United States Patent

[11] 3,593,747

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[21] Appl. No. **760,335**
[22] Filed **Sept. 17, 1968**
[45] Patented **July 20, 1971**

[54] **PRESSURE ACCUMULATOR**
4 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **138/30**
[51] **Int. Cl.** **F16l 55/00**
[50] **Field of Search** 138/30

[56] **References Cited**

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ABSTRACT: This invention relates to the art of pressure vessels and more particularly to a pressure accumulator of the type having a deformable bladder positioned in a container having a mouth with a closure plug positioned therein, the latter mounting an annular resilient member having a sealing portion integral with a supporting portion for the bladder, the latter being coaxial with the fluid port of the accumulator.

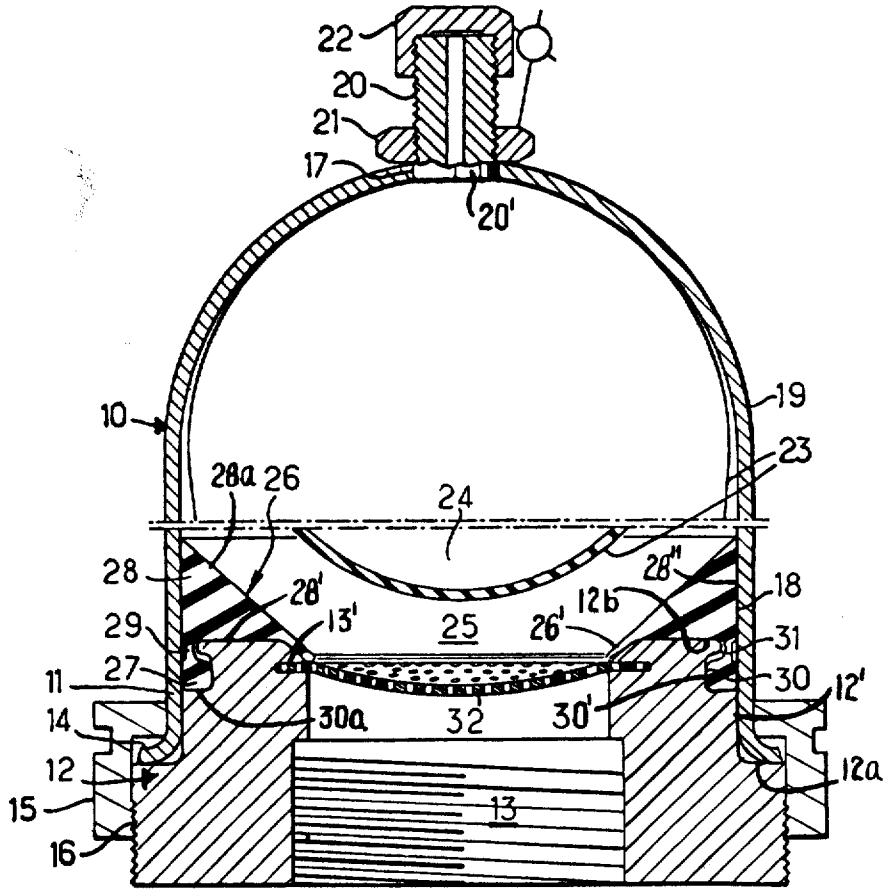


FIG. 1

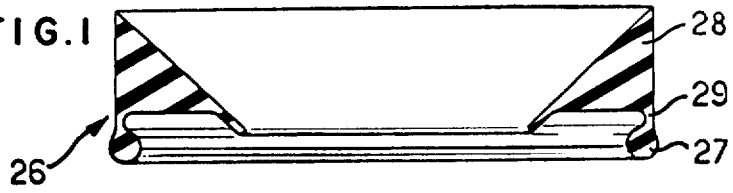


FIG. 2

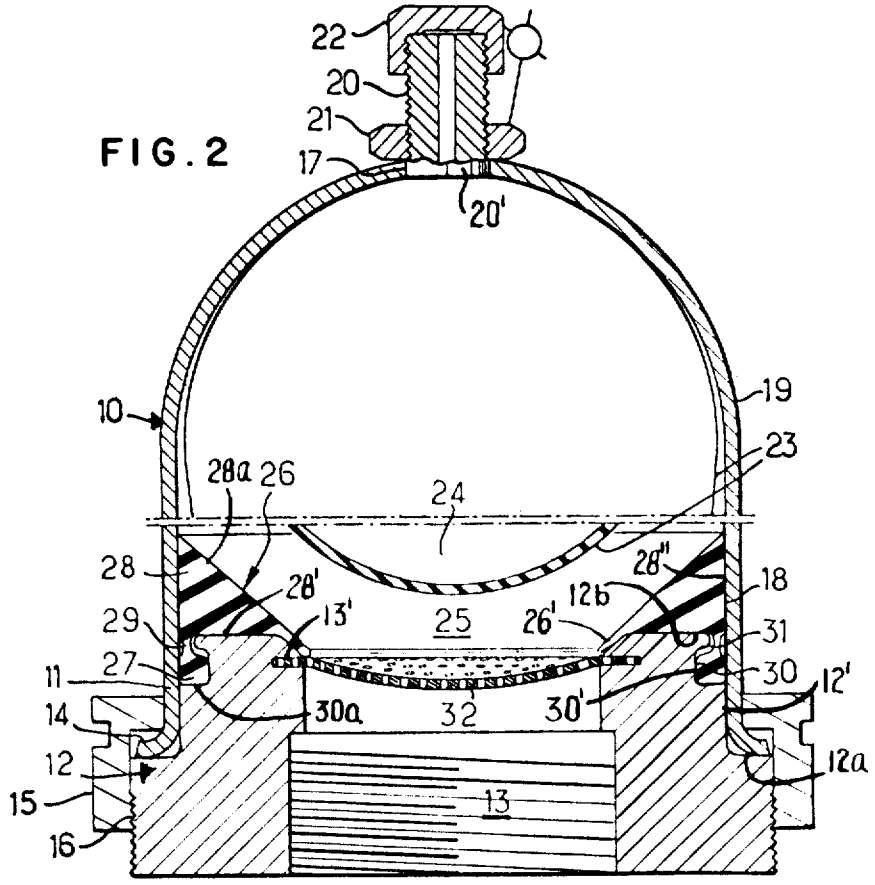
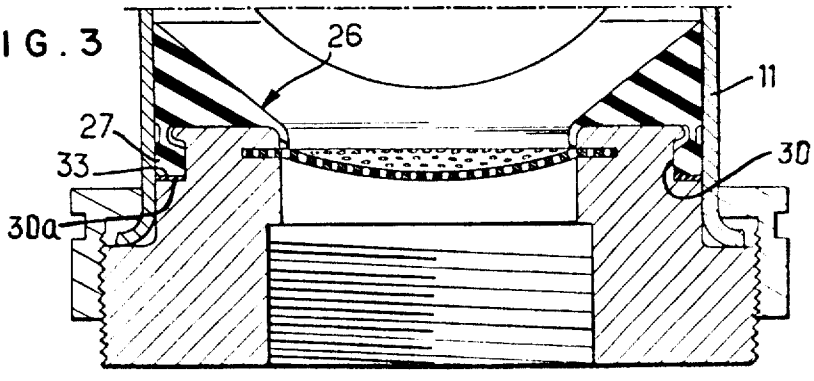


FIG. 3



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PRESSURE ACCUMULATOR

It is among the objects of the invention to provide a pressure accumulator of the type comprising a rigid container having a gas port at one end and a mouth at the other end in which a closure plug having an axial opening is mounted, a deformable bladder being positioned in said container with its mouth secured to said gas port, resilient means being provided to afford a dependable seal between the closure plug and the container wall and a substantially continuous supporting surface for the bladder without interfering with ready mounting of aid closure plug into the mouth of said container.

According to the invention these objects are accomplished by the arrangement and combination of elements hereinafter described and more particularly recited in the claims.

In the accompanying drawings which are shown one or more of various possible embodiments of the several features of the invention,

FIG. 1 is a sectional view of a sealing and supporting ring for a pressure vessel according to the invention;

FIG. 2 is a longitudinal sectional view of a pressure vessel incorporating said ring, and

FIG. 3 is a view similar to FIG. 2 of another embodiment.

Referring now to the drawings, as shown in FIG. 2, the pressure vessel, illustratively a pressure accumulator, comprises a rigid container **10** substantially cylindrical along the a portion of its length, being hemispherical at one end as at **19** and being open at its other end as at **11**, the end **19** having an axial opening **17** and the end **11** being outwardly flared as at **14**.

The container **10** is made of strong material such as steel or aluminum capable of withstanding the pressure to which the unit is subjected in use. Secured in opening **17** is a nipple **20** to which a source of gas under pressure may be connected and which mounts a lock nut **21** and a closure cap **22**. The inner end **20'** of nipple **20** is secured in conventional manner to the mouth of a deformable separator **23**.

The separator **23** which illustratively is a bladder of natural or synthetic rubber, divides the interior of container **10** into two chambers **24**, **25** to be charged with gas and oil respectively.

Positioned in the mouth **11** of container **10** is a cylindrical closure plug **12** externally threaded at its outer end as at **16'**. The plug **12** is of reduced diameter inwardly of its outer end as at **12'** defining an annular shoulder **12*a*** which forms a seat for the flared end **14** of mouth **11**, said end **14** being retained against shoulder **12*a*** by nut **15** screwed on threaded portion **16**.

The closure plug **12** is of further reduced diameter at its inner end as at **30'**, defining an annular shoulder **30*a*** , the inner surface **12*b*** of said plug having an annular flange **31** spaced from the inner surface **18** of container **10** to form an annular groove **30**.

The closure plug **12** has an axial bore **13** which is internally threaded to receive a suitable fitting (not shown) and which serves as the fluid port of the unit. The inner end of bore **13** is desirably beveled as shown and has an annular groove **13'** in which is positioned the periphery of a perforated wall or screen **32**, the latter having a concave inner surface.

Although the screen may be formed integral with the plug **12** when the latter is cast, it is of course possible to mount the screen to the plug in any other suitable manner.

Mounted on said closure plug **12** and positioned in container **10** is a sealing and supporting ring **26** of resilient material such as natural or synthetic rubber.

As shown in FIG. **1**, the resilient ring **26** has portion **28** substantially in the form of an isosceles triangle in cross section which forms a supporting member for the bladder **23**, and a portion **27** of circular cross section which forms a sealing member. The portion **27** is connected by a relatively thin web **29** to the triangular portion **28** at the apex of the latter defined by the sidewalls **28'**, **28''** thereof.

The sealing member **27** of ring **26** is positioned in the annular groove **30** in plug **12**, with side **28'** of the triangular supporting member **28** resting on the inner surface **12*b*** of plug **12** and the sidewall **28''** positioned against the sidewall **18** of container **10**. Web **29** extends loosely in the annular space which is formed between flange **31** and wall **18**.

The base **28*a*** of triangular member **28** defines a beveled support for the bladder **23** and the inner periphery of the base has an annular lip **26'** which extends over the beveled inner end of bore **13** to the immediate vicinity of screen **32** to prevent cutting of the bladder by the edge of annular groove **12'** when the bladder is fully expanded in operation.

To assemble the accumulator after the bladder is secured in the gas port **17**, the sealing portion **27** of ring **26** is positioned in annular groove **30** snugly to encompass the reduced diameter portion **30'**. As a result, the wall **28'** of the triangular supporting portion **28** will seat on the inner surface **12*b*** of plug **12**.

Thereupon, the plug **12** and ring **26** are moved into the tubular mouth **11**, the flared end **14** facilitating such assembly and the nut **15** is screwed onto the threaded portion **16** to complete the assembly.

Due to the fact that the sealing portion **27** of ring **26** is snugly positioned in groove **30**, such portion **27** will remain in position and by reason of the connection of the triangular supporting portion **28** to sealing portion **27** by web **29**, such supporting portion **28** will also remain in position.

In operation of the pressure accumulator, the bladder **23** is charged with gas under pressure and thereupon, a fluid such as oil under pressure is forced through port **13** to compress the charged bladder **23**. A valve (not shown) controlling port **13** is then closed and the accumulator is then used in conventional manner.

Due to the resilient member **28**, a firm support will be provided for the bladder upon expansion thereof in use. The sealing portion **27** will prevent leakage of oil from chamber **25** due to the differential pressures existing on opposed thereof.

The embodiment shown in FIG. **3** is substantially identical to the embodiment shown in FIG. **2** except that a deformable washer **33** is positioned on shoulder **30*a*** of annular groove **30** to compensate for tolerances between the diameter of plug **12** and that of mouth **11**.

As many changes could be made in the above construction, and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States IS:

1. A pressure vessel comprising a container of rigid material having a cylindrical mouth at one end and a port at its other end, a deformable bladder positioned in said container and secured to said port for charging of said bladder with gas under pressure, , a cylindrical plug having an axial fluid port, positioned in said mouth, with the inner end of said plug positioned in said container, means retaining said plug in position, said plug having a peripheral annular groove near its inner end, the periphery of said inner end being slightly spaced from the wall of said container, a resilient sealing and supporting ring encompassing said plug and coaxial with said axial port to prevent leakage of fluid from said container and to support said bladder upon expansion thereof, said ring having a sealing portion substantially circular in cross section positioned in said annular groove and a supporting portion substantially in the form of an isosceles triangle having one of its walls seated on the inner end of said plug, the other of its walls seated against the wall of said container and its base tapering from the container wall to substantially the periphery of the axial port in said plug, and a web extending through the space between the inner end of said plug and the container wall, connecting the sealing portion and the supporting portion.

2. The combination set forth in claim **1** in which a perforated plate extends across the axial fluid port in said plug adjacent its inner end and said base of said supporting portion of

said ring has its inner periphery extending to the outer periphery of said plate to provide a substantially continuous surface for said bladder upon expansion thereof.

3. The combination set forth in claim 1 in which the mouth has an outwardly flared end, said plug has a reduced diameter portion defining an annular shoulder against which said flared end abuts and means releasable to retain said flared end against said shoulder.

4. The combination set forth in claim 1 in which a deformable washer is positioned in said annular groove on the side thereof opposed to the inner end of said plug.