BEST AVAILABLE COPY

April 27, 1926. 1,582,855

W. J. PETER

HYDRAULIC SYSTEM FOR STORING, HANDLING, AND DELIVERING OIL

Filed March 27, 1925 3 Sheets-Sheet 1

Fig. 1.

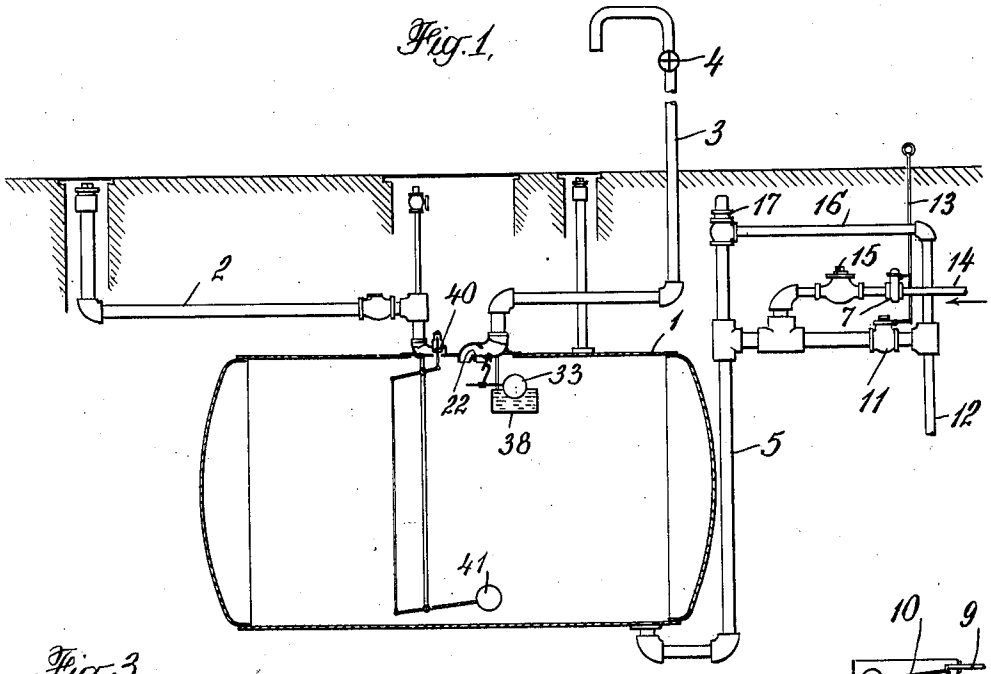


Fig. 3.

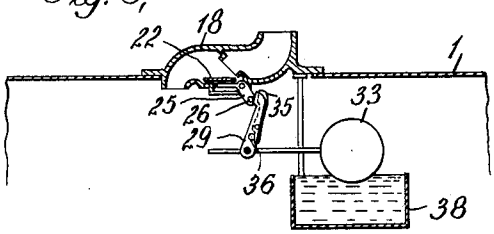


Fig. 2

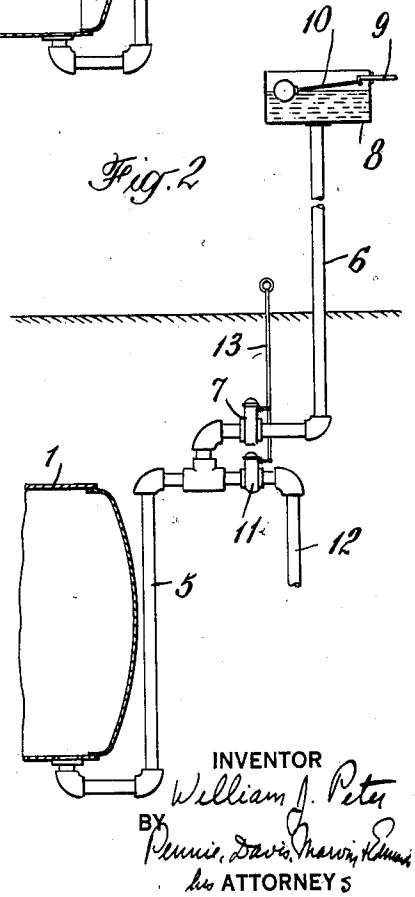


Fig. 4.

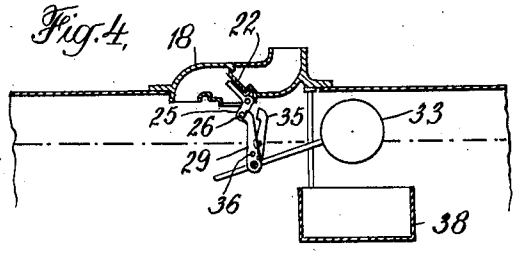
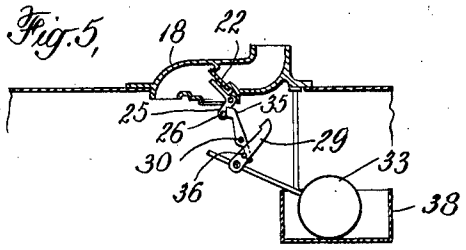


Fig. 5.



INVENTOR
William J. Peter
BY
Dennis, Davis, Marvin & Edmunds
his ATTORNEYS

April 27, 1926. 1,582,855

W. J. PETER

HYDRAULIC SYSTEM FOR STORING, HANDLING, AND DELIVERING OIL

Filed March 27, 1925 3 Sheets-Sheet 2

Fig. 6,

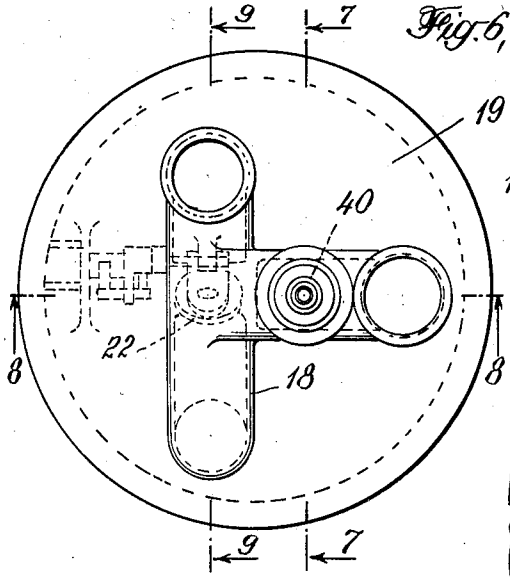


Fig. 7,

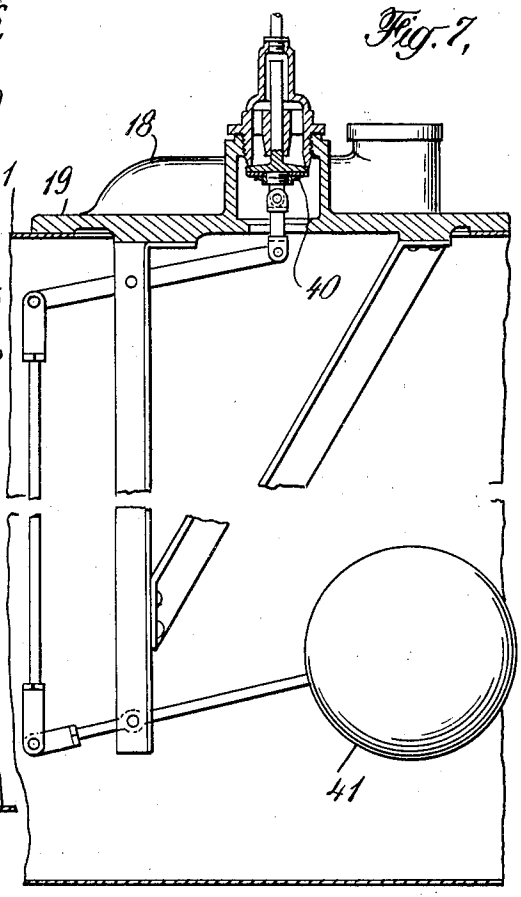


Fig. 8,

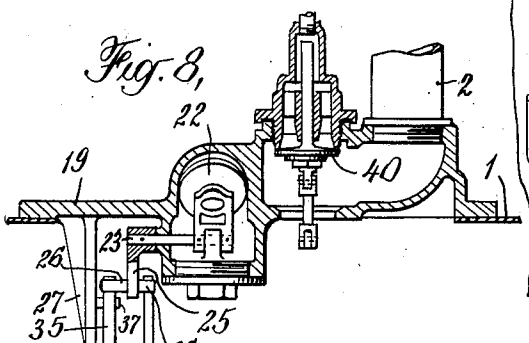
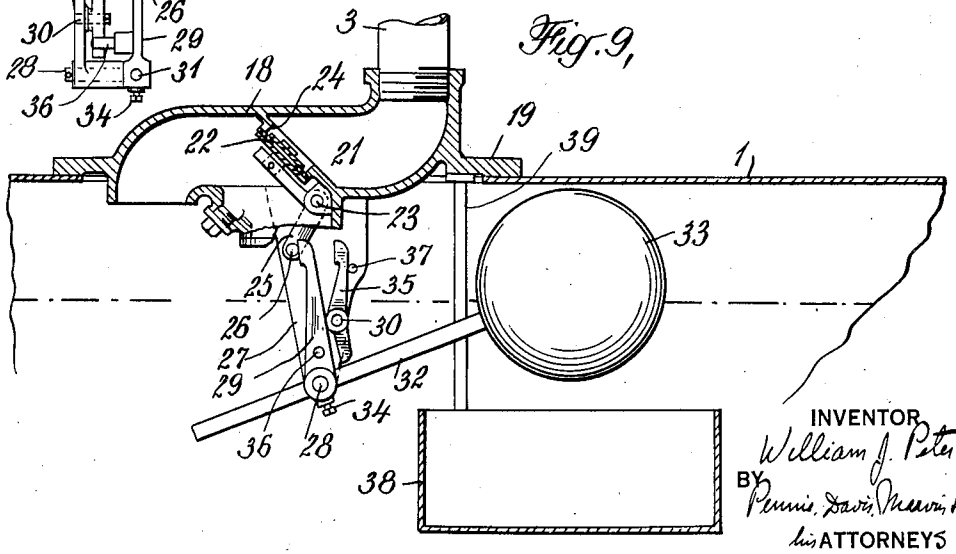


Fig. 9,



INVENTOR
William J. Peter
BY
Pennie, Davis, Marvin & Edmonds
his ATTORNEYS

April 27, 1926. 1,582,855

W. J. PETER

HYDRAULIC SYSTEM FOR STORING, HANDLING, AND DELIVERING OIL

Filed March 27, 1925 3 Sheets-Sheet 3

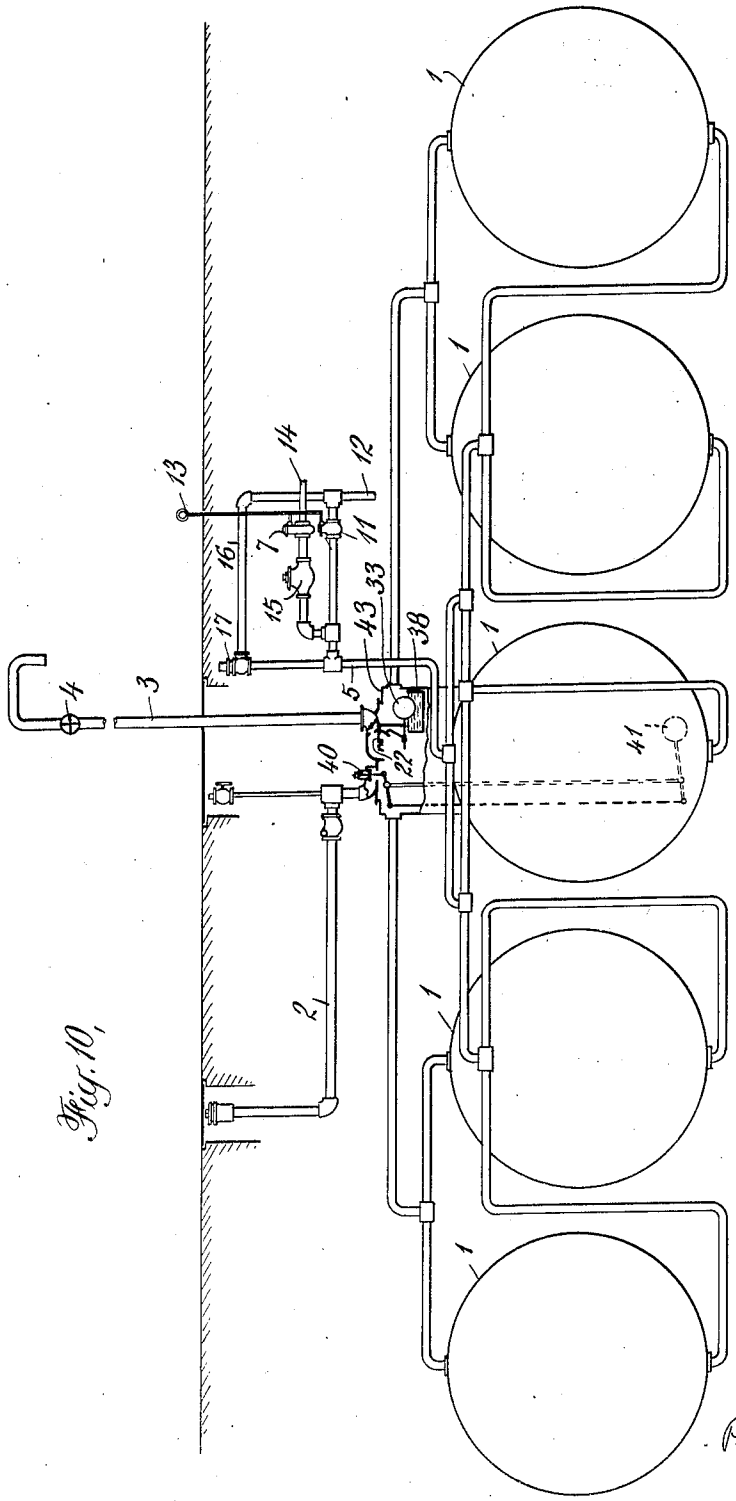


Fig. 10.

INVENTOR
William J. Peter
BY
Pennie, Davis, Marvin & Edmonds
his ATTORNEYS

Patented Apr. 27, 1926. 1,582,855

UNITED STATES PATENT OFFICE.

WILLIAM J. PETER, OF NEW YORK, N. Y.

HYDRAULIC SYSTEM FOR STORING, HANDLING, AND DELIVERING OIL.

Application filed March 27, 1925. Serial No. 18,782.

To all whom it may concern:

Be it known that I, WILLIAM J. PETER, a citizen of the United States, residing at New York city, in the county of Bronx, State of New York, have invented certain new and useful Improvements in Hydraulic Systems for Storing, Handling, and Delivering Oil; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to hydraulic systems for storing, handling and delivering oil, and more particularly to means for preventing the delivery of water with the oil.

In hydraulic systems for storing, handling and delivering oil, the storage tank is alway filled with liquid, oil and water, the oil overlying the water. In dispensing, the oil is forced out through a pipe in the top of the tank by forcing water in through the bottom. There is danger that when the tank is emptied of oil, water will be forced out of the oil delivery pipe, and some means should be provided for automatically closing the oil delivery pipe before water can pass through it. It has been proposed to place an automatically operated float-valve in the oil delivery pipe, the float sinking in oil but floating in water. Such an arrangement is unsatisfactory however for two reasons. First, the normal flow of the oil is likely to carry the float with it and repeatedly close and open the valve, thus causing a pulsating discharge and second, the float may spring a leak and thus fail to act.

It is an object of the present invention to provide an improved float-valve mechanism for automatically shutting off the delivery pipe before water can enter it, the float valve mechanism being so constructed and designed that the normal passage of liquid through the delivery pipe will not act on the valve, so that when closing starts the action will be quick and positive and so that if the float should leak and become inoperative, the valve will be automatically closed, and thus indicate the nature of the trouble. I attain this object by placing the float which operates the valve to one side of the oil discharge passage and employ a valve of the butterfly type which normally lies along one side of the discharge passage and is swung outwardly across it when closed. The float normally floats upon the surface of a small body of water carried in a small receptacle and the valve is open. This is the condition a long as there is oil in the tank and the float is in working order. As soon, however, as the water level in the tank reaches the float, the float rises from its small bath and automatically swings the delivery valve shut. On the other hand, should the float spring a leak at any time it will fill with water and sink to the bottom of its small bath and by this movement also automatically close the valve.

In my co-pending application, Serial No. 18,783, filed concurrently herewith, I have illustrated and described an automatically operated intake control valve. As a further improvement of the present invention I preferably mount this intake valve and the delivery control valve of the present application, together with the two floats and the small water bath receptacle for the delivery valve float upon a single man-hole cover designed to fit within a standard man-hole. All of the valve mechanisms are thus grouped together, can be readily installed, and readily removed for inspection or repair.

In order that the invention may be more clearly understood, I have illustrated certain preferred embodiments of it in the accompanying drawings in which Figure 1 is a diagrammatic elevation partly in section of a hydraulic system equipped with the novel features of the present invention. Figure 2 is a fragmentary view of one end of an oil storage tank showing the use of a water riser and float box designed to furnish the necessary delivery pressure. Figures 3, 4 and 5 are diagrammatic views showing the three positions of my automatic delivery control valve. Figure 6 is a plan view of the man-hole cover on which the automatic discharge valve of the present invention is mounted. Figure 7 is a vertical section taken along line 7—7 of Figure 6. Figure 8 is a vertical section taken along line 8—8 of Figure 6. Figure 9 is a vertical section taken along line 9—9 of Figure 6 showing the automatic delivery valve mechanism in detail. Figure 10 shows the control system applied to a battery of tanks.

As illustrated in Figure 1, the storage tank is indicated by reference numeral 1. This is the ordinary cylindrical storage tank

used in most systems and is commonly placed within an excavation with its longitudinal axis horizontal. The oil is introduced through a pipe 2 and discharged through a riser 3 having a manually operated valve 4, both pipes entering the top of the tank, as indicated. The water is introduced and discharged through a pipe 5 which enters the tank at the bottom. In the system illustrated in Figure 2, the water pressure is obtained by maintaining a constant head in the riser 6 which is connected with the pipe 5 through a valve 7. The upper end of the riser terminates in a float box 8 into which water is fed from any convenient source, such as the city water mains, by a feeder 9, the level of the float box being automatically maintained constant by means of a float valve 10. The pipe 5 also connects with the drain 12 through a valve 11. Valves 7 and 11 are preferably operated simultaneously by means of a valve stem 13 and the connections are so designed that when valve 7 is opened, valve 11 is closed and vice-versa. The head of water in the riser 6 and float box 8 is designed to force oil out of the delivery end of the oil riser 3, and in the normal operation of delivering oil, the valve 7 is opened and the valve 11 closed. The foregoing constitutes what is commonly known as the constant head hydraulic system.

In Figure 1, the riser 6 and the float box of the constant head system have been eliminated, and pressure is obtained from any convenient water supply having the requisite pressure. I prefer to take water directly from the city water mains through a pipe 14. The pressure required, of course, depends upon the height of the oil discharged above the tank. When this distance is about 15 ft., an average distance, the hydraulic pressure required is from 12½ to 13 pounds. Now, the usual pressure found in city water mains is more than this and I therefore place within the pipe 14 an adjustable pressure regulating valve 15 which is set to the desired pressure. The system is also provided with two simultaneously operated valves 7 and 11, the former controlling the flow of water in the pipe 14 and the other controlling communication between the pipe 5 and the drain 12, these valves operating in the same manner and performing the same functions as when used in connection with the constant head system illustrated in Figure 2. When, preparatory to delivering oil from the riser 3 the valve 7 is opened while the valve 4 is still closed, the sudden inrush of water builds up a back pressure within the tank due to the inertia of the liquid in the tank which is very objectionable. In order to avoid this I have provided a by-pass 16 extending from the pipe 5 to the drain 12 and equipped with a hydraulic relief valve 17 which is set to open at a pressure about 10% higher than that of the valve 15. This valve 17 operates to relieve the back pressure set up by the sudden surge of water and enables the entire system to come to equilibrium almost immediately with only a very little waste of water. As soon as the equilibrium is established the valve 17 closes.

I shall now describe in detail the construction and operation of the automatic valve which prevents the discharge of water into the oil riser 3 when the tank has been emptied of oil, with particular reference to Figures 6, 8 and 9. The oil riser 3 enters the tank through a valve housing 18 which is mounted upon and forms an integral part of a man-hole cover 19 adapted to fit the standard man-hole of oil tanks of this type. This housing is provided with a horizontal passageway 21 along the bottom of which the valve 22 is pivotally mounted upon a pin 23. When in open position this valve 22 lies horizontally along the bottom of the passageway 21 out of the path of flow, and when closed it is swung upwardly against a diagonally disposed seat 24 which extends across the passageway 21. The valve 22 is swung into closed position by means of an arm 25 secured to one end of the pin 23 and provided at its lower end with a pin 26 which extends on either side of the arm. The manner in which the valve is swung by means of this arm 25 will now be described.

Depending from the man-hole cover 19 is a bracket 27 at the lower end of which is journalled a pin 28 on a lever 29. This lever 29 is provided at its lower end with an aperture 31 through which the stem 32 of a float 33 is passed and adjustably held by means of a setscrew 34, the arrangement of the parts being such that the lever 29 and the float 33 are pivotally mounted as a unit on the lower end of the bracket 27. The upper end of the lever 29 is adapted to engage one end of the pin 26 so that upward movement of the float 33 will cause the lever 29 to strike pin 26 and close the valve.

Pivotally mounted at 30 upon the inner face of bracket 27 is a second lever 35 the upper end of which is designed to contact with one end of pin 26, and the lower end with a pin 36 on the lever 29 so that when the float 33 moves downward, the pin 36, acting through the lever 35, acts to close the valve. A stop 37 on the bracket 27 limits the outward movement of the lever 35. A small receptacle 38 depends from the man-hole cover 19 and is supported through bars 39. This receptacle is designed always to be filled with water in which the float 33 floats. This float is of such specific gravity that it floats in water but not in oil.

I shall now describe the operation of the valve, with particular reference to Figures

3, 4 and 5. Figure 3 represents the normal position of the float and valve when the oil and water level is below the float and the tank is being used to deliver oil. In this position the valve 22 is open and there is an unobstructed passage for the oil from the tank to the oil riser 3. When the oil and water level reaches the float, the float is lifted from the receptacle 28 and attains the position shown in Figure 4. This upward swinging movement causes the lever 29 to act upon the pin 26 to close the valve. After the valve is partly closed by this action, the out-rush of the oil acts to force the valve upon its seat quickly and positively. Delivery is thus cut off and the operator is notified that the tank has been emptied of oil and needs refilling. When the tank is refilled and the water level drops below the float, the valve due to the fact that the seat is inclined toward it, drops by gravity into open position. So much for the normal functioning of the valve. The automatic closing of the valve before water has had an opportunity to enter the riser 3, depends entirely upon the action of the float in rising when the oil and water level has reached it. Should the float have sprung a leak, it would not rise, and hence water would in time be forced out through the riser, were not other means provided for meeting this emergency. With the mechanism of the present invention, a leak in the float will cause it to sink within the receptacle 38 and assume the position shown in Figure 5. This downward swinging movement causes the pin 36 to engage the lower end of lever 35 and close the valve.

In Figure 7 I have illustrated the automatic intake control valve 40 and its operating float 41 described and claimed in my co-pending application, Serial No. 18,783. This valve and its associated mechanism, as well as the valve, float, etc., of the present application are all mounted upon and form a part of the single man-hole cover 19 and can thus be readily installed, inspected and removed.

My automatic valves and my means for obtaining pressure have been illustrated and described above in connection with a single tank. They are equally well adapted for use in connection with a battery of tanks in which case the oil and water pipes pass to the several tanks through a series of headers which equalize the flow resistances. A single set of control valves mounted on a central tank and a single pressure control can be utilized for the whole battery. Such an arrangement is shown diagrammatically in Figure 10. Five tanks are illustrated, the middle one being provided with an auxiliary turret 43 in which the intake and discharge control valves are located. The operation of this battery is the same as that of the individual tank already described and need not be repeated.

I claim:

1. In a hydraulic oil storage and delivery system, the combination of a tank, an oil discharge pipe near the top of the tank, means for forcing water into the tank to force the oil out, a valve pivoted at the side of the oil discharge pipe normally lying out of the path of flow and means unaffected by the passage of oil through the pipe for automatically swinging the valve into the path of flow when the water level has reached a predetermined point so that the flow of oil quickly and positively closes the valve and shuts off the flow.

2. In a hydraulic oil storage and delivery system, the combination of a tank, an oil discharge pipe near the top of the tank, means for forcing water into the tank to force the oil out, a valve in the oil discharge pipe, means for automatically closing the valve when the water level reaches a predetermined point, and other means for automatically closing the valve upon failure of the first closing means to act.

3. In a hydraulic oil storage and delivery system, the combination of a tank, an oil discharge pipe near the top of the tank, means for forcing water into the tank to force the oil out, a valve in the oil discharge pipe, a float designed to rise when the water level reaches it and close the valve, and means operated by the float to close the valve should the float spring a leak and sink.

4. In a hydraulic oil storage and delivery system, the combination of a tank, an oil discharge pipe near the top of the tank, means for forcing water into the tank to force the oil out, a valve in the oil discharge pipe, a float designed to rise when the water level reaches it and close the valve, a receptacle for water in which the float normally rests, and means operated by the float to close the valve should the float spring a leak and sink in the water receptacle.

5. Discharge control valve mechanism for oil tanks comprising the combination of a valve, a float, means operated by the float for closing the valve as the float rises, and other means operated by the float for closing the valve as the float sinks.

6. Discharge control valve mechanism for oil tanks comprising the combination of a housing, a valve pivotally mounted therein, an arm connected with the valve for swinging it into closing position, a float, a lever movable with the float contacting with the arm to swing the valve into closing position as the float rises, and a second lever operable by the float contacting with the arm to swing the valve into closing position as the float sinks.

7. Discharge control valve mechanism for oil tanks comprising the combination of a

horizontal housing, a valve pivotally mounted at the bottom thereof, a seat extending across the housing and inclined toward the valve a float, means connected with the float for swinging the valve toward the seat as the float rises, the valve being free to fall into open position as the float resumes its original position.

8. In a hydraulic oil storage and delivery system, the combination of a plurality of tanks, oil intake pipes connecting the tops of all of the tanks, oil delivery pipes connecting the tops of all of the tanks, water inlet and discharge pipes connecting the bottom of all the tanks, an oil intake valve common to all the tanks, an oil discharge valve common to all the tanks, and means for forcing water into the tanks common to them all.

9. In a hydraulic oil storage and delivery system, the combination of a tank having a man-hole in its top, a man-hole cover, a valve housing integral with the cover, a control valve in the housing and a float depending from the cover and supported thereby for operating the valve when the oil and water level in the tank reaches a predetermined level, the cover, housing, valve and float constituting a single unit having no other connections with the tank than the usual connections of a man-hole cover.

10. In a hydraulic oil storage and delivery system, the combination of a tank having a man-hole in the top, a man-hole cover, a valve controlling the inlet of oil into the tank, a valve controlling the discharge of oil from the tank, housings for said valves carried by the cover, floats depending from the cover and supported thereby for operating the valves when the oil and water level in the tank reaches certain predetermined levels, the cover, housings, valves and floats constituting a single unit having no other connections with the tank than the usual connections of a man-hole cover.

In testimony whereof I affix my signature.

WILLIAM J. PETER.