

June 13, 1933.

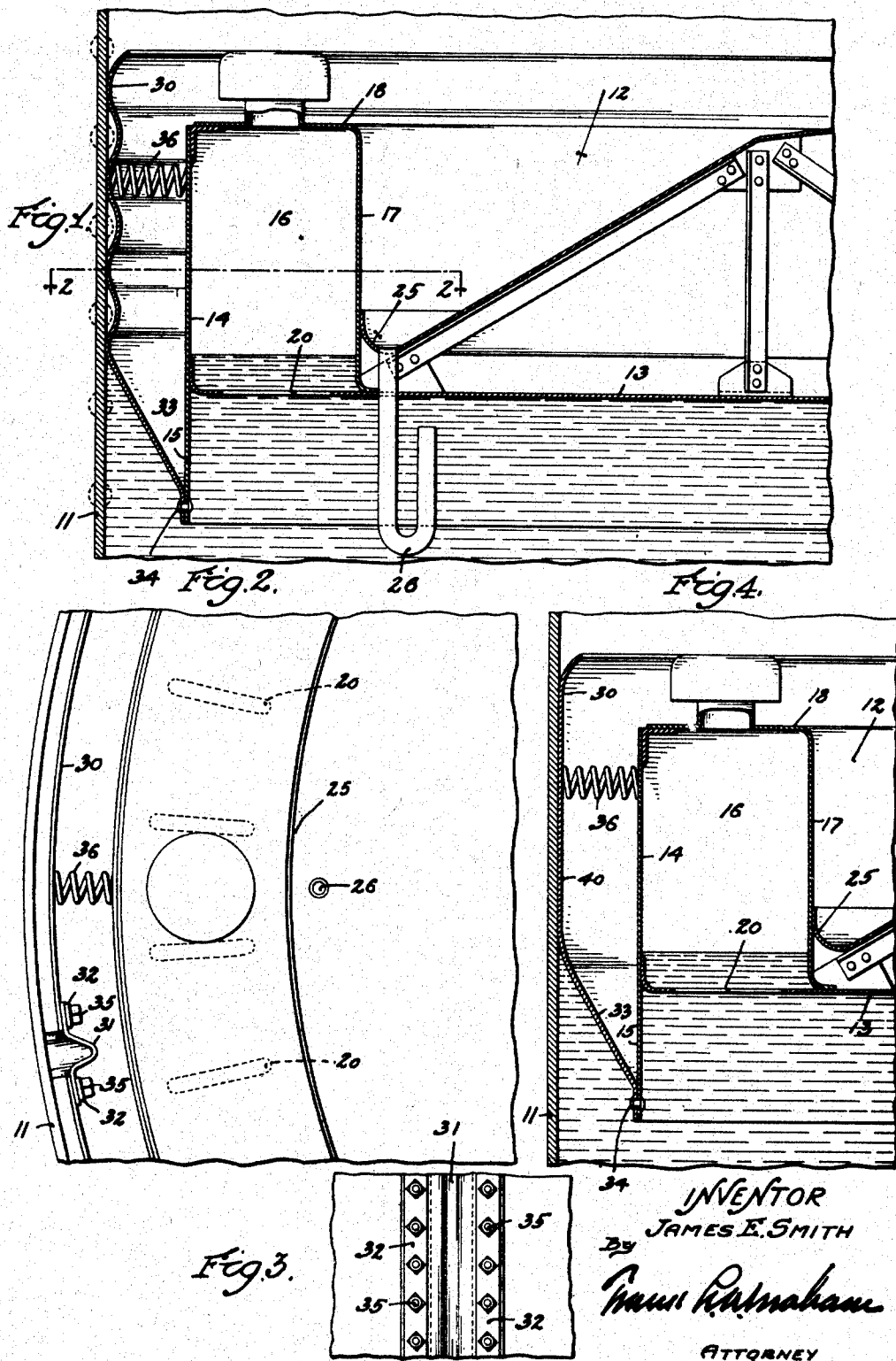
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FLOATING DECK FOR OIL TANKS

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2 Sheets-Sheet 2

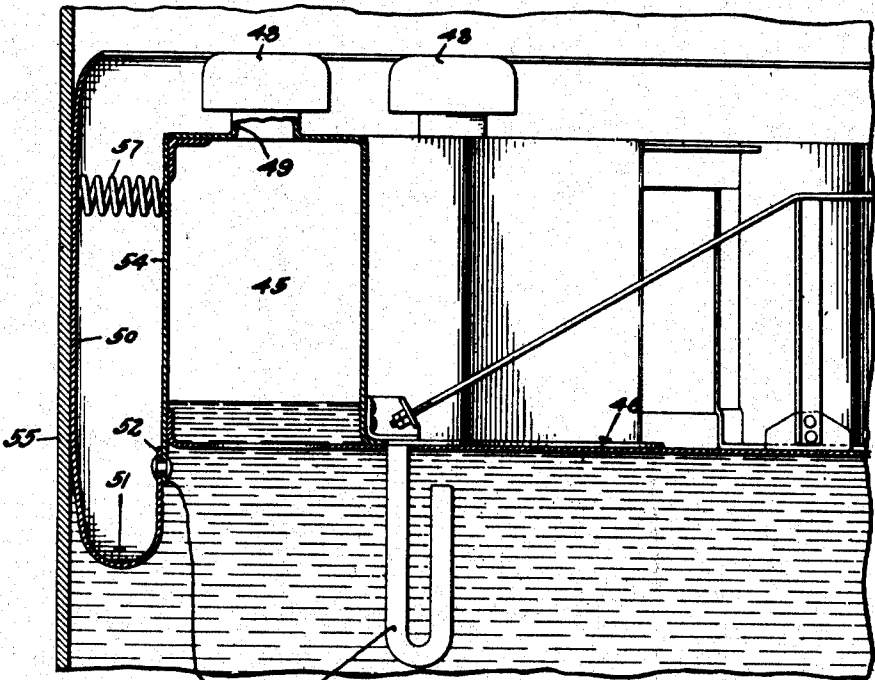


Fig. 5.

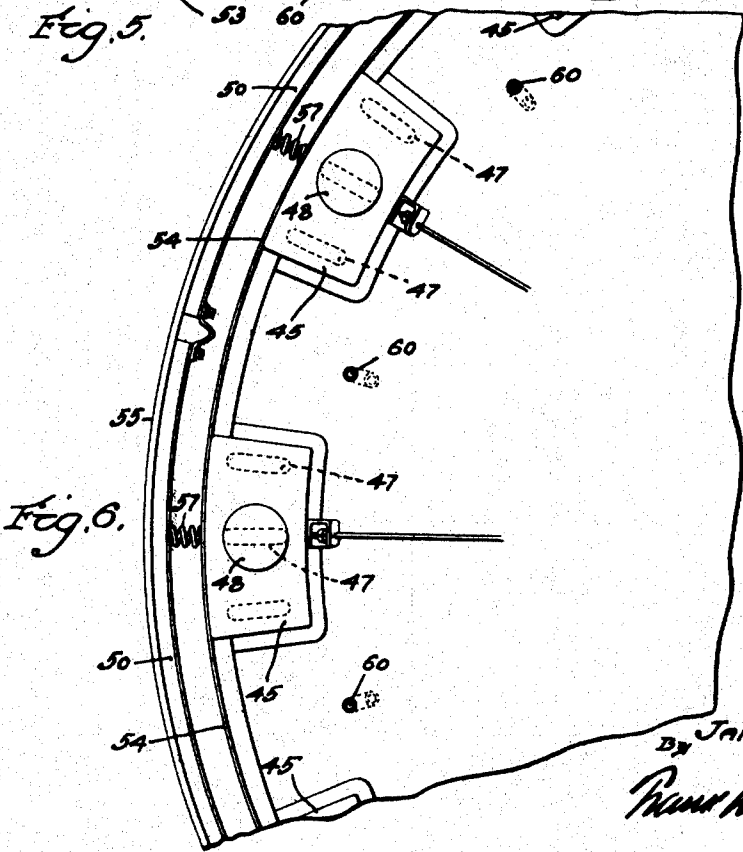


Fig. 6.

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FLOATING DECK FOR OIL TANKS

Application filed February 13, 1929. Serial No. 339,535.

This invention relates generally to the storage of petroleum oils in storage tanks of the type in which a floating deck or roof may be used for the purpose of preventing loss due to evaporation of the lighter constituents of the oil and the further purpose of minimizing the fire hazard, this invention relating more particularly to a novel deck construction and seal for closing the space between the deck and tank.

One of the principal objects of my invention is to produce a deck of the class described, having a simple and effective seal or closure member mounted thereon which has few parts and which is simple in operation.

Another object of my invention is to provide a deck construction of simple form in which provision is made for the accumulation and disposition of vapors and gases.

Another object of my invention is to provide a deck construction of simple form in which drainage of water accumulation on the deck is provided for in a simple and efficient manner.

Other objects and advantages will appear hereinafter in the following description and accompanying drawings.

Referring to the drawings which are for illustrative purposes only

Fig. 1 is a fragmentary vertical sectional view showing a portion of a tank and adjacent portions of a floating deck and seal embodying a form of my invention.

Fig. 2 is a fragmentary plan view of the parts illustrated in Fig. 1.

Fig. 3 is a face view of portions of two adjacent shield plates and flexible connection therebetween.

Fig. 4 is a view similar to Fig. 1 showing a modified form of shield plate or member.

Fig. 5 is a fragmentary vertical sectional view similar to Fig. 1 showing a modified form of my invention.

Fig. 6 is a plan view, on smaller scale, of the form shown in Fig. 5.

More particularly describing my invention as illustrated in the drawings, numeral 11 designates the side wall of a tank containing liquid such as petroleum oil, such tank being of common construction and open at the top.

Numeral 12 designates a floating deck or roof having a deck plate 13 and circular side wall 14 of somewhat less diameter than the tank 11, leaving a space between the deck and side walls of the tank which is closed by means of a suitable sealing device to be hereinafter described.

The side wall 14 of the deck extends below the deck plate or floor 13 to form a circular skirt 15 and also extends above the deck plate 13 to form one wall of an annular gas and vapor collecting chamber 16, circular inner wall 17 and top wall 18 forming the remaining walls of the annular chamber which is provided with slotted openings 20 formed in the deck plate 13 through which the oil, vapors and gas may enter the accumulating chamber 16. Numeral 21 designates any common form of relief valve which controls discharge of vapor or gas from the chamber 16, it being understood that such chamber adds to the buoyancy of the deck and being annular in form and disposed around the edge of the deck, such chamber minimizes the tendency of the deck to tip or to assume an uneven position in the tank.

Provision is made for handling rain or water deposited on the deck which consists of a cover member 25 consisting of light sheet metal which slants downwardly from the center of the deck to an annular trough 26 which is provided with discharge pipes 26 in the form of traps extending downwardly into the oil so that such traps at all times contain sufficient quantity of water to seal such traps against discharge of vapors or gas therethrough. An additional advantage is that water discharged therethrough is not discharged directly downwardly into the oil thereby agitating the oil but is discharged over the upwardly extending submerged end of the trap with a more quiescent action.

The sealing structure consists of a series of circular plates 30 of thin sheet metal of substantially the same diameter as the side wall of the tank, such plates at their adjacent edges being spaced apart and connected together by strips of flexible material 31, secured to the ends of the plates 30 by means of bars 32 and bolts 35. These strips 31 are

preferably made of fabric treated in any well known manner to make the same liquid and gas proof as nearly as practicable and when attached to the plates 30 form together with such plates a continuous yielding shield.

In the form shown in Figs. 1 and 2 inclusive, the plates 30 are formed of corrugated sheet metal as in tanks of the type upon which floating decks are commonly used are of the riveted type in which the rivet heads are on the inside of the tank as well as on the outside as indicated in dotted lines in Fig. 1 in which case the corrugated surface of the shield will permit a close contact of the shield between rivet heads exposed on the inside of the tank. The lower portion of each shield plate 30 is angularly disposed extending inwardly as indicated at 33 to the deck to which the lower end of the plates 30 are riveted or otherwise firmly secured as indicated at 34.

The angular portion or leg 33 of the plates 30 is of sufficient length to permit a yielding action of the plates 30 against the side wall of the tank, the plates being so arranged as to yieldingly press against the side wall of the tanks, which action may be assisted by coiled compression springs 36 or other well known resilient members, interposed between such plates and the deck, such springs being supported in described position in any suitable manner.

The form shown in Fig. 4 is the same as that heretofore described in connection with the preceding figures, except that the plates 40 are flat instead of the corrugated type heretofore described.

With either type of sealing plate shown, attention is directed to the broad idea disclosed of thin sheet metal plates fixed at their lower ends to the deck in such a manner that such lower or leg portions of the plates provide sufficient flexibility to permit the shifting of the deck in the tank against yielding pressure which tends to centralize the deck in the tank.

The sealing plates together with the wall 14 of the deck form an annular trough around the periphery of the deck, the sealing plates forming a yieldable side for such trough being so designed as to yieldingly remain in contact with the tank at such times as the deck may assume an eccentric position in the tank.

It is to be understood that my invention is not limited to any mechanical detail of construction shown and described but includes such changes and modifications as come within the scope of my invention as set forth in the appended claims.

In the form shown in Figs. 5 and 6, a series of vapor chambers 45 are constructed at spaced intervals around the edge of the deck plate 46, said chambers 45 extending above the deck plate and each being provided with

openings 47 to provide open communication with the fluid in the tank.

Relief valves 48 are mounted on outlets 49, each chamber 45 being provided with a separate relief valve.

In this form the sealing plates 50 are but inwardly and upwardly at their lower ends as indicated at 51 in the form of a trough, the inner upwardly extending edge 52 of which is riveted to the lower edge 53 of the circular side wall 54 of the deck.

The plates 50 being of light sheet metal yieldingly press against the tank wall 55, the curved portion 51 of such allowing a yielding movement of the plates. Coiled springs 57 are interposed between the plates 50 and the deck which assist in retaining the plates against the wall of the tank such springs being attached to the wall 54 in any suitable manner.

The plates 50 are connected to each other along their adjacent vertical edges by means of flexible strips 58 in the manner heretofore described in connection with the preceding figures. 60 designates a drain pipe by means of which any accumulation of moisture on the deck may be discharged into the tanks, such drain pipe in the form shown in Figs. 5 and 6 being connected to and supported by the deck plate 46.

I claim as my invention:

1. A floating deck for oil tanks having a series of curved sealing plates engaging the tank and extending inwardly and downwardly from such tank engaging portion to the deck to form an annular trough about said deck, said plates being formed of yieldable sheet metal and extending below the surface of the oil, and means for rigidly securing the lower ends of said plates to said deck to form a resilient support for said tank engaging portion.

2. A floating deck for oil tanks having a series of yieldable sealing plates circular in form rigidly attached at their lower ends to the outer face of the deck and extending therefrom outwardly and upwardly into yielding engagement with the tank and spring compression means interposed between said plates and said deck.

3. A floating deck for oil tanks having a series of yieldable sealing plates circular in form rigidly attached at their lower ends to the outer face of the deck and extending therefrom outwardly and upwardly into yielding engagement with the tank, spring compression means interposed between said plate and said deck, and flexible means connecting the adjacent edges of said plates.

4. A floating deck for oil tanks having a series of yieldable sealing plates circular in form rigidly attached at their lower ends to the outer face of the deck and extending therefrom outwardly and upwardly into yielding engagement with the tank, spring

compression means interposed between said plate and said deck, and flexible means connecting the adjacent edges of said plates, said flexible means consisting of strips of fabric and means for securing said fabric to the adjacent ends of said plates.

5. A floating deck for oil tanks having a series of curved sealing plates engaging the tank and extending inwardly and downwardly from such tank engaging portion to the deck to form an annular trough about said deck, said plates being formed of yieldable sheet metal and extending below the surface of the oil, and means for securing the lower ends of said plates to the outer face of said deck in fixed relation thereto, said tank engaging portion of said sealing plates being formed of corrugated sheet metal.

6. In combination with an oil storage tank, a floating deck, an annular vapor receiving chamber on said deck in open communication with the oil in said tank, and sealing means between said chamber and said tank, said sealing means consisting of a series of circular plates formed of yieldable sheet metal having their lower edges rigidly secured to a wall of said chamber and extending outwardly into yielding engagement with the tank.

7. In combination with an oil storage tank, a floating deck, an annular vapor receiving chamber on said deck in open communication with the oil in said tank, sealing means between said chamber and said tank, said sealing means embodying a sheet metal plate resiliently mounted on said chamber, and valve means for automatically relieving pressure in said chamber.

8. In combination with an oil storage tank, a floating deck, a cover for said deck forming an annular trough, discharge pipes for said trough, extending into the oil in said tank and having a submerged outlet end, and sealing means between said deck and said tank.

9. A floating deck for oil tanks comprising a horizontally disposed deck plate, a circular side wall extending upwardly from said deck plate, a circular rim on said deck plate extending downwardly therefrom, circular sealing plates about said deck, each having a yieldable tank engaging portion adapted to extend to the surface of the oil and terminating in a downwardly and inwardly extending portion and means for rigidly securing the lower end of said plates to said rim to form a resilient support for said plates.

10. A floating deck for oil tanks comprising a horizontally disposed deck plate adapted to rest upon the surface of the oil; a circular side wall extending downwardly from said plate into the oil; yieldable sheet metal plates rigidly secured to said downwardly extending wall beneath the surface

of the oil, said plates having outwardly extending portions adapted to yieldingly engage the tank below the surface of the oil.

11. A floating deck for oil tanks comprising a horizontally disposed deck plate adapted to rest upon the surface of the oil; a circular side wall mounted upon said deck plate, said side wall extending upwardly to form a lip around said deck plate and downwardly to form a circular wall extending into the oil; a vapor-receiving chamber associated with said upwardly extending lip; and a resilient metal sealing plate secured to the lower end of said downwardly extending wall, said sealing plate having outwardly extending portions adapted to yieldingly engage the tank.

12. A floating deck for oil tanks comprising a horizontally disposed deck plate, an annular vapor receiving chamber mounted on said deck plate extending upwardly therefrom, a side wall on said deck plate forming the outer wall of said chamber and extending below the deck plate to form an annular skirt thereon, said deck plate having openings therein in open communication with said chamber, and sealing means attached to said side wall extending into yielding engagement with the walls of the tank.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 31st day of January, 1929.

JAMES E. SMITH.