July 7, 1942. C. L. MARNER 2,289,139

BREATHER RESERVOIR

Filed Feb. 16, 1939

Fig. 1.

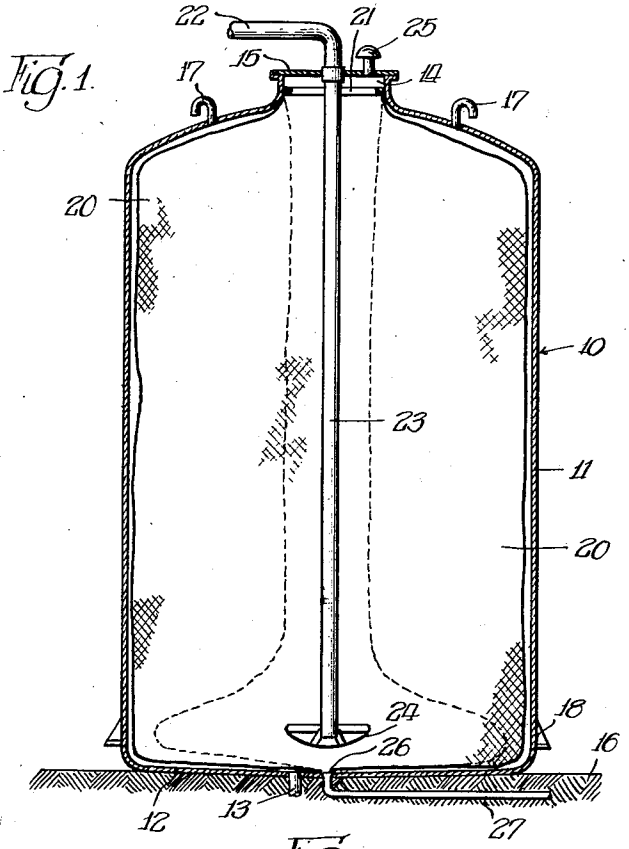
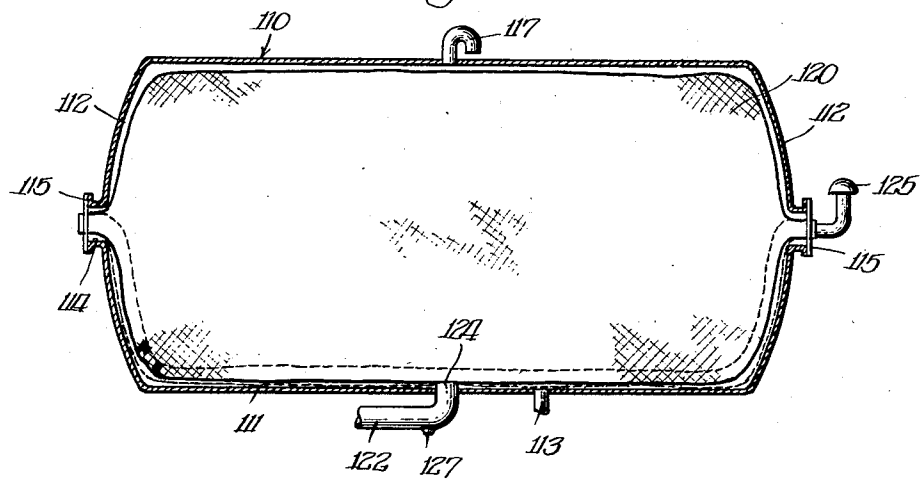


Fig. 2.



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BREATHER RESERVOIR

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6 Claims. (Cl. 220—85)

The invention relates to tanks and has more particular reference to a breather reservoir for connection to a plurality of bulk storage tanks for gasoline and other volatile liquids.

Storage tanks for gasoline and the like are sealed against vapor losses and in order to take care of variations in the vapor pressure in the tanks, due to temperature changes, breather roofs are provided therefor, or a number of tanks having roofs of conventional type may be connected to a breather reservoir.

An object of the invention is to provide an improved breather reservoir of simple construction, which can be economically manufactured and which may be housed within a new steel tank built especially for the purpose or within an old tank adaptable to the invention with only few slight changes.

Another object of the invention is to provide a breather reservoir comprising a fabric bag housed within a steel tank and wherein said fabric bag is readily accessible by removing the manhole cover plate of the tank and through which the bag may be removed and another bag replaced.

Another object is to provide a breather reservoir as above described in which the fabric bag is made larger in circumference than that of the steel shell so that in case of excess pressure there will be no damaging stresses on the fabric.

With these and various other objects in view, the invention may consist of certain novel features of construction and operation, as will be more fully described and particularly pointed out in the specification, drawing and claims appended hereto.

In the drawing which illustrates an embodiment of the invention and wherein like reference characters are used to designate like parts—

Figure 1 is a sectional view through the steel shell of the present breather reservoir showing the manner of supporting the fabric bag within; and

Figure 2 is a sectional view through the steel shell of a modified form of breather reservoir embodying the features of the invention.

Referring to Figure 1, the steel shell 10 may comprise a new steel tank of light construction built particularly for the breather reservoir of the invention or said shell may be formed by an old tank that has been renovated in order to accommodate the present construction.

The cylindrical walls 11 of the tank are joined at their lower end by a base 12 having a drain 13 and at their upper end said cylindrical walls converge to terminate in an opening 14 of fairly large diameter and which is closed by the removable manhole cover 15. The tank is adapted to rest on any suitable support such as the earth 16, and in order to connect the interior of the tank with the atmosphere vents 17 are provided in the roof of the tank and the cylindrical walls 11 are formed with screened openings 18.

The fabric bag 20, which may be rendered impervious to gases in any suitable manner, is supported within the tank 10 by means of a retaining ring 21 located in the opening 14. It is desirable that the retaining ring have a fairly large circumference in order to distribute the weight of the fabric bag to safely support the same when in a vacuum position as shown by the dotted lines in Figure 1. For this reason the manhole opening 14 is of a fairly large diameter as above stated. The vapor line 22 from the storage tanks enters the fabric bag through the manhole cover 15. In accordance with the invention an extension 23 is provided which terminates near the base 12 of the tank, having secured at said terminal end a curved guard plate 24 in order to prevent the fabric from being pulled into the extension pipe under vacuum conditions. The pressure and safety valve 25, located in the manhole cover 15, will allow the vapors to vent should the pressure within the fabric bag exceed a predetermined limit and also in the event of excessive vacuum, valve 25 will allow air to be drawn in from the atmosphere.

It will be assumed that the present breather reservoir is connected to a plurality of storage tanks for gasoline. It is well known in the art that the vapor pressure within said tanks increases during the mid-part of the day, due to the direct rays of the sun on said tanks, and this is especially true in the summer time. During the night the temperature will drop to an extent where a large proportion of the vapors are condensed. The resulting variations in the vapor pressure in the tank is known as breathing and the fabric bag 20 of the present reservoir will assume alternately an expanded position, shown in full lines and a vacuum position shown in dotted lines in Figure 1. The circumference of the fabric bag 20 is somewhat larger than that of the steel shell 10 so that in case of any excess vapor pressure there will be no damaging stresses on the fabric. The vapors from the several storage tanks are conducted to the breather reservoir through the vapor line 22 and are discharged into the fabric bag 20 at the lower end of the extension 23. The bag will expand to accommodate the increasing pressure of the vapors discharged

by line 23 and in the event the limit of valve 25 is exceeded the excess will be discharged thereby to the atmosphere. This valve is located in the manhole cover 15 so that upon discharge the hotter and leaner vapors will be exhausted to the atmosphere.

Also when the valve admits air under vacuum conditions this air will mix with the warmer and leaner air-vapor mixture in the upper part of the fabric bag. It follows that the cooler and richer vapors within the fabric bag 20 will be found in the lower part thereof and for this reason the extension 23 is provided so as to discharge the vapors in said lower part and to withdraw these cooler and richer vapors from the breather reservoir to compensate for the vacuum in the storage tanks which will develop when the vapors within the tank condense.

The vapor bag is connected at its bottom as at 26 to a condensate drain 27. Said drain will remove any moisture from within the bag and in a like manner any moisture collecting within tank 10 will be removed therefrom through drain 13.

In the modified form of breather shown in Figure 2 the cylindrical tank 110 is disposed horizontally and may be supported by any suitable structure, or said tank may rest on the earth as described in connection with Figure 1. The cylindrical walls 111 of the tank connect with dome-shaped end members 112, each of which is provided with a central opening 114 closed by the manhole cover 115. The interior of the tank is vented by means of the vent 117.

Located within the tank and suitably supported at its respective ends by the covers 115 is a fabric bag 120. In this modification the vapor line 122 enters the tank through the cylindrical walls 111 thereof and connects with the fabric bag at 124. The safety valve 125 communicates with the interior of the fabric bag 120 at one end where said bag is supported by the manhole cover 115.

The operation of the breather reservoir shown in Figure 2 is substantially the same as that described with respect to the device of Figure 1. The vapor from the storage tanks is conducted through line 122 to the fabric bag and as the vapor pressure increases the fabric bag will expand to accommodate said increased pressure. The cylindrical tank 110 is drained through pipe 113 and any condensate collecting within the fabric bag will be expelled through drain 127 located in the vapor line 122.

The invention is not to be limited to or by details of construction of the particular embodiment thereof illustrated by the drawing, as various other forms of the device will of course be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

What is claimed is:

1. In a breather reservoir, in combination, a cylindrical tank, a bag of gas impervious material suspended within said tank, vents connecting the interior of the tank with the atmosphere, and a supply line extending within said bag for supplying volatile vapors thereto and for withdrawing said vapors therefrom, the outlet end of said supply line being located in the lower portion of said bag in order to withdraw the cooler and richer vapors therefrom.

2. In a breather reservoir, in combination, a cylindrical tank, a bag of gas impervious material suspended within said tank, vents connecting the interior of the tank with the atmosphere, a supply line extending within said bag for supplying volatile vapors thereto and for withdrawing said vapors therefrom, and a pressure and vacuum safety valve for said bag, the outlet end of said supply line being located in the lower portion of said bag at a distance removed from said valve in order to withdraw the cooler and richer vapors therefrom.

3. In a breather reservoir, in combination, a cylindrical tank having an opening in the upper end thereof, a removable cover for said opening, a bag of gas impervious material suspended within said tank from said opening, whereby said removable cover closes the mouth of said bag, vents connecting the interior of the tank with the atmosphere, and a supply line extending through said removable cover into said bag for supplying volatile vapors thereto and for withdrawing said vapors therefrom, the outlet end of said supply line being located in the lower portion of said bag in order to withdraw the cooler and richer vapors therefrom.

4. In a breather reservoir, in combination, a cylindrical tank having an opening in the upper end thereof, a removable cover for said opening, a bag of gas impervious material suspended within said tank from said opening, whereby said removable cover closes the mouth of said bag, vents connecting the interior of the tank with the atmosphere, a supply line extending through said removable cover and terminating in the lower portion of the bag, and a pressure and vacuum safety valve positioned on said removable cover and communicating with said bag.

5. In a breather reservoir, in combination, a cylindrical tank having an opening in the upper end thereof, a removable cover for said opening, a bag of gas impervious material suspended within said tank from said opening, whereby said removable cover closes the mouth of said bag, vents connecting the interior of the tank with the atmosphere, a supply line extending through said removable cover and terminating in the lower portion of the bag, a pressure and vacuum safety valve for said bag, and a drain for said tank and bag respectively for removing the condensate therefrom.

6. In a breather reservoir, in combination, a tank having an opening in the upper end thereof, a fabric bag within said tank suspended from said opening whereby the mouth of said bag coincides with the circumference of said opening, a cover for said opening and which seals the interior of said bag from the atmosphere, a vapor supply line extending through said cover and terminating in the lower end of said bag, and a pressure and vacuum safety valve located on said cover and communicating with the interior of said bag.

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