Dec. 24, 1940. W. M. McGUFFEE 2,226,470

OIL TREATING APPARATUS

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FIG. 1.

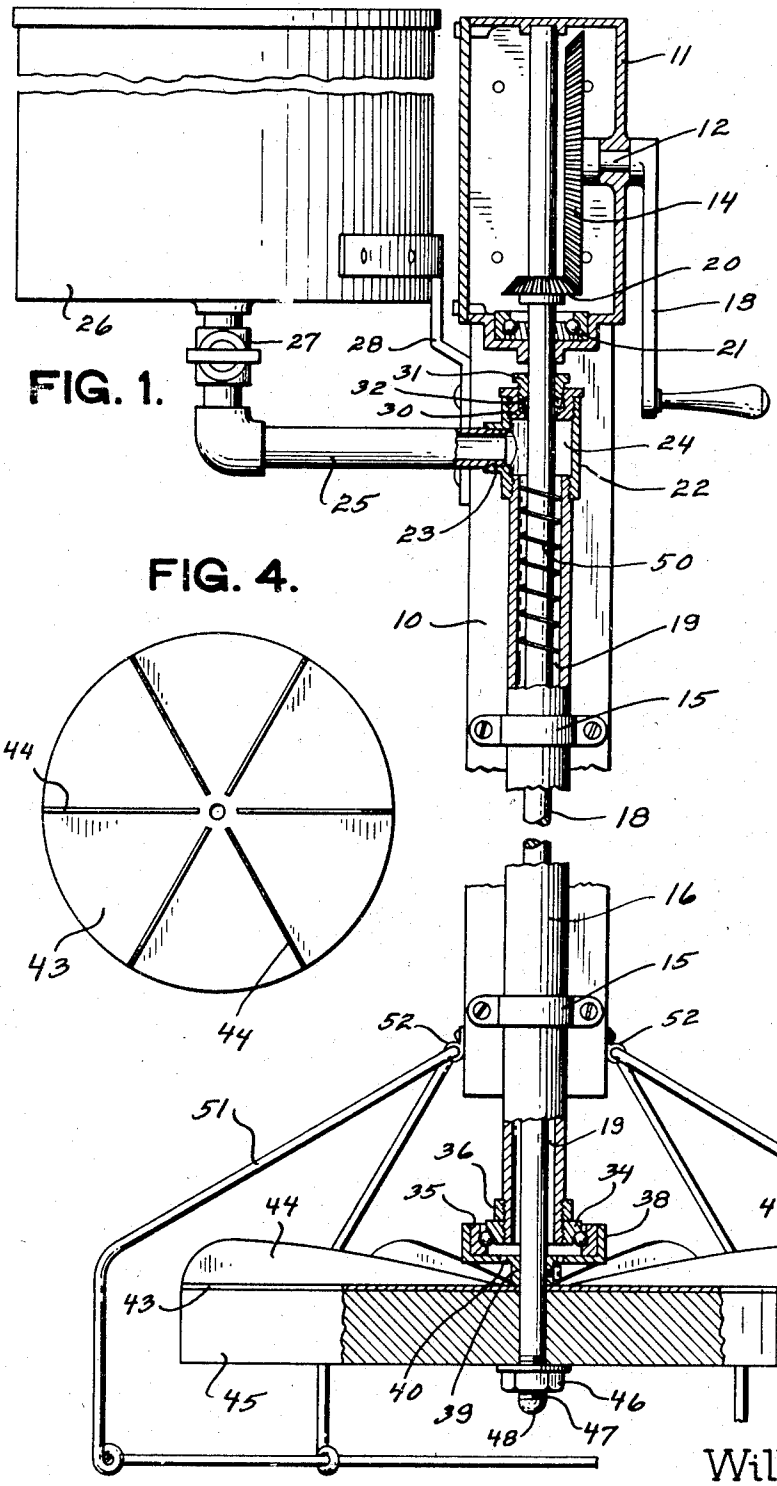


FIG. 2.

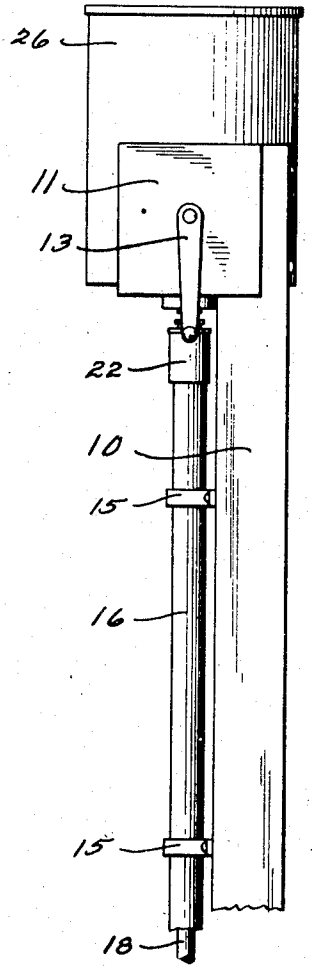


FIG. 4.

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FIG. 3.

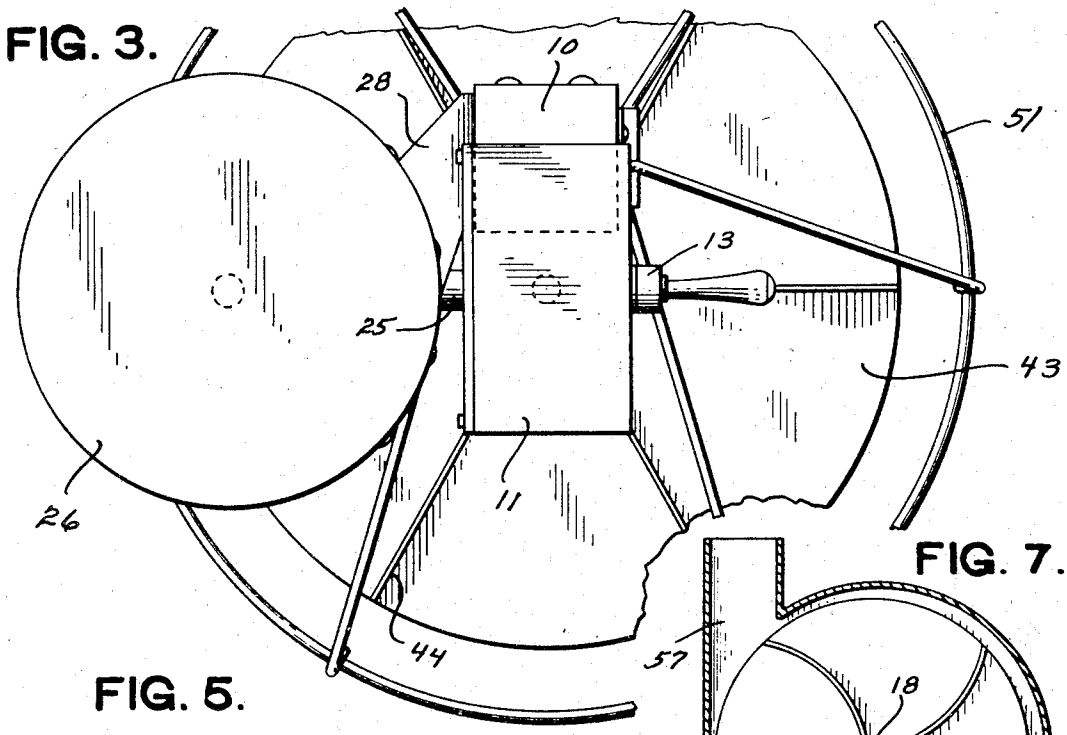


FIG. 7.

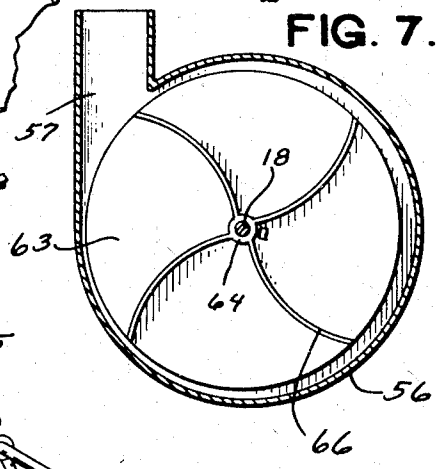


FIG. 5.

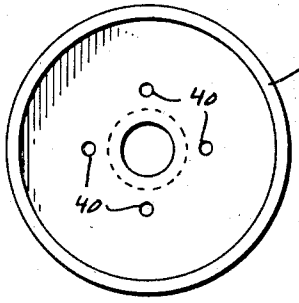


FIG. 6.

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UNITED STATES PATENT OFFICE

2,226,470

OIL TREATING APPARATUS

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Application October 18, 1939, Serial No. 299,992

6 Claims. (Cl. 259—23)

The present invention relates to oil treating apparatus and the primary object of the invention is to provide a simple and sturdy device for the treating of oil in deep oil tanks, such as commonly used at points of storage near oil wells, so as to render the oil ready for pipe line sales.

A further object of the invention is to provide oil treating apparatus of this character embodying means wherein treating of the oil is accomplished thru agitation and distribution of a treating chemical in the oil at the bottom of the tank.

A further object of the invention resides in the novel and simple arrangement for delivering the treating chemical into the bottom of the tank, together with means for agitating the oil and distributing the chemical in the bottom of the tank.

A further object is to provide apparatus of this character which is readily portable so as to be easily moved from one tank or container to another.

A still further object resides in the arrangement wherein the relatively long conductor for the chemical or treating acid, also forms a support for the combined agitator and chemical distributing means at the lower end of the device.

Other objects and advantages of the invention will be apparent from the following detailed description taken in connection with the accompanying drawings and in which drawings:

Figure 1 is a view part in elevation and part in vertical section thru the oil treating device, with its central portion broken away.

Figure 2 is a fragmentary side view of the upper portion of the device on a reduced scale from the showing in Figure 1.

Figure 3 is a top plan view of Figure 1.

Figure 4 is a plan view on a reduced scale, of the propeller or paddle shown in Figure 1.

Figure 5 is an enlarged top plan view of the centering cup at the lower end of the tubular support.

Figure 6 is a view part in elevation and part in section of a distributor head interchangeable with the head shown in Figure 1.

Figure 7 is a section on a reduced scale, on line 7—7 of Figure 6.

In the drawings and wherein like reference characters designate corresponding parts thruout the several views, and referring particularly to Figures 1 to 5 inclusive, the oil treating device or machine has been shown as comprising a relatively long supporting member 10 which is preferably formed of wood for lightness, altho this support may be of metal if so desired. The support 10 may vary in length, being from eight to twelve feet or more in length in accordance with the depth of tanks for which the device is to be used. While in the example illustrated, the device has been shown as being hand operated, the device may be power driven if desired.

Mounted upon the upper end of the support 10 is a gear case or housing 11 in which is journaled a shaft 12 provided with a hand crank 13. Mounted upon the inner end of the shaft 12 is a beveled gear 14. As shown in Figure 2, the gear case 11 is mounted upon the support 10 so that a substantial portion of the case extends to one side of the support.

Secured longitudinally along one side of the support 10 as by suitable straps 15, is a tubular casing 16 having its upper end terminating in spaced relation beneath the gear case 11 and with its lower end extending a short distance beyond the lower end of the support 10. This casing 16 may be a piece of small pipe or tubing having external screw threads at its upper and lower ends.

Extending axially thru the tubular casing 16 is a drive shaft 18 having a diameter which is less than the internal diameter of the casing and providing a fluid passageway 19 about the drive shaft and extending from end to end of the casing. The upper end of the drive shaft 18 extends upwardly into the gear case 11 and has mounted thereon a beveled pinion 20 for meshing with the beveled gear 14 whereby upon rotation of the hand crank 13, the drive shaft 18 will be rotated at a relatively high speed owing to the speed ratio of the gears 14 and 20. Supporting the drive shaft 18 in the lower side of the gear case 11 is a ball bearing mounting 21.

Means is provided for introducing a treating chemical or fluid into the upper end of the tubular casing 16, the chemical having downward travel in the fluid passageway 19 for discharge at the open lower end of the tubular casing. Threaded at one end upon the upper threaded end of the casing 16 is a coupling sleeve 22 having a lateral opening 23 and forming a fluid chamber 24 about the drive shaft 18 at the upper end of the casing. Threaded into the side opening 23 is an inlet pipe 25 which communicates with the bottom of a suitable tank or container 26 adapted to contain a treating chemical. A suitable valve 27 is provided in the feed or inlet pipe 25 for controlling flow of the chemical to the chamber 24. The tank 26 may be supported upon the support 10 by means of a suitable bracket 28 whereby the fluid

in the tank may have a gravity flow thru the feed pipe 25 to the chamber 24.

Closing the upper end of the fluid chamber 24 is a stuffing box thru which the drive shaft 18 extends. This stuffing box comprises a gland 30 which is threaded into the upper end of the sleeve 22, and a packing nut or follower 31 which is threaded into the gland 30 so as to bear upon a suitable packing 32 and force this packing into contact with the rotary drive shaft 18. Thus, chemical in the chamber 24 is prevented from escaping upwardly along the drive shaft.

Provided at the lower end of the tubular casing 16 is an anti-friction bearing structure mounting the drive shaft 18 axially in the casing. This anti-friction bearing may be in the form of a thrust ball bearing mounting including an inner ball race 34 and an outer ball race 35. The inner ball race 34 may be threaded upon the lower threaded end of the casing 16, and a locking nut 36 may be provided for adjustment of the race 34. The outer ball race 35 is fixed in an annular wall of a centering cup 38 having an axially depending collar 39 receiving the drive shaft 18, said collar being secured to the drive shaft as by means of a set screw or the like. Thus the cup 38, together with its associated ball bearing mounting, serves to axially support the lower end of the drive shaft 18 within the tubular casing 16. The bottom of the cup 38 is spaced slightly from the lower end of the tubular casing 16 and is provided with a number of small discharge openings 40 thru which the chemical in the passageway 19 may be discharged upon the upper side of and substantially at the center of a combined agitator and distributor head 42 mounted upon the lower end of the drive shaft 18. As will be observed, the upper and lower ball bearing mountings for the drive shaft 18 are such as to act as thrust bearings for preventing longitudinal movement of the drive shaft.

The agitator and chemical distributor 42 may comprise a base disc 43 provided upon its upper side with a series of radially arranged blades or paddles 44 disposed in right angular relation to the plane of the disc 43. These blades or paddles 44, as will be seen in Figure 1, are of greatest height adjacent their outer ends and have their upper edges gradually inclined and merging into the upper face of the base disc closely adjacent to the axis of the disc. With this arrangement, a more even distribution of the treating chemical between adjacent blades will be had where the chemical is delivered upon the central portion of the base disc, while the higher outer ends of the blades will cause the chemical to be discharged at the periphery of the base disc and mixed with the oil in which the distributor head is submerged. The drive shaft 18 extends axially through the distributor 42, with the base disc 43 bearing against the lower end of the collar 39 which acts as a stop for spacing the base disc a short distance beneath the apertured bottom of the cup 38.

Mounted upon the drive shaft 18 beneath the distributor 42 is a fly or balance wheel 45 which is held upon the drive shaft in contact with the base disc 43 by a nut 46 threaded upon the lower screw threaded end 47 of the drive shaft. The lower extremity of the drive shaft 18 is rounded as at 48. Thus, the distributor 42 and balance wheel 45, together with the bearing cup 38 are mounted upon and rotate as a unit with the drive shaft 18. The tubular casing 16 not only serves to conduct the chemical to the distributor, but also serves as a support for the distributor.

Provided on the drive shaft 18 within the upper portion of the tubular casing 16 is a worm or spiral feed screw 50 which, upon rotation of the drive shaft, acts to force or drive the chemical downwardly in the fluid passageway 19 to the bottom of the casing 16 where the chemical is discharged thru the openings 40 against the head pressure of the oil in the tank being treated.

An open protecting shield 51 is provided about the distributor head 42 and this shield may be secured to the lower end of the supporting member or rod 10 by suitable clips 52.

Referring particularly now to Figures 6 and 7, the form of distributor head shown therein is adapted to be interchangeable with the distributor shown in Figure 1. The distributor 55 shown in Figure 6 is designed to pump the chemical into the oil and at the same time create a circulation of the oil in the bottom of the tank being treated. This distributor 55 comprises a centrifugal pump including a housing 56 having a tangential discharge 57. The top wall 58 of the housing has a threaded opening 59 whereby the housing may be screwed upon the lower threaded end of the tubular casing 16 with the fluid passage 19 opening substantially axially into the housing. The lower side of the housing is closed by a removable cover plate 60 which is provided on its upper side with a step bearing 61 for receiving the rounded extremity 48 of the drive shaft 18.

Mounted upon the drive shaft 18 within the housing 56 is an impeller 62 including a base disc 63 having an upstanding axial hub 64 for receiving the drive shaft and which may be adjustably secured to the shaft as by a set screw 65. Extending from the hub 64 over the base disc 63 is a series of curved blades 66 which as shown in Figure 6 have their upper edges spaced slightly below the casing top wall 58. Thus the treating chemical is permitted to discharge from the lower end of the tubular casing 16 upon the center of the impeller 62.

Mounted on the drive shaft 18 beneath the impeller 62 is a fly or balance wheel 68 preferably having an axial recess 69 in its lower side for receiving the retaining nut 46 which is screwed upon the lower threaded portion 47 of the drive shaft.

Thus it will be seen that the manner of supporting the distributor heads is such that the distributor heads 42 and 55 are readily interchangeable. When the head 55 is applied, the ball bearing mounting for the lower end of the drive shaft as shown in Figure 1, is removed and the lower end of the drive shaft has mounting in the step bearing 61.

The machine or apparatus is designed for the purpose of settling oil in oil storage tanks by use of chemicals and thru agitation, and can be readily used upon tanks of various depths. By agitating the oil and simultaneously treating with acid, the settling of the basic settlement in the bottom of the oil tank can be purified and separated and made ready for pipe line sales.

Changes in detail may be made to the forms of the invention herein shown and described, without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. In apparatus for agitating and delivering a treating fluid at the bottom of a column of fluid,

a hollow imperforate casing, a drive shaft in the casing and spaced from the inner wall of the casing, drive means at the upper end of the casing for imparting rotation to the drive shaft, a combined agitator and distributor head mounted on the lower end of the drive shaft below the lower end of the casing including a base disc and blades mounted upon the upper face of the base disc, and means for discharging the treating fluid from the lower end of the casing upon said base disc and blades at adjacent the central portion of the base disc.

2. In apparatus for treating oil in storage tanks, the combination of a supporting rod of substantial length, a tubular casing mounted longitudinally of the supporting rod, a drive shaft in the casing and extending beyond the ends of the casing, drive means connected with the upper end of the drive shaft for imparting rotation to the drive shaft, means for delivering a treating chemical into the upper end of the tubular casing, a feed screw on the drive shaft for forcing the chemical downwardly in the casing, bearing means for the drive shaft at the lower end of the casing, and a distributor head of greater diameter than the inner diameter of the tubular casing mounted on the lower end of the drive shaft and upon which the chemical is discharged from the lower end of the tubular casing and in a direction substantially paralleling the longitudinal axis of the supporting rod.

3. In oil treating apparatus, a tubular casing adapted to have a treating chemical delivered into the upper end thereof, a rotary drive shaft extending thru the casing and projecting beyond the lower end of the casing, a cup mounted on the drive shaft and having discharge openings in its lower side, bearing means between the shaft and lower end of the casing, and a distributor head mounted on the drive shaft beneath said cup embodying a base disc having radially extending blades on its upper side which increase in height toward the periphery of the base disc.

4. In oil treating apparatus, a tubular casing, means for admitting a treating chemical into the upper end of the casing including a tank and a pipe opening at one end into the tank, at adjacent the bottom of the tank, and at its other end opening directly into the tubular casing, a rotary drive shaft extending thru the casing, a worm on the drive shaft at the upper end of the casing for forcing the chemical downward in the casing, a pump casing mounted on the lower end of the tubular casing and having an outlet from the tubular casing and a tangential outlet, and an impeller mounted on the lower end of the drive shaft within said pump casing.

5. In oil treating apparatus, a hollow casing, means for admitting an oil-treating medium into the casing adjacent its upper end, a drive shaft extending thru the casing, means carried by the drive shaft for forcing the treating medium downwardly thru the casing, a combined treating medium distributor and oil agitator adjacent the lower end of the casing, and means, carried by the casing and held against lateral movement by the lower end of the casing, for discharging the medium upon the distributor.

6. In oil treating apparatus, a hollow casing, means for admitting an oil-treating medium into the casing adjacent its upper end, a drive shaft extending thru the casing, means carried by the drive shaft for forcing the treating medium downwardly thru the casing, a combined treating medium distributor and oil agitator adjacent the lower end of the casing, and combined means for discharging the medium upon the distributor and providing a bearing for the shaft said means being carried by the casing and held against lateral movement by the lower end of the casing.

WILLIAM M. McGUFFEE.