W. L. MORRIS.

LIQUID SEPARATOR.

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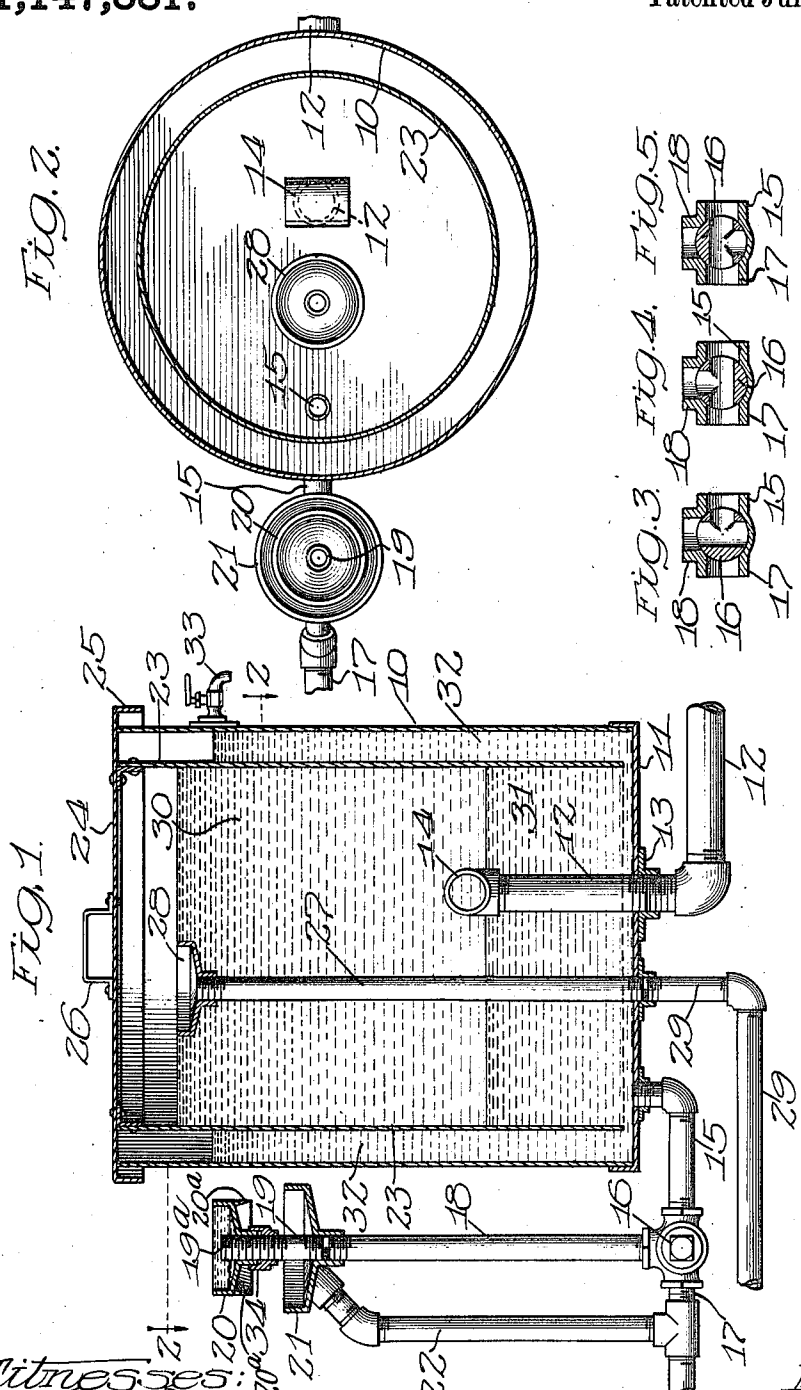
1,147,881. Patented July 27, 1915.



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UNITED STATES PATENT OFFICE.

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LIQUID-SEPARATOR.

1,147,881. Specification of Letters Patent. Patented July 27, 1915.

Application filed December 22, 1911. Serial No. 667,379.

To all whom it may concern:

Be it known that I, WILLIAM L. MORRIS, a citizen of the United States, residing at Fort Wayne, in the county of Allen and State of Indiana, have invented certain new and useful Improvements in Liquid-Separators, of which the following is a specification.

The invention relates to gravity liquid separators adapted particularly to separate water and various oils, as kerosene, gasolene or lubricating oils, and has for its chief object to provide an improved arrangement of devices whereby the water and oil or oils may be permitted to separate by their difference in gravity, and to discharge automatically the water to the sewer and the oil to its place of storage.

A further object of the invention is to provide improved means in a gravity liquid separator for sealing the oil during the process of separation, so that the oil will not be exposed to evaporation or fire risk.

A further object of the invention is to provide in a gravity separator of the class described an improved adjustable water overflow so arranged that the line between the oil and the water may be raised or lowered at will.

A still further object is an improved arrangement of water discharge from the bottom of the separator either to the overflow or to the sewer, or both, under the control of the operator.

Other objects of the invention are hereafter described, reference being had to the drawing forming a part of the specification, and finally pointed out in the appended claims.

In the said drawings Figure 1 is an elevation view in section of the essential parts of the entire device; Fig. 2 is a horizontal sectional view on broken line 2—2 Fig. 1; Figs. 3 to 5 inclusive are detail sectional views showing the various operated positions of the three-way valve controlling the water overflow and discharge outlet.

As a receptacle in which to receive the mixture of materials comprising oil, as kerosene, gasolene, or lubricating oils, and water, a tank is provided, preferably although not necessarily circular in form, as illustrated, the vertical walls of which are indicated by the reference character 10, the circular bottom member attached thereto by 11. The mixture of the materials to be separated is preferably admitted through the bottom 11 of the tank as through pipe 12, passing through bottom 11 at 13 and terminating some distance above the bottom on the interior of the tank, preferably with a suitable spreader to discharge laterally instead of vertically, as indicated as 14. The spreader 14 may be of any suitable or desirable construction, that shown being merely a T joint discharging horizontally in two opposite directions. The height of the discharge outlet 14 of the intake pipe 12 will be dependent upon the size and relative proportions of the tank, and the same will usually be found at about the normal line of separation between the oil and the water within the tank, as the oil being lighter than water will rise, while the water will settle to the bottom of the tank, where it may be discharged through the discharge pipe 15, communicating with the interior of the tank through the bottom 11, past the adjustable three-way valve 16, which may be set to discharge the water directly through the pipe 17 to the sewer, as illustrated by the position of the valve in Fig. 5, or if the valve 16 be set as shown in Fig. 3, the water upon being discharged through pipe 15 will pass upwardly through pipe 18 and the short section 19, and be discharged through the overflow 20, thence dropping downwardly into the pan 21 surrounding the vertical pipes 18 and 19. Discharge from the pan 21 is effected through the vertical pipe 22, which is tapped into discharge pipe 17 beyond the valve 16.

The oil seal is comprised in the cylindrical member 23, to the upper end of which the top cover 24 is secured, completely sealing the same. The top cover 24 extends outwardly from the periphery of the cylindrical sealing member 23 beyond the upper extremity of the casing 10, and has its outer periphery flanged, as indicated at 25. For the purpose of removing the top cover and the sealing member attached thereto a suitable handle, as indicated at 26, is secured to the top cover.

In the operation of the device the material consisting of mingled oil and water will enter through the pipe 12 and the discharge spreader 14 into the interior of the casing and the cylindrical seal 23, and if the valve 16 be opened to the overflow and be closed

to the sewer as shown in Fig. 3, to cause the water passing through discharge pipe 15 to enter the vertical pipe 18, the material within the tank or casing 10 will continue to rise until it reaches the level of the upper discharge portion of the pipe 18 or overflow member 20. Upon the valve 16 being closed to the sewer the liquid within the seal will rise higher and until it reaches the upper extremity of the oil discharge pipe 27 and the funnel shaped receptacle communicating with this pipe and secured to its upper extremity, the same being indicated by the reference character 28. The pipe 27 is preferably tapped into the bottom 11 of the tank or casing 10, and has a portion extending thence below and to the oil storage or other suitable means, such pipe being indicated by the reference character 29. The spreader 14 is constructed as shown and described to prevent the incoming fluid from too violently agitating the upper stratum of the fluid within the seal. The separation of the oil and water will take place due to gravity, the oil rising and the water finding its way to the bottom, the stratum of oil being indicated in the drawing by the reference character 30, and the water 31. It will be noticed that the cylindrical sealing member 23 does not extend entirely to the bottom 11 of the tank or closure, but terminates somewhat short of it, allowing room for the passage of liquid in order to effect a liquid seal which will consist mostly of water, as indicated by the reference character 32. If for any reason the cover 24 and the seal 23 secured thereto be removed from the tank or closure 10 while the closure is full of the mixture of oil and water in process of separation or about to be separated, the outer surrounding portion 32 of liquid between the cylindrical sealing member 23 and the outer walls of the tank or closure will contain mingled oil and water. After separation takes place and the oil rises to the top, such oil may be drawn off by means of a suitable stop cock, as indicated at 33, secured to the outer wall of the closure or tank 10 and communicating with the interior.

The section of pipe 19 comprising a portion of the water overflow pipe being an extension of the vertical pipe 18 has its upper extremity screw threaded for a considerable distance, as indicated at 19^a, for the purpose of adjustably receiving the overflow spreader member 20, which may be secured thereto if desired by means of the nut 34. By adjusting the overflow or spreader member 20 to various heights the line between the oil and the water within the tank or closure may be raised or lowered at will. By manipulating the water draw off cock 16, the water discharged from the bottom of the separator may be under complete control either to direct the water upwardly through vertical pipe 18 past the overflow and thence out through the descending pipe 22 to the discharge pipe 17, or by adjusting the draw off cock 16, as illustrated in Fig. 5, allowing the water from the bottom of the seal within the closure to pass directly to the sewer. Or if desired the cock 16 may be adjusted as indicated in Fig. 4 to deflect a portion of water within the pipe 18 to prevent the too rapid discharge from the bottom of the seal, but at the same time to allow a portion of the discharge to pass directly to the sewer.

An important feature of the invention is found in the peculiar construction of the overflow spreader member 20, the lower outer peripheral edge of which is provided with a sharp continuous depending flange indicated at 20^a, which prevents water overflowing from trickling down on the underside of member 20, but sheds it directly into the pan 21, rendering the quantity overflowing plainly visible.

In order that the invention might be understood, the details of the preferred embodiment have been specifically shown and described, but it is not desired to be limited thereto, and

What I claim is:

1. In a liquid separator, the combination with a tank of an intake pipe extending through the bottom of the tank, a discharge pipe extending through the bottom of the tank and being provided with an intake adjacent the zone of the lighter liquid, a discharge pipe for the heavier liquid, said discharge pipe having an intake adjacent the bottom of the tank, a top cover for the tank, and a liquid seal comprising a hollow cylindrical member of less diameter than the diameter of the tank and being secured at its upper extremity to the tank cover to form a closure therewith and extending to a point adjacent the bottom of the tank whereby a circumferential space is provided between the outer wall of the cylindrical liquid seal and the inner wall of the tank.

2. In a liquid separator, the combination with a tank, of an intake pipe for the liquid to be separated, extending through the bottom of the tank, a discharge pipe extending through the bottom of the tank and being provided with an intake adjacent the zone of the lighter liquid, a discharge pipe for the heavier liquid extending through the bottom of the tank, and having an intake adjacent the said bottom, a removable top cover for the tank, and a liquid seal comprising a hollow cylindrical member secured at its upper extremity to the removable tank cover to form a closure therewith and being open at the top and extending to a point adjacent but not contiguous to the bottom of the tank, the said cylindrical mem-

ber surrounding the said intake pipe for the liquid to be separated and the discharge pipe for the lighter liquid and being separated from the walls of the tank whereby an annular space is formed between the hollow cylindrical member and the inner wall of the tank.

3. In a liquid separator, the combination with a tank of means for introducing liquids to be separated through the bottom thereof, comprising a pipe having a discharge portion above the bottom of the tank, a discharge pipe for the lighter liquid, with an intake adjacent the zone of the lighter liquid near the upper part of the tank, a discharge pipe for the heavier liquid having an intake adjacent the bottom of the tank and a liquid seal comprising a hollow cylindrical member closed at its upper extremity, and being positioned on the inside of the tank with its lower extremity adjacent but not contiguous to the bottom of the tank, and being of a sufficient size whereby an annular space is formed between the outer periphery of the cylindrical sealing member and the walls of the tank, and at the same time surrounding and sealing the upper extremities of the said intake and discharge pipes in a common closure in coöperation with liquid within the tank.

4. In a liquid separator, the combination with a tank of an intake pipe for the liquids to be separated, extending through the bottom of the tank, a discharge pipe extending through the bottom of the tank and being provided with an intake adjacent the zone of the lighter liquid, a discharge pipe for the heavier liquid extending through the bottom of the tank and having an intake adjacent said bottom, a removable cover for the tank, a liquid seal comprising a hollow cylindrical member secured at one extremity to the tank cover, and forming a seal therewith, and extending to a point adjacent the bottom of the tank, and an overflow in the discharge pipe for the heavier liquid, comprising a vertical valve controlled pipe communicating with the discharge pipe and having an adjustable overflow at its upper extremity, a return pipe communicating with the overflow at one extremity and with the discharge pipe beyond the said valve controlled vertical overflow pipe at its other extremity.

5. In a liquid separator, the combination with a tank, of means for introducing liquids to be separated through the bottom thereof, a discharge pipe for the lighter liquid with an intake adjacent the zone of the lighter liquid and passing downwardly through the bottom of the tank, a discharge pipe for the heavier liquid, with an intake adjacent the bottom of the tank, passing downwardly through the bottom of the tank, a liquid seal comprising a cylindrical member provided with a top closure member, the circumference of which is extended to form a top closure member, also for the tank, there being an annular space between the outer periphery of the cylindrical member and the tank walls, and means for discharging the lighter liquid from the said annular space through the tank wall.

6. The combination with a tank of an inner gas tight compartment open at the bottom and having an inlet for the mixed oil and water and an oil overflow passed up through this opening, and an outer receptacle with a water overflow, the oil and water overflow set so the line between the oil and water will be maintained above the opening in the inner compartment.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 28th day of November, A. D. 1911.

WILLIAM L. MORRIS.

Witnesses:
J. W. Burrows,
C. M. Smith.