STACKED BARRELS CONTAINING COLLAPSIBLE BAGS

Fig. 1.

Fig. 2.

INVENTOR
EDWARD REGINALD CARTER
RICHARD FREDERICK HOLBROW

BY

ATTORNEY
STACKED BARRELS CONTAINING COLLAPSIBLE BAGS


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This invention concerns barrels, casks, vessels or the like containers for the storage of fluids which are to be dispensed or delivered under pressure. The invention relates generally to containers for liquids though it relates more especially to containers for beverages such as beers, milk, soft drinks, cordials and so on. For convenience a barrel, cask, vessel or the like for the purpose referred to is hereinafter referred to as a storage barrel.

According to the present invention a storage barrel comprises a rigid, fluid-tight container, a collapsible, impervious bag for the fluid to be dispensed, the bag being loosely within the container, a delivery pipe connection carried by the container and communicating with the interior of the bag and a valve connector carried by the container by which the interior of the container is pressurised thereby to compress the exterior of the bag. The bag within the container is filled with the fluid to be dispensed and the container, being fluid-tight, prevents escape of air from the container as the bag expands. The air within the container is thereby initially compressed during filling. The valve connector enables the initially compressed air to be further pressurised e.g. after the filling operation has been completed. Since the bag is loosely within the container it may be readily collapsed therein and withdrawn from the container.

A practical arrangement of the invention will now be described, by way of example only, as applied to a barrel to contain beer which is to be delivered under pressure e.g. from a cellar in which the barrel stands to a dispensing tap in a bar above. The invention will be described with reference to the accompanying drawings whereof:

FIG. 1 is a side view of a number of storage barrels according to this invention stacked one upon another,

FIG. 2 is a side view of a storage barrel, the impervious bag being filled with beer,

FIG. 3 is a view similar to FIG. 2, the impervious bag having been emptied, and

FIG. 4 is a sectional side view of a part of a storage barrel as shown in FIGS. 2 and 3 and to a larger size.

The storage barrel 9 is of metal (e.g. mild steel) having a cylinrical side wall 10 and dished end plates 11, 12. The wall 10 is formed or provided with two or more axially-spaced, external rings 13, upon which the barrel may conveniently be rolled. The rolling rings may be of metal welded to the wall 10 but they are preferably of a resilient material such as rubber or polyvinylchloride.

The side wall 10 is extended axially beyond each of the dished ends, as at 14, 15. The bottom end extension 14 is substantially of the same diameter as the wall 10 whereas the other end extension 15 is set-in (at 16) and brought to a smaller diameter at its extremity 17 closely to fit within the bottom end extension 14 of another barrel. In this way when one barrel is stacked upon another, the set-in end 16 nest within the bottom end 18 and the shoulder formed by the offset supports the bottom end of the upper barrel. The extension 15 has a pair of oppositely disposed hand holes 18 to assist in the ready handling of the barrel, especially during stacking.

The top and plate 11 has a central opening to receive a cap 19 which is quickly releasable and engageable from plate 11 e.g. by a bayonet joint. The cap is suitably sealed in pressure-tight manner to the top plate and has a passageway therethrough. The cap 19 carries a dispenser valve unit 20.

An impervious transverse plate 21 divides the interior of the barrel into an upper and lower compartment 22, 23 respectively of which the upper compartment 22 is slightly larger (i.e. axially longer) than the lower compartment. The passageway in the cap 19 communicates with the upper compartment as later described. The division plate 21 permits localised communication of air between the compartments. For instance, the plate is secured (e.g. welded) to the inner surface of the wall 10 and the edge of the plate is spaced at intervals from the wall to form air passageways; the spacing of course may be quite small while permitting communication between the compartments.

A collapsible, impervious bag 24 (e.g. of relatively thin synthetic resin material) is loosely received within the upper compartment 22 and rests upon the division plate 21 so as to be removably supported thereon. The bag has a neck which is secured to a central portion of the removable cap 19. Thus, the neck may be clamped between a flange of the valve unit 20 and a central recess (which receives said flange) in the cap 19.

The dispenser-valve unit 20 comprises a tube 25 to extend through the cap, the neck of the bag and into the bag. The valve unit also comprises a rotary valve of any known or convenient construction (not shown) arranged to receive a connector 26 for the delivery pipe 27, the connector being secured to the unit (e.g. by a bayonet coupling) in fluid-tight manner as a preliminary to opening the valve. In this way the delivery pipe 27 may be connected with the bag without loss of beer. Thus the unit 20 comprises a delivery pipe connection carried by the container to the upper side of the bag 24 remote from the support plate 21.

The pipe 27 extends across the top end plate 11 and through one of the hand holes 18. The delivery pipe is thus brought to outside the barrel. If two or more barrels are stacked one upon the other (see FIG. 1) the delivery pipes 27 of the barrels connect with a common vertical pipe 28 leading from the cellar to the bar above. A cock or tap 29 is provided in each pipe 27 so that the stacked barrels may be selectively connected to the vertical pipe.

The bottom plate 32 receives a non-return valve 30 by which a fluid may be supplied under pressure within the container 10. The fluid is preferably compressed air. The bag 24 prevents the compressed air coming into contact with the contents of the bag. Thus, no contamination of the contents can occur by the compressed air. The air pressure within the container compressees the bag 24 thereby tending to collapse the bag and the beer is delivered through pipe 27 under pressure. The pressure in the bag is relatively large (e.g. 35 lb. per. sq. in.) and is sufficient to force substantially all the beer from the bag.

In use: when the beer has all been delivered from the barrel the compressed air within the container will have substantially completely collapsed the bag. The empty barrel is returned to the brewers. The brewers remove the cap 19 and withdraw the bag 24 which is attached to the cap from the container 10. The empty bag 24 is taken off the cap and a new sterile bag is fitted to the cap. The new bag is then inserted into the container and the cap is replaced. The used bag is then thrown away.

A pipe connection is suitably made to the dispenser-valve unit 20 and the bag is filled with beer by the brewers. Thereafter it is not readily possible to tamper with or adulterate the contents. A new sterile bag will be fitted each time the barrel is returned to the brewery to be filled. Besides filling the bag the brewers will pressurise the container, as explained above. Since the bag is im-
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3. The compressed air cannot contaminate the beer or other contents it is unnecessary especially to clean or filter the air for pressurising the container. Furthermore since a new, sterile bag is used each time that the barrel is filled it is not necessary to sterilise the barrel; general cleaning only is required.

The provision of the division plate 21 is especially important in this invention. It serves, of course, to divide the container 10 into the chambers or compartments 22, 23 and thereby provide an air space or reservoir beneath the bag so that the volume of compressed air is adequate to dispense all the liquid contents of the barrel 24 without excessive pressure e.g. well within the pressure of a compressed air supply available in a factory, brewery, processing plant and so on. The division plate also serves to support the bag 24, the bottom of the bag being strongly pressed against the plate by the weight of the liquid (beer) contents with the effect that the compressed air can not act upon the bottom of the bag. It is to this end that the plate 21 is impervious and communication between compartments 22, 23 is localised around the edge of the plate. The air within compartment 22 acts upon the sides of the filled bag and upon the top thereof but not upon the bottom of the bag which rests upon plate 21. To ensure that compartments 22, 23 are in communication as described the downwardly turned flange of the plate, which is attached to the inner surface of the wall 10, may have a plurality of axial grooves (constituting the air passageways above referred to) angularly spaced around the flange. Alternatively the plate 21 may have axial holes therethrough to constitute air passageways. To achieve the effects referred to such holes must be in the marginal edge of the plate—thus, a ring of holes close to the plate flange may be provided. The air may pass around the bag to the top thereof when compartment 23 is pressurised and consequently the bag is not an exact fit within compartment 22 e.g. the bag when deflated is flat and rectangular with the neck thereof towards the top and in one side of the bag. The air in compartment 22 therefore acts radially inwardly and downwardly upon the bag and the bag is collapsed inwardly and downwardly upon plate 21. Finally the bag assumes the shape shown in FIG. 3, it will be noted—compare FIGS. 2 and 3—that the bottom of the bag is maintained pressed against the plate 21 and substantially undisturbed while the beer is expelled from the bag and consequently that the liquid contents at the bottom of the bag are undisturbed until towards the end of the liquid-discharge operation. Consequently any sediment or the like matter collecting on the bottom of the bag will be delivered from the container only with the contents at the bottom of the bag. Unless the amount of sediment is large the sediment will be delivered at the very end of the liquid-discharge operation. This consideration is important, for instance when draught beer is stored in the container.

Because the bag collapses radially inwardly the tube 25 or an equivalent passageway is necessary to provide that the contents can be delivered after the bag has been partly emptied. The tube 25 extends close to the bottom of the bag to enable substantially all of the contents to be expelled. The storage barrel must be upright i.e. with tube 25 vertical or closely approximating to the vertical. Thus, if the storage barrel is placed horizontally the collapsing bag is likely to lie across the end of the tube (or the opening in cap 19 if the tube is dispensed with, as may be done, for instance, by providing the bag with internal ribs between which a passageway is assured from the bottom of the bag to the neck thereof when the bag is collapsed) and the discharge of liquid from the barrel is impeded or prevented.

The container may be made from relatively cheap metal (e.g. mold steel) which is easy to fabricate so that the cost is low. Careful cleaning and sterilisation of the container is unnecessary thereby reducing servicing costs. The contents may be introduced to the storage barrel and maintained in sterile conditions. The liquid is expelled by gas pressure using readily-available compressed air which does not require filtering to remove substances harmful to the liquid e.g. oil from the air compressor.

The storage barrel when filled forms a self-contained unit for dispensing liquid under pressure. It may therefore be used for many purposes. Should the contents become frozen it is unlikely that the metal container will be damaged or burst open. Since the bag (even when filled) permits small expansion of the liquid contents. The bag may be filled with a gas instead of a liquid.

We claim:

1. An installation comprising at least two storage barrels stacked one upon another, each barrel comprising a rigid fluid-tight container, an impervious division plate to divide the container into a pair of superposed compartments, air passageways in the marginal edge of the division plate to permit communication between the compartments, a collapsible impervious bag for the fluid to be dispensed, a delivery pipe connection carried by the container and communicating with the interior of the bag which is suspended within the upper of said pair of compartments so that it rests upon the division plate without obstructing the air passageways, a fluid discharge tube extending from the fluid-pipe connection downwardly within the bag to near the division plate and a valve connector carried by the container by which the interior of the container is pressurised thereby to press the bag upon the division plate, the bottom of each barrel being constructed and arranged to interlock with the top of another barrel.

2. An installation according to claim 1 comprising, for each storage barrel, an opening provided in the side of the container near the top thereof so that a delivery pipe may be passed therethrough and connected to the delivery-pipe connection, the delivery pipes being connected to a common delivery pipe, a fluid regulating valve being provided for each delivery-pipe from a barrel.

3. A storage barrel forming a rigid, fluid-tight container, an impervious plate extending diametrically across said barrel and dividing the barrel into two superposed compartments, air passageways formed in the marginal edge of said division plate to permit communication between the compartments along the wall of the barrel, a collapsible impervious bag for the fluid to be dispensed removable supported on said division plate within the upper of said compartments and radially inwardly of said air passageways, a delivery pipe connection carried by said barrel to the upper side of said bag remote from said division plate and communicating with the interior of the bag, and a valve connector carried by said barrel by which the interior thereof is pressurised with the lower of said compartments serving as a reservoir for compressed gas and so as to maintain the bag pressed against said division plate throughout pressurised dispensation of the fluid from the bag.

4. A storage barrel according to claim 3 wherein a fluid discharge tube extends from said delivery pipe connection downwardly within the bag to near the division plate.

5. A storage barrel according to claim 3 wherein the top and the bottom of the barrel are constructed and arranged to interlock respectively with the bottom and top of further identical barrels in a stack, and an opening is provided in the side of the container near the top thereof so that a delivery pipe may be passed therethrough and connected to the delivery-pipe connection.

6. A storage barrel according to claim 3 wherein said
upper compartment is slightly larger than said lower compartment.

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EVON C. BLUNK, Primary Examiner.

LOUIS J. DEMBO, Examiner.

S. H. TOLLBERG, Assistant Examiner.