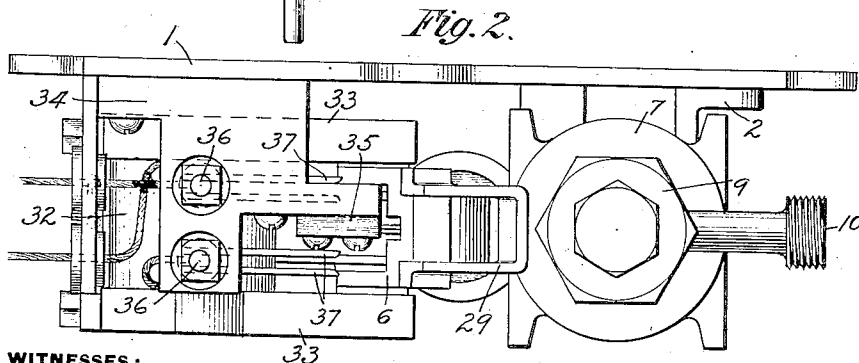
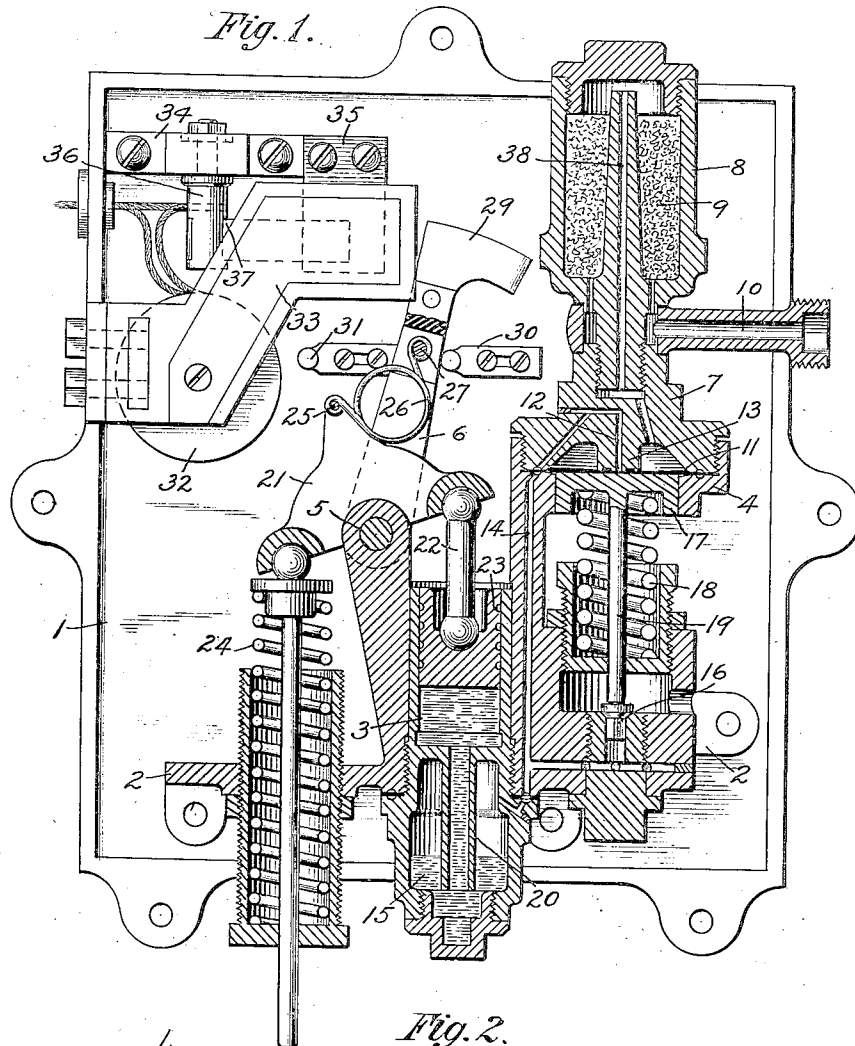


F. L. CLARK.
 PRESSURE GOVERNOR FOR ELECTRICALLY OPERATED PUMPS.
 APPLICATION FILED FEB. 24, 1902.

965,689.

Patented July 26, 1910.



WITNESSES:

Jas. B. MacDonald.
J. P. Custer

INVENTOR,

Francis L. Clark
 by *E. Wright*

Att'y.

UNITED STATES PATENT OFFICE.

FRANCIS L. CLARK, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO STANDARD TRACTION BRAKE COMPANY, A CORPORATION OF NEW JERSEY.

PRESSURE-GOVERNOR FOR ELECTRICALLY-OPERATED PUMPS.

965,689.

Specification of Letters Patent. Patented July 26, 1910.

Application filed February 24, 1902. Serial No. 95,354.

To all whom it may concern:

Be it known that I, FRANCIS L. CLARK, a citizen of the United States, residing in Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a certain new and useful Improvement in Pressure-Governors for Electrically-Operated Pumps, of which improvement the following is a specification.

My invention relates to a pressure-governor for an electric motor-operated air compressor, and its object is to provide an improved construction of governor whereby the switch is actuated to close the circuit and start the motor when the air pressure produced by the compressor is below a certain minimum, and to automatically open the circuit and stop the motor when the air pressure rises to a certain maximum.

With this object in view the invention comprises an improved form of switch and connections and pressure-operated devices which are very sensitive to changes of pressure and arranged to move the switch with a positive snap-like action in making and breaking the circuit.

The invention also consists in certain combinations and construction of parts all as hereinafter more fully described and claimed.

In the accompanying drawings Figure 1 is a side view, partly in elevation and partly in vertical section showing an embodiment of my invention, and Fig. 2 is a plan view.

My improved device is shown as provided with a base or back plate 1, on which the parts are mounted and by which they may be conveniently supported in any desirable location. On the back plate is secured the casting 2, which carries the pressure cylinder 3, the diaphragm casing 4 and the fulcrum 5, on which the switch arm 6 is pivoted. On the cover 7 of the diaphragm chamber is mounted the air strainer 8 containing the filtering material 9 and connected to the air inlet passage 10 leading from the reservoir or pressure chamber of the air pump. The diaphragm 11 acts as a valve to open and close the passage 12 in the projection 13 of

the cover 7 and this passage is connected by another passage 14 with the liquid chamber 15 and also by a branch passage with the exhaust valve 16. The diaphragm bears against the plunger head 17 which is forced upward by the adjustable spring 18 and has a stem 19 extending into engagement with the exhaust valve 16. The liquid chamber 15 communicates with the pressure cylinder 3 by means of a tube 20 which extends below the level of the liquid. On the fulcrum 5 is also pivoted the double bell-crank lever 21, which is operated in one direction by the stem 22 of the piston 23 and in the opposite direction by the adjustable spring 24. A spring 26 is pivoted at 25 to the bell crank lever and at 27 to the main switch arm 6, so that as the point 25 passes the line between the point 27 and the fulcrum 5 the switch arm will be thrown to its other position with a quick and positive movement.

The U-shaped switch arm 6 is preferably made of vulcabeston or other insulating material, and has secured at its upper end a U-shaped contact plate 29, the two ends of which are adapted to engage between the pairs of contact blades 37 carried by the binding posts 36. These binding posts are supported on a bracket 34, as is also the block of insulating material 35 which extends down between the pairs of contact blades 37. The circuit wires are connected up to the binding posts as usual, and a blow out magnet coil 32 is provided having pole pieces 33 located on opposite sides of the switch contact blades for the purpose of extinguishing the sparks at the contact points. Stops 30 and 31 are secured on the back plate to limit the throw of the switch arm 6.

The spring 24 is adjusted to determine the maximum pressure at which the device shall operate to open the switch and stop the pump, while the spring 18 is adjusted to determine the minimum pressure at which the device shall operate to close the switch and start the pump into action, and by the use of these two springs arranged as shown,

any desired range of pressure may be secured between the maximum and minimum points. Thus, for instance, if it is desired to have the pump in action whenever the pressure goes below 60 lbs. per square inch, and cut out when the pressure rises to 80 pounds per square inch, the spring 18 is adjusted so as to hold the passage 12 closed when the air pressure in the reservoir and diaphragm chamber falls to 60 pounds or less, then the exhaust valve 16 is free to open and the pressure in the liquid chamber and on the piston will be relieved allowing the spring 24 to throw the switch to its closed position. As the pressure then increases above 60 pounds on the diaphragm the passage 12 is opened while the stem 19 is forced down against the exhaust valve 16, holding the same closed, and the air pressure enters the liquid chamber and is transmitted through the column of liquid to the piston 23. The piston then moves upward slowly, but will not move far enough to throw the switch until the air pressure from the pump, which is acting on the liquid, has increased to 80 pounds per square inch, for which pressure the spring 24 is adjusted. When the pressure rises to this maximum the point 25 of the attachment of spring 26 to the bell crank lever 21 will pass the line between the fulcrum 5 and the point 27 on the switch arm 6 and the switch will then be thrown by a quick snap-like action to its open position, thus stopping the pump. As shown in the drawing, the switch is in its open position and the reservoir pressure has decreased to the minimum point at which the spring 18 is adjusted, so that the passage 12 is closed and exhaust valve free to open and relieve the air pressure in the liquid chamber. The springs 24 and 18 may be adjusted to the same pressure if desired. As the air from the reservoir or compressor enters at 10, it is passed up through the filtering material 9 and then down through the tube 38 to the diaphragm chamber. By this means it is relieved of all objectionable foreign matter which might interfere with the operation of the diaphragm.

It will be noticed that the exhaust valve 16 is held closed by the pressure of the diaphragm on the head 17 and stem 19 when the passage 12 is open and that as soon as said passage is closed by the spring acting on the diaphragm the exhaust valve is free to open outwardly by the pressure in the liquid chamber. By means of this construction the movement of the diaphragm, stem and exhaust valve may be very slight, only a very small fraction of an inch, thus rendering the device very sensitive and accurate in its operation.

The tube 20 which conducts the liquid to

the pressure cylinder extends below the level of the liquid in the chamber 15, so that the air under pressure acting on the surface of said liquid is sealed against entering the pressure cylinder 3, thus preventing all leakage of air around the piston.

While I have described my improved pressure governor in connection with an electric switch, it is evident that it could also be used to actuate the main controlling device of other forms of motors which might be employed to operate the pump, such as a belt shifter, a throttle valve, etc., and my invention is therefore not limited to this specific application.

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

1. In a pressure governor for air pumps, the combination with a controlling device for the pump and a cylinder and piston for operating the same, of a liquid chamber having a sealed passage communicating with said cylinder, a movable abutment subject to pump pressure for supplying air to said chamber and an exhaust valve rigidly connected to said abutment for releasing air from said chamber.
2. In a pressure governor for pumps, the combination with a controlling device and a movable abutment for operating the same, of a high pressure spring governing the action of said abutment, a diaphragm subject to the pump pressure for controlling the supply of fluid under pressure to said abutment, an exhaust valve, a stem actuated by the fluid pressure on the diaphragm for holding the exhaust valve closed when the pump pressure is above a predetermined degree, and a low pressure spring opposing the pump pressure on said diaphragm.
3. In a pressure governor, the combination of a controlling device, a cylinder and piston for operating the same, a diaphragm subject to the opposing pressures of the pump and an adjustable spring for controlling a supply passage leading to the cylinder, an exhaust valve, and means actuated by the pump pressure on the diaphragm for holding the exhaust valve closed when the pump pressure is above a predetermined point.
4. In a pressure governor, the combination of a controlling device, a cylinder and piston for operating the same, supply and exhaust passages for said cylinder, a diaphragm exposed to pump pressure for controlling the supply passage, an exhaust valve adapted to open outwardly by the pressure in the cylinder, and a stem rigidly connected to and actuated by the diaphragm to hold the exhaust valve closed when the supply passage is open.
5. In a pressure governor, the combination

with a controlling device and a movable
abutment for operating the same, of an ad-
justable spring for actuating the abutment
in one direction, a supply passage for a fluid
5 for actuating the abutment in the opposite
direction, an exhaust valve, a diaphragm
exposed to fluid pressure, for holding the
exhaust valve closed, and an adjustable

spring for opposing said fluid pressure on
the diaphragm.

In testimony whereof I have hereunto set
my hand.

10

FRANCIS L. CLARK.

Witnesses:

R. F. EMERY,
E. A. WRIGHT.