April 21, 1942. J. A. HONEGGER 2,280,088

CONTAINER OR CAPSULE FOR HIGHLY COMPRESSED FLUID MEDIA

Filed March 1, 1938 2 Sheets-Sheet 1

Fig. 1.

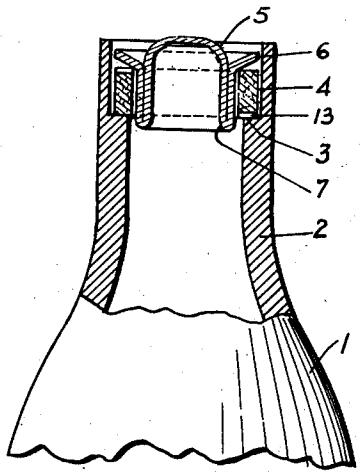


Fig. 2.

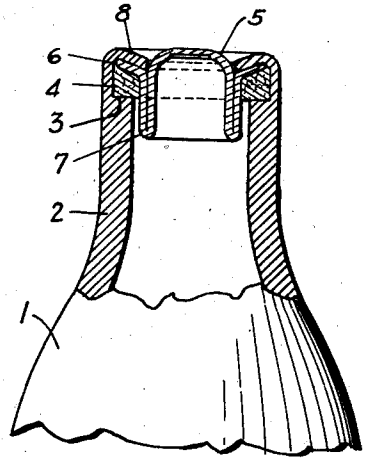


Fig. 5.

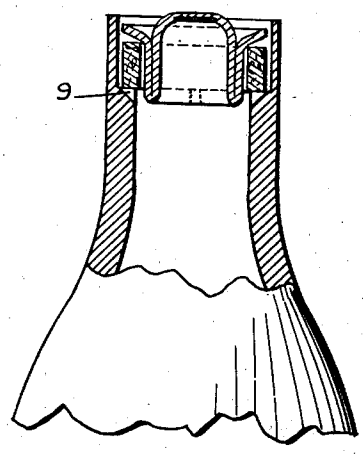
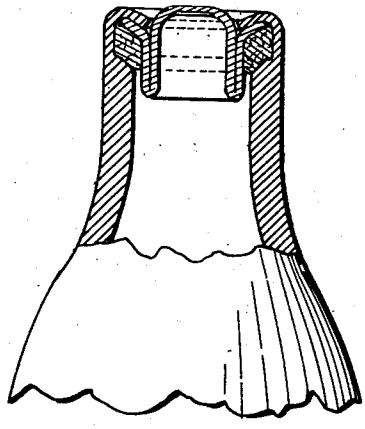


Fig. 6.



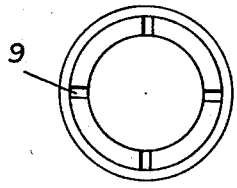


Fig. 7.

INVENTOR
JOHN A. HONEGGER
BY
J. William Carson
ATTORNEY

April 21, 1942. J. A. HONEGGER 2,280,088

CONTAINER OR CAPSULE FOR HIGHLY COMPRESSED FLUID MEDIA

Filed March 1, 1938 2 Sheets-Sheet 2

Fig. 3.

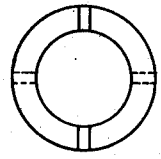


Fig. 4.



Fig. 8.

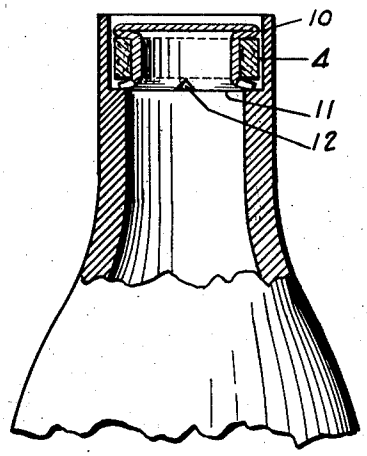


Fig. 9.

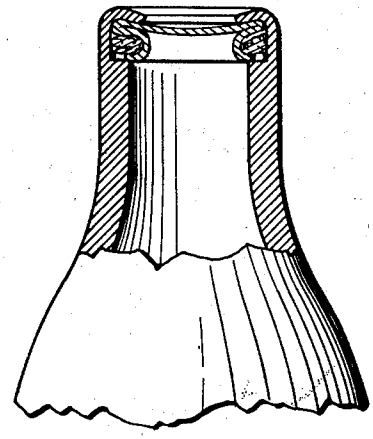
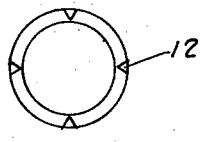


Fig. 10.



INVENTOR
John A. Honegger
BY
J. William Carson
ATTORNEY

Patented Apr. 21, 1942 2,280,088

UNITED STATES PATENT OFFICE

2,280,088

CONTAINER OR CAPSULE FOR HIGHLY COMPRESSED FLUID MEDIA

John A. Honegger, Bloomfield, N. J., assignor to Specialties Manufacturing Company, Inc., Bloomfield, N. J., a corporation of Delaware

Application March 1, 1938, Serial No. 193,253

6 Claims. (Cl. 220—3)

This invention relates to containers adapted to confine fluid media under very high pressures over comparatively long periods of time.

More specifically the invention has reference to closures for metallic capsules designed to store compressed or liquefied gases such as are used for aerating or carbonating beverages. In commercial practice these capsules are often stored for long periods of time under widely varying temperature conditions and with the type of closure at present in general use have been subject to appreciable leakage and sometimes total loss of the gas charge. The usual method of closing these capsules has been to employ a simple form of metallic cap inserted into a counterbored open end of the neck of the capsule to rest on a shoulder formed therein, a rubber washer being placed over the peripheral edge of the cap as a sealing gasket, and the end wall of the counterbored neck being bent over, after completion of the filling operation, to compress the washer and hold the cap in place. In such a procedure, however, there are too many variables to assure uniform leakage proof closing of the capsules, especially in view of the unpredictable shape into which the rubber washer would be pressed, the final shape and position of which is of prime importance in overcoming leakage of the high pressure fluid charge. This problem has been solved by the present invention by controlling the pressure acting on the rubber washer and by providing a closure which definitely confines the washer and compresses it from all sides.

It is therefore an object of this invention to provide a closure for high pressure medium containers, that is substantially leakage proof.

Still another object is to provide a closure that will result in definite compressive confinement of the sealing means.

It is another object to provide a closure which is economical in manufacture and application.

A still further object is to provide a closure which may be easily pierced to effect liberation of the medium thereby confined.

In the accompanying drawings, Figure 1 shows in section the upper portion of a container or capsule, before being closed in accordance with this invention; Figure 2 is the container of Figure 1 shown when it has been closed; while Figures 3 and 4 show two types of washers that may be used with this type of closure.

Figures 5 and 6 show another form of closure before and after closing, while Figure 7 is a top view of the shoulder of the container of Figure 5.

Figures 8 and 9 show still another variation of the closure principle of Figure 1, while Figure 10 is a bottom plan view of the closure of Figure 8.

In Figure 1, the container or capsule 1 is formed with a neck portion 2 counterbored at its upper end to form an internal shoulder 3, which supports a rubber washer or gasket 4 carrying the inverted cap 5, which is, so to speak, held suspended on the washer by its flange 6, and which has a body part 7 of sufficient length to extend into the neck of the container beyond the shoulder 3, and of sufficient thickness to properly withstand any pressure acting through the rubber as a consequence of a closing operation, and to thereby confine the sealing washer, as will be shown later. Figure 1 also represents the position of the elements during the filling of the capsule, space being left between the various elements to permit the passage of gas during the filling operation, upon completion of which the capsule is closed by crimping the open end of the neck over the flange 6 of the cap 5. The result of this operation is illustrated in Figure 2, the edge of the open neck having been crimped as shown at 8 over the flange 6 of the inverted cap 5 to form an interlocking union therewith in direct metal to metal contact. The flange 6 is made sufficiently yieldable to conform to the inside of the crimped-over neck portion to achieve said interlocking union, as well as to prevent any "give" later on due to reactive pressure of the confined washer. The rubber gasket 4 is here seen to have been compressed to about half its original height, being compressively confined by the relatively non-yieldable body part 7 and the neck in the horizontal plane; and by the shoulder 3, the interlocked flange 6, and the crimped-over portion 8 of the neck in the vertical plane; being thereby actually tightly confined on all sides, and thus insuring a leakage proof seal for the high pressure charge in the container. In fact the pressure of the fluid medium in the container even serves to improve the seal, as it acts to further compress the gasket.

Figure 4 illustrates a washer which may be used with the closure of the present invention, and which may be made from molded rubber having serrations so as to thereby provide passages for the gas while the container is being filled, with the closure assembled as shown in Figure 1. Figure 3 is another type of washer which may be used, having radial gas passages on its top and bottom faces. There are, of

course, many variations of such washers possible which would achieve the same effect. Passages in accordance with Figure 3 are indicated on the washer 4 of Figure 1, as at 13.

Figures 5 and 6 show a variation of the closure illustrated in Figures 1 and 2, in that the gas passages are here not provided in the washer 4, but rather in the form of radial notches 9 made in the shoulder 3 of the capsule, as shown in detail in the plan view of the neck and shoulder in Figure 7. Upon crimping of the neck wall over the flange 6 of the inverted cap 5, the washer 4 is compressed to such an extent that the notches in the shoulder are filled in, while otherwise the seal is the same as that illustrated in Figures 1 and 2. Another variation of the principle employed in this invention is provided by the design of Figures 8 and 9. Here, the flange 6 of Figure 1 is obtained not by inversion of the body walls of the cap but rather by a mushroom formation of the top of the cap as indicated at 10, the cap nevertheless serving to confine the washer 4 from the top and sides as before. Here, however, there is another difference in that the wall of the cap body does not extend down beyond the shoulder but is so formed as to rest on it by means of a bottom flange 11, which also serves to confine washer 4 from the lower inside edge. The shoulder 3 confines the washer from below, as in the examples before. In this construction the bottom flange of the cap, which rests on the shoulder, has formed therein gas passages in form of radially placed notches 12 as can be more clearly seen in Figure 10, which is a view of the bottom flange 11. The washer here has no gas passages, as is the case in the construction of Figure 1, but due to its diametrical dimension permits gas to pass between the neck wall of the capsule and the washer through the notches in the bottom flange.

It may be added, in connection with each of the types of closure caps shown, that the central top portion of each cap is coined or thinned out so as to facilitate piercing of the cap when discharge of the confined gas is desired.

It will be noted that in each of the embodiments of the invention illustrated, the closure cap is so constructed as to compressively confine the sealing means from all sides in cooperation with the container wall, upon the bending over of a portion of said container wall to engage the cap and to compress the sealing means. With this construction, the sealing means completely fills the space provided for it and seals every path of escape of the fluid medium while the confinement of the sealing material is such that an extrusion thereof is avoided and the fluid pressure in the container assists in rendering the seal more dense, and therefore better, without the possibility of extrusion.

From the foregoing description, it will be seen that I have provided an improved means to seal a high pressure fluid medium in a container of the type described which is simple and effective, providing as it does a substantially leakage proof seal. It will be further seen that my invention accomplishes the various objects pointed out at the beginning of this specification. Finally, while my invention resides in certain principles of construction and operation which have been illustrated and described in connection with the accompanying drawings, it will be apparent to those skilled in the art that the invention may be embodied in other forms of construction without departing in any manner from the spirit and scope of the invention, and I therefore do not wish to be strictly limited to the disclosure, but rather to the scope of the appended claims.

I claim:

1. In a container for holding a highly compressed fluid medium having a pliable neck formed with an inwardly projecting shoulder having radial recesses, sealing means having a central opening adapted to seat on said shoulder, closure means having a body disposed in said opening extending into the container beyond said shoulder and adapted to be pierced when liberation of the fluid medium is desired; fluid medium conducting means leading into the container comprising in cooperation said neck, said recesses in said shoulder and portions of said sealing means; and supporting means for said closure means comprising a flange thereon adapted to rest on the sealing means; a portion of said neck being bent inwardly to interlock with said flange upon deformation thereof, and said sealing means thereby being compressibly confined between the shoulder and the flange and between said body and neck.

2. In a container for holding a highly compressed fluid medium having a filling opening recessed to provide a shoulder therein encompassed by a relatively thin-walled portion of the container, a noncompressible sealing members subject to "cold-flow" under pressure having a central opening disposed in the recess, a closure member in said recess, a relatively nonyielding body portion of said closure member extending through the sealing member to a point immediately adjacent said shoulder adapted to substantially prevent the "cold-flow" of the sealing member toward its center under pressure, and a relatively yieldable flange on said closure member resting upon said sealing member, the thin-walled portion of the container being crimped-over downwardly over said flange to deformingly interlock therewith, said flange being adapted to transmit to the sealing member the compressive pressire due to the crimping-over of said neck portion, the coaction of said crimped neck portion, said body portion, said flange and said shoulder placing said sealing member under substantially uniform compressive confinement, the "cold-flow" in any direction of the section of the sealing member being substantially prevented thereby.

3. In a container for holding a highly compressed fluid medium having a pliable neck formed with an inwardly projecting peripheral shoulder, sealing means having a central opening disposed in said neck and resting on said shoulder, closure means having a rigid body disposed in said opening and projecting downwardly substantially below said shoulder and closely adjacent the same, and a deformable flange on said closure means overlying said sealing means, a portion of said neck being bent inwardly to deformingly engage said flange, and said sealing means thereby being compressibly confined between the shoulder and the flange and between said body and neck and thereby prevented from being extruded.

4. In a container for holding a highly compressed fluid medium having a pliable neck formed with an inwardly projecting shoulder, sealing means seated on said shoulder having a central opening and radial recesses on at least its seating edge, closure means having a body disposed in said opening extending into the con-

tainer beyond said shoulder and closely adjacent the same and adapted to be pierced when liberation of the fluid medium is desired, fluid medium conducting means leading into the container comprising in cooperation said recesses in the sealing means, said neck and portions of said shoulder and sealing means, and supporting means for said closure means comprising a deformable flange thereon resting on the sealing means, a portion of said neck adapted to be bent inwardly to interlock with said flange upon deformation thereof, whereby said sealing means is adapted to be compressibly confined between the shoulder and the flange and between said body and neck and a tight closure for the container is formed.

5. In a container for holding a highly compressed fluid medium having a pliable neck formed with an annular recess and an inwardly projecting peripheral shoulder formed thereby, an annular sealing member disposed in said recess above said shoulder and having a central opening therein substantially the same as the shoulder, an imperforate closure member for said container disposed within said neck centrally of the opening and having a central perforable portion substantially on a level with the upper edge of said container, a flange-like peripheral formation on said closure member overlying said sealing member substantially on a level with said central closure portion adapted to contact and to retain said sealing member from above, and skirt means integral with the closure member and extending downwardly from the central portion thereof and within the opening of the sealing member to a point closely adjacent the inner edge of the shoulder to laterally retain said sealing member, a portion of said neck being bent inwardly to engage said flange which, in coaction with the shoulder, the neck and said skirt, forms compressive confining means for said sealing member, thereby effecting a tight seal.

6. In a container for holding a highly compressed fluid medium having a pliable neck formed with an annular recess and an inwardly projecting peripheral shoulder formed thereby, an annular sealing member disposed in said recess above said shoulder and having a central opening therein substantially the same as the shoulder, an imperforate closure member for said container disposed within said neck centrally of the opening and having a central perforable portion, a flange-like peripheral formation on said closure member overlying said sealing member adapted to contact and to retain said sealing member from above, and skirt means integral with the closure member and extending downwardly from the central portion thereof and within the opening of the sealing member to a point closely adjacent the inner edge of the shoulder to laterally retain said sealing member, a portion of said neck being bent inwardly to engage said flange which in coaction with the shoulder, the neck and said skirt, forms compressive confining means for said sealing member, thereby effecting a tight seal.

JOHN A. HONEGGER.