May 2, 1933. W. SCHWEMLEIN 1,907,268

TANK DECK

Filed Aug. 3, 1931

Fig. 1.

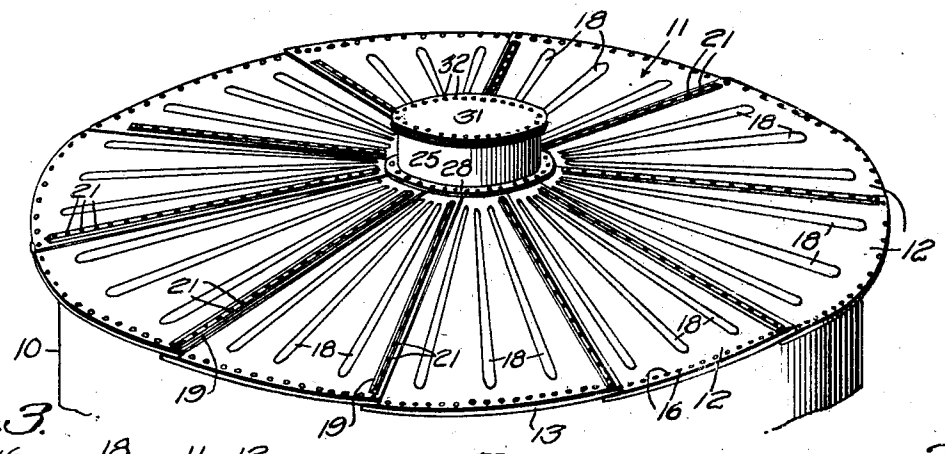


Fig. 3.

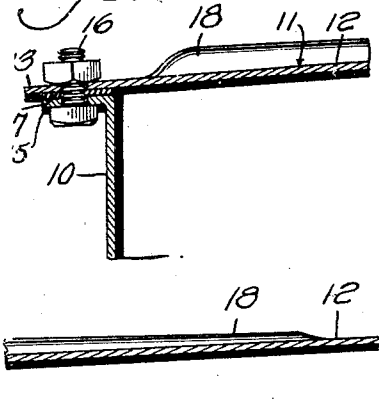


Fig. 2.

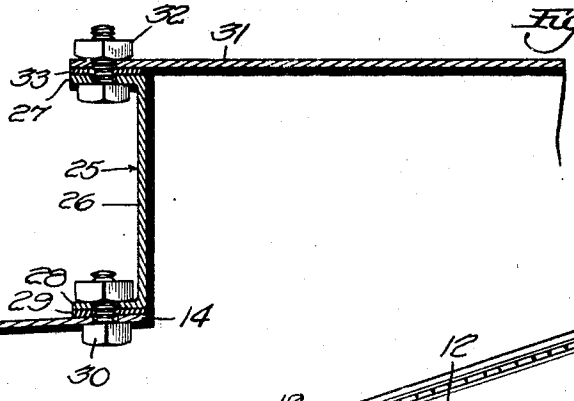
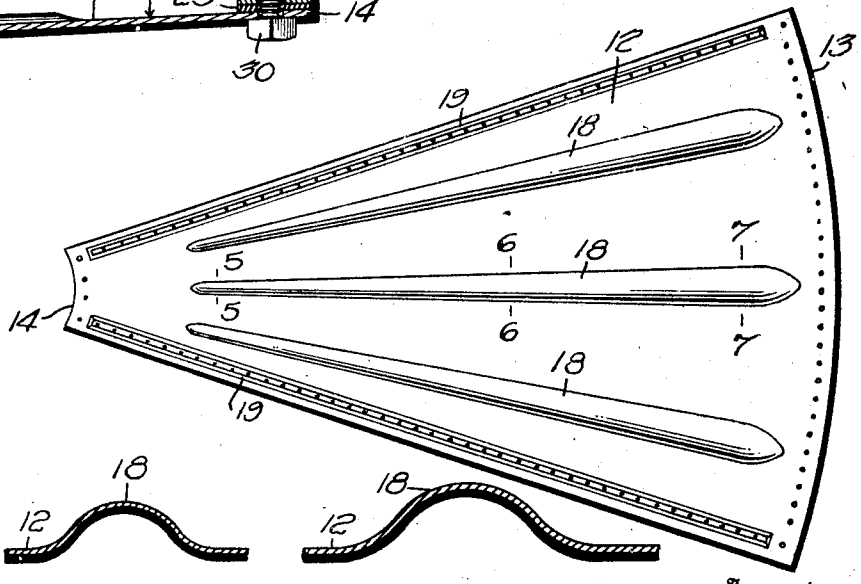


Fig. 4.



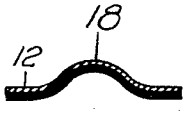


Fig. 5.

Fig. 6.

Fig. 7.

Inventor
WILLIAM SCHWEMLEIN

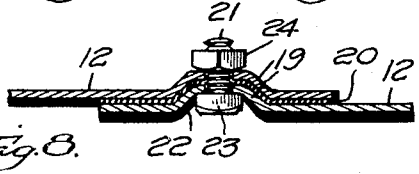


Fig. 8.

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Patented May 2, 1933 1,907,268

UNITED STATES PATENT OFFICE

WILLIAM SCHWEMLEIN, OF PARKERSBURG, WEST VIRGINIA, ASSIGNOR TO THE PARKERSBURG RIG AND REEL COMPANY, OF PARKERSBURG, WEST VIRGINIA, A CORPORATION OF WEST VIRGINIA

TANK DECK

Application filed August 3, 1931. Serial No. 554,890.

This invention relates to tank deck constructions, and more particularly to a construction for the decks of large oil storage tanks.

In the oil industry, it is the common practice to employ large storage tanks having capacities of 100 barrels and upwardly, and the construction of the parts of these tanks, as well as their erection and maintenance involves considerable expense. Due to the capacities of such tanks they necessarily are of substantial diameters, and one of the most important items in the expense of manufacturing the tanks lies in the construction of the tops or decks thereof. The decks usually are fabricated from rectangular metal sheets with portions thereof forming the edge of the deck curved to conform to the cross sectional shape of the tank. The deck thus provided is supported by a plurality of metal angles arranged radially with respect to the tank, and it has been found that the cost of these rafters amounts to approximately 6.5 per cent of the cost of the average size tank.

The rafters employed in the deck constructions merely support the deck against downward movement, and thus the weight of the deck is taken care of, and the tendency of the deck to move downwardly is prevented when a partial vacuum is created in the tank due to the contraction of the contents thereof occurring when a drop in temperature takes place. However, no provision is made for preventing the deck from rising when the contents of the tank expand under increased temperature conditions, it having been found impracticable to bolt the deck plates to the rafters due to the expense for material and labor involved in the use of a sufficient number of bolts to accomplish the desired result. The decks are free to move upwardly, therefore, and it requires only a few ounces of pressure per square inch within the tank to permanently distort the deck.

An important object of the present invention is to provide an improved deck construction particularly adapted for oil storage tanks which is cheaper to manufacture and erect than the standard tanks now in use.

A further object is to provide a deck construction for tanks wherein vertical movement of the deck is resisted both upwardly and downwardly when expansion or contraction takes place in the contents of the tank.

A further object is to provide a deck construction of the character referred to which possesses all of the advantages of the present deck constructions without the disadvantages thereof, and wherein the cost and time involved in the manufacture and erection of the tank is reduced while the use of the usual metal rafters is eliminated.

A further object is to provide a tank deck which possesses a substantial degree of rigidity against vertical movement and which effectively braces the tank against lateral distortion which would alter its cylindrical shape, without the use of the usual metal rafters.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the drawing I have shown one embodiment of the invention. In this showing:

Figure 1 is a perspective view of the top of an oil storage tank, showing the deck in position thereon,

Figure 2 is an enlarged fragmentary vertical sectional view to the top of the tank, taken radially with respect to the tank,

Figure 3 is a similar view showing the connection between the deck and side plates of the tank,

Figure 4 is a plan view of one of the deck sheets,

Figure 5 is an enlarged detailed fragmentary sectional view on line 5—5 of Figure 4,

Figure 6 is a similar view on line 6—6 of Figure 4,

Figure 7 is a similar view on line 7—7 of Figure 4, and

Figure 8 is a detailed sectional view showing the connection between two adjacent deck plates.

Referring to the drawing numeral 10 designates the body of the tank which may be made up of a plurality of plates secured together at their edges in any suitable manner. The construction of the body of the tank forms no part of the present invention.

The deck of the tank is indicated as a whole by the numeral 11 and comprises a plurality of segmental plates 12 one of which is shown in detail in Figure 4. Each plate 12 has its side edges substantially radial with respect to the tank, while the outer edge 13 of each plate is curved to conform to the curvature of the body of the tank. The inner edge of each deck plate is curved as at 14 for a purpose to be described. The plates forming the upper end of the body 10 are turned outwardly to form flanges 15 to support the deck plates 12 as shown in Figure 3. Bolts 16 secure the edge portions 13 of the deck plates to the flanges 15, suitable packing 17 being arranged between these members to provide a leak-proof joint.

Each deck plate 12 is provided with a plurality of ribs 18 extending substantially radially with respect to the tank and terminating relatively short distances from the edges 13 and 14 of each deck plate. As shown in Figures 5, 6 and 7, the ribs 18 increased both in depth and width toward the outside of the tank. The ribs 18 serve to reinforce the deck and the body of the tank in a manner to be described.

The plates 12 are secured to each other in the manner shown in Figure 8. Each plate 12 is provided at both of its side edges with reinforcing ribs 19, the rib 19 at one edge of each plate registering with the corresponding rib at the edge of the next adjacent plate, as shown in Figure 8. Packing 20 is arranged between the overlapping edges of the sheets 12, and bolts 21 pass through the overlapping edges and through the packing to secure these elements together and to provide a leak-proof joint. The inner face of the lower rib 19, in each instance, forms a channel 22 to receive the head 23 of each bolt 21 whereby the bolt is prevented from turning when its nut 24 is tightened.

The tank is provided with a dome indicated as a whole by the numeral 25. The dome comprises a cylindrical body 26 having outstanding flanges 27 and 28 at its upper and lower ends, as shown in Figure 2. Packing 29 is arranged between the flange 28 and the deck plates 12, and these elements are secured together by bolts 30.

A cover plate 31 is arranged at the top of the dome and is secured to the flange 27 by bolts 32, packing 33 being arranged between the flange 27 and cover plate 31.

The operation of the deck will be apparent from the foregoing description. The use of the usual metal rafters is completely eliminated, it having been found that a substantial degree of rigidity against vertical movement of the deck is provided by the reinforcing ribs 18. These ribs are increased in width and depth toward their outer ends to provide additional rigidity where the ribs are spaced further apart. It has been found that this construction resists movement of the deck both upwardly and downwardly under different temperature conditions which causes expansion and contraction of the contents of the tank. While the vertical movement of the deck referred to is resisted, it takes place to some extent under extreme conditions of expansion and contraction, but not to a sufficient extent to permanently distort the deck plates.

Moreover, it has been found that the use of radial joints between the deck sheets also tends to prevent permanent distortion of the plates, while resistance to vertical movement and distortion also is greatly increased by the use of the overlapping channel joints between the deck plates themselves, as shown in Figure 8. The use of such a channel construction also permits leakage from the tank to be more effectively prevented by causing the packing 20 to assume the shape of the ribs 19, while the channel 22 permits the nuts 24 to be tightened after erection of the tank without permitting the bolts 21 to turn, to eliminate any leakage which may occur between the deck plates.

The edges 14 of the deck plates combine to define a circular opening corresponding in shape and size to the opening through the dome. The sloping of the deck together with the features of reinforcement referred to permits the dome to be directly secured to the inner ends of the deck plates without the use of the usual angle iron braces employed for stiffening the deck at the point where the dome is secured thereto.

It also has been found that the rigidity of the deck construction is such as to prevent radial distortion of the top of the tank from its true cylindrical form, and thus a further necessity for the use of rafters is eliminated.

From the foregoing it will be apparent that the present construction embodies all of the advantages of the usual deck constructions, and in addition thereto, provides means for resisting distortion of the deck due to the accumulation of pressure therein when expansion of the contents of the tank takes place. Thus a large item in the manufacturing cost of the tank is eliminated since it is wholly unnecessary to employ the rafters. Moreover, the elimination of the rafters also reduces the time and the cost of labor involved in the erection of the tank.

While I have described in detail the preferred embodiment of my invention it is to be understood that various changes in the size, shape and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. A tank deck plate comprising a substantially planiform sheet of substantially segmental shape provided adjacent one lateral edge with a channel-like portion offset from

the plane of the body of the sheet to form a substantially radial relatively shallow joint member designed to register with a corresponding member of an adjacent sheet, said joint member extending throughout the greater portion of the length of the sheet and terminating inwardly of the outer end thereof, said sheet having a continuous substantially planiform portion on opposite sides and radially outwardly of said joint member adjacent the outer end thereof.

2. A tank deck plate comprising a substantially planiform sheet of substantially segmental shape provided adjacent one lateral edge with a channel-like portion offset from the plane of the body of the sheet to form a substantially radial relatively shallow joint member designed to register with a corresponding member of an adjacent sheet, said joint member extending throughout the greater portion of the length of the sheet and terminating inwardly of the outer end thereof, said sheet having a continuous substantially planiform portion on opposite sides and radially outwardly of said joint member adjacent the outer end thereof, said sheet being further provided intermediate its width with a rib offset from the plane of the sheet and extending radially thereof with its outer end spaced from the outer end of the sheet, said rib progressively increasing in width and depth from its inner end toward its outer end.

3. A tank deck comprising a plurality of substantailly planiform sheets of substantially segmental shape having their lateral edges overlapping and each provided adjacent each lateral edge with a channel-like portion offset from the plane of the body of the sheet to form a substantially radial relatively shallow joint member designed to register with the adjacent joint member of the adjacent sheet, each joint member extending throughout the greater portion of the length of the sheet and terminating inwardly of the outer end thereof, each sheet having a continuous substantially planiform portion on opposite sides and radially outwardly of each joint member adjacent the outer end thereof, and packing arranged between each pair of overlapping edges.

4. A tank deck comprising a plurality of substantially planiform sheets of substantially segmental shape having their lateral edges overlapping and each provided adjacent each lateral edge with a channel-like portion offset from the plane of the body of the sheet to form a substantially radial relatively shallow joint member designed to register with the adjacent joint member of the adjacent sheet, each joint member extending throughout the greater portion of the length of the sheet and terminating inwardly of the outer end thereof, each sheet having a continuous substantially planiform portion on opposite sides and radially outwardly of each joint member adjacent the outer end thereof, each sheet being further provided intermediate its width with a rib offset from the plane of the sheet and extending radially thereof with its outer end spaced from the outer end of the sheet, said rib progressively increasing in width and depth from its inner end toward its outer end, and packing arranged between each pair of overlapping edges.

In testimony whereof I affix my signature.

WILLIAM SCHWEMLEIN.