Jan. 16, 1934. W. A. DEL MAR 1,944,005

PRESSURE RESERVOIR WITH FABRIC BAG

Filed Feb. 21, 1933

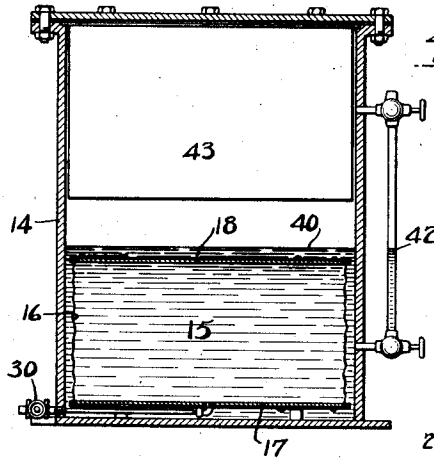


FIG. 1.

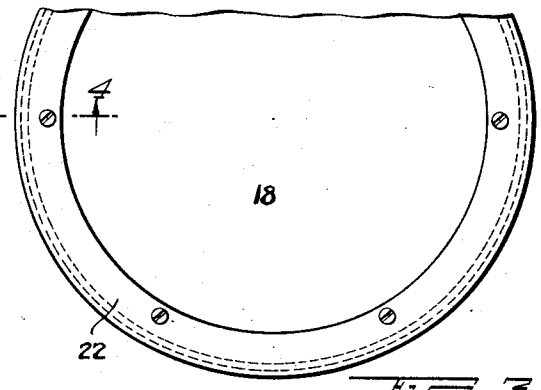


FIG. 3.

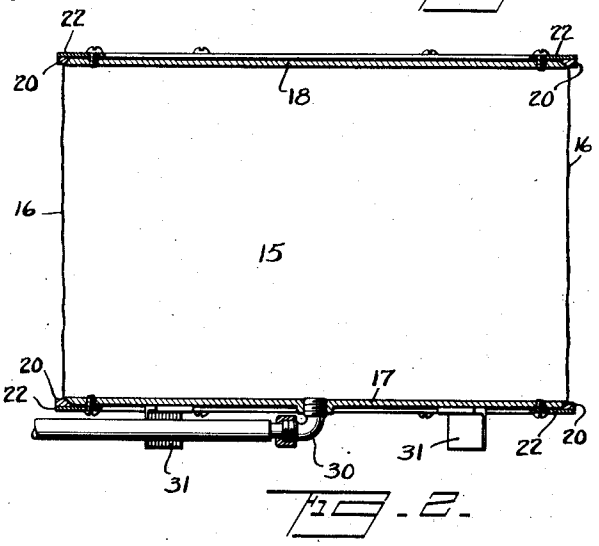


FIG. 2.

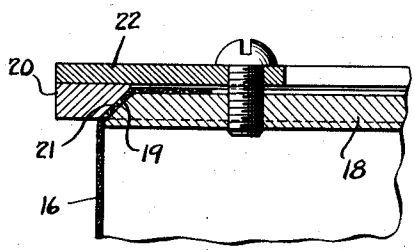


FIG. 4.

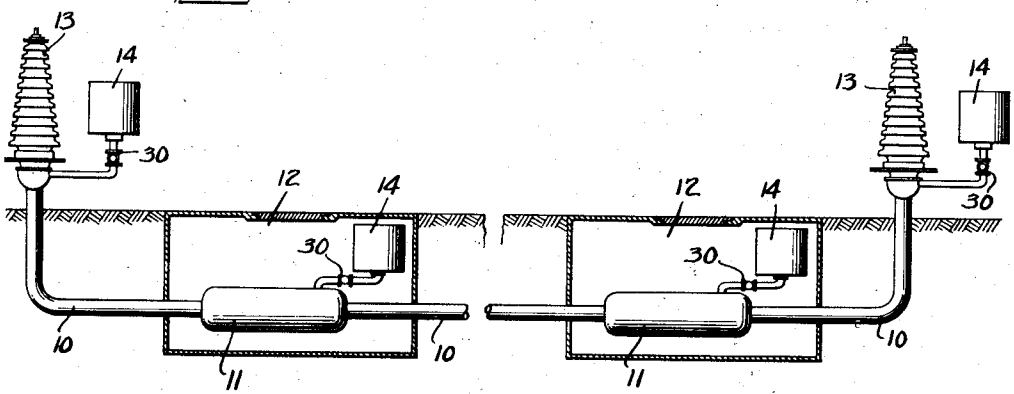


FIG. 5.

INVENTOR
William A. Del Mar
BY
ATTORNEY

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PRESSURE RESERVOIR WITH FABRIC BAG

William A. Del Mar, Greenwich, Conn., assignor to Habirshaw Cable and Wire Corporation, New York, N. Y., a corporation of New York

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3 Claims. (Cl. 137—71)

My invention relates to improvements in pressure reservoirs for oil filled cable systems and more particularly to systems conveying high voltages under ground. During normal operation such cables undergo a temperature cycle due to the variations of current which they are called upon to transmit. The oil, therefore, expands or contracts in volume and by means of suitable channels provided in the cable such oil may be allowed to flow in and out of the cable at the ends or joints. With this class of cable it is customary to provide reservoirs at the ends or joints to receive the surplus oil during periods of high temperatures in the cable and hold the oil until periods of low temperature occur in the cable when the oil contracts.

Where reservoirs can be located at suitable elevations above the cables, and connected therewith, constant pressure in the reservoirs and cables is easily maintained due to the constancy of the gravity head. Where, however, elevated reservoirs cannot be maintained it has been common practice to use compressed gas in the reservoirs. In such cases the reservoirs usually comprise two parts, one for the oil of the cable system, the other for gas, the oil and gas being separated from each other by suitable pressure transmitting partitions.

In these pressure reservoirs the expansion chambers are generally made with a flexible metallic wall between the oil and the pressure regulating gas.

Experience with such walls, whether made as bellows or diaphragms, indicates that the fatigue of the metal leads to its early cracking in service. I have, therefore, used as a substitute, oil-impervious fabric and have found that it has a very satisfactory life.

In order to obtain the best operating life, however, I have found that three features of construction are of importance.

First, the operation of the fabric with oil on both sides, and

Second, the use of a cylinder of flexible fabric attached at both ends to hard discs, preferably of metal.

Third, the fastening of the cylinder to each of the discs by means of two pressure rings, one of which serves to press on the other, which is wedge-shaped in cross-section. By virtue of this pressure, the fabric is held in oil-tight and gas-tight relation with the discs.

The foregoing and other features of my invention will now be described in connection with the accompanying drawing, forming part of this specification, in which I have represented my pressure reservoir with fabric bag in its preferred form, after which I shall point out more particularly in the claims those features which I believe to be new and of my own invention.

In the drawing:

Figure 1 is a vertical cross-section through a pressure reservoir or gas chamber in which my expansion chamber is assembled.

Figure 2 is a vertical cross-section through my expansion chamber.

Figure 3 is a top view of my expansion chamber as shown in Figure 2.

Figure 4 is an enlarged section through corner 4—4 of Figure 3.

Figure 5 is a diagrammatic sketch showing my pressure regulator in relation to the cable in a transmission system.

In Figure 5 I have illustrated diagrammatically an oil filled cable system in which the high tension cable 10 mainly located underground, is shown in several lengths being connected by joints 11 within manholes 12 of well known construction. The outermost cable lengths are shown connected with terminators 13 in the usual way. My reservoirs 14 are shown connected with the joints 11 and the terminators 13. The cables, joints and terminators are charged with insulating oil in the well known way to a desired extent that the oil will be within the expansion chamber 15 of my reservoir or gas chamber 14.

My expansion chamber 15 shown in detail in Figures 2, 3 and 4 comprise a cylindrical fabric bag 16 cemented to two discs 17 and 18. Both these discs have sloping edges 19 as shown in the enlarged detail in Figure 4. A ring 20 provided with a sloping inner edge 21 complementary to the sloping edge 19 is pushed down over the bag. Another ring 22 is then secured to the discs 17 so as to force down the wedge ring 20 and hold the fabric 16 tightly against the disc 17. The disc 17, which as shown in Figure 2 is the lower one, has a suitable oil outlet 30 connecting with the cable system as shown in Figure 5. Feet 31 are provided on the lower disc 17.

This assembly is then installed within a gas chamber or metal tank 14 and sufficient oil 40 is placed within the tank to keep the assembly covered. The object of this oil is three fold.

1. To keep the fabric bag out of contact with air or gas which would tend to dry it and allow its surface to crack.

2. To afford a medium for operating a calibrated level glass 42 to indicate the height of oil in the fabric bag.

3. To reduce the diffusion of gas or air through the fabric.

I have found it advantageous to use the above described apparatus in conjunction with a gas adsorbent material 43 for the purpose of reducing the volume of gas required to keep pressure within the desired limits.

I wish it distinctly understood that my pressure reservoir with fabric bag herein described and illustrated is in the form in which I desire to construct it and that changes or variations may be made as may be convenient or desirable without departing from the salient features of my invention and I therefore intend the following claims to cover such modifications as naturally fall within the lines of invention.

I claim:

1. A variable capacity reservoir for feeding oil to high tension oil filled electric cables, said reservoir comprising a bag with flexible fabric sides and rigid ends, and connected to the oil filled cable, and a gas chamber surrounding the reservoir containing sufficient oil to submerge the reservoir.

2. A variable capacity reservoir for feeding oil to high tension oil filled electric cables, said reservoir comprising a bag with flexible fabric sides and rigid plate ends, and rings cooperating with the plates to wedge the fabric to the discs.

3. The device of claim 2 in which the wedging ring is forced against the fabric by a clamping ring.

WILLIAM A. DEL MAR.