Oct. 28, 1969 F. J. DANIELS ET AL 3,474,931

FLEXIBLE FLOATING BLANKET FOR VAPOR LOSS CONTROL IN VERTICAL STORAGE TANKS

Filed March 12, 1968 2 Sheets-Sheet 1

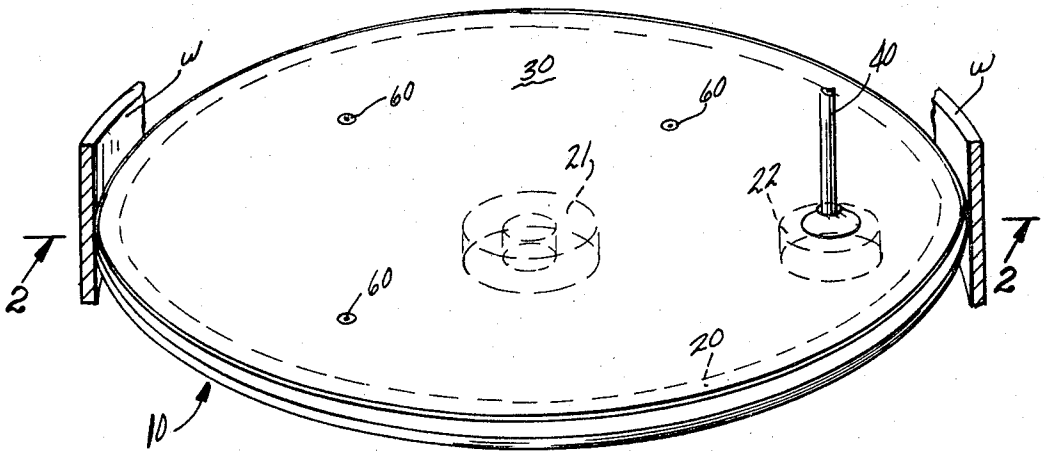


FIG - 1

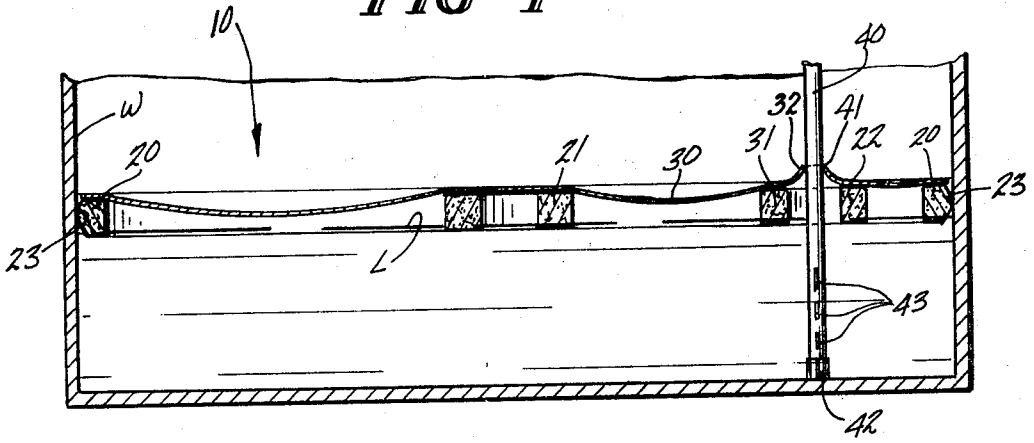


FIG - 2

INVENTORS
FRANK J. DANIELS
LOU C. CREITH

BY Henry W. Cummings
ATTORNEY

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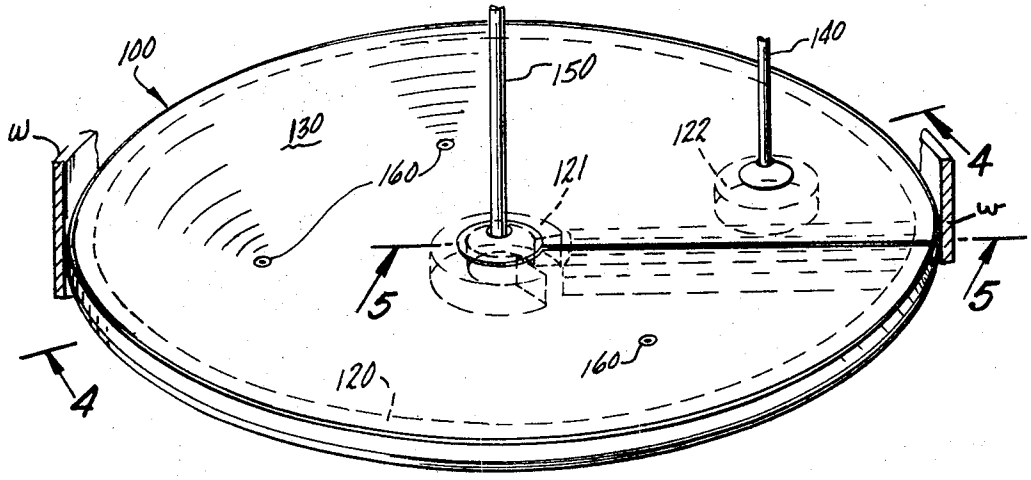


FIG-3

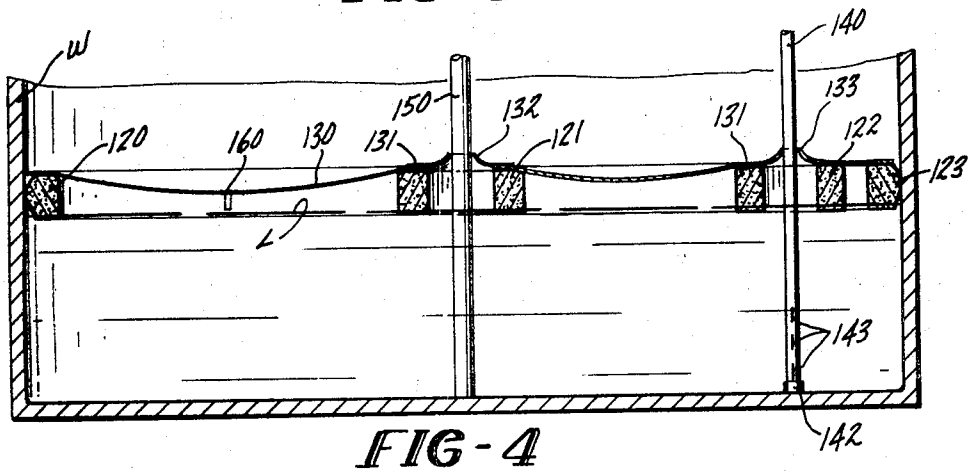


FIG-4

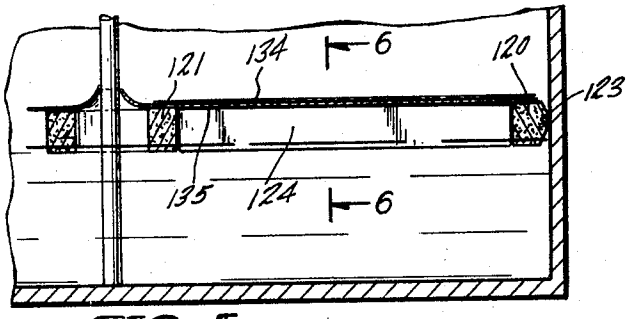


FIG-5

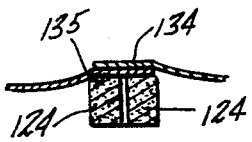


FIG-6

INVENTORS:
FRANK J. DANIELS
LOU C. CREITH

BY Henry W. Cummings

ATTORNEY

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FLEXIBLE FLOATING BLANKET FOR VAPOR LOSS CONTROL IN VERTICAL STORAGE TANKS

Frank J. Daniels, Baldwin, N.Y., and Lou C. Creith, Allentown, Pa., assignors to Olin Mathieson Chemical Corporation, a corporation of Virginia

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U.S. Cl. 220—26 4 Claims

ABSTRACT OF THE DISCLOSURE

A floating covering is provided comprising a blanket having a peripheral floating ring, the periphery of which ring is in excess of the tank wall periphery and one or more auxiliary floats are attached to the underside of the blanket to avoid the blanket contacting the liquid being stored.

An impervious cover floating atop a volatile liquid in a vertical storage tank will greatly decrease evaporation and contamination of the product. Several such blankets are in use at present and serve quite well.

However, with existing designs, all such floating blankets presently in use are expensive to manufacture and are difficult and expensive to maintain.

This design will be extremely simple to install and maintain, and will be relatively inexpensive, particularly in tanks of 15 feet in diameter and under.

Once installed, its maintenance cost will be minimal throughout its life, and replacement at the end of its life will be as simple as the original installation. Normally, no tools of any sort are necessary for the installation or removal of a blanket of this design.

Other advantages will become apparent to those skilled in the art as a detailed description of specific embodiments proceeds with reference to the drawings which form a part hereof, and in which:

FIGURE 1 is a perspective view of a floating deck according to the present invention in which installation does not involve a center pole.

FIGURE 2 is a sectional view along the lines 2—2 of FIGURE 1.

FIGURE 3 is a perspective view of a floating deck according to the present invention in which installed is a tank having a center pole.

FIGURE 4 is a sectional view along the lines 4—4 in FIGURE 3.

FIGURE 5 is a partial sectional view along the lines 5—5 in FIGURE 3.

FIGURE 6 is a sectional view along the lines 6—6 in FIGURE 5.

The floating deck of the present invention is adapted for use both in tanks having, and tanks not having, a fixed center pole.

Thus, according to one embodiment of the present invention, adapted to a tank not having a fixed center pole, in FIGURES 1 and 2 the deck **10** will comprise a circular blanket **30** covering a plurality of floats **20**, **21** and **22**. The designation L represents the liquid level.

The blanket **30** will be made of, for example, a fabric composed of nylon cloth with polyurethane film calendered on both sides. The particular fabric will vary with the application. Its weight will be about 10–12 ounces per square yard, preferably about 11 ounces per square yard. All joints in the covering fabric will be sealed to assure leak-proof joints. This can be done with commercially available polymeric cements. An electric heat sealing method can be used, if desired.

The floats **20**, **21** and **22** will be made of polyurethane

flexible foam weighing about 1.0 to 2.0 pounds per cubic foot with a RMA test value of about 24–36 pounds at 25% compression.

The main float **20** will be in the form of a ring with an outside diameter larger than the inside diameter of the tank wall W, for example, by approximately ½ inch. The cross-sectional shape of this float is rectangular, except for the wall contacting side which has a somewhat pointed, contacting surface **23**. The main float **20** will provide most of the floatation and will also serve as a peripheral seal at **23** against the tank wall W. The fact that the diameter of this float is greater than that of the tank wall provides the necessary force to keep the ring pressed against the tank wall.

Float **21** is included to keep the non-buoyant blanket **30** suspended above the liquid. While this float is shown circular in FIGURE 1, it could comprise another configuration, such as a square, rectangle, etc. Furthermore, a plurality of floats could be used instead of the single float.

Float **22** provides an enclosed well for a guide and gauging pipe **40**. Again, the configuration and the number of floats may vary from the single, circular float shown.

In the area where the guide pipe **40** passes through the blanket, the blanket may be reinforced by the addition of one or more layers of fabric **31**. The blanket will also contact the pipe at **41** to provide a seal **32**.

The guide pipe **40** will serve as both a guide and a gauging well. It may be, for example, an aluminum pipe of suitable size having a number of slots **43** along its length. The slots will provide for free flow of liquid through the pipe in case sampling is required. The slots are not essential to the operation of the blanket itself.

The pipe will be anchored to the tank floor by the magnet **42** in one end and to the tank gauge hatch (not shown) at the roof by suitable means.

To provide for the possibility that water or some other liquid might find its way onto the top of the blanket, as by a leaky roof, the blanket will be allowed to sag between the floats and drains **60** will be installed at low points on the blanket.

The blanket will be installed in the tank, while the tank is in service, by folding the blanket in half, causing the ring float **21** to take a half-moon configuration, with the float on the outside and the cover forming a double semicircle. One end of the crescent can then be inserted through a roof manhole (not shown) and then the entire blanket fed through.

Once inside, the resilience of the ring float **20** will cause the ring to snap out against the tank wall W and the blanket is launched. If the liquid level in the tank has been set approximately 6 to 8 feet below the top, the guide pipe **40** can now be used to move the blanket around to the proper position where the pipe **40** can be installed through the gauge hatch and through the blanket at **32** and set in the proper position on the tank bottom.

Once the blanket is installed in the tank, the manhole will be left open on the tank roof to vent out any fumes above the blanket and a suitable ventilating device (not shown) will be installed above the manhole and, if necessary, in another roof area to assure maintenance of nonflammable air-vapor mixtures above the blanket.

FIGURES 3–6 illustrate another embodiment of the present invention directed to the case where the tank contains a fixed center pole.

In this case, a blanket will be used which, at its center, does not have a continuous ring such as **21** in FIGURE 1. It rather will have one or a plurality of floats which have an opening therein, for example, that shown at **121** in FIGURE 3. Furthermore, the two ends of the peripheral ring float **120** will not abut, but enough space will be left

between the two ends so that overlap can be provided for center pole installation.

Before installation, the blanket will be slit from the center (through the opening in float **121**) to the edge at the place where the gap between the ends of the ring float exist, resulting in flaps **134** and **135**. As shown in FIGURE 6, elongated floats **124** will be cemented to one flap **135** from the center portion to the edge. During installation, the blanket **130** will be folded parallel to and at the slit. The slit ends **134** and **135** will be fed in first and pushed so as to straddle the pole **150**. Once inside, the blanket **130** will be rotated so that the split falls under the manhole. Flap **134** will then be made to overlap flap **135** and sealed thereto with polymeric cement.

The blanket and the floats will, of course, be made of the same materials as in the non-center pole embodiment. Also, if a fixed guide pole is encountered, ring float **122** with reinforcing layer **131** and sealing ends **133** may be provided, as described in regard to FIGURES 1 and 2.

Furthermore, reinforcing material **131** will be provided around center floats **121** and guide pole floats **122**. The blanket will also provide seals **132** and **133** with respect to center pole **150** and guide pole **140**, respectively.

As was the case in FIGURES 1 and 2, drain holes **160** are provided.

The peripheral ring float **120** is, of course, larger than the tank wall W so that the ring will remain in contact therewith. The shape of the peripheral ring float **120** is the same as in FIGURES 1 and 2 with contact area **123** being provided to contact the wall.

It will, thus, be apparent that the basic difference between the center pole embodiment and the non-center pole embodiment is the presence of the elongated floats **124** (FIGURES 5 and 6) passing from the center to the edge in the center pole embodiment.

It is to be understood that the invention is not limited to the illustrations described and shown herein which are deemed to be merely illustrative of the best modes of carrying out the invention, and which are susceptible of modifications of form, size, arrangement of parts and detail of operation, but rather is intended to encompass all such modifications which are within the spirit and scope of the invention.

What is claimed is:

1. A covering for tanks containing volatile liquids to be used in conjunction with a tank having a fixed roof support pole comprising a blanket having mounted thereon a peripheral float, said peripheral float having a peripheral size sufficiently in excess of the size of the inner periphery of the tank so that said peripheral float will remain at all times in sealing engagement with said tank wall, said blanket containing a roof support pole opening and a slit extending radially therefrom with overlapping first and second flaps, at least one float attached to the lower surface of said first flap, said second flap being sealingly attached to the upper surface of said first flap, said blanket having mounted on its lower surface at least one additional float to avoid said blanket contacting the surface of the liquid to be stored in the tank.

2. A covering according to claim **1** in which an additional opening in said blanket is provided for passage of a guide pole therethrough.

3. A covering according to claim **1** in which said blanket is reinforced at said roof support pole opening and at said guide pole opening.

4. A covering according to claim **1** in which said one float extends from the center to the edge of said blanket.

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JOSEPH R. LECLAIR, Primary Examiner

J. R. GARRETT, Assistant Examiner