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CLOSED PONTOON FLOATING DECK FOR OIL TANKS AND PROCESS OF PRODUCING SAME

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Fig. 1.

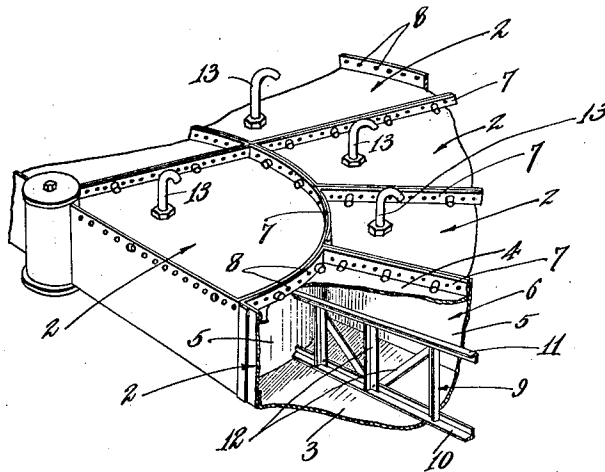
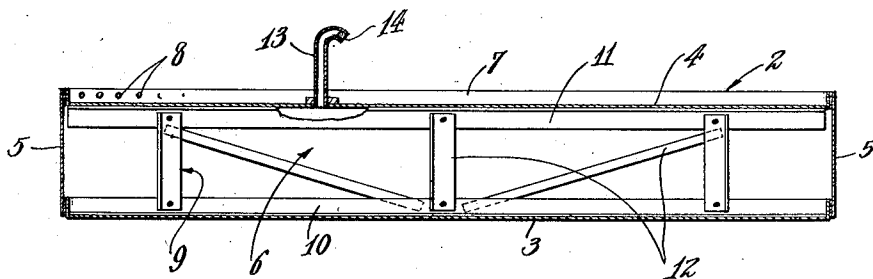


Fig. 2.



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CLOSED-PONTOON FLOATING DECK FOR OIL TANKS AND PROCESS OF PRODUCING SAME

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This invention relates to the subject of floating decks such as are employed in oil storage tanks and like containers of oil.

In the storage of petroleum it is now recognized that the best practice is to provide on the top of the oil storage vessel, a floating deck. A floating deck has the advantage of eliminating evaporation, preventing moisture and foreign matter entering the contents of the tank and at the same time, prevents the formation of explosive mixtures in the surface of the oil in the tank. Thus, a floating deck for an oil storage tank is recognized as the best protection against fire.

Of the floating decks employed for oil storage tanks, the most successful are those of the pontoon type or those providing an enclosed air space over the surface of the oil. An enclosed air space over the surface of the oil insulates the contents of the tank against transfer of heat and thereby, reduces materially the evaporation losses from the tank. In order to make a floating deck for an oil storage tank, particularly those of the larger tanks, it is required that the deck be made up of a plurality of individual pontoons which can be assembled together inside of the tank into a continuous floating deck of predetermined area. A floating deck made of a plurality of individual pontoons secured together contains considerably more area of metal than the floating decks which are of the straight pan type construction. It is, therefore, generally advisable for commercial purposes, to manufacture the floating deck of the pontoon type of comparatively light weight metal. When the pontoons are manufactured of light weight metal, the variations in temperature which the pontoons are subjected to, is sufficient, if the pontoons are sealed air-tight, to cause great distortion of the pontoons and floating deck, if not sufficient to cause an actual rupture of the pontoons. It has, therefore, been the practice prior to the present invention, to provide the pontoons of a floating deck with air venting means for equalizing the internal pressure of the pontoons with the exterior pressure. Furthermore, even if the pontoons were made of sufficiently thick metal, properly reinforced

to stand such variations in pressure under ordinary atmospheric conditions, a closed or sealed pontoon in case of fire offers a source of danger, as the excessive pressures which would develop in the pontoon in case of fire, would necessarily be sufficient to cause the pontoons to burst.

When, however, the pontoons of a floating deck are provided with air venting means, difficulty may be experienced, particularly in moist or foggy climates, in preventing corrosion on the interior of the pontoons, as moisture is continually drawn into the pontoons by the breathing of the same through the air vents.

It is an object of the present invention to provide a form of floating deck of the pontoon type in which the individual pontoon members may be sealed air-tight, while at the same time, providing a structure which can be fabricated of light weight metal without danger of the pontoons being distorted by the fluctuations in pressure accompanying atmospheric changes in temperature and without the pontoons forming a source of danger in case of a surrounding fire and the invention also includes as an object, a process by which such a floating deck or pontoon therefor, can be constructed.

The present invention, together with various further objects and advantages thereof, will best be understood from a description of the preferred form or example of the floating deck and process of forming or producing the same embodying the invention. For this purpose, reference is made to the accompanying drawings in which the preferred form of the invention is illustrated.

In the drawings:

Figure 1 is a fragmentary perspective of a floating deck embodying the present invention and

Figure 2 is an elevation in vertical section taken through one of the pontoons of the floating deck section being taken radially through the deck.

Referring to the drawings: The floating deck may be composed of a plurality of pontoon members 2, which generally are in sector shape so that they may be fitted together to

form one or a plurality of rings of pontoons, the number of the rings of pontoons determining the diameter of the deck. Various methods of constructing the individual pontoons may be used. For example, the pontoons include a bottom plate of sheet metal 3, a top plate of sheet metal 4 and side plates 5 of sheet metal. The sides and the tops being secured together to form airtight joints defining within each pontoon an enclosed air chamber 6.

The pontoons 2 may have their sides or one of their surfaces extending beyond the pontoons in order to provide a peripheral flange 7 which is preferably located at the top of the deck, so that the individual pontoon members may be rigidly attached together by suitable means, such as rivets 8, to form a rigid deck of predetermined area.

The sides, including the tops and bottoms of the pontoons are preferably composed of sheet metal in order that the floating deck may be fabricated at the properly low cost. There is also preferably provided within each pontoon member, a central pressure distributing member or brace 9 for transferring load from the bottom over the top plates and vice versa. With the pontoon constructed as before described, pressure exerted upon the top or the bottom, for example, by the weight of a person walking on the top, or the pressure of the liquid against which the deck is floating, may cause the top or the bottom to be curved inwardly, distorting the pontoon, unless means are provided for distributing the load from the top to the bottom and vice versa. The brace 9 preferably comprises a bottom straight edge 10 of angle iron and a top straight edge 11 of angle iron, adapted to engage respectively the bottom and top plates of the pontoons and the straight edges 10 and 11 are interconnected and supported one from the other by means of braces 12.

Each pontoon of the floating deck also includes one or more exhausting pipes 13 communicating with the air chamber 6 of the pontoons and leading to a point somewhat above the top of the individual pontoons.

In the process of forming and closing the pontoon decks, the pontoons are first constructed with their side walls sealed together air-tight and with the internal brace 9 in position. The pontoons are then processed in order to expel from the pontoons sufficient gases so that, at normal atmospheric temperature, the gas or air within the pontoons will be at a pressure considerably less than atmospheric pressure. This may be accomplished through connecting a vacuum pump with the exhaust pipes 13 or by heating the pontoons 2 sufficiently to heat the temperature of the air within the pontoons, or where air may be externally heated and circulated into the pontoons through the ex-

hausting pipes 13 in order to displace the cold air of the pontoons with warm air. Preferably, the pontoons are treated by in some manner heating the gas or air within the air chamber 6 of the pontoons to a temperature nearly as high as the temperature to which the air within the pontoons will be raised in operation. For example, the temperature of the air within the pontoon is raised to a temperature of 125° F. At such temperature, the pressure between the hot air within the pontoons and the atmosphere is equalized and the pontoon is then sealed gas-tight by closing the exhaust pipes 13. When the pontoons are thus processed, the cooling of the air within the pontoons to normal atmospheric temperature results in a partial vacuum being created within the pontoons, drawing the top and bottom plates tightly against the straight edges 10 and 11. The construction of the pontoons is such that they are capable of withstanding appreciable vacuums within the pontoons, as vacuum has the tendency to draw the sides of the pontoons inwardly.

The pontoons, however, are incapable of withstanding any appreciable pressure within the pontoons above atmospheric as the pontoon's sides are distorted outwardly and there is no means for properly taking care of the force tending to outwardly distort the plates of the pontoon. By sealing the pontoons so that at normal atmospheric temperature, there is an appreciable vacuum within the pontoon, the raising of the temperature of the gases within the pontoons to temperatures appreciably above normal will raise the pressure of the gas within the pontoons only to about atmospheric or slightly in excess of atmospheric, and distortion of the pontoons does not take place. It should be appreciated that a floating deck of the type to which this invention relates is frequently subjected directly to the sun rays and the top plates of the pontoons are heated by radiation to temperatures materially above atmospheric, so that the temperature of the air within the pontoons may frequently rise to 125° F.

While the sealed pontoon thus described is capable of withstanding all pressure variations which would take place through changes in temperature in normal operation, in case of a fire around the pontoon, much higher pressures might be developed within the pontoons and in order to take care of such contingency, the exhaust pipes 13 of the pontoons are preferably sealed, as indicated at 14, with a fusible material, such as a low temperature alloy or with other material operative to release the seal when the temperature or pressure exceeds predetermined limits.

While the floating deck and process of forming the same herein described is well

adapted to carry out the objects of the present invention, various modifications and changes may be made in the details of construction without departing from the principles of the present invention, and this invention includes all such modifications and changes as come within the scope of the appended claims.

I claim:

1. A floating deck comprising a pontoon member having an air chamber, said air chamber being gas-tight, and said air chamber containing air which, at normal atmospheric temperature, is at a pressure less than atmospheric.

2. A floating deck for oil storage receptacles comprising, a plurality of individual pontoon members attached together to form a deck of predetermined area, said pontoon members having air chambers, said air chambers being gas tight, and said air chambers containing gas which, at normal atmospheric temperature is at a pressure less than atmospheric.

3. A floating deck comprising, a plurality of individual pontoon members united together to form a deck of predetermined area, the pontoon members having gas-tight air chambers, and a fusible means for releasing the gases within the pontoons when the temperature exceeds a predetermined value.

4. A floating deck comprising, a plurality of individual pontoon members united together to form a deck of predetermined area, the pontoon members having gas-tight air chambers, and a fusible means for releasing the gases within the pontoons when the temperature exceeds a predetermined value, said air chambers of the pontoons normally having the air therein at a pressure less than atmospheric.

Signed at Los Angeles, California, this 5th day of July, 1928.

JAMES F. KIMBELL.