Oct. 25, 1960 G. B. RICHARDS 2,957,490

FLUID SEGREGATORS

Filed Nov. 3, 1955

2 Sheets-Sheet 1

Fig. 1.

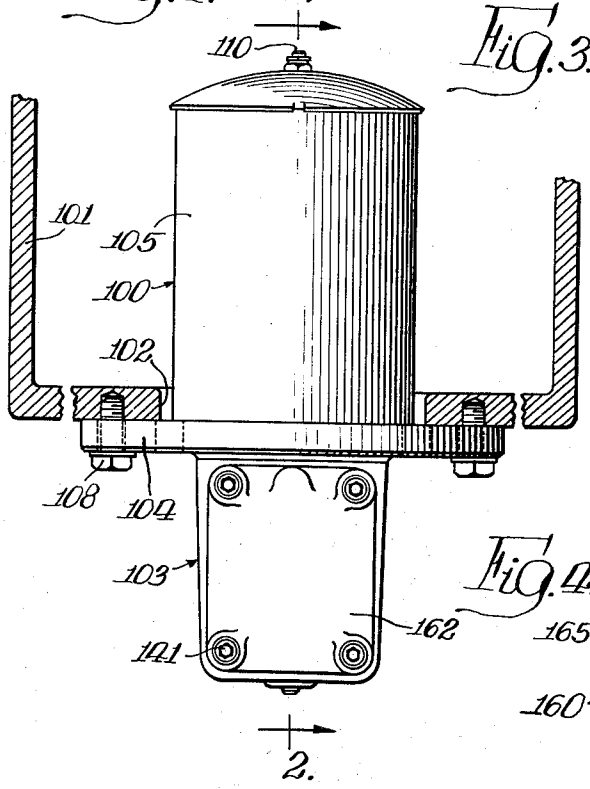


Fig. 3.

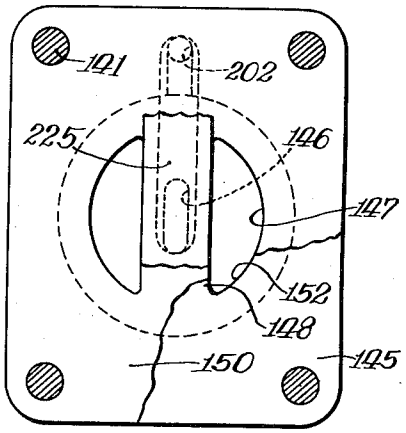


Fig. 4.

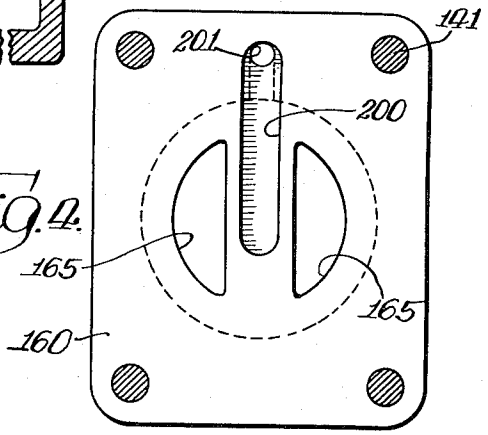


Fig. 6.

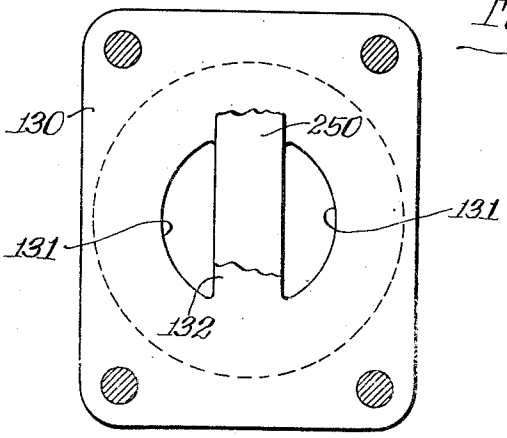
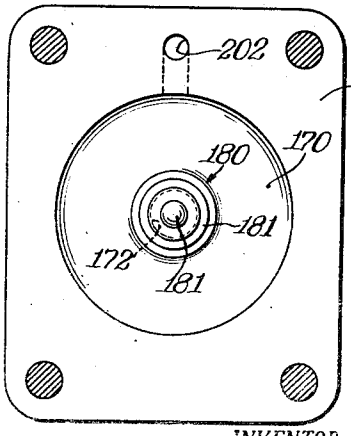


Fig. 5.



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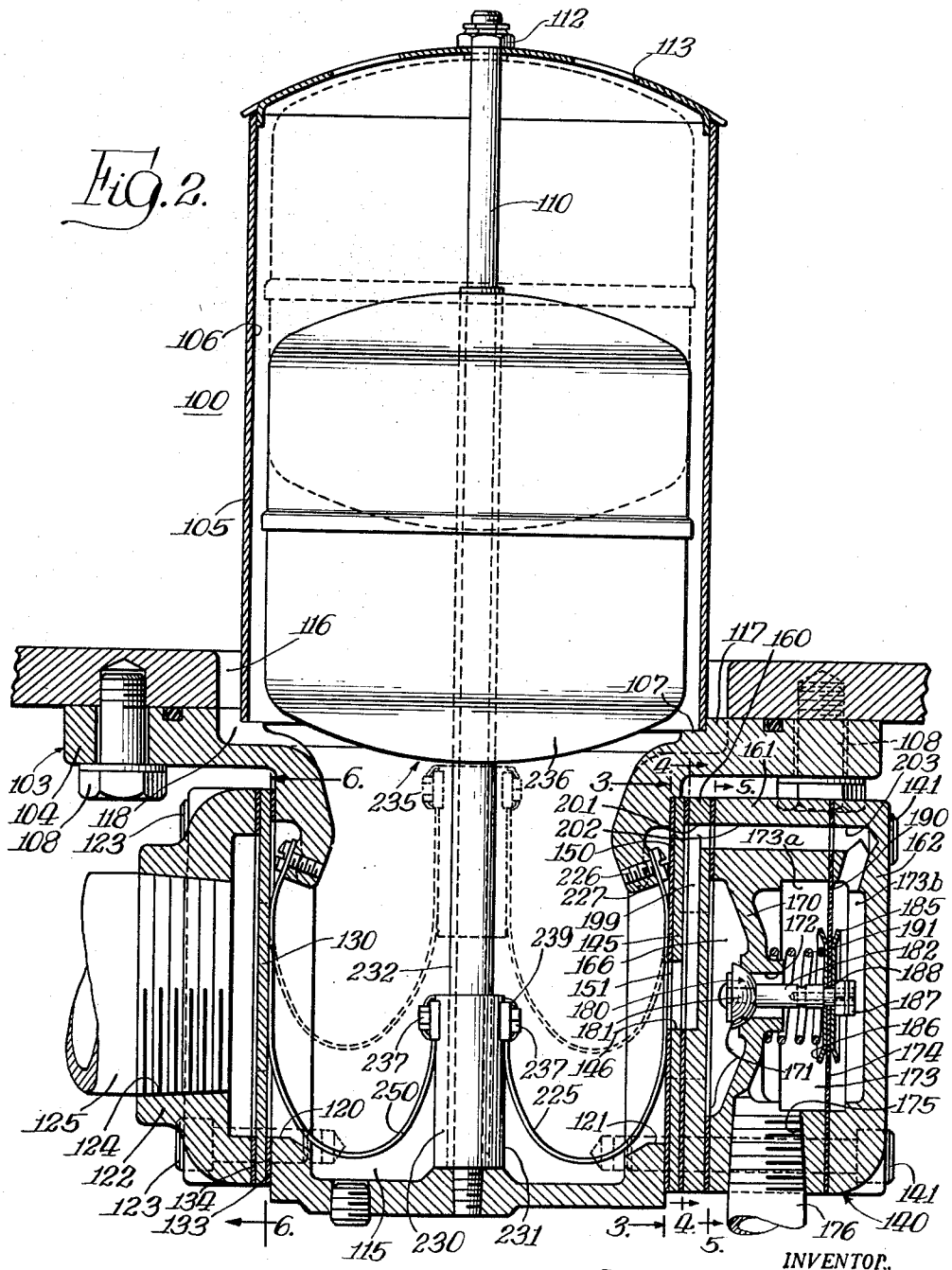
Oct. 25, 1960 G. B. RICHARDS 2,957,490

FLUID SEGREGATORS

Filed Nov. 3, 1955

2 Sheets-Sheet 2

Fig. 2.



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2,957,490

FLUID SEGREGATORS

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Filed Nov. 3, 1955, Ser. No. 544,668

8 Claims. (Cl. 137—172)

This invention relates to fluid segregators and has to do more particularly with a segregator for separating two immiscible liquids or a liquid and a gas, of different specific gravities wherein a flow-actuated valve is employed to permit the discharge of the heavier liquid from a container in which the heavier liquid is allowed to settle to the bottom.

Liquid segregators are commonly employed for separating or segregating two immiscible liquids of different specific gravities, such as water and petroleum products. They are used extensively in connection with the removal of water and other contaminants such as dirt and sediment from lighter liquids as for example petroleum products and are usually installed in a sump at the bottom of a storage tank. In liquid segregators as heretofore constructed segregation is effected by causing the liquid to flow into a container whereby the heavier of the two liquids settles to the bottom of the container and accordingly may be withdrawn, while the lighter of the two liquids rises to the upper portion of the container and floats on the heavier liquid. The separation is effected by controlling the outflow of the heavier liquid from the container by means of a float-controlled valve so that the heavier liquid flows out of the container until such time as the heavier liquid is substantially entirely withdrawn from the container, whereupon the valve is closed to prevent the lighter liquid from flowing out of the container. Liquid segregators as heretofore constructed, have included a casing located at the bottom of the tank to receive liquid therefrom. The casing is formed with a discharge outlet or orifice and a discharge valve for controlling the flow of liquid through the outlet, which valve is actuated by a float so constructed as to float in the heavier of the two liquids, but to sink in the lighter of the two liquids. The arrangement is such that when there is no heavier liquid present in the tank, or only a small quantity, the float sinks to its lowermost position and the discharge valve is closed. When the quantity of heavier liquid increases and the level thereof rises the float is thereby buoyantly supported and is caused to rise until such time as it reaches a predetermined elevation when it causes the discharge valve to open and allow the heavier liquid to flow from the tank in which the segregator is located.

It has been found that where the flow of liquid through the discharge outlet is at a substantial rate and the velocity is relatively high the Bernoulli effect causes a reduction in pressure over the valve which exerts a closing force on the valve and the valve may be closed even though the level of the liquid is such as to dictate that the valve remain open. In other words the Bernoulli or suction effect is sufficient to overcome the buoyancy or lifting effect of the heavier liquid on the float and to cause the valve to flow and pull down the float below its proper position.

An object of the present invention is to provide a new and improved liquid segregator.

Another object is to provide a liquid segregator wherein the operation of the discharge valve is independent of the rate of flow of the liquid through the discharge outlet.

Another object is to provide a liquid segregator of the type having a float-actuated valve and a discharge valve controlled by the float-actuated valve and of such construction that it is closed solely under the control of the float-actuated valve and its operation is entirely independent of the rate of flow of liquid through the discharge outlet.

A further object is to provide a liquid segregator which is simple and inexpensive to make, is effective in operation and requires a minimum of attention, adjustment repair and replacement of parts.

Another object is to provide a liquid segregator of the type employing a strip or reed type valve wherein the closing of the valve is solely under the control of a float and is independent of the rate of flow of the liquid through the discharge outlet.

Other objects and advantages of the invention will appear from the following description taken in connection with the appended drawings wherein:

Figure 1 is a side elevational view of a liquid segregator constructed in accordance with my invention;

Fig. 2 is a vertical sectional view through the segregator of Fig. 1 taken along line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken along line 3—3 of Fig. 2;

Fig. 4 is a sectional view taken along line 4—4 of Fig. 2;

Fig. 5 is a sectional view taken along line 5—5 of Fig. 2; and

Fig. 6 is a sectional view taken along line 6—6 of Fig. 2.

A fluid segregator 100 constructed in accordance with the present invention is disposed at the lower portion of a liquid tank or container 101 of any suitable form and preferably in a sump portion thereof. The segregator is disposed in an outlet opening 102 leading from the bottom of the tank 101. The segregator includes a first, cup-like housing member or base 103 having a flange 104 by which the segregator is secured to the tank 101 as by screws 108 extending through the flange 104 and into the bottom wall of the container or tank 101.

The segregator also includes a second housing member or casing 105 defining a float chamber 106 which casing 105 is supported on a ledge or shoulder 107 formed on the flange 104 and underlying the opening 102 in the bottom wall of the tank 101. The casing 105 is rigidly secured in position by a rod 110 which extends through the casing 105 and downwardly into the base 103 the rod being threaded into the bottom wall of the base and secured at its upper end by a nut 112. The base 103 defines a valve chamber 115 which is disposed below and forms a continuation of the float chamber 106.

The casing 105 is of lesser diameter than the opening 102 in the bottom wall of the tank 101 and therefore there is provided an annular passage 116 leading to the interior of the tank 101 into the chamber 115. In order to provide communication between the passage 116 and the chamber 115 a plurality of bosses 117 are provided on the flange 104 which support the lower edge of the casing 105 above the top surface of the shoulder 107 whereby a plurality of passages 118 are provided which connect the passage 116 with the chamber 115 to thereby allow free flow of liquid from the interior of the tank 101 into the chamber 115.

The base 103 is provided with side openings 120 and 121 providing outlets from the chamber 115. Secured to the base 103 over the opening 120 is an end plate 122. The end plate 122 which is secured to the base 103 as by screws 123 may be formed with a threaded opening 124 adapted to receive a pipe 125 for a purpose

hereinafter described or it may be made imperforate and without any threaded opening therein if the functions of the pipe **125** are not desired. Secured between the end plate **122** and the base **103** is a plate **130** provided with a pair of openings **131** (Fig. 6) therethrough to permit the passage of liquid therethrough from the chamber **115**. The size of the openings **131** is not critical but they are of sufficient size to allow relatively free passage of liquid therethrough from the chamber **115**. Moreover the openings **131** are spaced apart sufficiently so as to provide a central vertically extending strip-like portion **132** of the end plate **130** of sufficient width to provide a backing strip capable of functioning as hereinafter explained. Interposed between the plate **130** and the base **103** and the end plate **122** respectively are ring gaskets **133** and **134** formed of suitable sealing material.

The opening **121** is closed by a valve housing **140** hereinafter described more in detail. The valve housing is secured to the casing in a suitable manner as by screws **141**. Secured between the base **103** and the valve housing **140** is an orifice plate **145** (Fig. 3) formed with a central vertically elongated orifice **146** and a pair of openings **152** spaced laterally on either side of the orifice **146** providing a vertically extending central backing strip **148** similar to the strip **132**, except that it is provided with the orifice **146**. The strip **148** is of sufficient width to provide sealing surfaces on either side of the orifices for the valve element **225** hereinafter described.

Interposed and secured between the orifice plate **145** and the base **103** is a gasket **150** which overlies the inner face of the plate **145** except the openings in the latter. It will be understood that where I refer hereinafter to the "face" of the orifice plate **145** this diesignates the face as covered by the gasket except as otherwise expressly indicated. The gasket **150** has an orifice **151** therein corresponding in shape and registering with the orifice **146** and openings **147** corresponding in shape and registering with the openings **152** respectively of the orifice plate **145**.

Secured against the outer face of the orifice plate **145** is the valve housing **140** now to be described. The valve housing is formed preferably by an inner end plate **160**, a body member **161** and an outer end plate **162** all of which members are secured together and to the base **103** by the screws **141**. The inner end plate **160** is provided with openings **165** corresponding in shape to and registering with the openings **152** in the orifice plate **145** and together with such openings providing communication between the chamber **115** and a valve chamber **166** provided between the end plate **160** and the body **161**.

The body **161** is formed with a partition **170** which is formed with a valve seat **171** through which extends an outlet or discharge orifice or port **172** leading to an outlet chamber **173** defined by the body **161** and by a diaphragm **174** hereinafter described. Leading from the discharge chamber **173** is a discharge outlet **175** in which preferably an outlet or discharge pipe **176** is threaded.

A poppet valve **180** is provided for closing the valve orifice **172** and to this end is formed with a head portion **181** adapted to seat on the valve seat **171** in position closing the orifice **172** and with a stem portion **182** carrying the head for sliding movement into and out of closed position. The valve stem is secured in the diaphragm **174** in a suitable manner as by a pair of metal plates **185** and **186** between which the diaphragm is clamped by means of a nut **187** threaded on the stem **181** and a shoulder **188** formed on the stem.

The diaphragm **174** is formed from a suitable resilient, water-impervious material which is inert to the water or to any other liquid materials which might enter the segregator. While the diaphragm may be made of rubber or synthetic rubber I prefer to form it from a suitable plastic and preferably the material sold under the trade name "Teflon." The diaphragm **174** is clamped between the body **161** and the end plate **162** and divides the chamber **173** into two portions namely an inner portion **173*a*** communicating with the orifice **172** and the outlet **175** and an outer portion **173*b***, the purpose of which will be explained hereinafter. The diaphragm **174** is formed with a bleeder orifice **190** providing limited communication between the chamber portions **173*a*** and **173*b*** sufficient to permit the diaphragm to be restored to its normal position after displacement but not sufficient to permit any substantial flow of liquid between the chamber portions **173*a*** and **173*b***. In lieu of the orifice **190** in the diaphragm an equivalent orifice (not shown) may be provided in the wall of the body member **161** positioned to provide communication between the bore **202** and the chamber portion **173*a***.

Instead of providing the diaphragm **174**, I may employ a piston to perform a similar function. Such piston (not shown) is slidable in the chamber **173** and is connected to the valve stem **182** for actuating the valve **180** in a manner equivalent to the operation of the diaphragm **174**.

The valve **180** is normally urged to closed position by a spring **191** seated at one end against the face of the partition **170** and at the outer end against the disc **186**. Means are provided for opening the valve **180** against the closing force of the spring **191** when it is desired to allow the liquid to flow from the chamber **115**. To this end communication between the chamber **115** and the chamber **173*b*** is provided, whereby pressure of the liquid within the chamber **115** is applied to the face of the diaphragm **174** in a direction to urge the valve **180** off its seat and allow the liquid to flow from the chamber **115** through the orifices **152** and **165**, the chamber **166**, the valve orifice **172**, the chamber **173*a*** and the outlet **175**. The aforesaid communication is provided by a passage **199** leading from the orifice **151** which passage preferably includes a portion defined by a groove **200** formed in the inner face of the plate **160** extending vertically of the plate **160** from the orifice **146**, a bore **201** in the end plate **160**, a bore **202** extending in the body **161** and a passage **203** in the cover plate **162** and opening into the chamber portion **173*b***. Thus it will be seen that when the orifice **146** is open the pressure of the liquid in the chamber **115** is transmitted through the passages just described to the chamber portion **173*b*** and accordingly is applied to the corresponding face of the diaphragm **174** to urge the valve toward open position.

Means are provided for controlling the opening and closing of the orifice **146** in accordance with the level of the heavier liquid in the segregator. Such means includes a valve which preferably is generally similar to the valves described and claimed in the copending applications of Henry Robert Billeter and George B. Richards, Serial No. 775,077, filed November 19, 1958, and Serial No. 775,045, filed November 19, 1958, each being a division of their application Serial No. 512,551, filed June 1, 1955, now abandoned, and which application also discloses and claims certain other features in common with the features of the segregator herein disclosed.

The valve **225** takes the form of an elongated flat strip of flexible, resilient material, preferably metal, which is inert to the liquid with which the segregator is adapted to be used. While any spring material having suitable flexibility, resiliency and inertness may be used, we have found that a spring steel alloy sold under the trade name "Elgiloy" provides excellent results.

The valve **225** is of sufficient width to extend across and completely close the orifice **146** when the valve is in closed position and is of sufficient length to permit it to be mounted and actuated as hereinafter described.

The valve strip or element **225** is rigidly secured to the casing at a point above the orifice **146** and in such position that the adjacent portion of the strip lies against the face of the cover gasket **150** at all times. To this end the upper end of the strip is secured, as by a machine screw **226** to a boss **227** projecting from the base **103** in position to suitably support the upper end of the valve element in the desired position.

The other end of the valve element or strip **225** is attached to a tubular stop **230** which is formed with a straight flat face **231** providing a flat surface against which the adjacent portion of the strip lies to varying degrees as explained hereinafter. The face **231** extends parallel to the inner face of the gasket **150** overlying the orifice plate **145** for a purpose which will appear hereinafter. It should be noted at this point that the orifice plate **145** preferably is arranged in a vertical position so that its inner face extends vertically and accordingly the inner face of the gasket **150** similarly extends vertically.

The stop **230** is connected to a guide stem **232** forming a portion of a float **235**. The stem **232** extends through and is suitably secured in the "ball" portion **236** of the float and projects therefrom at both ends. At its lower end the stem **232** is inserted into the stop **230** and is connected thereto by screws **237** which extend through these members and through clips **239** which serve to retain the ends of the valve elements **225** and **250** against twisting out of position relatively to the stop **230**.

The stem **232** is hollow and it is telescoped over the post **110** and thus serves to guide the float **235** for movement in a vertical direction within the float member **106**.

The valve element **225** is so secured to and supported by the casing and the float that in all positions thereof throughout its range of movement from its upper, open position (shown in broken lines in Fig. 2) to its lower, closed position (shown in full lines in Fig. 2) it has a free portion extending between the portion which bears against the face of the orifice plate and the portion which bears against the face **231** of the stop, which free portion is bent back upon itself and assumes a curved shape. More particularly the element **225** assumes a symmetrical, curved shape in which each portion on opposite sides of the vertical medial plane through the elements **225** are similar. This shape is retained in all positions of the float although the location of the bend in the strip varies with the position of the float. The bending is effected by attaching the valve element **225** to the face and stop only at its ends, disposing the face **231** of the stop **230** and the face of the orifice plate **145** in parallelism, and providing for movement of the float in a direction parallel to these two faces.

A second element **250** is provided which is secured to the face and to the stop in a manner similar to that in which the valve element **225** is secured, except that the element **250** is disposed oppositely to the valve element **225**. The element **250** is positioned to bear against the inner face of the closure plate **130** in a manner equivalent to that in which the valve element **225** bears against the orifice plate **145**. However, as stated above the closure plate **130** is not provided with any orifice corresponding to the orifice **146** and the valve element **250** therefore does not function to close any orifice. The function of the valve element **250** is to provide for a balanced construction as will now be explained. Accordingly, the element **250** is referred to as a "balancing" element.

The two elements **225** and **250** are connected to the base **103** and to the stop **230** at diametrically opposite points whereby they are disposed in opposition. Accordingly, they exert on the stop **230**, and consequently on the float **235**, equal and opposite forces so that the float is positioned centrally in the float chamber and normally does not bear against the guide stem **110**. The guide stem **110** however is provided so as to insure true vertical movement of the float **235** in a direction parallel to the faces of the orifice plate **145** and the face of the closure plate **130**.

Since the assembly consisting of the valve elements **225** and **250**, the stop **230** and the float **235** is freely positioned, the forces exerted by the respective valve elements **225** and **250** against their respective plates **145** and **150** are equal and the elements therefore are completely balanced.

Moreover, the arrangement is such that each of the

elements **225** and **250** is under stress throughout its entire range of movement, which stress causes the elements to be urged against its corresponding plate throughout at least a portion of the element during its entire range of movement. As will be seen from the drawings, when the float is in its upper position, the elements **225** and **250** bear against the faces of their respective plates throughout only the lower portions of the elements and at an area on the orifice plate **145** above the orifice **146** and the corresponding area on the plate **130**. However, as the float **235** falls to its lower position, as established by the abutment of the stop **230** against the lower wall of the chamber **115** the elements **225** and **250** bear against greater areas of their respective plates and the valve **225** closes the orifice **146**, and also bears against the plate **145** at a portion above and below the orifice in order to provide complete closure for the orifice. Thus it will be seen that the elements are urged into positions wherein the valve element **225** closes and seals the orifice **146** by its own resilience.

In the operation of the liquid segregator in accordance with the invention the tank **101** is connected to a liquid line which may contain liquids of two different specific gravities (or a gas and a liquid). As the liquids pass into the container or casing **105** the heavier liquid settles to the bottom of the casing and passes into the chamber **115** through the passages **116** and **118**. When this occurs any of the lighter liquid which may have entered the chamber **115** is forced upwardly through the float chamber **106** and passes out of the casing **105** through suitably provided openings **113** which preferably are formed in the upper wall or roof of the casing **105**, and enters the chamber defined by the tank **101**. It will be understood that the float **235** is so constructed that it is buoyant in the heavier of the two liquids but is not buoyant in the other and lighter liquid (or gas) and thus the float rises and falls in accordance with the rising and falling of the level of the heavier liquid. In other words when there is a sufficient quantity of the heavier liquid in the float chamber **106**, the float **235** is buoyantly supported in an upper position whereby the valve **225** and the cooperating element **250** are retained in their upper positions and the orifice **146** is opened. With the valve **225** in open position the liquid exerts a pressure on the liquid in the passages **200** and the chamber portion **173***b* to apply a force on the diaphragm **174** in a direction to open the valve **180**. The orifice **172** is thus opened and the heavier liquid may flow freely from the chamber **115**. When the level of the heavier liquid falls to the lower predetermined level, the float **235** falls with the level of the heavier liquid and if the level continues to fall the float reaches the position in which it closes the valve **225**. No further pressure will then be applied on the diaphragm to hold the valve open and the spring **191** will move the valve to closed position. The small orifice **190** in the diaphragm **174** permits this to take place.

It will be seen that the operation of the control valve **225** is independent of the rate of flow of liquid through the valve seat **171** and is subject only to the height of the float **235** as dictated by the level of the heavier liquid. Accordingly the valve **180** will remain open regardless of the rate of flow of liquid through the seat **171** and there will be no tendency for the valve to be closed owing to the Bernoulli effect produced by the flow of liquid to the valve seat **171**.

The pipe **125** is employed as a backwash connection through which flushing liquid may be passed to flush out the segregator and the tank with which it is associated. Where it is not necessary or desirable to provide such a backwash connection the opening **124** may be closed by a plug (not shown). Where this is done, the plate **130** may be made imperforate if desired, instead of being provided with the openings **131** as shown.

It will be understood that while I have described the invention particularly in connection with its application

to the separation or segregation of two immiscible liquids of different specific gravities, it also may be employed for separating a gas and a liquid.

I claim:

1. A segregator for separating two immiscible fluids of different specific gravities at least the heavier of which is a liquid, comprising a casing defining a chamber having an inlet opening into said chamber and a discharge opening leading from said chamber, a discharge valve for closing said discharge opening, and means for controlling the operation of said discharge valve in accordance with the level of the heavier of the two fluids in said chamber, said last means comprising a pressure-actuated member connected to said discharge valve, a passage leading from said chamber below the level of the heavier fluid to a first face of said pressure actuated member for applying the pressure of the heavier fluid to said face of said pressure-actuated member in a valve-opening direction and having an inlet orifice in a wall of said chamber, a constantly open bleeder passage providing restricted communication between said passage and a second face of said pressure-actuated member, a float guided for movement in said chamber in a direction parallel to said wall and a valve element including a flexible, resilient member secured at one portion to said float and at another portion to said casing in a position whereby a portion of said valve element intermediate said secured portions is curved back upon itself and another portion lies against said wall in sealing relation to said inlet orifice when said float is in one position and is displaced from said inlet orifice when said float is in another position.

2. A segregator for separating two immiscible fluids of different specific gravities at least the heavier of which is a liquid, comprising a casing defining a chamber having an inlet opening into said chamber and a discharge opening leading from said chamber, a discharge valve for closing said discharge opening, and means for controlling the operation of said discharge valve in accordance with the level of the heavier of the two fluids in said chamber, said last means comprising a pressure actuated member connected to said discharge valve, a passage leading from said chamber below the level of the heavier fluid to a first face of said pressure actuated member for applying the pressure of the heavier fluid to said face of said pressure-actuated member in a valve-opening direction and having an inlet orifice in a wall of said chamber, a constantly open bleeder passage providing restricted communication between said passage and a second face of said pressure-actuated member, a float, means guiding said float for movement in said chamber in a direction parallel to said wall, a valve element including a flexible, resilient member secured at one portion to said float and at another portion to said casing in a position whereby a portion of said valve element intermediate said secured portions is curved back upon itself and another portion lies against said wall in sealing relation to said inlet orifice when said float is in one position and is displaced from said inlet orifice when said float is in another position, and a balancing element similar to said valve element and secured in a similar manner to said float and to said casing in a position diametrically opposite said valve element and positioned to bear against a wall of said chamber opposite said first wall.

3. A segregator for separating two immiscible fluids of different specific gravities at least the heavier of which is a liquid, comprising a casing defining a chamber having an inlet opening and an outlet opening at a level below said inlet opening, a float adapted to be supported by the heavier of the said fluids and guided for vertical movement in said chamber, a discharge valve for closing said outlet opening, a spring urging said valve into closed position, and means in said casing for controlling the operation of said discharge valve in response to movement of said float to an appropriate level, said means including a pressure-responsive element connected to said discharge valve and cooperating therewith, means defining a passage leading from said chamber below the level of the heavier fluid to one face of said pressure-responsive element for applying thereto the pressure of the heavier fluid in said chamber in a valve-opening direction, said passage having an inlet orifice leading from said chamber and ahead of said pressure-responsive element, means actuated by said float for opening or closing said orifice in accordance with the level of the heavier fluid in said chamber, and means for equalizing the pressures on both faces of said pressure-responsive element when said orifice is closed including a constantly open, restricted bleeder passage leading from said first passage to the interior of said casing on the other side of said pressure-responsive element.

4. A segregator for separating two immiscible fluids of different specific gravities at least the heavier of which is a liquid, comprising a casing defining a chamber having an inlet opening and an outlet opening at a level below said inlet opening, a float adapted to be supported by the heavier of the said fluids and guided for vertical movement in said chamber, a discharge valve for closing said outlet opening, a spring urging said valve into closed position, and means for controlling the operation of said discharge valve in response to movement of said float to an appropriate level, said means including a flexible diaphragm connected to said discharge valve and cooperating therewith, means defining a passage leading from said chamber below the level of the heavier fluid to one face of said diaphragm for applying the heavier fluid thereto, said passage having an inlet orifice leading from said chamber, and means actuated by said float for opening or closing said orifice in accordance with the level of the heavier fluid in said chamber, said diaphragm having a constantly open bleeder orifice operative for relieving any differential of pressure on the two faces of said diaphragm when said passage orifice is closed.

5. A segregator for separating two immiscible fluids of different specific gravities at least the heavier of which is a liquid, comprising a casing defining a control valve chamber having an inlet opening and a discharge opening, a discharge conduit leading from said discharge opening, a discharge valve in said discharge conduit, resilient means urging said discharge valve toward one position, means defining a discharge chamber in said discharge conduit, a pressure-responsive element operatively connected to said valve and dividing said discharge chamber into a pressure section and a discharge section, a discharge outlet leading from said discharge section, means defining a passage leading from said control valve chamber below the level of the heavier fluid to said pressure section for applying the pressure of the heavier fluid in said control valve chamber to a face of said pressure-responsive element acting in opposition to said resilient means, said passage having an inlet orifice opening into said control valve chamber, a control valve for closing said inlet orifice, a float in said casing positioning said control valve in accordance with the level of the heavier fluid in said valve chamber and means for equalizing the pressures on both faces of said pressure-responsive element when said inlet orifice is closed including a constantly open bleeder opening connecting said passage and said discharge section.

6. A segregator for separating two immiscible fluids of different specific gravities at least the heavier of which is a liquid, comprising a casing defining a float chamber having an inlet opening and an outlet opening at a level below said inlet opening, a float supported by the heavier of the said fluids and guided for vertical movement in said chamber, a discharge valve controlling said outlet opening, spring means urging said valve into one position, a control chamber within said casing, a diaphragm dividing said control chamber into a pressure section and a discharge section and operatively connected to said discharge valve, a passage within the walls of said casing, said passage interconnecting said float chamber and said pressure

section for applying the pressure of the heavier of said fluids to said diaphragm in opposition to said spring means, an orifice in said passage communicating into said float chamber below the level of the heavier fluid, a constantly open bleeder passage providing restricted communication between said first passage and said discharge section, and a control valve element including a flexible, resilient strip secured at one end to said float and the other end to said casing whereby a first portion of said element lies against the float surface and a second portion lies against said wall portion in sealing relation to said orifice when said float is in one position and in displaced relation to said orifice when said float is in another position, said strip being bowed between said first and second portions in all float positions.

7. A segregator for separating two immiscible fluids of different specific gravities at least the heavier of which is a liquid, comprising a casing defining a float chamber having an inlet opening and an outlet opening at a level below said inlet opening, a float supported by the heavier of the said fluids and guided for vertical movement in said chamber, a discharge valve controlling said outlet opening, spring means urging said valve into one position, a control chamber within said casing, a diaphragm dividing said control chamber into a pressure section and a discharge section and operatively connected to said discharge valve, a passage within the walls of said casing, said passage interconnecting said float chamber and said pressure section for applying the pressure of the heavier of said fluids to said diaphragm in opposition to said spring means, an orifice in said passage communicating into said casing chamber below the level of the heavier fluid, a constantly open bleeder passage providing restricted communication between said first passage and said discharge section, a control valve element including a flexible, resilinet strip secured at one end to said float and at the other end to said casing whereby a first portion of said element lies against the float surface and a second portion lies against said wall portion in sealing relation to said orifice when said float is in one position and in displaced relation to said orifice when said float is in another position, said

strip being bowed between said first and second portions in all float positions, and a balancing element similar to said control valve element and secured in a similar manner to said float and to said casing in position whereby all the horizontal forces exerted on said float by said control valve and balancing element are balanced.

8. A segregator for separating two immiscible fluids of different specific gravities, at least the heavier of which is a liquid, comprising a casing defining a chamber having an inlet opening into said chamber and a discharge opening leading from said chamber below said inlet, a discharge valve for closing said discharge opening, and means for controlling the operation of said discharge valve including a pressure-responsive member in said casing and connected to said discharge valve, a control passage leading from said chamber to a face of said pressure-responsive member and having an inlet orifice opening from said chamber, a control valve for closing said inlet orifice, said pressure-responsive member being exposed on its other face to the pressure in said casing on the discharge side of said discharge valve, a float in said chamber for opening and closing said control valve in accordance with the level of the heavier fluid in said chamber, said float being of such buoyancy that it closes said control valve when at a level of said heavier fluid above said discharge opening, and said inlet orifice, and means for equalizing the pressure on both faces of said pressure-responsive member when said control valve is closed including a constantly open, restricted passage connecting said control passage and the interior of said casing on said other face of said pressure-responsive member.

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