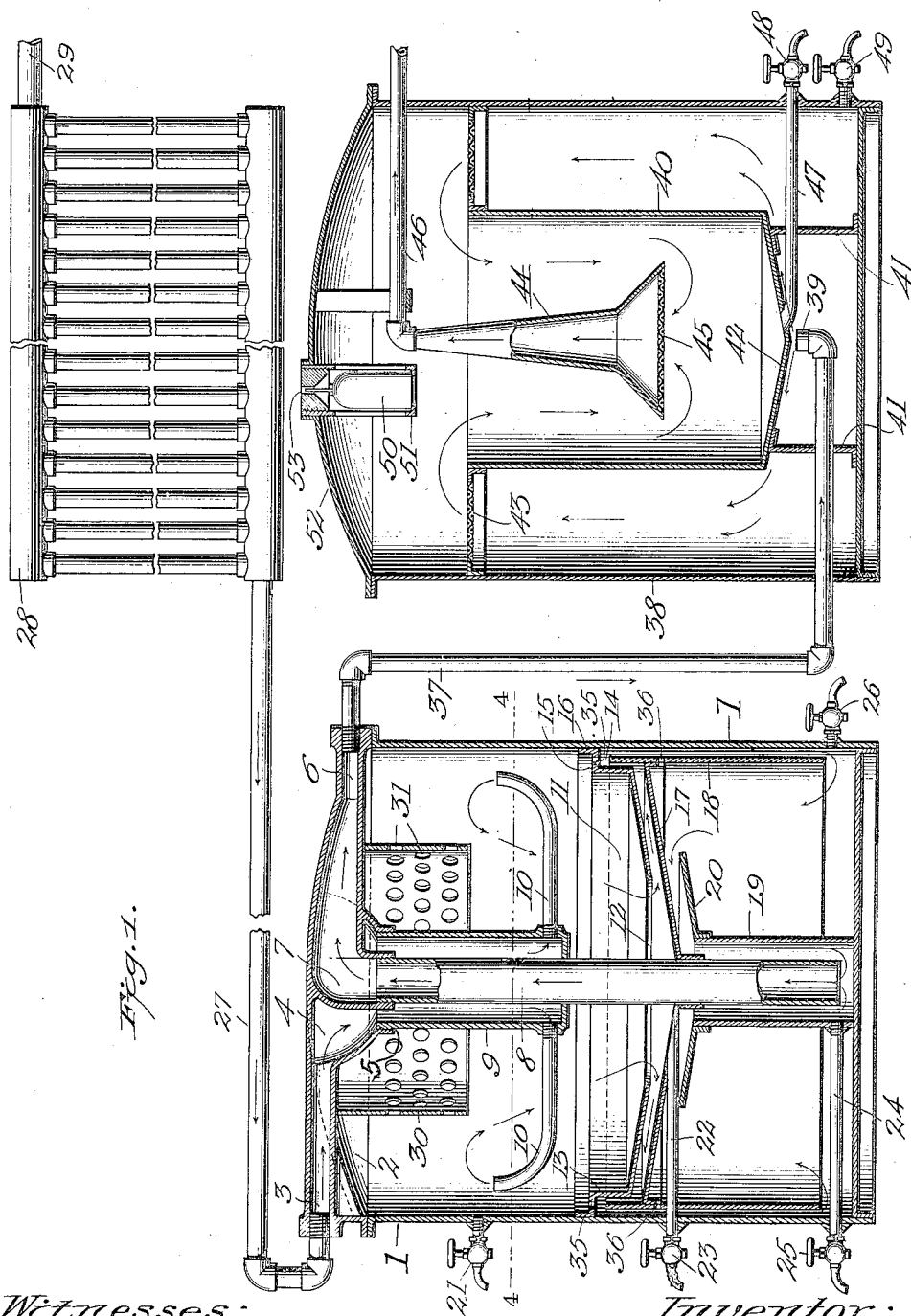


G. C. RENSINK.
OIL SEPARATOR AND PURIFIER.
APPLICATION FILED NOV. 5, 1913.

1,134,419.

Patented Apr. 6, 1915.

2 SHEETS—SHEET 1.



Witnesses:
G. Sargent Elliott.
Elizabeth Smith

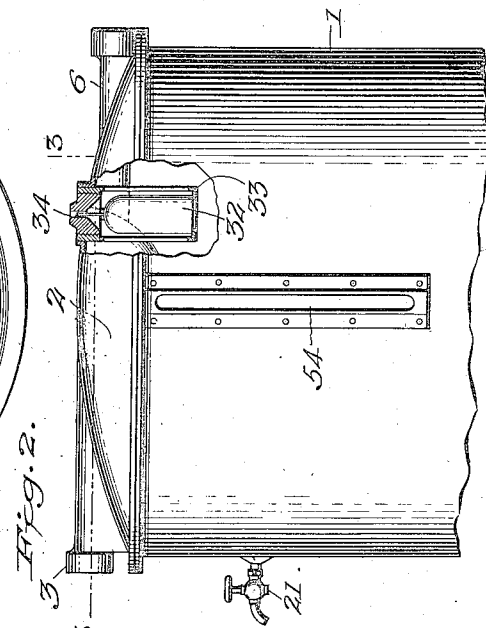
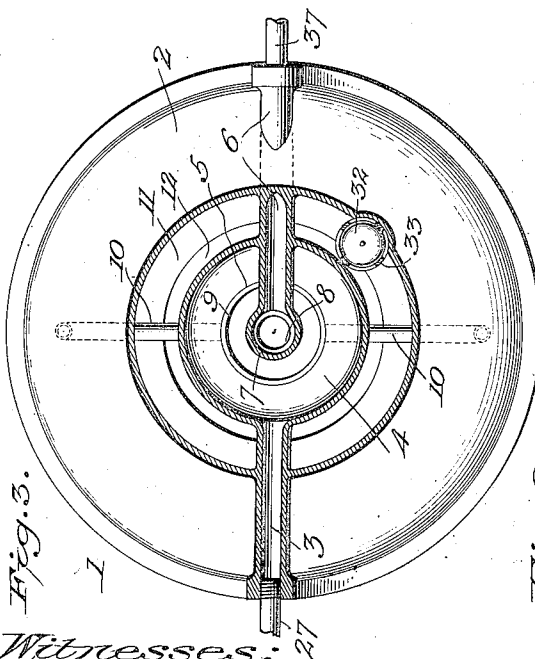
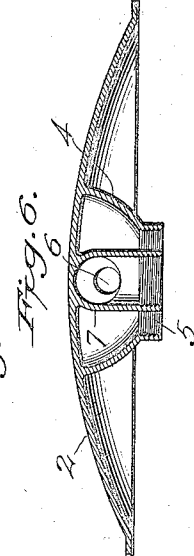
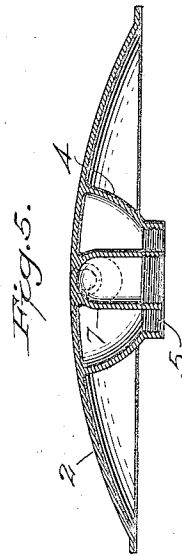
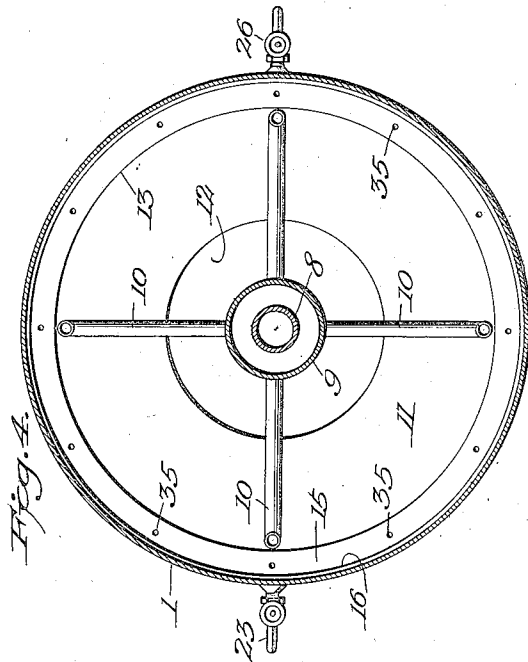
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By A. S. Bailey Attorney.

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UNITED STATES PATENT OFFICE.

GEORGE C. RENSINK, OF DENVER, COLORADO.

OIL SEPARATOR AND PURIFIER.

1,134,419.

Specification of Letters Patent.

Patented Apr. 6, 1915.

Application filed November 5, 1913. Serial No. 799,326.

To all whom it may concern:

Be it known that I, GEORGE C. RENSINK, a citizen of the United States of America, residing in the city and county of Denver and State of Colorado, have invented a new and useful Oil Separator and Purifier, of which the following is a specification.

This invention relates to improvements in oil separators and purifiers.

The object of the invention is to provide a device of this character, comprising a main tank in which the water of condensation from a stationary engine or the engine of a steam-propelled vehicle is given a circuitous course from its entrance therein to its exit therefrom, whereby a complete separation of the oil from the water is effected; and a supplemental tank in which the water is freed from all sediment and foreign substances.

Further, to provide a main tank in which the water is given a circuitous course from its entrance to its exit, and which is arranged to receive sediment at various non-communicating points in the course of travel of said water, faucets being provided for drawing off said sediment, said tank being also arranged to prevent it from becoming either air-bound or steam-bound during the passage of the water through the tank, a supplemental tank being provided to receive the water from the main tank and to thoroughly filter the same, said tanks being provided with float valves, which permit the escape of air or steam when the water in said tanks is below a predetermined level.

These objects are accomplished by the device illustrated in the accompanying drawings, in which:

Figure 1 is a vertical, sectional view through the two tanks comprising my improved oil separator and purifier. Fig. 2 is a side view of a portion of the main tank, partly broken away to show a float valve located at the upper end of said tank. Fig. 3 is a horizontal sectional view on the line 3—3 of Fig. 2. Fig. 4 is a horizontal, sectional view on the line 4—4 of Fig. 1. Fig. 5 is a vertical, sectional view through the cap of the main tank at right angles to the section illustrated in Fig. 1; and Fig. 6 is a similar sectional view to that shown in Fig. 5, but looking in the diametrically opposite direction.

Referring to the accompanying drawings:

The numeral 1 indicates the main tank in which the separation of the oil from the water takes place. This tank is closed by a concavo-convex cap or cover 2, which is tightly secured thereon in any suitable manner, and this cap is preferably cast iron on account of the nature of its construction. An inlet passage 3 extends from the marginal edge of the cap toward its axial center and terminates in an axial semi-spherical chamber 4, having a relatively large threaded opening 5 extending through its bottom, the walls of the inlet, the chamber 4 and the cap being integrally connected. An outlet passage 6 extends through the cap at a diametrically opposite point from the inlet passage 3, and through the adjacent side of the chamber 4, and terminates in the chamber in an elbow 7, the lower end of which is internally threaded, and extends into, and is concentric with the opening 5 in the said chamber 4, but is of considerably less diameter than the said opening. The elbow and outlet are also integral with the cap and with the wall of the chamber 4, but there is no communication between the inlet and outlet passages, as will be understood by reference to Figs. 1 and 3. A pipe 8 is screwed into the elbow 7 and extends down to within a short distance of the bottom of the tank. A short pipe or jacket 9 surrounds the upper portion of the pipe 8, and screws into the opening 5 of the chamber 4. The lower end of the pipe 9 is closed, save for an opening which is formed therein, through which the pipe 8 passes, the pipe fitting the said opening tightly. A plurality of radially disposed tubes 10, are screwed into the jacket 9, adjacent to its lower end, and the outer ends of these tubes are upturned and extend adjacent to the sides of the tank. A diaphragm 11, extends across the tank, below the tubes 10. This diaphragm comprises a slightly conical bottom having a relatively large central opening 12. The outer margin of the bottom terminates in an annular wall 13, which is concentric with the wall of the tank, but spaced therefrom so as to form an annular space 14, between the said wall 13 and the wall of the tank. The wall 13 terminates in a horizontal annular step 15, and the step terminates in a flange 16, which is secured to the wall of the tank.

Slightly below the diaphragm 11, and parallel with it, is a second diaphragm 17,

having a central hub, which tightly surrounds the pipe 8. The circumferential edge of this diaphragm is secured to a cylindrical wall or partition 18, which is spaced
 5 from the wall of the tank and extends from a point near the bottom of the tank to within a short distance of the step portion 15, of the diaphragm 11, a space being left between it and the annular wall 13 of the said diaphragm. A jacket 19 surrounds the lower
 10 portion of the pipe 8. This jacket rests upon and is secured to the bottom of the tank and extends up to within a short distance of the diaphragm 17, its upper end being provided with a flaring flange 20,
 15 which is parallel with the said diaphragm 17. A drain faucet 21 is positioned at the oil level in the tank; a drain pipe 22, leads from the bottom of the diaphragm 17,
 20 through the wall of the tank, and is provided with a faucet 23; a drain pipe 24 leads from the bottom of the jacket 19, through the wall of the tank, and is provided with a faucet 25, and a faucet 26 is positioned at
 25 the bottom of the tank.

The tank above described is the one in which the separation of the oil from the water takes place. The water, carrying the oil, enters the inlet 3, through a pipe 27,
 30 which leads from a cooler 28, of any preferred type, said cooler forming no part of the present invention. The cooler is connected by a pipe 29, with a suitable receiving tank, which is supplied from a condenser which receives the steam from the
 35 engine, the water being forced into the main separating tank by a pump connected with the receiving tank. The receiving tank, the pump and the condenser and engine are
 40 omitted from the drawings, as they form no part of the present invention.

A cylindrical wall or baffle plate 30; is secured to the cap 2, and extends down a suitable distance into the tank. This baffle
 45 plate is provided with a multiplicity of perforations 31, and it is adapted to prevent undue agitation or splashing of the water in the tank, particularly where the separator is used in connection with steam propelled
 50 vehicles. A float valve 32, is supported in a suitable cage 33, attached to the cap 2, and this valve normally closes an outlet 34, which permits the escape of either steam or
 55 air, when the water in the tank drops below the level of the bottom of the cage 33, as will be fully explained hereinafter. The step 15, of the diaphragm 11, is provided with a circular series of small apertures 35,
 60 and the wall 12 is also provided with similar apertures 36, the object of which will appear later.

A pipe 37, connects the outlet 6, of the main tank 1, with the lower end of a tank 38, in which the water is purified by being
 65 freed of all sediment and foreign substances

which it may contain. The pipe 37, extends into the axial center of the tank 38, and is provided with an upwardly projecting nozzle 39. A cylindrical receptacle 40
 is supported within the tank 38, upon legs 70 41. This receptacle is of considerably less diameter than the tank 38, and has a conical bottom 42, the apex of which is in line with and slightly above the nozzle 39. The receptacle 40, extends up to within a suitable
 75 distance of the top of the tank 38, and between its upper end and the wall of the tank is supported a circular horizontal screen 43, of suitable mesh. A funnel-shaped pipe 44, extends down a suitable distance into the
 80 receptacle 40, and over its lower flared end is secured a screen 45. The upper end of this funnel-shaped pipe is connected with an outlet pipe 46, which extends out through the wall of the tank, and leads to a receiving
 85 tank—not shown—which is connected with the boiler. A drain pipe 47, extends from the bottom of the receptacle 40, through the wall of the tank, and is provided with a faucet 48, and a faucet 49 is positioned in
 90 the wall of the tank adjacent to the bottom thereof. A float valve 50 is supported in a cage 51, secured to the cap 52, of the tank, and this valve normally closes an outlet 53, in the said cap, but permits the escape of
 95 either air or steam when the water in the tank falls below, or fails to reach a predetermined level.

In Fig. 2, a gage 54 is shown on the upper portion of the tank 1, by means of which the
 100 water and oil level in the tank may be ascertained.

In operation, water of condensation is pumped into the tank 1, through the inlet 3, and passes into the chamber 4 and down
 105 into the jacket 9, whence it passes out and upward, through the tubes 10, and falls upon the diaphragm 11, whence it flows into the diaphragm 17. As the water above the diaphragm 17 increases in volume, it is
 110 forced out between the diaphragms 11 and 17, and over the upper edge of the wall 18, the sediment meantime precipitating to the bottom of the diaphragm 17, whence it may be drawn off through the faucet 23. As the
 115 water overflows the upper edge of the wall 18, it passes down between the said wall 18 and the wall of the tank and into the tank. It then rises in the chamber inclosed by the wall 18, and the air or steam between the
 120 upper surface of the water and the diaphragm 17, escapes through the apertures 36 and 35, thereby relieving the pressure upon the water. Sediment in the water is deposited in the bottom of the tank, and is
 125 drawn off, when necessary, through the faucet 26. When the water rises to the level of the flange 20, it overflows into the jacket 19, and sediment collected in the bottom of said jacket may be drawn off through the
 130

faucet 25. From the jacket 19, the water passes up through the pipe 8, to the outlet 6, whence it passes through the pipe 37, to the purifying tank 38. Should there be a volume of air or steam in the tank sufficient to prevent the water from rising to the level of the outlet, the float valve 32 will drop by gravity, and permit the said air or steam to escape through the outlet 34, but when the water rises to a sufficient height, the valve is lifted and closes the said outlet, and the water passes freely through the tank. In the purifying tank, the water from the pipe 37, passes out through the nozzle 39 against the conical bottom of the receptacle 40, by which it is divided or separated, and passes up around the sides of the receptacle 40, and through the screen 43, into the receptacle 40, whence it passes through the screen 45, on the lower end of the funnel-like pipe 44, through said pipe and out through the outlet pipe 46. The sediment separated by the screen 43, being of greater specific gravity than the water, falls by gravity and settles to the bottom of the tank, thus preventing the screen from becoming clogged, and is drawn off by the faucet 49, while that separated by the screen 45 settles to the bottom of the receptacle 40, leaving the screen free, as in the case of the screen 43, and is drawn off by the faucet 48. When the water is discharged from the pipe 46, it is purified to such an extent that it is in condition to be returned to the boiler.

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

1. In an oil separator and purifier, a tank having a cap thereon provided with an axial chamber which terminates in an inlet passage, said chamber having an opening in its bottom, and an outlet passage which terminates in an elbow within the said chamber, a pipe threaded to said elbow and extending nearly to the bottom of the tank, a jacket threaded to the opening in the said chamber, and surrounding, but spaced from the upper portion of said pipe, and being closed at its lower end, radially disposed pipes extending from the lower portion of said jacket, a cylindrical partition in the lower part of the tank and spaced therefrom, a diaphragm near the upper end of the partition, having a hub tightly surrounding the said pipe, a jacket surrounding the lower portion of the pipe and spaced therefrom, and having a flange on its upper end parallel with and adjacent to the said diaphragm, said jacket being fast to the bottom of the tank; and a second diaphragm above, but adjacent to and parallel with the first diaphragm, having an annular step portion which extends above the upper edge of the cylindrical partition, and is secured to the wall of the tank, said second

diaphragm having a relatively large central opening.

2. In an oil separator and purifier, the combination with an oil separating tank, of a cylindrical partition in the lower half thereof and spaced from the bottom and wall of said tank, a conical diaphragm near the upper end of said partition, a jacket extending centrally from the bottom of said tank to within a short distance of said diaphragm and having a flared flange parallel with said diaphragm, a cap on said tank having an axial chamber with a threaded opening in its bottom and a radial inlet opening into said chamber, an elbow in said chamber terminating in a radial outlet, said inlet and outlet being non-communicating, a jacket threaded to the opening in said inlet chamber provided with radial tubes adjacent to its lower end, having upturned outer ends, a pipe extending from said elbow through the adjacent jacket, and the diaphragm and into the lower jacket to within a short distance of the bottom of the tank, draw-off tubes leading from the bottom of the lower jacket and the bottom of the diaphragm and provided with faucets; a ring form of diaphragm spaced from the first diaphragm and cylindrical partition and secured to the wall of the tank, and automatically operated means for permitting the escape of air or steam from the upper end of the tank.

3. In an oil separator and purifier, a separating tank, a cap therefor having an axial inlet, an outlet within the inlet, said inlet and outlet terminating at opposite sides of the cap and having no communication, a pipe extending down from the axial outlet to within a short distance of the bottom of the tank, a jacket loosely surrounding the upper portion of said pipe and threaded at its upper end to the axial inlet, its bottom being closed around the said pipe, tubes having upturned outer ends extending from the bottom of said jacket, a jacket surrounding loosely the lower portion of the pipe and made fast to the bottom of the tank, said jacket having a flaring flange at its upper end, a diaphragm secured to the pipe above and parallel with the said flaring flange, a cylindrical partition secured to the circumferential edge of said diaphragm, which is spaced from the wall of the tank and extends above the diaphragm and to within a short distance of the bottom of the tank, a ring-like diaphragm slightly above the first diaphragm, having an annular perforated stepped portion, which extends above the top of the cylindrical partition and is secured to the wall of the tank, perforations being formed in the said partition below the first diaphragm, and a float valve attached to said cap, which normally closes a vent therein.

4. In an oil separator and purifier, the combination with a tank, of a cap therefor having an inlet terminating in an axial opening, and an outlet terminating in an axial opening within the axial inlet opening, a pipe extending from the axial outlet opening to within a short distance of the bottom of the tank, means for conveying the contents of the tank through a devious course to the bottom of said pipe, a float valve supported at the top of the tank and adapted to normally close a vent in said tank.

5. In a device of the character described, the combination with a tank, of a cap therefor having a radial inlet terminating in an axial chamber with an opening in its bottom, and a radial outlet which extends into said chamber and terminates in an elbow, a pipe extending from said elbow to within a short distance of the bottom of the tank, a jacket loosely surrounding the lower portion of said pipe and secured to the bottom of the tank, a diaphragm secured to said pipe above said jacket, a cylindrical partition secured to said diaphragm and spaced from the wall and bottom of said tank, an open diaphragm above and spaced from the first diaphragm, a jacket threaded to the axial opening of the inlet and loosely surrounding the upper portion of said pipe, and radial tubes extending from the lower end of said jacket, means for drawing off the contents at settling points in the tank, and automatically operating means for permitting the escape of air or steam from the upper end of the tank.

6. In a device of the character described, the combination with a tank, of a cap therefor having an inlet passage which terminates in an axial opening, and an outlet passage which terminates within the axial inlet opening, said passages being on substantially the same horizontal plane, a pipe extending from the outlet passage to within a short distance of the bottom of the tank, and means including spaced diaphragms and a cylindrical partition for deviating the course of the water in said tank from its entrance therein to the bottom of said pipe.

7. In a device of the character described,

a tank, an outlet pipe extending from near the bottom of said tank and connected with an outlet at the top of said tank, a closed bottom jacket loosely surrounding the upper portion of said outlet pipe and connected with an inlet passage in the top of said tank, outlet tubes extending from the lower end of said jacket, a diaphragm midway of the depth of the tank, a draw-off pipe extending from the bottom of said diaphragm through the wall of the tank and provided with a faucet, a cylindrical partition surrounding said diaphragm and forming a chamber beneath the same, which is open at the bottom, an annular space being left between the wall of the tank and the partition wall, an open diaphragm above and spaced from the first diaphragm, whereby a continuous passage is formed between said diaphragms, and the partition and tank walls, which communicates with the chamber below the first diaphragm, and a jacket surrounding loosely the lower portion of the outlet pipe, the upper end of said jacket being open.

8. An oil separating tank having an inlet and an outlet at its upper end, a pipe extending from the outlet to within a short distance of the bottom of the tank, a jacket loosely surrounding the lower end of said pipe and open at its upper end, a draw-off pipe extending from the bottom of said jacket and provided with a faucet, cooperating diaphragms and a cylindrical partition for forming upper and lower chambers, also an angular passage extending from the upper chamber to the bottom of the lower chamber, a drain faucet at the lower end of the tank, a drain faucet near the upper end of the tank, and a float valve in the upper end of the tank which permits the escape of air or steam when the water in said tank is below a predetermined level.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE C. RENSINK.

Witnesses:

G. SARGENT ELLIOTT,
ELIZABETH SMITH.