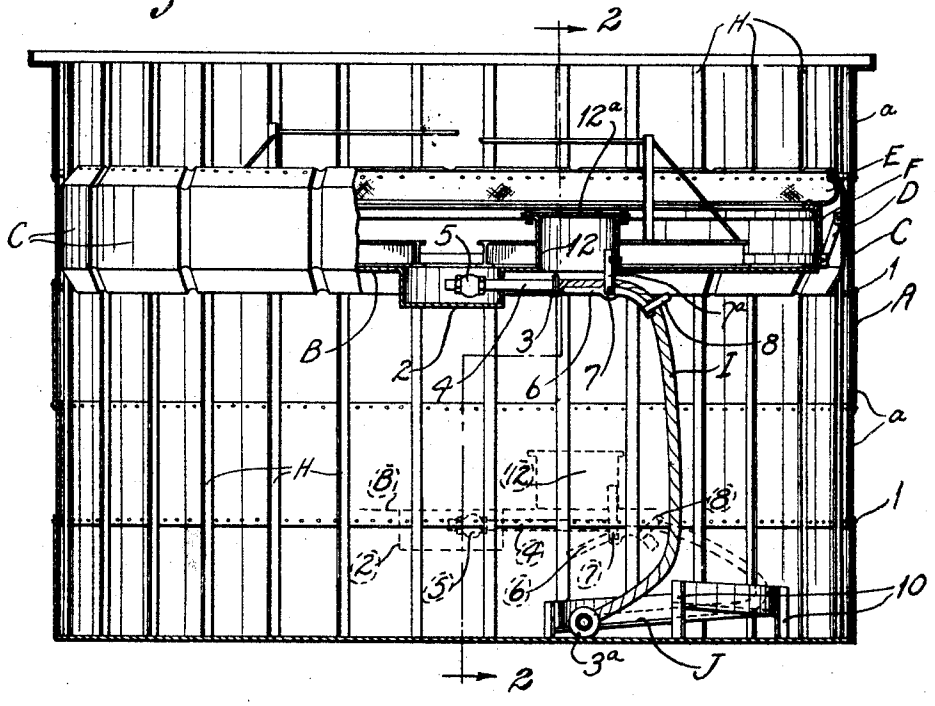
July 19, 1927. 1,636,540

J. H. WIGGINS

LIQUID STORAGE TANK

Filed Feb. 15, 1926 2 Sheets-Sheet 1

Fig. 1.



INVENTOR:
JOHN H. WIGGINS
BY Bakewell & Church
ATTORNEY

July 19, 1927. 1,636,540

J. H. WIGGINS

LIQUID STORAGE TANK

Filed Feb. 15, 1926 2 Sheets-Sheet 2

Fig. 2.

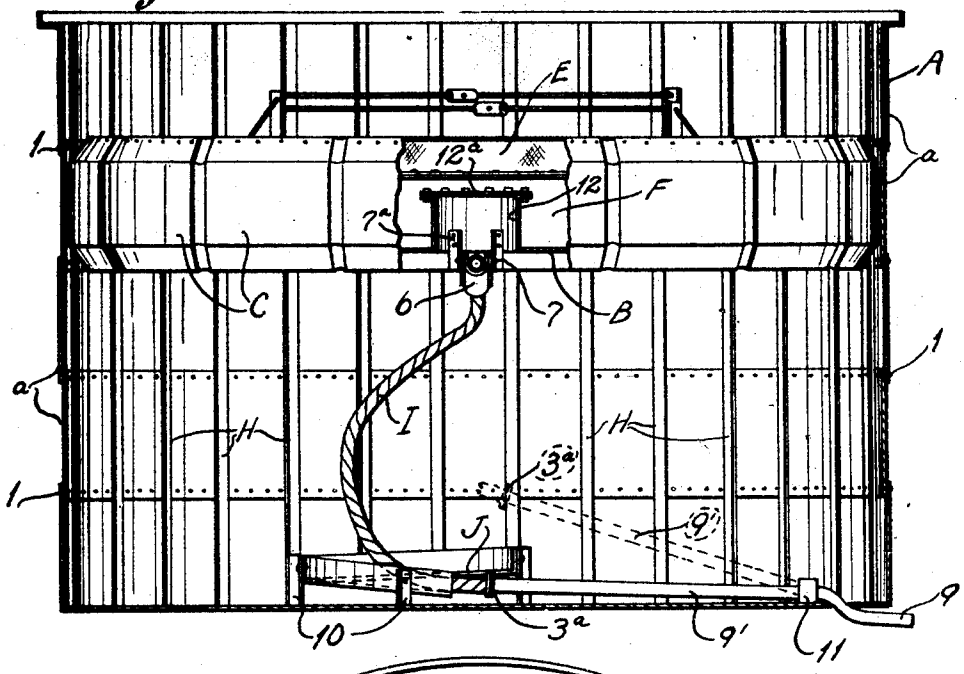
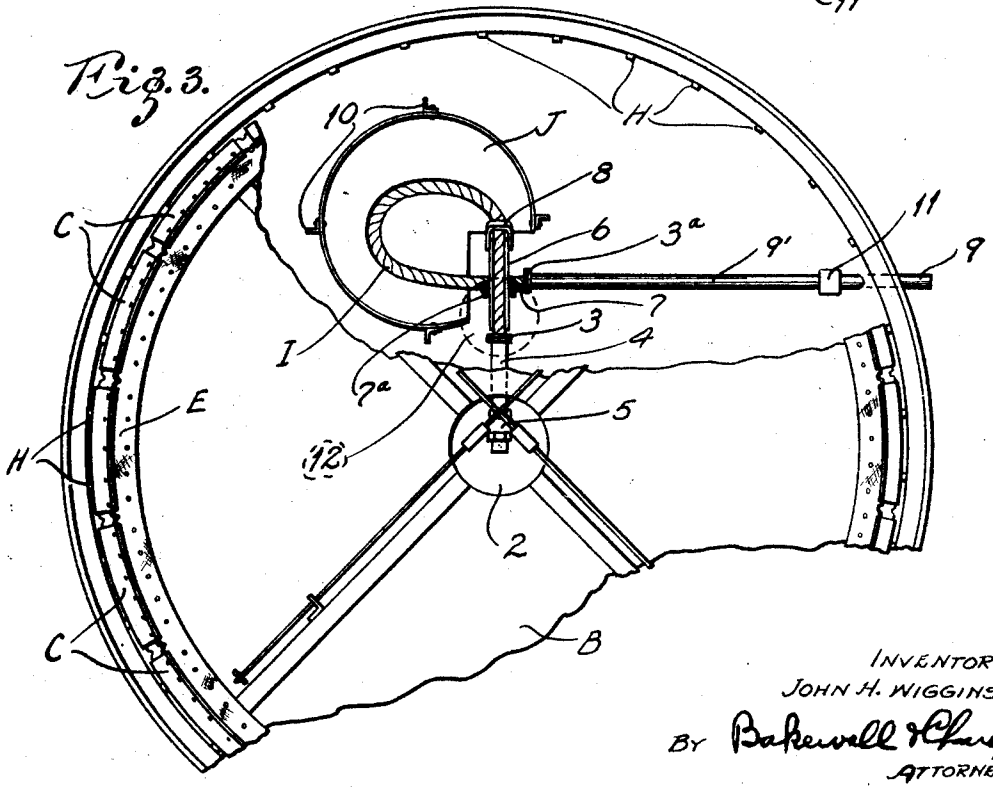


Fig. 3.



INVENTOR:
JOHN H. WIGGINS.
BY Bakewell & Church
ATTORNEYS.

Patented July 19, 1927. 1,636,540

UNITED STATES PATENT OFFICE.

JOHN H. WIGGINS, OF BARTLESVILLE, OKLAHOMA.

LIQUID-STORAGE TANK.

Application filed February 15, 1926. Serial No. 88,303.

This invention relates to liquid storage tanks of the type that comprise a floating deck or roof supported by the liquid in the tank and provided at its peripheral edge with a sealing means that slides over the inner surface of the side wall of the tank when the deck rises and falls, due to variations in the level of the liquid in the tank.

One object of my invention is to provide a flexible drain conduit for the floating deck or roof of a liquid storage tank which is combined with a means that eliminates the possibility of said conduit becoming kinked or subjected to destructive or injurious strains when the deck rises and falls.

Another object is to provide a drainage means for the floating deck or roof of a liquid storage tank which is so constructed and arranged that it will be maintained in an hydraulic gradient at any position of the deck, even when said deck is in its extreme lower position.

And still another object of my invention is to provide a practicable means for draining the top surface of a floating deck or roof that can be easily inspected, repaired or replaced when the deck is floating on liquid in the tank. Other objects and desirable features of my invention will be hereinafter pointed out.

Figure 1 of the drawings is a vertical transverse sectional view of a liquid storage tank constructed in accordance with my invention, showing the floating deck or roof partly broken away so as to more clearly illustrate the construction of same.

Figure 2 is also a vertical transverse sectional view of said tank, taken at substantially right angles to Figure 1 on the line 2—2 of Figure 1; and

Figure 3 is a top plan view of the tank, with a portion of the roof or deck broken away so as to illustrate the platform on the bottom of the tank that is used to support the flexible drain conduit in certain positions of the deck.

Referring to the drawings which illustrate the preferred form of my invention, A designates the side wall of the tank, which is of circular shape in outline and made up of metal plates *a* whose horizontal edge portions are lapped and connected together, usually by rivets, and B designates the floating deck or roof of the tank which normally rests upon and is supported by the liquid in the tank. The deck B is of less diameter than the side wall of the tank, and the annular space between the peripheral edge of said deck and the side wall of the tank is closed by a sealing means of any preferred type of construction, but which is herein illustrated as being composed of segmental shoes members C supported by swinging links or hangers D, carried by the deck B, and a flexible closure E, usually formed of a gas-tight fabric, attached to the upper edges of the shoe members C and to a rim F that projects upwardly from the peripheral edge of the deck B, the adjacent ends of the shoe members C being joined together by flexible elements G, which are usually formed from pieces of gas-tight fabric.

When the level of the liquid in the tank varies, the deck B rises and falls, and in order to insure the shoe members C sliding freely over the inner face of the side wall A of the tank, I provide said side wall with a means that effectively prevents said shoe members from catching on the horizontal edges of the plates *a*, or on the heads of the rivets 1 in said side wall. Usually, said means will be formed from continuous, vertically-disposed rubbing bars H on the inner surface of the side wall A of the tank that bridge the horizontal joints in said side wall, and thus insure the shoe members C sliding over said joints and over the rivets 1 in same, without liability of catching, sticking or in any way interfering with the rise and fall of the deck B. It is not essential, however, that said means consist of continuous rubbing bars H, for if desired, short rubbing bars H′ provided with beveled ends can be arranged over the horizontal joints in the side wall of the tank. By constructing the tank in this manner I correct or overcome a thing which heretofore has been a serious problem in oil storage tanks of the type in which the upper end of the tank is closed by a floating deck or roof provided at its peripheral edge with a sealing means that is adapted to slide over the inner surface of the side wall of the tank.

In floating tank decks or roofs of the kind above described a flexible conduit formed usually from a piece of metal hose is used for draining the top surface of the deck, said flexible conduit leading downwardly from a sump in the deck to the bottom of the tank, where it is attached to a metal eduction pipe that leads out of the tank.

One object of my present invention is to

provide a drainage means of the general type just described, which is of such construction that the flexible conduit that forms part of the same will not kink or be subjected to injurious strains when the deck rises and falls, and which, moreover, can be inspected, repaired or replaced while the deck is floating on liquid in the tank. Accordingly, I provide the floating deck B of the tank with a sump 2 arranged preferably at the center of the deck for receiving and collecting rain that falls on the deck and conduct the water out of said sump by a flexible conduit I which is so constructed and arranged that it will coil in a certain quadrant when the deck B moves downwardly towards the bottom of the tank and will uncoil when said deck rises or moves upwardly.

In the preferred form of my invention, as herein illustrated, the flexible conduit I is formed from a piece of metal hose that has considerable inherent stiffness, and the upper end of said conduit is connected by a coupling 3 to a horizontally-disposed pipe 4 arranged with its receiving end positioned inside of the sump 2 and equipped with a check valve 5 that permits water to escape freely from said sump, but which prevents water from passing from the pipe 4 back into the sump. The upper end portion of the flexible conduit I is sustained or supported by a downwardly-curved supporting member 6 which is preferably pivotally connected by a removable pin 7 to a bracket or other suitable supporting device 7^a on the underside of the deck B. Usually, the supporting member 6 will be formed from a piece of channel iron which is curved downwardly to the minimum radius to which it is desired to bend the conduit I and the upper end portion of said conduit will be retained in operative position on said supporting member 6 by a stirrup 8, or other suitable means, as shown in Figures 1 and 3. The lower end of said flexible conduit I is connected by a union 3^a to a hinged portion 9′ of an eduction pipe 9 that leads out of the tank, and a platform J provided with a top supporting surface of substantially helical form is arranged on the bottom of the tank at such a point that the conduit I will coil up on same when the deck B moves downwardly towards the bottom of the tank, said platform J being provided with supporting legs 10 so proportioned that the low point of the platform will be spaced high enough above the bottom of the tank to insure the hinged portion 9′ of the eduction pipe assuming an inclined position leading downwardly from the lower end of the conduit I when the deck B is in its extreme lower position. The high point of the platform J may terminate at any desired level, but in practice I prefer to construct said platform in such a way that the conduit I will form into a single coil when the deck B moves downwardly into its extreme lower position.

The adjustable section 9′ of the eduction pipe can be connected by any suitable form of pivotal joint 11 with the stationary portion of said eduction pipe, so long as said elements are combined together in such a manner that said adjustable section 9′ can be swung upwardly into the position shown in broken lines in Figure 2, and in the preferred form of my invention, as herein shown, the adjustable section 9′ of the eduction pipe is arranged at substantially right angles to the intake pipe 4 leading from the sump in the deck to which the upper end portion of the flexible conduit I is connected, as such an arrangement of the pipes 4 and 9′, when combined with a flexible conduit I that has considerable inherent stiffness, insures said flexible conduit coiling into a certan quadrant when the deck B moves downwardly. In order to permit inspection, removal or repair of the flexible conduit I, while the deck B is floating on liquid in the tank, I provide said deck with a manhole 12 arranged at a point in proximity to the union 3 that joins the upper end of the conduit I to the intake pipe 4, and I arrange the platform J in such relation to said manhole that the union 3^a which joins the lower end of the conduit I to the eduction pipe is accessible through the manhole 12 when the deck B is adjacent the botom of the tank. Accordingly, if it becomes necessary to disconnect the upper end of the flexible conduit I from the pipe 4 which leads from the sump 2, this can be accomplished without the necessity of draining the tank, and without liability of kinking the upper end portion of the condut I, by simply removing the cover 12^a of the manhole 12 in the deck, disconnecting the union 3 and then tilting the support 6 in such a direction as to swing the upper end of the conduit I upwardly into the manhole at a point above the level of the body of liquid in the tank on which the deck B floats. In the event it becomes necessary to remove the flexible conduit I, for replacement, repair or cleansing, this can be accomplished when the deck B is in proximity to the bottom of the tank, but still resting upon or supported by the liquid in the tank, by first releasing the upper end portion of the conduit I and drawing it upwardly through the manhole 12 and then swinging the adjustable section 9′ of the eduction pipe upwardly in the manner indicated in broken lines in Figure 2, so as to position the union 3^a in the manhole 12, and at a point above the level of the body of liquid on which the deck is floating.

From the foregoing it will be seen that in a tank deck drainage means of the construc-

tion above described the flexible conduit of said means cannot become kinked or subjected to injurious strains when the deck rises and falls, due to variations in the level of liquid in the tank; the passageway through which the water escapes from the sump 2 of the deck is maintained in an hydraulic gradient for any position of the deck, and the element of said drainage means which is most liable to wear or deteriorate, i. e., the flexible conduit I, can be inspected or replaced quickly and easily, without the necessity of first draining the tank.

I have not herein claimed the means illustrated and described for insuring the sealing means at the peripheral edge of the deck sliding freely over the inner surface of the side wall of the tank, as said means forms the subject-matter of my divisional application for patent Serial No. 149,635, filed Nov. 20, 1926.

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

1. A liquid storage tank provided with a floating roof or deck that normally rests upon the liquid in the tank, a flexible conduit leading downwardly from said deck towards the bottom of the tank for draining the top surface of said deck, and means for causing said conduit to coil into a certain quadrant when the deck rises and falls due to variations in the level of the liquid.

2. A liquid storage tank provided with a floating deck or roof that is normally supported by the liquid in the tank, a flexible conduit leading downwardly from said deck towards the bottom of the tank for draining the top surface of the deck, and means for preventing said conduit from kinking and for maintaining said conduit in an hydraulic gradient in any position of the deck.

3. A liquid storage tank provided with a floating deck or roof that is normally supported by the liquid in the tank, a flexible conduit leading downwardly from said deck towards the bottom of the tank for draining the top surface of the deck, means for maintaining said conduit in an hydraulic gradient free from kinks or sharp bends in any position of the deck, and means for enabling said conduit to be removed while the deck is supported by liquid in the tank.

4. A liquid storage tank provided with a floating deck or roof that normally rests upon the liquid in the tank, a flexible conduit leading downwardly from said deck towards the bottom of the tank for draining the top surface of the deck, and a platform adjacent the bottom of the tank provided with a substantially helical surface on which said conduit is supported when the deck is in its extreme lower position.

5. A liquid storage tank provided with a floating deck or roof that normally rests upon the liquid in the tank, a flexible conduit leading downwardly from said deck towards the bottom of the tank for draining the top surface of the deck, a platform adjacent the bottom of the tank provided with a substantially helical surface on which said conduit is supported when the deck is in its extreme lower position, and an inclined eduction pipe connected to the lower end of said conduit and leading out of the tank.

6. A liquid storage tank provided with a floating deck or roof that normally rests upon the liquid in the tank, a flexible conduit leading downwardly from said deck towards the bottom of the tank for draining the top surface of the deck, a platform adjacent the bottom of the tank provided with a substantially helical surface on which said conduit is supported when the deck is in its extreme lower position, and an eduction pipe at the lower end of the tank provided with an adjustable portion that is detachably connected to the lower end of said conduit.

7. A liquid storage tank provided with a deck or roof that normally rests upon the liquid in the tank, a flexible conduit leading downwardly from said deck towards the bottom of the tank for draining the top surface of the deck, and a supporting member on the deck for the upper portion of said conduit provided with a downwardly-inclined part on which said conduit bears.

8. A liquid storage tank provided with a deck or roof that normally rests upon the liquid in the tank, a flexible conduit leading downwardly from said deck towards the bottom of the tank for draining the top surface of the deck, and a pivotally mounted supporting member on the deck on which the upper end portion of said conduit is sustained.

9. A liquid storage tank provided with a floating deck or roof that normally rests upon the liquid in the tank, a flexible conduit leading downwardly from said deck towards the bottom of the tank for draining the top surface of the deck, a manhole in the deck, and a supporting member on the underside of the deck accessible through said manhole and provided with a downwardly curved portion on which the upper end portion of said conduit rests.

10. A liquid storage tank provided with a floating deck or roof that normally rests upon the liquid in the tank, a sump in said deck, an intake pipe in said sump, a flexible drain conduit on the underside of the deck detachably connected to said intake pipe, an adjustable member on the underside of the deck for supporting the upper end of said conduit, and a manhole in the deck that provides access to said supporting member and to the connection between the upper end of said conduit and said intake pipe.

11. A liquid storage tank provided with a

floating deck or roof that normally rests upon the liquid in the tank, a conduit leading downwardly from the deck towards the bottom of the tank and formed from a flexible member that has considerable inherent stiffness, a sump in said deck provided with an intake pipe to which the upper end of said conduit is connected, and an eduction pipe adjacent the bottom of the tank connected to the lower end of said conduit and arranged at substanially right angles to said intake pipe.

12. A liquid storage tank provided with a floating deck or roof that normally rests upon the liquid in the tank, a conduit leading downwardly from the deck towards the bottom of the tank and formed from a flexible member that has considerable inherent stiffness, a sump in said deck provided with an intake pipe to which the upper end of said conduit is connected, an eduction pipe adjacent the bottom of the tank connected to the lower end of said conduit and arranged at substantially right angles to said intake pipe, and a substantially helical platform arranged adjacent the bottom of the tank for supporting said flexible conduit.

13. A liquid storage tank provided with a floating deck or roof that normally rests upon the liquid in the tank, a sump on said deck, an intake pipe leading from said sump, a flexible conduit detachably connected to said intake pipe, an adjustable supporting member on the underside of the deck for the upper end portion of said conduit constructed so as to sustain said conduit without kinking the same, an eduction pipe at the lower end of the tank provided with an adjustable section to which the lower end of said conduit is detachably connected, a manhole in the deck arranged so as to provide access to the connections between said conduit and the pipes with which it co-operates, and a platform on the bottom of the tank provided with a substantially helical surface on which said flexible conduit coils when the deck moves downwardly towards the bottom of the tank.

JOHN H. WIGGINS.