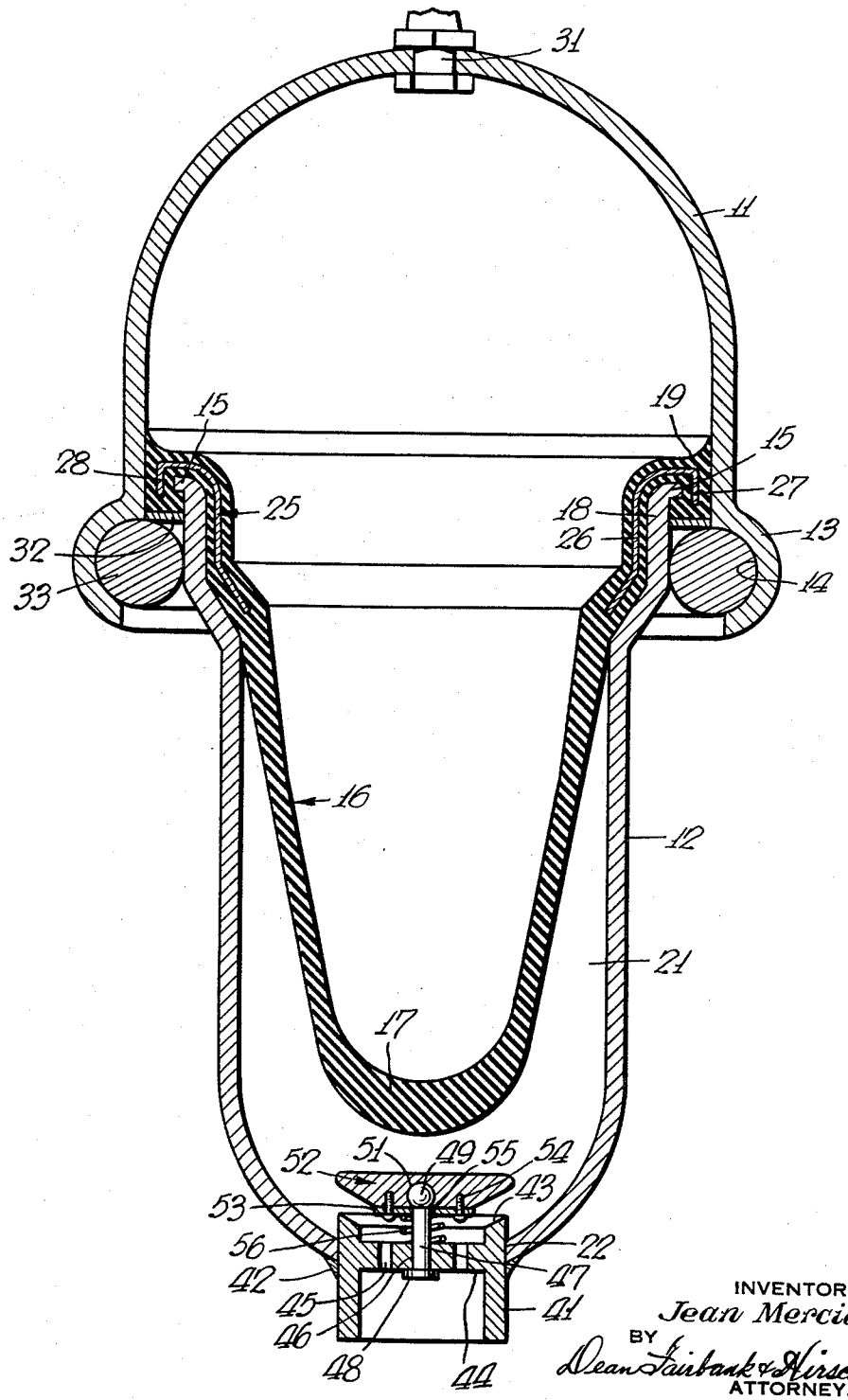
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PRESSURE ACCUMULATOR

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PRESSURE ACCUMULATOR

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3 Claims. (Cl. 138—30)

This invention relates to pressure accumulators, more particularly of the type having two shells with a deformable partition therebetween.

It is among the objects of the invention to provide a pressure accumulator of the above type that may readily be fabricated at relatively low cost and in which the deformable partition will be securely clamped at its periphery between the rims of the shells without excessive compression of said periphery with resultant weakening thereof, yet will be retained therebetween without likelihood of inward displacement which might cause leakage between the gas and liquid chambers of the accumulator with resultant inoperativeness thereof.

Another object is to provide a pressure accumulator of the above type in which the portion of the deformable partition adjacent the rim thereof, which is clamped between the two shells, will have substantially no sharp bending stress or strain imposed thereon which might cause weakening of the partition at such region with resultant tearing of the partition, regardless of the number of times the partition is expanded and contracted due to charging and discharging of the accumulator with continuous use.

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

This application is a division of co-pending application Serial No. 327,602, filed December 23, 1952 now Patent No. 2,773,511, dated December 11, 1956.

In the accompanying drawing in which is shown one of various possible embodiments of the several features of the invention, the single figure is a longitudinal sectional view of one embodiment of the invention.

Referring now to the drawing, the accumulator desirably comprises a pair of substantially cup-shaped shells 11, 12 of rigid material, the mouth of shell 11 having a rim 13 with an internal annular groove 14 and the mouth of shell 12 having an annular outwardly extending lateral rim 15, the outer diameter of which is less than that of the mouth of shell 11.

A flexible and deformable partition 16, of resilient material preferably a bladder of natural or synthetic rubber is normally positioned in shell 12. The bladder 16 is substantially conical in longitudinal cross section and has a rounded bottom wall 17 of greater thickness than its side wall.

The shell 12 in which the non-inflated bladder 16 normally extends, is substantially cylindrical along the greater portion of its length and is of enlarged diameter near its mouth as at 18. Thus the distance from the outer surface of bladder 16 to the inner surface of shell 12 progressively increases from the rim 19 of the bladder to its free end 17.

As a result of the shape of the shell 12 and bladder 16 above described, as the bladder 16 expands in use of the accumulator to force the liquid in chamber 21 out of port 22, it will progressively engage the shell wall. As a result, no liquid pockets will be formed and substantially all the liquid in the chamber 21 will be expelled therefrom.

As such progressive engagement of the shell by the bladder is set forth in detail in Patent No. Re. 23,437, dated December 4, 1951 and per se forms no part of this invention, it will not be further described.

The bladder 16 is desirably supported at its rim 19 in such manner that regardless of the number of times it is expanded and contracted during charging and discharging of the accumulator, no sharp bending stress will be imparted to such rim with the disadvantages previously pointed out.

To this end, an annular supporting member 25 is affixed to bladder 16 at the rim 19 and adjacent portion thereof. The supporting member 25 is of resilient sheet material such as metal or plastic and is substantially reversely bent forming an inner and outer leg 26, 27 which desirably are molded into the rim 19 and adjacent wall portion of the bladder respectively. Thus, as shown, the rim 19 of the bladder will also be reversely bent so that the rim 15 of shell 12 may be positioned between legs 26, 27. The inner surface of rim 19 on leg 27 desirably has an annular groove 28 to receive rim 15 to retain the rim 19 of bladder 16 over the mouth of shell 12.

To assemble the accumulator, the open end of the shell 12 with the bladder 16 mounted thereon as previously described, is moved into the mouth of shell 11 until the enlarged diameter portion 18 of shell 12 is between the annular groove 14 and the port 31 of shell 11.

An annular washer 32 is then positioned around the enlarged diameter portion 18 of shell 12 against the undersurface of the reversely bent rim 19. The shell 12 is then locked in shell 11 as by means of a split type snap ring 33 positioned in annular groove 14. The snap ring is desirably circular in cross section and of diameter substantially equal to the distance between the outer surface of the enlarged diameter portion of shell 12 and the floor of annular groove 14 most remote from said shell 12.

Thus the snap ring will prevent lateral displacement of shell 12 in shell 11. When pressure is applied through port 31 to charge the accumulator with gas, the shells will tend to move apart compressing rim 19 between washer 32 and rim 15 to provide a dependable seal between the opposed walls of shells 11 and 12.

As the outer diameter of rim 15 is greater than the inner diameter of snap ring 33 when it is seated in annular groove 14, the outward movement of shell 12 from shell 11 will be limited.

Although the outlet port 22 may be controlled in any suitable manner, as illustratively shown, the shell 12 desirably has a tubular member 41 positioned in the port 22 and affixed therein as by welding as at 42, the beveled inner edge 43 of member 41 defining a valve seat. Tubular member 41 has a wall 44 extending transversely thereacross, with a plurality of passageways 45 desirably arranged in a ring about an axial opening 46 through which extends a pin 47. The pin 47 desirably has a stop in the form of a nut 48 screwed on the outer end thereof and has a ball conformation 49 at the inner end thereof positioned in a socket 51 in a valve head 52. The ball 49 is desirably retained in socket 51 by means of a plate 53 affixed to the underface of the valve head 52 as by screws 54 and having an opening 55 through which pin 47 extends.

The valve head 53 is desirably retained in its outermost position spaced from its seat 43 by a coil spring 56 compressed between the undersurface of valve head 52 and wall 44.

In the operation of the accumulator, regardless of which portion of the periphery of the valve head 52 is

engaged by the thickened bottom 17 of partition 16, the valve head will pivot in the direction of the force applied thereagainst until a portion of the periphery of the valve head is against its seat 43. As a result, extrusion of the partition through openings 45 is prevented. Upon further expansion of the partition and as pressure is applied against the entire valve head, the entire periphery of the latter will finally be seated to close the port 22.

By reason of the valve construction above described, regardless of the position of the partition 16 in the accumulator when it engages the valve head, the portion of the valve head adjacent the openings 45 closest to the partition will seal such openings to prevent extrusion of the partition.

With the construction above described, a simple yet highly efficient pressure accumulator is provided which is capable of continuous use for long periods of time without breakdown of the deformable partition therein.

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 shell, a cover member for the mouth of said shell, said mouth having an annular outward extending rim, said shell being of larger diameter at the portion thereof adjacent said rim than at the adjacent portion thereof, said larger diameter portion being cylindrical in cross section, said cover member having an internal annular groove encompassing the mouth of said shell and adapted to be positioned between said rim and the end of the shell remote from the mouth thereof, a rigid split ring in said annular groove having an inner diameter substantially the same as the larger diameter portion of said shell whereby said shell is restrained from lateral displacement with respect to said cover member to retain the shell and the cover member in axial alignment and said shell being restrained from longitudinal displacement away from said cover member and a deformable partition in the shape of a bladder of resilient material positioned in said shell, said bladder having a reversely bent mouth, the periphery of which extends laterally inward between said rim and said ring to be clamped therebetween.

2. The combination set forth in claim 1 in which an annular washer encompasses said cylindrical larger diameter portion and is positioned between said ring and the inwardly extending periphery of said bladder mouth.

3. A pressure vessel comprising a container shell, a cover member for the mouth of said shell, said mouth having an annular outwardly extending rim, said shell being of larger diameter at the portion thereof adjacent said rim than at the adjacent portion thereof, said cover member having an internal annular groove encompassing the mouth of said shell and adapted to be positioned between said rim and the end of the shell remote from the mouth thereof, a rigid ring in said annular groove having an inner diameter substantially the same as the larger diameter portion of said shell, whereby said shell is restrained from lateral displacement with respect to said cover member and longitudinal displacement away from said cover member and a deformable partition in the shape of a bladder of resilient material positioned in said shell, an annular supporting member of flexible material reversely bent in cross section, defining a pair of legs is molded into the mouth of the bladder, whereby said mouth will be reversely bent, the portion of said mouth on the outer leg of said supporting member defining an internal annular groove, the rim of said shell being positioned between the legs of said supporting member and extending into said annular groove.

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