April 19, 1927. 1,625,031

L. P. KESSELMAN

OIL PUMP

Filed March 12, 1925 2 Sheets-Sheet 1

Fig. 1.

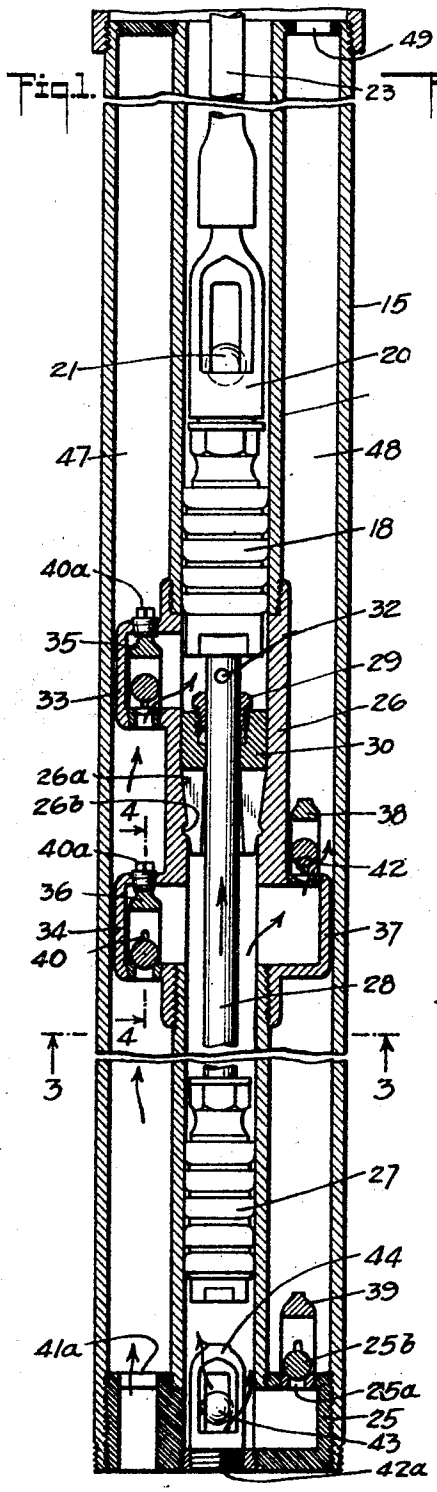

Fig. 2.

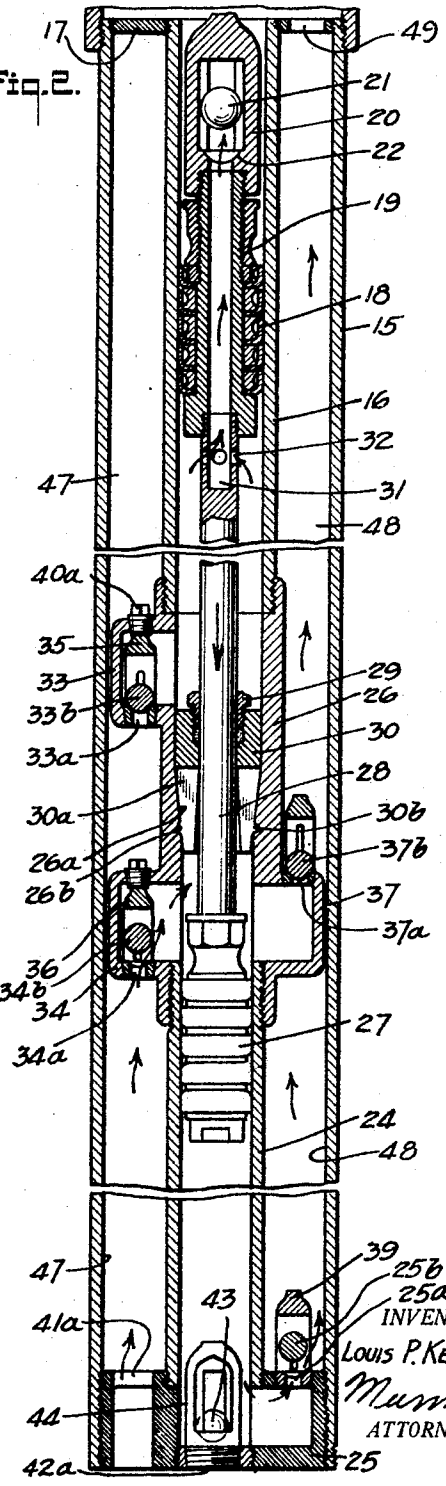

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Fig. 3.

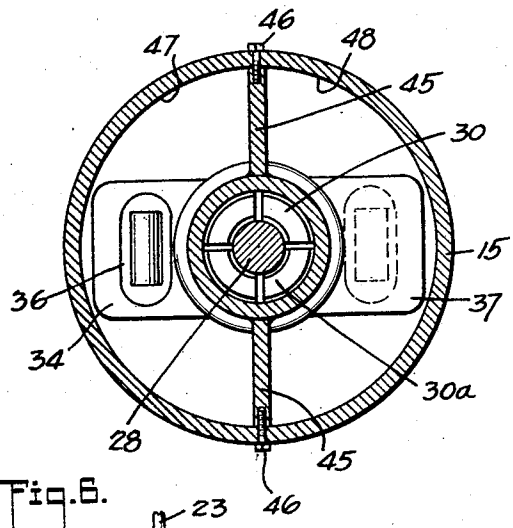


Fig. 4.

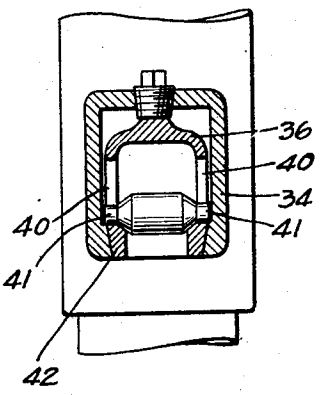


Fig. 6.

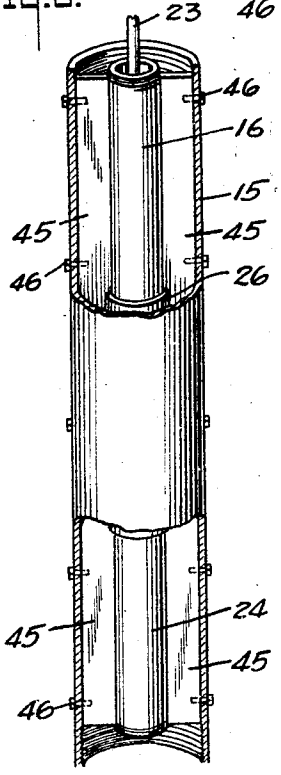
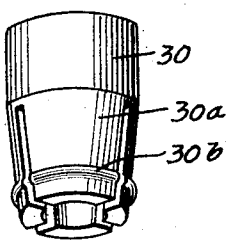


Fig. 5.



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Patented Apr. 19, 1927. 1,625,031

UNITED STATES PATENT OFFICE.

LOUIS PHILIP KESSELMAN, OF WHITTIER, CALIFORNIA.

OIL PUMP.

Application filed March 12, 1925. Serial No. 15,061.

My invention relates to pumps for removing oil from wells, and a purpose of my invention is the provision of a pump having the following advantages: a pump having two or more pumping units operating in conjunction with each other to effect the continuous elevation of a liquid and in such manner as to maintain the liquid in motion to prevent sand or other solid matter from settling in or on the valves comprised in the pump; a pump having a multiplicity of inlets and outlets by means of which an equalization of pressure on the plungers when moving in either direction is effected and the tendency eliminated of the casing maintaining the pump valves in open position; and a pump constructed to permit pulling of the rods and plungers from the well independently of the valve.

I will describe only one form of oil pump embodying my invention, and will then point out the novel features thereof in claims.

In the accompanying drawings—

Figures 1 and 2 are views showing in vertical section one form of pump embodying my invention and illustrating the plungers in their two extreme positions and the corresponding positions of the valves.

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

Figure 4 is a vertical sectional view taken on the line 4—4 of Figure 1.

Figure 5 is an enlarged detail view of the dividing plug shown in Figures 1 and 2.

Figure 6 is a view on a reduced scale showing the pump in perspective and with portions of the pump casing broken away.

Similar reference characters refer to similar parts in each of the several views.

Referring specifically to the drawings my invention in its present embodiment is shown as comprising a casing 15 in which are arranged a pair of pumping units, each unit being complete within itself but the two units operating together. The upper unit comprises a working valve 16 centered within the casing by means of a partition 17 threadedly fitted in the upper end of the casing and threadedly engaging the upper end of the barrel. Working within the barrel is a plunger 18 mounted on a tubular rod 19 threadedly connected at its upper end to a valve cage 20 in which a ball valve 21 works to control an outlet port 22. This valve cage 20 is adapted for connection with a sucker rod 23 (Figure 1) by means of which reciprocating movement of the plunger rod can be effected from the top of the well.

The lower pumping unit comprises a working valve 24 centered within the casing by a double wall partition 25 threadedly engaging the casing and the valve at the lower ends of the latter. The upper end of the barrel 24 is detachably connected to the barrel 16 of the upper pumping unit through the medium of an intermediate or connecting barrel 26. A plunger 27 works in the barrel 24 and is provided with a rod 28 movable through a stuffing box 29 of a plug 30 so as to extend upwardly into the barrel 16 for connection with the plunger rod 19 of the upper pumping unit. As shown in Figure 2, the upper end of the rod 28 is threadedly connected to the lower end of the rod 19 and is provided with a pocket 31 to which oil is admitted from the barrel 16 through ports 32, the pocket being in communication with the interior of the plunger rod 19 so that oil can be ultimately delivered to the port 22.

The connecting or intermediate barrel 26 comprises a tubular body having a tapered bore 26^a formed with an annular groove 26^b, and fitted in this bore is a tapered skirt 30^a of the plug 30, the skirt as shown in Figure 5 being split longitudinally at circumferentially spaced intervals to permit constriction of the skirt as it is inserted into the tapered bore. In the final position of the skirt within the bore the annular rib 30^b is seated within the groove 26^b, and with the sections of the skirt held under tension by the tapered bore, it will be clear that the rib 30^b is firmly held within the groove so as to maintain the entire plug within the barrel.

This plug applied as described provides a dividing wall between the upper barrel 16 and the lower barrel 24 so that the two plungers 18 and 27 although being operatively connected to each other can function independently of each other in their respective barrels.

The barrel 26 is provided with lateral hollow extensions 33 and 34 in which valve cages 35 and 36, respectively, are mounted. The barrel 26 is also provided with an extension 37 on which is a valve cage 38. The double wall partition 25 is also provided with a valve cage 39, and all of the valve cages, 34 to 39 inclusive, are constructed as

illustrated in Figure 4 where it will be seen that each valve cage comprises a U shaped yoke the parallel portions of which are slotted as indicated at 40 to receive the reduced ends 41 of a roller valve which is adapted to normally engage a seat 42 disposed within a port, the valve controlling the passage of liquid through the port. By reference to Figure 2, it will be seen that the extensions 33 and 34 are formed with inlet ports 33^a and 34^a, respectively, controlled by valves 33^b and 34^b, respectively. The extension 37 is provided with an outlet port 37^a controlled by a roller valve 37^b, the partition 25 is provided with an outlet port 25^a controlled by roller valve 25^b. In every instance the roller valves for the inlet and outlet ports normally occupy closed position but are adapted to be moved to open position under the suction created by movement of the plungers 18 and 27 within the working barrels in order to admit or discharge oil to or from the barrels. These valves are guided in their opening and closing movements by their reduced ends 41 working within the slots 40. In this manner they are assured of properly re-seating on their seats to effectively close the ports.

The valve cages 35 and 36 are retained in fixed position within the extensions 33 and 34 by screw plugs 40^a threadedly fitted in the extensions and bearing against the top of the cages as clearly illustrated in Figure 4.

As shown in Figures 1 and 2, the partition 25 is provided with an inlet port 41^a through which oil is delivered to the casing. The partition is also provided with a second inlet port 42^a controlled by a ball valve 43 working in a cage 44. This valve 43 is adapted to be moved to open position under the suction created in the barrel 34 by upward movement of the plunger 27.

Referring now to Figures 3 and 6, I have here shown a pair of partitions 45 arranged at diametrically opposed points with respect to the barrels 16, 24 and 26 and secured in this position by means of fastening members 46. These partitions 45 extend from the upper partition 17 to the lower partition 25 and serve to divide the space between the working barrels and casing into two separate and distinct chambers designated at 47 and 48, respectively, the chamber 47 constituting an oil intake chamber while the chamber 48 constitutes an oil discharge chamber. Oil is supplied to the chamber 47 through the inlet port 41, it being noted that the upper end of this chamber is closed by the partition 17. A port 49 in the partition 17 permits discharge of oil supplied to the chamber 48 upwardly of the pump to comingle with oil discharged from the working barrel 16 as described hereinafter.

The operation of the pump is as follows: With the plungers 18 and 27 in the lowermost position as shown in Figure 1, it will be clear that as these plungers move upwardly as indicated by the arrow the plunger 27 will operate to create a negative pressure in the working barrel 24 to open the inlet valve 23 whereby oil at a point below the pump would be drawn upwardly into the barrel. It will be understood that the positive pressure at the upward side of the plunger 27 operates to maintain the inlet valve 34^b in closed position while the valve 37^b will be moved to open position. With upward movement of the plunger 18, a negative pressure is created in the barrel 16 which operates to open the valve 33^b thus drawing oil already supplied to the chamber 47 through the port 41, into the barrel 16.

With the barrels 16 and 24 filled with oil in the manner just described, it will be clear that upon downward movement of the plungers oil will be discharged from the barrels as follows: On downward movement of the plunger 27 the valve 43 is forced to closed position while the valve 25^b is opened to permit the discharge of oil from the barrel 24 through the partition 25 into the discharge chamber 48. As the plunger 18 goes downwardly the valve 33^b is closed thus causing the oil in the barrel to be forced into the tubular rod 19 through the ports 32, and from the latter through the discharge port 22 to a point above the pump.

It is to be noted that during downward movement of the plunger 27 a negative pressure is created in the barrel 24 at the upper side of the plunger. This operates to open the valve 34^b to permit the influx of oil from the chamber 47 into the barrel 26 so that upon subsequent upward movement of the plunger the valve 34^b will be closed and the valve 37^b opened to permit the discharge of this body of oil into the chamber 48.

From the foregoing operation, it will be manifest that the two pumping units although operatively connected, operate independently of each other to draw oil into and discharge oil from its respective barrel. The two pumping units co-operate to effect a continuous and uninterrupted movement of the oil in such manner as to prevent the settling of sand or other solid matter in the pump barrel or on the valves, and by the provision of three independent inlets and outlets, it will be manifest that the possibility of gas operating to maintain the valves in open position is reduced to a minimum.

Although I have herein shown and described only one form of oil pump embodying my invention, it is to be understood that various changes and modifications may be

made herein without departing from the spirit of the invention and the spirit and scope of the appended claims.

What I claim is:

1. A pump comprising a casing, a pair of barrels arranged one above the other within the casing, a third barrel connecting the first two barrels, a plug removably fitted into the third barrel for dividing the first two barrels, partitions associated with the barrels and casing for maintaining the barrels in spaced relation to the casing to form therebetween intake and discharge chambers, a tubular plunger rod movable in the upper barrel a plunger fixed to said rod, a second plunger rod connected to the first rod and movable through said plug and in all of the barrels, a second plunger fixed to the second rod, inlet ports in the second rod providing communication between the upper barrel and the tubular rod, a valve outlet port in the upper end of the tubular rod to open on downward movement of the third rod, valve inlet ports for placing the intake chamber in communication with the upper or lower barrels according as the plungers are moved upwardly or downwardly in said barrels, valved outlet ports for placing the discharge chamber in communication with the upper barrel or lower barrel according as the plungers are moved downwardly or upwardly in the barrels, and a valved intake port with the lower end of the lower barrel.

2. A pump as embodied in claim 1 wherein the valved inlet ports and one of the discharge ports are in the intermediate barrel and the other discharge port is in one of said partitions.

3. In a pump of the character described a working barrel having valved inlet port at its lower end, a casing surrounding the barrel and spaced therefrom, a plug for dividing the space between the casing and barrel into an intake chamber and a discharge chamber, an inlet port between the barrel and casing through which fluid is admitted to the intake chamber, a valved port through which fluid may be discharged from the barrel into the discharge chamber, a valved inlet port at the upper end of the working barrel providing communication between the barrel and the intake chamber, a valved outlet port providing communication between the barrel and the discharge chamber, and a plunger movable in one direction in the barrel to open the first valved port to supply fluid to the barrel and in another direction to close the first inlet port and open the first valved outlet port whereby fluid is discharged from the barrel through the first valved outlet port and other fluid is drawn into the barrel through the second valved inlet port for subsequent discharge from the valve through opening of the second valved outlet port upon movement of the plunger in the first mentioned direction.

4. A pump as embodied in claim 3 wherein a second working barrel is provided having a valved inlet port through which oil is supplied to the barrel from the intake chamber, a plunger movable in the second barrel, a tubular plunger rod for the plunger having a valved outlet port, said second plunger being movable in one direction to open the valved inlet port to supply fluid to the second barrel and in another direction to close the valved inlet port and open the valved outlet port whereby the fluid in the barrel will be discharged therefrom through the outlet port.

5. A pump as embodied in claim 3 wherein a second working barrel is provided having a valved inlet port through which oil is supplied to the barrel from the intake chamber, a plunger movable in the second barrel, a tubular plunger rod for the plunger having a valved outlet port, said second plunger being movable in one direction to open the valved inlet port to supply fluid to the second barrel and in another direction to close the valved inlet port and open the valved outlet port whereby the fluid in the barrel will be discharged therefrom through the outlet port operatively connecting the two plungers, and a plug for separating one barrel from the other in a manner to permit simultaneous removal of the plungers from their respective barrels.

LOUIS P. KESSELMAN.