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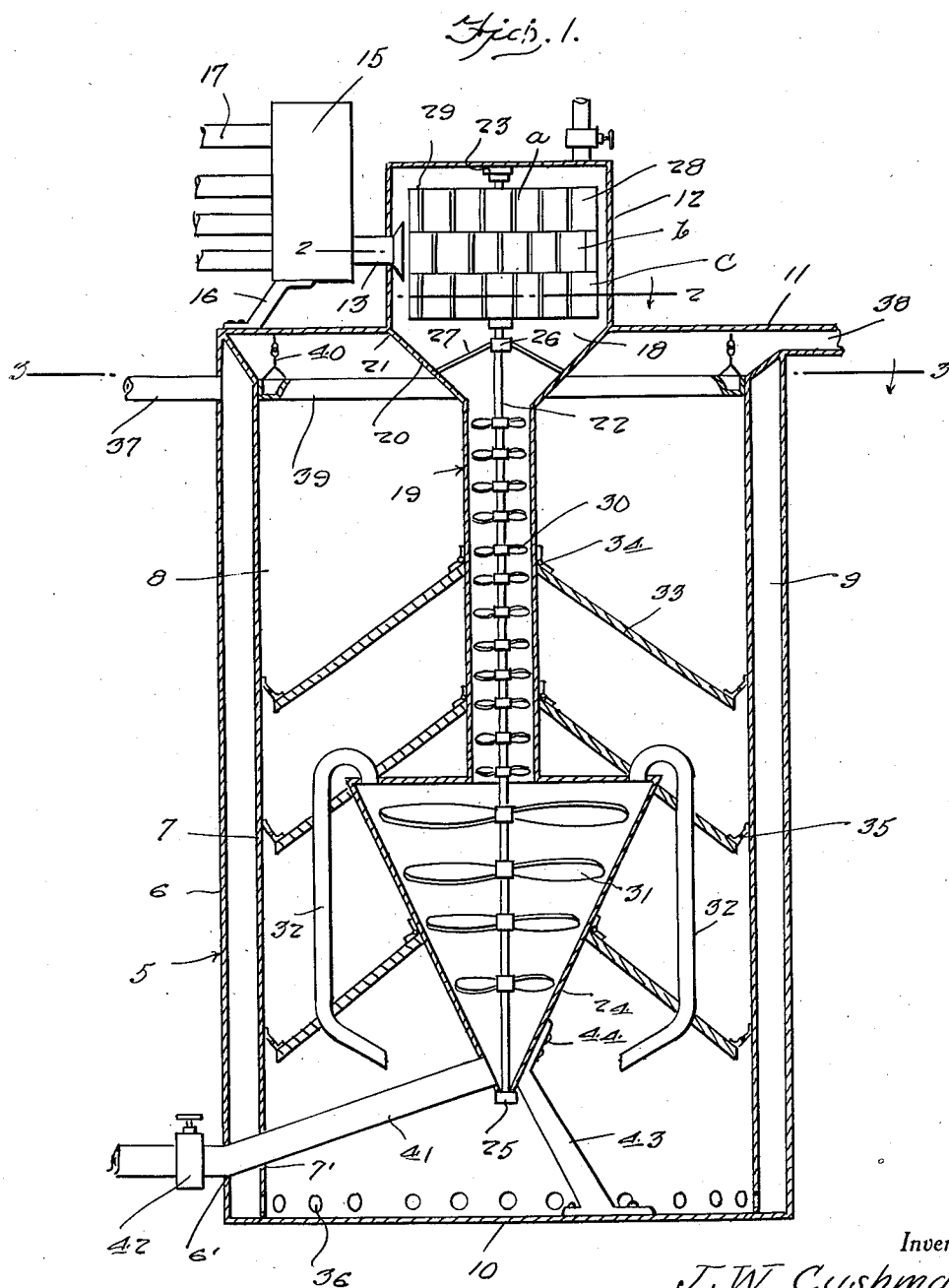
J. W. CUSHMAN ET AL

1,753,403

OIL SEPARATOR

Filed March 30, 1929

2 Sheets-Sheet 1



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Fig. 2.

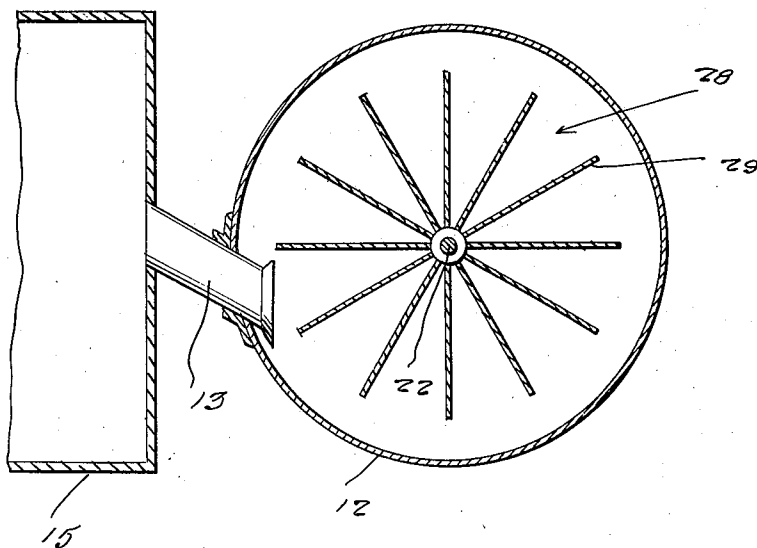
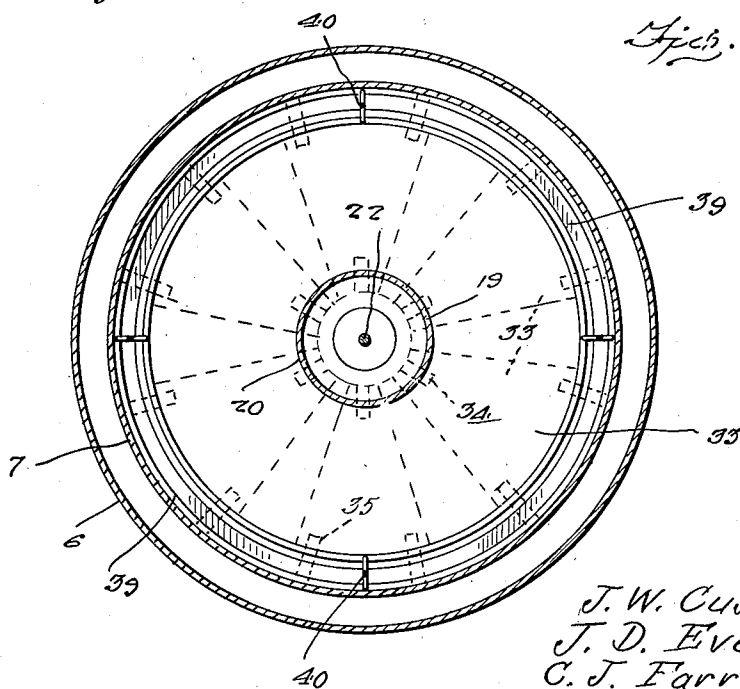


Fig. 3.



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OIL SEPARATOR

Application filed March 30, 1929. Serial No. 351,398.

This invention relates to improvements to what is known in the art as an oil separator.

The primary object of the invention is to provide an improved oil separator whereby crude oil from the well will be thoroughly cleansed and freed of water and other foreign substances prior to its reception into supply tanks.

A further object of the invention is to provide a device, whereby the oil from a plurality of wells is admitted into a single oil separator and there to be freed of water and all foreign and impure substances in a thorough and novel manner, and then to be discharged and conveyed to the reservoir tank.

Another salient object of the invention is to provide an oil separator which is simple in construction, inexpensive, practical, and thoroughly efficient in use.

Other objects and advantages of the invention will be apparent from a study of the following description taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a vertical section taken through the tank showing my improved separating means.

Figure 2 is a sectional view, taken on the line 2—2 of Figure 1.

Figure 3 is a sectional view, taken on the line 3—3 of Figure 1.

With reference more in detail to the drawings, it will be seen that my improved separator embodies a cylindrical tank generally designated by the reference character 5 and comprising a pair of spaced inner and outer walls 6 and 7 respectively, spaced so as to provide an inner chamber 8, and outer chamber 9. The cylindrical tank 5 is further provided with the usual bottom 10 and top 11. The upper portion of the tank 5 is provided with a receiving head 12 adapted to receive the crude oil from a plurality of wells through an intake exhaust 13, extending inwardly thereof as at 14, which intake 13 leads from an intake chamber 15, suitably supported on the cylinder 5 by means of the bracket 16 and into which the oil is conducted from the respective well by means of intake conduits 17. The top 11 of the tank is provided with an opening 18, while a funnel shaped member

19 is formed integral with the top 11 and depends inwardly into the inner chamber 8. The funnel shaped member 19 has its flared mouth 20 formed integral with the top 11 adjacent the opening 18 as at 21. It is to be understood, of course that the receiving head 12 communicates with this opening 18 and consequently with the flared mouth of the funnel shaped member 19. A vertical shaft 22 has one end journaled in the top wall of the cylinder head 12 within journal bearings 23 and the other end of the shaft 22 journaled in the bottom end of a sediment trap 24, as at 25. The sediment trap 24 will be hereinafter more fully described. The shaft 22, it is to be noted, is supported in a bearing 26, which bearing 26 is suitably supported in the mouth of the funnel member 19 by means of brackets 27.

The funnel shaped member 19 terminates adjacent its lower end in the sediment trap 24, which trap 24 is formed preferably integral with the funnel 19 and is substantially conical in formation and having at its apex the bearing 25 in which is journaled the shaft 22, as before set forth.

Fixed to the shaft 22, and located within the receiving head 12 is a power wheel 28, and is constructed of sectionalized bands having three circular sections A, B, and C, provided with alternating bands 29, against which the oil from the intake exhaust 13, impinges for rotating the shaft 22. Fixed to the shaft and in spaced relation is a plurality of cutting blades 30 located within the funnel 19 and adapted to rotate therein during actuation of the shaft 22. Within the sediment trap 24, that portion of the shaft depending therein carries a plurality of cutting blades 31, graduating in size with the smallest of the blades disposed adjacent the apex of the chamber. Thus it will be seen that the crude oil upon striking the bands 29 to operate the wheel 28 will, by gravity, flow through the funnel 19 and there be further broken up and forced downwardly by the rotation of the cutters 30, forcing its way by virtue of the force of the cutter into the sediment stop 24, to be again further broken up and forced downwardly by the cutters 31, where the foreign substance

in the crude oil settles, the sediment settling in the bottom of the trap and the oil and water rising to be forced out of the trap through the outlet pipe into the inner or what may be termed the oil chamber 8.

The oil and water having collected in the chamber 8, the oil will seek the higher level and direct its course upwardly against the retarders or baffle plates 33, which plates are hingedly connected to the funnel 19 as at 34, and the said plates adapted to extend downwardly and outwardly from the funnel with their free ends terminating in spaced relation to the inner walls 7. The plates 33 are preferably of triangular formation and radiate from the funnel in spaced relation. These plates are preferably arranged in series and each of said series comprising a plurality of the plates arranged one above the other and in spaced relation to each other. See Figures 1 and 3. Suitable brackets 35 connect the free ends of the baffle plates 33 with the inner wall 7 for bracing the plates when in their extended position. The oil then rises upwardly in the chamber 8 between the individual plates and the inner wall of the chamber, freeing itself of the water which settles in the bottom of the chamber to be discharged from the chamber to a plurality of openings 36, formed in the wall 7 adjacent the bottom 10 of the tank to rise within the outer chamber 9, being finally discharged through the water outlet pipe 37, communicating with the chamber adjacent the upper end of the tank 5, the oil rising within the chamber 8, forcing its way between the baffle plates to be finally discharged through the outlet 38 formed in the upper end of the tank 5 and communicating with the chamber 8. A U-shaped member 39 in the form of a ring fits closely around and on the inside of the inner chamber 8, the inside wall of the U being curved outwardly toward the center of the inner chamber to provide a cutting edge for the purpose of cutting the thinnest film of oil from whatever water may remain in the oil during its rise within the chamber. The U-shaped member is suspended from the top of the cylinder 5 by a plurality of flexible links 40 to permit upward movement of the member 39. This U-shaped member 39 I will hereinafter refer to as a cutting edge and is adapted to be kept in position at all times to take off the thinnest film of oil and at the same time being capable of rising with the oil to prevent the oil and water pressure from forcing the oil over the cutter, that would not be free from the water.

The basic settlements and all foreign substances are solid found in the oil and which settle in the trap and are discharged therefrom by gravitation to a discharge pipe 41, leading from the lower end of the trap through the walls 6 and 7 as at 6' and 7' respectively.

The discharge 41 is provided with the usual valve 42, the purpose of which is apparent.

Such gas as may be present at the time oil is discharged from the intake pipe 17 into the intake chambers 15 and finally into the receiving head 12 to be discharged against the power wheel 28 will be readily relieved through the pressure of valves 46 on the outlet pipe 45 rising from the receiving head.

It is yet to be mentioned that a bracket 43 rises from the bottom 10 and is riveted or otherwise secured as at 44, to the trap 24 adjacent the apex of the trap. This bracket 24 tends to hold the funnel 19 and trap 24 rigid within the chamber 8.

It is though that the construction, operation, and advantages of this invention will be clearly understood without a more detailed description thereof. The present embodiment of the invention has been disclosed in detail merely by way of example and it is apparent that changes in the details of construction and the combination and arrangement of parts may be resorted to, without departing from the spirit of the invention and the scope of the claims without sacrificing any of its advantages.

Having thus described my invention, what I wish to claim is:

1. In a device of the class described, a cylindrical tank comprising a pair of spaced walls dividing the same into an inner and outer chamber, a receiving head formed on the top of the tank and provided with an opening, an intake funnel formed centrally of and depending from the top of the cylinder into said inner chamber and communicating with the opening in the receiving head, a trap formed on the lower end of said funnel, a shaft journaled in the funnel and extending into the head and trap, cutting blades on the shaft and located within the funnel and trap, a power wheel on the upper end of the shaft and adapted to rotate within said receiving head.
2. In an oil separator of the class described, a cylindrical tank comprising a pair of spaced walls dividing the same into an inner and outer chamber, an oil receiving head formed on the top of the tank and provided with an opening, an intake funnel formed centrally of and depending from the top of the cylinder into said inner chamber and communicating with the opening in the receiving head, an intake chamber disposed on the top of the tank and communicating with said intake head, means for supplying oil to the intake chamber, a shaft journaled in the funnel and extending into the head, a power wheel on the upper end of the shaft, said power wheel being provided with a plurality of bands radiating therefrom and against which the oil from the intake chamber is adapted to impend for operating the

wheel, a plurality of blades carried by the shaft and located within said funnel, a trap formed at the lower end of the funnel to receive the oil in its passage through the funnel, and overflow pipes associated with the trap and communicating with the inner chamber.

3. In an oil separator of the class described, a cylindrical tank comprising a pair of spaced walls dividing the same into an inner and outer chamber, an oil receiving head formed on the top of the tank and provided with an opening, an intake funnel formed centrally of and depending from the top of the cylinder into said inner chamber and communicating with the opening in the receiving head, an intake chamber disposed on the top of the tank and communicating with said intake head, means for supplying oil to the intake chamber, a shaft journaled in the funnel and extending into the head, a power wheel on the upper end of the shaft, said power wheel being provided with a plurality of bands radiating therefrom and against which the oil from the intake chamber is adapted to impend for operating the wheel, a plurality of blades carried by the shaft and located within said funnel, a trap formed at the lower end of the funnel to receive the oil in its passage through the funnel, and overflow pipes associated with the trap and communicating with the inner chamber, baffle plates within said inner chamber and supported by said funnel and said inner chamber being provided with an oil outlet formed adjacent the upper end of the tank.

4. In an oil separator of the class described, a cylindrical tank comprising a pair of spaced walls dividing the same into an inner and outer chamber, an oil receiving head rising from the top of said tank, an intake funnel formed centrally of and depending from the top of the cylinder into said inner chamber, and said funnel communicating with said oil receiving head, said funnel terminating at its inner end in a conical shaped oil receiving trap, a shaft journaled in the funnel and extending into said head and trap, a power wheel carried by the shaft and located within said oil receiving head, said wheel comprising a plurality of bands radiating therefrom and against which the oil is adapted to impend for rotating the wheel, cutting blades on the shaft and located within the funnel and trap, means for directing the oil from the trap into said inner chamber, baffle plates within said inner chamber and supported by said funnel, an oil outlet for the chamber formed in the tank adjacent the top of said tank, and said inner wall being provided with a plurality of spaced openings adjacent the bottom thereof communicating with said outer

chamber, and a water outlet portion for said outer chamber.

5. In a device of the character described, a cylinder comprising a pair of spaced walls dividing the same into an inner and outer chamber, an oil receiving head rising from the top of said cylinder, an intake funnel formed centrally of and depending from the top of the cylinder into said inner chamber, said intake funnel adapted to communicate with said oil receiving head, a trap formed on the lower end of said funnel, a head journaled in said funnel and extending into the head and trap, cutting blades on the shaft and located within the funnel and trap, a power wheel on the upper end of the shaft adapted to rotate within said oil receiving head, said trap being provided with overflow pipes extending into said inner chamber, drain means associated with the trap and extending outwardly of the cylinder, baffle plates within said inner chamber, a plurality of openings formed on said inner wall and communicating with said outer chamber, an outlet for said outer chamber, an outlet for said inner chamber formed in the tank adjacent the top of the tank, and a substantially ring-like member depending inwardly of the inner chamber adjacent said outlet.

6. In a device of the class described, a tank, an oil receiving head associated with the tank at the upper end thereof, an oil receiving chamber, means for supporting the chamber adjacent said oil receiving head, a pipe leading from said chamber and extending inwardly of said oil receiving head, a vertical shaft within the tank and extending into said oil receiving head, a power wheel on the shaft disposed in operative relation to said intake pipe, an oil conduit leading from said head inwardly of the tank, and said shaft adapted to extend through said conduit and being provided with a plurality of cutting blades for agitating the oil during its flow through the conduits.

7. In a device of the class described, a cylindrical tank comprising a pair of spaced walls dividing the same into an outer chamber, an oil receiving head formed on the top of the cylinder and having an opening provided therein, an intake funnel formed centrally of and depending from the top of the cylinder into said chamber and communicating with the opening in the receiving head, a trap formed on the lower end of said funnel, overflow pipes for the trap extending into said inner end chamber, a drain leading from the trap and extending outwardly of said tank, a shaft journaled in the funnel and extending into the head and trap, cutting blades on the shaft located within the funnel and trap, a power wheel on the upper end of the shaft having a plurality of alternately arranged spaced bands radiating therefrom, means for rotating the wheel for actuating

the shaft, baffle plates extending from the
funnel and projecting downwardly and out-
wardly therefrom, the free ends of said baf-
fles terminating in spaced relation from said
5 inner walls, a plurality of openings formed
in said inner walls adjacent the bottom of
said walls, outlets for the respective cham-
bers, a substantially ring-like member of
U-shaped formation in cross section fitting
10 loosely around the inside of said inner cham-
ber adjacent its outlet, means for suspend-
ing said member from the top of said tank,
and the inner wall of said ring-like U-shaped
member being curved outwardly toward the
15 center of said inner chamber.

In testimony whereof we affix our signa-
tures.

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