Sept. 28, 1943. D. W. JAYNE 2,330,366

APPARATUS FOR PREVENTING EVAPORATION FROM OIL STORAGE TANKS

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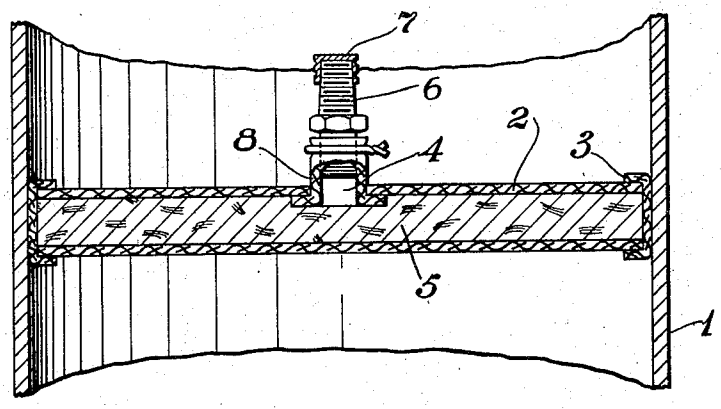

Fig. 1

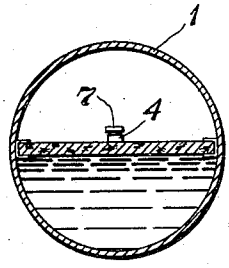

Fig. 2

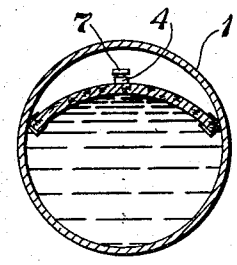

Fig. 3

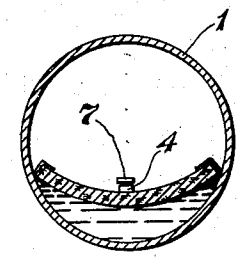

Fig. 4

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APPARATUS FOR PREVENTING EVAPORATION FROM OIL STORAGE TANKS

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2 Claims. (Cl. 220—26)

This invention relates to tanks in which volatile liquids are stored and more particularly to active storage or distributing tanks containing gasoline or other volatile fractions.

In tanks of this kind the volume of liquid is constantly changing due to additions and withdrawals of the contents. As the gasoline is withdrawn, fresh air enters the tank and becomes saturated with the vapors of the gasoline, and when the gasoline is added to the tank, the large volume of air saturated with the gasoline vapors escapes into the atmosphere and is lost. Where the volume of the gasoline in the tanks changes constantly by reason of additions and withdrawals, the amount of the vapors lost becomes enormous.

Many devices have been proposed to eliminate this loss. One method now in use to eliminate evaporation losses involves placing a steel pontoon roof within the tank. Such a pontoon roof is a self-contained element fitting within the shell of a storage tank and replacing the usual roof of a storage tank. These pontoons are adaptable to construction in new storage tanks of large capacity but are not economical for existing tanks as the original roof of the tank must first be removed. Such pontoon roofs reduce the effective volume of the tank by the volume of the pontoon element.

Another disadvantage of the pontoon roof is that rain must be collected in a basin and allowed to overflow through a syphon drain into the liquid content below and settle to the bottom of the tank and must be removed from time to time.

It is, therefore, an object of this invention to provide means for preventing the evaporation of the volatile components of liquids which may be applied to either existing or new tanks. Another object of this invention is the provision of a device adapted to float on the surface of the liquid in a storage tank through which vapors cannot pass and is highly resistant to liquids which are likely to be stored in such tanks. A still further object is the provision of a floating device which may be installed in a storage tank by introducing the materials through the conventional manhole with which practically all such tanks are provided. Other objects will appear as the description of the invention proceeds.

These objects are accomplished by providing an envelope of buoyant material which consists essentially of a casing filled with ground cork and which when filled, floats upon the surface of the volatile liquid.

The invention will be more clearly understood by reference to the drawing in which Fig. 1 is a sectional view of a vertical tank containing the float of the present invention. Fig. 2 illustrates a sectional view of a horizontal cylindrical tank which is about half filled with a volatile liquid. Fig. 3 represents a similar tank in which the tank is substantially more than half filled with liquid. Fig. 4 is a sectional view of a horizontal cylindrical tank which is less than half filled with volatile liquid.

In all of the figures, 1 represents the steel wall of the tank in which the volatile liquid such as gasoline is stored. The tank is provided with a float which consists essentially of a coated or impregnated canvas casing shown as 2. This canvas is usually coated with neoprene which is a synthetic rubber-like substance prepared from a polymer of 2 chloro 1, 3, butadiene or similar synthetic rubber-like polymer which is not attacked by gasoline or similar hydrocarbons. The edges of the envelope are sealed by means of a similar piece of coated canvas shown as 3, which may be cemented to the casing 2. In the casing there is a hole 4 through which the ground cork may be introduced. This hole may conveniently be made in the form of a short tube of neoprene coated canvas and cemented to the casing 2. In the drawing it is illustrated as 8. The ground cork 5 is introduced through the hole 4 and fills the envelope 2. The cork may be introduced in amount sufficient only to insure sufficient buoyancy for it to float on the surface.

In the operation of the device the envelope 2 which is made up outside of the tank is introduced through the usual manhole. In a tank of about 20' in diameter or less, the rolled up envelope will usually pass through a conventional manhole. After the rolled envelope is passed into the tank, it is spread out and the ground cork is introduced through the opening 4 by any means such as blowing. When the envelope is filled the opening 4 may be closed by any suitable means such as by clamps or a wooden plug coated with neoprene or similar cement so that the liquid being stored will not find its way into the inside of the envelope. The opening 4 may also be fitted with a metal nipple 6 and cap after introduction of the cork. The cap is shown as 7.

In vertical tanks the finished disk should be substantially the same diameter as the inside of the tank, and it has been found that usually 2 or 3 inches in depth is sufficient to insure buoyancy in ordinary liquids and with ordinary weight canvas. It will rise and fall with the level of the liquid. In horizontal tanks the disk should be

rectangular and of the approximate dimensions of the tank at its horizontal center plane. If the cork is not packed in too tightly, the envelope will tend to conform to the walls of the tank and is sufficiently deformable to prevent any considerable areas of liquid surface which are not covered.

In the drawing only one hole for introducing the cork is shown. However, it will be apparent that more than one may be provided, or the hole may take the form of a slit in the fabric which can be closed by cementing a patch over it after the cork has been introduced.

In operation, the gasoline or other volatile liquid is pumped into the tank through an opening in the bottom (not shown). As soon as the liquid rises to a depth of a few inches, the float rests upon the surface of the liquid. As the tank is filled and the surface rises, the float likewise rises and due to its flexible nature substantially covers the entire surface of the liquid.

While I have described the invention as being suitable for gasoline, it is to be understood that it is equally suitable for crude petroleum, naphtha, benzene, and practically all organic liquids. While I have illustrated the invention by the use of ground cork, it will be understood that any material which is light and porous and which will not pack will be suitable.

The canvas should be coated with neoprene or similar material on at least one side and preferably both sides so that the vapors of gasoline or of the liquid to be stored will not penetrate it. In the case of liquids other than those mentioned, a different coating and cement may be found necessary.

The present invention has an advantage over the prior art in that the envelope may be introduced through a conventional manhole and the buoyant material put in place afterward. The use of granular cork, or similar small grain buoyant material, gives extreme flexibility to the completed float. The invention also offers the advantage that the float herein described is relatively inexpensive.

It is apparent that many widely different embodiments of this invention may be made without departing from the spirit and scope thereof, and therefore, it is not intended to be limited except as indicated in the appended claims.

I claim:

1. The combination of a closed storage tank adapted to contain a volatile hydrocarbon liquid, means for passing the said hydrocarbon liquid in and out of the said tank, and a float covering the liquid in said tank and preventing evaporation thereof comprising a substantially flat vapor and liquid tight flexible envelope loosely filled with a solid granular buoyant material and having a dimension substantially equal to the largest horizontal cross-sectional dimension of the tank, said flexible envelope being sufficiently flexible to be inserted in the tank through a manhole and having liquid tight means which can be readily opened and closed for inserting the said granular buoyant material, said envelope being rendered impervious to the hydrocarbon liquid by having a film on its surface of a synthetic rubber-like polymer.

2. The combination of claim 1 in which the buoyant material is granular cork.

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