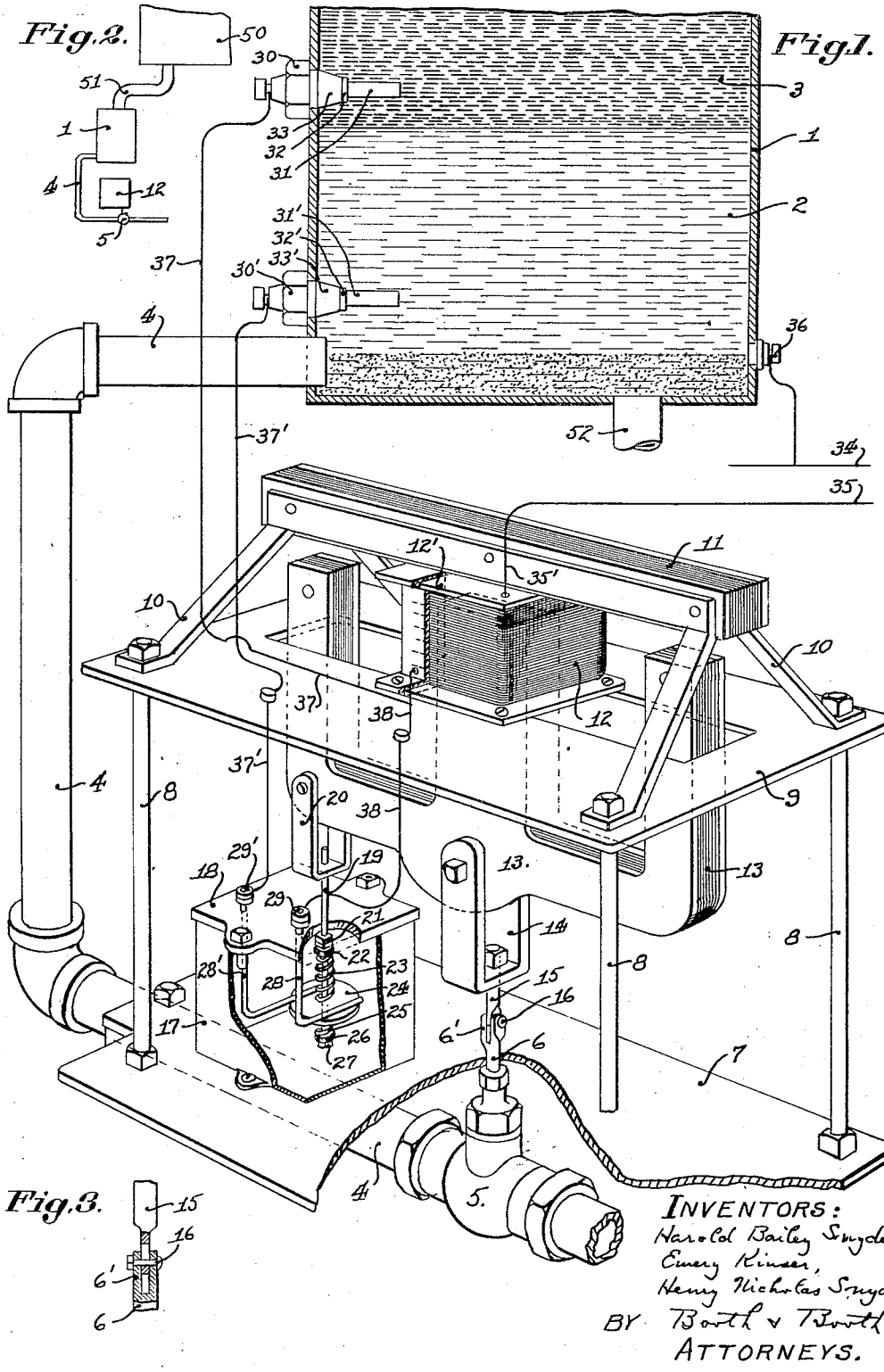
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AUTOMATIC BLEEDER VALVE FOR OIL TANKS

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AUTOMATIC BLEEDER VALVE FOR OIL TANKS.

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Our invention relates to means for withdrawing the settled water and emulsion from oil storage tanks, such withdrawal being commonly known in the art as "bleeding."

The object of our invention is to automatically bleed the tank without the attendance of a pumper of gauger; and to this end our invention consists in the novel bleeder valve which we shall hereinafter fully describe. Briefly stated, our device comprises, in its preferred form, an auxiliary tank placed below the level of the main tank, and communicating therewith through a bleeder line, which permits the water and emulsion to gradually settle out from the main tank into the auxiliary tank; an outlet pipe from the auxiliary tank; a valve controlling said outlet pipe; and electrically operated means for opening and closing said valve, automatically dependent upon the level of the settled content of said auxiliary tank. However, the auxiliary tank may be dispensed with, the valve being operated, electrically, directly by the level of the water and emulsion in the main storage tank.

In the accompanying drawings, to which reference is made, we show a preferred form of our bleeder valve, it being understood that changes in form, structure and arrangement may be made without departing from the spirit of the invention as defined by the claims hereunto appended.

In the drawings, Fig. 1 is a perspective view of our device, parts being in section and other parts broken away.

Fig. 2 is a diagrammatic view showing the positional relation of the several parts.

Fig. 3 is a detail view showing the slotted connection of the rod 15 with the stem 6 of the valve 5.

1 is a galvanized iron tank, which from its function relatively to the main oil-storage tank, may be termed a settling or auxiliary tank. We have in Fig. 2 shown at 50 the main oil tank only diagrammatically as it forms no part of our device. It will be sufficient to say that the auxiliary tank 1 is set at a lower level than the main oil tank and communicates therewith through a bleeder line 51, so that the water and emulsion gradually settle out from the main tank into the auxiliary tank. This settling, because it forms part of the automatic operation of the device, we have illustrated in Fig. 1 by the numeral 2 which is the settled water and the numeral 3 which is the settled emulsion.

The capacity of the tank 1 we may say for illustration is about 50 gallons. From one side of the auxiliary tank 1, say about two inches from the bottom, issues the outlet pipe 4, which is controlled by a valve 5, of any suitable kind, said valve being opened and closed by the reciprocative movement of the stem 6. A drain connection to be manually operated is indicated at 52 to remove any sediment. 7 is the support base, 8 the column rods, and 9 the upper plate, comprising the general frame for carrying the solenoid and oil contactor switch. 10 are brackets rising from the upper frame-plate 9, and carrying a magnet bar 11. The magnet coil 12, attached to said bar 11, has a brass shell on which the coil is wound, said shell being opened at 12′ in order to do away with secondary current which would heat up and burn out the coil. 13 is the movable magnet armature or core, carrying a clevis 14 from which depends a rod 15 the foot of which is slotted and is seated slidably in the forked upper end 6′ of the valve stem 6, upon a cross pin 16. See Fig. 3.

Thus when the core 13 is pulled up the valve 5 is opened and the water and emulsion pass out from the auxiliary tank 1, through the outlet pipe 4.

17 is a galvanized container of an oil contactor switch, carried by the support base 7. This container or switch box has a fiber top 18 and through said top a rod 19 passes down into the box. The upper end of the rod is fitted to a clevis 20 carried by the magnet core 13. Within the box the rod 19 near the top of the box carries a nut 21 which holds in place a fiber bushing 22 which in turn holds the spring 23 in place. There must be enough clearance between the nut 21 and the box lid to allow the rod to move with the magnet core. At the bottom of the spring 23 is a copper contact disc 24 which is supported by the back pressure spring 25 held in place by the fiber bushing 26 and nut 27. The contactor feet 28 and 28′ pass through the fiber top 18 of the switch box 17 and carry the respective contact nuts 29 and 29′. The box 17 is filled with oil (not shown) in order to do away

with any contact arcing between the feet 28 and 28′ and the contactor disc or plate 24.

Fitted to the auxiliary tank 1 are two electrodes. One is about, say 6 inches from the top of the tank and the other say about 4 inches from the bottom of the tank. These electrodes may be of any suitable construction, a preferable form being as follows. Referring first to the upper electrode, 30 indicates the shell and nut of a high tension electrode fitted into the tank wall, and carrying a lead contact 31 on its inner end, said contact being provided with a shoulder 32 and preferably held in place by litharge in a glass bushing or tube 33. This insulates the tank, and the shell of the electrode from the lead contact 31, causing the current to pass from the lead contact through the water to the tank or ground. The lower electrode is like the upper electrode, its corresponding parts being designated respectively by the numerals 30′, 31′, 32′ and 33′.

The electrical connections are as follows:—34 and 35 are two leads of a suitable current supply line or circuit, preferably the usual 110 volt A. C. lighting circuit, 34 being the neutral or grounded wire and 35 the hot wire. The neutral wire 34 is connected to the tank or ground at any point, as at 36, the use of the neutral being necessary as it is grounded at the transformer. If the condition were reversed a fuse would blow, since there would be direct ground through the circuit when completed. The hot wire 35 is connected directly to the coil 12 by the wire 35′. The upper electrode 31 is connected through the lead 37 to a wire 38 which is common to the opposite end of the coil 12 and to the nut 29 of the switch contact foot 28. The lower electrode 31′ is connected directly by the lead 37′ to the contact nut 29′ of the other foot 28′ of said switch.

When the water 2 and the emulsion 3 replace the oil in the auxiliary tank 1 and raise the oil above the upper electrode 31 the water acts as a conductor as follows. Current passes from the line wire 35 through the coil 12 to lead 37. It does not pass through the oil contactor switch on the instant, as the solenoid magnet core 13 is not held up by the magnet coil 12. The current passes through lead 37 to the upper electrode 31 and through the water 2 to the tank 1 and the neutral wire 34. The tank ground connection 36 may be omitted if said tank is otherwise sufficiently grounded, and if the neutral line wire 34 is likewise grounded at the transformer (not shown), as is usual. When this electrical action occurs, the coil 12 is energized and sets up a magnetic flux which magnetizes the bar 11 and draws the magnet core 13 up. This movement of the core, acting through the rod 15 and the valve stem 6, opens the valve 5 in the outlet pipe 4. The slotted connection between the rod 15 and the stem 6 permits the magnet to overcome the starting torque caused by inertia and allows the core to pull in a short distance before the rod 15 begins to lift the valve stem 6, which it does with a jerk, thereby breaking the valve loose suddenly from the pressure of the liquid back of it. The valve 5 being opened, the contents of the tank 1 begins to drain.

The closing of the contactor switch is practically simultaneous with the above action. The magnet core 13 pulls up the rod 19, which raises the copper disc 24, the latter being balanced by the springs 23 and 25. This completes the circuit between the two feet 28 and 28′, through the disc 24. The current then passes from the hot wire 35 through the coil 12 to wire 38, switch contact foot 28, contact disc 24, contact foot 28′, wire 37′, lower electrode 31′, water 2, and contact at 36 or ground to neutral wire 34. This action throws th, two circuits in parallel for an instant only unless the water is coming in as fast as it is being bled out, which is a rare condition, and would only occur on some flow tank that was connected to a well making more water than oil. Under normal conditions, the top electrode is out of the circuit, due to the lowering water level, within a fraction of a second after completing the circuit of the bottom electrode through the solenoid and the oil contactor switch.

The circuit, being completed through the bottom electrode and the switch, then remains closed until the water and emulsion pass below the level of the bottom electrode, when said circuit is opened by the oil within the tank 1. The magnet core 13 then drops, closing the valve 5 and opening the contactor switch, and the parts are again in their original positions, remaining so until the level of the water and emulsion in the tank 1 again rises to the upper electrode 31.

It will be apparent to those skilled in the art that the bleeder pipe 4 may lead directly from the lower portion of the main oil storage tank 50 instead of from an auxiliary settling tank 1 as described above, and in this case the electrodes 31 and 31′ would be inserted through the wall of said main storage tank 50. The action of the valve 5 and its control, through the instrumentality of the described electrical circuits, would be identical with that described above. It is preferable, however, to use the auxiliary tank 1, partly for the reason that, on account of its smaller size, there is a greater variation in the level of the water and emulsion in it than would occur in the larger main tank, but principally because by the

use of such an auxiliary tank, containing a relatively small amount of oil, the danger of fire resulting from accidental sparking at any of the electrical contacts or connections is greatly reduced.

It is to be observed that, whether the auxiliary settling tank 1 be used or not, the action of the bleeder valve 5 is automatically dependent upon the level of the water and emulsion in the tank equipped with the electrodes 31 and 31'. Moreover, our device is obviously applicable to tanks containing any two liquids of different specific gravity and of different electrical conductivity, and as such constitutes a device for automatically removing one such liquid from the tank, or it may be used with equal facility to control the discharge from a tank containing only a single liquid, the function of the other liquid, in so far as the control of the electrical circuits is concerned, being performed by air or some other gas having a different electrical conductivity from that of the liquid.

We claim:—

1. In combination with a tank adapted to contain a liquid and provided with an outlet; a valve for controlling said outlet; electrical means for operating said valve; an electrode within said tank and normally out of contact with the liquid therein; an electrical circuit including said valve operating means, said electrode, the liquid within said tank, and a source of electrical energy, said circuit being closed by the rise of the liquid into contact with said electrode; and a holding circuit for maintaining the flow of electrical energy through said valve operating means when the first mentioned circuit is opened by the falling level of the liquid

2. In combination with a tank adapted to contain a liquid and provided with an outlet; a valve for controlling said outlet; an electromagnet for operating said valve; a pair of electrodes positioned at different levels within said tank; an electrical circuit including said magnet, the uppermost of said electrodes, the liquid within the tank, and a source of electrical energy for energizing said magnet to open said valve; a second circuit including said magnet, the lowermost of said electrodes, the liquid within the tank, and said source of electrical energy; and a switch operated by said magnet for holding the second circuit closed after the first circuit is opened by the fall of the liquid within said tank.

In testimony whereof we have signed our names to this specification.

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