

W. L. MORRIS.
OIL CLARIFYING SYSTEM AND APPARATUS.
APPLICATION FILED APR. 12, 1916.

1,305,735.

Patented June 3, 1919.

2 SHEETS—SHEET 1.

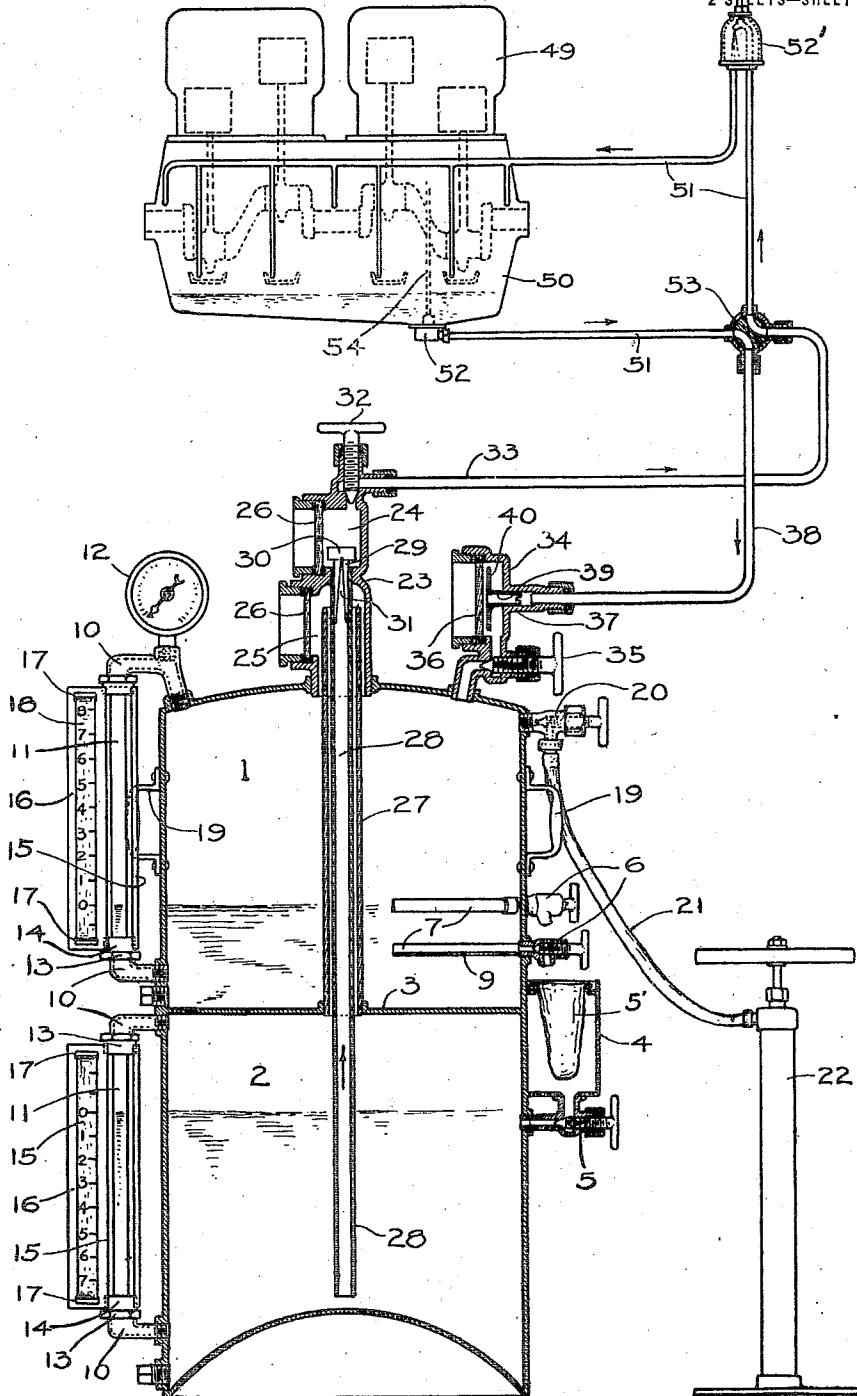


Figure 1

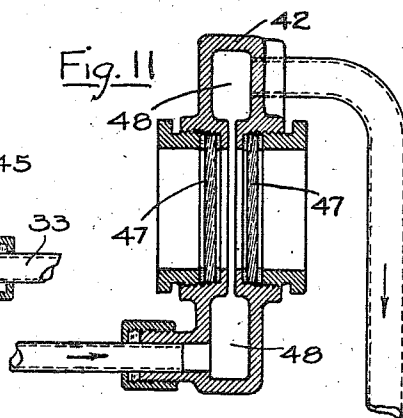
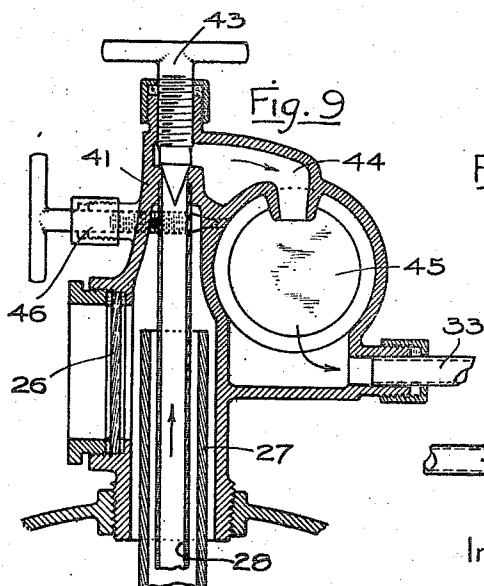
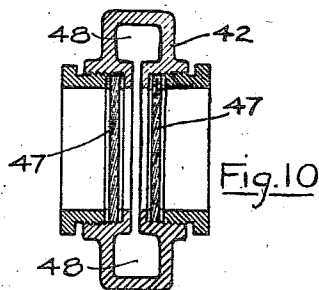
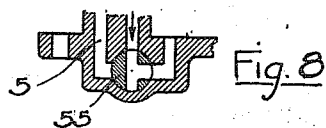
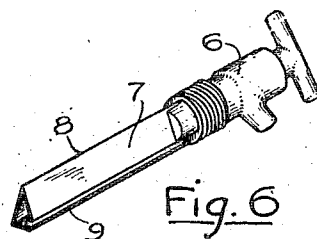
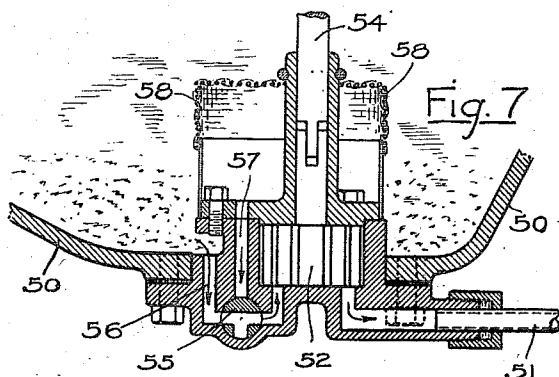
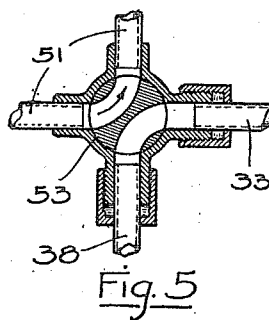
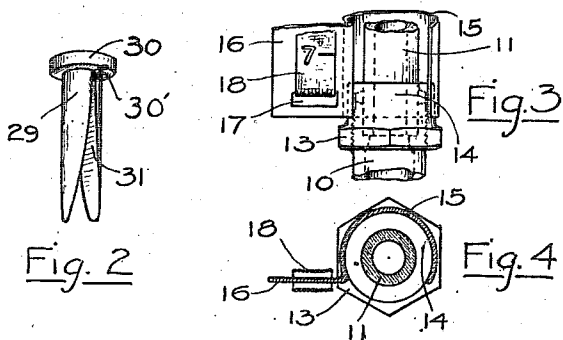
Inventor,
William L. Morris

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2 SHEETS—SHEET 2.



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William L. Morris

UNITED STATES PATENT OFFICE.

WILLIAM L. MORRIS, OF CHICAGO, ILLINOIS.

OIL-CLARIFYING SYSTEM AND APPARATUS.

1,305,735.

Specification of Letters Patent.

Patented June 3, 1919.

Application filed April 12, 1916. Serial No. 90,556.

To all whom it may concern:

Be it known that I, WILLIAM L. MORRIS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Oil-Clarifying Systems and Apparatus, of which the following is a specification.

My invention relates to a system and apparatus for withdrawing dirty or used liquid from a circulating device and replacing the withdrawn liquid with new or clean liquid. The principal object of the invention is to provide a new and improved construction, combination, and arrangement of parts for accomplishing the desired result.

In the accompanying drawings, Figure 1 is a diagrammatic and sectional view of a system and apparatus constructed in accordance with the principles of my invention and applied to a gas engine and its lubricating system; Fig. 2, is a perspective of a fluid resistance plug and indicator; Fig. 3, is an enlarged detail of one end of a gage glass guard and a movable tape; Fig. 4, is a sectional view of the parts shown in Fig. 3; Fig. 5 is a detail view of the four-way cock in closed position; Fig. 6 is a perspective of one of the draw off valves; Fig. 7 is an enlarged view of the oil pump in connection with the engine; Fig. 8 is a view of the three-way pump valve in another position; Fig. 9 is a sectional view of a modified form of clean oil feeder sight; Fig. 10 is a plan sectional view of a modified form of the dirty oil return sight; and Fig. 11 is a vertical section of the sight shown in Fig. 10.

Although this invention is intended primarily for automobile engine lubricating systems, it may also be used on stationary or marine engines, or for any bearing or group of bearings which have a fixed volume of oil and pumping means for repeatedly circulating this oil over the bearings. Not only does this apparatus permit withdrawing the dirty oil and replacing with clean, but it permits passing much more oil through the system to be cleaned than the fixed amount contained in the system, the clean oil being fed to the bearings while the dirty oil is being discharged.

This apparatus comprises a receptacle 1 for holding dirty oil, and the receptacle 2 for receiving clean oil, the two receptacles preferably constituting parts of the same tank, separated by a common partition 3.

The dirty oil receptacle 1 is placed above the clean oil receptacle 2 so that the top oil can be run from the dirty receptacle to the clean receptacle. For this purpose a filter case, 4, is attached at the outside of the receptacles at the bottom of the dirty oil receptacle, 1, connected through a valve, 5, with the upper part of the clean oil receptacle, 2. In the case 4 is a filter 5' in the form of a bag or any other suitable kind which may be filled with granular or fibrous filtering material. Above the filter case 4, are draw-off cocks 6 which are arranged at different heights to discharge oil from the dirty oil receptacle into the filter 6, as desired. Connected to each cock 6 inside the receptacle 1 is a draw off tube 7 shown more clearly in Fig. 6. Each tube has an upturned angular edge 8, which being sharp with steep sides, prevent any precipitation from lodging upon the tube, and is formed with a horizontal slot 9, which extends the full length of the tube, and under it so that the precipitation will not lodge in it. Thus the entrance to the draw off is in a horizontal plane, over a large area, and in a direction other than from below.

Connected to the receptacles 1 and 2 by suitable fittings 10 are gage glasses 11, with a pressure gage 12 connected preferably to the upper fitting 10. Threaded on each fitting 10 is a packing nut 13 with a rounded portion 14 upon which a guard 15 for each glass 11 is rotatable. These guards 15 are preferably coated on the inside or made of such material that the height of oil shows clearly through the glass against the colored inside as a back ground, the glass being visible through a longitudinal slot in the guard as clearly shown in Figs. 1, 3, and 4, and the guard being formed with an extending wing 16 having slots 17 at top and bottom upon which a graduated endless tape 18 is slidable. At the bottom of each receptacle is a clean-out plug for removing dirt and sediment.

At opposite sides of the receptacle 1 are handles 19 by which the device is carried, the parts and connection being also located at the sides as shown in Fig. 1, so that in carrying the receptacles with the two hands there will be no projections directly in front to catch the clothes of a person.

A hand valve 20 is connected to the top of the dirty oil receptacle 2 and is adapted to have a hose 21 of an air pump 22 connected

thereto. Although a hand pump is shown in Fig. 1, it is obvious that a power pump of any kind may be so connected. Many automobiles now carry power pumps for inflating tires and it is intended that they be used too.

In order to equalize the pressure in the two receptacles 1 and 2, a fitting 23 having an upper chamber 24 and a lower chamber 25 is connected to the top of the dirty oil receptacle, each chamber being fitted with a glass sight disk 26. A tube 27 is connected through the partition 3 with which it makes a fluid tight connection, and extends through the dirty oil receptacle 1 into the chamber 25 of fitting 23 leaving a space about the tube for the passage of liquid, the top of the tube extending nearly to the top of the sight disk in the lower chamber. Extending entirely through the tube 27 is a pipe 28, the lower end of which is adjacent the bottom of the clean oil receptacle and the upper end is threaded into the bottom of the upper chamber 24 of the fitting 23. There is a space between the pipe 28 and the tube 27 so that air may pass through the tube 27 from one receptacle to the other equalizing the pressure and liquid is prevented normally from passing except as it overflows the top of the tube 27, which is visible through the glass sight 26 in the lower chamber 25.

In the upper end of the pipe 28 is a resistance plug and marker 29 which has a head 30 and a V-slot 31, and is freely slidable in the pipe. For every varying flow this plug assumes a different position in the tube, balancing the resistance of flow, and permitting the greatest flow when in its highest position. The head 30 being close to the glass sight 26 is clearly visible through it. At the top of the upper chamber 24 is a hand valve 32 to control the discharge of clean oil through a pipe 33:

Also connected in the top of receptacle 1 is a return fitting 34 having a hand valve 35 and a sight glass 36. The fitting has a projection 37 opposite the glass 36 to which a dirty oil return pipe 38 is connected and in the projection 37 is an adjustable member 39 having a central perforation through which returning oil passes, and a flat reflector 40 arranged close and parallel to the glass 36 so that incoming oil must pass outwardly from the center. The thickness of the film of oil is varied by adjusting the member 39 and the color and cleanliness of the oil is observed through the glass 36.

Instead of the two fittings 23 and 34 a discharge fitting 41 as shown by Fig. 9, and a return fitting 42 as shown by Figs. 10 and 11, may be employed. In fitting 41 a hand valve 43 closes the end of pipe 28 and a lateral passage 44 leads to a downwardly extending air space sight feed 45 to which

the discharge pipe 33 is connected. An air valve 46 admits air from the fitting 41 to the air space without which the rapid flow of oil under pressure continues to carry air bubbles from the air space until the sight is full of oil. By leaving air valve 46 open a stream of oil passes across the sight feed 45 in the direction of the arrows. In fitting 42 two transparent disks 47 are placed close together with a peripheral passage 48 extending around them so that only a part of the oil passes over the glasses in the direction indicated by the arrows. By placing a light behind one glass and looking through the other the character of the dirty returning oil can be clearly observed. These two fittings have the objection that they are not self draining as are the other forms, and therefore are not so desirable.

This apparatus is applicable to any oil using and circulating device, such for example, as a gas engine designated in Fig. 1 by the reference numeral 49. Oil is drained to the bottom of a crank case 50, from which it is forced through pipes 51 and a sight feed 52' by means of a pump 52 such as shown by Fig. 7, to lubricate the bearings and parts. The only thing needed to conveniently apply the apparatus of this invention to such a system is to insert a four-way valve 53 in the pipes 51 of the engine oiling system to which the discharge and return pipes 33 and 38 may be connected. In ordinary engine construction the pump 52 is driven with the engine by means of a shaft 54. The pump suction is connected through a three-way valve 55 with a passage 56 leading directly to the bottom of the crank case 50 for withdrawing all of the dirt and sediment or with a passage 57 leading to a screen 58 through which the oil is drawn.

When the apparatus of this invention is not connected to the engine the four-way valve 53 is in the position shown in Fig. 5. The pipes 33 and 38 may then be connected to the valve 53 while the engine is running or not, as desired.

Before operation the clarifier is made ready for use before attachment to the valve 53, by drawing off through cocks 7 any oil from the dirty oil receptacle 1 which is fit for reuse, this oil passing through filter 5', then discharging the residue from the dirty oil, and by filling the clean oil receptacle with new oil, if necessary. The indicating tapes 18 are moved so that the zero of their graduations coincide with the top surface of their respective liquids, it being noted that the numerical graduations extend in opposite directions from the zero mark in the two tapes. A suitable pressure is then applied to both receptacles by means of the pump which can be observed in the pressure gage 12 and if the pipes 33 and

38 are connected to the valve 53, the clarifying apparatus is ready for use.

In operation, valves 32 and 35 are opened and with the engine running and circulating its oil, the four-way valve 53 is turned to connect the pipes 38 and 33 with the pipes 31. Dirty oil from the engine is then discharged into the dirty oil receptacle 1, the air under pressure forcing a uniform amount of clean oil out of the pipe 28 into and through the distributing pipes 51 of the engine oiling system, because of the pressure equalizing connection between the receptacles 1 and 2. The valves 32 and 35 are moved to regulate the flow, and the height of liquid compared with the tapes 18 shows whether the amount of dirty oil discharged from the engine equals the amount of clean oil returned, the amount of oil remaining practically constant in the clarifying apparatus. The cleanliness of the returned oil is observed by noting its color in the dirty oil sights, and possibly all the clean oil will not be passed through the engine oiling system; the capacity of both dirty and clean receptacles is greater than the contents in the engine oiling system, so that the crank case can be thoroughly cleaned.

After noting that the two indicator tapes show similar quantities handled the four-way cock 53 is turned back to its normal position and the clarifier is disconnected.

After the clarifier is disconnected it is set aside preferably in a warm place where it can remain quiet and precipitate the impurities and by the time oil in the engine has become dirty the oil in the cleaner will be ready to draw off and reuse, as before explained.

It should be understood that although as explained, the clean oil discharged may be the same in amount as the dirty oil admitted to the dirty oil receptacle, it is possible to vary the amount by adjusting the valves 32 and 35 so that the amount of clean oil discharged, while not equal, is proportional or continuously the same amount while the engine 49 is in operation. It is found in practice that if this cleaning or replacing apparatus is used in connection with an automobile engine, which is using dirty oil, the engine will gradually speed up as the dirty oil is replaced by the clean oil, frequently to such an extent as to necessitate throttling the engine to prevent racing, thus demonstrating the value of clean oil supplied to the bearings.

Although this apparatus has been described as being portable, it is obvious that it may be a larger and stationary outfit such as used by public garages and automobile service stations where the connection tubes corresponding to pipes 32 and 35 would preferably be flexible instead of rigid pipes. The

four-way valve being installed on the automobile as a part of the oil circulation system would make it possible to use the portable apparatus described, or a larger permanent installation.

I claim:

1. In apparatus of the class described, the combination with a pair of closed receptacles having a common wall, of a discharge connection for one of the receptacles, an inlet for the other receptacle, tubular means for keeping liquid contents of the receptacles separate but permitting the free passage of air between them, and a pump connected to one of the receptacles but causing the same pressure in both receptacles.

2. In apparatus of the class described, the combination with a tank having two receptacles disposed one above the other and separated by a perforated partition, a tube connected through the partition and extending above the top of the upper receptacle, a pipe extending through the tube from adjacent the bottom of the lower receptacle to a point above the top of the tube, a discharge connection leading from one receptacle, an inlet for the other receptacle, and means for applying pressure to the upper portion of one receptacle which is also communicated through the tube to the other receptacle.

3. The combination with two closed receptacles, of means connecting the receptacles for equalizing pressure but not permitting exchange of liquid, a discharging connection from one receptacle, and an inlet to the other receptacle whereby the admission of liquid to the last mentioned receptacle causes the added pressure to discharge this same amount from the discharging connection.

4. The combination with two closed receptacles having a tubular connection between them for equalizing pressure but not normally permitting a liquid exchange, means for injecting a fixed volume of air under pressure, a discharge connection from one receptacle, an inlet to the other receptacle whereby the transfer of air under pressure caused by incoming liquid will cause the discharge of a uniform amount of liquid from the other.

5. The combination with two closed receptacles having a tubular connection between them for equalizing pressure but not normally permitting a liquid exchange, means for supplying a predetermined quantity of air under an initial pressure to both of said receptacles, a discharge connection from one receptacle, an inlet to the other receptacle, and means for forcing liquid in at the inlet thereby expelling an equal amount of liquid from the other receptacle.

6. The combination with two closed receptacles, one above the other, of means con-

necting the receptacles to permit a pressure exchange and normally preventing a liquid exchange, a fluid inlet for one receptacle, a fluid discharge connection for the other receptacle, means for applying a common pressure to both receptacles, an open casing at the side of the lower receptacle having a valved opening at the bottom of casing, and one or more draw off cocks in connection with the upper receptacle to discharge into the casing.

7. The combination with two closed receptacles connected together for equalizing pressure and normally preventing a liquid exchange, of means for applying pressure to both receptacles, a liquid inlet to one receptacle, a discharge connection for the other, means for forcing liquid into one receptacle adding pressure to it and by the equalizing connection causing an equal amount to be discharged from the other receptacle, and visible indicators without the receptacles to show the liquid withdrawn from one receptacle and that added to the other.

8. The combination with two closed receptacles connected together for equalizing pressure and normally preventing a liquid exchange, of means for applying pressure to both receptacles, a liquid inlet to one receptacle, a discharge connection for the other, means for forcing liquid into one receptacle and by the equalizing connection discharging from the other, fluid height gages connected to the receptacles, and means in connection with each gage to show the liquid added or withdrawn from its receptacle.

9. The combination with two closed receptacles connected together for equalizing pressure and normally preventing a liquid exchange, of means for applying pressure to both receptacles, a liquid inlet to one receptacle, a discharge connection for the other, means for forcing liquid into one receptacle and by the equalizing connection discharging from the other, a fluid height gage connected to each of the receptacles, and a movable tape adjustable with respect to each glass having graduations extending oppositely on the two tapes to show the liquid added to one receptacle and that withdrawn from the other.

10. In a fluid clarifying system, the combination with two closed receptacles, one approximately empty and having means for receiving dirty liquid under pressure, the other approximately full of clean liquid with a discharge connection therefor, of an air equalizing connection between the tops of said receptacles, and means for injecting a fixed volume of air into said receptacles.

11. In a fluid clarifying system, the combination with two closed receptacles, one approximately empty and having means for receiving dirty liquid under pressure, the

other approximately full of clean liquid with a discharge connection therefor, of an air equalizing connection between the tops of said receptacles, means for injecting a fixed volume of air into said receptacles, and visible indicators without the receptacle to show the amount of liquid withdrawn from one receptacle and the amount added to the other.

12. In a liquid clarifying system, the combination with two closed receptacles each containing liquid and together having a fixed volume of confined air under pressure, of means for connecting the receptacles for equalizing pressure but not permitting exchange of liquid, an inlet to one receptacle for receiving liquid under pressure, and a discharge connection for ejecting a like amount of liquid from the other receptacle, a constant pressure being maintained in both receptacles by the transfer of air from one receptacle to the other through said equalizing means.

13. In a liquid clarifying system, the combination with two closed receptacles one above the other, of means for forcing liquid into the upper receptacle, an oil discharge connection for the lower receptacle, draw-offs at different elevations in the upper receptacle for discharging liquid into the lower receptacle, means for connecting the receptacles to permit a pressure exchange but normally preventing a liquid exchange, and means for applying a common pressure to both receptacles.

14. In an oil clarifying system, the combination with a closed receptacle having means for receiving a liquid and another closed receptacle with means for discharging approximately the same amount as that received in the first receptacle, of an air equalizing connection between the tops of the receptacles, means for injecting a fixed volume of air into said receptacles, and visible indicators without the receptacles graduated to show the amount of liquid received and discharged with means for adjusting said graduation to register with the surface level of the liquid.

15. In an oil clarifying system, a tank having two closed receptacles disposed one above the other and separated by partitions, an air equalizing tube connected through said partitions and extending to the top of the upper receptacle, a pipe extending through the tube from adjacent the tube of the lower receptacle to a point above the top of the tube, and means for supplying a fixed quantity of air under pressure to said receptacles, one receptacle being adapted to receive a liquid under pressure which ejects a similar amount of the contained liquid from the other receptacle.

16. In a fluid clarifying system, the com-

5 bination with two closed receptacles, one ap-
 proximately empty and having means for
 receiving dirty liquid under pressure, the
 other approximately full of clean liquid
 5 with a discharge connection therefor, of an
 air equalizing connection between the tops
 of said receptacles, means for injecting a
 fixed volume of air into said receptacles,
 visible indicators without the receptacle to
 10 show the amount of liquid withdrawn from
 one receptacle and the amount added to the
 other, and protecting means for said indi-
 cators when not in use.

15 17. In an oil clarifying system, a clean oil
 receptacle, a dirty oil receptacle, means for
 admitting liquid under pressure to the dirty
 oil receptacle, an air equalizing connection
 between the receptacles, a discharge for the
 clean oil receptacle comprising a fitting with
 20 a gage glass therein, and a movable ob-
 struction in said discharge that assumes dif-
 ferent positions in the fitting under different
 flow of velocities and is in view through said
 gage glass.

25 18. In a fluid clarifying system, the combi-
 nation with two closed receptacles, one ap-
 proximately empty and having means for
 receiving dirty liquid under pressure, the
 other approximately full of clean liquid with
 30 a discharge connection therefor, of an air
 equalizing connection between the tops of
 said receptacles, means for injecting a fixed
 volume of air into said receptacles, and
 means for observing and regulating the flow
 35 to and from both of said receptacles.

40 19. In an oil clarifying system, the com-
 bination with a pair of receptacles one above
 the other of a fitting at the top of the upper
 receptacle having an overflow chamber
 communicating therewith, an outlet for the
 lower receptacle, a tubular member connect-
 45 ed to the bottom receptacle through the
 bottom of the upper receptacle extending
 into said chamber whereby the overflow
 from the top receptacle will not discharge
 through the tubular member until the upper
 receptacle is full, and means to admit fluid
 to the upper receptacle, the tubular member
 50 serving to equalize pressure between the
 receptacles.

20. In an oil clarifying system, the com-
 bination with two receptacles one above the
 other, of means forming a chamber at the
 top of the upper receptacle, a tubular con-
 55 nection from the top of the lower receptacle
 extending into said chamber, a pipe extend-
 ing through said tubular member and
 through said chamber from a point adjacent
 the bottom of the lower receptacle, means
 60 for placing the receptacles under pressure,
 and a resistance member at the top of said
 pipe to limit the flow of liquid from the bot-
 tom receptacle depending upon the pressure
 in both receptacles.

21. The combination with a pair of re- 65
 ceptacles, one above the other, of a fitting
 at the top of the upper receptacle having an
 overflow chamber communicating therewith,
 with a sight glass therein, and a tubular
 member connected to the bottom receptacle 70
 through the bottom of the top receptacle and
 extending into said chamber whereby the
 overflow from the top receptacle through
 the tubular member is visible through said
 glass. 75

22. The combination with two receptacles,
 one above the other having a separating par-
 titition, of a fitting connected to the upper
 receptacle having a chamber with a sight
 glass therein, a tubular member connected 80
 through said partition and extending into
 said fitting with the top opposite the glass,
 and a pipe extending through said tubular
 member and through said chamber into the
 fitting from a point adjacent the bottom of 85
 the lower receptacle.

23. The combination with two receptacles,
 one above the other having a separating par-
 titition, of a fitting connected to the upper re-
 ceptacle having a chamber with a sight 90
 glass therein, a tubular member connected
 through said partition and extending into
 said fitting with the top opposite the glass,
 a pipe extending through said tubular mem-
 ber and through said chamber into the fit- 95
 ting from a point adjacent the bottom of the
 lower receptacle, means for placing the re-
 ceptacles under pressure, and a resistance
 member at the top of said pipe to limit the
 flow of liquid from the bottom receptacle 100
 depending upon the pressure in both pipes.

24. The combination with an upper and a
 lower receptacle having a common separat-
 ing partition, of a fitting attached to the up-
 per receptacle having an upper and a lower 105
 chamber with sights therein; a tube extend-
 ing through the partition into the bottom
 chamber opposite the sight therein, a pipe
 extending through the upper receptacle, the
 bottom chamber, into the bottom of the said 110
 upper chamber, from a point adjacent the
 bottom of the lower receptacle, and a fluid
 flow resistance marker in the upper end of
 the pipe opposite and visible through the
 sight thereof. 115

25. In oil clarifying apparatus, a dirty oil
 receptacle, and an inlet therefor comprising
 a fitting with a gage glass therein, and a flat
 disk adjacent the glass having a central per-
 foration through which oil comes passing to 120
 the periphery of the disk between it and the
 glass which shows the character of the oil in
 a thin film as it passes to said receptacle.

26. In oil clarifying apparatus, a fluid re- 125
 ceptacle, an inlet fitting therefor comprising
 a flat gage glass and a threaded projection
 in the fitting opposite it, and a perforated
 member threaded in the projection adjust-

able toward and from the glass with a disk portion parallel with the inner face of the glass so that a thin film of liquid will pass through said perforation and will pass between the disk and the glass.

27. In apparatus of the class described, the combination with two closed receptacles one above the other, of means connecting the receptacles for equalizing pressure but normally not permitting exchange of liquid, an inlet fitting attached to the upper receptacle, and means in connection therewith to observe the condition of the liquid admitted, and another fitting having a connection with the lower receptacle and means for observing liquid therefrom, and means for visibly disclosing liquid when it overflows from the upper receptacle to the lower one.

28. In apparatus of the class described, the combination with two closed receptacles, one above the other, of means connecting the receptacles for equalizing pressure but normally not permitting exchange of liquid, means for regulating and observing the fluid returned to one receptacle, means for regulating and observing the fluid discharged from the other receptacle, and an overflow with a gage glass for observing the height of liquid in the upper receptacle.

29. The combination with oil using devices, of a predetermined volume of reused oil contained therein, means for normally supplying said devices with reused oil, and apparatus for positively and simultaneously withdrawing the reused oil from the said devices and supplying them with new oil.

30. In oil clarifying apparatus, the combination with devices to be lubricated and a known volume of contained oil, of circulating means for reusing said oil, and apparatus attachable to said circulating means for diverting the dirty reused oil to said apparatus, said apparatus also having means for discharging clean oil at the same time to said devices to be lubricated.

31. In an oil clarifying system, the combination with devices for lubrication and a fixed volume of contained reused oil, of means for circulating the reused oil to the parts to be lubricated, and apparatus connectible with said circulating means for receiving the dirty oil from the said devices and for discharging clean oil to said devices, the apparatus having means for showing both the amount of dirty oil admitted and the amount of clean oil discharged from it.

32. The combination with journals for lubrication, of means for circulating lubricant therefor, apparatus having a clean oil receptacle and a dirty oil receptacle, means for placing the said receptacles under common pressure, and tubular connections between said receptacles and said means whereby said circulating means in discharg-

ing the circulating lubricant to the dirty oil receptacle will force clean oil from the other receptacle to the journals.

33. The combination with a normal lubricant supply devices to be lubricated, and means for circulating lubricant thereto, of clarifying means comprising a receiving receptacle, and a clean oil receptacle, and means embodying a valve for connecting the said circulating means with the receiving receptacle and the clean oil receptacle with the devices to be lubricated, whereby the circulating means can be used to discharge the normally reused lubricant into the receiving receptacle and to replenish the normal supply with clean lubricant.

34. The combination with devices to be lubricated, and means for continuously circulating and re-using the same lubricant, of clarifying means comprising a receiving receptacle, and a clean oil receptacle, and means embodying a valve normally connected in the said circulating means, but movable to connect the circulating means to the receiving receptacle and the clean oil receptacle to the devices to be lubricated, and connections for expelling the same amount of clean oil from its receptacle as is admitted to the receiving receptacle.

35. The combination with devices to be lubricated, a normal supply of lubricant, and means for re-using and supplying the same lubricant to the devices, of clarifying means comprising a receiving receptacle, and a clean oil receptacle connected together, means for applying the same pressure to both receptacles, a valve in the lubricant supply means, and tubular connections from said receptacles to the valve to connect the said lubricant supplying means to the receptacles to add lubricant to the receiving receptacle and thereby increasing the pressure in the other receptacle to expel the same quantity from the clean oil receptacle and to deliver it to the said devices.

36. The combination with devices to be lubricated, and means for continuously circulating lubricant therefor, of clarifying means comprising a receiving receptacle, and a clean oil receptacle connected together, means for applying the same pressure to both receptacles, and connecting means embodying tubular members and a valve normally connected in the circulating means for connecting the circulating means with the clarifying means while the said circulating means is in operation, thereby adding pressure to the receptacles to force clean oil to the devices to be lubricated.

37. The combination with devices to be lubricated, and means to supply said devices with lubricant which is re-used, of an outside receptacle, and an outside clean oil supply, and a single valve in the re-use supply to discharge the lubricant being re-

used into said outside receptacle and by the continued operation of said supply means to discharge clean oil to the said devices to be lubricated.

38. The combination with a dirty oil receptacle and a clean oil receptacle connected together to receive the same pressure, of devices to be lubricated and means to circulate the same oil thereto for re-use, and a valve in the oil circulation system and also connected to said receptacle which when turned will, by the action of said circulating means, deliver the re-used oil to the dirty oil receptacle, and by adding pressure thereto and to the clean oil receptacle, will cause clean oil to be discharged into the devices to be lubricated.

39. The combination with a dirty oil receptacle and a clean oil receptacle, of means for re-using oil comprising a drip reservoir, a pump, and circulating pipes, means connecting the receptacles for receiving the same pressure; a tubular connection to the dirty oil receptacle, and one from the other receptacle, and a valve in the circulating pipes connected to said tubular connections, to add the pressure of the said pump to the dirty oil receptacle, which is communicated to the clean oil receptacle causing the discharge of an equal amount of clean oil therefrom to keep the pressure and total volume of oil in the receptacles substantially the same.

40. The combination with a dirty oil receptacle and a clean oil receptacle, of means for re-using oil, comprising a drip reservoir, a pump, circulating pipes, a screen in the reservoir, and a double connection from the pump to take oil direct from the reservoir or through the screen, a valve in the circulating pipes, and tubular connections therefrom to each of the said receptacles.

41. The combination with a dirty oil receptacle and a clean oil receptacle, of means for re-using oil, comprising a drip reservoir, a pump, circulating pipes, a screen in the reservoir, and a double connection from the pump to take oil direct from the reservoir or through the screen, a four-way valve in the circulating pipes, tubular connections therefrom to each of the said receptacles, a sight to show the condition of oil admitted to the dirty oil receptacle, and a control valve and sight to govern and show the condition of the oil discharged from the clean oil receptacle.

42. The combination with a dirty oil receptacle and a clean oil receptacle, of means for re-using oil, comprising a drip reservoir, a pump, circulating pipes, a screen in the reservoir, and a double connection from the pump to take oil direct from the reservoir or through the screen, a valve in the circulating pipes, tubular connections therefrom to each of the said receptacles, and a gage and ad-

justable graduated indicating means in connection with each gage which may be set to indicate directly the amount of oil added to one receptacle and the amount of oil withdrawn from the other receptacle.

43. The combination with a dirty oil receptacle, and a clean oil receptacle connected together, means for applying pressure to both of said receptacles, oil circulating means normally independent of said receptacles, having means for connection to both of the receptacles at will, whereby the discharge of oil to one of said receptacles will add pressure thereto which is communicated to the other receptacle causing the discharge therefrom to the circulating means of an equal quantity of clean oil thereby keeping the pressure and amount of liquid in the two receptacles substantially the same.

44. In a clarifying system and apparatus of the class described, the combination with a dirty oil receptacle, of a clean oil receptacle beneath it, means for admitting oil to the dirty receptacle, means for withdrawing oil from the clean receptacle, a casing having communication with the clean receptacle, a plurality of draw-off cocks at different heights on the dirty oil receptacle to discharge into the casing, and an angular tube for each cock having steep sides and a horizontal slot underneath the sides opening laterally to take oil over a large space without disturbing the oil in the receptacle and in a lateral direction to prevent precipitation lodging in the tube.

45. The combination with two closed receptacles having a tubular connection between them for transfer of air from one to the other but not normally permitting a liquid exchange, means for placing said air under pressure, means for forcing liquid into one compartment, regulating means for the discharge from the other compartment, all of said means insuring continuously maintained pressure and flow to and from said receptacles after so established.

46. The combination with two closed containers, each containing air and liquid and having an air passage between the tops of the containers which normally does not pass liquid from one to the other, means for admitting air to create pressure therein, external means for forcing liquid into one container and thereby adding pressure to expel liquid from the other container, and means for regulating the discharge from this other container.

47. In oil clarifying apparatus, the combination with two closed receptacles, of means connecting the receptacles for equalizing pressure but normally not permitting exchange of liquid, means for regulating and observing the fluid returned to one receptacle which correspondingly increases the pressure in the receptacles to expel the same

amount of fluid from the other receptacle, and means for regulating and observing the fluid discharged from the other receptacle.

48. In an oil clarifying system, the combination with devices to be lubricated, a volume of reused oil, and means for circulating the lubricant thereto; of clarifying means comprising a receptacle to receive the oil that is passed over the devices lubricated, and a clean oil receptacle to supply the devices to be lubricated with clean oil; valved means for connecting said receptacles to said circulating means; and means for removing impurities from the oil in the dirty receptacle and discharging the oil thus clarified by gravity to the clean oil receptacle.

49. In an oil clarifying system, the combination with journals to be lubricated, of a volume of oil that is reused over said journals, and means for circulating said oil, apparatus having a clean oil receptacle and a dirty oil receptacle, a valve connection forming a part of said circulating means which is attachable to said receptacles and permits the discharge of dirty oil to its receptacle and clean oil from the other receptacle to the bearing surfaces, and means for clarifying oil from the dirty oil receptacle and discharging it by gravity to said clean oil receptacle.

50. In an oil clarifying system, the combination with bearing surfaces, an oil container, a volume of reused oil, and pumping means for circulating oil to said bearing surfaces; of an oil container cleaning device comprising a closed dirty oil receiving receptacle under pressure, a closed clean oil storage receptacle under the same pressure, detachable means for connecting said dirty oil receptacle to the discharge of said pumping means and for connecting said clean oil receptacle to said bearing surfaces; and means for discharging confined air under pressure from the dirty oil receptacle to the clean oil receptacle.

51. In an oil clarifying system, the combination with devices to be lubricated, pumping means for continuously circulating and reusing the same lubricant, and a container for the lubricant; of means for removing impurities from the devices to be lubricated and from the lubricant container, said means comprising a closed clean oil receptacle and a closed dirty oil receptacle, a valve in said pumping means to make connections where-

by the pump will discharge the dirty oil from the devices to be lubricated to the dirty oil receptacle and to direct the clean oil from the clean oil receptacle to the devices to be lubricated; and connecting means for maintaining uniform pressure in the two receptacles.

52. The combination with two closed liquid and air containing receptacles, of means for pumping air into the receptacles to create a desired pressure therein, a cross connection for equalizing air pressure in the two receptacles, and means depending upon the equalizing connection for discharging approximately the same volume of liquid for one container as that received by the other.

53. The combination with two closed receptacles having a connection between them for equalizing pressure but not normally permitting a liquid exchange, means for admitting a fixed volume of air to produce a desired pressure in the receptacles, a liquid discharge from one receptacle and a liquid inlet to the other, and means for regulating the volume discharged from one receptacle to equal that received in the other because of the additional pressure produced by the addition of liquid to the other receptacle.

54. The combination with a mechanism and its means for circulating a body of oil, an attachable pair of receptacles, one containing a clean lubricant, the other sufficiently empty to receive the said body of oil; means for diverting this body of oil from the mechanism to said empty container, and means whereby the admission of said body of oil into the empty container will add pressure to expel oil from the other container to the mechanism.

55. The combination with an oil using mechanism, a lubricant container, and means for circulating the lubricant for use and reuse by the mechanism; means for diverting lubricant from the container, an external receptacle to which the lubricant is diverted; and another source of supply for directing clean lubricant to the mechanism and dependent for its connection with the mechanism, upon the means for diverting oil from said container.

Signed at Chicago, in the county of Cook, and State of Illinois, this 5th day of April, 1916.

WILLIAM L. MORRIS.