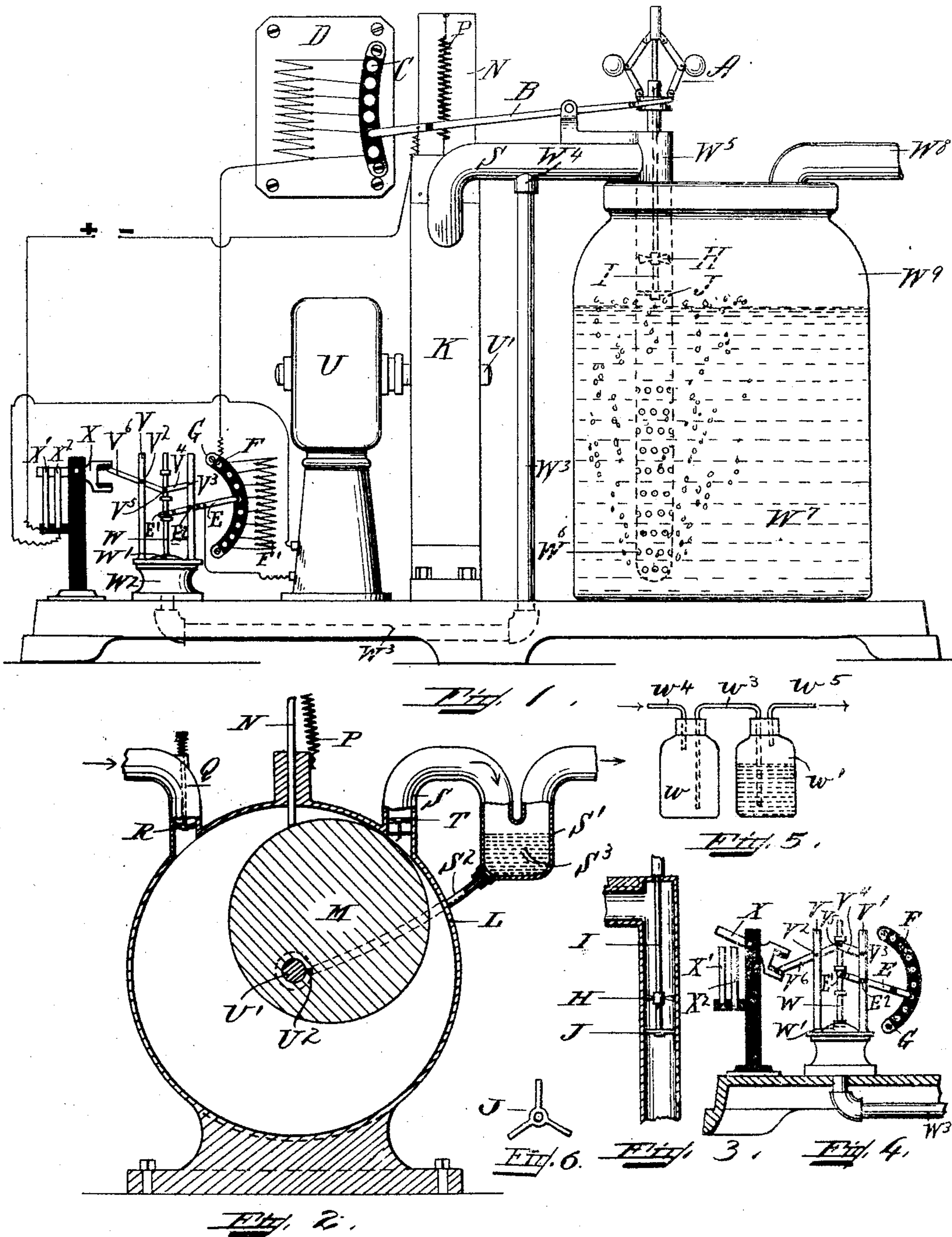


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E. F. PORTER.  
ELECTRIC PUMP.

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Witnesses:  
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# UNITED STATES PATENT OFFICE.

EDWIN F. PORTER, OF BOSTON, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO PORTER AIR COMPRESSOR COMPANY, OF KITTERY, MAINE, A CORPORATION OF MAINE.

## ELECTRIC PUMP.

SPECIFICATION forming part of Letters Patent No. 779,623, dated January 10, 1905.

Application filed February 9, 1903. Serial No. 142,461.

*To all whom it may concern:*

Be it known that I, EDWIN F. PORTER, a subject of the King of Great Britain, residing at Boston, (Dorchester,) in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Electric Pumps, of which the following is a specification.

My invention relates to new and useful improvements for automatically controlling the operation of a pump, and which has for its object the provision of a varying supply of air at a constant pressure, said pressure to be maintained automatically by varying the electric current by which the device is operated.

Another object is to automatically connect and disconnect the circuit as the supply of air is to be turned on or discontinued.

My invention consists of certain novel features hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, which illustrate a construction embodying my invention, Figure 1 is a side elevation of the apparatus in combination with a rotary pump and air-cleansing apparatus. Fig. 2 is a cross-section of the pump, showing its working parts. Fig. 3 is a longitudinal sectional view of part of the air-conduit, showing the governor-rod and small fan for its rotation. Fig. 4 is a view of the switch and toggle-joint, showing the same in their upper position. Fig. 5 is a sectional view hereinafter described. Fig. 6 is a detail plan view of a spider-support hereinafter described.

Like letters of reference refer to like parts throughout the several views.

A represents a fly-ball governor which operates the lever B, which lever moves over the sliding contacts C of the rheostat D. E is another lever which in like manner moves over the sliding contacts F of the rheostat G.

H is a small propeller-wheel which is made fast to the governor-shaft I, which is stepped in the bearing J, as shown in detail in Fig. 3.

K is a rotary pump which consists of the casing L, which includes the eccentric piston M, operating on the sliding abutment N, which

is caused to maintain its position against the piston by the tension of the spring P. 50

Q is a feed-pipe controlled by the puppet-valve R.

S is a delivery-pipe, also controlled by the valve T.

U is an ordinary electric motor whose armature is made fast to the shaft U' of the rotary pump. 55

V V' are two springs upon which are pivoted at V<sup>2</sup> V<sup>3</sup> the toggle-joint V<sup>4</sup>. The center of the toggle-joint is pivoted at V<sup>5</sup> to the rod W, which rod is located at and made fast to the center of the diaphragm W', which is fastened to the open end of the chamber W<sup>2</sup>, which chamber is connected by the pipe W<sup>3</sup> to the pipe S, leading from the pump at W<sup>4</sup>. 60 The lever E is also pivoted to the rod W at the point E' and to the spring V' at E<sup>2</sup>. The extension V<sup>6</sup> of the toggle-joint V<sup>4</sup> operates the switch-lever X and in the position shown in Fig. 1 closes the circuit through the brushes X' X<sup>2</sup>. The air, which comes from the pump K through the pipe W<sup>4</sup> and enters the pipe W<sup>5</sup>, is vented from the perforations W<sup>6</sup>, passing through the liquid W<sup>7</sup> out through the pipe W<sup>8</sup> from the receptacle W<sup>9</sup> for any desired use. 65 70 75

In Fig. 4 the diaphragm W' is arched by a greater pressure of the air and has caused the toggle V<sup>4</sup> to pass its center, forcing in so doing the springs V V' apart. The return of these springs carries the toggle still farther up, bringing the extension V<sup>6</sup> against the lower projection of the lever X and causing a quick break of the circuit at the brushes X' X<sup>2</sup>. 80

The full operation of the device is as follows: The air being pumped by, we will say the medium speed of the motor, it is desired to get a greater supply without diminishing the pressure or increasing the same. When the organ is opened up for more air, as in organ-blowing, for instance, by pressing a greater number of keys the current of air is accelerated momentarily in the pipe W<sup>5</sup>, speeding the fan-wheel H, and thereby the governor A, causing the lever B to move downward over the contacts C, cutting out 85 90 95

resistance and causing the motor to speed. The reverse motion of the lever B is caused, of course, by using less air, and the motor is slowed. It will be seen that by these parts  
 5 the motor is made to automatically keep pace with the requirement for air. If the operation of the lever B on the contacts C should cause any slight rise or fall of pressure, this will be corrected by the lever E, which is operated by the varying pressure through the  
 10 diaphragm W'. If the pressure rises a little more, resistance is added to the circuit at this point, just enough to correct any error that may be made in cutting out resistance D, as  
 15 the resistances D and F' are both in series with the motor. If the air is entirely shut off—viz., if there is none being used while the motor is running—the diaphragm W' will rise with the increased pressure suddenly and carrying the toggle V<sup>1</sup> by the center will open  
 20 the switch by moving the lever X and releasing it from contact with the brushes X' X<sup>2</sup>. The levers X, E, and B being partly in the electric circuit are properly insulated. It is  
 25 of course obvious that when the use of air is resumed the pressure will go down to the normal point, allowing the diaphragm to descend, which it does by its tension, drawing down the toggle V<sup>1</sup> and again starting the  
 30 motor by throwing the switch-lever X.

Referring to Fig. 2, there is shown in section an oiling device consisting of a trap or reservoir S' in communication with the shaft U' by the duct S<sup>2</sup>, which is connected to the  
 35 oiling-hole U<sup>2</sup>. The operation of this device is as follows: Oil for lubricating the pump is admitted at the intake Q and enters the pump and vents through the pipe S into the trap S'. This pipe S being the vent-pipe of the pump  
 40 will of course contain air or gas under pressure, which pressure will act on the surface of the oil S<sup>3</sup> in the reservoir S' and force said oil back into the pump for lubrication through the duct S<sup>2</sup>, to be pumped out again as above  
 45 described, and will thereby circulate through the pump. There are two ducts from the reservoir communicating with both bearings of the pump, only one being shown in the drawings, as the other is a duplicate of it.

Fig. 5 represents a modification of the receptacle W<sup>9</sup> and consists of two receptacles w and w', placed in series, communication between the two being through the tube w<sup>3</sup>, both legs of which extend to the bottom of  
 55 the receptacles. The feed-pipe w<sup>4</sup> communicates with the top of the receptacle w, and the vent-pipe w<sup>5</sup> communicates with the top of the receptacle w'. The operation of this device is as follows: The fluid for the washing of the air is placed in the receptacle w', and air being forced through the system bubbles up through this fluid and vents through the pipe w<sup>5</sup>. If, however, the pump with which this device is connected is brought to  
 65 a standstill and the air in the reservoir sup-

plied by the tube w<sup>5</sup> is liable to make back, due to leakage or other cause, the fluid in the receptacle w' will be carried over into the receptacle w, which is of sufficient capacity to contain it. This fluid is thereby prevented  
 70 from being carried back into the pump by such back action of air, which is the object of this device.

The rotary pump herein shown and described is not claimed in this application, but  
 75 forms the subject-matter of another application filed March 4, 1903, Serial No. 146,218.

I do not limit myself to the arrangement and construction shown, as the same may be varied without departing from the spirit of  
 80 my invention.

Having thus described the nature of my invention and set forth a construction embodying the same, what I claim as new, and desire to secure by Letters Patent of the United  
 85 States, is—

1. In an apparatus of the character described, a pump, a source of power for operating said pump, and means operated by the flow of the fluid through the pump and by the  
 90 pressure produced by the pump for varying the action of said pump.

2. In an apparatus of the character described, a pump, a source of power for operating said pump, and means operated by the  
 95 flow of fluid through the pump to control the motion of the pump.

3. In an apparatus of the character described, a pump, a source of power for operating said pump, means operated by the flow  
 100 of fluid through the pump to control the motion of the pump, and means operated by the pressure produced by the pump for varying the action of the pump.

4. In an apparatus of the character described, a pump, an electric circuit for operating said pump, means operated by the flow of fluid through the pump to control the motion of the pump, and means operated by the  
 105 pressure produced by the pump for varying the action of the pump, both of said means controlling rheostats in series in the same circuit.

5. In an apparatus of the character described, a pump, a source of power for operating said pump, and a rheostat operated by the flow of fluid through the pump for controlling said pump.  
 115

6. In an apparatus of the character described, a pump, a source of power for operating said pump, a controlling-rheostat operated by the flow of fluid through the pump for controlling the motion of said pump.  
 120

7. In an apparatus of the character described, a pump, an electric circuit for operating said pump, and a toggle-joint operated by the flow of fluid through the pump to make and break the circuit.  
 125

8. In an apparatus of the character described, a pump, an electric circuit for oper-  
 130

ating the pump, a toggle-joint operated by the flow of fluid through the pump to make and break the circuit, and a spring to amplify the action of said toggle-joint.

5 9. In an apparatus of the character described, a pump, an electric circuit for operating said pump, a toggle-joint operated by the flow of fluid through the pump to make and break the circuit, a spring to amplify the action of the toggle-joint, and a switch operated  
10 by said toggle-joint.

10. In an apparatus of the character described, a pump, a source of power for oper-

ating said pump, means operated by the flow of fluid through the pump for controlling the motion of the pump, and means operated by the pressure produced by the pump for disconnecting said source of power. 15

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 16th day of January, A. D. 1903. 20

EDWIN F. PORTER.

Witnesses:

E. L. HARLOW,

A. L. MESSER.