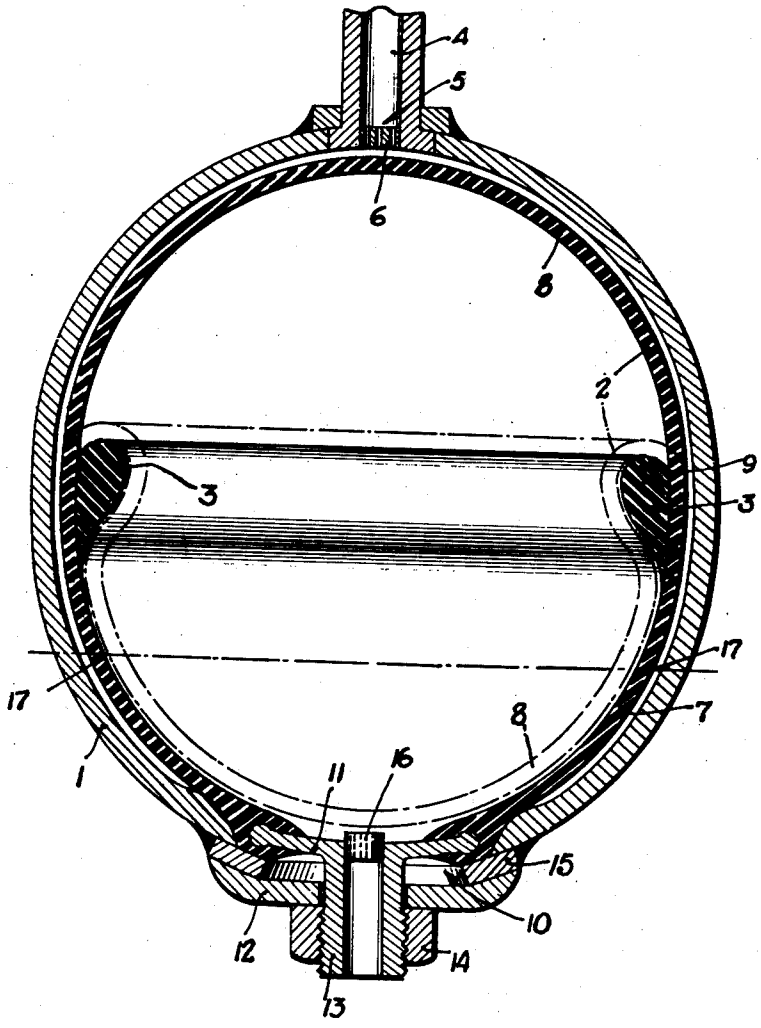
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ACCUMULATOR BAG

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ACCUMULATOR BAG

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1 Claim. (Cl. 138—30)

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This invention pertains to hydraulic storage devices and more particularly to the type including two variable volume chambers formed within a container by a bag shaped diaphragm, in which one chamber is to be filled with the fluid to be stored and the other with a gas—usually air—under pressure.

The fluid to be stored is the oil or water for actuating hydraulic units and in practice the bag is generally filled with a gas and attached to the portion of the storage device which is normally the upper portion thereof while a passage member is provided in the opposite, or lower, portion for supply and discharge of a liquid. It has been observed that storage devices of this type are subject to disturbances when they are operated while turned upside down. This usually happens to the storage devices when used on aircraft; therefore, the aforesaid disturbances may best be removed by containing the liquid inside said bag and retaining the gas outside thereof.

It has been observed, however, that the usual bag is injured after a short time when operation of the storage device with the liquid contained within said bag is attempted.

It is an object of the present invention to devise a storage device which will be safe in operation when the liquid is inside of the bag but which will also serve satisfactorily with a gas inside said bag and the liquid in the chamber formed between the inside of the container and the outside of said bag.

To that end, the interior of the bag is provided with an annular smoothly curved guiding member of a moderate mechanical resistance. This guiding member is so positioned within the bag, approximately at the dividing section, that the bag forms into two halves, of which either side will be deformed but slightly and will be retained against the wall of the container while the other is free to advance and to retract therein. When the bag is completely drained, each upper half will be folded down against its corresponding lower half, except for the portion surrounding the guiding member.

The present invention is further concerned with an improved structure at the end of the container where the bag is to be introduced into and secured to the same.

To that end the container is provided with an oval hole and the bag is secured to an oval duplex lid.

Further features of the present invention will become apparent from the following description

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of an embodiment thereof given by way of example and illustrated in the accompanying drawing.

In the drawing, 1 designates the container and 2 the bag. Bag 2 carries an annular guiding member 3 made of somewhat harder rubber or the like than the bag and integral therewith. Conduit 4 connects container 1 to an auxiliary container from which a gas under pressure is supplied to container 1 or vice versa. A passage member 6 formed with a plurality of very small holes is inserted into port 5 to protect bag 2 from injury when the latter completely occupies container 1 and tends to deform into any sizeable openings.

Guiding member 3 must be so positioned that it will divide bag 2 into two halves 7 and 8 of approximately equal shape and size. Half-bag 7 will have very little deformation when the storage device is operated, while half bag 8 will expand and retract and will, when completely drained, conform to the position of the half bag 7, except for the portion surrounding member 3. Half bags 7 and 8 are shown in full lines in the position they occupy when container 1 is almost completely drained. When fluid is admitted into container 1 to compress bag 2, half bag 7 is, practically, not affected and half bag 8 assumes the shape shown in dotted lines when bag 2 is drained. The portion of guiding member 3 which is not secured to bag 2 must be smoothly curved and have a well polished surface.

The guiding portion proper 9 of member 3—i. e., the portion around which the bag may fold up—has preferably a circular curvature whose diameter is, at least, twice as long as the bag's thickness in that area.

From portion 9 to the opposite end member 3 has a conically tapered shape, while the surface not permanently secured to the bag has a slight concave curvature.

Container 1 is fitted with an opening 10 which must be relatively large to permit the introduction of bag 2 with guiding member 3. In order to close opening 10 securely and conveniently, notwithstanding the high values of pressure which may prevail when the storage device is in operation, a lid according to the following description has been found satisfactory.

Opening 10 has a cross section of oval shape. The lid is composed of an interior portion 11 and an exterior portion 12, both having also an oval cross section and portion 12 having larger cross sectional dimensions than portion 11 and opening 10.

Portion 11 carries a tubular flange 13 traversing a hole in the center of portion 12 and projecting beyond the same. Flange 13 is threaded on its outside so that a nut 14 can be screwed on to draw both portions together.

Container 1 is reinforced along the circumference of opening 10 by a metal band 15 which is permanently secured to the area of container 1 adjacent opening 10. The remaining portion of band 15 projects into opening 10 and reduces the cross sectional dimensions thereof so as to make them smaller than the corresponding dimensions of lid-portion 11.

The end face of bag 2 adjacent lid portion 11 is of increased thickness and so applied to the same that the whole peripheral area of portion 11 is surrounded on all sides by a layer of rubber or the like.

When the storage device is assembled nut 14 must be tightened until the peripheral portion of lid 11 is firmly applied against band 15.

A liquid or a gas can be admitted to and exhausted from bag 2 through the hollow interior of flange 13. A passage member 16 is inserted into the opening of flange 13 to the interior of container 1 to prevent bag 2 from being forced into flange 13 when the bag is completely drained.

In the embodiment described above a complete bag 2 with its portions 7 and 8 was described and this is considered the preferred structure. However, if desired, a part of half bag 7 extending between opening 10 and a line 17 below and at a certain distance from guiding member 3 may be omitted providing the remainder of half bag 7 is bonded to the surface of container 1. The size of the area which has to be bonded depends upon the contemplated maximum pressure in the storage device.

Also, if container 1 is composed of two half shells, half bag 7 may be omitted and portion 8—then assuming the function of a diaphragm—may be made to project to the outside and to be clampingly secured between the rims of the

two half shells when the storage device is assembled.

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

What is claimed is:

Hydraulic accumulator which comprises a container, a first opening in one portion thereof, another opening in the opposite portion of the same, a reinforcing band with an oval opening secured to the outside of said container over the area adjacent said first opening and projecting into the same, a passage member adapted to close said oval opening and including an interior element having slightly smaller cross sectional dimensions than said first opening, an external element having slightly larger cross sectional dimensions than said oval opening, a passage extending through the center of both said elements, means for clampingly securing both said elements together and to force the same to engage said band, and a bag made of a flexible and elastic material extending to the inside of said container and secured to said internal element so as to completely surround the peripheral area of the same.

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