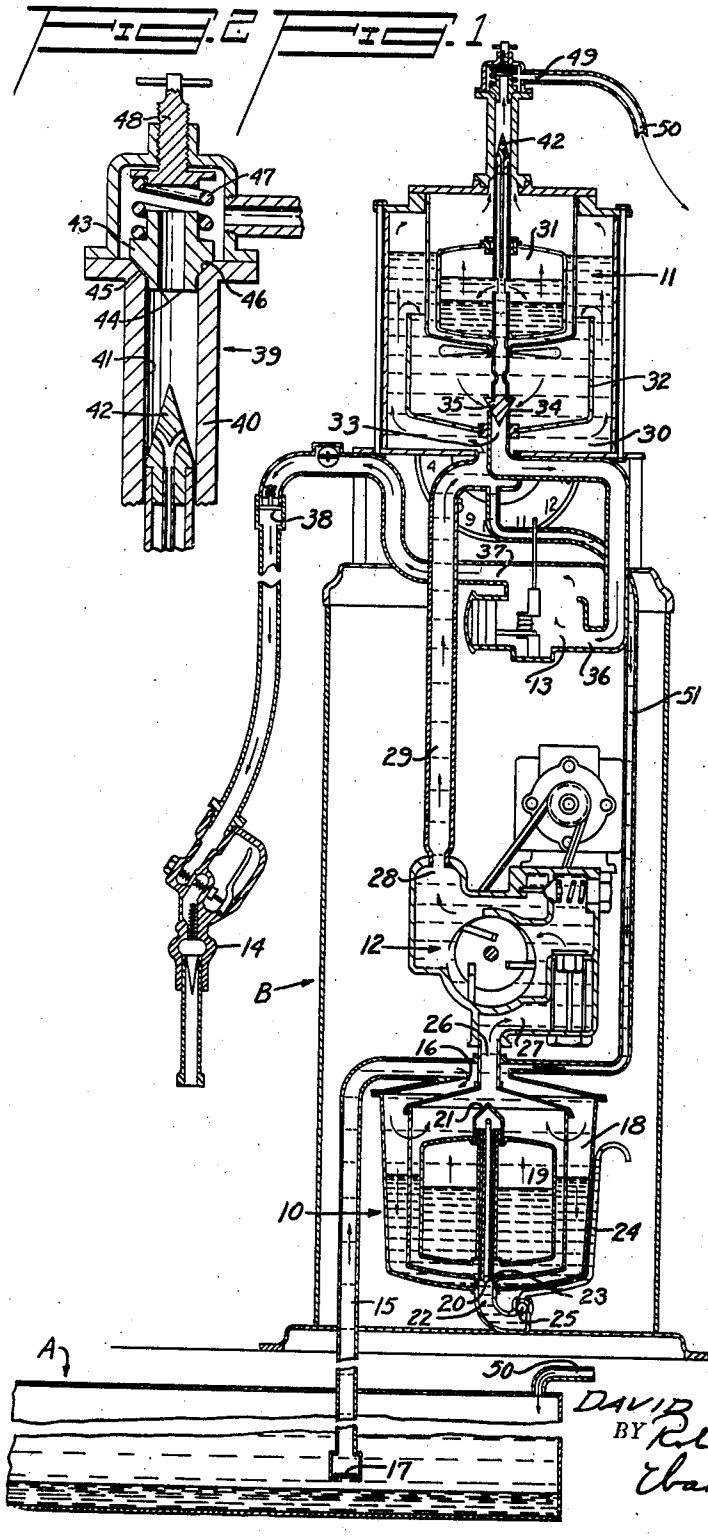
June 14, 1938. D. SAMIRAN 2,120,266

FLUID DISPENSING APPARATUS

Filed March 10, 1936

FIG. 2 FIG. 1



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FLUID DISPENSING APPARATUS

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22 Claims. (Cl. 221—95)

(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.

The present invention relates generally to fluid segregating apparatus and more particularly to force feed fluid dispensing systems in which a separation of fluids of different specific gravities is obtained.

The present invention is particularly directed to fluid supply or fluid dispensing systems in which the supply tank is practically inaccessible or disposed underground and in which the fluid is fed from the source of supply by suitable fluid impelling or flowing means.

It is a well-recognized fact that while certain fluids of different specific gravities, such as water and oil or water and gasoline, are normally not miscible, yet these fluids, when agitated, will form an emulsion or mixture that is not readily separable. When such non-miscible emulsified fluids are present in a dispensing system and the tank is inaccessible to permit a gravitational segregation of the fluid of heavier specific gravity that has settled to the bottom of the tank and it is desirable to isolate these fluids from each other, it will be apparent that such isolation must take place before the fluid is dispensed from the apparatus. Especially is this true if the fluid is fed from the source of supply by suction impelling means, as in the case of conventional pump dispensing systems for the reason that the mechanical action of the suction impelling means tends to emulsify the components in passing through the system, thus affording no opportunity for the liquids to be gravity segregated before reaching the point of delivery due to the velocity of their passage through the delivery pipe.

Under these and other circumstances, the grade, weight, and accurate measure of the liquid dispensed becomes exceedingly problematical.

It is therefore the primary aim and one of the important objects of the present invention to provide a fluid dispensing system incorporating a plurality of fluid segregators so disposed with respect to the source of fluid supply and the fluid impelling means as to automatically and accurately effect not only a segregation and separation of the undesirable components, such as water, oil, etc., from the fluids in the system immediately after their leaving the source of supply, but, in addition thereto, to effect a separate segregation of the remaining miscible or non-miscible fluids remaining in the apparatus and obtain a discharge of only the desired of such fluids from the system.

A further object of the present invention is to provide in a fluid dispensing apparatus for the separation of non-miscible liquids and subsequent isolation of miscible or non-miscible liquids having different specific gravities a float controlled means operating to permit the discharge of one of said liquids only as long as said liquid has a desired specific gravity, said means being rendered inoperative to prevent discharge of any liquid from said system whenever the specific gravity of any of the liquids, whether miscible or non-miscible, is less than a predetermined value.

A further object of the present invention is to provide in a fluid dispensing apparatus of this character means for separating and trapping the undesired component of two miscible liquids, said means operating to not only prevent the passage of such undesired components through the system but also to effect an intermittent discharge of said undesirable components from said system.

A still further object of the present invention is to provide in a fluid dispensing system for the separation of non-miscible liquids and subsequent isolation of two miscible or non-miscible liquids having different specific gravities, an auxiliary storing chamber having a float controlled valve mechanism and metering means associated with said valve mechanism for accurately measuring the quantity of fluid passing from said storing chamber, said metering means being entirely dependent upon the actuation of said valve mechanism to be rendered operative insofar as permitting discharge of liquid from the system.

A still further important object of the present invention is to provide in a fluid dispensing system of this character, a float controlled means for not only removing air from said system, due to leakage of the joints or from other causes, prior to the passage of the fluid through said metering means, but, in addition thereto, to maintain the fluid in said storing chamber of a predetermined pressure and thereby insure a discharge of fluid from said system having a predetermined weight, grade and measure.

With the foregoing and other objects in view, the invention consists in the novel construction and arrangement of elements described, illustrated, and claimed, it being understood that other modifications may be made within the scope of the claims without departing from the spirit of the invention.

In the drawing:

Fig. 1 is a diagrammatic cross-sectional view of the dispensing system in a present preferred embodiment of my invention.

Fig. 2 is an enlarged sectional detailed view of a bleeder valve arrangement used in connection with my invention.

Referring more particularly to the drawing, wherein corresponding parts are designated by like numerals throughout the several views, the apparatus in the present preferred embodiment of my improved system herein illustrated comprises generally a source of fluid supply that is located, as is the general custom, in an underground storage tank A and a fluid dispensing apparatus generally indicated by the letter B. The fluid dispensing apparatus comprises a primary, or lower, fluid segregator 10 adapted to obtain a gravitational segregation of a fluid of heavier specific gravity from a fluid of lighter specific gravity and an upper, or secondary, segregator 11 for separating the residual fluid received from said first-mentioned segregator. The lower segregator 10 incorporates a float controlled valve mechanism of the type generally set forth in Reissue Patent No. 19,227, granted to me on June 26, 1934, and in which I have described a new and novel method and means for adjusting a float to have known buoyant characteristics in a reference medium of given density but sink in any other medium of less density.

The upper segregator incorporates a float controlled valve mechanism of the type set forth in my copending application Serial No. 61,361, filed January 29, 1936, in which I have described a float controlled valve mechanism incorporating a float capable of automatically adjusting itself to have a predetermined weight in a given reference medium when immersed therein so that, when once adjusted, the upper surface of said float will assume a predetermined position between the common surface of such reference medium and any other overlying medium having a density less than the density of the reference medium.

The system further incorporates the use of impelling means such, for example, as a motor driven pump 12 which is interposed between the upper and lower segregator units, heretoforementioned, metering means 13 for measuring the liquid discharged from the upper segregator and a discharge mechanism 14 for dispensing the liquid subsequent to its passage through the metering means.

The underground tank A is provided with a suction delivery pipe 15 which is connected at its one end to the upper inlet passage 16 of the lower segregator 10. The other end of the delivery pipe 15 is positioned adjacent the bottom of the tank A and provided with a foot valve 17 which operates to maintain a constant head of liquid in the pipe 15 even though the tank is completely exhausted of liquid.

The lower segregator 10 includes a float chamber 18, a float 19 disposed within said chamber, a lower needle valve 20 and an upper needle valve 21, both of which are operatively connected to and controlled by the float 19. The float chamber 18 further incorporates a lower outlet passage 22 having a valve-seat 23 against which the lower needle valve 20 is adapted to seat. The passageway 22 embodies a discharge tube 24 incorporating a check-valve 25 which is constructed in accordance with the teachings set forth in my copending application Serial No. 630,237, filed August 24, 1932, and which operates to trap a predetermined head of the heavier or undesirable component in the float chamber and to obtain an automatic and intermittent segregation of such undesirable component from the float chamber when the combined head of the lighter and heavier components in the float chamber is greater than a predetermined value.

The float chamber 18 further embodies an upper outlet passage 26 which is connected to the intake port 27 of the pump 12. The outlet port 28 of the pump communicates with a fuel delivery pipe 29 which connects at its upper end with a fluid receiving or storing chamber 30 forming a part of the upper segregator 11, heretofore mentioned.

As a matter of precaution and with a view towards avoiding deception in the dispensing of liquids, the side walls of the storing chamber are formed of transparent material so that the contents of the chamber may be readily observed. Within this chamber there is suitably mounted a self-adjusting float 31 constructed in accordance with the teachings of my copending application Serial No. 61,361, hereinabove referred to. The storing chamber 30 further incorporates an inner transparent container 32 which is spaced from the side walls thereof. This container is also formed of transparent material and embodies a lower outlet passage 33 provided with a valve seat 34 against which the lower needle valve 35 of the float 31 is adapted to seat. The lower outlet passage 33 of the container 32 is suitably connected to the inlet port 36 of the metering unit 13. The outlet passage 37 of the metering unit is connected to a dispensing nozzle forming a part of the discharge mechanism heretofore mentioned. It will be noted that the pipe 37 which interconnects the metering unit 13 and the dispensing nozzle 14 includes a pressure control relief valve 38 which operates to control the pressure of the liquid transmitted to the nozzle 14.

The upper end of the fluid storing chamber 30 is provided with an adjustable pressure control relief valve 39. This valve, as shown in enlarged detail in Fig. 2, preferably comprises a valve housing 40 which is suitably secured to the upper end of the chamber 30 and which is suitably apertured as at 41 to receive the upper needle valve 42 of the float 11. The housing 40 further embodies a valve-seat body portion 43 formed at its lower end with an inner seat 44 against which the needle valve 42 is adapted to engage. The valve body portion 43 further incorporates an outer valve 45 which engages against a seat portion formed internally of the valve housing, as indicated at 46. Movement of the valve body portion 43 upwardly relative to the housing 40 is controlled by a spring 47. The tension on this spring is controlled by a suitable adjusting nut 48 and operates to control the opening or closing of said valve body portion.

The valve body portion is further provided with an exhaust port 49 which communicates with an air line 50, the latter, in turn, communicating with the upper end of the storage tank A.

The operation of the device is as follows: Initially, let us assume that air is present in the system, as would be the case upon the initial assembly of the apparatus. With the pump in operation, fuel contained in the storage tank A will be forced upwardly through the pipe 15, into the float chamber 18 of the lower segregator 10, through its upper inlet passage 16 and thence outwardly through the upper outlet pas-

sage 26 and into the pump 12. As long as the several components of the fluid entering the inlet passage 16 are of a specific gravity which is less than the specific gravity of the reference medium to which the float 19 has been adjusted, the float will not be buoyant. Consequently, the lower needle valve 20 will be seated on its valve seat 23 and the incoming fluid will be forced outwardly and upwardly by suction pressure toward the liquid storing chamber 30. As the liquid passes through the pump 12 and is being forced upwardly toward said receiving chamber, the air that is present will be forced from the apparatus through the relief valve 39 and thence returned to the storage tank through the conduit 50. Should the fluid which enters the lower segregator chamber comprise several liquids such, for example, as water and gasoline, or water, gasoline, and kerosene, or any combination of liquids which contain at least the reference medium to which the lower float has been adjusted, the float will respond in the reference medium and rise in said float chamber. For example, suppose water is the reference medium, the float will be buoyant in the water, but sink in any other liquid or liquids having a specific gravity less than the specific gravity of the water, and should the head of water which accumulates in the lower float chamber be sufficient to materially raise the float, a segregation of the water will occur in the lower float chamber and a subsequent discharge of such water obtained from the apparatus through the discharge tube 24. If the amount of water entering the lower float chamber is excessive, a further upward displacement of the lower float will operate to close the upper outlet passage 26 and prevent the flow of the overlying medium as well as any other medium toward the upper storing chamber 30.

As long as the fluid continues to flow into the storing chamber 30 and should one of the components of such fluid have a specific gravity which corresponds to that for which the upper float 31 has been adjusted, the float will automatically adjust itself to such component in accordance with the teachings of my above-identified copending application Serial No. 61,361 and thereafter rise in said chamber. In rising, the lower needle valve will be raised and thus permit a flow of the desirable component of such entering fluid into the metering unit 13 and toward the dispensing nozzle of the apparatus. When a sufficient head of liquid is contained within the upper storing chamber, the upper needle valve will seat against the valve-seat 23 which, as aforementioned, is contained within the pressure relief valve 39 and held against opening before a predetermined pressure is reached, and pressure will be built up in the storing chamber 30. When the pressure in this chamber corresponds to the pre-set pressure of the control valve 38, said valve will open and permit a flow of the fluid through the dispensing nozzle.

It is necessary that the expansion of the liquid in the storing chamber, arising from changes in atmospheric temperature or other causes, be accommodated with the pump inoperative, otherwise damage would occur with the receiving chamber completely filled with fluid. Under these circumstances the float 31 will be displaced upwardly and its upper needle valve will be seated against the initial valve-seat 43 and prevent the escape of air or fluid into the return line 50. Obviously, with an increase of pressure within the storing chamber, the float 31 will tend to rise further and will raise the valve body portion from its seat 45 against the action of the spring 46, and fluid will be discharged into the line 50 and returned into the storage tank as long as the pressure in the storing chamber 30 is excessive. In any event, should the volume of liquid entering the storing chamber be greater than the volume of liquid discharging through the relief valve 39, the tendency toward increasing pressure would be accommodated through the bleeder arrangement incorporated in the pump 12.

The foregoing explanation as to the operation of the invention has been limited to cases arising where the fluid entering the storing chamber or at least one of the components of said fluid is of a specific gravity which corresponds to that for which the upper float has been adjusted.

Should the fluid entering the storing chamber comprise two liquids which are miscible such, for example, as high test gasoline and low test gasoline, and since the float 31 has been adjusted to be buoyant in the heavier of the liquids, there would occur by reason of the miscibility of such liquids a resulting liquid medium having a specific gravity which is less than the specific gravity of the heavier liquid but greater than the specific gravity of the lighter liquid. Since, as aforementioned, the float will not be buoyant in such a resulting liquid by reason of its adjustment to float in a heavier liquid, no liquid can be discharged from the storing chamber. On the other hand, the entering fluid may consist of two or more non-miscible liquids which remain in the apparatus even though an undesired liquid such as water has been segregated from the system by the lower segregator. Under these circumstances and as long as the specific gravity of the heavier of these liquids corresponds to the specific gravity of the reference medium to which the float has been adjusted, a segregation will occur but not otherwise. Therefore, if the head of the overlying, or lighter, medium be excessive, the float will be displaced downwardly and the lower needle valve 35 will become seated against the valve-seat 34 and thus again prevent further passage of any fluid into the metering unit.

During the time that the pump 12 is in operation and the passage of the fluid into the pump from the lower segregator chamber is prevented by reason of an excess of the undesirable component in the lower segregator chamber, means is provided to permit a rapid discharge of this undesirable component. To this end I provide a by-pass line 51 which is connected at its upper end with the lower inlet passage of the storing chamber 30 and which, at its lower end, is connected to the upper inlet passage 16 and the lower float chamber 18. By means of this arrangement, as long as the fluid passageway leading into the pump from the lower segregator is closed, the head of the liquid represented by that contained within the receiving chamber and the by-pass 51 is utilized to force the said undesirable component through the discharge tube 24, it being understood that during this period air may readily enter the fluid storing chamber 30 through the relief valve 39 heretofore mentioned. Should the level of the liquid in the storing chamber drop by reason of the discharge of liquid through the by-pass 51, the upper float will be lowered and consequently prevent further passage of the desired liquid into the metering unit.

It should also be observed that the construction of the inner container 32 lends itself toward

trapping a predetermined head of liquid therein, should the head of liquid in the storing chamber decrease by reason of leaky connections in the apparatus between the source of supply and the storing chamber. Obviously, under these circumstances, when once adjusted to a desired reference medium, the upper float will function properly.

Under ordinary operating conditions, the suction produced by the pump 12 has a tendency to hold the needle valve 21 of the lower segregator in seating engagement with its valve-seat. To this end and in order to obtain a positive unseating of the needle valve 21 when occasion requires, I intend that the needle valve assembly of the lower segregator unit be constructed in accordance with the teachings of Patent No. 1,948,543, issued to me on February 27, 1934, wherein I have described a novel means for permitting a limited floating vertical movement between the float and the needle valve assembly and which operates to break the vacuum between the upper needle valve and its seat and thus permit fluid to pass into the pump.

From the foregoing detailed description as to the construction and operation of my dispensing apparatus, it will be apparent that I have provided new and novel means which operate to permit a discharge of liquids having a predetermined specific gravity—one in which the undesirable components of two non-miscible liquids will be separated from the desired component and subsequent discharge of the undesired component from the system prior to its reaching the pumping unit; one in which all of the air present in the apparatus is bled from the system prior to the dispensing of any liquid; one in which excessive pressure built up in the apparatus may be relieved through an arrangement of valves and bypasses without the loss of any of the desired liquid; and, finally, one in which the fluid dispensed is of a predetermined weight, grade, and an amount corresponding to that indicated by the apparatus.

Having described the invention, it will be obvious to those skilled in the art that the construction shown and described is subject to changes, alterations and modifications. I am fully aware of this and it is to be understood that the specific construction shown in the accompanying drawing is merely illustrative of the present preferred embodiment of my invention and that I consider myself entitled to all such changes and modifications as may fall within the purview and limit of the appended claims.

What I claim is:

1. In a fluid dispensing system, segregator means for effecting an automatic segregation of fluids of different specific gravities, a source of fluid supply, fluid impelling means to feed said fluids from said source to said segregator means, fluid metering means, and fluid density responsive means communicatively connected between said fluid impelling means and said metering means for controlling the flow of a liquid component of the residual fluid medium received from said segregator means to said metering means in accordance with a predetermined density and quantity of said component.

2. In a fluid dispensing system, segregator means for effecting an automatic segregation of fluids of different specific gravities, a source of fluid supply, fluid impelling means to feed said fluids from said source to said segregator means, fluid metering means and fluid density responsive means communicatively connected in common with the output side of said impelling means, the input side of said metering means, and said source of supply, said fluid density responsive means serving to control the flow of a liquid component of the residual fluid medium received from said segregator means to said metering means in accordance with a predetermined density and quantity of said component and to control the flow of components of lighter density of said residual medium to said source when either the density or quantity of said liquid component is below the predetermined value.

3. In a fluid dispensing system, a source of fluid supply, suction means for withdrawing the fluid from said source and for flowing said fluid through said system, segregator means communicatively connected between said source and said suction means for effecting an automatic segregation of a fluid medium of heavier specific gravity from a fluid medium of predetermined maximum lighter specific gravity prior to the discharge of said lighter medium through said suction means, fluid metering means and fluid density responsive means communicatively connected between said suction means and said metering means for controlling the flow of a liquid component of the lighter medium received from said segregator means to said metering means in accordance with a predetermined density and quantity of said liquid component.

4. In a fluid dispensing system, a source of fluid supply, suction means for withdrawing the fluid from said source and for flowing said fluid through said system, segregator means communicatively connected between said source and said suction means for effecting an automatic segregation of a fluid medium of heavier specific gravity from a fluid medium of predetermined maximum lighter specific gravity prior to the discharge of said lighter medium through said suction means, fluid metering means and fluid density responsive means communicatively connected in common with the output side of said impelling means, the input side of said metering means and said source of supply, said fluid density responsive means serving to control the flow of a component of the lighter medium received from said segregator means to said source when the density and quantity of said component is above a predetermined value.

5. In an apparatus for transmitting a liquid of predetermined density from a source of supply to a point of delivery, segregator means for effecting an automatic segregation of fluids of different specific gravities, fluid impelling means to feed said fluids from said source to said segregator means, fluid metering means, and fluid density responsive means communicatively connected between said fluid impelling means and said metering means for controlling the flow of a liquid component of the residual medium received from said segregator means to said point of delivery through said metering means in accordance with a predetermined density and quantity of said component and valve means to control the pressure of liquid passing toward said point of delivery.

6. In a fluid dispensing system, a source of fluid supply, suction means for pumping the fluid from said source through said system, segregator means interposed between said source and said suction means, said last-mentioned means comprising a float chamber having a discharge outlet, a float-operated valve mechanism disposed

within said float chamber operating to effect a gravitational segregation and isolation of the fluid of heavier specific gravity from the fluids of lighter specific gravity prior to the passage of said lighter fluids through said discharge outlet, fluid metering means, and fluid density responsive means communicatively connected with said segregator means for effecting a separate segregation of the residual fluids received from said segregator, said fluid density responsive means comprising a fluid storing chamber, a float-operated valve mechanism mounted in said storing chamber and interposed between said suction means and said fluid metering means operating to control the passage of a fluid into said metering means having a specific gravity that is lighter than the heavier liquid isolated in said segregator means but heavier than the lighter liquid received in said fluid storing chamber.

7. In a fluid dispensing apparatus, segregator means adapted for isolating a fluid of heavier specific gravity from fluids of lighter specific gravity flowing through said segregator from a source of supply, suction means for withdrawing fluid from said source and for flowing said fluid through said apparatus, fluid metering means, fluid density responsive means interposed between said suction means and fluid metering means for effecting a separate segregation of the residual fluids received from said segregator means and operating to control the passage of a fluid having a specific gravity lighter than the heavier fluid isolated in said segregator means but heavier than the lighter of the residual fluids into said metering means, and means associated with said density responsive means for effecting a segregation of the heavier fluid from said segregator means when said suction means is rendered inoperative by the effects of said heavier fluid in said segregator.

8. In a fluid dispensing apparatus, segregator means comprising, a float chamber having a discharge outlet, a float-operated valve mechanism disposed within said float chamber adapted for effecting a gravitational isolation of the fluid of heavier specific gravity flowing through said segregator from a source of supply, suction means for pumping said fluid from said source and for discharging the lighter fluids, fluid metering means, fluid density responsive means disposed above said segregator means and communicatively connected with and disposed between said metering means and said suction means for effecting a separate segregation of the residual fluids received from said segregator means, said density responsive means comprising a fluid storing chamber, a float-operated valve mechanism disposed in said storing chamber for controlling the passage of the desired of said residual fluids into said metering means, and means for effecting a discharge of the fluid of heavier specific gravity from said segregator means comprising a valve device associated with said density responsive means and a by-pass interconnecting said storing chamber and segregator chamber and operating to overcome the suction effects in said lower float chamber when said suction means is rendered inoperative by the effects of said heavier fluid in said segregator.

9. In a fluid dispensing apparatus, segregator means adapted for isolating a fluid of heavier specific gravity from fluids of lighter specific gravity flowing through said segregator from a source of supply, suction means for withdrawing fluid from said source and for flowing said fluids through said apparatus, fluid metering means, fluid density responsive means for effecting a separate segregation of the residual fluids received from said segregator means, said fluid density means being interposed between said suction means and metering means and operating to control the passage of a fluid having a specific gravity lighter than the heavier fluid isolated in said segregator means but heavier than the lighter of the residual fluids into said metering means, and valve means associated with said fluid density responsive means for limiting the pressure of the fluids therein to a pre-determined value.

10. In a fluid dispensing apparatus, segregator means adapted for isolating a fluid of heavier specific gravity from fluids of lighter specific gravity flowing through said segregator from a source of supply, suction means for withdrawing the fluid from said source and for flowing said fluid through said apparatus, fluid metering means, fluid density responsive means operatively connected to said suction means for effecting a separate segregation of the residual fluids received from said segregator means, said fluid density responsive means comprising a fluid storing chamber, a float-operated valve mechanism disposed in said storing chamber and interposed between said fluid impelling means and said metering means, and provided with an inlet and two discharge outlets for controlling the passage of the desired of said residual fluids through one of said outlets into said metering means, and valve means operable in a predetermined position of the float in said fluid density responsive means for preventing the flow of fluid through said other outlet when the pressure in said chamber is below a pre-determined maximum value.

11. In a liquid segregating system, a source of liquid supply, at least two liquid segregator devices communicatively connected with one another and with said source of supply, in series relation, and means for supplying said liquid to said segregator devices from said source of supply, each of said segregator devices serving to segregate from said supplied liquid, a liquid of given density, the density of the liquid segregated by one of said devices being different from that segregated by another.

12. In a fluid segregating system such as defined in claim 1 wherein one of said segregators automatically controls the supply of fluid to a subsequent segregator when the fluid of predetermined density segregated thereby exceeds a given quantity of supply in the fluid supplied to said first mentioned segregator device and another of said segregator devices automatically serves to prevent the segregation of the fluid of predetermined density to be segregated thereby when the quantity of supply of said predetermined fluid density in the fluid supplied to said second mentioned segregation device is less than a given quantity of supply.

13. In a fluid segregating system such as defined in claim 1 wherein the segregator that is initially disposed with respect to the source of supply automatically shuts off the supply of fluid to a subsequent segregator when the fluid of predetermined density segregated thereby exceeds a given quantity of supply in the supplied fluid and said subsequent segregator device automatically serves to prevent the segregation of the fluid of predetermined fluid density in said

supply fluid is less than a given quantity of supply.

14. In a fluid segregating system, a source of fluid supply, a segregator device for segregating a fluid of given density, a further segregator device for segregating a fluid of given density different in value than the density of the fluid to be segregated by said first mentioned device and impelling means communicatively connected at its input with said first mentioned segregator device and at its output with said second mentioned segregator device for supplying fluid from said source of supply to said segregator devices.

15. In a fluid segregating system as defined in claim 4 wherein said first mentioned segregator automatically controls the supply of fluid to the second mentioned segregator device when the quantity supply of the fluid of predetermined density to be segregated thereby exceeds a given quantity of supply in the fluid supplied to said first mentioned segregator device.

16. In a fluid segregating system such as defined in claim 4 wherein the second mentioned segregator device automatically serves to prevent the segregation of the fluid of predetermined density to be segregated thereby when the quantity of supply of the fluid of predetermined density in the fluid supplied to said second mentioned segregator device is less than a given rate of supply.

17. In a fluid segregating system, a source of fluid supply, at least two fluid segregating devices communicatively connected with one another and with said source of supply, in series relation, and means for forcing fluid from said source of supply through said segregators and return in a circuitous path, each segregator device serving to segregate from said supplied fluid, a fluid of given density, said segregated fluids differing in density value, and means automatically to prevent the flow of the supplied fluid through one of said segregators when the fluid of given density is being segregated thereby.

18. In a fluid segregating system, a source of fluid supply, at least two fluid segregating devices communicatively connected with one another and with said source of supply, in series relation, and means for forcing fluid from said source of supply through said segregators and return in a circuitous path, each segregator device serving to segregate from said supplied fluid, a fluid of given density, said segregated fluids differing in density value, and means automatically to prevent the flow of the supplied fluid through one of said segregators when the fluid of given density is being segregated thereby, pressure valve relief means normally preventing the flow of fluid through said segregator when said fluid is being segregated thereby.

19. In a fluid segregating system, a source of fluid supply, at least two fluid segregating devices communicatively connected with one another and with said source of supply, in series relation, and means for forcing fluid from said source of supply through said segregators and return in a circuitous path, each segregator device serving to segregate from said supplied fluid, a fluid of given density, said segregated fluids differing in density values, and means operatively connected with one of said segregators for opening or closing said circuitous path in accordance with a predetermined change in the quantity of supply of the fluid to be segregated thereby.

20. In a fluid segregating system, a source of fluid supply, at least two fluid segregating devices communicatively connected with one another and with said source of supply, in series relation, and means for forcing fluid from said source of supply through said segregators and return in a circuitous path, each segregator device serving to segregate from said supplied fluid, a fluid of given density, said segregated fluids differing in density values, and means operatively connected with one of said segregators for opening or closing said circuitous path in accordance with a predetermined change in the fluid pressure in said segregator.

21. In a fluid segregating system, a source of fluid supply, at least two fluid segregating devices communicatively connected with one another and with said source of supply, in series relation, and means for forcing fluid from said source of supply through said segregators and return in a circuitous path, each segregator device serving to segregate from said supplied fluid, a fluid of given density, said segregated fluids differing in density values, and means operatively connected with a subsequent segregator for opening or closing said circuitous path in accordance with a predetermined change in the quantity of supply of the fluid to be segregated thereby and in accordance with a predetermined change in the fluid pressure in said segregator.

22. In a fluid segregating system, a source of fluid supply, a segregator device for segregating a fluid of given density, a further segregator device for segregating a fluid of given density different in value than the density of the fluid to be segregated by said first mentioned device, said segregator devices being constructed and arranged such that the static pressure of the liquid head in the latter segregator device is greater than that of the former, suction pump means communicatively connected at its input with said first mentioned segregator device and at its output with said second mentioned segregator device for supplying fluid from said source to said segregator devices, means for automatically shutting off the supply of fluid to the second mentioned segregator device when the rate of supply of the fluid to be segregated by said first mentioned segregator exceeds a given rate of supply thereof including a suction controlled valve at the inlet side of said pump, and means cooperating with said second mentioned segregator for opening said valve by breaking the partial vacuum when the pump is inoperative.

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