Nov. 20, 1923. 1,474,439

V. H. PALM

PUMP

Filed April 15, 1922 2 Sheets-Sheet 1

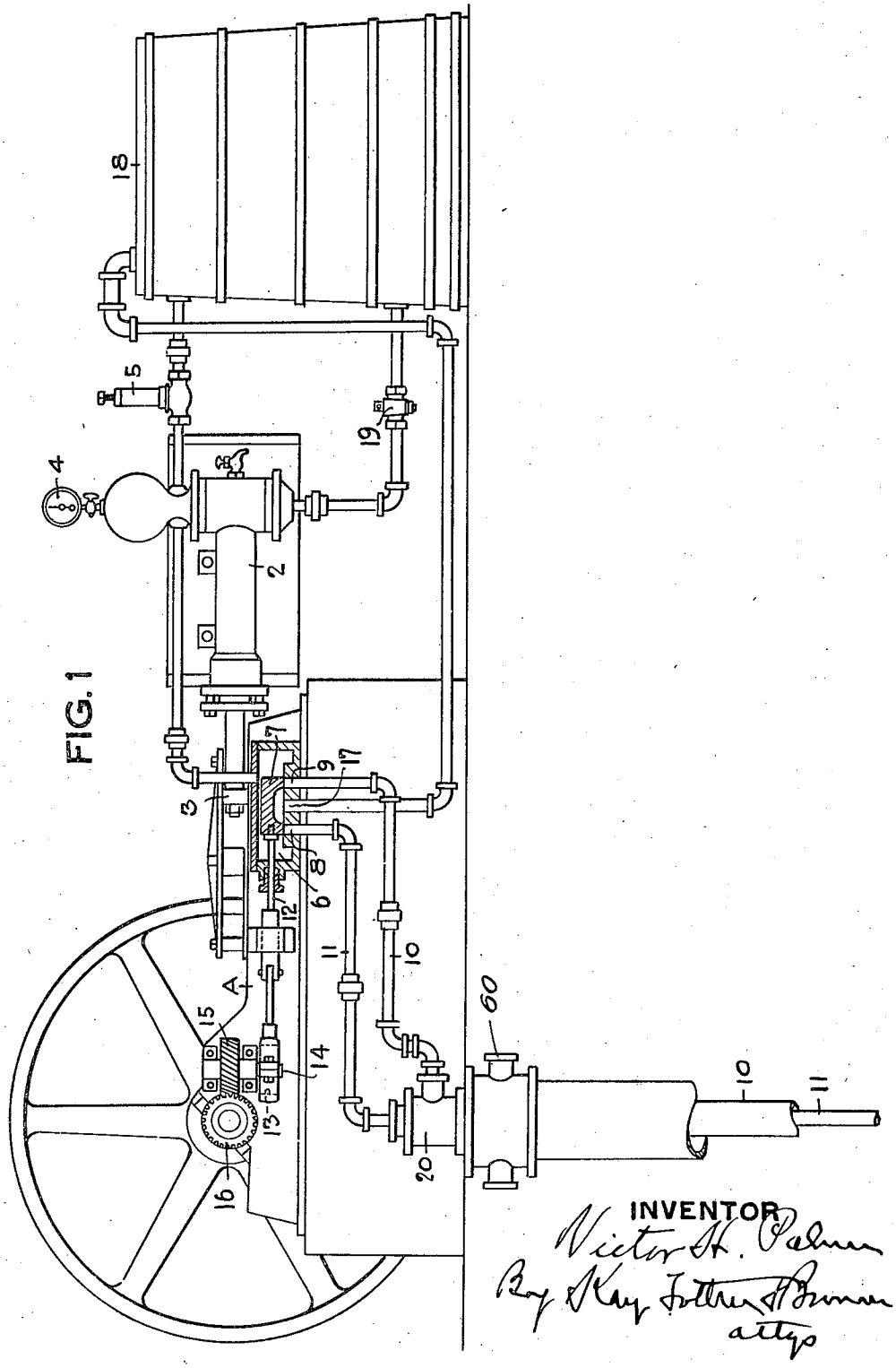


FIG. 1

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FIG. 2

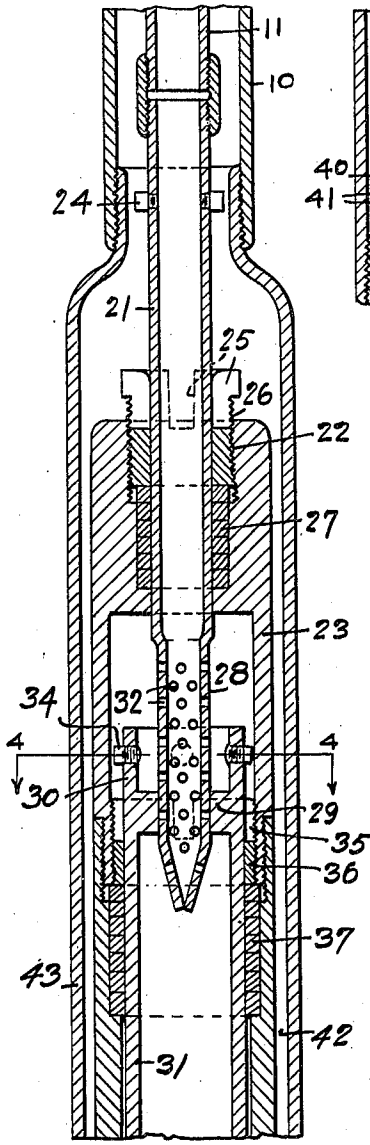


FIG. 3

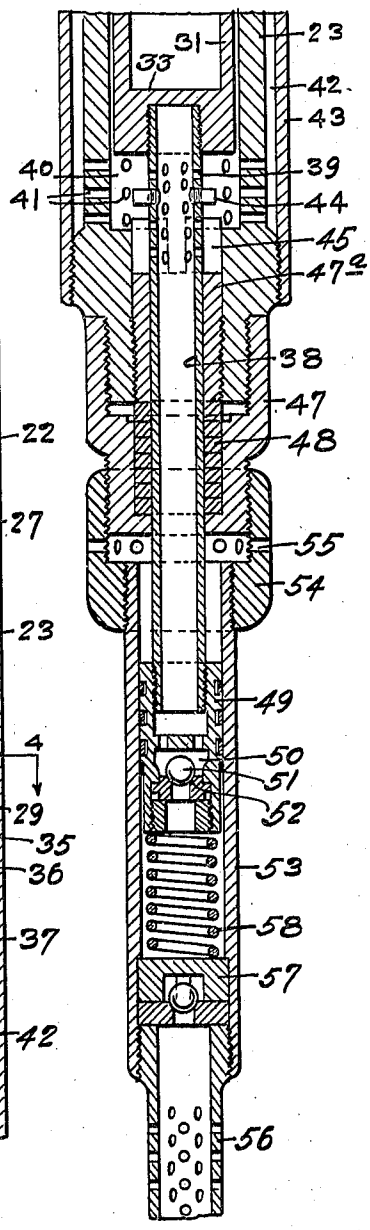


FIG. 4

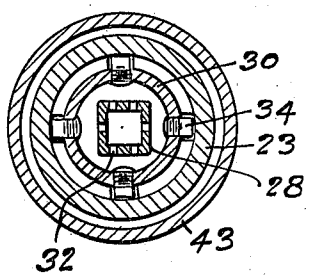
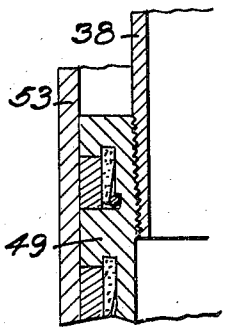


FIG. 5



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Patented Nov. 20, 1923. 1,474,439

UNITED STATES PATENT OFFICE.

VICTOR H. PALM, OF BUTLER, PENNSYLVANIA.

PUMP.

Application filed April 15, 1922. Serial No. 552,934.

To all whom it may concern:

Be it konwn that I, VICTOR H. PALM, a citizen of the United States, and resident of Butler, in the county of Butler and State of Pennsylvania, have invented a new and useful Improvement in Pumps; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to pumps that are more especially adapted for pumping water or oil out of deep wells, the object of the invention being to provide a pump which will dispense with the walking beam or jack orinarily heretofore employed, as well as the sucker-rods for raising and lowering the pumping-valves, but in lieu thereof to use fluid for raising and lowering the pumping valves or pistons, thereby doing away with the cumbersome mechanism heretofore employed and the great power required to operate same.

To accomplish the above object I employ two strings of tubes one inside the other, so arranged that when full of fluid the pressure will be on opposite sides of a plunger to which the working-plunger and valve is attached. When both tubes are full of fluid the pressure against the said plunger is nearly balanced except for the area that the valved plunger displaces. By putting extra pressure alternately into the tubes by means of a pump that discharges through a timing valve it is so arranged that when one tube is receiving more pressure the other will be exhausting, so that the plunger and the valved plunger connected thereto is reciprocated up and down. The fluid from the well is pumped out on the down stroke, and is discharged out of the outer tube. The timing valve is geared to the engine or motor, and the ratio is determined by how fast the motor runs, the size of the pressure pump, and how fast the well is to be pumped.

In the accompanying drawings, Fig. 1 is a side elevation of the pump and engine and the connection to the well; Fig. 2 is a vertical sectional view of the upper portion of the pump in the well; Fig. 3 is a like view of the lower portion of the pump; Fig. 4 is a section on the line 4—4, Fig. 2; and Fig. 5 shows the detailed connection between the inner tube and the working-valve.

In the drawings the numeral 2 designates a suitable pressure-pump connected up to the cross-head 3 of a suitable steam engine or motor A. I do not, however, limit myself to a pump 2 connected up in this way to the engine, as it may be geared or belt-driven, or may be operated by a separate engine or motor. A suitable pressure-gage 4 is provided, and a safety-valve 5 regulates the pressure that is put in the tubes in the well.

A chest 6 is provided which is similar to the ordinary steam chest of a steam engine with its ports 8 and 9 controlled by the ordinary D-valve 7 without any overlap, said valve controlling the ports 8 and 9 connecting with the tubes 10 and 11 leading into the well.

The valve 7 is connected up by the rod 12 to the eccentric 13, said eccentric being mounted on the vertical shaft 14 which has the worm-gear 15 meshing with the worm 16 on the engine shaft. In this way the timing-valve is geared to the engine and the ratio is determined by how fast the engine or motor runs, the size of the pressure-pump and how fast the well is to be pumped.

The exhaust-port 17 delivers the fluid from the pipes 10 and 11 back into the tank 18. The valve 19 controls the fluid to the pump, so that there will be the right amount for the displacement of the plunger in the well for the distribution valve 7.

A stuffing-box 20 is provided to pack the tube 11 where it enters the tube 10 in passing down into the well. The tube 10 is supported from the top of the well and carries the pump and working barrels.

The tubing 11 also hangs from the top of the well and is connected to the tube 21 which extends through the stuffing-box 22 at the upper end of the barrel 23. The tube 21 has the pins or lugs 24 which are adapted to engage the recesses 25 formed in the gland 26 of the stuffing-box 22 when it is desired to turn the gland 26 to tighten the packing 27.

The tube 21 is square in cross-section as at 28 after it passes through the stuffing-box 22, and said square portion passes through a like opening 29 in the head 30 of the plunger 31, which is adapted to move up and down in the barrel 23.

The square portion 28 of the tube 21 is provided with the perforations 32 so that the fluid can enter the hollow plunger 31 and work on the inner face of the lower head 33 thereof, as well as the upper end.

The upper end of the plunger 31 is pro-

vided with the pins 34 which are adapted to engage the recesses 35 formed in the gland 36, so that by bringing said pins into engagement with said recesses the gland 36 may be turned to tighten the packing 37.

The plunger 31 is connected at its lower end to the tube 38 which has perforations 39 which bring said tube into communication with the chamber 40 with the perforations 41 leading into the space 42 between the barrel 23 and the outer barrel 43, so that the fluid coming up through the tube 38 can pass out into said space 42 and out through the pipe 10.

The tube 38 has the pins or projections 44 which are adapted to engage recesses 45 of the gland 47^a, so that by turning said tube the gland is lowered and the packing 48 tightened.

Connected to the lower end of the tube 38 is a working-valve 49 of the ordinary construction having the cage 50 with the ball valve 51 normally resting on the seat 52. This working valve is adapted to move up and down in the barrel 53 which is connected by the collar 54 to the stuffing-box 47. The collar 54 is provided with the perforations 55 to permit any fluid leaking past the valve 49 or stuffing-box 47 to escape.

The numeral 56 designates the customary anchor or perforated pipe at the bottom of the well, and above the same in the barrel 53 is the ordinary standing-valve 57. A coil spring 58 is interposed between the standing-valve 57 and the working-valve 50, said spring acting to keep the pins 34 and 44 from striking their respective stuffing-box glands when the fluid is used to force the plunger down. When it is desired to tighten the different glands the tube 11 is disconnected at the top of the well and then lowered until the pins engage in the several glands. The seats or recesses formed in the several glands vary in depth so that when the tubing 11 is lowered the upper pins will engage the top gland, and by lowering the tubing still farther the lower glands will be engaged, so that if it is found that the first packing is tight it can be loosened a little and then tightened with the next one lower down. In order to effect the engagement of the pins with the several glands it will be necessary to compress the spring 58. A casing head 60 of the ordinary construction is employed to permit of the drawing off of gas.

When in operation the pump 2 will act to alternately deliver fluid to the pipes 10 and 11. When fluid is delivered under pressure to the pipe 11 the said fluid passes through the perforations in the lower end of said tube into the plunger 31, and said fluid acting on the inner bottom face of said plunger and on the upper end of said plunger will act to lower same, so that the fluid contained in the barrel 53, previously pumped into the lower end of said barrel by the upstroke of the pumping-piston 49, passes up through the working valve 50 and pipe 38 and is forced out through the openings 41 into the space 42 and thence into the pipe 10 which is connected up to the exhaust 17 connected to the tank. The slide-valve 7 then operates to direct the fluid under pressure into the pipe 10, the pipe 11 being connected up to the exhaust, whereupon the fluid passes down through the space 42 through opening 41 into the chamber 40 to act on the lower face of the plunger 31 to lift the same. As the plunger 31 moves upward the standing-valve 57 is opened and fluid is admitted to the lower end of the working-barrel 53 below the working-valve 51, and this fluid is again lifted by the lowering of the plunger 31, as previously described.

What I claim is:

1. In a pump, the combination of an inner and outer-barrel communicating with each other, a hollow plunger in the inner-barrel, a tube connected up to the interior of said plunger, a tube connected up to the outer-barrel, a pump for delivering fluid to said tubes alternately, means for exhausting one of said tubes when the fluid is being introduced to the other, and a valved pumping-piston and a pipe connected to said pumping-piston and to said plunger, said last named pipe communicating with said outer barrel.

2. In a pump, the combination of an inner and outer-barrel communicating with each other at the lower end, a hollow plunger in said inner-barrel, a tube adapted to enter the upper end of said hollow plunger on which said hollow plunger is slidable, a tube connected to the outer-barrel, a pump adapted to force fluid alternately into said pipes, means for connecting said pipes alternately to the exhaust, a valved pumping-piston, a pipe connected to said pumping-piston and to said plunger, said last named pipe communicating with the said outer barrel.

3. In a pump, the combination of an inner and outer-barrel communicating at their lower ends, a hollow plunger in said inner barrel, a tube perforated at its lower end adapted to enter said plunger and on which said plunger is slidable, a tube connected to the outer barrel, a pump adapted to force fluid alternately into said tubes, means for alternately exhausting said tubes, a valved pumping-piston, a pipe connected to said pumping-piston and to said plunger, said last named pipe communicating with the said outer barrel.

4. In a pump, the combination of an inner and outer-barrel communicating at their

lower ends, a hollow plunger in said inner barrel, a tube having an angular perforated end portion adapted to enter a correspondingly shaped opening in said hollow plunger and on which said hollow plunger is slidably mounted, a tube connected to the outer-barrel a pump adapted to force fluid into said tubes alternately, means for exhausting said tubes alternately, and a valved pumping-piston, a pipe connected to said pumping-piston and to said plunger, said last named pipe communicating with the said outer barrel.

5. In a pump, the combination of an inner and outer-barrel communicating at their lower ends, a hollow plunger in said inner-barrel, a tube adapted to enter the upper end of said hollow plunger and on which said hollow plunger is slidably mounted, a tube connected to the outer-barrel, a pressure pump, a slide-valve on said pressure-pump, controlling ports leading to said tubes and to the exhaust, an engine, and connections between said engine and said slide-valve for operating same, whereby the fluid is forced by said pump alternately into said tubes and exhausted therefrom, and a valved pumping-piston and a pipe connected to said pumping-piston and to said plunger, said last named pipe communicating with the outer barrel.

6. In a pump, the combination of an inner and outer-barrel communicating at their lower ends, a hollow plunger in said inner-barrel, a tube adapted to enter the upper end of said hollow plunger and on which said hollow plunger is slidably mounted, a stuffing-box through which said tube passes, interengaging means on said tube and gland of said stuffing-box, whereby said tube may be brought into engagement with said gland for turning the same, a tube connected to the outer-barrel, a pump for delivering fluid to said tubes alternately, means for exhausting one of said tubes when fluid is being introduced to other, a valved pumping-piston, and a pipe connected to said pumping-piston and to said plunger, said last named pipe communicating with said outer-barrel.

7. In a pump, the combination of an inner and outer-barrel communicating at their lower ends, a hollow plunger in said inner barrel, a tube adapted to enter the upper end of said hollow plunger and on which said hollow plunger is slidably mounted, a stuffing-box through which said tube passes, a projection on said tube adapted to engage the seat formed in the gland of said stuffing-box, whereby said tube may be brought into engagement with said gland for turning the same, a tube connected to the outer-barrel, a pump for delivering fluid to said tubes alternately, means for exhausting one of said tubes when fluid is being introduced to the other, a valved pumping-piston, and a pipe connected to said pumping-piston and to said plunger, said last named pipe communicating with said outer-barrel.

8. In a pump, the combination of an inner and outer-barrel communicating with each other at their lower ends, a hollow plunger in the inner-barrel, a tube connected up to the interior of said plunger, a tube connected up to the outer-barrel, a stuffing-box in said inner-barrel through which said plunger passes, interengaging means on said plunger and the gland of said stuffing-box, whereby said plunger may be brought into engagement with said stuffing-box, said tube connected to said plunger having an angular end portion adapted to enter a correspondingly shaped opening in said hollow plunger, a pump for delivering fluid to said tubes alternately, means for exhausting one of said tubes when fluid is being introduced to the other, a valved pumping-piston, and a pipe connected to said pumping-piston and to said plunger, said last-named pipe communicating with said outer-barrel.

9. In a pump, the combination of an inner and outer-barrel communicating with each other at their lower ends, a hollow plunger in said inner-barrel, a stuffing-box in said inner-barrel through which said plunger passes, a tube having an angular perforated end portion adapted to enter a correspondingly shaped opening in said hollow plunger, a stuffing-box in said inner-barrel through which said tube passes, studs on said tube adapted to enter recesses formed in the gland of the stuffing-box through which said tube passes, studs on said plunger adapted to engage recesses formed in the gland of the stuffing-box through which said plunger passes, the recesses in the gland of the stuffing-box through which said tube passes being shallower than the recesses formed in the gland of the stuffing-box through which said plunger passes, a tube connected to the outer-barrel, a pump for delivering fluid to said tubes alternately, means for exhausting one of said tubes when the fluid is being introduced to the other, a valved pumping-piston, and a pipe connected to said pumping-piston and to said plunger, said last-named pipe communicating with said outer barrel.

10. In a pump, the combination with an inner and outer-barrel communicating with each other at their lower ends, a hollow plunger in said inner-barrel, a stuffing-box in said inner-barrel through which said hollow plunger passes, a perforated tube having an angular portion at its lower end adapted to enter an angular-shaped opening formed in said hollow plunger, a stuffing-box in said inner-barrel through which said tube passes, studs on said tube adapted to enter seats formed in the gland of said last-named stuffing-box, studs on

said plunger adapted to engage seats formed in the gland of its stuffing-box, a pipe connected to the lower end of said plunger, a pumping-piston connected to said pipe, a stuffing-box in said inner-barrel through which said pipe passes, studs on said pipe adapted to engage seats formed in said stuffing-box of said pipe, the seats in the glands of the stuffing-box for the first-named tube being shallower than the seats in the gland for said plunger, and the seats in the gland of the plunger being shallower than the seats in the gland of said last-named pipe, a tube connected up to the outer-barrel, a pump for delivering fluid to said tubes alternately, means for exhausting one of said tubes when the fluid is introduced to the other, a valved pumping-piston, a pipe connected to said pumping-piston and to said plunger, said last-named pipe communicating with said outer barrel.

11. In a pump, the combination of an inner and outer barrel communicating with each other at their lower ends, a hollow plunger in said inner-barrel, a stuffing-box in said inner-barrel through which said hollow plunger passes, studs on said hollow plunger, seats formed in the gland of said stuffing-box to receive said studs, a tube having at its lower end an angular perforated end portion adapted to enter a correspondingly-shaped opening in said hollow plunger, a spring resisting the downward movement of said plunger, whereby said studs are prevented from striking said gland, a tube connected to the outer-barrel, a pump for delivering fluid to said tubes alternately, means for exhausting one of said tubes when the fluid is introduced to the other, a valved pumping-piston, and a pipe connected to said pumping-piston and to said plunger, said last-named pipe communicating with said outer-barrel.

12. In a pump, the combination of an inner and outer-barrel communicating with each other at their lower ends, a hollow plunger in said inner barrel, a tube adapted to enter the upper end of the said hollow plunger and on which said hollow plunger is slidably mounted, a tube connected to the outer barrel, a pressure pump for delivering fluid to said tubes alternately, means for exhausting one of said tubes when fluid is being introduced to the other, a valved pumping-piston, a pipe connected to said pumping-piston and to said plunger, said last-named pipe communicating with said outer barrel, and means for venting the space around said last-named pipe, whereby any fluid collecting around said pipe is permitted to escape.

In testimony whereof I, the said VICTOR H. PALM, have hereunto set my hand.

VICTOR H. PALM.