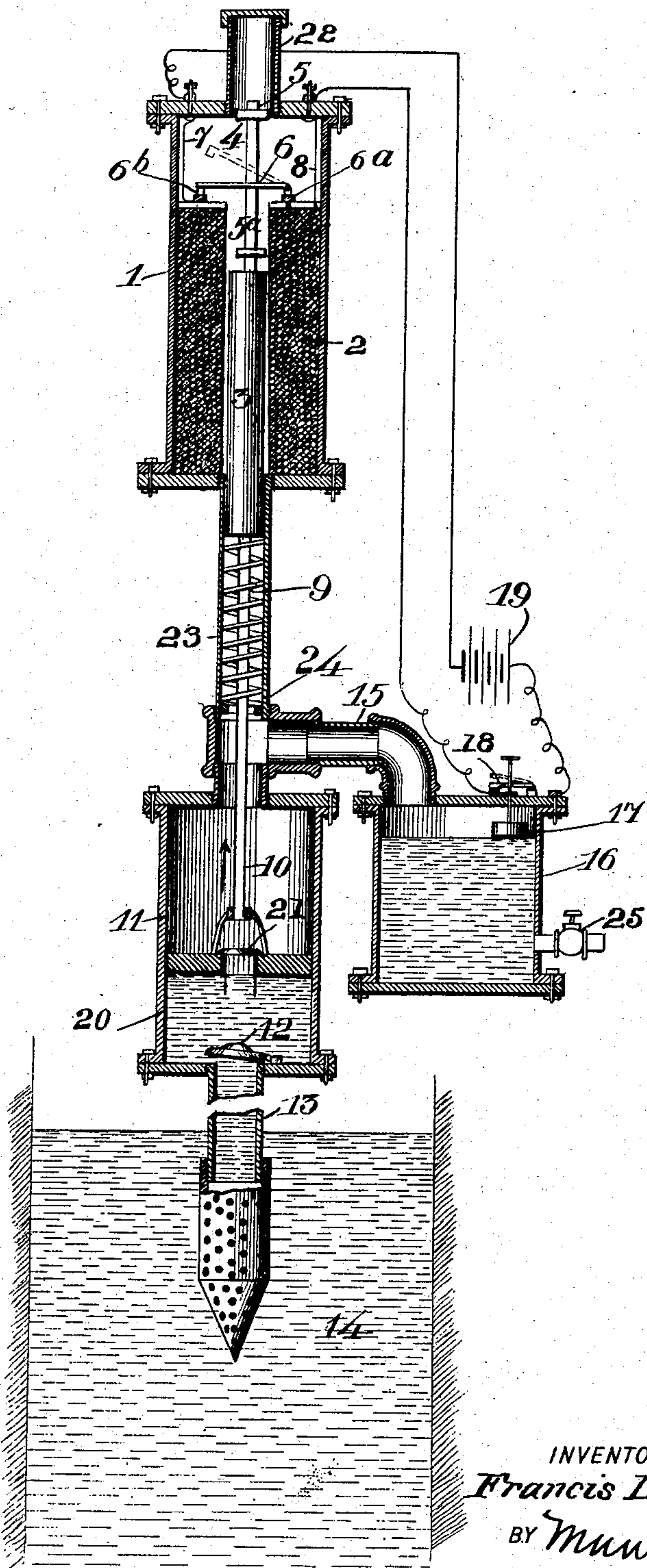


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F. L. ORR.
AUTOMATIC ELECTRIC PUMP.
APPLICATION FILED SEPT. 9, 1903.

NO MODEL.



WITNESSES:

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FRANCIS LEONARD ORR, OF THURMAN, IOWA, ASSIGNOR OF ONE-HALF
TO WILLIAM W. KEYSER, OF PERCIVAL, IOWA.

AUTOMATIC ELECTRIC PUMP.

SPECIFICATION forming part of Letters Patent No. 750,115, dated January 19, 1904.

Application filed September 9, 1903. Serial No. 172,494. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS LEONARD ORR, a resident of Thurman, in the county of Fremont and State of Iowa, have invented a new and useful Improvement in Automatic Electric Pumps, of which the following is a specification.

My invention is in the nature of an automatic electric pump designed to lift and force water or other liquid to any desired height, to be automatically started into action or stopped, according as the tank is empty or full, and operating in a smooth and practically noiseless manner and with an economic expenditure of electric current.

It consists in the novel construction and arrangement of a solenoid-coil with vibrating core and circuit-closing devices, in combination with the pump, and a casing which incloses and protects the solenoid and circuit-switch and also at the same time forms the air-chamber for the force-pump.

It also consists in other novel constructions and arrangements of parts, which will be hereinafter more fully described with reference to the drawing, in which the figure is a vertical longitudinal section of the entire apparatus.

In the drawing, 14 represents a well of any depth or any other source of supply of water or other liquid, 13 the suction-pipe of the pump, and 11 the pump-barrel, into the lower end of which the suction-pipe opens through an upwardly-opening valve 12. A piston 20 is connected to a rod 10 to reciprocate in the pump-barrel and has an upwardly-opening valve 21. These parts represent a pump of ordinary construction and may be replaced by any other form of pump.

From the top of the pump-barrel a concentrically-arranged pipe 23 extends vertically and gives passage-way to the pump-rod 10. The upper end of the pump-rod is rigidly fixed in vertical alinement to a soft-iron core 3 of a solenoid-coil 2, through which latter the core is arranged to reciprocate vertically. To sustain the weight of this core and the piston-rod and piston, a coil-spring 9 is wound around the piston-rod below the solenoid-core

and is seated at its lower end upon a collar 24, fixed in the lower portion of pipe 23.

The solenoid-coil is inclosed within an enlarged casing 1, which at its upper end is prolonged upwardly at 22 with a somewhat-smaller diameter.

The pipe 23 and casings 1 and 22 are formed with and connected by air-tight joints and serve the double purpose of inclosing the solenoid and all accessory parts and at the same time form the air-cushion ordinarily employed in force-pumps to give a continuous flow of water and send it to a higher elevation than it can be lifted by suction.

On top of the solenoid and within its casing is arranged an automatic circuit-controlling switch. This consists of a transverse hinged arm 6, one end of which at 6^a is connected to one terminal of the coil on one side of its axis and the other end of which is adapted to come into contact with a plate 6^b, connected to the other terminal of the coil on the other side of its axis. This plate 6^b and arm 6 are connected by wires 7 and 8 to external binding-posts on the casing which are in the circuit of a battery 19.

From the core of the solenoid a stem or extension 4 projects upwardly and has a collar 5 at the top and another, 5^a, near the bottom, which collars act as tappets to strike the switch-arm 6 and raise or lower it, according to the movement of the solenoid-core. The prolongation 22 of the casing gives passage-way to this stem when it rises, and the switch-arm has a friction-washer at its hinged end or other provision for holding it to whatever position it may be moved.

Communicating with the lower end of pipe 23 there is a right-angular branch pipe 15, which communicates with a tightly-closed tank 16. This tank has a float 17, whose stem passes to the outside of the tank and has two collars on it that act upon and raise or lower a second switch 18, also included within the circuit of the battery 19.

The operation of my pump is as follows: In the position of parts shown the circuit of the battery 19 is closed by the switch 6 through

the solenoid and the coil of the latter is drawing up the core 3 and raising the pump-piston, valve 21 is closed and valve 12 is open, and water is filling the lower end of the pump-barrel. As soon as the solenoid-core rises high enough for collar 5^a to lift the switch-arm 6 and break the electric circuit the coil 2 is demagnetized and the solenoid-core and pump rod and piston descend from gravity. This causes valve 12 to close and 21 to open and the water passes to the upper side of the piston. When the solenoid-core and pump-piston reach the lowest point of the stroke, collar 5 strikes the switch-arm 6 and by forcing the same down upon contact 6^b again closes the circuit through the solenoid-coil, again charging it. The core and piston again rise, drawing in water at valve 12 and lifting the water above the piston up to branch pipe 15 and compressing the air in the air-chamber formed by pipe 23 and casings 1 and 22. The water is consequently forcibly ejected into tank 16, which, being tight and hermetically sealed, causes the water to be stored therein under pressure. This water may therefore be carried off through the valve 25 and connecting-pipe under pressure to any desired point. This pumping action continues as long as the float 17 is down and the switch 18 closed. When, however, the tank 16 is filled and float 17 is raised, so as to lift the arm of switch 18 and open the battery-circuit, the pumping action is discontinued until the water is drawn from tank 16 and the float again closes the switch 18 and sends the battery-circuit to the solenoid again. It is not necessary that the tank should be air-tight, for in some instances it may be located at an elevated point, and the water will be forced up to it by the pressure of the air and will then issue from the tank by gravity.

In defining my invention with greater clearness I would state that I am aware that a solenoid with a reciprocating core and an automatic circuit making and breaking switch has been heretofore used to operate reciprocating tools, and I do not claim this broadly.

The tank 16 for convenience of illustration is shown proportionally small. It is intended to be of sufficient capacity to hold any desired quantity of water.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

55 1. An automatic electric pump, comprising

a pump-barrel with piston, piston-rod and valves, a battery-circuit, a solenoid with reciprocating core connected in alinement with the pump piston-rod, an automatic switch controlled by the solenoid-core and an inclosing casing for the solenoid made tight and in open communication with the top of the pump to form an air-chamber for the same substantially as described.

2. An automatic electric pump, comprising a pump-barrel with piston, piston-rod and valves, and electric circuit, a solenoid with reciprocating core connected in alinement with the pump piston-rod, an upward extension from the solenoid-core bearing tappet projections, a switch-arm hinged upon one side of said solenoid and having electrical connection with one terminal of the solenoid-coil, a contact on the opposite side connected to the other terminal of the coil, the said switch-arm extending transversely to the solenoid-axis and lying between the tappet projections and acted upon alternately by the same substantially as described.

3. An automatic electric pump, comprising a pump-barrel with piston, piston-rod and valves, an electric circuit, a solenoid with reciprocating core connected in alinement with the pump piston-rod, an automatic switch controlled by the solenoid-core, an air-tight casing for the solenoid and switch, a pipe connecting the air-tight casing to the pump-barrel and a spring arranged in said pipe about the pump piston-rod and sustaining the weight of the piston, piston-rod and solenoid-core, substantially as described.

4. An automatic electric pump, comprising a pump-barrel with piston, piston-rod and valves, an electric circuit, a solenoid with reciprocating core connected in alinement with the pump piston-rod, an automatic switch controlled by the solenoid-core, an air-tight casing for the solenoid, a pipe connecting the same to the pump, a water-tank, a branch pipe connecting the tank to both the air-tight casing and the upper end of the pump-barrel, a float in said tank, an automatic switch controlled by said float and an electric circuit extending to the solenoid and controlled by the tank-switch substantially as described.

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Witnesses:

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