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APPARATUS FOR SEPARATING LIQUIDS OF DIFFERENT SPECIFIC GRAVITIES

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2 Sheets-Sheet 2

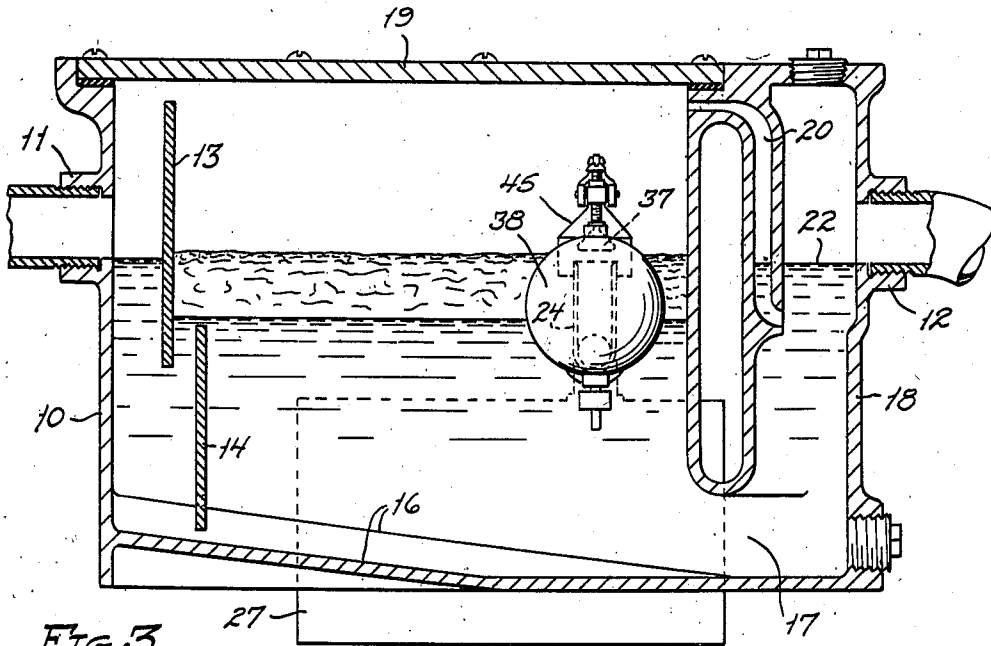


FIG. 3

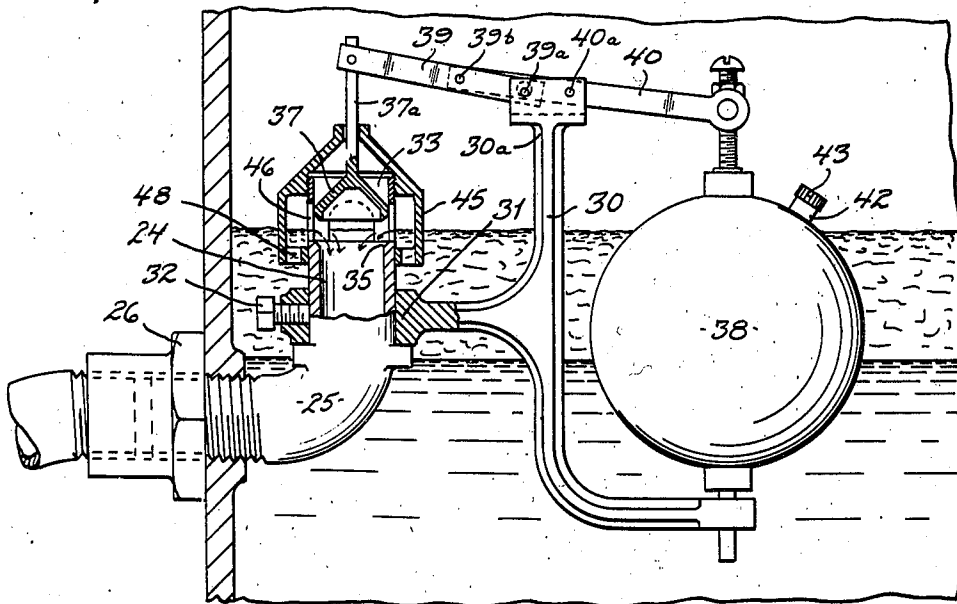


FIG. 4

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APPARATUS FOR SEPARATING LIQUIDS OF  
DIFFERENT SPECIFIC GRAVITIESWells S. Fleming, Michigan City, Ind., assignor,  
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5 Claims. (Cl. 210—54)

This invention is directed to improvements in apparatus adaptable for the separation of liquids of different specific gravities, and the general object thereof is the provision of an apparatus for the removal of a lighter gravity liquid floating upon a heavier gravity liquid in a manner to prevent the escape of any of the heavier gravity liquid with the lighter gravity liquid.

Another object of the present invention is the provision of a liquid-separating apparatus for separating mixed liquids of different specific gravities that is operable intermittently and only after a certain amount or thickness of layer of lighter gravity liquid has been separated from the heavier gravity liquid.

A further object of the present invention is the provision of an apparatus which will separate grease, oils or fats from waste waters, first by gravity influence as the waste waters flow through the apparatus, and which will subsequently effect the removal of the separated grease, oils or fats from the apparatus during periods when no waste waters are flowing through the apparatus.

A still further object of my invention is the provision of a float-operated device, which can be utilized in liquid separators that are dependent upon gravity for effecting initial separation of the liquids.

Other objects of my invention will become apparent from the following description, which refers to the accompanying drawings, and the drawings illustrate my invention incorporated in a grease, oil and fat separator, as a matter of convenience in disclosing the invention.

In the drawings, Fig. 1 is a plan view of a grease, oil and fat separator equipped with a form of my invention; Fig. 2 is a cross-sectional view taken substantially along the line 2—2 of Fig. 1; Fig. 3 is a cross-sectional elevation of the apparatus, illustrated in Fig. 1, taken substantially along the line 3—3 of Fig. 1, and Fig. 4 is a fragmentary cross-sectional elevation which substantially corresponds to the section shown in Fig. 2.

My invention contemplates the provision of a draw-off or skimming mechanism adaptable to any separator apparatus or container which is utilized for effecting the separation of mixed fluids having different specific gravities. For convenience of illustrating one form thereof, the same is shown as being incorporated in an oil, grease and fat separator of a known type, which is adapted to effect the separation of grease, oils and fats from waste waters as the waste waters float through the apparatus.

The separator apparatus shown comprises a

container or basin having a body 10 provided with an inlet branch 11 and an outlet branch 12, the two branches being located at about the same level at an elevated position above the bottom of the basin, whereby a substantial body of water is always present in the basin. The initial normal water level within the basin is determined by the height of the outlet branch 12 relative to the bottom of the basin. As shown, the separator apparatus may comprise a single casting with the exception of baffle members 13 and 14 and the lid or cover 19. Separators of this general type are in use in plumbing systems, for the purpose of preventing grease and fat from flowing into the plumbing lines of buildings, to thereby prevent the clogging of the waste water lines.

In adapting my invention to a liquid separator of the type above described, I have taken into consideration the operating conditions which exist when such an apparatus is in use, that is, when waste waters are flowing therethrough. For example separators of this type are in intermittent use. Upon the inrush of waste water to the basin, a certain action takes place which causes the water level within the basin to be raised considerably above the normal level of the water within the basin. Accordingly, any fats or greases floating thereupon are likewise raised, and during the period the apparatus is being charged with waste water, the water within the basin is maintained at an elevated level, even though a constant flow of the waste water through the outlet branch 12 is taking place.

My skimming or draw-off apparatus is such that the outlet for the escape of the lighter gravity liquids can be positioned at various elevations relative to the initial normal level of the heavier gravity liquid within a container, and in the present instance I locate the draw-off apparatus within the basin relative to the initial normal water level indicated by the reference numeral 22 in Fig. 3, so that the draw-off port has its outlet area disposed horizontally slightly above the initial normal water level.

As shown in Figs. 2 and 4, the draw-off apparatus may comprise a vertically extending draw-off stand pipe 24, provided with an elbow portion 25 which is threaded and engages an internally threaded opening, formed in a side wall of the basin 10. A securing nut and coupling member 26 is provided, to which may be attached a pipe leading to a grease storage reservoir or tank 27 (see Fig. 3). The member 24 comprises a support for a bracket 30, as shown in Fig. 4, the bracket being provided with a suitably bored arm

31, which is fitted upon the draw-off pipe 24, and is held in adjusted position relative thereto by a screw member 32.

The upper end of the draw-off pipe 24 is provided with an internally tapered valve seat 35, which engages a complementarily formed tapered surface on a valve member 37. The valve member 37 is operated in a vertical direction by a float member 38 to close and open the port, there being lever members 39 and 40 forming an operative connection between the float member 38 and the valve member 37. An upwardly extending bearing portion 30a formed on the bracket member 30 serves to support the lever mechanism.

The separator apparatus is provided with baffle members 13 and 14, which extend across the inlet end of the basin and serve to decrease the velocity of the inflowing waste water and to create a turbulence in the water within the basin, whereby the fat or oil or grease particles commingled in the waste water are liberated and rise to the top of the waste water within the basin. The basin is provided with a bottom 16, which slopes toward the basin outlet passageway 17 and the passageway 17 communicates with a vertically extending riser 18, on which the outlet branch 12 is formed. If desired, the separator apparatus may be provided with a cover 19, in which event a passageway 20 is provided to extend from the uppermost part of the inside of the basin downwardly into the riser 18, with the lower terminus thereof disposed below the normal water level of the waste water present in the riser 18.

The float member 38 may be formed of any material which will float upon the waste water. In the instant showing, the float member 38 comprises a hollow, metallic member which is provided near the top thereof with an apertured sleeve 42 into which is screw-fitted a sealing plug 43, whereby the degree of buoyancy of the float member may be adjusted by pouring into the interior thereof water, mercury or other fluid. By controlling the degree of buoyancy of the float member, the thickness of the layer of the grease, oil or fat which accumulates upon the surface of the waste water within the basin 10 before the valve member 37 is operated by the float member 38, can be controlled. In the present illustration of the invention, grease and fat are separated from the waste water from a dish-washing machine and the discharged waste water is considerably above normal temperature. Hence, the separated fats and greases are in liquid condition. As the separated grease and fat accumulates with in the basin, the initial normal water level corresponding to the normal water level in the riser 18 is gradually lowered. Greases and fats have some buoyant effect upon the float member 38, but as the water level within the basin is lowered by the accumulation of greases and fats, the buoyant effect of the water within the basin upon the float member 38 is gradually decreased, and eventually the float is dropped, thus causing the valve member 37 to open the draw-off port of the stand pipe 24. This permits the separated grease and fat, while still in a warm or liquid condition, to draw off through the stand pipe into the storage reservoir or tank 27. As the thickness of the layer of grease and fat decreases, the water level within the basin rises to some extent, and the fluid greases and fats will continue to float through the port until the top level thereof reaches the level of the port.

It is to be understood that when the apparatus

is installed and first placed in use, the initial normal water level in the basin 10 will be at the same level as the normal water level in the riser 18, and that when waste waters are flowing into the basin at any time, as stated, the water level and the top level of the grease and fat layer is always above the level assumed by the waste water and grease when quiescent, that is, when the apparatus is not being charged with waste waters.

By reason of the elevated levels of the grease and waste water during operation of the apparatus, the float, during this period, exerts downward pressure on the valve member 37 through the lever members 39 and 40. Even though the accumulation of grease and fat during the operating period of the apparatus may exceed the predetermined amount, the draw-off port is maintained closed, and neither water nor grease can escape therethrough during this operating period. Upon the cessation of inflow of waste waters into and through the apparatus, the water level in the basin gradually drops to a quiescent state, at which time the valve member 37 will be raised, thus permitting the escape of the accumulated grease and fat therethrough.

To prevent any light floating solid from becoming deposited upon the valve seat 35 and thus prevent water-tight closure of the draw-off port, I provide a shield or hood 45 which is adjustably mounted upon a sleeve member 46, carried by the stand pipe 24. The member 45 has the lower end thereof disposed a substantial distance below the initial normal water level within the basin 10, and is provided with upwardly extending passageways 48. The sleeve member 46 is likewise provided with openings in the sides thereof, whereby when the draw-off port is opened, the liquid greases and fats may flow upwardly inside of the shield member 45 through the passageways 48.

It will be noted that in the construction shown that the member 45 also serves as a guide for the stem 37a of the valve member 37, and by having the draw-off port positioned slightly above the initial normal water level of the apparatus, access of water to the valve 35 is prevented. After one operation of the draw-off mechanism, the valve 35 and the complementary valve surface of the valve member 37 become coated with greases and fats. This film of grease and fat present between the valve member and the valve seat when the draw-off mechanism is in closed condition, permits the use of a metal seal in the valve structure and the seepage of water through the valve port when an upward surge of the waste water within the basin 10 takes place, upon the inflow of waste water thereto, is prevented.

From the foregoing description of the application of my invention to a grease, oil and fat separator of the type illustrated in the drawings, it will be apparent that the draw-off mechanism operates only intermittently and only after a certain amount of grease, oils or fats have accumulated upon the surface of the waste waters within the basin 10.

I claim:

1. In an apparatus for the reclaiming of grease, oils and fats from waste waters, the combination of a liquid container having an inlet and an outlet, the outlet being positioned at an elevation relative to the bottom of the container to determine the initial normal waste water level within the container, a draw-off mechanism for drawing off the grease, oils and fats having a draw-off port positioned slightly above the level of the waste

water outlet in the container, a partition between the draw-off port and outlet opening extending below the level of said outlet to provide a riser, a valve mechanism for closing and opening said port, a buoyant member, operative upon the lowering of the normal water level means connecting the buoyant member to the valve mechanism, the buoyant member being positioned relative to the waste water outlet to maintain said valve mechanism in closed relation to said port, and said buoyant member being operative to shift said valve mechanism to open position relative to said port only after an accumulation of grease, oil or fat within the container has lowered substantially the waste water level within the container.

2. In an apparatus for the reclaiming of grease, oils and fats from waste waters, the combination of a liquid container having an inlet and an outlet, the outlet being positioned at an elevation relative to the bottom of the container to determine the initial normal waste water level within the container, a draw-off mechanism having a draw-off port for the grease, oils and fats positioned slightly above the level of the waste water outlet in the container, a partition between the draw-off port and outlet opening extending below the level of said outlet to provide a riser, a valve mechanism for closing and opening said port, a buoyant member operative upon the lowering of the normal water level and means adjustably connecting the buoyant member to the valve mechanism, the buoyant member being positioned relative to the waste water outlet to maintain said valve mechanism in closed relation to said port.

3. In an apparatus for the reclaiming of grease, oils and fats from waste waters, the combination of a liquid container having an inlet and an outlet opening at substantially the same levels, and the outlet serving to determine the initial normal waste water level within the container, a draw-off mechanism for drawing off the grease, oils and fats having a draw-off port positioned slightly above the level of the waste water outlet in the container, a partition between the draw-off port and said outlet opening extending below the level of the outlet to provide a riser, a valve mechanism for closing and opening said port and a buoyant member positioned relative to the waste water outlet to maintain said valve mechanism in closed relation to said port when the water level is at normal position, and said buoyant member being operative to shift said valve mechanism to open position relative to such port only after an accumulation of grease, oil or fat within the

container has lowered substantially the waste water level within the container.

4. An apparatus for separating grease, oils and fat from waste water, comprising a container having an inlet, an outlet duct the discharge end of which is disposed above the bottom of the container to determine the initial normal level of the waste water, a draw-off mechanism for draining off accumulated grease, oil or fat floating upon the waste water within the container and having a draw-off port disposed above the waste water outlet, a partition between the draw-off port and outlet opening extending below the level of the outlet to provide a riser, a buoyant member, a valve means for closing and opening the port, means connecting the buoyant member to the valve means, whereby the raising and lowering of the buoyant member will effect respectively the operation of the valve mechanism to close and to open said port and the valve mechanism is shifted to open position only after the initial normal waste water level within the container has been lowered by an accumulation of grease, oil or fat, and means associated with the valve mechanism disposed below the level of the grease but above the water level for preventing access of floating solids to said port.

5. An apparatus for separating grease, oils and fat from waste water, comprising a rectangularly shaped container having an inlet at one end, and an outlet at the other end disposed above the bottom of the container to determine the initial normal level of the waste water, a draw-off mechanism for draining off accumulated grease, oil or fat floating upon the waste water within the container, comprising a vertically extending tube having its upper end disposed above the waste water outlet, a buoyant member, a partition between the draw-off port and outlet opening extending below the level of said outlet opening to provide a riser, a valve means for closing and opening the upper end of the tube, means connecting the buoyant member to the valve means whereby the raising and lowering of the buoyant member will effect respectively the operation of the valve means to close and to open said port and the valve means is shifted to open position only after the initial normal waste water level within the container has been lowered a substantial distance below the upper end of the tube by an accumulation of grease, oil or fat, means associated with the valve mechanism disposed below the level of the grease but above the water level for preventing access of floating solids to said port.

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