No. 669,640. Patented Mar. 12, 1901.

E. M. HEWLETT.

ELECTRICALLY OPERATED PUMP.

(Application filed Dec. 4, 1899.)

(No Model.)

Fig. 1.

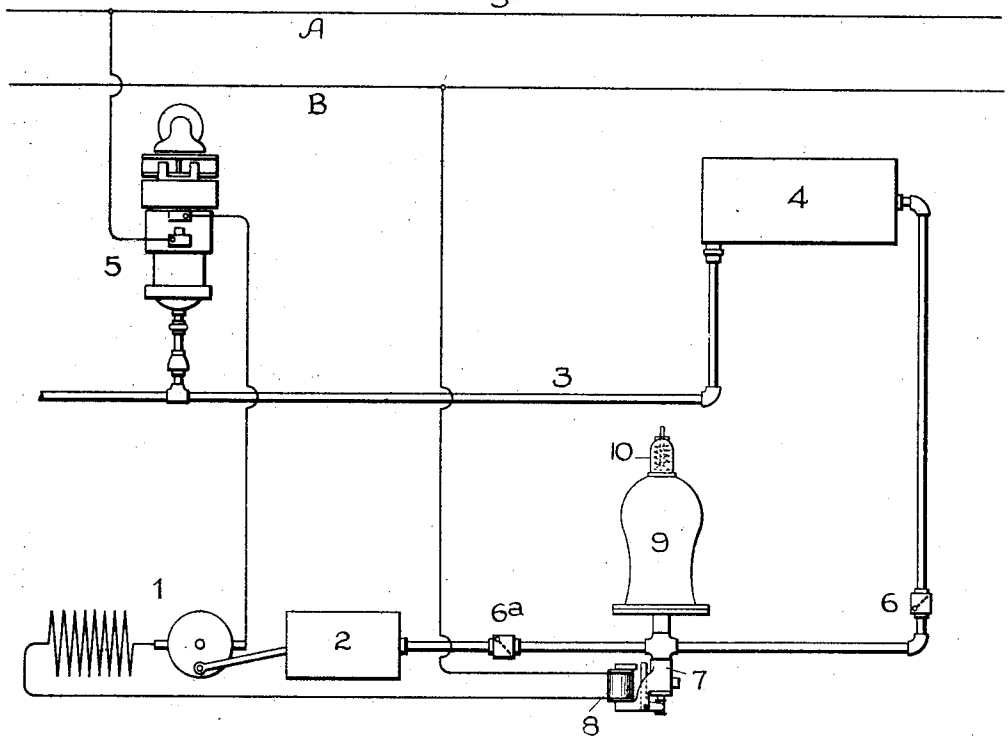
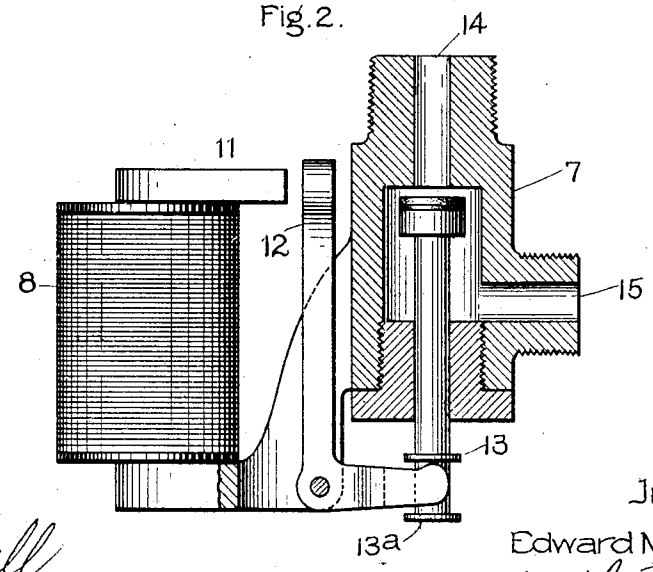


Fig. 2.



Witnesses.

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UNITED STATES PATENT OFFICE.

EDWARD M. HEWLETT, OF SCHENECTADY, NEW YORK, ASSIGNOR TO THE GENERAL ELECTRIC COMPANY, OF NEW YORK.

ELECTRICALLY-OPERATED PUMP.

SPECIFICATION forming part of Letters Patent No. 669,640, dated March 12, 1901.

Application filed December 4, 1899. Serial No. 739,069. (No model.)

To all whom it may concern:

Be it known that I, EDWARD M. HEWLETT, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Electrically-Operated Pumps, (Case No. 1,237,) of which the following is a specification.

The object of this invention is to provide for the control of an electrically-operated pumping system without the employment of a starting-rheostat for the propelling electric motor. In the operation of such systems it is customary to employ an electric motor acting periodically to maintain a uniform or practically uniform pressure in the system it controls. In starting the motor into operation against the pressure of the system it acts at the instant of being cut into circuit against a heavy load and unless a rheostat is employed carries a heavy current liable to damage the motor and consumes much energy and in some cases, as with induction-motors, has a weak torque. I obviate these difficulties by arranging the system supplied by the pump so that the motor is permitted to start under practically no load and allowed to get to speed before being opposed by the pressure in the system controlled. For example, in water-distributing systems where an electrically-operated pump is employed to maintain a uniform pressure when the level in the storage-tank declines to a determinate point and it is necessary to throw the motor into operation the latter must act against the full pressure on the system of an incompressible medium, necessitating, especially in the case of an alternating-current motor, the employment of a starting-rheostat. So, also, in systems where air is employed under pressure, as in the operation of air-brakes for railway-trains, the motor must start from rest against high pressure. I obviate these difficulties by reducing the pressure at that point in the system which communicates directly with the pump, thus permitting the motor to run comparatively free until it has acquired a working speed. This end may be attained in a variety of ways, a simple one of which I have illustrated in the accompanying drawings, consisting of a bleeding-valve located between a check-valve in the pressure system and the pump, so as to reduce the pressure against the pump-piston until the motor rises to a satisfactory speed. Where the pipe-section between the check-valve and the cylinder is short, I prefer to employ an air-reservoir to give sufficient capacity to permit the pump to make a number of strokes required to allow the motor to get to a good working speed.

My invention therefore comprises a fluid-distributing system in which the pressure is maintained by an electric motor and means for reducing the pressure adjacent to the motor when the latter is not in action, thereby permitting it to start when again cut in under a light load.

It comprises other features more specific, the novelty of which will be hereinafter more fully described, and definitely indicated in the claims appended to this specification.

In the accompanying drawings, which illustrate my invention, Figure 1 is a diagram showing a fluid-pressure system embodying my improvements, and Fig. 2 is a sectional detail view showing the construction of a bleeding-valve.

1 represents an electric motor, and 2 a pump driven thereby, in communication with which is a distributing system 3. This may be fed by a reservoir, which in the case of an incompressible medium may be a simple tank, as indicated at 4, or in the case of a gas, as air, may be a closed reservoir.

5 represents a governor acting upon a determinate reduction of pressure to cut into circuit the electric motor between two supply-mains A and B. This governor may be of any suitable character and in the case of a liquid system, as a water-distributing system, might be controlled by a float operated by the level of the water. I prefer, however, to employ a governor of the type shown, in which the pressure of the distributing system operates against a diaphragm and opens the circuit when a predetermined maximum pressure has been reached and closes it again at a predetermined minimum pressure. Such a device is described at length in an application filed by me November 7, 1898, patented De-

cember 18, 1900, No. 664,086. It will be sufficient for the present description to say that a movable terminal operated by the diaphragm is brought into contact or thrown away from a coöperating terminal, both connected in the motor-circuit. At a point in the system adjacent to the pump is located a check-valve 6. In the line of communication between the pump-cylinder and the check-valve is a bleeding-valve 7, controlled by an electromagnet 8, included in series with the motor. The parts are so arranged that when the motor is operating, and the magnet 8 therefore energized, the bleeding-valve is closed, and the pump and motor act to increase the pressure in the system. When, however, the motor is cut out by the action of the governor 5, the magnet 8 becomes deënergized and the bleeding-valve is opened, permitting the water or air to leak from the section between the pump and the valve 6, thus causing a reduction of pressure therein and permitting the motor when restarted to rise to speed under a light load. I prefer also to employ an auxiliary check-valve 6^a, adjacent to the pump. This serves to prevent leakage from the pump-cylinder. Where the pipe-section between the valve 6 and the pump is short, (and it will be convenient in practice to make it so,) I employ an air-reservoir 9, in which may be placed an inwardly-opening check-valve 10, (indicated in dotted lines,) of advantage where the system is a water-pressure system, permitting air to leak into the reservoir as the water leaks out from the bleeding-valve. The check-valve 6^a prevents back pressure due to the air-reservoir running the motor backward against its brushes. This bleeding-valve may be of any suitable construction. A convenient form is illustrated in Fig. 2, where 8 represents the controlling-magnet, 11 a pole-piece, and 12 the armature, a bent arm of which plays between two collars 13 13^a, arranged on the valve-stem. The head of the valve is arranged to be seated against the wall of a duct 14, communicating with the pipe system or the air-reservoir 9. An outlet-pipe, which when water is employed may be connected with a drain, is indicated at 15.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A fluid-pressure system comprising a pump, an electric motor for driving the same, a governor responsive to fluid-pressure, a circuit-controller operated thereby, a valve for reducing pressure on the pump when starting, and an electromagnet controlled by the governor for operating the valve.

2. A liquid-pressure system, comprising a pump, an electric motor for driving the same, a pressure-actuated governor for cutting in and out the motor, an air-reservoir, a bleeding-valve for relieving the pump of pressure when the motor starts, and an inwardly-opening valve in the air-reservoir to permit the bleeding-valve to respond promptly.

3. A fluid-pressure system comprising a pump, an electric motor for operating the same, a pressure-controlled governor for cutting the motor into and out of action, a check-valve between the pump and the distributing system, and a bleeding-valve permitting escape of fluid for reducing pressure on the pump-piston when the motor is cut out.

4. A fluid-pressure system comprising a pump, an electric motor for operating the same, a pressure-controlled governor for cutting the motor into and out of operation, a check-valve between the pump and the distributing system, and a magnetically-controlled bleeding-valve for reducing the pressure adjacent to the pump when the motor is cut out of action.

5. A fluid-pressure system comprising a pump, an electric motor for operating the same, a pressure-controlled governor for cutting the motor into and out of operation, an air-reservoir, check-valves at the sides thereof opening away from the pump, and an automatically-controlled bleeding-valve opened by the governor upon a determinate decrease of pressure.

In witness whereof I have hereunto set my hand this 2d day of December, 1899.

EDWARD M. HEWLETT.

Witnesses:

BENJAMIN B. HULL,

MABEL E. JACOBSON.