

July 3, 1951

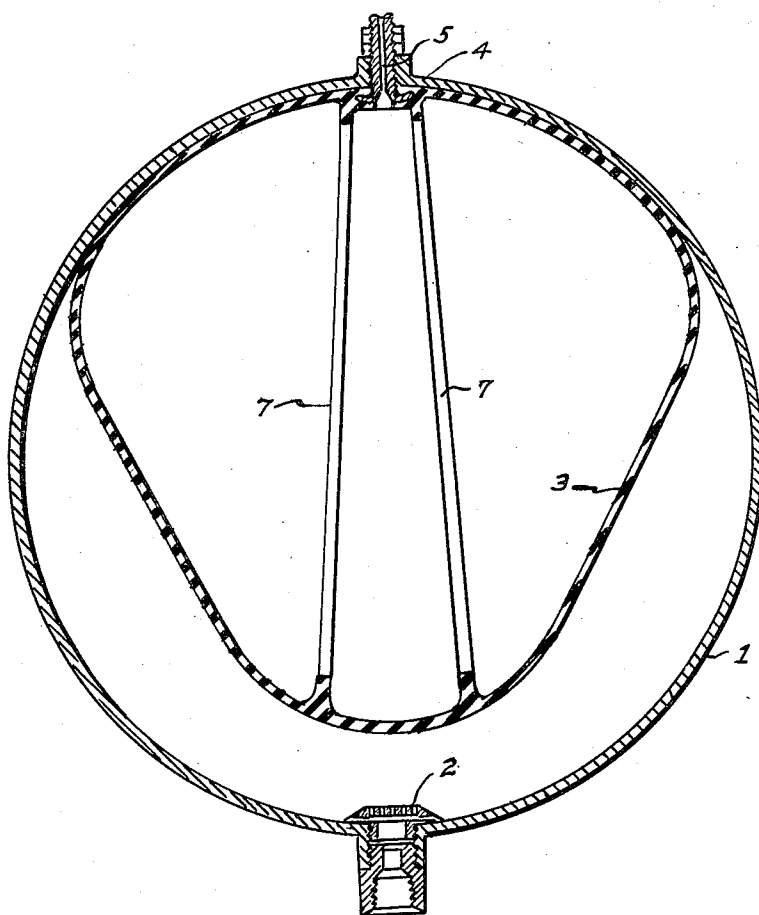
J. MERCIER
ACCUMULATOR

2,558,770

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2 Sheets-Sheet 1

Fig. 1.



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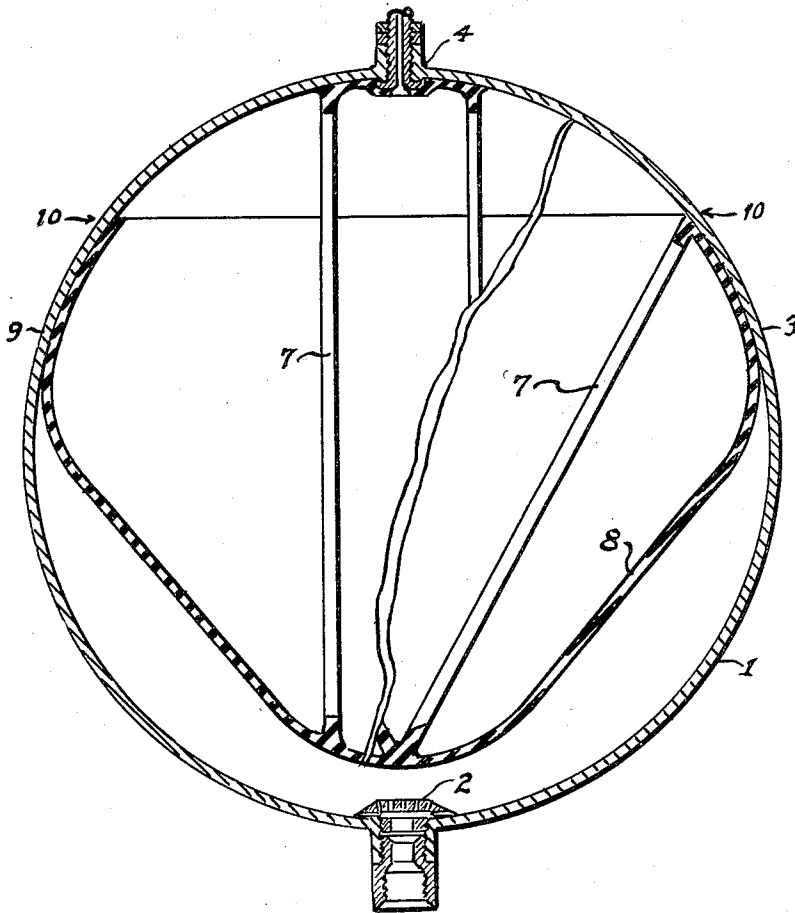
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Fig. 2.



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UNITED STATES PATENT OFFICE

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ACCUMULATOR

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In Canada February 7, 1944

10 Claims. (Cl. 138—30)

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This application is a continuation in part of the previously filed application Serial No. 474,577, filed February 3, 1943, now abandoned.

The present invention pertains to storage devices for fluids under pressure. It is concerned with that type of storage devices in which fluid, in the majority of cases a liquid, is supplied through a port to one portion of a metallic container. A fluid inflated bag of rubber or the like is provided in the interior of said container—generally attached to an opposite port in said container; said bag exerts pressure on the fluid when it is stored and is adapted to expel the fluid from the container when the communicating utilization circuit demands it.

In certain cases, and particularly on aircraft, such storage devices have proved to be unsatisfactory because their operation ceases to be reliable mainly when their usual position is inverted, so that the portion of the container to which the bag is attached becomes the bottom portion of the storage device. In that event, the delivery of liquid under pressure from the storage device may cease, although the same is filled to capacity. A high speed surge will cause a suction on the bag and may cause the same trouble.

The cause of the aforesaid shortcoming of the storage device seems to reside in the structure of the bag. If the same is attached to the upper portion of the container and a passage for liquid is provided in the opposite portion of the same, then, when the storage device is inverted the bag acquires a tendency to float on the liquid. The resulting hydro-static pressure changes the usual form of the bag so as to unduly elongate the same. This excessive elongation of the bag is easily carried to a point where the bag comes into contact with and obstructs the passage provided in the container for the supply and discharge of liquid.

The present invention has for its object to overcome this insufficiency of the storage device.

A further object is to reinforce the bag in such a fashion that it will not elongate unduly in operation within the storage device.

To that end the bag is provided with one or more retaining bands, radially across its interior, adapted to prevent an undue elongation thereof. In this construction, the band will directly oppose elongation. Preferably, these bands are so located that they reinforce the bag along one of its lines of greatest circumference or along one of its largest diameters in the zone between the two fluid ports.

Further features of the present invention will

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become apparent from the following description of embodiments thereof, given by way of example and illustrated in the accompanying drawings.

Fig. 1 is a cross section of a storage device provided with a bag according to the present invention.

Fig. 2 is a section of the same storage device with a modified structure of the bag.

Fig. 1 shows a container 1 and fluid port 2. A bag 3 with its retaining band 7 are shown mounted within the container 1. The bag 3 is secured to the container at the air valve portion 4.

The retaining bands 7 extend radially through the interior of the bag from the point 4 where the same is attached to the container 1 to the opposite portion thereof which is in close proximity to the fluid port 2. Such a band may be used with a complete bag such as shown in Fig. 1 being bonded at its inner central zone. It is to be noted that the elastic bands are located within one chamber which is independent from the second chamber which may contain a fluid having chemical characteristics which are detrimental to the elastic qualities of the bag structure. In another form the bag could be composed of a polyvinyllic resin compound or of nylon, which would retain the deformable but not the elastic characteristics when submerged in an aromatic fluid. The bands 7 being composed of rubber-like substance and being subjected to the fluid in the first chamber in the majority of cases a gas, will not be chemically effected by the gas.

Fig. 2, however, shows a modification in that the outer surface of the bag or diaphragm is bonded to the inner surface of container, in any conventional manner such as vulcanizing thereon, over the section extending between points 9—10 in Fig. 2. When the bag or diaphragm is so bonded to the container, the portion lying between line 10—10 and point 4 where the bag was originally attached to the container becomes unnecessary and may be eliminated. This feature permits a saving of rubber.

In practice it will, of course, not be necessary to introduce first a complete bag into the container, then to bond a portion of former to the latter, and finally to cut out the portion to be omitted. Instead, the valve device 4 will be independent from the bag-like diaphragm 8 as shown in Fig. 2 except for band 7 which connects both these members together.

Fig. 2 also shows another modification in that

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the bag 8 is bonded to the internal periphery of the container between the points 9—10 and the retaining bands 7 are positioned between the central portion of the baglike structure above the port 2 and extend to the lip of the bag at the point 10. In this case the complete bag or diaphragm may be introduced into the container and bonded between the points 9—10 to the container.

Retaining bands of the type described above may also be used to guard the bag against undue elongation due to other causes, such as: for instance, jerks or other sharp movements, or to a sudden withdrawal of an important amount of liquid from the storage device.

The strength and dimensions of the retaining bands have to be sufficient to prevent an undue elongation of the bag under the effect of the forces which may act on the same when the storage device is inverted, or in the case of occurrence of any of the disturbances contemplated in the preceding paragraph. The term "undue elongation" wherever used in the present specification and the appended claims means an elongation of the bag which would cause the same to close the passage member provided in the container for ingress and egress of liquid before substantially all liquid is expelled from said container.

The forces tending to produce an undue elongation of the bag, although generally small, may occasionally attain a more appreciable value. In such cases, it may be advantageous to give band 7 Fig. 1 a considerable resistance, as: for instance, by making the same of a non-stretchable material. Care must be taken, however, to retain enough flexibility in band 7 to permit the expansion and contraction of that portion of the bag required for the normal operation of the storage device.

The foregoing description is not intended to limit my invention which extends to all changes, modifications and equivalents within the scope of the appended claims.

What is claimed is:

1. An accumulator comprising a rigid shell and a deformable bag within said shell, two ports in said shell, said deformable bag being affixed to a first port, said deformable bag being adapted to be charged with one fluid through the first port, while another fluid is adapted to be charged through the second port to said shell, said bag having a retaining band bonded to the portion of said bag nearest to the second port, while the retaining band is also bonded to the shell at the zone around the first port.

2. An accumulator comprising a rigid shell and a deformable bag retained within said rigid shell, said shell having two opposed ports, the first port for fluid that is usually a liquid, and the second port for fluid that is usually a gas, said bag being attached to the second port, said bag having retaining bands of resilient material bonded to the bag at the zone of the second port and extending through the interior of said bag to be bonded at their opposite end to the bag at a point nearest to the first port.

3. An accumulator comprising a shell having a port at each end of an axis thereof, a deformable diaphragm therein having its peripheral portion bounded to said shell symmetrically about said axis with the central portion of said diaphragm spaced from the corresponding port and a retaining band extending from said bonded portion to the central portion of said baglike

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diaphragm to prevent undue elongation of said diaphragm away from the bonded portion.

4. An accumulator with a rigid shell and a deformable resilient bag, two ports within said shell, said bag affixed at one end zone within said rigid shell, said bag having at least one retaining band bonded thereto of resilient material extending through said bag from said zone of fixation to the opposite zone adjacent to one port, said bag being adapted to be filled with a first fluid while the rigid shell is charged with a second fluid, said retaining band restraining the amount of elongation of the bag beyond a predetermined limit as the second fluid charge decreases.

5. An accumulator with a rigid shell and a deformable resilient bag, two ports within said shell, said bag affixed at one zone within said rigid shell, said bag having a retaining band of elastic material therethrough from said zone of fixation to the opposite zone adjacent to one port, said band serving to limit the elongation of the bag when charged with fluid under pressure thereby permitting flow of fluid out of the other port of the shell.

6. An accumulator comprised of a resilient bag and a rigid shell, said shell having two ports at opposite ends thereof, said bag being mounted within said shell and affixed to one port, to receive a charge of a first fluid, said other being open to receive a flow of a second fluid under pressure, said resilient bag having a retaining band of elastic material bonded thereto at the zone adjacent to said first port and at the opposite zone adjacent to the said other port, said retaining band limiting elongation of said bag when the fluid pressure decreases.

7. An accumulator with a rigid shell and a deformable resilient diaphragm, said diaphragm affixed at a zone around the inside periphery of the shell, said shell having a first and a second fluid port one at either side of said diaphragm, said diaphragm having a retaining band of resilient material bonded to its center zone and the opposite end of the retaining band being affixed to the zone of the shell around the first fluid port to limit elongation of said diaphragm when the first fluid side of said diaphragm is charged with fluid under pressure thereby preventing the diaphragm from closing the second fluid port of the rigid shell and permitting flow of fluid out of the second fluid port.

8. An accumulator with a rigid shell and a deformable resilient diaphragm, said diaphragm being peripherally affixed about a zone within the shell, said shell having two ports one at either side of said diaphragm, one port being a first fluid port and the other port being a second fluid port, said diaphragm having a retaining band of deformable material bonded to its center zone and the opposite end of the retaining band being affixed to the zone of the shell around the first fluid port to limit the elongation of said diaphragm when the first fluid side of said diaphragm is charged with fluid under pressure, thereby preventing the diaphragm from closing the second fluid port of the rigid shell and permitting flow of fluid out of the second fluid port.

9. An accumulator with a rigid shell and a deformable resilient bag, said shell having a first and second port, said bag affixed at one end zone within said rigid shell, said bag having a plurality of retaining band of elastic material therethrough and extending from said zone of fixation

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to the opposite zone adjacent to the second port, said bag being adapted to be filled with a fluid through said first port and the rigid shell being adapted to be charged with a fluid through said second port, said retaining bands limiting the elongation of said bag.

10. An accumulator with a rigid shell and a deformable partition within said shell, and affixed thereto, said shell having two ports one at either side of said partition, one port being a gaseous fluid port and the other port being a liquid fluid

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port, said partition having a retaining band of deformable material bonded at one end of the band to the central portion of said partition and affixed at its opposite end with respect to the zone of the shell around the first fluid port to limit the elongation of said partition when the first gaseous fluid side of said partition is charged with gaseous fluid under pressure.

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No references cited.