Sept. 2, 1930. J. F. PATTERSON 1,774,943

STORAGE TANK FOR OILS

Filed Oct. 21, 1927 2 Sheets-Sheet 1

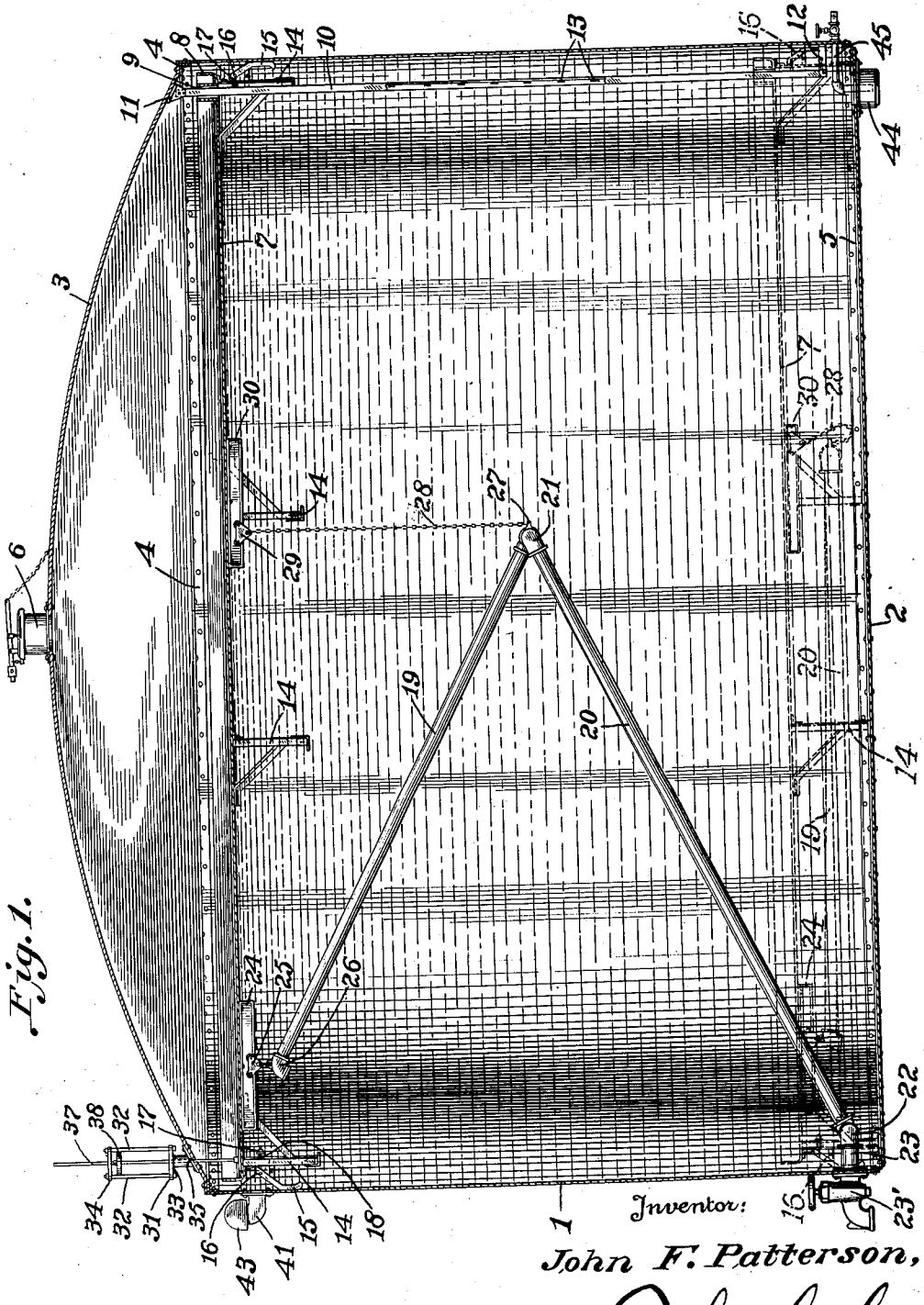


Fig. 1.

Inventor:
John F. Patterson,
By Parker Cook
Attorney

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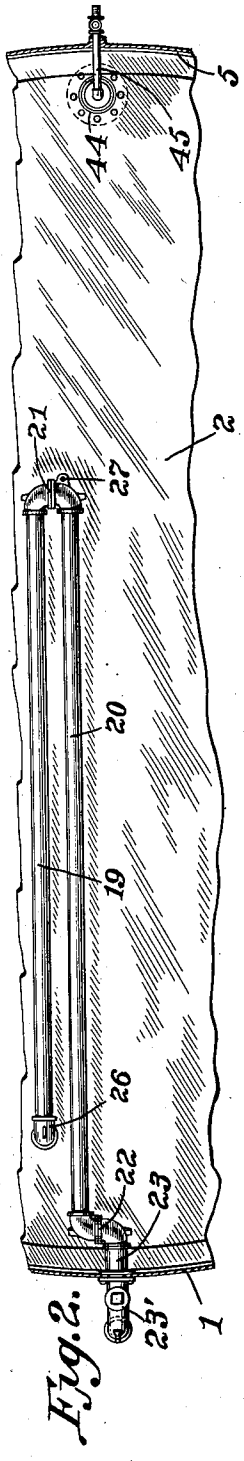


Fig. 2.

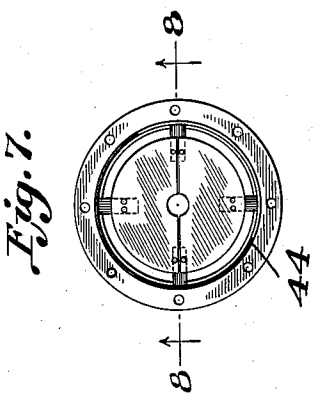


Fig. 7.

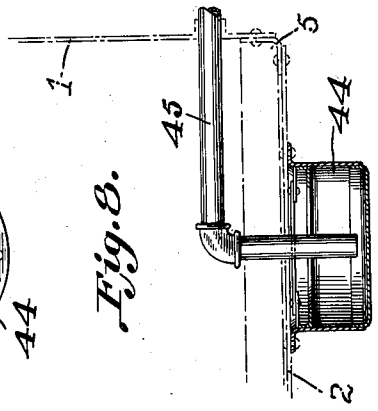


Fig. 8.

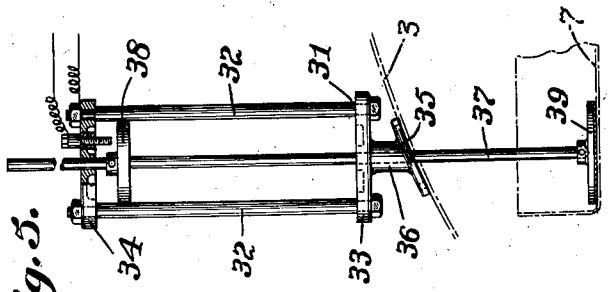


Fig. 5.

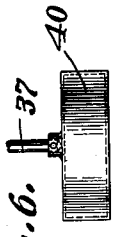


Fig. 6.

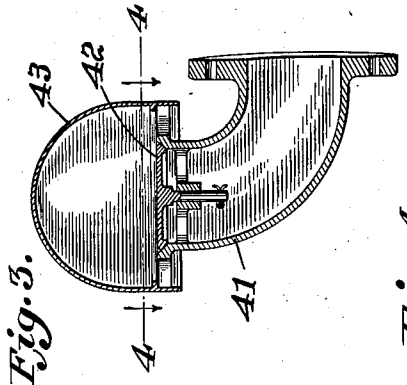


Fig. 3.

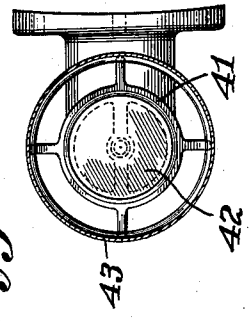


Fig. 4.

Inventor:

John F. Patterson,

By Parker Cook

Attorney

Patented Sept. 2, 1930 1,774,943

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 FOR OILS

Application filed October 21, 1927. Serial No. 227,831.

My invention relates to new and useful improvements in storage tanks for oils and more particularly to a type of storage tank that is provided with a floating deck.

In the present application I have shown a storage tank provided with both a floating deck and a roof or dome so that the tank is gas-tight with the exception of a vent provided in the dome thereof.

One of the objects of the present invention is to provide a large storage tank for oils and other liquids wherein there is provided a floating deck that covers a major portion of the oil and floats thereon to thus reduce the losses from evaporation, and reduce the fire hazard, while at the same time a dome or cover is provided to prevent rain or snow from entering the tank.

Still another object of the invention is to provide a storage tank with a top or cover having a vent at the top thereof so that when the tank is filled and emptied, air will have a free passage in and out of the tank without building up a pressure either internally or externally of the tank.

Still another object of the invention is to provide a storage tank having a dome or cover and also a floating deck and to further provide swinging outlet means for the oil, which means rises and falls with the deck as the tank is filled and emptied.

Still another object of the invention is to provide a storage tank for oils wherein there is provided a floating deck and wherein means are provided for correctly centering the deck at all times in its rising and falling movement, also to provide further means for indicating the height of the liquid in the tank and safety devices in the way of alarms and signals should the tank be filled beyond its capacity.

The present application is one of the several companion cases filed by me on even date herewith and bearing Serial Numbers 227,829, 227,830, 227,832 and 227,833.

With the above and numerous other objects in view as will be more fully explained as the specification proceeds, the invention consists in new and novel arrangements and combination of parts as will be hereinafter more fully explained and pointed out in the claims.

Referring now to the drawings, showing a preferred embodiment of the invention:—

Fig. 1 is a large sectional view of the tank showing the floating deck, the dome, vent, and the means of discharging the contents of the tank,

Fig. 2 is a fragmentary top plan of the swinging discharge pipe in its position at the bottom of the tank,

Fig. 3 is a sectional view of the relief valve as arranged near the upper edge of the tank,

Fig. 4 is a section taken on line 4—4 of Fig. 3,

Fig. 5 is a detailed view partly in section of the indicator for showing the depth of the liquid in the tank,

Fig. 6 shows a somewhat different float used with other than a floating deck,

Fig. 7 is a top plan of a sump at the bottom of the tank, and

Fig. 8 is a section taken on line 8—8 thereof.

Referring now to the drawings and to Fig. 1 in particular, there is shown a large storage tank 1 composed of a metal shell, a bottom 2 and the stationary roof or dome 3 that is securely riveted to the upper edge of the shell or sides of the tank 1. This upper edge may be reinforced by the angle 4, and in the same manner the bottom may be reinforced by angles 5 or other means so that the tank will properly hold the liquid to be stored therein without bulging or bending the tank.

At the top of the dome cover 3 there is shown a vent 6 which may be held normally open and may be manually or automatically closed.

The construction per se however of this vent, forms the subject matter of a companion

case filed of even date and bearing Serial Number 227,830.

Now, positioned within the tank 1 there may be seen a floating deck or cover 7 that is formed of metal, having an imperforate bottom and the upwardly extending rim 8 to prevent any oil or stored liquid from flowing over onto the deck.

This cover or deck is intended to float on the liquid, within the tank, and rise and fall therewith and as heretofore mentioned is imperforate with the exception of the small protected opening 9 thru which extends the upright members of an inside ladder 10, the uprights being secured to the interior surface of the dome 3 as at 11. The lower ends of the uprights may be fastened to the short arms 12 as may be seen in Fig. 1 while suitable rungs 13 are provided on the uprights to form the ladder.

The upright members may be formed of angle bars and rollers (not shown) may be secured to the lower surface of the deck to bear against the uprights of the ladder, the rollers being placed beneath the deck and thus beneath the upper surface of the oil to avoid any sparks that otherwise might be occasioned by the contact of the rollers and the ladder.

It is necessary to provide means for supporting this deck when the tank is empty and as may be seen in Fig. 1, I provide a plurality of feet 14 which are formed of angle iron and properly placed and braced, so that if the deck comes to rest as shown by the dotted lines in Fig. 1, the floating deck will be properly supported on these feet.

In one of the companion cases, I have shown more fully, how the bottom of the deck is supported but it will be sufficient here to state that enough of these feet will be provided to support the deck on the bottom of the tank should the tank become empty.

Still referring to Fig. 1 there will also be seen means for properly centering the floating deck in its rise and fall within the tank. Secured to the feet that are arranged around the under periphery of the floating deck, are the fingers or guides 15 which are pivotally mounted as at 16 on the small bolts 17 on which bolts are positioned the small springs 18, the upper end of the fingers being so fastened to the bolts that the springs will tend to push the lower end of the fingers tightly against the inner surface of the shell or sides of the tank.

Thus these fingers act as a deck guide as the deck rises and falls with the liquid and properly centers the deck in its rising and falling movement, as well as in the stationary position that it occupies between the filling or emptying of the tank.

These fingers, it will be seen, are also always below the surface of the oil so that there will be no friction to cause sparks to ignite the oil or gases that might be in the tank.

It will be seen that these fingers as well as the ladder always properly center the deck in its rising and falling movement.

Special means are provided for discharging the stored liquid from the tank which consists of the pipes 19 and 20 with a swing joint 21 connecting their adjacent ends together while a further swing joint 22 is provided at the other end of the pipe 20 and secured to the outlet discharge 23, and its valve 23'.

Although only two pieces of pipe 19 and 20 are shown it will be understood that a number of sections may make up these two sections 19 and 20.

Now, the upper end of this pipe line is supported by providing a small rail 24 on which is supported the trolley 25 which in turn is fastened to the elbow 26 on the end of the pipe 19. As the deck rises and falls therefore, and the sections of the swinging pipes 19 and 20 fold or open, the trolley will move and thus allow for the changing position of the pipes. In the same manner, the swing joint 21 is provided with a small lug 27 to which in turn is fastened a chain 28, the upper end of the chain being supported by the similar trolley 29 that rides within the rail or housing 30 that is likewise fastened to the under surface of the deck, similar to the housing 24.

With these trolley supports on the under surface of the deck, both the pipe sections and the swing joint are properly supported from the deck and allowance also made for the shifting positions of the pipes.

In dotted lines at the bottom of Fig. 1, there is shown the pipe line discharge in its folded position. Of course the chain 28 does not support the swing joint when the sections are folded, but this dotted line position shows how the deck will be supported when there is no oil in the tank. It will also be understood that after the tank is once placed in operation however, it will be kept full or nearly full at all times.

In Fig. 2, the swinging pipe sections are shown with the chain and trolleys removed so that its structure may be more plainly understood.

Referring now for the moment to Figs. 1 and 5, there is shown an indicator 31 for denoting the height of the liquid within the tank, that is, after the tank is partly full which will be the normal condition.

Glancing therefore more particularly at Fig. 5, there may be seen a skeleton housing consisting of the bolts 32 which are fastened at one end in a casting 33 and in a small plate 34 at their upper end. This casting may be provided with an arched base 35 to be fastened to the cover or dome 3 by rivets or bolts. There is a central opening thru the casting

36 thru which the tell-tale rod 37 may pass while secured to this rod is the disc 38 of any desired color so that it may be plainly read from the ground. The length of the bolts 32 and the rod 37 may be as desired so that the position of the plate 38 within its housing will designate the height of the liquid within the tank.

There is a small foot 39 on the end of the rod 37 which bears against the floating deck 7 after the liquid reaches a certain height, and the foot and its rod 37 of course are actuated by the deck rising within the tank.

In the upper casting or plate 34 I have shown an electric contact so that when the plate 38 is at its upper extreme limit it may ring a bell or light a signal lamp (not shown) so that the proper person may be warned that the tank is filled to its danger limit.

In Fig. 6 there is shown a small float 40 that might be used on the bottom of the tell-tale rod 37 in case a floating deck were not used in the tank.

Even with an indicator I have found it best to also provide an overflow valve as of course the stored liquid in the tank must not go above a certain point or otherwise it would swamp the deck.

In Figs. 3 and 4, therefore, I have shown a detail of a relief valve or overflow valve 41 which will prevent a further rising of the deck as the liquid will raise the small check valve 42 and overflow around the sides thereof.

There is a dome 43 over the check valve, as may be seen, to keep any impurities or water from running into the tank, and, the check valve being normally closed will also prevent any gas from escaping out of the same.

Now, in Figs. 7 and 8, I have shown a small sump or well 44 from which may lead a small pipe (not shown) so that any water or sediment that collects in the bottom of the tank may flow into this small well or sump, and then be drained from the same. The inlet pipe 45 preferably extends into this sump but to avoid agitating the water or sediment in this well when the oil is being pumped into the tank, there is a baffle plate preferably formed of two parts covering a major portion of the well, but small enough in diameter to provide a circular opening all around the outer edge of the baffle plate and the side of the sump for the water and sediment to flow into the sump.

The operation of the various parts of the tank are easily understood.

Oil will be pumped into the inlet pipe 45 to fill the tank, and as the tank fills, the deck will float on the liquid and will always rise and fall with the liquid in the tank. As the deck approaches its upper limit the indicator will function, plainly showing the amount of liquid in the tank. Should the tank become dangerously full the electric alarm will be sounded, as heretofore explained, and the relief valve will overflow if any further oil is pumped into the tank.

As the deck rises and falls it will be always centered by the small fingers and the sections of swinging pipe that form the discharge line will open and close and travel horizontally slightly by the provisions of the trolleys secured to the under surface of the deck.

Any air or gas above the deck and beneath the dome cover may escape or be drawn in thru the tortuous passage in the vent 6 (which vent per se forms the subject matter of a separate application) so that no pressure will build up within the dome of the tank.

It will be understood that the valve 23′ is conventional and any form of cutoff valve and line may be used at this point.

It will also be seen that the weight of these pipes is supported by the floating deck, so that they should give continuous service without any necessity of repairing.

The fire hazard is greatly reduced as the vent is so arranged that it is impossible for a flame to pass down thru the vent to the stored liquid.

The floating deck also prevents or tends to prevent evaporation and by floating on the liquid reduces the chances of combustion as may be well understood.

Many changes might be made in the details of construction and of the several parts without departing from the spirit or scope of the invention.

I am aware that it is old to provide a tank with a floating deck and to provide a form of swinging pipe, and I do not claim my invention as such, but what I do claim and desire to secure by Letters Patent is:

1. A tank for storing oils and other liquids provided with a floating deck, a discharge pipe line having a hinged joint therein and a hinged joint at its lower end where it connects to the side of the tank, means carried on the under surface of the deck for supporting the pipe line as the deck rises and falls within the tank, said means comprising a freely slidable member to support the upper end of the pipe line, and a further freely slidable member connected to the pipe line at the first-mentioned hinged joint.

2. A tank for storing oils and other liquids provided with a floating deck, a discharge pipe line hinged at its lower end to the side of the tank and shiftably secured at its upper end and provided with a swing joint at its central portion, a trolley movable on the under side of the deck and secured to the upper end of the pipe line, a second trolley supporting the pipe line at the swing joint whereby the weight of the pipe line is carried by the floating deck and the upper end of the pipe line may shift slightly with rela-

tion to the floating deck as the same rises and falls within the tank.

3. A tank for storing oils and other liquids provided with a floating deck, a pipe line for the discharge of the liquid, a hinged joint about centrally of the line, tracks on the undersurface of said deck and trolleys on said tracks, one supporting the pipe line at its upper end, and the other supporting the pipe line at the hinged joint, whereby the line may shift horizontally as well as be movable vertically when the deck rises and falls within the tank.

In testimony whereof I affix my signature.

JOHN F. PATTERSON.