

Feb. 28, 1939.

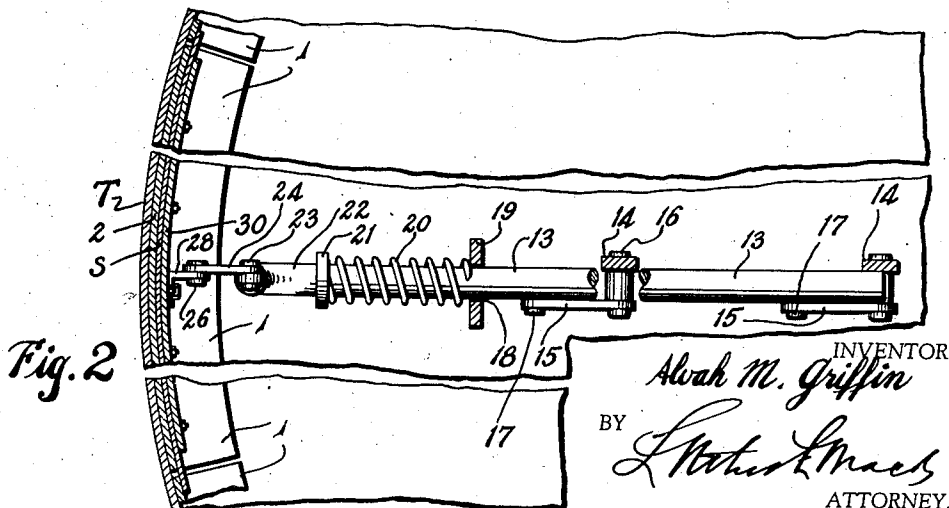
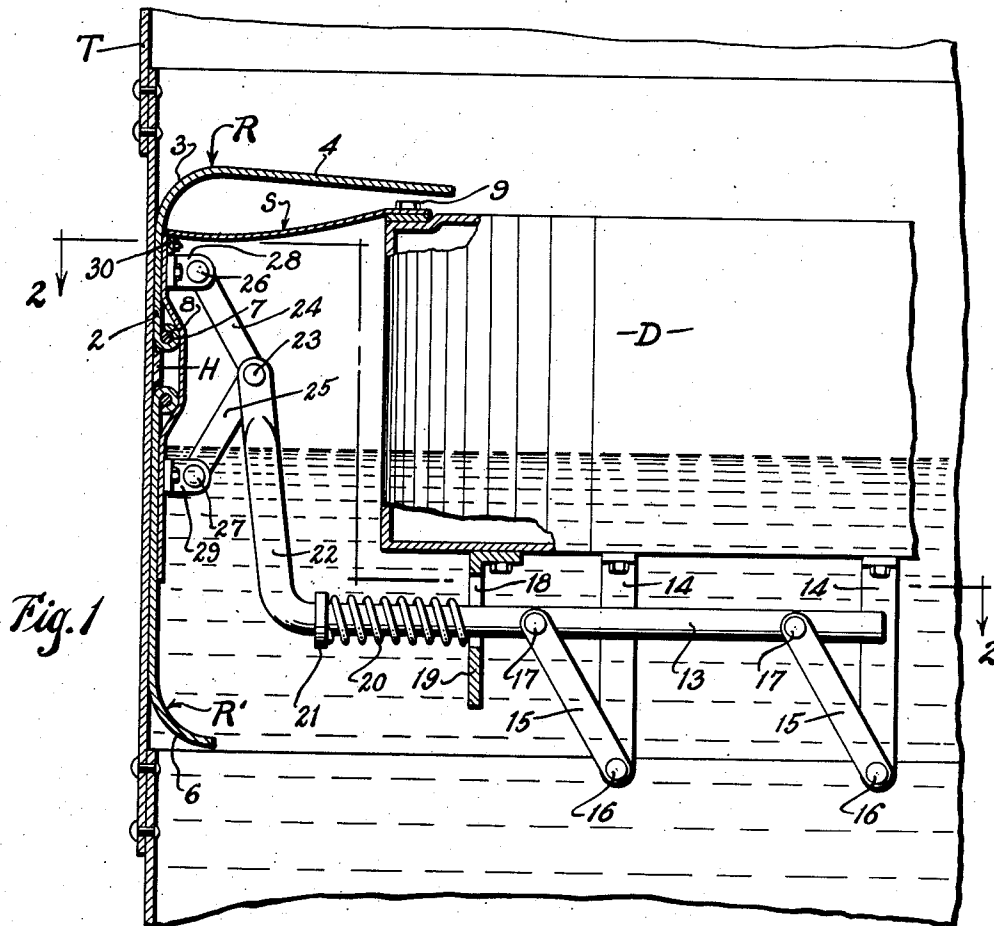
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2,148,811

FLOATING DECK STRUCTURE FOR OIL STORAGE TANKS

Filed Jan. 28, 1936

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

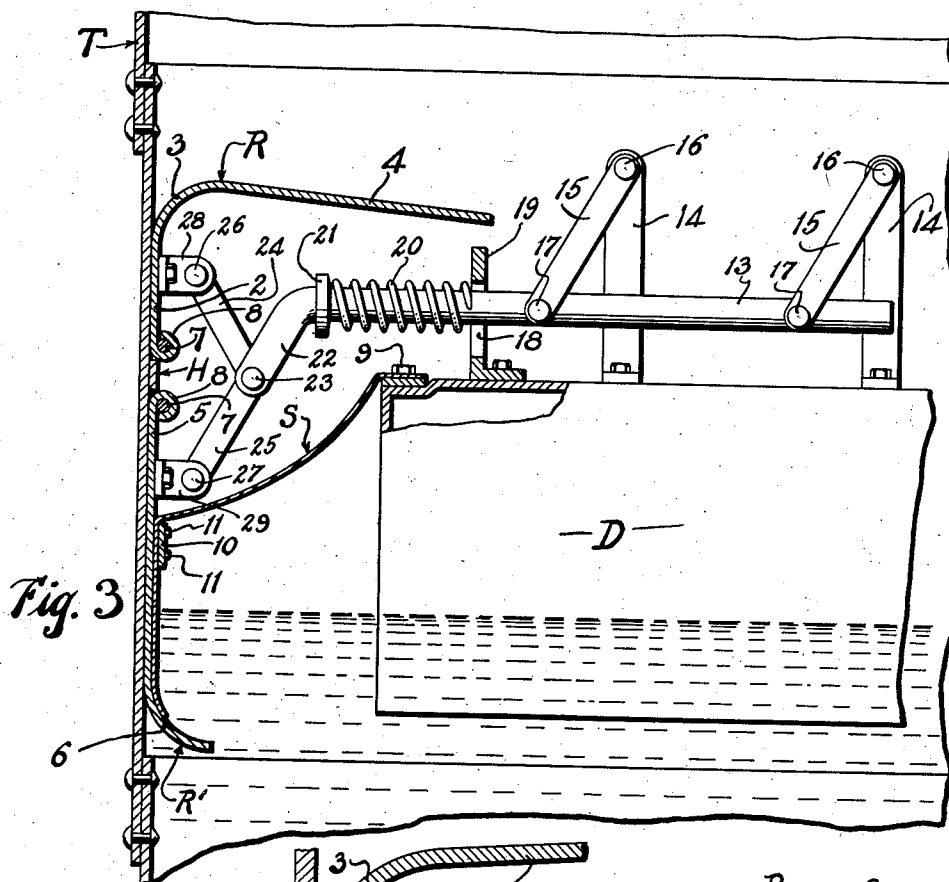


Fig. 3

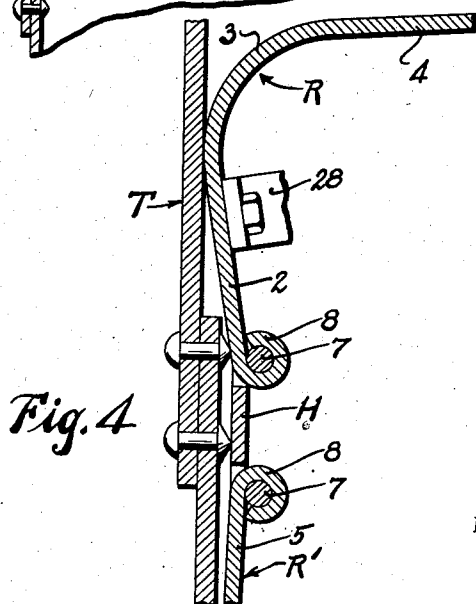


Fig. 4

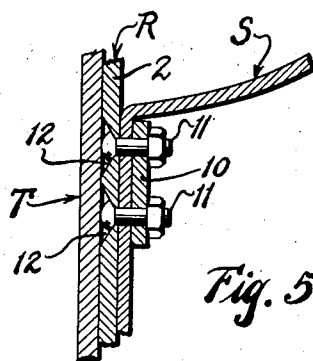


Fig. 5

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UNITED STATES PATENT OFFICE

2,148,811

FLOATING DECK STRUCTURE FOR OIL STORAGE TANKS

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Application January 28, 1936, Serial No. 61,186

3 Claims. (Cl. 220—26)

While this invention relates generally to floating deck structures it more particularly relates to an improved seal applicable to a floating deck for sealing the space between the deck and a tank whereby the gas generated in the tank below the deck may not escape.

An object is to provide in a floating deck structure a sealing device of annular form carried by the deck and embodying an upper and a lower series of segmental sections hingedly connected and independently yieldable for conforming to the inner surface of the tank wall and for movement over rivet heads, lapped joints and other projections in the tank, and a flexible curtain of asbestos or the like secured at opposite margins to the deck and to the two series of segmental sections in a manner which will effectively seal the joints between said sections against leakage of gas.

Another object is to provide a novel and improved means for yieldably mounting the sealing rings on the deck for engagement with the wall of a tank. Other objects may appear as the description progresses.

In the accompanying drawings I have shown a preferred form of mechanism for the purpose described and embodying the invention, in which:

Fig. 1 is a fragmentary sectional elevation of an oil storage tank with a floating deck structure and sealing mechanism operatively mounted therein and supported on the bottom of the deck; Fig. 2 is a sectional plan of the same on line 2—2 of Fig. 1;

Fig. 3 is a view similar to Fig. 1 but showing the sealing means mounted on the top of the deck;

Fig. 4 is a fragmentary section of the tank wall and sealing rings showing the adaptation of the seal to lapped joints and other projections within the tank; and

Fig. 5 is a fragmentary section showing a method attaching the flexible seal to the sealing rings for preventing binding of the seal on the tank wall.

Referring to Figs. 1 and 3 it will be observed that regardless of whether the seal is mounted on the top or the bottom of the deck D within an oil storage tank T the mechanism is substantially similar and includes: an upper annular sealing ring R and a lower similar ring R', each of which is composed of a plurality of segmental sections 1, 1', etc., of metal, a flexible seal of annular form, as at S, and a plurality of yieldable supporting devices carried on deck D and opera-

tively connected with the sealing rings R and R', as hereinafter described.

Said sealing ring R is formed of a plurality of angularly bent plates having depending flat portions 2 which are adapted to frictionally engage the inner side of the wall of tank T, curved intermediate portions 3 so formed as to readily surmount and move over rivet heads and other projections on the tank wall and inwardly projecting portions 4 overlying the top of deck D. The sections of the lower sealing ring R' have upwardly projecting flat portions 5 engaging the tank wall and curved lower portions 6 corresponding in form and purpose to the portions 3 of the sections of the upper ring R.

Corresponding sections of rings R and R' are hingedly connected by means of hinges H having pintles 7, 7', held in curled portions 8, 8', of rings R and R'. The flexible seal S is attached at its inner margin to the upper side of deck D by means of bolts 9 and either to the upper ring R or to the lower ring R' as shown in Figs. 1 and 3, depending upon the manner of mounting the ring supporting means. As shown in Fig. 5 the outer margin of the seal S may be held by cleats 10 and bolts 11 with their heads countersunk in recesses 12 on the outer side of the portions 2 or 5 of the ring sections, as the case may be. In any event the sealing member S is so formed and secured in position as to close the space between the deck D and the sealing rings against leakage of gas from the tank T, and is sufficiently flexible to permit the movement of the deck in the tank and to a slight extent relative to the sealing rings R and R'.

The rings R and R' are operatively supported on the deck by means of a plurality of radially adjustable rods 13 which are yieldably held on a pair of brackets 14 either depending from or extending upwardly from the deck D and secured at their bases to the bottom or to the top of the deck, as shown in Figs. 1 and 3. Links 15 are pivotally held at 16 on the extremities of brackets 14 and are similarly pivoted at 17 to spaced points on the rods 13 and said rods extend through apertures 18 in brackets 19 and carry springs 20 outwardly of the brackets 19 which compress between the brackets 19 and collars 21 secured to the rods. Thus said springs tend to urge the rods outwardly and permit the yielding thereof to a suitable extent inwardly.

The rods 13 are bent upwardly or downwardly as the case may be, as at 22 and are each commonly pivoted at 23 to a pair of oppositely disposed links 24 and 25 which are pivoted at their

other extremities, as at 26 and 27, respectively, to fixtures 28 and 29 positioned on opposite sides of the hinges H. Fixtures 28 and 29 overlie the seal member S and are attached to and may serve as means for holding the seal member on the portions 2 and 5 forming the skirts of the sealing rings R and R'. Thus, as shown in Fig. 4, the rings R and R' are independently adjustable on the portions 22 of rods 13 for movement over lapped joints in the wall of the tank or projecting rivet heads and other obstructions without completely disengaging the sealing rings from the tank wall.

As many of the supporting rods 13 may be used as may be necessary in each case and two or more of the sections of rings R and R' may be joined together as by means of an arcuate or flexible metallic circular band 30 as shown in Fig. 1 or the band 10 shown in Fig. 3 and in either case attached to the skirts of the ring sections.

When the ring supporting means is attached to the bottom of the deck the seal S will overlie the connections between the rods 13 and the ring sections but when said means is attached to the top of the deck the seal S will underlie said connections. The inwardly extending portions 4 of the ring sections serve to prevent the collection of water and dirt on the seal S and to deflect said elements inwardly onto the deck from which they may be removed when necessary.

What I claim is:

1. In a floating deck structure for oil storage tanks, the combination with a tank and a deck movable therein, of a sealing mechanism for sealing the space between said tank and said deck against the leakage of gas and including a pair of sectional sealing rings hingedly connected together and formed with curved upper and lower portions and adapted to frictionally engage the wall of said tank, a flexible curtain having its inner edge secured to said deck and its outer edge

secured to one of said sealing rings, and means for yieldably supporting said sealing mechanism on said deck, said supporting means including a plurality of members movably held on said deck and dual connections between each of said members and said sealing rings.

2. In a floating deck structure for oil storage tanks, the combination with a tank and a deck movable therein, of a sealing mechanism for sealing the space between said tank and said deck against the leakage of gas and including a pair of sectional sealing rings hingedly connected together and formed with curved upper and lower portions and adapted to frictionally engage the wall of said tank, a flexible curtain having its inner edge secured to said deck and its outer edge secured to one of said sealing rings, means for yieldably supporting said sealing mechanism on said deck, said supporting means including a plurality of members movably held on said deck and dual connections between each of said members and said sealing rings, and tensioning means for constantly urging said rings into engagement with the tank wall.

3. In a floating deck structure for oil storage tanks, a tank, a deck movable therein and a sealing mechanism for sealing the space between the deck and tank including a pair of sealing rings arranged to engage the wall of the tank, means hingedly connecting said rings with one another, a flexible sealing membrane between the deck and one of said rings, and spring loaded means supporting and bodily urging said rings into engagement with said tank and permitting independent yielding of said rings relative to said tank, said last named means including links pivoted to said rings on opposite sides of said hinge means and a laterally yieldable support to which said links are pivoted at points spaced inwardly of said hinge means.

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