(No Model.) 2 Sheets—Sheet 1.

F. E. HERDMAN.

PUMP.

No. 530,618. Patented Dec. 11, 1894.

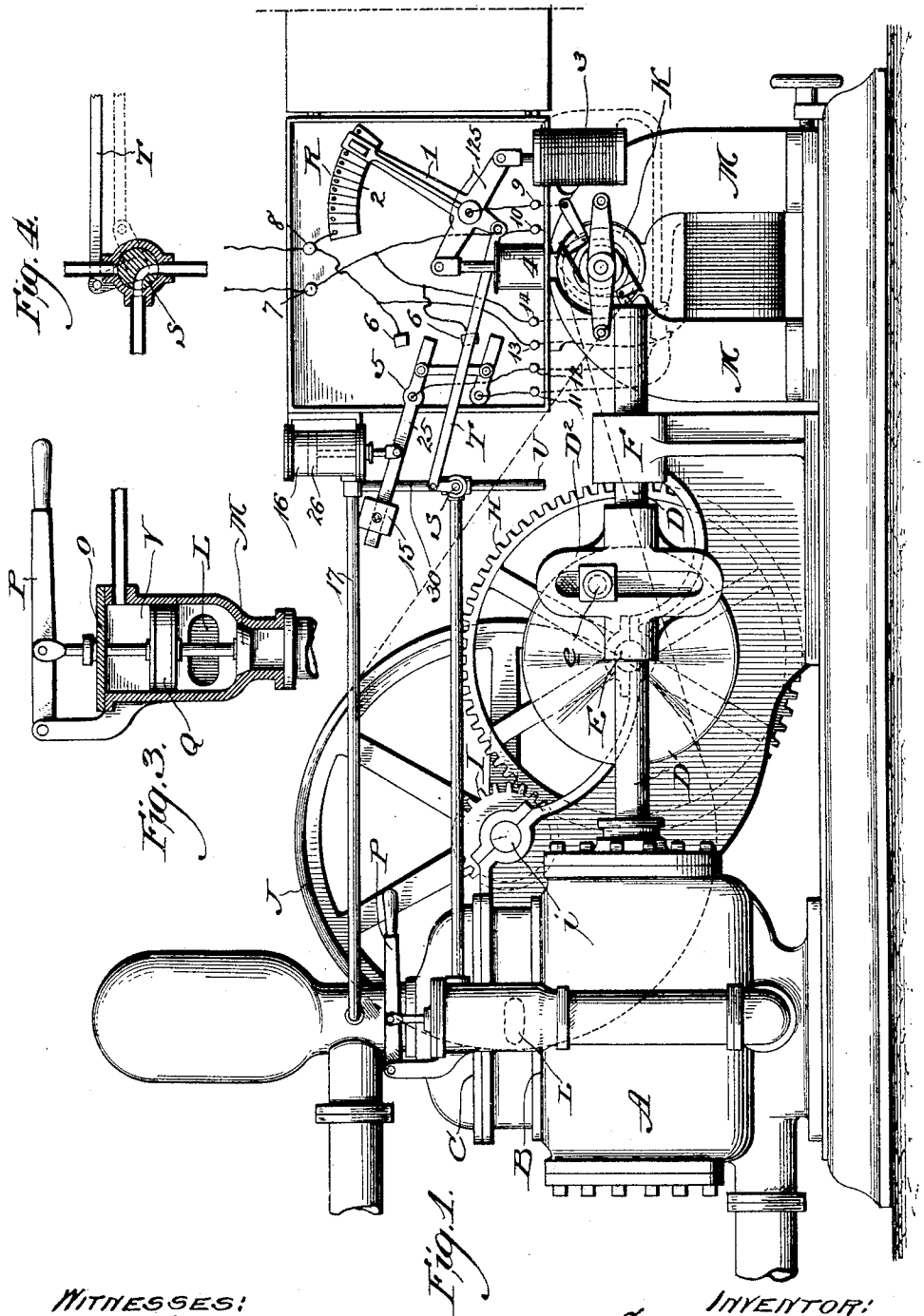


Fig. 4.

Fig. 3.

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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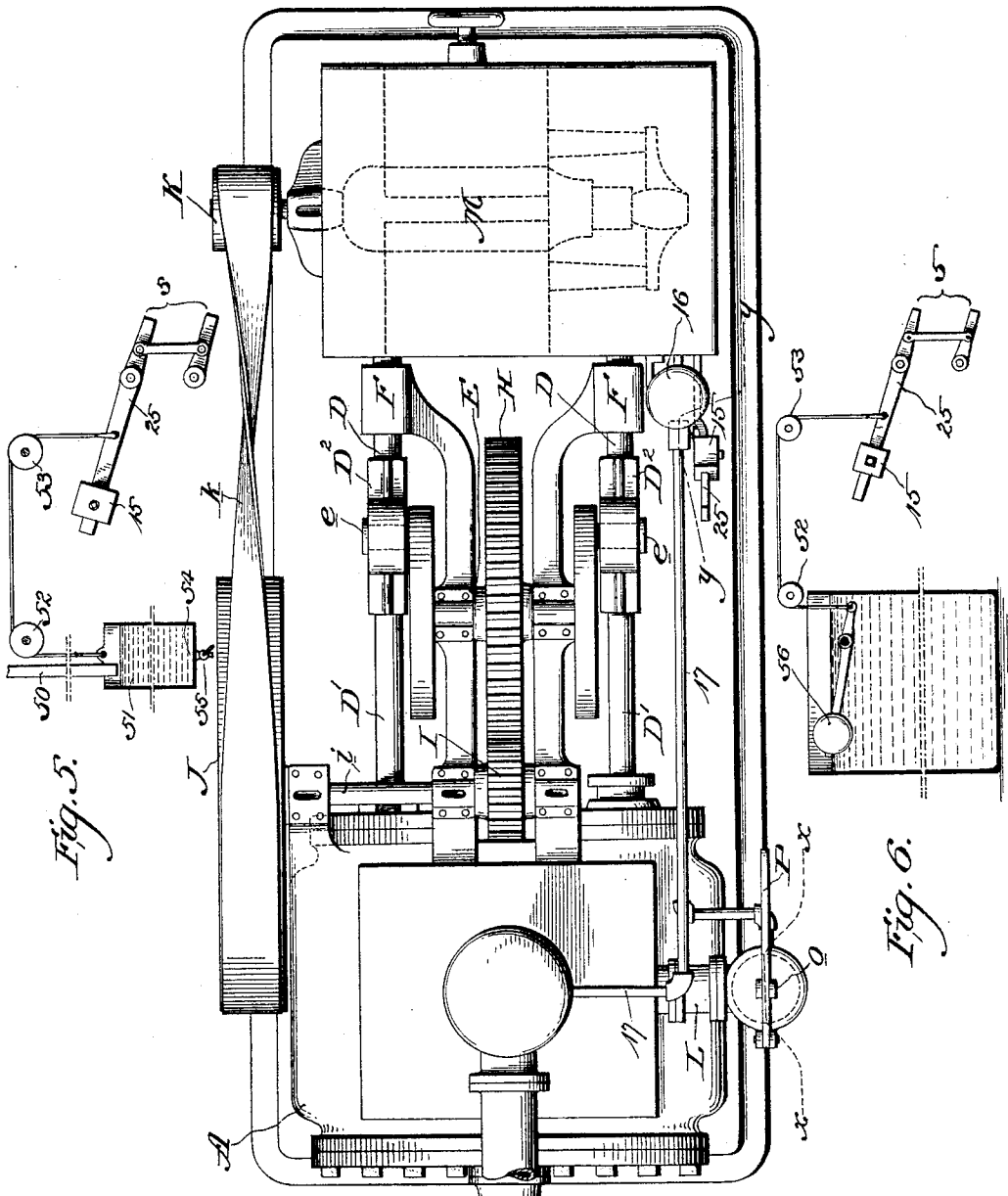


Fig. 2.

Fig. 5.

Fig. 6.

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UNITED STATES PATENT OFFICE.

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PUMP.

SPECIFICATION forming part of Letters Patent No. 530,618, dated December 11, 1894.

Application filed November 22, 1892. Serial No. 452,785. (No model.)

To all whom it may concern:

Be it known that I, FRANK E. HERDMAN, a citizen of the United States, residing at Indianapolis, county of Marion, and State of Indiana, have invented a new and useful Improvement in Pumps, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

In the drawings:—Figure 1 is a side elevation of pump with electric attachments. Fig. 2 is a plan view of the same. Fig. 3 is a section on line *x—x*, Fig. 2. Fig. 4 is a section on line *y—y*, Fig. 2. Fig. 5 is a view of modified apparatus. Fig. 6 is a view of another modified apparatus.

A is the water end of an ordinary duplex pump.

B and C are portions of the chest containing the valves. The valve C is used in place of the check valve in the delivery.

D, D, are rods to which the piston rods D′ D′ of the pump are connected. The slides D^2 are connected with the crank pins *e* on the shaft E. The far ends of the piston rods travel in the slides F. To the shaft E is attached the gear H which meshes in the pinion I. The shaft *i* of the pinion I has at its outer end the pulley J.

M is the electric motor and K a pulley on the shaft of the motor. A belt *k* connects the pulleys J and K. The pulleys and gears are so arranged as to obtain the proper relative speed between the pump and the motor. On top of the motor is placed the resistance box provided with rheostat and controlling switches.

R are the resistances.

1 is the arm adapted to pass over the resistance contacts 2. To the lower end of arm 1 is connected a cross arm 125, connected at one end to the solenoid 3 and at the other to the dash pot 4. At the left side of the switch board is placed the double switch 5, having the contacts 6—6. The main circuit from the source of current supply is connected with the binding posts 7 and 8. Binding post 8 is connected with the resistances R. Arm 1 carries a brush in electrical connection with resistances and the other end of arm 1 is in electrical connection with binding post 9, and binding post 9 is in electrical connection with the armature of the motor. The return wire from the armature of the motor is connected with the binding post 10 which in turn is connected with binding post 7. The fields of the motor are connected with binding posts 13 and 14, which in turn are connected in shunt with the main circuit. The solenoid 3 is connected with binding posts 11 and 12 which binding posts are connected with the arm of switch 5; and contacts 6, 6 are in electrical connection with the source of current supply. To the end of the lever 25 of switch 5 is attached a weight 15. To this lever 25 is connected also the piston 26 of cylinder 16, the cylinder having a pipe 17 connected with its lower end, this pipe 17 being connected with the pump at delivery or tank into which the pump delivers. If for pressure tank system the weight 15 is adjusted to the desired pressure to be maintained in the tank—when the pressure falls below the desired amount the weight 15 drops and in consequence draws down the piston. The dropping of the weight 15 closes the switch 5. As soon as the switch is closed the circuit is closed through the solenoid 3. This draws the core upward and forces the arm 1 over the resistances as rapidly as the dash pot 4 will permit.

As the arm 1 passes over the resistance contacts to admit the current to the armature of the motor, it starts it and puts the pump into operation. When the pump has raised the pressure to the desired amount, then this pressure overcomes the weight 15 by raising the piston in the cylinder 16, breaking the contact through the switch 5, which breaks the circuit through the solenid 3. As soon as the circuit is broken through the solenoid 3, the core of this solenoid drops and draws the arm 1 to the right, breaking the circuit through the armature of the motor. As soon as the pressure again falls below the desired amount the weight 15 drops closing the switch 5, again starting the motor. As it is difficult for the motor to start up with the full pressure on the pump, this difficulty I overcome in the following manner: Between the upper valve C and lower valve B is a port L shown in Fig. 3, having connected with it a chamber V the lower end of which is connected with the suction of the pump. The chamber V is arranged with valve M making a by-path valve. When

valve M is open and the pump in operation it simply pumps water through valve B, through this pipe and back into the suction of the pump. The valves C prevent the water returning from the delivery pipe. The chamber containing the port L, has at its lower end the disk M provided with a contact seat. This disk M has a stem O passing through the top of the chamber and attached to lever P. To the stem O is attached the piston Q provided with packing,—the piston Q being above the port L when the disk M is on its seat.

The upper portion of the chamber is connected by the pipe with the valve *s* which valve is shown in detail, Fig. 4. The stem of valve *s* is connected by link T with the lower end of arm 1. The valve *s* is also connected with the supply pipe 17 by pipe 30. When the motor is at rest the arm 1 is at the right as shown and when in this position, the valve *s* is thrown so as to throw the discharge U in connection with the chamber V. In consequence the water from above the piston Q is discharged. When the pump starts up the piston and the disk M are raised, and the by-pass L opened. As the arm 1 moves over the contacts the valve is moved so as to connect the supply with the chamber V and the pressure is admitted above the piston Q, forcing it down and closing the by-pass. When the motor first starts this by-pass is open and the pump simply pumps from the delivery to the suction, the adjustment being such that the valve *s* is not opened so as to admit water to chamber V until the arm 1 has passed nearly or quite to the left. This arrangement allows the motor to gain its speed, without being against great pressure, as it takes a certain time for the chamber V to fill, and the motor is prepared to take its load before the bp-pass is closed. When stopping, the current is first broken through the solenoid 3 and the arm 1 returns to the right, and when it reaches that position the valve *s* is thrown for the water to discharge from the chamber V and as the port L is in connection with the delivery and the piston Q of larger diameter than the disk M the piston is forced upward and the by-pass opened before the pump comes to a rest. In starting up when there is no pressure in the tank, if the by-pass is open it can readily be closed by the attendant pushing down the lever P.

Having now fully described my invention, what I claim, and desire to protect by Letters Patent, is—

1. In combination with a pump, a chamber connected with the suction of the pump, a port from the delivery to said chamber, a motor to operate said pump, a valve adapted to close the connection between the chamber and the suction of pump, a valve stem connected to said valve, a piston connected to said stem, a pipe leading from said chamber above the piston, connection between said pipe and a source of pressure, and between said pipe and an outlet, a valve adapted to connect said pipe with either the source of pressure or the outlet, a motor, power controlling devices for said motor, and connection between said power controlling devices and said valve adapted to operate the valve to open the connection between the pipe and source of power on its movement in one direction, and between the pipe and outlet in its movement in the other direction.

2. In combination with a pump, a suction pipe, a chamber connecting with said suction, a port from the delivery, a valve adapted to close the entrance of suction pipe, a valve stem connected to said valve and a piston connected to said stem, a pipe leading from said chamber, a valve in said pipe, an electric motor, a source of current supply, resistances, electric connection between said resistances and source of current supply, an arm adapted to travel over said resistances, and electric connection between said arm and armature of motor, connection between said arm and said last mentioned valve.

3. In combination with a pump, a suction pipe, a chamber connecting with said suction, a port from the delivery, a valve adapted to close the entrance of suction pipe, a valve stem connected to said valve and a piston connected to said stem, a pipe leading from said chamber above the piston, connection between said pipe and pump delivery and between said pipe and outlet, a valve in said pipe, said valve being adapted to close the connection between said pipe and outlet and open the connection between the pipe and pump delivery, or vice versa, and means to operate said valves as described.

4. In combination with a pump, a suction pipe, a chamber connecting with said suction, a port from the delivery, a valve adapted to close the entrance of suction pipe, a valve stem connected with said valve and a piston connected to said stem, a pipe leading from said chamber, a valve in said pipe, a motor, a source of power for operating said motor, an operative arm for regulating the admission of power to the motor, and connection between said arm and said last mentioned valve.

In testimony of which invention I have hereunto set my hand.

F. E. HERDMAN.

Witnesses:
W. V. MARTIN,
E. B. KERR.