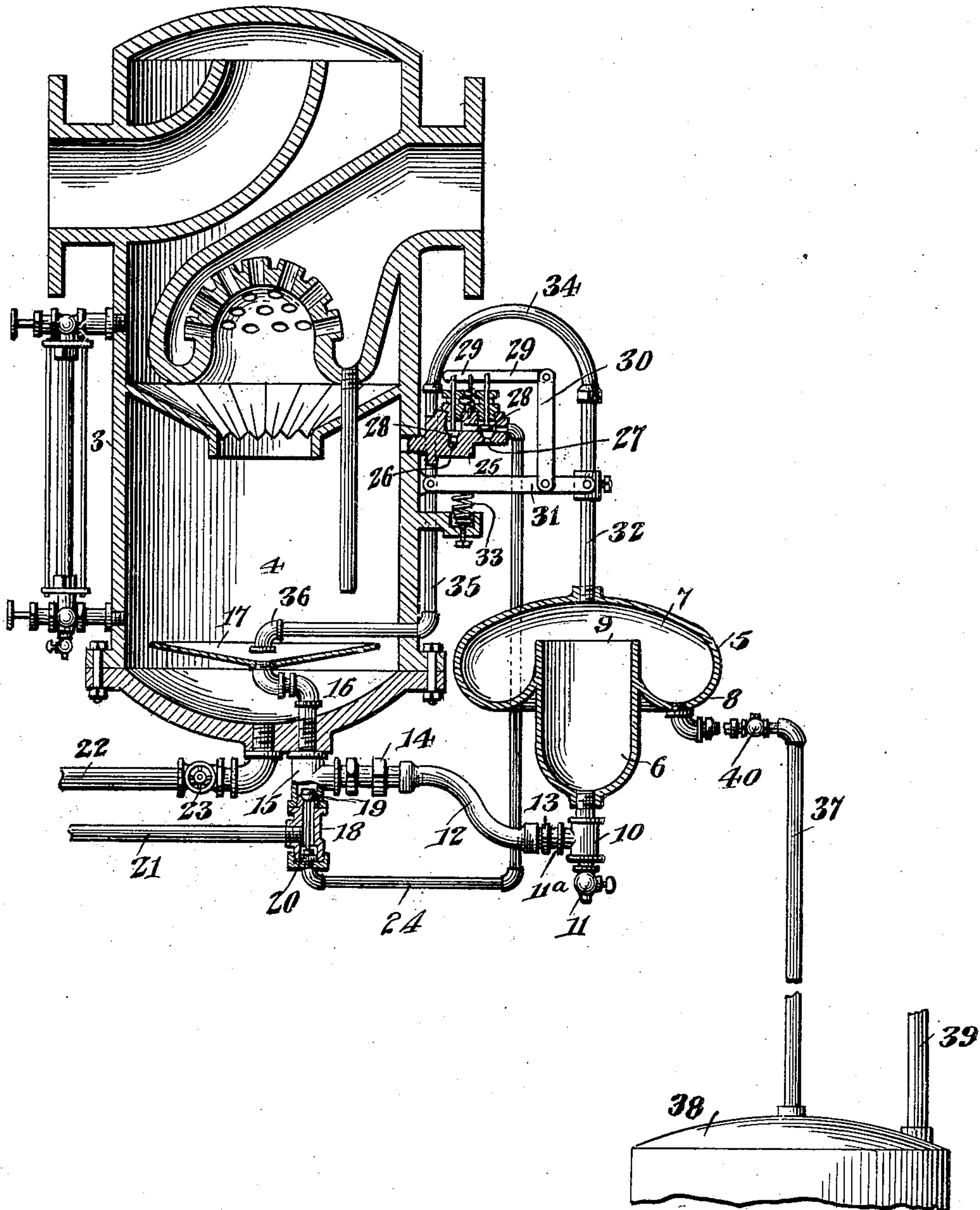


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PATENTED AUG. 25, 1908.

J. F. SENTER.
SEPARATING MECHANISM.
APPLICATION FILED JULY 21, 1906.



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SEPARATING MECHANISM.

No. 897,161.

Specification of Letters Patent.

Patented Aug. 25, 1908.

Application filed July 21, 1906. Serial No. 327,219.

To all whom it may concern:

Be it known that I, JOHN F. SENTER, a citizen of the United States, residing at Chattanooga, in the county of Hamilton and State of Tennessee, have invented a new and useful Water and Oil Separating Mechanism, of which the following is a specification.

This invention relates more particularly to means for separating oil and water after the two liquids have been collected in a combined state from steam, but the invention is not necessarily limited to this particular use.

One of the principal objects is to provide novel mechanism that will automatically take the collected liquids from the steam separator, separate a comparatively great percentage of water from the oil, automatically discharge the former, and conserve the oil and grease remaining, the mechanism being continuously operable and not being liable to derangement.

An embodiment of the invention, that is at present considered the preferable one, is illustrated in the accompanying drawings, wherein the figure is a vertical sectional view through the structure.

In the embodiment disclosed, a steam and liquid separator is illustrated, which is fully set forth and claimed in a co-pending application, Serial No. 306,361, and which therefore need not be fully described. Suffice it to state that a closed casing 3 is employed, in the upper portion of which is located the separating mechanism, the lower portion 4 constituting a collector or reservoir for the liquids separated from the steam. So far as the present invention is concerned, any suitable separating mechanism may be employed. Separating means, in the form of a movable gravity tank 5, is located exteriorly of the closed casing 3, and consists of a receiving chamber 6, having an open top, which is surrounded and inclosed by an overflow chamber 7, the bottom 8 of said overflow chamber being lower than the upper edge 9 of the receiving chamber. The receiving chamber has a depending nipple 10, provided with a drain cock 11, said nipple having a coupling 11^a, to which a section of flexible hose 12 is connected by a detachable union 13. This flexible hose is furthermore connected by another union 14 to one arm of a T-coupling

15, another arm of which is secured to a discharge pipe 16 extending within the lower portion of the casing, and supporting a funnel or catch pan 17. The remaining depending nipple of the T-coupling 15 has secured thereto a motor valve, comprising a casing 18, in the upper portion of which a valve 19 is located, said valve being connected by a piston 20 operating in the lower portion of the casing. A discharge pipe 21 is connected to the casing below the valve, the flow of liquid through this discharge pipe thus being controlled by said valve. Another discharge pipe 22 is connected to the bottom of the casing 3, and its passageway is controlled by a suitable manually operated valve 23.

A combined supply and exhaust port 24 is connected to the casing 18 of the motor valve below the piston, and is also connected to any suitable source of motive fluid supply through a valve casing 25. This valve casing has an inlet port 26, and an exhaust port 27, controlled respectively by valves 28 that are connected in turn to a lever 29. This lever 29 has a link connection 30 with a supporting lever 31, one end of the lever being coupled to the tank 5 by an upright pipe 32, which is threaded into the top of said tank. A spring 33 operates against the lower side of the lever 31 to yieldingly support the same, and thereby the tank 5. With this structure, it will be evident that if the tank 5 is moved downwardly, the valve 28, controlling the inlet port, will be opened, and the valve controlling the exhaust port will be closed. Thus the motive fluid will be admitted to the casing 18 below the piston 20, and raising said piston, will also elevate the valve 19 and open the same, thus throwing the lower portion of the separator casing 3 and the tank 6 into communication with the discharge pipe 21. On the other hand, if the tank 5 moves upwardly, the exhaust port 27 will be opened, while the inlet port will be closed. The supply of motive fluid being cut off, and the exhaust being opened, the valve 19 will move to its closed position. So far as this valve operating mechanism *per se* is concerned, no claim is made herein to it, as said valve mechanism constitutes the subject-matter of a co-pending application, Serial No. 327,217.

The pipe 32 above described, which is in

communication with the upper portion of the interior of the tank 5, has its upper end suitably coupled to a flexible hose 34, said hose having its other end connected to a pipe 35 that extends into the casing 3, and has a downturned open terminal 36 arranged over the funnel 17, preferably within the same, and directly over the inlet end of the pipe 16. An oil and greasy water conducting pipe 37 is connected to the bottom of the overflow chamber 8, and leads to a reservoir 38, having a suitable vent pipe 39. A check valve 40 is preferably located in the pipe 33.

The operation of the structure is substantially as follows. As the steam passes through the separating mechanism in the casing 2, the liquids collected therefrom will drop into the lower portion of the casing 3, as fully disclosed in the co-pending application to which reference has already been made. This oil and water will drop upon the pan or funnel 17, and gravitate down the pipe 16, thus passing through the flexible conduit 12 into the receiving chamber 6. The tank 5 and casing 3 are furthermore in open communication through the pipes 32, 34 and 35, so that the pressure therein is substantially equalized. As the height of the liquid rises, it will be evident that in time the inlet end 36 of the pipe 35 will be submerged, and thus sealed by liquid. It will also be evident that as the oil floats on the surface of the water, the said inlet end 36 will be practically submerged in the oil. It will also be evident that the oil will be on the surface of the water in the receiving chamber 6. As soon as the inlet end 36 of the pressure equalizing pipe 35 is submerged, the supply of steam to the tank 5 will be cut off, and the steam contained therein will quickly condense, thus destroying the equal pressure in the casing 3 and tank 5. As soon as the pressure in the tank 3 overcomes the pressure in the tank 5, it will be evident that the oil on the surface of the water in the casing 3 will be forced through the pipe 35, and thus find its way into the tank 5. The water also will flow quickly through the pipes 16, 12 and 10 into the receiving chamber. This will cause the level of the liquid in the receiving chamber 6 to rise suddenly, and said liquid will overflow into the chamber 8, the overflow being substantially all oil, though of course some greasy water will pass over with it. As soon as a predetermined amount of overflow has taken place, the weight of the tank 5 and its contents will cause it to lower against the tension of the spring 33. As already disclosed, the lowering movement of the tank effects the opening of the valve, controlling the supply of motive fluid to the motor valve 19. As soon as this valve is raised, the water contained in the chamber 6 and in the pipes and casing will discharge, while the oil and greasy water within the overflow chamber 8

will enter the reservoir 38. As soon as the discharge has taken place, the tank 5, being lightened thereby, will again be elevated by the spring 33, thus cutting off the supply of motive fluid to the motor valve and opening the discharge, permitting said valve to close, whereupon the parts are in condition to repeat the operation above described.

From the foregoing, it is thought that the construction, operation, and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. In mechanism of the character described, the combination with a closed container for holding steam and liquid under pressure, of oil and water separating means located exteriorly thereof and including a closed casing, a pipe connecting the steam and liquid holding means and the oil and water separating means for conveying the liquid from the former to the latter, said pipe also having a discharge for drawing off the water from the oil and water separating means, a valve controlling the discharge, and means for drawing the oil from the separating means.

2. In mechanism of the character described, the combination with liquid holding means including a closed casing, of oil and water separating means located exteriorly of the casing, a pipe connecting the lower portion of the casing and the oil and water separating means for conveying liquid from the casing to the latter, and another pipe connecting the casing and the oil and water separating means, said latter pipe having both ends disposed above the ends of the first mentioned pipe and having the end that communicates with the casing disposed in a position to be submerged by the rise of liquid in said casing.

3. In mechanism of the character described, the combination with a liquid container, of mechanism for discharging the liquid therefrom, including a water and oil separator that constitutes controlling means for said discharging mechanism.

4. In mechanism of the character described, the combination with a liquid container, of a discharge therefor, a valve controlling the discharge, and mechanism for actuating the valve including an oil and water separator.

5. In mechanism of the character described, the combination with a container for water and oil, of a discharge connected to the container, a valve controlling the discharge,

and means for actuating the valve including an oil and water separator that communicates with and receives the water and oil from the container.

5 6. In mechanism of the character described, the combination with a liquid holding means, of a discharge therefor, a valve controlling the discharge, and mechanism for actuating the valve including a movable gravity oil and water separating tank connected to and receiving the liquid from the holding means.

15 7. In mechanism of the character described, the combination with a liquid holding casing, of a discharge pipe connected thereto, a motor valve in the pipe, means for supplying motive fluid to the motor valve, valve mechanism controlling the motive fluid supply, and a movable oil and water separating tank connected to the casing and to the valve for operating the latter on an accumulation of liquid therein.

25 8. In mechanism of the character described, the combination with oil and water separating means, of means for supplying liquid thereto, and means for discharging liquid therefrom, including valve mechanism, said separating means constituting an automatic controller for the valve mechanism.

30 9. In mechanism of the character described, the combination with movable oil and water separating means, of means for supplying liquid thereto, means for discharging liquid therefrom, a valve controlling the discharge, and means controlled by the movement of the separating means for operating the valve.

40 10. In mechanism of the character described, the combination with a movable oil and water separating tank having means for supplying liquid thereto, of a discharge pipe communicating with the tank, a valve in said pipe, and means controlled by the movement of the tank for operating the valve.

45 11. In mechanism of the character described, the combination with a movable oil and water separating tank having means for supplying liquid thereto, of a discharge pipe connected to the tank, a motor valve in said pipe, means for supplying motive fluid to the motor valve, valve mechanism controlling the motive fluid supply, and connections between the valve mechanism and tank, whereby the former is operated on the movement of the latter.

55 12. In mechanism of the character described, the combination with liquid holding means, of oil and water separating means connected thereto and receiving the liquid therefrom, and automatic mechanism for periodically discharging the water from the latter, said mechanism being controlled by the separating means.

65 13. In mechanism of the character described, the combination with liquid holding

means, of movable oil and water separating means, a discharge pipe connecting both means and having an outlet, a valve controlling the outlet, and means controlled by the movement of the oil and water separating means for operating the valve.

14. In mechanism of the character described, the combination with a steam and liquid holding means, of a gravity operated oil and water separating tank, a discharge pipe connecting the holding means and tank and having an outlet, a motor valve controlling said outlet, means for supplying motive fluid to the motor valve, valve mechanism controlling the supply, and connections between the said valve mechanism and tank, whereby the mechanism is operated on the movement of the tank.

15. In mechanism of the character described, the combination with movable oil and water separating means, of mechanism for supplying the liquid to be separated to said separating means, and means operated by the separating means upon its movement for automatically and intermittently discharging the water from said separating means.

16. In mechanism of the character described, the combination with liquid collecting means, of an oil and water separator, a conduit connecting the collecting means and separator for conducting liquid from the former to the latter, means for discharging water from the separator, and a separate pressure equalizing pipe connecting said means and separator.

17. In mechanism of the character described, the combination with liquid collecting means, including a closed casing, of an oil and water separating tank disposed exteriorly of the casing, a conduit connecting the casing and tank for conducting liquid from the former to the latter, means for discharging water from the separator, and a separate pressure equalizing pipe connecting the casing and tank and having its inlet end arranged to be submerged in the liquid accumulated in the casing.

18. In mechanism of the character described, the combination with liquid conducting mechanism, including a closed casing having a funnel in its lower portion, of an oil and water separating tank disposed exteriorly of the casing, a liquid conducting conduit connecting the funnel and lower portion of the tank, and a pressure equalizing pipe connected to the upper portion of the tank and having its inlet end arranged in the casing and over the funnel.

19. In mechanism of the character described, the combination with steam and liquid holding means, including a closed casing, of a funnel located in the lower portion thereof, an oil and water separating tank disposed exteriorly of the casing, a discharge

pipe connecting the funnel and lower portion of the tank and having an outlet, a motor valve controlling the outlet, means for supplying motive fluid to the valve, valve mechanism for controlling the motive fluid supply, connections between the valve mechanism and the tank, and a pressure equalizing pipe connected to the upper portion of the tank and having one end arranged within the casing and over the funnel therein.

20. In mechanism of the character described, the combination with steam and liquid holding means including a closed casing, of oil and water separating means located exteriorly of the casing, a funnel located in the casing, a pipe leading from the lower end of the funnel into the lower portion of the oil and water separating means, said pipe having a discharge, an automatic valve controlling the discharge, and another pipe having one end disposed above the funnel and having its other end communicating with the upper portion of the oil and water separating means.

21. The combination with separating mechanism, of means for supplying liquid thereto, said separating mechanism comprising a receiving chamber, and an overflow chamber surrounding the receiving chamber and having its upper end disposed below the top of said receiving chamber, a common supply and draw-off pipe connected to the receiving chamber, means connected to said pipe for drawing off the water from the receiving chamber, and means for drawing oil from the overflow chamber.

22. The combination with separating mechanism, of means for supplying liquid thereto, said separating mechanism comprising a receiving chamber having an open top, an overflow chamber surrounding the receiving chamber and having its bottom disposed below the top and above the bottom of the receiving chamber, means for introducing

liquid to be separated into the receiving chamber, means for drawing the water out of said receiving chamber, and means for drawing the oil from the overflow chamber.

23. In mechanism of the character described, the combination with a steam and liquid holding mechanism, including a closed casing, of a separating tank disposed exteriorly thereof and comprising a receiving chamber having an open top, and an overflow chamber surrounding the upper portion of the receiving chamber and extending over the open top thereof, a flexible connection between the lower portion of the casing and the receiving chamber, a flexible pressure equalizing pipe connecting the top of the tank and the casing, a discharge outlet having communication with the tank and casing, a valve controlling the discharge outlet, means actuated by the tank for operating the valve, and an oil receiver having a flexible connection with the overflow chamber of the tank.

24. In mechanism of the character described, the combination with a casing for holding liquid under pressure, of an oil and water separator movable between positions at different elevations, a pipe connecting the casing and separator for conducting liquid from the former to the latter, a valved discharge for the water separated in said separator, means for automatically opening the valve on the movement of the separator to one of its positions, and means for removing the oil from the separator.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JOHN F. SENTER.

Witnesses:

W. C. FRIERSON,
F. P. LLEWELLYN.