July 28, 1931. J. F. PATTERSON 1,816,124

STORAGE TANK OF THE FLOATING DECK TYPE

Filed Oct. 21, 1927 3 Sheets-Sheet 1

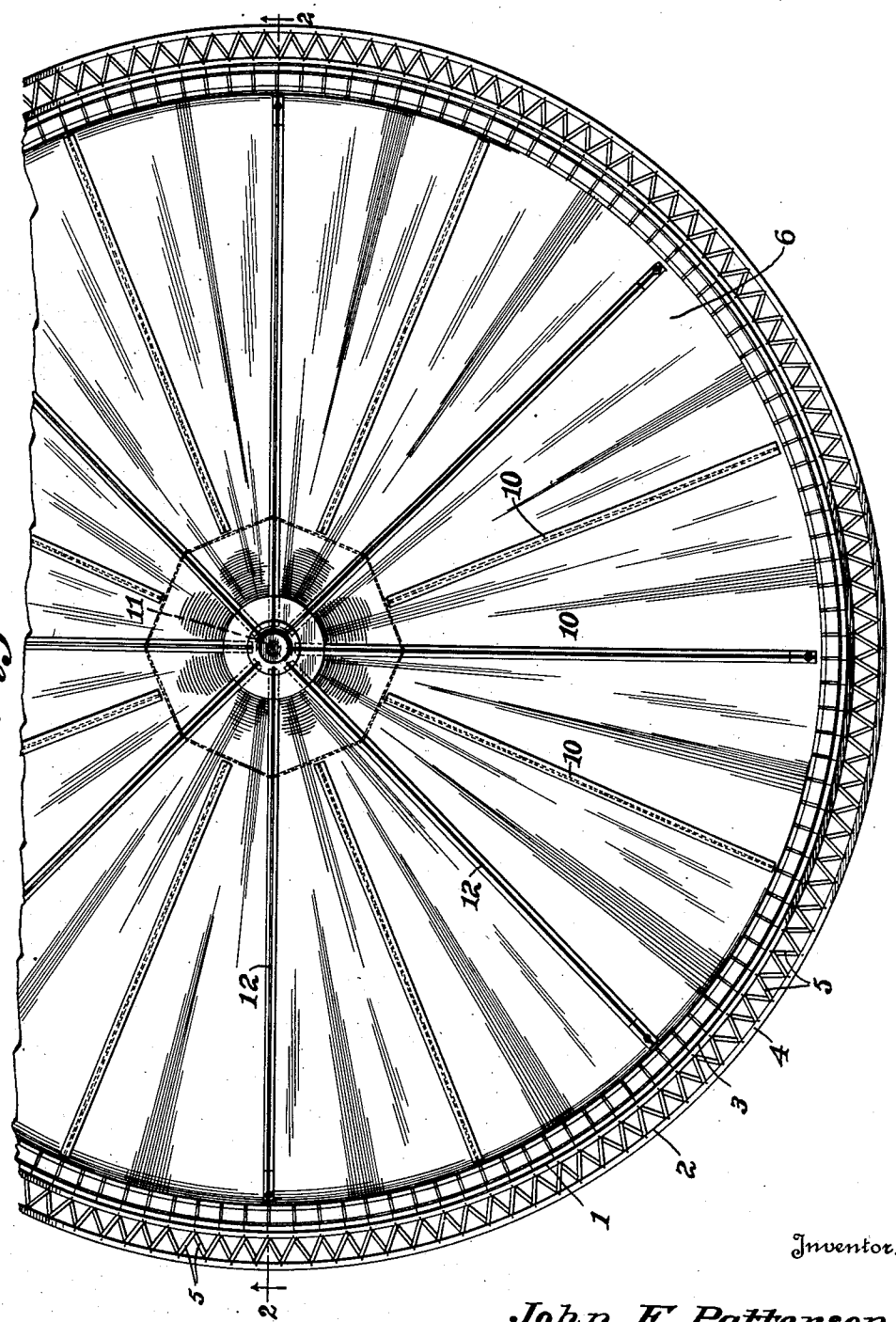


Fig. 1.

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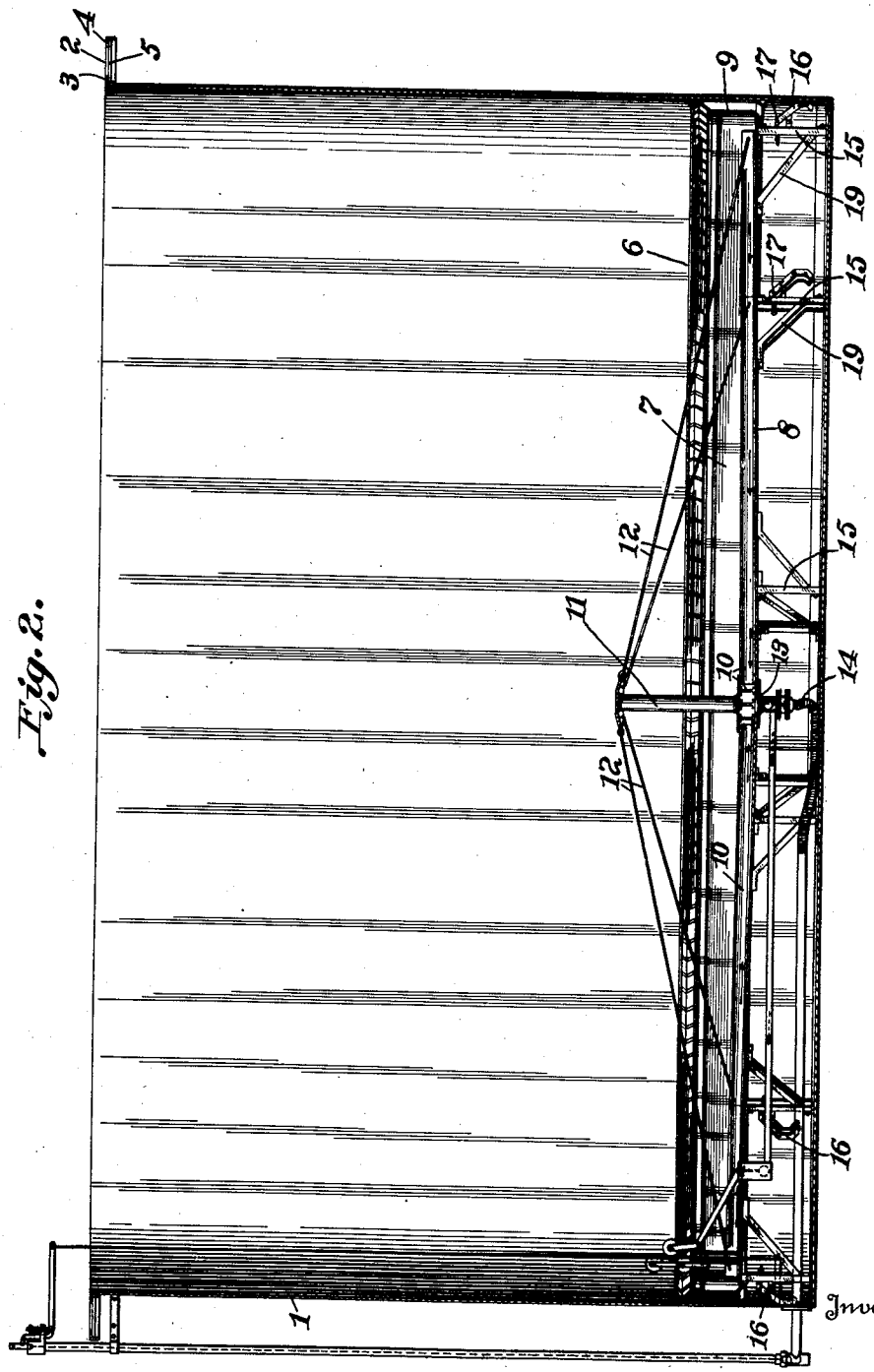


Fig. 2.

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Fig.4.

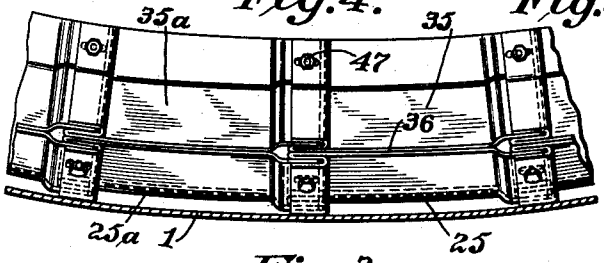


Fig.5.

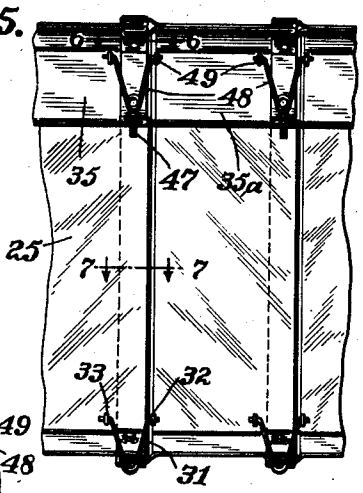


Fig.3.

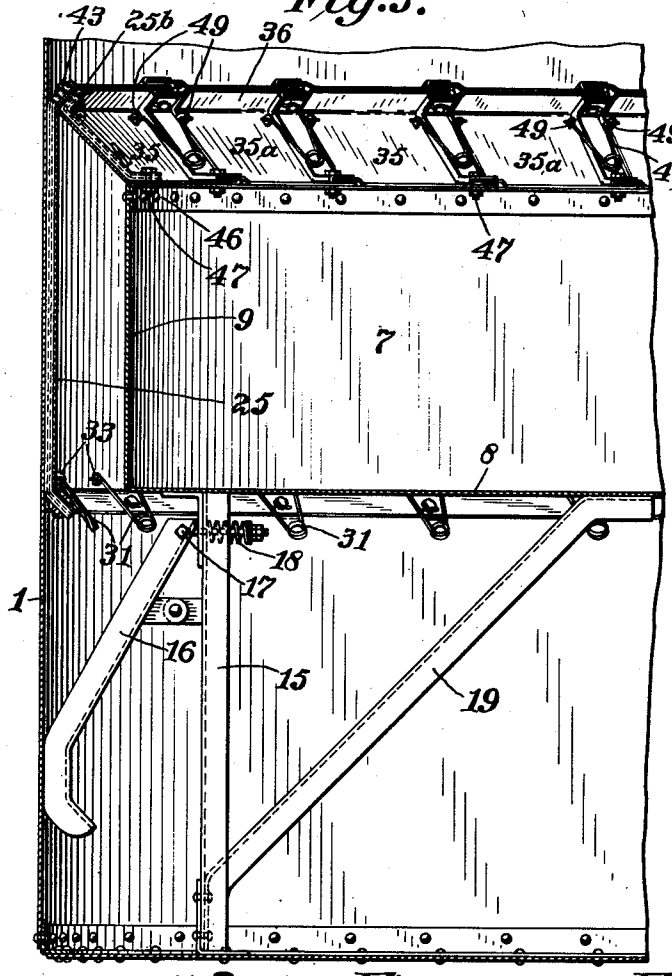


Fig.9. Fig.8.

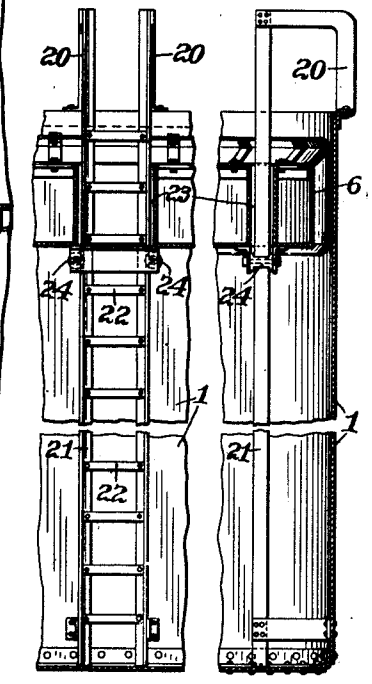


Fig.6.

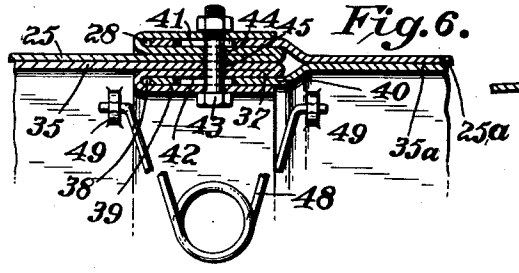


Fig. 7.



Inventor:
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Patented July 28, 1931

1,816,124

UNITED STATES PATENT OFFICE

JOHN F. PATTERSON, OF WARREN, OHIO, ASSIGNOR TO THE WARREN CITY TANK & BOILER COMPANY, OF WARREN, OHIO, A CORPORATION OF OHIO

STORAGE TANK OF THE THE FLOATING DECK TYPE

Application filed October 21, 1927. Serial No. 227,832.

My invention relates to new and useful improvements in oil storage tanks, and is of the well known floating deck type.

The present application is also a companion case of four other applications, executed by me of even date herewith, to wit: Serial Numbers 227,830, 227,833, 227,829, and 227,831.

One of the objects of the present invention is to provide a tank with a floating deck, which deck is formed with a plurality of telescopic plates, so that these plates act as seal plates to prevent any water such as rain, or melting snow from entering the tank and mixing with the oil.

Still another object of the invention is to provide a tank with the floating deck which rises and falls with the rise and fall of the liquid in the tank and at the same time provides sealing plates for the deck and fingers so that the deck will always be properly centered with regard to the casing as the deck rises and falls within the same.

Still another object of the invention is to provide a tank of the floating deck type having a plurality of telescopic plates which tightly seal the deck with regard to the casing and so provide these plates that they will be normally under expansion, to thus seal the deck with regard to the casing, but on the other hand may telescope slightly, to move either inwardly or outwardly to allow for the contraction or expansion due to the differences in temperature throughout the season.

Still another object of the invention is to provide a tank of the floating deck type wherein the parts may be made up in quantities, and when the tank is constructed, the various parts may be easily and quickly assembled.

As is well-known in the art, tanks of the floating deck type have many advantages over the tanks of the dome or cover type, one of the advantages being that there is less chance for evaporation, due to the seal formed by the floating deck; another advantage being that there is less chance of fire as the gases are not confined between the liquid level and the top of the dome cover.

There are other advantages of this type of tank, but one of the difficulties to be overcome is the sealing method between the floating deck and the casing, so that rain water will not fall within the deck or pass between the sides of the deck and the casing, and run down into the storage tank.

The present invention, therefore, contemplates the use of a storage tank with a floating deck and the use of telescopic plates formed in a certain manner to effectually seal the floating deck with regard to the casing.

With these and other objects in view, the invention consists in certain new and useful improvements, and combination of parts, as will be hereinafter more fully described and pointed out in the claims.

Referring now to the drawings,

Fig. 1 is a fragmentary top plan view showing the floating deck within the casing,

Fig. 2 is a sectional view, taken on line 2—2 of Fig. 1,

Fig. 3 is a vertical section of a portion of the tank and deck, some of the parts being left out for the sake of clearness.

Fig. 4 is an enlarged plan of several of the joints, along the upper edge of the deck,

Fig. 5 is a developed view from the inside of the deck, showing the combined telescopic plates,

Fig. 6 is an enlarged section on line 6—6 of Fig. 5,

Fig. 7 is an enlarged section on line 7—7 of Fig. 5,

Fig. 8 is a small vertical section through the tank and deck where the ladder is installed, and

Fig. 9 is a view from the inside of Fig. 8.

Referring now more specifically to the several views and to Figs. 1 and 2 in particular for the moment, there is shown a casing 1, which may be formed of metal plates riveted together, and of course the size of the casing will depend upon the amount of oil desired to be stored.

About the upper edge of this case, there will be noticed a rim 2 which is made up of the angles 3 and 4, which angles will be

bridged by the straps 5, as may be clearly seen in Fig. 1.

As shown in Fig. 2, there is a floating deck 6 and in this Fig. 2, the deck is shown in its lowermost position, or in other words, there is no oil or liquid within the tank. It, of course, will be understood that this deck is so constructed that as the tank is filled, the deck will float on the surface of the oil and will always rise and fall, with the rise and fall of the liquid.

The deck is formed of a plurality of seal plates about an inner casing 7, and the manner in which these plates are formed and assembled, forms the gist of the invention. Before describing more fully the arrangement of this deck, it might be mentioned that the under structure and the way it is braced, forms the subject matter of a companion application. The details, therefore, of the under structure and the bracing in this application will only be pointed out in a general way.

The floating deck, as heretofore mentioned, comprises the cylindrical casing 7 having the bottom 8 and the side walls 9 and is open at its top. The bottom of the deck is braced by a plurality of beams 10, there being a central post 11 with the tie rods 12 extending from this post to the outer ends of the beams 10. There is an opening 13 centrally of the bottom of the deck so that the rain water may flow into the pipe 14, which is an automatic arrangement for the discharge of water, this arrangement being shown and claimed in one of the companion applications.

It might be mentioned here, that the special manner of discharging the oil from the tank is not shown in this application, as it forms no part of the present invention, but in one of the companion applications, there is shown a novel device for discharging the tank, which discharge mechanism also rises and falls with the floating deck.

In Figs. 2 and 3, I have shown a part of the under structure comprising, in part, a plurality of legs 15 which are suitably braced and which legs are designed to support the deck should the tank become empty, so that there is no danger of the weight of the deck collapsing or injuring some of the under structure or associate parts when the deck is resting within the bottom of the casing.

Around the periphery of the under structure, there will be seen a plurality of guiding pivotal fingers 16 to centrally position the deck in its vertical movement within the tank. These fingers are fastened at their upper ends as at 17, to a leg 15, there being provided a small spring arrangement 18, so that the lower end of the fingers will always be held outwardly against the inner surface of the casing. The legs 15 are braced by the compression members 19 and are securely riveted to the leg and to the under portion or bottom of the floating deck. Before describing more specifically the sealing plates, and their manner of assembly, a short description will be set out of the ladder, as shown in Figs. 8 and 9, which is placed within the tank and which extends through the floating deck.

As may be seen in Fig. 8, small arms 20 are fastened to the rim 2, which in turn are secured to the uprights of the ladder 21, these uprights being formed of commercial angles and provided with steps or cross pieces 22. The casing 7 of the upper deck is provided with an opening 23 through which the ladder passes, and small rollers 24 are provided which bear against the uprights of the ladder, it being noted that these are on the under surface of the deck, so that these rollers will work in the stored oil and thus prevent the possibility of any sparks which might be caused by any friction between the uprights and the rollers of the ladder.

It will be seen the ladder, not only provides a means for entering the tank, above the deck, in case it is desired to repair any damaged part, but furthermore, the ladder and its rollers on the deck will prevent any rotation of the deck with regard to the casing.

Referring now to the sealing plates and their manner of construction and assembly, reference is made especially to Figs. 3, 4, 5, 6 and 7, and particularly to Fig. 6, which is an enlarged section, taken on line 6—6 of Fig. 5. The side plates 25 have their ends so formed that the edge of one plate may telescope or fit within the edge of the other. As may be seen in Fig. 7, one of the plates 25 is turned back on itself as at 26 and again extends forwardly as at 27 but providing a space 28, in which the offset end 29 of the adjacent plate may slide. The entire outer periphery is formed of plates in this manner so that the edge of one plate may slide slightly with respect to the other.

As may be seen in Fig. 5, a small spring arm 31 is arranged to fit within eyelets 32 and 33 on the adjacent plates, the tendency of the spring being to force the plates away from each other, and to thus grip the inner surface of the tank shell or casing 1. These small spring arms 31 are adjacent telescoping points along the lower edge, and only a few of them are shown, but it should be understood that wherever the plates telescope, there will be one of these spring arrangements.

Referring now more particularly to the arrangement of the upper edge of the plates and the manner of connecting them with the upper edge of the casing 7, it will be seen that the upper edge of the plates 25 and 25*a* which represent the adjacent plates throughout the deck, are offset as at 25*b*.

To fit within these plates, there is provided a second series of plates 35 and 35*a*, with like-

wise offset upper edges 36, so that, except at their opposite edges, they lie flush with the offset ends 25*b* of the side sealing plates.

Referring to Fig. 6, it will be seen that this plate 35 has its end formed similar to the end of the plate 25 in that it is turned back on itself as at 37 and then a small space provided as at 38, and again forwardly as at 39, thus providing a joint as clearly illustrated in Fig. 6. The adjacent or companion plate 35*a* is similar to the arrangement of the plate 25*a*, except that its end is offset in the opposite direction, so that its end or edge 40 may fit within the space 38.

Thus we have the two edges of the sealing plate and the plate 35*a* fitting within the spaces 28 and 38 provided in the overlapping edges of the plates 25 and 35. In the end 29 of the plate 25*a*, and the end 40 of the plate 35*a*, small slots 41 and 42 are provided so that the bolt 43 may pass through these slots and through holes 44 and 45 in the ends of the plate 25 and 35, so that plates 25*a* and 35*a* may move inwardly or outwardly a short space equal to the length of the slot.

In other words, the side sealing plates and the small inclined slanting plates which connect the casing with the outer sealing plates are so arranged that the edges may telescope slightly to allow for any expansion or contraction of the deck, and at the same time, form a tight seal between the inner casing and the deck.

As will be noticed in Fig. 3, the lower edge of these plates 35 and 35*a* are also slightly offset horizontally and are bolted to an angle iron 46 which in turn is riveted to the inner upper edge of the deck casing 7. It will be noticed at this lower edge that only one edge of the plate fits within the edge of the other, because there are no vertical sealing plates at this point, whereas at the upper edge there is the sealing plate, plus the inclined connecting plate so that there are eight thicknesses of metal at the joints of the sealing plates and the inclined plates at their upper edges.

Small bolts 47 are passed through the lower inclined edges of these plates 35 and 35*a*, as shown in Fig. 6, otherwise, of course, the joint would not permit of a telescopic action.

The small spring arrangements 31 have been mentioned, which appear at the lower edge of the sealing plates 25 and a similar arrangement of the spring arms 48 are provided along the plates 35 and 35*a*, their respective opposite arms fitting within eyelets 49 of the adjacent plates, and these springs being under compression will always tend to force the plates outwardly to thus tightly hold the plates against the inside surface of the casing.

In this manner, the floating deck will rise and fall with the liquid within the tank and will be self-centered, prevented from rotation, and the deck being constructed with an outer rim of sealing plate and plates connecting the central casing of the deck with these sealing plates, and both series of plates capable of a telescopic action, will completely seal the tank from any water which may fall into the open casing or shell. Furthermore, provision is made to allow for the expansion and contraction, due to the different temperatures existing during the day and night and during the different seasons, and at the same time, always seal the deck within the casing, allowing, of course, the deck to rise and fall with the rise and fall of the liquid within the tank.

I am aware that it is old to use different forms of sealing plates and to use means for allowing for contraction and expansion, and I do not claim my invention broadly as such. However, the manner of forming the vertical sealing plates and the inclined sealing plates, and the manner of forming the telescopic edges, are new and novel, so far as I am aware.

Many slight changes might be made without in any way departing from the spirit and scope of the invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A storage tank comprising an outer casing, a floating deck comprising a casing, overlapping seal plates cooperating therewith, some of said plates being vertical and some being inclined, the latter being movably connected to the casing and all the overlapping plates being capable of a peripheral expansion and contraction to thereby seal the deck within the outer casing.

2. A storage tank comprising an outer casing, a floating deck within the casing and including vertical and inclined plates, an inner casing forming a part of the floating deck and slidably connected about its upper edge to the lower edge of said inclined seal plates and the said seal plates overlapping and interlocked with each other and capable of peripheral expansion to thereby seal the deck within the outer casing.

3. A storage tank for oils comprising an outer casing, a floating deck comprising an inner casing, inclined seal plates and vertical seal plates, the inclined seal plates being slidably connected to the said inner casing, the said seal plates being overlapped and slidingly interlocked, and means for normally tending to slide the overlapping plates away from each other to thereby seal the deck within the outer casing.

4. A storage tank for oils comprising an outer casing, a floating deck within said casing, said floating deck also comprising a casing, inclined seal plates slottedly connected to the upper edge of said last-mentioned casing, said seal plates overlapping each other, fur-

ther vertical seal plates interlockingly connected with said first mentioned seal plates, spring means for forcing the overlapping plates peripherally outwardly, a ladder extending downwardly through the floating deck, and said ladder also arranged to prevent the floating deck from rotating within the casing.

5. A storage tank for oils comprising a shell, a floating deck within said shell, said floating deck comprising a casing open at its top, a set of overlapping plates slottedly secured to the upper edge of said casing and inclined upwardly and outwardly, a set of vertical plates overlappingly connected to the upper edge of said first mentioned plates and extending downwardly to substantially opposite the bottom of the casing, and the lower edges of said plates spaced apart from said casing and the interlocking overlapping plates capable of moving slidably with relation to each other to thereby seal the deck within the shell.

6. A storage tank for oils comprising a shell, a floating deck within said shell, said floating deck including a casing, vertical overlapping interlocking slidable plates spaced from said casing and overlapping interlocking slidable inclined plates connected to the upper end of said vertical plates and also slidably connected to the upper edge of said casing.

7. A storage tank for oils comprising a shell, a floating deck within said shell and including overlapping slidably mounted interlocking seal plates slottedly connected to the floating deck, spring fingers mounted on the plates to normally force the adjacent plates away from each other, and expansion means connected with said plates and engaging the inner walls of the shell for sealing the deck with relation to the shell.

In testimony whereof I affix my signature.

JOHN F. PATTERSON.