or tab 80 which overlaps with and underlies the metal surrounding a generally circular pouring/venting opening and is hinged to the end at 81. A pressure releasing closure or tab 82, of the same type as tab 55 in Figures 9 and 10 of the earlier application referred to above, is formed partly within the tab 80 and is connected to the end at 83, which connection is located outside the tab 80 and about which the tab 82 flexes in the manner described in the earlier embodiments. As shown in Figure 2, the tab 82 overlaps and underlies the surrounding sheet metal of tab 80. In this embodiment, overlap of the tabs 80 and 82 is increased by coining the periphery of the tabs and the sheet metal adjacent the opening closed by tab 80. The dimensions of tab 82 are selected in accordance with the earlier application to prevent permanent opening thereof by a digitally applied force.

In use, the tab 82 is opened to relieve the

pressure within the can. In most cases, the force digitally applied to the tab 82 will also open the tab 80, once the pressure is relieved. However, because the tab 82 is located near the hinge line of tab 80, this tab will tend to open controllably rather than suddenly to avoid accidental injury to the digit from the sides of the opening.

When the closure 80 is opened as shown in Figure 3, the closure 82 is forced to open about its connection 83 and because of the separation between the hinge 81 and the connection 83, the neck of metal joining the tab 82 and the connection 83 will be displaced below the surrounding metal of tab 80 and the can end to create a passageway 84 which acts as an air vent during the pouring or drinking operations. This improves the pouring and drinking characteristics of the end, especially the drinking characteristics in the event that the user's mouth substantially covers the pouring opening.

A modification of the embodiment of Figures 1 to 3 is shown in Figure 4. In this embodiment the pouring and pressure releasing tabs 80' and 82' are identical in construction to the tabs 80 and 82 but the position of tab 82 is inverted so that the main operating portion thereof lies outside the pouring tab 80' and the tab 82' is connected to the tab 80' at 83'.

The main advantages of this embodiment over the preceding embodiment are that the pouring tab 80' cannot be accidently opened when the pressure releasing tab 82' is opened and a larger air venting passageway is formed when the large tab is opened because the main operating portion of the tab 82' is removed from its opening when tab 80' is opened to the position shown in Figure 3.

The same pouring/drinking characteristics may be achieved without the use of a resealable pressure release

tab of the type described in the earlier application referred to above. However, the use of this type of tab is preferred for the reasons expressed in our earlier application.

Referring now to Figure 5, the can end is formed with a fully sheared closure member or tab 90 which overlaps with and underlies the metal surrounding the opening in the same manner as tab 80. The tab 90 is hinged to the end about 91 and a small non-resealable pressure releasing closure tab 92 is formed over the hinge line with part of the tab 92 projecting into the tab 90. The tab 92 is formed in basically the same manner as tab 82 only it is hinged to end about 93 in such a manner that the metal defining the connection permanently deforms when the tab 92 is opened to release the pressure within the can. When the pouring tab 90 is opened, the tab 92 is still further opened as in the preceding embodiment to create a permanent venting passage for the pouring/drinking operations.

The embodiment of Figure 5 may also be modified similarly to the embodiment of Figure 3 by inverting the tab 92.

It will be appreciated that in each of the preceding embodiments, the shape of each of the tabs may be varied at the designer's choice. For example, as shown in Figure 6, the embodiment of Figure 1 is modified so that the tab 80'' is oblate and the tab 82'' is formed with a circular operating portion having a straight sided neck extending therefrom to the connection 83''. Similarly the tab 80 or the tab 82'' may be pear-shaped as in Figure 9 of our earlier application. The tabs 90 and 92 in Figure 4 may be similarly modified.

A still further modification is shown in Figure 7. In this embodiment, the tab 100 is pear-shaped and

its hinge 101 is located adjacent the countersink of the can end. The pressure releasing tab 102 is similar to the tab 82 and has its connection 103 to the end located outside the tab 100 and spaced from the hinge 101. The two tabs have the same basic construction as the preceding embodiments.

The above embodiment opens similarly to the closure shown in Figures 1 to 3 but the tab 102 does not act as a vent during pouring and drinking. Instead the opening created by the tab 102 when the tab 100 opened facilitates additional draining of the contents of the can thereby overcoming one of the problems inherent in positioning the hinge 101 near the countersink.

It may be desirable, where the hinges of tabs 80, 90 and 80'' and tabs 82, 92 and 82'' are located near the centre of the can end, to restrict the extent to which the tabs can be bent about their hinges. This can be achieved by forming an indent or otherwise suitably shaping the undersides of tabs 80, 90 and 80'' so that the forward edges of the tabs 82, 92 and 82'' are engaged within the indent or shaping whereby the tabs 82, 92 and 82'' act as a strut to prevent further bending movement of the tabs 80, 90 and 80'' respectively. In some cases this function may be achieved sufficiently by the frictional contact between the two tabs or by the sealant applied to the tabs. Such an arrangement reduces the likelihood that the hinge metals connecting the tabs to their ends will fracture. This is not a problem with the Figure 7 embodiment since the can wall prevents bending beyond about 90^{o}.

The embodiments of Figures 1, 4 and 5 have some similarity with the can end described in Werth et al U.S.Patent No. 3,741,432 in that the pressure releasing tabs are located partly within the pouring tabs.

However, in the present invention the pressure releasing tab is partly located outside the pouring tab and its hinge or connection is not coincident with the hinging connection of the pouring tab to the end. This provides the quite distinct advantage that a separate air venting passageway, outside the confines of the opening closed by the pouring tab, is formed when the pouring tab is opened, whether or not the pressure releasing tab has been opened previously. While the Werth et al patent describes the release vent tab 21 as remaining open when the tab 15 is opened to create an air admission opening, this opening is unlikely to contribute significantly to the venting of the contents during normal pouring or drinking from the can since sufficient air will be admitted through the can opening. However, if the can is tilted so that the main opening is immersed in liquid, the opening created by the tab 21 will also be immersed thereby preventing the admission of air to the can.

In the embodiments described above, the separate air venting passageway will remain open even when the pouring opening is full of liquid since the venting tab extends outside the pouring opening. Furthermore, the air vent passageways created in the present embodiments are less likely to be covered during the drinking operation, even if the whole of the pouring opening is covered by the mouth of the user.

The closures of the present invention can be used in can ends or in other container members, and can be formed of any suitable sheet metal material, including aluminium and steel, and can be of any suitable shape, depending upon the shape of the can body to which the can end or other container member is to be secured. It is also envisaged that the closures may be made in plastics materials by suitable moulding techniques.

There is no criticality in the absolute size of the pouring closure, although normally the pouring closure will be of such size as to prevent complete insertion of a user's finger, yet large enough to permit adequate outflow of liquid container contents. Likewise, the absolute size of the pressure releasing/venting aperture or opening is not critical, but normally the opening will be of a size as to prevent complete insertion of a user's finger, yet large enough to permit adequate outflow of internal container pressure upon pressure releasing, and to permit adequate inflow of air upon venting.

The sealant which is used for fully severed closures can be any suitable means or material, such as a sealing compound, plastic tape, adhesive foil, hot melt material, a combination thereof, etc. A particularly suitable sealing compound is a plastisol-grade polyvinylchloride combined with a conventional plastisizer and compounding ingredients. Such plastisol should be heat curable to form a non-tacky, somewhat yieldable solid material that aids in retaining the closure in place and maintains a hermetic seal under pressures of the magnitudes which normally occur in cans of carbonated and malt beverages. The sealant must be sufficiently frangible to be ruptured upon the application of digitally applied push-in force on the respective closures. The maximum angular displacements of the closure mentioned above apply only to the indicated grade of aluminium, and to the indicated thickness thereof. Changes of these and other variables in the closure construction will change the maximum permissible angle of displacement.

1. A container member for use in a container for pressurized liquid, said container member including a push-in easy opening pouring closure defined by at least a weakening line, and a smaller pressure releasing closure defined by at least a weakening line and capable of being opened by a push-in force, characterised by said pressure releasing closure being formed partly within said pouring closure and partly outside said pouring closure, said pressure releasing closure being arranged so as to be permanently opened by the opening of said pouring closure to create an air venting passageway to assist in the venting of the contents of the container during pouring or drinking therefrom.

2. The container member of claim 1, wherein said pressure releasing closure is integrally connected to said container member or to said pouring closure, said pressure releasing closure flexing about said connection during the opening operation, said pressure releasing closure being contructed to return substantially to its closed position in the absence of said push-in force.

3. The container member of claim 2, wherein said pressure releasing closure is constructed to prevent deflection of said closure by a digitally applied push-in force beyond the angle at which the elastic limit of the metal at said connection is exceeded.

4. The container member of claim 3, wherein said pressure releasing closure is sufficiently spaced from its connection to said container member to prevent deflection of said connection beyond said angle.

5. The container member of claim 1, wherein said pressure releasing closure is integrally connected to said container member and about which connection said pressure releasing closure hinges during the opening operation, said pressure releasing closure being construc-

ed to permanently deform said connection on opening thereof.

6. The container member of any one of claims 1 to 5, wherein said container member is formed from sheet metal, said pouring closure and said pressure releasing closure being fully sheared from said sheet metal except for a portion connecting each of said closures to said container member, said pouring closure and said pressure releasing closure overlapping and underlying the sheet metal surrounding the opening closed by said closures.

7. A container end for use in a container for pressurized liquid, said container end including a push-in easy opening pouring closure defined by at least a weakening line, and a smaller pressure releasing closure defined by at least a weakening line and capable of being opened by a push-in force, said pressure releasing closure being formed partly within said pouring closure and partly outside said pouring closure, said pressure releasing closure being arranged so as to be permanently opened when said pouring closure is opened, said closures being integrally connected to said container end at a position adjacent the periphery of the end whereby said permanently opened pressure releasing closure creates a liquid draining opening which facilitates substantially complete draining of the contents of a liquid filled container having said container end.

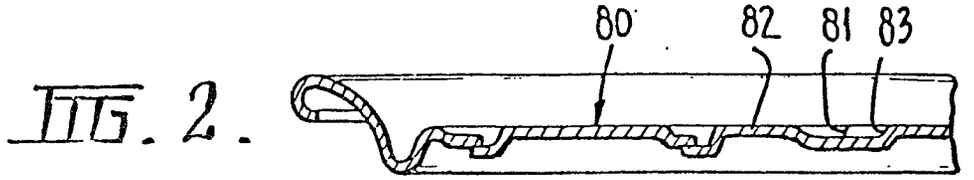

FIG. 2.

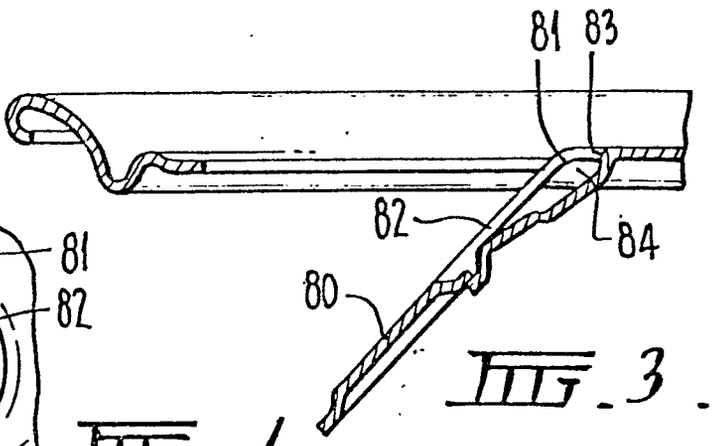

FIG. 3.

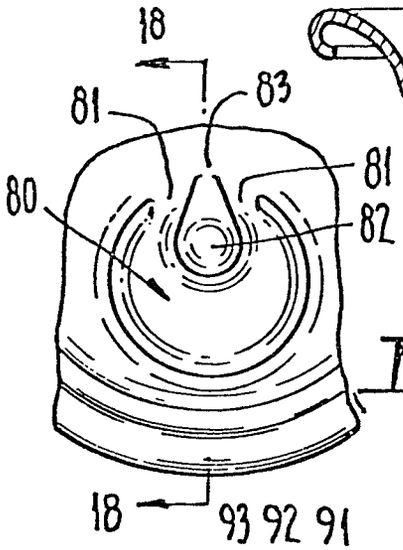

FIG. 1.

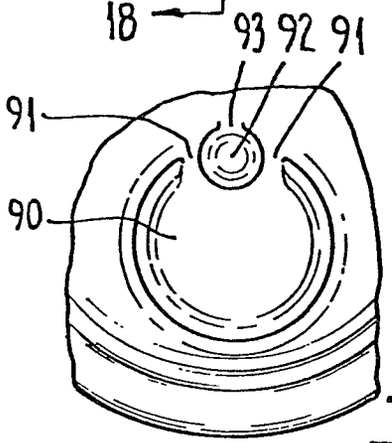

FIG. 5.

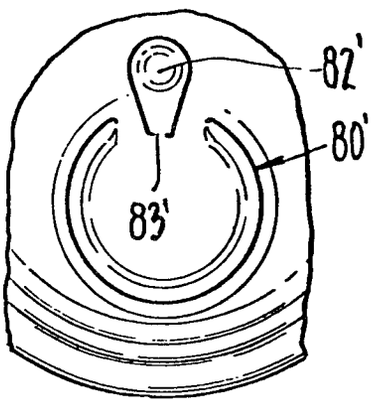

FIG. 4.

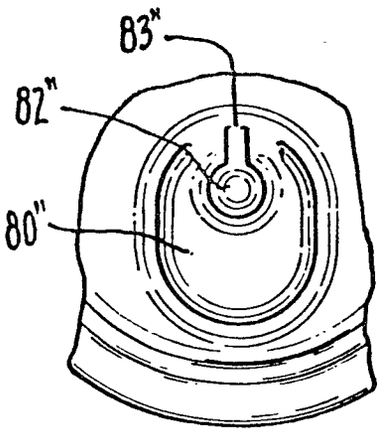

FIG. 6.

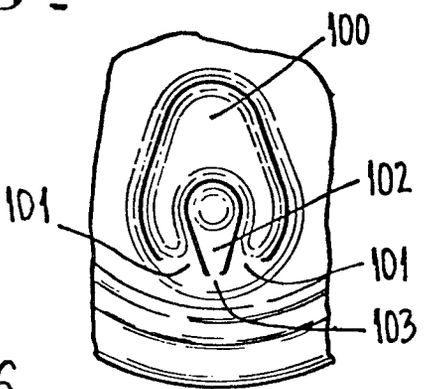

FIG. 7.