

April 1, 1958

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LIQUID OR GAS CAPACITOR

2,828,769

Filed Dec. 20, 1954

FIG. 1

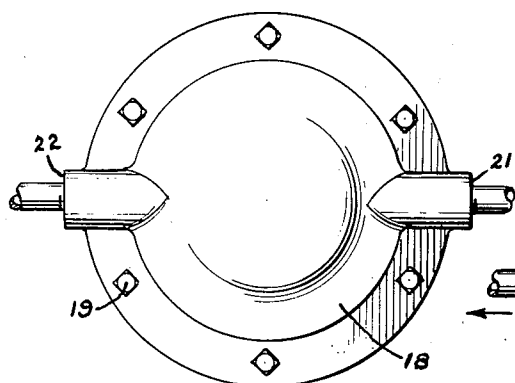


FIG. 3

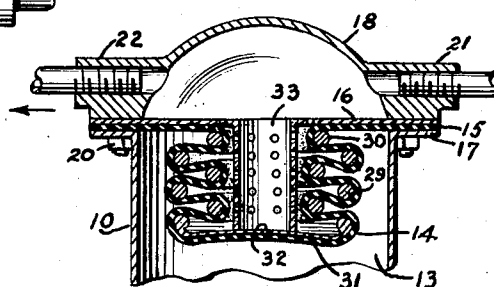


FIG. 2

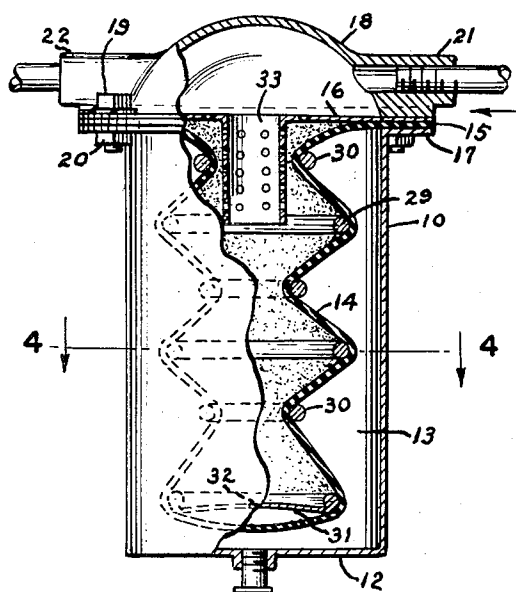


FIG. 4

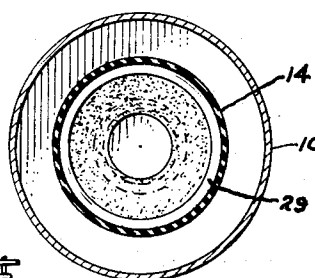
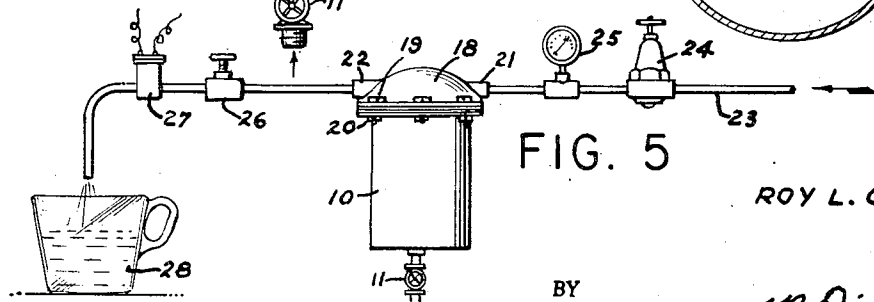


FIG. 5



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LIQUID OR GAS CAPACITOR

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Application December 20, 1954, Serial No. 476,523

1 Claim. (Cl. 138—30)

The present invention relates to means for storing a local supply of fluid for dispensing intermittently at a substantially constant rate higher than available from a supply source under normally variable supply pressure.

The object of the present invention is to provide an accumulator in a fluid supply line having a gas-cushion and a limited capacity for quick dispensing of a limited quantity of said fluid independently of the normally available slower rate of supply through said line.

A further object is to form this accumulator by a flexible wall in a rigid vessel separating the accumulator chamber from the gas-cushion.

A further object is to provide a rigid operated support for the separating wall across the vessel, with the flexible wall on the air-cushion side of said support.

A further object is to make this flexible wall in sylphon form open at the support end with rigid compression limiting rings inside of the ridges of the sylphon and rigid expansion limiting rings on the outside of the grooves, so as to provide free collapsing and expanding characteristics to said accumulator.

A further object is to make the ring material of sufficiently large radius to prevent sharp folds at the ridges and grooves in the flexible wall material when it is fully collapsed.

A further object is to form a perforated cylindrical depression in the support to provide a guide for the groove portions and a rest for the closed end of the wall in its fully collapsed condition.

A further object is to provide the closed end of the flexible wall with a rigid plate which may be integral with the ring inside the last ridge of the sylphon.

A further object is to provide gas sealed under pressure outside of said accumulator wall in said rigid vessel to form a resilient cushion into which the accumulator might expand at leisure after each dispensing operation.

Other and more specific objects of this invention will become apparent in the following detailed description of a preferred form as applied to a water dispensing device for use in water mixture vending machines, when taken together with the accompanying drawing, wherein

Figure 1 is a plan view of the accumulator.

Figure 2 is an elevational view thereof partly in section, showing the accumulator wall extended.

Figure 3 is a partial sectional view thereof, showing the accumulator wall fully collapsed.

Figure 4 is a sectional view taken on the line 4—4 of Figure 2, and

Figure 5 is an elevational view of the accumulator connected in the supply line and a dispensing cup being filled at a suitably high rate by the aid of the accumulator.

Although the device shown in the drawing for purposes of illustration of the invention, is a water capacitor for use in water dispensing means for water mixture vending machines, it will be understood that this sort of device is useful for many other purposes where the available supply of fluid from its source under pressure is unsteady or insufficient to meet the desired constant rate of limited

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quantities that may be demanded at intervals. This device will smoothen out the unsteady pressure of the supply and will accumulate limited quantities of the liquid which are supplied at a low rate between the intervals of its demand and will supply the fluid locally at a sufficiently high rate as may be desired.

Referring to the drawing, the device comprises a rigid vessel 10 of cylindrical form with a supply valve 11 attached to its bottom 12, for supplying a charge of compressed gas to and sealing it off in the cushion space 13 on the outside of the accumulator separating wall 14.

Wall 14 is of impervious flexible material made in sylphonic form open at the top with an outwardly extending concentric flange 15 at the top. The outer edge of flange 15 is clamped with periphery of the perforated support 16 between the flange 17 at the top of vessel 10 and its cover 18 by bolts 19 and nuts 20 to define an accumulator chamber. Cover 18 has inlet 21 and outlet 22 for connection in the supply line 23, which in the present instance is provided with a pressure control valve 24, a pressure gage 25 at the inlet side of the accumulator device and a control valve 26 and an electrically operated valve 27 at the outlet side. The dispensing cup 28 is shown being filled during a dispensing interval when the accumulator operates to fill the cup promptly with the required amount of water for the mixture being dispensed, independently of the slower rate of supply presumably available through the pressure control valve 24 from the water supply source.

Wall 14 may be made of suitable plastic substantially non-elastic material. It is provided with compression limiting rings 29 inside the ridges of the Sylphon and with expansion limiting rings 30 on the outside of the wall in the grooves. These rings are made of rigid material circular in section and of a sufficient radius to prevent sharp folds of the flexible wall at the ridges and grooves when the wall is fully collapsed, in order to avoid fatigue cracks or cracks due to setting of the sharp folds when not in use for extended periods in the fully collapsed condition and consequent failure of this wall in service.

The ring inside the last ridge at the closed end of the Sylphon may be made integral with a rigid end plate 31 having a centrally disposed aperture 32, the plate being arched to provide rigidity to the plate. This is to prevent impingement of the successive folds of the wall axially between the successive rings when the Sylphon is fully collapsed at the end of a dispensing period if the pressure in the cover 18 is reduced below that in the cushion space 13 at that time. This is attained with the assistance of a cylindrical perforated depression 33 formed in the support 16, the bottom end of which provides a stop for the plate and ring to prevent such impingement and to permit the closed end of the flexible wall to take on an arched form consonant with the fullest collapse of the flexible wall without forming any sharp bends or folds therein. The depression 33 may be entirely open at the bottom, as shown in Figure 3. Besides providing a stop for the end wall plate 31, it also serves as a guide for the inside of the Sylphon grooves as the flexible wall collapses. Hence a uniformly ample flow of fluid is provided out of the accumulator when the outlet valve 27 is opened and a prompt emptying thereof is accomplished independently of the available rate of supply from the supply source, by reason of the substantially steady high pressure in the cushion space 13.

This device may be adapted to other useful purposes as mentioned above, whether the intermittent dispensing is of a measured quantity of the fluid, supplied or not, and whether the fluid is a gas or a liquid.

Thus many obvious modifications in the form and proportion of this device may be made without departing

from the spirit and scope of this invention, as defined in the appended claim.

What is claimed is:

An accumulator comprising a hollow body having an open end, a wall carried by the body and closing the opposite end thereof to define therewith a rigid vessel, a hollow fluid impervious extensible member carried by the body in closing relation to the open end thereof extending thereinto to define within said body a cushion space, a hollow cover carried by the body and extending across the end thereof remote from the wall to define with the extensible member an accumulator chamber, said cover having a fluid inlet port through which fluid may be introduced into the accumulator chamber to fill said chamber and extend the extensible member against the pressure of compressible fluid trapped in the cushion space, said cover having a fluid outlet port through which fluid contained in the accumulator chamber may be expelled by the collapse thereof under the influence of compressible fluid contained in the cushion space, the end remote from the cover carrying an inwardly arched plate

for supporting said end wall, a support carried by the rigid vessel and extending across the open end thereof adjacent the cover, and a cylindrical stop carried by the support and extending into the hollow extensible member for engaging said arched plate at the end thereof remote from the cover to prevent the complete collapse and possible deflection thereof into the cover under the influence of fluid within the cushion space said plate enclosed in said extensible member.

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