United States Patent

[11] **3,584,769**

[72] Inventor **August H. Pinke**
Hastings, Minn.

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[73] Assignee **H. D. Hudson Manufacturing Company**
Chicago, Ill.

[54] **PRESSURE CONTAINER ASSEMBLY**
14 Claims, 10 Drawing Figs.

[52] **U.S. Cl.** **222/340,** 222/38
[51] **Int. Cl.** **G01f 11/32**
[50] **Field of Search** 220/44, 40; 222/340, 385

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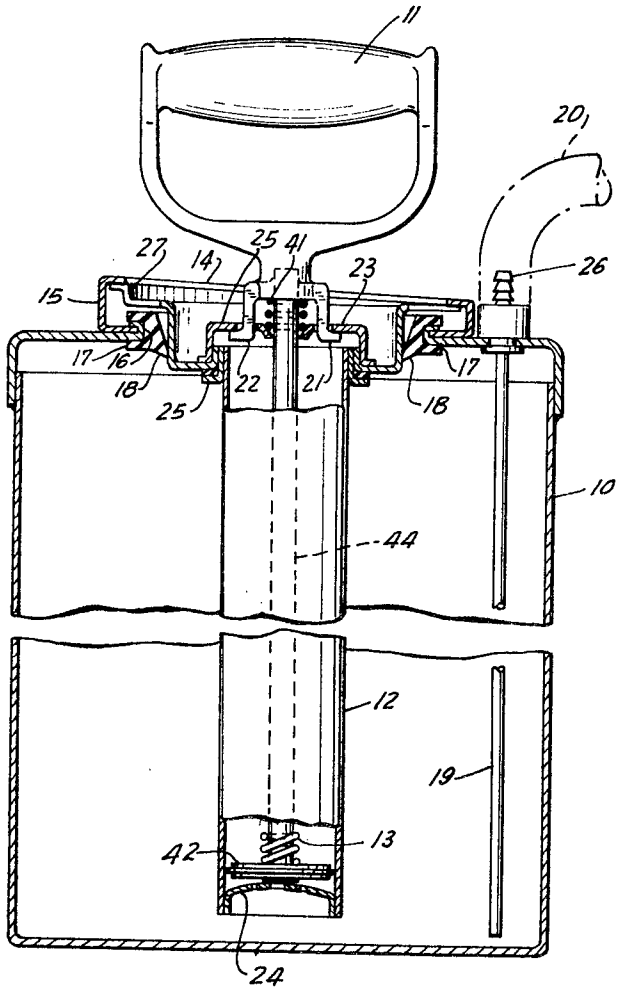
Primary Examiner—Samuel F. Coleman
Assistant Examiner—Norman L. Stack, Jr.
Attorney—Kane, Dalsimer, Kane, Sullivan, and Kurucz

ABSTRACT: A pressure container is described which features a new closure assembly having a pressure release valve which opens to release the tank pressure before the tank cover can be removed. The container is also provided with a seal which increases in effectiveness as the pressure in the tank is increased. This pressure container can be economically manufactured and combines depressurization safety features with increased sealing effectiveness.



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SHEET 1 OF 3

FIG. 1

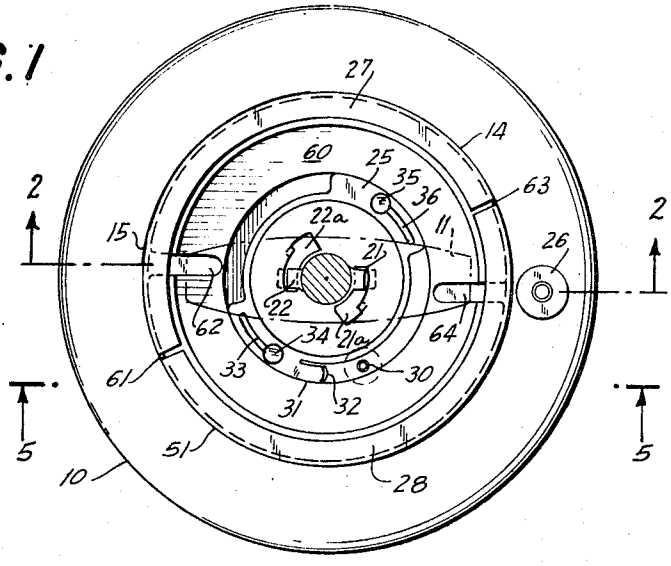
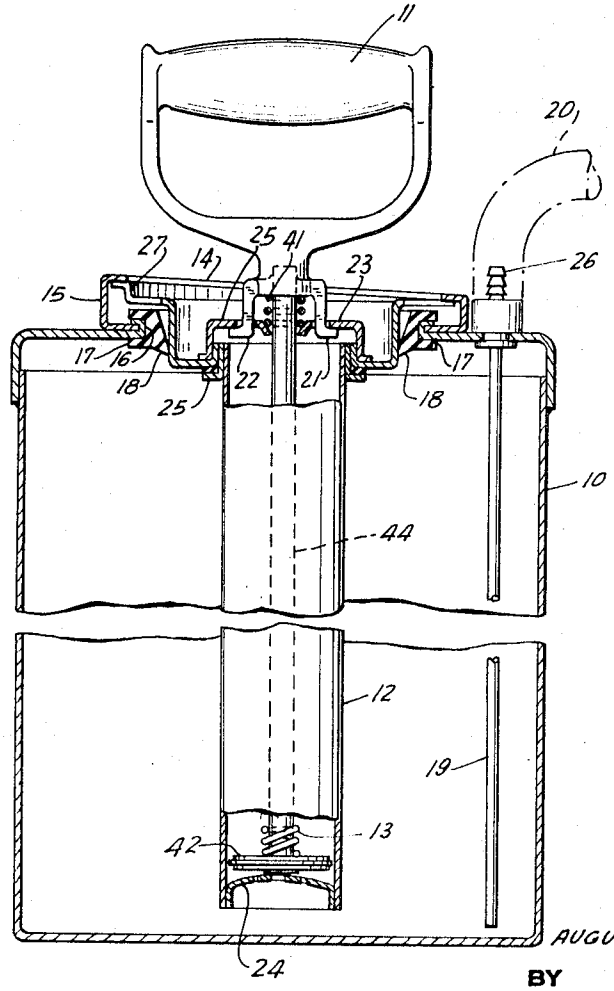


FIG. 2



INVENTOR
AUGUST H. PINKE

BY

Kane, Dalsimer, Kane, Sullivan & Kurucz

ATTORNEYS

FIG. 3

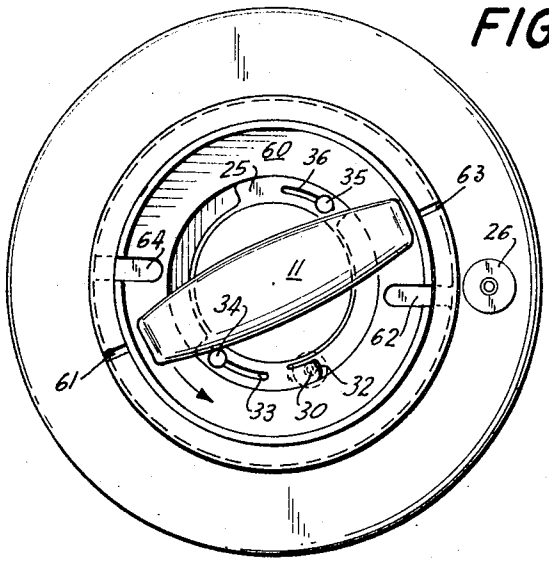
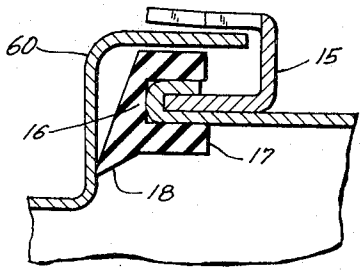


FIG. 10



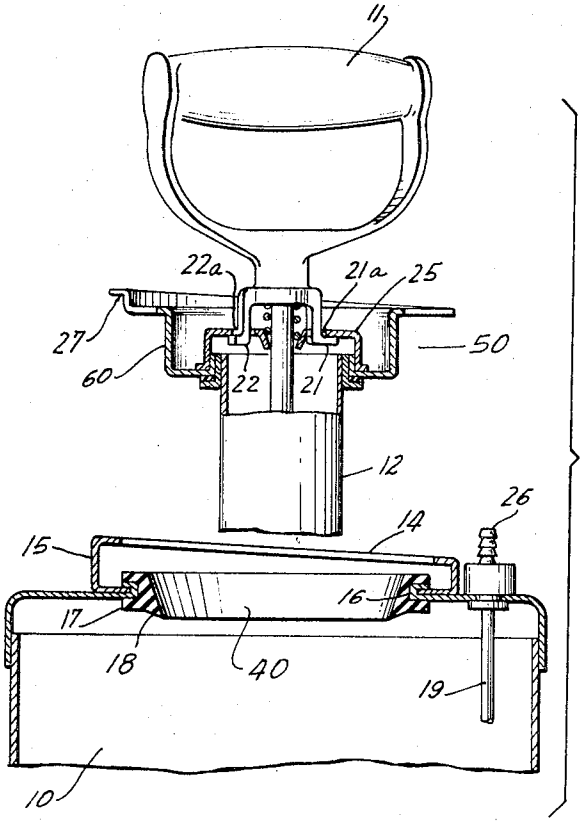
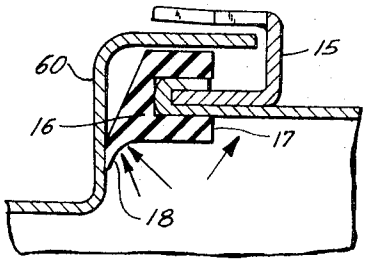


FIG. 7

FIG. 9



INVENTOR
AUGUST H. PINKE

BY

Kane, Dalsimer, Kane, Sullivan & Smith
ATTORNEYS

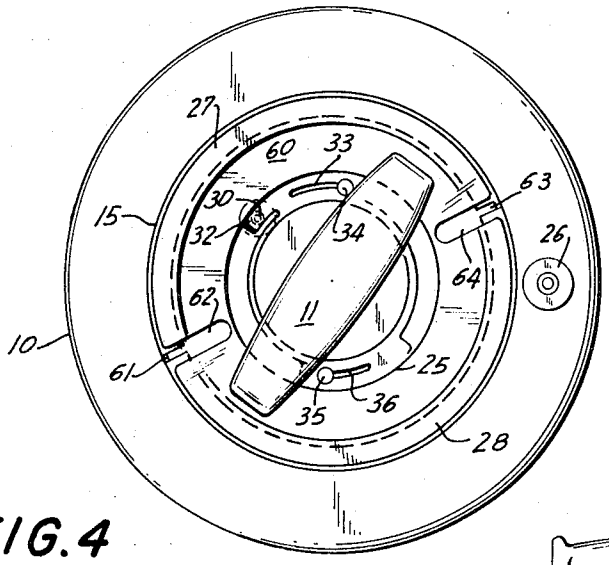


FIG. 4

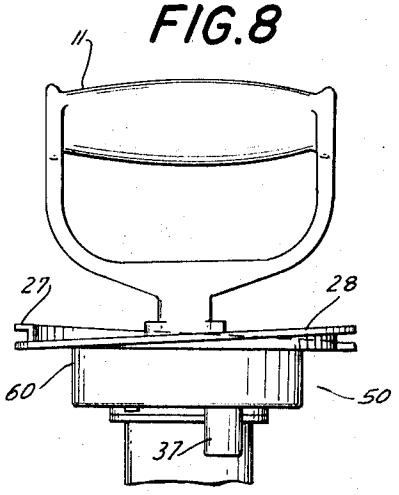


FIG. 8

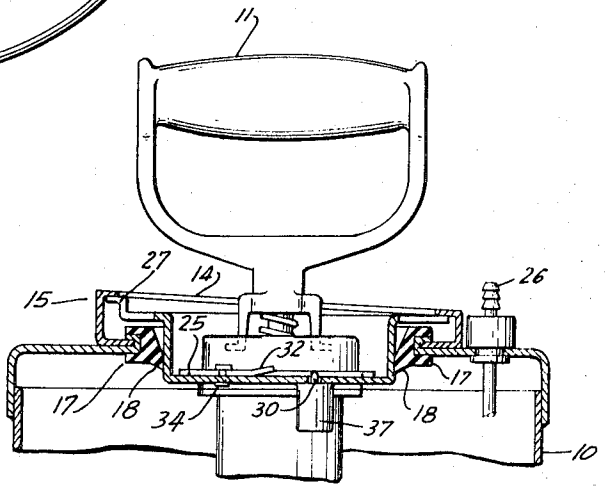


FIG. 5

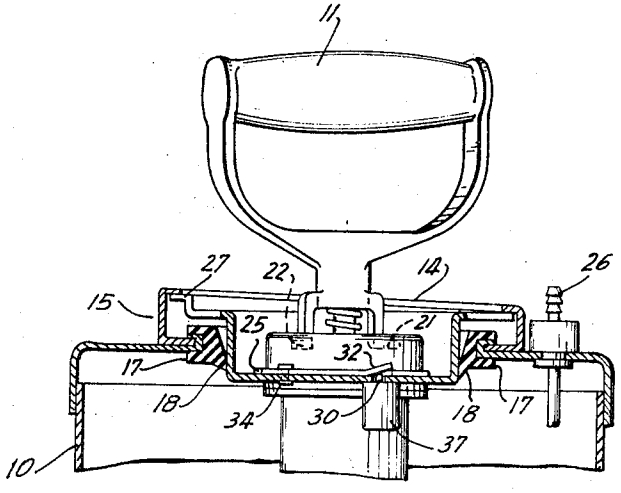


FIG. 6

INVENTOR
AUGUST H. PINKE

BY

Kane, Dalsimer, Kane, Sullivan & Smith
ATTORNEYS

PRESSURE CONTAINER ASSEMBLY

BACKGROUND OF THE INVENTION

This invention relates to a pressure container and, more particularly, to a container for storing fluid under pressure which is provided with an improved closure to cause release of the tank pressure before the cover can be removed from the tank. The closure assembly also includes improved sealing means.

Many containers are commercially available for storing air, liquid or other fluids under pressure. These containers however do not combine depressurization safety features with adequate sealing means in a pressure container which is economical to manufacture.

BRIEF SUMMARY

A container assembly for storing fluid under pressure has now been developed which permits the user to release the internal pressure of the container before the cover is removed. The closure for the container assembly is designed so that the effectiveness of the pressuretight seal increases as the internal fluid pressure of the container tank is increased. This container assembly can be used, for example, as a compressed air sprayer.

An object of this invention is to provide a container assembly for storing fluid under pressure.

Another object of this invention is to provide a container for storing fluid under pressure which is provided with an improved closure assembly which causes the release of the internal fluid pressure before the user can remove the cover from the container tank.

A further object of this invention is to provide a container assembly for storing fluid under pressure which is provided with a closure which increases the effectiveness of the pressuretight seal as the fluid pressure in the container tank is increased.

Other objects and advantages will become apparent from the following description taken in conjunction with the accompanying drawings in which:

FIG. 1 is a top plan view of the container assembly and closure;

FIG. 2 is a vertical sectional view taken along the line 2–2 of FIG. 1;

FIG. 3 is a top plan view of the container assembly and closure with the pressure valve in the open position prior to removal of the container top from the tank;

FIG. 4 is a top plan view of the container assembly and closure showing the container cover in the removable position;

FIG. 5 is a sectional view of the upper portion of the container tank and closure assembly taken along the line 5–5 of FIG. 1, showing the pressure release valve in the closed position;

FIG. 6 is a sectional view similar to that shown in FIG. 5 depicting the pressure release valve in the open position;

FIG. 7 is an exploded partial sectional view showing the upper portion of the container tank and closure assembly in disassembled relationship;

FIG. 8 is a side elevation view of the closure assembly;

FIG. 9 is a sectional view through a portion of upper container assembly showing the sealing gasket elastically deformed by the fluid pressure in the tank into sealing engagement with the cover and tank neck; and

FIG. 10 is a similar sectional view as that of FIG. 9 showing the sealing gasket when the interior of the tank is not under pressure.

DESCRIPTION OF THE INVENTION

In accordance with this invention, the container assembly for storing fluid under pressure includes a tank for storing the fluid which is provided with a mouth through which the fluid can be added to the tank. The tank has a helical neck surrounding the tank mouth and a removable cover having a mating helical flange so that when the cover is positioned over the tank mouth and then rotated, the helical flange of the cover and the helix of the tank neck are brought into mating engagement to secure the cover on the tank. A flexible sealing gasket is circumferentially positioned about the tank mouth and is provided with a bevelled lower section. The gasket is elastically deformed under the fluid pressure of the tank into sealing engagement with the tank and cover to render the container assembly pressuretight. Also included are means for removing the fluid contents of the tank while under pressure, and a pressure release valve carried by the cover which communicates with the interior of the tank. Means are provided for rotating the cover to secure or disassemble the cover and tank. In addition, means cooperating with the cover rotating means are also provided for opening the release valve so that when the cover is rotated for disassembly from the tank, and while the container assembly is pressuretight, the valve will be opened causing the pressure in the tank to be released before the cover breaks sealing engagement with the gasket.

PREFERRED EMBODIMENT

Referring now to the drawings, FIGS. 1, 7 and 8 show the container assembly including tank 10 and closure 50. The upper portion of tank 10 includes neck 15 which is provided with cam surfaces or helix 14 and which surrounds tank mouth 40. Lip 16 serves to circumferentially position gasket 17 about tank mouth 40. Closure 50 includes removable tank cover 60 which is provided with helical flanges 27 and 28 for engaging mating cam surfaces or helices 14 and 51, respectively, of tank neck 15. Handle 11 is provided with legs 21 and 22 which extend downwardly through openings 21*a* and 22*a*, respectively, of plate 25. Handle 11 functions as a means for rotating cover 50 into engagement with neck 15 to couple or uncouple the cover and tank.

FIGS. 9 and 10 show the detailed construction and operation of flexible gasket 17. FIG. 10 shows gasket 17 mounted on lip 16 of the tank with cover 60 in place. Bevelled section 18 in the lower part of gasket 17 is positioned so that its tip engages cover 60. FIG. 9 shows the effect of the internal fluid pressure of the tank on gasket 17, which is here shown in an elastically deformed state (the internal fluid pressure in the tank being represented schematically by the arrows) wherein lower bevelled section 18 is pressed into engagement with cover 60 and the remainder of gasket 17 is pressed upwardly into sealing engagement with neck 15. As the internal pressure in the tank is increased, gasket 17 is further deformed elastically so as to increase sealing engagement with the cover and tank neck. It has been found that an angle of about 20° for bevelled section 18 is satisfactory.

FIGS. 1, 3 and 4 show the sequence of operations in removing cover 60 from tank 10. FIG. 1 is a top plan view of the container tank assembly with cover 60 assembled on the container 10 and plate 25 rotatably mounted on cover 60. Members 34 and 35 protrude upwardly from cover 60 through slots 33 and 36, respectively, of plate 25. When handle 11 is rotated counterclockwise, leg 22 engages the edge of opening 22*a* and leg 21 engages the edge of opening 21*a* so that plate 25 is rotated with respect to cover 60 from the position shown in corresponding FIGS. 1 and 5 to that shown in corresponding FIGS. 4 and 6. As plate 25 is rotated counterclockwise, lip 32 projecting upwardly at an angle of less than 90° with plate 25 (as shown in FIG. 5) engages valve pin 30 of valve 37 mounted in cover 60 (as shown in FIG. 6). Valve pin 30, under the action of the cam surface of lip 32, is depressed downwardly to open valve 37 and release the pressure contained in the interior of tank 10. As can be seen from FIG. 3, as lip 32 covers or engages valve pin 30, protruding members 34 and 35 are pressed against the ends of slots 33 and 36, respectively, of plate 25, and rotates plate 25 along with cover 60 so that the mating helices of cover 60 and neck 15 are disengaged for removal of closure 50 from tank 10. FIGS. 1, 3 and 4 show

slots 33 and 36 to be of predetermined size and position such that plate 25 is rotated through a predetermined angle corresponding to the slot size before members 34 and 35 engage the ends of slots 33 and 36, respectively, to cause plate 25 to rotate in cooperation with cover 60. Moreover, when members 34 and 35 engage the end edges of slots 33 and 36, respectively, lip 32 will have moved valve pin 30 into a depressed position to open valve 37. When plate 25 is caused to rotate in the opposite direction and members 34 and 35 engage the opposite end edges of slots 33 and 36, respectively, lip 32 will have broken engagement with valve pin 30 permitting valve pin 30 to move upwardly into a raised position to close valve 37. When valve 37 is closed the assembled container will retain pressure. It is to be noted, however, that before cover 60 can be removed from tank 10 valve pin 30 is first depressed causing valve 37 to open and release the pressure in the tank 10 before sealing engagement between gasket 17 and the cover and neck is broken. As cover 60 is rotated in the counterclockwise direction to uncouple cover 60 from tank 10, plate 25 will move along with cover 60 and lip 32 will maintain valve pin 30 in a depressed position keeping valve 37 open to ensure equal pressure between the inside and outside of tank 10. FIG. 4 shows cover 60 in the position for removal from tank 10 by lifting upwardly. The safety of the container assembly is thus improved by causing a release of the internal tank pressure before the cover is removed.

FIG. 2 shows handle 11 connected to a pump comprising piston rod 44 extending downwardly into casing 12 and connecting to piston 42. Piston rod 44 forms a pressuretight seal with cover 25 so that handle 11 can be moved upward and downward in a reciprocal motion to increase the interior pressure of tank 10. The fluid contents of tank 10 are removed through outlet tube 19 and connecting hose 20 which can be opened to the atmosphere.

FIGS. 4 and 8 show cover 60 provided with separate helical flanges 27 and 28. Neck 15 shown in FIG. 1 is provided with a pair of mating helices for engaging helical flanges 27 and 28 of cover 60. FIG. 4 shows cover 60 inserted onto tank 10 by aligning cutout sections 61 and 63 of neck 15 with cutout sections 62 and 64 of cover 60. Cover 60 is then rotated clockwise by means of handle 11 so that the mating helices engage and cover 60 is tightened onto tank 10.

Although the present invention has been described in conjunction with preferred embodiments, it is to be understood that modifications and variations may be resorted to without departing from the spirit and scope of the invention as those skilled in the art will readily understand.

What I claim is:

1. A container assembly for storing fluid under pressure which comprises:

a tank for storing the fluid which is provided with a mouth through which fluid can be added to the tank;

a removable cover extending across the mouth of the tank;

means for removably securing the cover to the tank including means for rotating the cover to couple or uncouple the cover and tank;

means at the mouth of the tank and mounted thereon for sealing the cover to the tank to render the container assembly pressuretight including a flexible gasket circumferentially positioned about the tank mouth in contact with the tank and cover and provided with a bevelled lower section, said gasket being in an initial sealing relationship with the tank and being elastically deformed under the fluid pressure of the tank to enhance the sealing engagement with the tank and cover to render the container assembly pressuretight;

means for removing the fluid contents of the tank while under pressure including a piston-type pump mounted by said cover and a connecting line communicating with and extending from the interior of the tank to the outside;

a pressure release valve carried by the cover and communicating with the interior of the tank;

means for opening the release valve as the cover is uncoupled from the tank and while the container assembly is pressuretight causing the pressure in the tank to be released before the cover is completely uncoupled from the tank and the seal therebetween is broken, the means for opening the release valve cooperate with the cover so that as the cover is rotated to uncouple the cover and tank, and while the container assembly is pressuretight, the valve will be opened causing the pressure in the tank to be released before the cover breaks sealing engagement with the gasket.

2. A container assembly in accordance with claim 1 wherein the tank is provided with a helical neck surrounding the tank mouth.

3. A container assembly in accordance with claim 2 wherein the removable cover is provided with a mating helical flange so that when the cover is positioned over the tank mouth and then rotated, the helical flange of the cover and the helix of the tank neck are brought into mating engagement to secure the cover on the tank.

4. A container assembly for storing fluid under pressure which comprises:

a tank for storing the fluid which is provided with a mouth through which the fluid can be added to the tank;

a helical neck surrounding the tank mouth;

a removable cover having a mating helical flange so that when the cover is positioned over the tank mouth and then rotated, the helical flange of the cover and the helix of the tank neck are brought into mating engagement to secure the cover on the tank;

a flexible gasket circumferentially positioned on the tank and about the tank mouth in contact with the tank and cover and provided with a bevelled lower section, said gasket being in an initial sealing relationship with the tank and being elastically deformed under the fluid pressure of the tank to enhance the sealing engagement with the tank and cover to render the container assembly pressuretight;

means for removing the fluid contents of the tank while under pressure including a piston-type pump mounted by said cover and a connecting line communicating with and extending from the interior of the tank to the outside;

a pressure release valve carried by the cover and communicating with the interior of the tank;

means for rotating the cover to couple or uncouple the cover and tank; and

means cooperating with the cover coupling means for opening the release valve so that as the cover is rotated to uncouple the cover and tank, and while the container assembly is pressuretight, the valve will be opened causing the pressure in the tank to be released before the cover breaks sealing engagement with the gasket.

5. A container assembly in accordance with claim 4 wherein the means for actuating the release valve comprises:

a plate rotatably mounted on the cover, and

means carried by the plate for engaging the release valve when the plate is rotated with respect to the cover.

6. A container assembly in accordance with claim 5 wherein the pressure release valve is provided with an upwardly extending valve pin which can be depressed to open the valve.

7. A container assembly in accordance with claim 6 wherein the means for opening the release valve includes a lip protruding upwardly from the plate so that when the lip of the plate engages the valve pin, the pin will be moved into a depressed position to open the valve and release the internal pressure of the tank.

8. A container assembly in accordance with claim 7 wherein the plate is provided with at least one slot of predetermined size and the cover is provided with at least one member protruding through the slot and so positioned on the cover so that when the plate is rotated in one direction through a predetermined angle corresponding to the slot size, the valve pin will be depressed by the lip to open the valve and the protruding member will engage an end edge of the slot; and

when the cover is rotated in the opposite direction, the valve pin will be disengaged by the lip to allow the valve pin to move upward into a raised position to close the valve while the protruding member engages the opposite end edge of the slot.

9. A container assembly in accordance with claim 8 wherein the plate is provided with a pair of oppositely disposed slots and the cover is provided with a pair of members each protruding through a slot.

10. A container assembly in accordance with claim 9 wherein the lip protruding upwardly from the plate makes an angle less than 90° with the plate.

11. A container assembly in accordance with claim 10 wherein the cover is provided with a pair of helical flanges and the neck is provided with a pair of mating helices for engaging the helical flanges of the cover.

12. A container assembly in accordance with claim 11 wherein the means for rotating the cover comprise a handle provided with a pair of downwardly extending legs for engaging the cover.

13. A container assembly in accordance with claim 12 wherein the cover is provided with a pair of spaced openings for receiving the legs of the handle so that when the handle is rotated the legs are urged against the edges of the openings to cause the cover to rotate.

14. A container assembly in accordance with claim 13 wherein the lower bevelled section of the gasket is about 20°.