April 3, 1928. 1,665,163

C. R. GALLAGHER

FLOATING DECK FOR OIL TANKS OR THE LIKE

Original Filed June 12, 1926 3 Sheets-Sheet 1

Fig. 1.

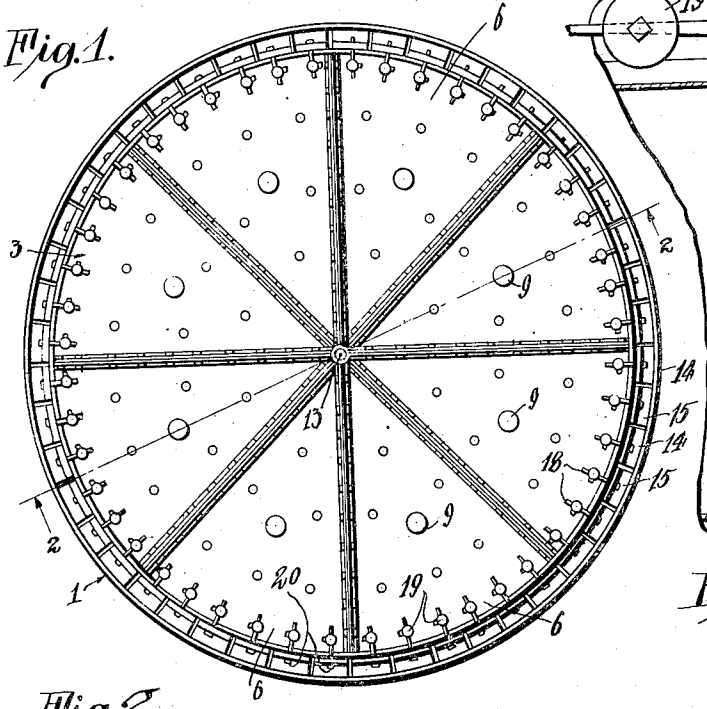


Fig. 5.

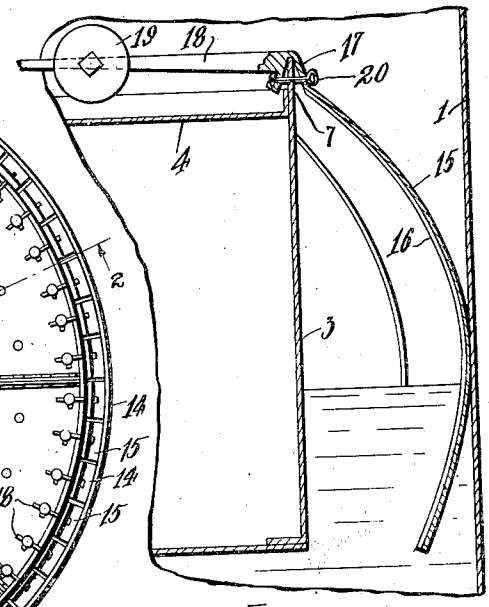


Fig. 2.

Fig. 6.

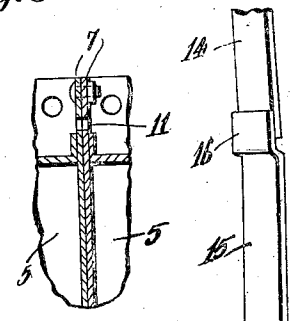


Fig. 7.



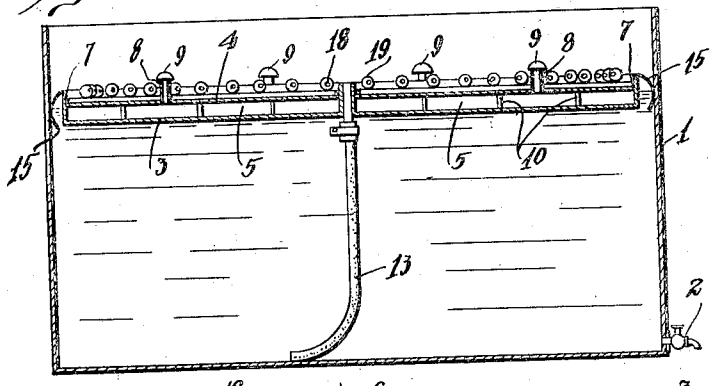


Fig. 3.

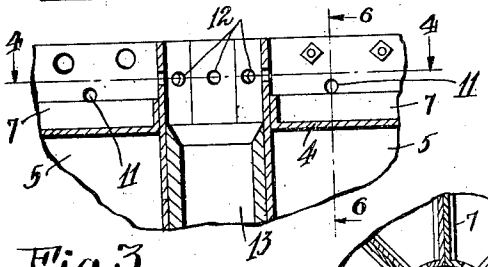


Fig. 8.

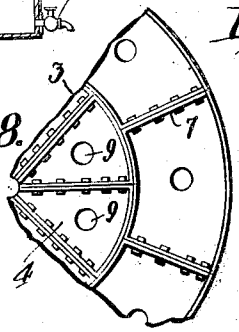
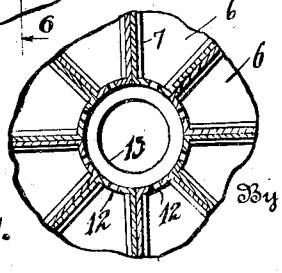


Fig. 4.



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FLOATING DECK FOR OIL TANKS OR THE LIKE

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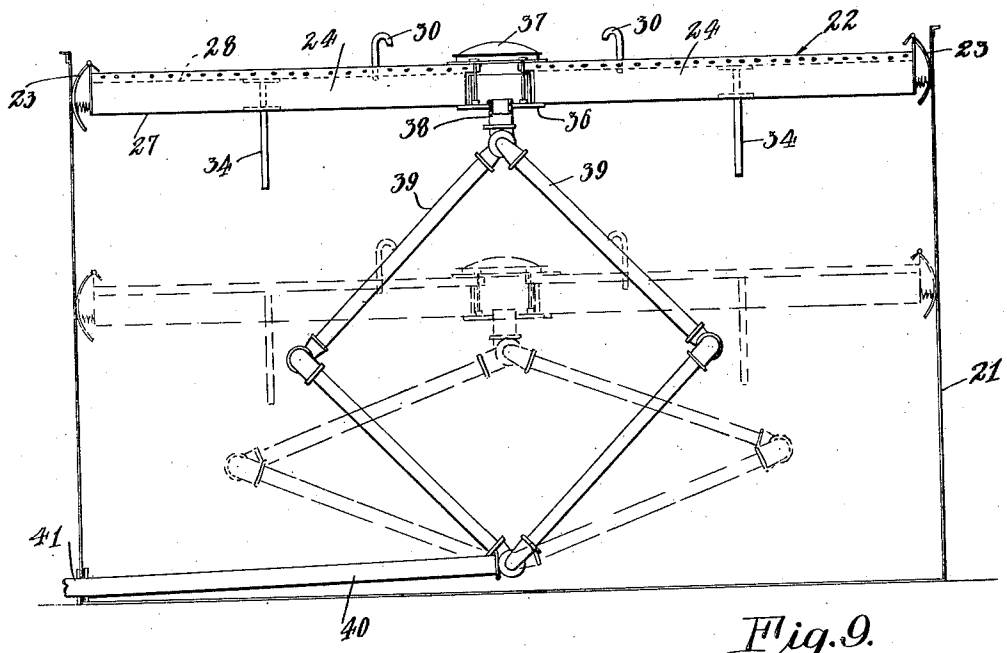


Fig. 9.

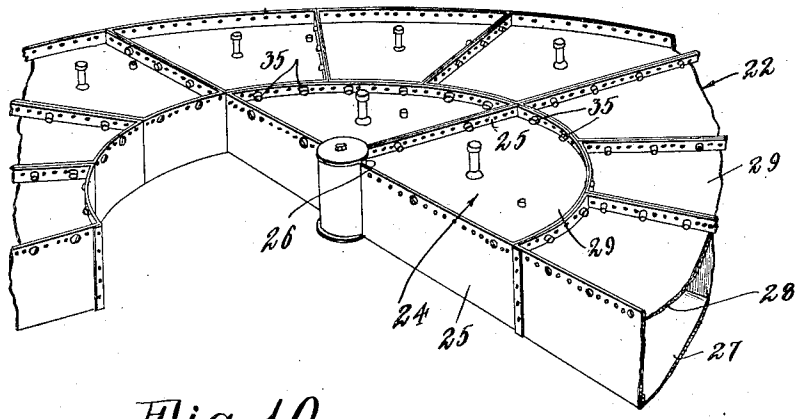


Fig. 10.

Inventor

Charles R. Gallagher

By Lyon & Lyon Attorneys

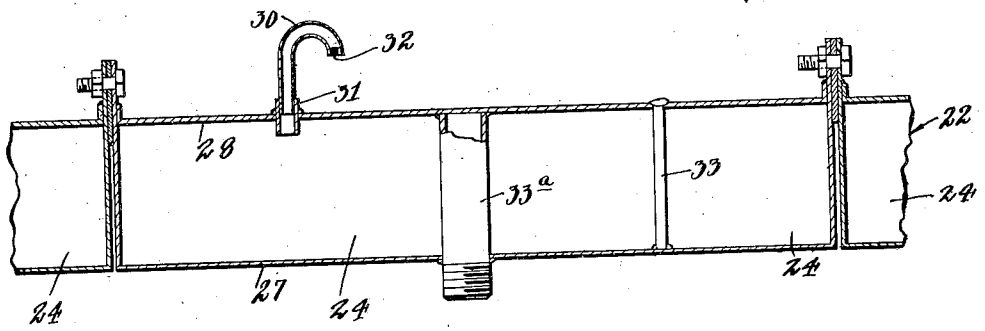
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C. R. GALLAGHER

FLOATING DECK FOR OIL TANKS OR THE LIKE

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Fig. 11.



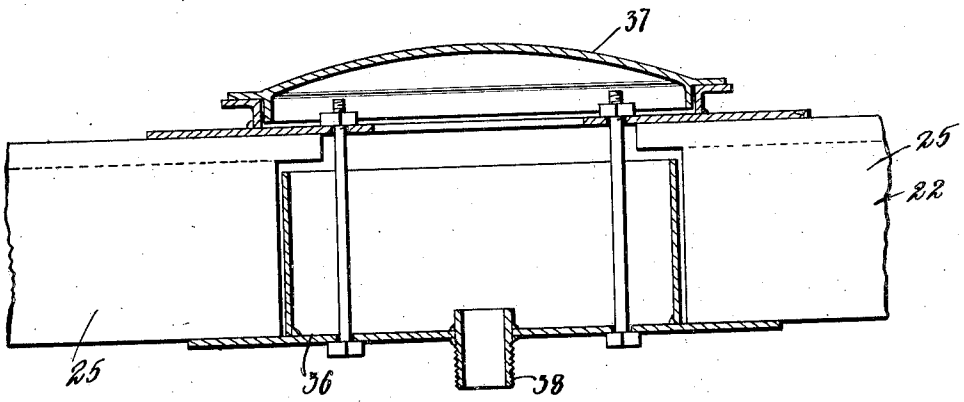


Fig. 12.

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Patented Apr. 3, 1928. 1,665,163

UNITED STATES PATENT OFFICE.

CHARLES R. GALLAGHER, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO UNIVERSAL HOLDING COMPANY, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF DELAWARE.

FLOATING DECK FOR OIL TANKS OR THE LIKE.

Application filed June 12, 1926, Serial No. 115,453. Renewed October 4, 1927.

This invention relates to floating decks for use upon large tanks, such as oil tanks. This application is a continuation in part, of my copending application, filed September 22, 1924, Serial No. 739,122.

Heretofore tanks, such as oil tanks, have been provided with floating decks for the purpose of acting as an insulator for retarding the evaporation of the oil and reducing the loss entailed thereby, and also to eliminate explosive mixtures from the oil tanks and to protect the tank from being set on fire by lightning or flames.

The floating decks heretofore in practical use have generally been of the open pan construction. All of these prior tanks have been subject to frequently filling with water or oil and sinking in the oil tank. This is for the reason that a leak in any part of an open pan deck will permit the oil from the tank to enter the pan and filling the same, with the result that the deck as a whole will sink.

It is an object of the present invention to provide a floating deck for oil tanks which will not be in danger of filling with oil or water and sinking.

Another object of the present invention is to provide a floating deck for a tank, such as an oil tank, which is provided at its upper side with a water collecting chamber or basin adapted to collect any water falling thereon and to suitably discharge the excess water from the deck, and also to enable the deck to hold a slight amount of water in order to lower the temperature of the deck and reduce the generation of gas and vapor from the oil within the tank.

Another object of the present invention is to provide a hollow standardized deck construction, which is made up of units individually complete and adapted to be merely attached or assembled together in the construction of a deck, and moreover, adapted by the attaching together of additional units to form a deck of larger size, when desired, the deck of the present invention thus being readily adapted for convenient handling, storage and transportation.

In accordance with the present invention, the buoyant or floating deck for oil tanks comprises a plurality of pontoons which are preferably of sector shape in horizontal section so that they may be readily fitted together to form a circular deck and these pontoons are individually complete in themselves, each possessing marginal walls or other means which extend upwardly to provide open receptacles or pans for the collection of water so that the pontoons may be said to possess both an air or gas chamber and an upper or superimposed water chamber. Said individually completed pontoons are attached together by suitable means, preferably through only their upper walls, to form a complete deck for an oil tank and when so constructed, the entire deck is free from any danger of filling with water or oil and the deck sinking, inasmuch as the buoyancy of the deck is due not to a single air chamber, but a plurality of separate air chambers, a number of which may leak and be filled with water or oil without permitting the deck as a whole to sink. Moreover, due to the construction of the deck from individually complete pontoon units, any one of the units of the floating deck may be removed for repair or replaced by another unit without the entire deck having to be rebuilt and reconstructed.

Moreover, the individual pontoon units each possessing its individual and separate air collecting pan, the surface of the floating deck is broken by numerous baffles, which prevent the water from being blown all to one side of the deck, as frequently occurs with the present open pan construction.

Another feature of the present invention is the provision of means by which the water from all of the individual water pans of the unit pontoons of the deck is permitted to drain to a single discharge position wherefrom all of said water may be conveniently discharged from the tank or from the deck when the same collects on the deck in excess of the desired amount.

Various further objects and advantages of the present invention will be understood from the following description of the preferred form or forms of floating decks embodying the present invention.

In the drawings:

Figure 1 is a plan view of an oil tank equipped with a floating deck embodying the invention,

Figure 2 is a vertical section of the same on line 2—2 of Figure 1,

Figure 3 is an enlarged vertical section of the upper central part of the deck to dis-

close points of communication between the sections of the water collecting pans of the deck and openings for the escape of water therefrom,

Figure 4 is a horizontal section on line 4—4 of Figure 3,

Figure 5 is a fragmentary enlarged vertical section corresponding to part of Figure 2,

Figure 6 is a vertical section on line 6—6 of Figure 3 and on the same scale as said figure.

Figure 7 is an enlarged horizontal section of a plurality of adjoining plates of a set constituting the seal for the space or joint between the deck and the wall of the tank, and,

Figure 8 is a plan view on a reduced scale of a deck or cover made up of two series of segmental sections arranged in concentric relation, this type of construction being particularly desirable and suitable for large tanks,

Figures 9, 10, 11 and 12 relate to a slightly modified construction in which

Figure 9 is an elevation partially in vertical section.

Figure 10 is a fragmentary perspective view of the floating deck itself to better disclose the construction and assembly of the individually completed pontoon units,

Figure 11 is an enlarged fragmentary section of the pontoon construction, and,

Figure 12 is an enlarged fragmentary section of the central structure of the deck.

Referring to the drawings, there is therein illustrated an oil tank 1 of the customary or any preferred construction and 2 indicates a form of drain cock for water which may accumulate in the tank below the oil therein.

The floating deck or cover is indicated at 3, and in the preferred construction, has an upwardly flanged top 4, and is formed with a plurality of air compartments 5. The deck is preferably composed of a series of segmental portions or pontoons of sector shape in horizontal section 6, having upwardly projecting marginal flanges 7 (see Figures 2 and 5), bolted together in the assembling of the sections to form the deck as shown clearly in Figures 1, 3, 6, and 8, the said flanges projecting to a higher plane than the flanges of the top, to form a water pan, of which the top 4 constitutes the bottom. Each air compartment or pontoon has a vent in the form of a short tube 8, projecting from the top 4 to a plane above the flanges 7, and a suitably supported hood 9 overlying the tube to exclude rain without interfering with the free ingress and egress of air to and from the air compartment, and each section is stiffened or braced by vertical rods 10 or the like.

The radial flanges 7 of the deck, are provided with openings 11, to permit of free circulation of water from one chamber of the pan to another, and the sections have openings in the flanges at their inner ends, as at 12, in a higher plane than openings 11, so that excess water may flow from the pan down through a flexible tube 13, leading to the bottom of the tank and accommodating variations in the altitude of the deck. The water collected below the oil can be withdrawn by opening the drain cock 2.

The deck floats on the body of oil in the tank and is of substantially less diameter than the latter, and to bridge or close the space or joint between the deck and tank wall, a seal capable of automatic expansion and contraction is provided. The seal encircles the deck and consists of a series of segmental plates 14 and 15, arranged in overlapping relation at their side edges, the plates 15 having inwardly offset portions or edges 16, underlying the corresponding or adjacent side edges of the plates 14, as clearly shown in Figure 7. The arrangement of the plates is such that the exterior surfaces of all the plates describe a common circle so that they all can contact simultaneously with the wall of the tank and thus form an efficient seal for the said space or joint.

Each of the sealing plates 17 is formed with a transverse and slightly arcuate bent portion 17 of inverted V-shape for fitting pivotally on the circumferential flanges of the deck, and extending radially inward from said bent portions are lever arms 18 upon which are adjustably secured weights 19, adapted for holding the convex sides of the sealing plates yieldingly against the wall of the tank, it being preferred that the parts shall be so proportioned, as shown, that any material shifting or drifting of the deck from its central position in the tank shall be immediately checked by the descent of the weights at the opposite side from that toward which the drift occurs, upon the top of the deck, as said weights, through the overlapping relation of the whole series of sealing plates, tend to transfer and apply pressure outwardly on the free ends of the sealing plates at the side of the deck approaching the tank wall. In other words, any tendency of the float to move from its central position, results in expansion of the sealing circle of plates and the space or joint remains properly bridged or sealed. To guard against dislocation of the sealing plates, cotters 20 extend through the bent portions 17 and the circumferential flange of the deck, as shown by Figure 5, the connection being loose to avoid interfering with the ready pivotal operation of the sealing plates in response to shifting of the deck.

For the smaller sizes of tanks, the deck will preferably be composed of a single cir-

cular series of segmental sections, but for large tanks, it is contemplated that there shall be two or more concentric series of sections, as indicated by Figure 8, with a proportionately greater number of the sealing plates to provide for the sealing of a space or joint of increased diameter, the extra series of sections being bolted together and to the enclosed series, as indicated in said Figure 8.

From the foregoing description, it will be apparent that with the floating deck of the character described, the individual sector units or individually completed pontoon members each being provided with an air chamber and a water chamber and all of the individual pontoons or sector members being attached together, one or more of the members may leak or become otherwise filled with oil or water without danger of the entire deck sinking and, moreover, that the deck may support a considerable amount of water upon its surface in order to assist in retaining the deck cool and retarding evaporation of the contents of the oil tank. Furthermore, the water collecting pans of the deck are composed of a number of units splitting up the deck surface and that the marginal walls of such units provide baffles which prevent the sweeping of all of the water on the deck to one side of the deck, thus aiding in maintaining the water on the deck properly distributed and preventing any possibility of the deck being capsized in severe weather. Moreover, the floating deck being constructed solely of a plurality of individually complete members, permits the manufacture, shipment and erection of the deck at a minimum expense and facilitates the replacement or repair of injured or lost parts without material loss of time or expense.

Now, referring to the form of the invention illustrated in Figures 9 to 12 inclusive, 21 indicates a tank such as an oil tank, provided with a floating or buoyant deck, which is generally indicated at 22. Said deck is also indicated as provided with suitable spring pressed seals 23 around its periphery for engagement with the walls of the tank 21, in order to seal the space between the tank 21 and the floating deck 22. The floating deck 22 is indicated as made up of a plurality of sector shaped pontoon sections 24, each of which comprises two converging side walls 25, and two circularly curved walls 26, said walls having a common axis. Furthermore, each pontoon is provided with a bottom wall 27 which may be integral with the side walls and with the top wall 28, which is spaced below the top of the side walls 25 and 26 to provide water collecting pans 29 at the top of each individual pontoon section. The pontoon sections, most clearly illustrated in Figure 10, are shaped so that they may be set into circular series, the deck being made up of either one or a plurality of circular concentric series of individual pontoon members. Preferably, in assembling the individual pontoon members together, they are fastened together only by their upper walls which extend above the top walls 28 of the pontoon sections, leaving the lower sections of the pontoon members free for slight movement and compensate for irregular expansion and contraction of the deck due to temperature changes. As best shown in Figure 11 the means for attaching the pontoons together is preferably in the form of bolts 43 engaging the flanges of adjacent pontoons and between the flanges is disposed packing means 42. The packing means 42 provide a more complete gas tight connection between the individual pontoons.

Each of the individual pontoons is provided with a suitable breathing member 30 to permit the passage of air to and from the air chambers in order to prevent a pressure being set up therein. Said breathers are indicated at 30 as hook-shaped pipes threaded into fittings 31 in the top walls of the pontoon sections (see Figure 11), said hook-shaped pipes extending above the water collecting chambers and provided with fire screens 32 at their discharge outlets. Said fire screens are employed in order to prevent the danger of fire or explosion taking place through one or more of the pontoons through leaking and becoming filled with petroleum vapors.

Each of the pontoon sections also preferably includes one or more vertical bracing rods 33 and also preferably includes suitable supporting means for the deck in order to provide for the support of the deck upon withdrawal of oil from the tank 21. Said supporting means are indicated as comprising the hollow tubes 33^a, in which are slidably mounted adjustable legs 34.

There is also preferably provided suitable means by which the water collected in the individual water collecting pans can all be discharged to a central discharge point for which purpose the deck is disclosed as provided with weirs 35. These weirs are indicated as establishing communication between circular-shaped walls of joining pontoons and may have their lower edges at various levels above the top of the top walls 28 of the pontoons or as low as said top walls 28, depending upon the amount, if any, water which it is desired that the floating deck should normally maintain in use. The center of the deck is indicated as including a water collecting chamber 36, suitably united to the inner pontoon sections and provided with a cover 37. Said water collecting chamber 36 is indicated as provided with an axial nipple 38, by which it is con-

nected to swinging discharge pipes 39, two of which are indicated, the discharge pipes 39 being indicated as adapted to move in opposite directions to balance the stress on the deck, said pipes 39 being indicated as connected to a common pipe 40 near the bottom of the tank, which discharges from one side of the tank, as at 41.

The floating deck of this embodiment of the invention possesses all of the advantageous features of the previous embodiment. It will be readily seen how each of the individual pontoon sections may be removed and replaced from the floating deck of Figures 9 to 12, inclusive, just as the members may be removed from the floating deck of Figures 1 to 8 inclusive. It will also be apparent how the construction and the form of deck of Figures 9 to 12, inclusive, prevents danger of the deck sinking, and facilitates the manufacture, transportation and erection of the deck.

Each of the floating decks herein described is constructed of a number of individually formed pontoon members in which the air chambers are defined by a simple continuous walling of sheet metal and are of very economical construction. The light, inexpensive construction of the pontoon members is made possible through the use of an air vent for each member which insures at all times that the pressure inside of the air chambers will be the same as atmospheric pressure. The construction of the individual pontoon members in which one or more of the walls of the air chamber are continued to provide a marginal flange facilitates the attachment of the individual members together by simple and inexpensive means.

While the particular forms of floating decks herein described are well adapted to accomplish the objects of the present invention, it is not intended to limit the invention to the particular examples of floating decks described for the purpose of illustrating the invention, but the invention includes all such modifications, changes and substitution of equivalents as come within the proper scope of the appended claims.

I claim:

1. A buoyant deck for oil tanks comprising a plurality of pontoons of sector shape in horizontal section and having marginal walls extending upwardly to provide water pans, the pontoons being placed in a circular series to form a circular deck, and means for attaching the pontoons together.

2. A buoyant deck for oil tanks comprising a plurality of pontoons of sector shape in horizontal section and having marginal walls extending upwardly to provide water collecting pans, the pontoons being placed in a plurality of concentric circular series to form a circular deck, and means for attaching the pontoons together.

3. A buoyant deck for oil tanks comprising a plurality of pontoons of sector shape in horizontal section and having marginal walls extending upwardly to provide water collecting pans, the pontoons being placed in a circular series to form a circular deck, means for attaching the pontoons together, and means for establishing communication between the different water collecting pans.

4. A buoyant deck for oil tanks comprising a plurality of pontoons of sector shape in horizontal section and having marginal walls extending upwardly to provide water pans, the pontoons being placed in a circular series to form a circular deck, means for attaching the pontoons together, means for equalizing the water level within the various water collecting pans, and a central water discharging tube for the deck adapted to discharge water from all of the pans.

5. A buoyant deck for oil tanks comprising a plurality of pontoons of sector shape in horizontal section and having marginal walls extending upwardly to provide water pans, the pontoons being placed in a circular series to form a circular deck, means for attaching the pontoons together, and air vent tubes for the pontoons having openings above the water collecting pans.

6. A buoyant deck for oil tanks comprising a plurality of pontoons of sector shape in horizontal section and having marginal walls extending upwardly to provide water collecting pans, the pontoons being arranged in circular series to form a circular deck, and fasteners connecting adjacent marginal walls for attaching the pontoons together.

7. A buoyant deck as described in claim 6, in which the pontoons are provided with vertical rods extending between their upper and lower walls.

8. A buoyant deck for oil tanks comprising a plurality of pontoons of sector shape in horizontal section and having marginal walls extending upwardly to provide water collecting pans, the pontoons being placed in a circular series to form a circular deck, means for attaching the pontoons together, air vents for the pontoons, openings in the marginal walls to permit equalizing of the water in the various water collecting pans, and a central discharge tube.

9. A floating deck for oil tanks, comprising a circular series of sector members providing superposed air and water chambers, the sector members being placed sidewise abutting and rigidly attached together at their upper sides only, each sector member being provided with a breather pipe, means establishing inter-communication between adjacent water chambers, and means at the axis of the deck for discharging water col-

lected by the water chambers to a point exterior to the oil tank.

10. A floating deck for oil tanks, comprising a plurality of independently formed units each comprising two straight converging vertical walls, two circular curving vertical walls, the curve of said walls having common axes, a top and a bottom wall in sector form, the top wall being placed somewhat below the top of the vertical walls so that there is provided a water collecting chamber at the top of the member, said plurality of thus formed independent units being arranged in a circular series to form a circular deck, the different units being rigidly attached together by means engaging the side vertical walls where they extend above the top horizontal wall.

11. A device as in claim 10, in which there is one or more fastening means for each adjacent pair of members to permit communication betwen the water collecting basins of the different members.

12. A device as in claim 10, in which each of the members is provided with a breather pipe and with means establishing communication between its water collecting chamber and that of the adjacent members.

13. A floating deck of the type having a predetermined area including as an operative part thereof, a plurality of individual members each having a walling defining an enclosed air chamber, said walling being composed of relatively thin sheet metal, said walling being so constructed and arranged as to in and of itself have the capacity of constituting an operative pontoon and air chamber, the individual members being fitted together to form a continuous floating deck surface, and means for non-slidably interconnecting the upper portions of the individual members in a gas-tight manner.

14. A floating deck of the type having a predetermined area including as an operative part thereof, a plurality of individual members each having a walling defining an enclosed air chamber, said walling being composed of relatively thin sheet metal, said walling being so constructed and arranged as to in and of itself have the capacity of constituting an operative pontoon and air chamber, an air venting means for one or more of said air chambers arranged to exclude water from entering its respective air chamber, the individual members being fitted together to form a continuous floating deck surface, and means for non-slidably interconnecting the upper portions of the individual members.

15. A floating deck of the type having a predetermined area including as an operative part thereof, a plurality of individual members each having a walling defining an enclosed air chamber, said walling being composed of relatively thin sheet metal, said walling being so constructed and arranged as to in and of itself have the capacity of constituting an operative pontoon and air chamber, an air venting means for one or more of said air chambers arranged to exclude water from entering its respective air chamber, the individual members being fitted together to form a continuous floating deck surface, and means for non-slidably interconnecting peripheral portions of the individual members.

16. A floating deck of the type having a predetermined area including as an operative part thereof, a plurality of individual members each having a walling defining an enclosed air chamber, said walling being composed of relatively thin sheet metal, said walling being so constructed and arranged as to in and of itself have the capacity of constituting an operative pontoon and air chamber, an air venting means for one or more of said air chambers arranged to exclude water from entering its respective air chamber, the individual members being fitted together to form a continuous floating deck surface, and means for non-slidably interconnecting peripheral portions of the individual members, the side plates of the individual members having engaging edges hermetically sealed.

17. A floating deck of the type having a predetermined area including as an operative part thereof, a plurality of individual members each having a walling defining an enclosed air chamber, said walling being composed of relatively thin sheet metal, said walling being so constructed and arranged as to in and of itself have the capacity of constituting an operative pontoon and air chamber, an air venting means for one or more of said air chambers arranged to exclude water from entering its respective air chamber, the individual members being fitted together to form a continuous floating deck surface, and means for non-slidably interconnecting peripheral portions of the individual members, said means being disposed entirely exterior to said air chambers.

18. A floating deck of the type having a predetermined area including as an operative part thereof a plurality of individual members each having a walling defining an enclosed air chamber, said walling being composed of relatively thin sheet metal, said walling being so constructed and arranged as to in and of itself have the capacity of constituting an operative pontoon and air chamber, an air venting means for one or more of said air chambers arranged to exclude water from entering its respective air chamber, the individual members being fitted together to form a continuous floating deck surface, the individual members being provided with peripheral flanges at their upper portions, means for non-slidably in-

terconnecting said peripheral flanges of the individual members, and packing means between said peripheral flanges.

19. A floating deck of the type having a predetermined area and provided with a continuous cellular air chamber throughout its area, said floating deck including as an operative part thereof a plurality of individual members each having a walling defining an enclosed air chamber, said walling being composed of relatively thin sheet metal, said walling being so constructed and arranged as to in and of itself have the capacity of constituting an operative pontoon and air chamber, an air venting means for one or more of said air chambers arranged to exclude water from entering its respective air chamber, the individual members being fitted together to form a continuous floating deck surface, the individual members having juxtaposition marginal projections, and means disposed entirely exterior to said air chambers for rigidly and non-slidably interconnecting said marginal projections together.

20. A floating deck of the type having a predetermined area including as an operative part thereof, a plurality of individual members each having a walling defining an enclosed air chamber, said walling being composed of relatively thin sheet metal, said walling being so constructed and arranged as to in and of itself have the capacity of constituting an operative pontoon and air chamber, the individual members being fitted together to form a continuous floating deck surface, and means for non-slidably interconnecting peripheral portions of the individual members.

21. A floating deck for oil storage receptacles, the floating deck being of the type having a predetermined area, said floating deck including as an operative part thereof a plurality of individual members each having a walling defining an enclosed air chamber, said walling being composed of relatively thin sheet metal, said walling being so constructed and arranged as to in and of itself have the capacity of constituting an operative pontoon and air chamber, said walling having a peripheral flange extending outside of said air chamber, said flange being a continuation of the walls of the air chamber, the individual members being fitted together with their peripheral flanges juxtapositioned to form a continuous floating deck surface, and means disposed entirely outside the said air chambers for engaging said flanges and non-slidably interconnecting the individual members rigidly,

Signed at Los Angeles, California, this 24 day of May, 1926.

CHARLES R. GALLAGHER.