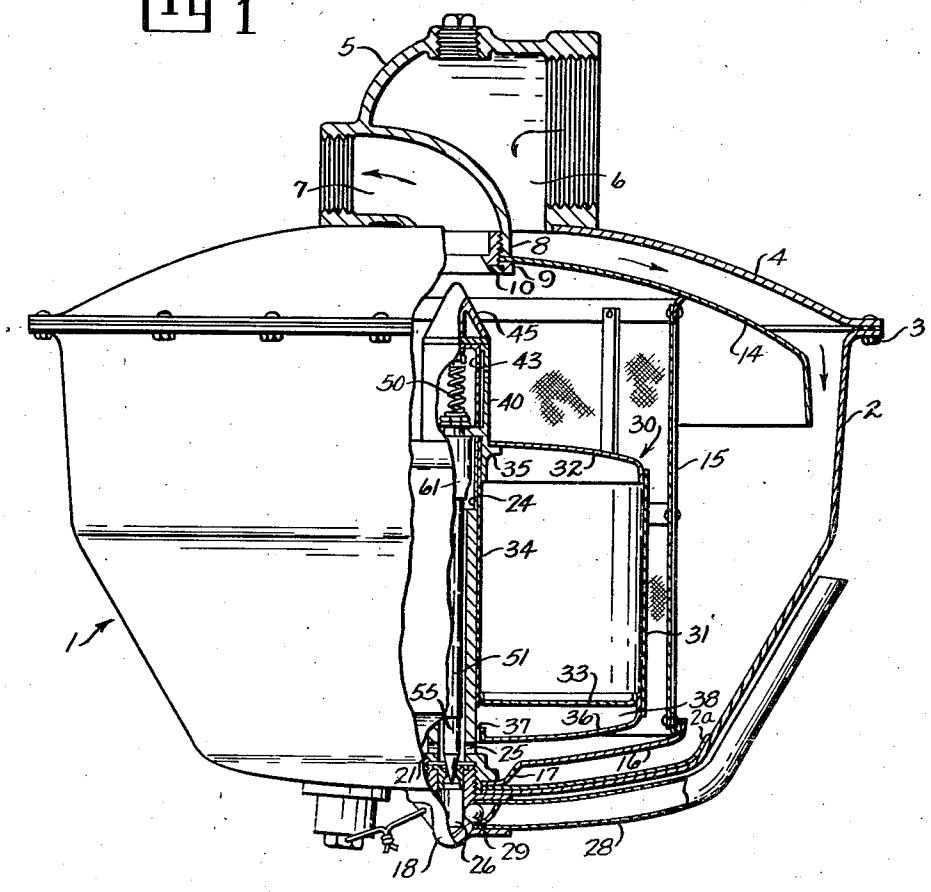
Feb. 23, 1943. D. SAMIRAN 2,311,697

FLUID SEGREGATING APPARATUS

Filed Aug. 31, 1938 3 Sheets-Sheet 1

Fig 1



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FLUID SEGREGATING APPARATUS

Filed Aug. 31, 1938 3 Sheets-Sheet 2

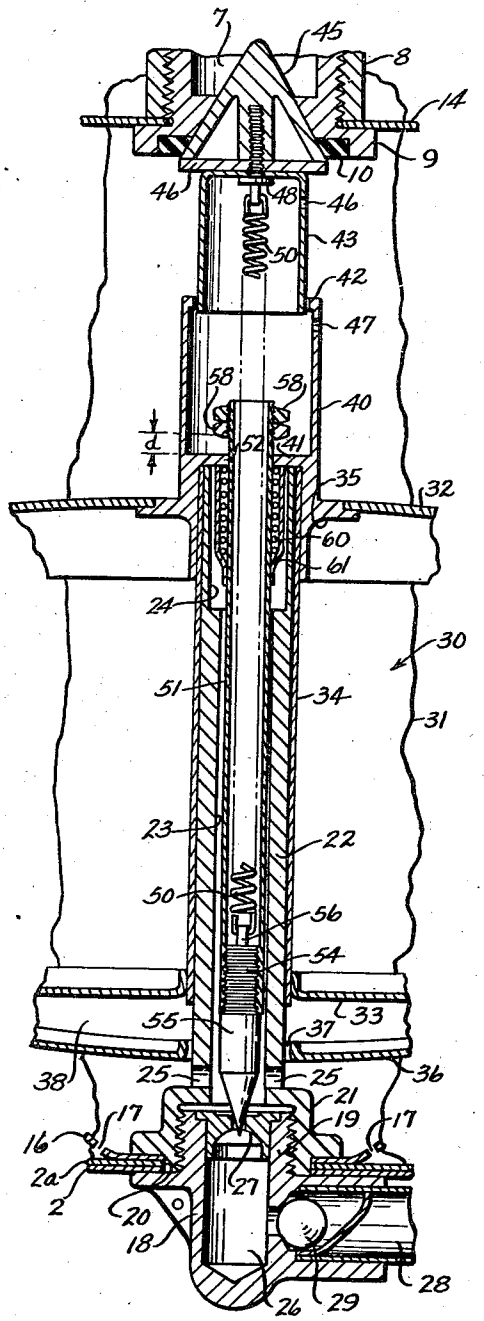

Fig 2

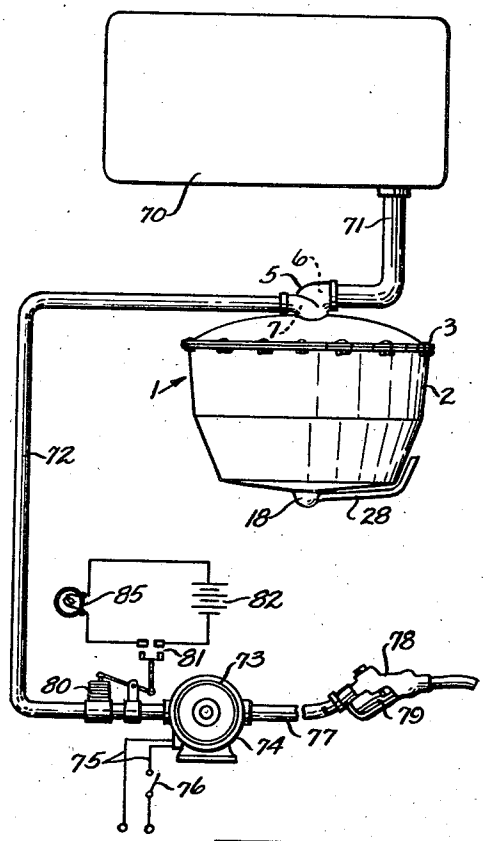

Fig 3

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FLUID SEGREGATING APPARATUS

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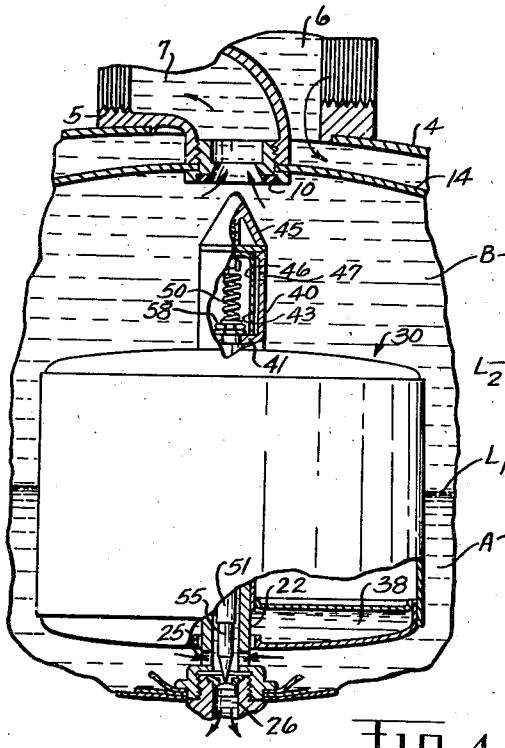

Fig 4

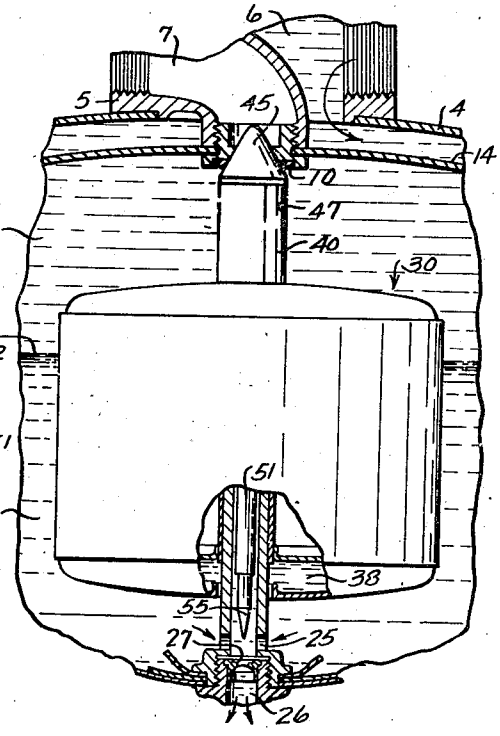

Fig 5

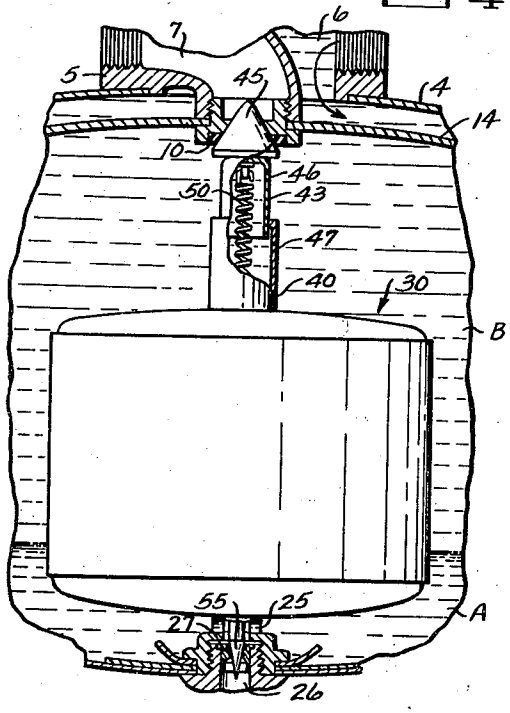

Fig 6

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Patented Feb. 23, 1943 2,311,697

UNITED STATES PATENT OFFICE

2,311,697

FLUID SEGREGATING APPARATUS

David Samiran, Dayton, Ohio

Application August 31, 1938, Serial No. 227,651

5 Claims. (Cl. 210—54)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates to improvements in fluid segregators for separating a mixture of non-miscible fluids of different specific gravities into the individual components, such as separating water from a mixture of gasoline and water.

The present invention is particularly applicable to segregators such as shown and described in my prior U. S. Patent 1,948,543, which are widely employed in aircraft fuel dispensing systems. Devices of the class disclosed in this patent substantially all broadly comprise a casing having an inlet passage through which the mixed fluid enters, an upper outlet passage from which the separated gasoline is taken, and a lower outlet passage from which the separated water drains, together with a float which carries two valves, one for closing the lower or water outlet when most of the water has drained out and the float has settled, and the other for closing the upper gasoline outlet temporarily by rise of the float when the water accumulates faster than it can escape from the drain. In the device disclosed in my prior patent, and in similar devices of which I am aware, the valves were not capable of relative motion with respect to each other, so that, when the valve controlling the outlet passage for the gasoline became seated and was held seated by the suction in the gasoline outlet passage, the outlet valve for the discharge of the separated water was necessarily open and the valves would remain in this position so long as the suction existing in the gasoline outlet passage remained unbroken. This suction could, of course, be broken by stopping the pump or other suction creating means, whereupon the upper outlet passage could, in a given time, be vented by leakage backwardly through the pump or other suction creating means, and the upper valve thus be released. It was essential, however, that the suction be completely broken and the upper valve be thereby released before all of the water escaped, for otherwise the gasoline would flow out through the water drain. It thus became necessary to restrict the size of the valve port controlling discharge of the water so that the discharge of gasoline through the water discharge passage would be unlikely before the venting of the suction in the gasoline outlet passage could be accomplished. The ability of such a segregator for handling a given volume of water was thus intimately connected with the physical dimensions of the segregator so that in cases where large volumes of water would pass into the segregator with the gasoline a very large segregator had to be employed if loss of gasoline through the water drain was to be prevented.

The present invention overcomes the above noted difficulty by providing lost motion connections in the operating mechanism for the valves, respectively controlling the outlets for the segregated gasoline and water. The lost motion connections are so arranged that the float when rising, due to increase in water level in the segregator casing, can rise a predetermined amount before opening the water drain valve, but the float when rising will positively move the gasoline outlet valve in the seating direction, so that upon upward movement of the float beyond a predetermined position, the valve controlling the gasoline outlet passage will seat and thereafter remain seated until the suction created in the gasoline outlet passage by the dispensing pump is broken. While the gasoline outlet passage valve is seated the lost motion in the operating means therefor allows the float to return to its lowest position as the water level in the segregator drops, thus closing the water discharge valve before all of the water in the segregator is discharged. Means are also provided for transmitting a restoring force, due to the weight of the float, to the gasoline outlet valve so that, when the pressure difference acting thereon is sufficiently decreased, the said valve will immediately open. A manual or a float actuated switch may be employed to stop the dispensing pump driving motor so that the vacuum in the gasoline outlet passage of the segregator will be broken and as soon thereafter as the surplus accumulated water in the segregator is discharged the pump driving motor can be manually or automatically started for further operation.

By means of the improvements in accordance with the invention the water handling capacity of a given segregator has been more than trebled and the interruptions in fuel delivery due to excessive quantities of water have been reduced to a minimum.

The primary object of the invention is the provision, in a segregating device of the character described having float actuated valves respectively operative to control the discharge of the lighter and heavier fluids therefrom, of lost motion means in the valve operating mechanisms whereby the float may rise a predetermined amount due to increase in level of the water or

other heavier fluid before opening the discharge valve for the heavier fluid and upon a predetermined further increase in rise of the float to close the valve controlling the discharge of the lighter fluid, the lost motion connection in the operating mechanism for the last named valve permitting the float to return to its initial position and thereby close the heavier fluid discharge valve even though the lighter fluid outlet valve is held seated due to difference in the pressures acting on opposite sides thereof, and of means interconnecting the float and lighter fluid outlet valve whereby the weight of the float and connected ports is transmitted to the lighter fluid outlet valve to open the same upon decrease in the said pressure difference.

Another object of the invention is the provision, in a segregating device of the character described, having an upper outlet passage for the fluid of lesser density and a lower discharge passage for draining the fluid of greater density, said passages terminating within the segregator in axially aligned valve ports, of upper and lower valves respectively operative to control fluid flow through the ports, a float guided for vertical movement for actuating said valves, and a lost motion actuating connection between the upper valve and the float whereby the float may return to its lowermost position to close the lower valve independent of the fact that the upper valve is retained in a seated position.

Other objects of the invention will appear by reference to the detailed description of the invention hereinafter given, taken in conjunction with the appended drawings, in which:

Fig. 1 is a front elevation view partly in section illustrating the invention;

Fig. 2 is a view illustrating to an enlarged scale the valve and float arrangement of the device of Fig. 1;

Fig. 3 illustrates the arrangement of the segregator in a motor driven fuel dispensing system;

Fig. 4 is an elevational view partly in section illustrating the opening of the lower valve by the float;

Fig. 5 is a view similar to Fig. 4 illustrating the seating of the upper valve by the float;

Fig. 6 is a view similar to Fig. 2 showing the float and lower valve returned to the initial position with the upper valve in the seated position.

Referring now to Fig. 1, the segregator, constructed in accordance with the invention, is generally indicated by the reference numeral 1 and includes a deep bowl-shaped metal housing or casing 2 reinforced in the bottom by a plate 2a, and having an annular peripheral flange 3 which serves as a gasket seat to sealingly support a removable cover 4 which is clamped to the main casing 2 by means of bolts or the like. A T shaped fitting 5 secured to the cover 4 is provided with an inlet passage 6 adapted to be connected at its outer end to an inlet conduit and having its inner end in communication with the interior of the casing 2. The fitting 5 also has formed therein a separate outlet passage 7 communicating at its inner end through a tubular extension 8 with the interior of the casing 2 and at its outer end is adapted to be connected to a suitable outlet conduit for the withdrawal of gasoline or other fluid of lesser specific gravity separated in the segregator casing 2. The tubular extension 8 is suitably threaded to receive a short annular sleeve 9 having a flexible valve seat insert 10 therein concentric with the vertical axis of the casing 2, the seat 10 being adapted to cooperate with a conical outlet valve 45 later to be described which controls the withdrawal of gasoline from the segregator through the outlet passage 7. The tubular sleeve 9 also serves as a means for clamping an inverted dished baffle member 14 to the tubular extension 8. The baffle 14 serving in conjunction with the walls of the cover member 4 and upper side walls of the casing 2 to direct all of the flow of intermixed gasoline and water entering casing 2 from the inlet passage 6, downward along the casing walls to the bottom thereof and allows only gasoline gravitationally freed from water to enter the outlet passage 7.

A suitably reinforced fine mesh cylindrical filter screen 15 is disposed within the casing 2 concentric with the axis thereof and having its upper end engaging the deflector shield 14 and its lower end abutting an annular dished metal closure 16 which is supported by the bottom of casing 2, small holes 17 through the closure 16 providing for equalization of the water level within and without the cover member. The filter screen prevents the passage of any dirt or sediment into the gasoline outlet 7 of the segregator. A flanged outlet fitting 18 (see enlarged view Fig. 2), has a threaded extension 19 which extends through a common central aperture 20 in the bottom of casing 2, the plate 2a, and the filter screen closure 16. An annular nut portion 21 of a hollow vertical guide 22 serves to support the guide and clamp the filter assembly in the casing 2. The guide 22 is provided with a central bore 23 extending therethrough and which is enlarged adjacent the upper end of the guide into a counterbored portion 24. Transverse ports 25 located adjacent the bottom of the guide 22 provide communication between the interior of the guide and the interior of the casing, the ports serving as means to conduct excess water in the segregator casing to the drain means in the outlet fitting 18.

The outlet fitting 18 is provided with a chamber 26 extending through the extension 19 of the fitting and having an insert providing a tapered valve seat 27 arranged in the upper end thereof concentric with the vertical axis of the casing 2. The valve seat 27 is centrally apertured to serve as a direct communication between the lower interior portion of the guide 22 and the discharge chamber 26 and is adapted to cooperate with a valve 55 hereinafter described to control the discharge of water collected in the casing 2 into the discharge chamber 26 from whence the water may flow into a connected drain conduit 28 having a ball type check valve 29 arranged therein so as to prevent reverse flow through the valve and preventing suction, due for example to pumping fuel from a lower level supply tank, from lifting the water discharge valve. The drain conduit 28 is upwardly inclined (see Fig. 1), an amount sufficient to prevent all of the water being withdrawn from the segregator under normal operating conditions thus keeping the check valve 29 from sticking due to oxidation.

As previously noted, the annular nut 21, which serves as a clamping means for the outlet fitting 18, has integrally formed therewith the hollow guide rod 22, the latter being concentric with the vertical axis of the casing 2. The guide rod 22 serves to vertically guide a hollow metal float, generally indicated by the reference numeral 30, so that the float may move up or down on the guide due to changes in level of water within the casing 2. The float 30 comprises a cylindrical sheet metal middle portion 31 closed at its

upper and lower ends by dished cover plates 32 and 33 respectively which are centrally apertured to receive a hollow vertical tubular guide 34 which is a sliding fit on the guide rod 22. At its upper end the guide tube fits into a flanged tubular head 35 which is secured by soldering to the upper cover 33 of the float. The float 30 is also provided with a dished false bottom 36 provided with a central bore 37, the bore having a greater diameter than the outside diameter of the guide 22, and the false bottom defining a chamber 38 between itself and the float bottom 33, which chamber becomes filled with liquid and the ingress or egress of which through the clearance between the periphery of aperture 37 and guide 22 serves to dampen any oscillation of the float. All of the parts of the float are securely soldered together to form a unitary structure, and the weight of the float is so determined that the same will float in water with a predetermined amount thereof submerged but will sink in gasoline which is within the density range of the fuels likely to be encountered in service. The structure thus far described is substantially identical with the corresponding structure shown in my aforementioned Patent 1,948,543 and the valves and actuating mechanism operated by the float which constitute distinct features of novelty and which are shown in detail in Fig. 2 will now be described.

Referring to Fig. 2 it is seen that the head 35 on the float 30 has a tubular extension 40 thereon having a bottom wall 41 and at its upper end is provided with an inwardly directed circular flange 42 which serves as a guide for the hollow stem 43 of a conical valve 45 which serves, when seated on the valve seat 10, to prevent the discharge of gasoline from the segregator casing 2 into the outlet passage 7. The valve 45 at its base has a diameter equal to the diameter of the tubular extension 40 of the float, so that the underside 46 of the valve may seat on the top of the flange 42, whereby the valve may be positively moved in the closing direction by the float 30, but the float and extension 40 may move downward on the valve stem 43, the connection between the valve and float thus being of a telescoping nature. Vent openings 46 and 47 located respectively in the side wall of the hollow valve stem 43 and the extension 40 on the float allows a restricted flow of fluid into or out of the chamber defined by the interiors of the valve stem and the said extension, which serves to dampen any sudden movement of the float relative to the valve.

A screw eye 48 extending downward from the underside of the valve 45 serves as an anchorage for the upper end of a light tension spring 50 which when tensioned, normally urges the valve 45 downward to its retracted position such as illustrated in Fig. 1, but is of such a scale as to permit downward movement of the float with respect to the valve. The spring 50 is enclosed by a hollow tubular valve stem 51 which extends down from the interior of the extension 40 and passes through a circular opening 52 in the bottom wall 41 of said extension and into the bores 23 and 24 of the vertical float guide 22. The valve stem 51 is suitably internally threaded at its lower end to receive the threaded shank 54 of a needle valve 55, the shank being provided with an eye 56 to which the lower end of the spring 50 is anchored. The needle valve 55 is adapted to cooperate with the valve seat 27 to control the drainage of water from the segregator into the drain chamber 24 and drain conduit 28.

The hollow stem 51 of valve 55 is slidable through the opening 52 and on its upper end is threaded to take a pair of adjustable stop nuts 58 which are adapted to engage the lower wall 41, of the extension 40, on the float 30, so as to lift the valve 55 from its valve seat 27 upon a predetermined upward movement of the float from its lower limiting position. The underside of the lower wall 41 of the float extension 40 engages the upper end of a light compression spring 60 which is arranged concentric with and surrounding the valve stem 51, the lower end of the spring engaging an abutment sleeve 61, rigidly secured to the valve stem 51, the spring and sleeve being housed in the counterbore 24 of guide 22. The scale of the spring 60 is made such that when the valve 55 is seated the weight of the float less any buoyant forces acting thereon will slightly compress the spring and the float will have to rise through the lost motion distance d, Fig. 2, before engaging the stop nuts 58 to lift valve 55 off its seat. The compression spring 60 also serves to axially align the valve stem 51 and valve 55 with the axis of guide rod 22 and valve seat 27 and also absorbs the shock when the valve is seating. The valve stem 51 and valve 55, are smaller in diameter than the bore 23 of the float guide 22, so as to be capable of a slight lateral movement so that when the needle valve 55 enters its conical seat 27 it may move into alignment therewith for proper seating.

The segregator of Fig. 1 is arranged for use in a dispensing system such as illustrated in Fig. 3 in which a supply fuel tank 70 is connected by means of a conduit 71 to the inlet passage 6 of the segregator, and a conduit 72 connects the gasoline outlet passage 7 to the inlet of a pump 73, the latter being driven by an electric motor 74 supplied by conductors 75 from any convenient source of electric current (not shown). The energizing of the electric motor 74 is controlled by a manually actuated switch 76. The pump 73 has its outlet connected to a dispensing line 77 having a fuel dispensing nozzle 78 connected thereto, the nozzle being controlled by a manual valve actuator 79. A pressure responsive bellows 80 is connected to the conduit to respond to the pressure existing therein and is operative upon the occurrence of a predetermined subatmospheric pressure in conduit 72 to close a switch 81 arranged in a circuit with a battery 82 or other source of current supply and an indicator lamp 85. The lighting of the lamp 85 is an indication to the attendant that the fuel outlet valve in the segregator has been closed by the float due to the presence of an abnormal quantity of water in the segregator so that the attendant will then stop the motor driving the dispensing pump by opening the switch 76. Backward leakage through the pump will soon so reduce the pressure in the pipe 72 that the suction therein will no longer hold the valve 45 closed. When the valve 45 opens, the system may be restored to operation by closing of the switch 76.

Operation

The functioning of the segregator illustrated in Figs. 1 and 2, when employed in the dispensing system of Fig. 3, will be best understood by reference to Fig. 1 and to the supplemental

views Figs. 4 to 6 inclusive and detailed operation of which is as follows:

With the segregator float and valves in the position shown in Fig. 1 the same is ready for operation in the system of Fig. 3 and gasoline and any entrapped water will flow through the inlet passage 6 into the segregator casing 2 being deflected by baffle 14 towards the bottom of the casing. Any water in the gasoline will separate by gravitation and collect in the bottom of casing 2 while the gasoline will pass through the filter screen directly by displacement and pass out through the outlet passage 7 to conduit 72 and dispensing pump 73 (Fig. 3). The float due to its own weight and the weight of the associated parts will remain in its lowermost position as shown in Fig. 1 with the water collected in casing 2 having access through the passages 17 in the filter screen closure 16 to the ports 25 in guide 22 but the water is prevented from passing from the hollow interior bore 23 of the guide to the outlet chamber 26 and drain conduit 28 because of the lower float controlled valve 55 engaging its seat 27. The float 30 will remain in its lowermost position as seen in Fig. 1, until the level of the segregated water has risen sufficient to give rise to buoyant forces exceeding the then submerged weight of the float and upper valve and the friction forces and thereafter will rise substantially in proportion to the increase in level of the segregated water until the float has risen through the lost motion distance *d*, Fig. 2, the upper valve 45 during the upward movement of the float remaining in its retracted position and moving with the float.

When the float has risen along the guide 22 and relative to the valve stem 51 until the wall 41 on the float head 35 has contacted the stop nuts 58 on the valve stem, valve 55 will be positively lifted as indicated in Fig. 4, and when the water indicated as A has risen to level L_1, the valve 55 will be lifted sufficient to allow unrestricted flow of water to drain chamber 26 while gasoline indicated as B continues to be withdrawn through outlet passage 7. The amount that the valve 55 is opened due to float movement is dependent on the rate at which water is segregated as compared to the rate of discharge, and as soon as the volume of water discharged exceeds the water segregated in unit time, the valve 55 will seat. When however an abnormally high concentration of water in the gasoline passes into the segregator casing 2, such that the maximum discharge opening of valve 55 cannot take care of the increasing water level, then the float 30 will continue to rise, carrying valve 55 along with it until the parts are positioned as illustrated in Fig. 5.

Referring to Fig. 5, the segregated water A is seen to have risen to level L_2 causing float 30 to be vertically displaced sufficient to cause the upper valve 45 to engage valve seat 10 which will immediately cut off the flow of gasoline from the segregator to the outlet passage 7, and, so long as the dispensing pump 73 continues to run, the difference in the pressures, acting on opposite sides of valve 45, will maintain the same seated. When the attendant notes the lighting of the warning lamp 85 and stops motor 74 by actuation of switch 76, as noted with reference to Fig. 3, he thereby causes the pump 73 to cease delivery. But the suction produced by the pump will still hold valve 45 seated until backward leakage through the pump causes a sufficient reduction of the vacuum in conduit 72 that the tension in spring 50, caused by the effective weight of the float and the weight of the valve 45 itself, is operative to cause the same to open and return to the retracted position on the float such as illustrated in Fig. 1.

While the float is in its upper position as seen in Fig. 5, with upper valve 45 seated, lower valve 55 will have moved upward with the float, allowing drainage of segregated water through valve seat 27 to drain chamber 26 and drain conduit 28 at the maximum rate.

As the water level falls due to discharge through the lower valve, the float 30 and lower valve 55 will move downward, with upper valve 45 still remaining seated and the downward movement of float 30 can continue until the parts are positioned as illustrated in Fig. 6, the lower valve 55 engaging valve seat 27, cutting off the discharge of water from the segregator. With the parts as shown in Fig. 6 the scale of spring 50 is chosen so as to permit the movement of the float to its lowermost position and to thereby permit lower valve 55 to seat while upper valve 45 is held seated due to the differential pressure acting thereon. Upon release of the suction in outlet passage 7 due to leakage back through the idle pump, upper valve 45 will be unseated and restored to its retracted position as indicated in Fig. 1 due to the net weight of the float 30 being transmitted to the valve 45 by the tension force of spring 50. As soon as upper valve 45 opens, fuel can again be withdrawn from the segregator outlet 7.

Under ordinary operating conditions the drainage capacity through the water outlet valve is sufficient to restore the float 30 to its lower limiting position as seen in Fig. 1, thus closing valve 55 in less time than will elapse before the attendant can stop the dispensing pump, and pump leakage can release the upper valve 45 by breaking the vacuum in the conduit 72 and outlet passage 7. In the event that the water is segregated at a rate greater than the capacity of the outlet 18, the float 30 will remain in the elevated position as shown in Fig. 5 due to the buoyant forces acting on the float and thus positively preventing the withdrawal of gasoline from the segregator gasoline outlet passage 7 during the existence of abnormal conditions. Further, the feature whereby the float 30 and lower valve 55 may return with decrease in water level to cause seating of valve 55, even though upper valve 45 is still seated, positively prevents the discharge of gasoline through the water drain outlet.

Instead of the manual switch means 76 (Fig. 3) herein described for stopping pump 73 which subsequently causes breaking of the vacuum in the gasoline outlet 7 of the segregator, this switch means may be automatically actuated by a stem extension of needle valve 55, the extension having adjustable stops thereon adapted to respectively engage the switch actuator in the maximum upper position of the float 30 and when the float has caused seating of the lower valve 55. This arrangement ensures that the dispensing pump 73 (Fig. 3) will be stopped when the upper valve 45 is seated and will cause the pump to be started up whenever the excess water is disposed of from the segregator casing 2. The above described automatic pump driving motor control, actuated by a segregator float, is fully illustrated and described in my aforementioned U. S. Patent 1,948,543 and hence the adaption of the same to the present invention is believed to be obvious

and for simplicity has not been illustrated in the drawings.

While one form of apparatus embodying my invention has been illustrated and described, other variations and modifications thereof will be apparent to those skilled in the art as falling within the scope of the invention as defined by the appended claims.

I claim:

1. In a fluid segregator of the character described for separating a heavier fluid from a nonmiscible mixture of two fluids of differing density, a casing forming a float chamber, an outlet passage from said chamber located in the upper portion thereof for discharge of the fluid of lesser density, a drain passage in the lower portion of said casing for discharge of the heavier fluid, a float in said chamber movable within said chamber between lower and upper limiting positions in response to change in level of the heavier fluid collected in said chamber, a normally closed lower valve adapted to control communication of said drain passage with said chamber, an operative connection between said lower valve and said float whereby a predetermined rise of said float due to increase in level of the heavier fluid will open said valve, a normally open upper valve for controlling communication of said outlet passage with said chamber, means for operating said upper valve in the closing direction to close said upper valve upon movement of said float to the upper limiting position thereof, said upper valve operating means including a lost motion connection between said upper valve and said float which permits free downward movement of said float relative to said upper valve with decrease of level of the heavier fluid until the float causes a closing of said lower valve, irrespective of the upper valve being held closed by the difference in the pressures acting on opposite sides thereof and resilient means interconnecting said upper valve and said float and adapted to be tensioned by the effective weight of the float upon the descent of said float relative to said upper valve, whereby said upper valve is moved to the open position upon a predetermined diminution in the difference in pressures acting thereon.

2. In a fluid segregator of the character described for separating a heavier fluid from a nonmiscible mixture of two fluids of differing density, a casing forming a float chamber, an outlet passage from said chamber located in the upper portion thereof for discharge of the fluid of lesser density, a drain passage in the lower portion of said casing for discharge of the heavier fluid, said passages communicating with said chamber concentric with the vertical axis thereof, a float in said chamber responsive to change in level of the heavier fluid collected therein, means for guiding said float for vertical movement coaxial with the vertical axis of said chamber, a lower valve adapted to control communication of the drain passage with the chamber, an operative connection between said valve and the float, an upper valve for controlling communication of said outlet passage with said chamber, a telescoping connection between said upper valve and said float, said connection when retracted serving as a means for positively moving said valve in the closing direction upon upward movement of said float and for seating the valve after a predetermined upward movement of the float from a lower limiting position thereof, said telescoping connection being extensible to allow free downward movement of said float relative to said upper valve upon decrease in level of the heavier fluid until the float closes the lower valve, and irrespective of the upper valve being retained in the closed position by differences in pressure acting thereon, and yielding means interconnecting said float and said upper valve and adapted to be tensioned by the effective weight of the float upon extension of said telescoping connection to cause said upper valve to open upon a predetermined diminution in the difference in pressures acting thereon.

3. In a fluid segregator of the character described for separating a heavier fluid from a nonmiscible mixture of two fluids of differing density, a casing forming a float chamber, an outlet passage in the upper portion of said chamber for the withdrawal of the fluid of lesser density, a drain passage in the lower portion of said casing for discharge of the heavier fluid, said passages communicating with said chamber concentric with the vertical axis thereof, a float in said chamber guided for vertical movements between upper and lower limiting positions coaxial with the vertical axis of said chamber in response to variation in level of the heavier fluid, a normally closed lower valve adapted to control communication of the drain passage with the chamber, an operative connection between said lower valve and said float, said connection including a lost motion means whereby the float may rise a predetermined amount from said lower limiting position before engaging the lower valve to open the same and further upward movement of the float causing the lower valve to move therewith as a unit, a normally open upper valve for controlling communication of said outlet passage with the float chamber, a telescoping connection between said upper valve and said float, said connection when retracted serving as a means for positively moving said upper valve in the closing direction upon upward movement of said float and for seating the valve after a predetermined upward movement of the float from the lower limiting position thereof, said telescoping connection being extensible to allow free downward movement of said float and lower valve upon decrease in level of the heavier fluid until the lower valve is closed and the float reaches its said lower limiting position, and irrespective of the upper valve being retained in the closed position due to the difference in the pressures acting on opposite sides thereof, and yielding means interconnecting said upper and said lower valves and adapted to be tensioned by the effective weight of said float and said lower valve to cause said upper valve to open upon a predetermined diminution in the difference in pressures acting thereon.

4. In a fluid segregator of the character described for separating a heavier fluid from a nonmiscible mixture of two fluids of differing density, a casing forming a float chamber, an inlet passage in said casing for entrance of the mixed fluid, an upper outlet passage in said casing for the withdrawal of the lighter fluid, a drain passage in the lower portion of said casing for the discharge of the heavier fluid, said outlet and drain passages being arranged concentric with the vertical axis of said casing, a tubular float guide secured in said casing with the axis thereof concentric with the vertical axis of said casing, ports located adjacent the bottom of said guide to provide for passage of the heavier fluid through the interior thereof to the drain passage,

a float reciprocably mounted on said guide for vertical movement between lower and upper limiting positions in response to variation in the level of the heavier fluid collected in the chamber, a normally closed lower valve adapted to control communication of said drain passage with said chamber, a stem for actuating said valve positioned within said tubular guide, a lost motion connection between the upper end of said valve stem and said float whereby said float must rise a predetermined amount from its lower limiting position before lifting said lower valve, continued upward movement of said float carrying said valve and stem with the float as a unit, an upper valve adapted to control the passage of the lighter fluid through said upper outlet passage, a telescoping support for said valve mounted on the upper side of said float, said support being normally retracted with said upper valve being adapted to be positively moved in the closing direction with the upward movement of said float until the upper valve is seated, said upper valve then being maintained seated due to the difference in the pressures acting on opposite sides thereof, said telescoping support being extensible to permit the float and lower valve to descend with decrease in the level of the heavier fluid until the lower valve seats and the float moves to its lower limiting position, and a light tension spring interconnecting said upper and said lower valves and adapted to be tensioned by the effective weight of the float and lower valve upon downward movement of the float relative to said upper valve when the latter is held seated due to pressure difference acting thereon, the tension stress in said spring being sufficient to cause retraction of said upper valve support and opening of said upper valve upon a predetermined diminution in the said pressure difference acting on said upper valve.

5. The structure as claimed in claim 3, in which the stem of said lower valve is hollow throughout its length, the tension spring interconnecting the said upper and lower valves passing through said stem and having its lower end connected to said lower valve within the stem.

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