

W. V. TURNER.
ELECTRIC PUMP GOVERNOR.
APPLICATION FILED MAY 15, 1907.

950,737.

Patented Mar. 1, 1910.
2 SHEETS—SHEET 1.

Fig. 2.

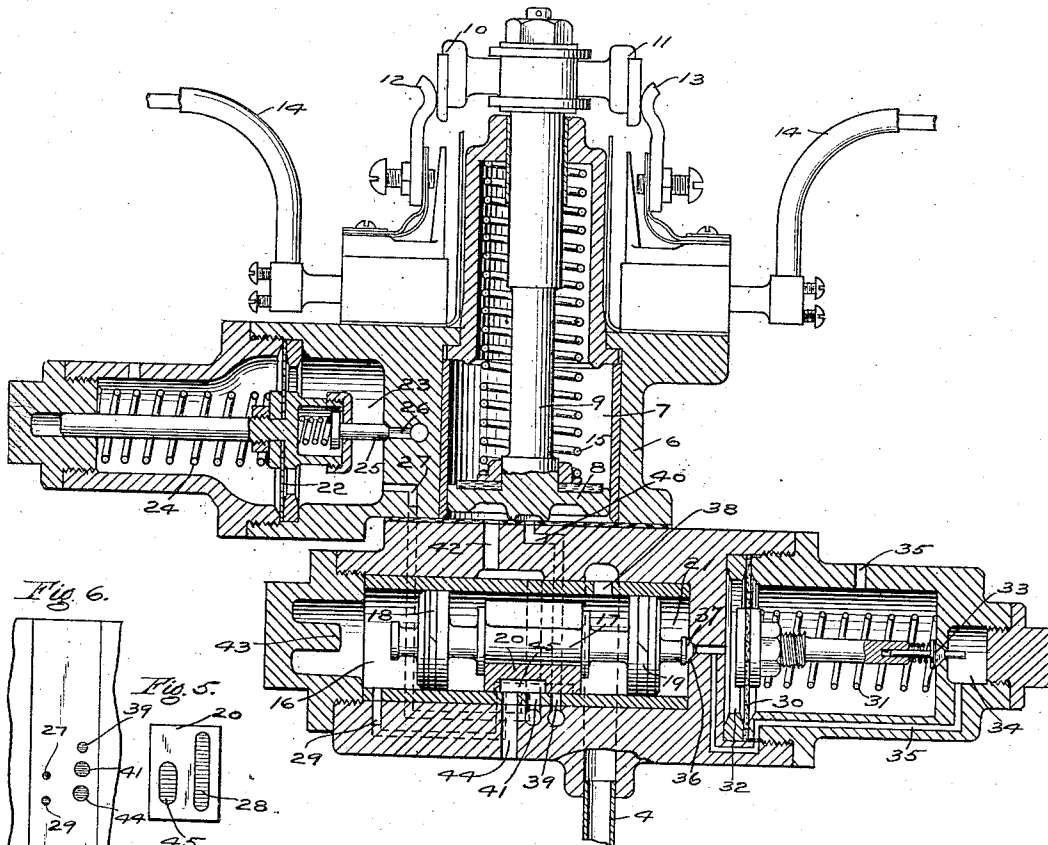


Fig. 6.

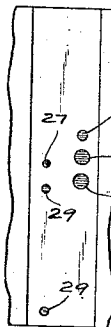
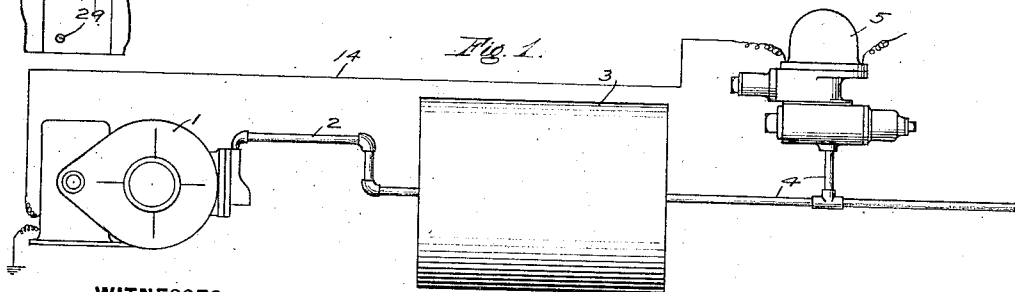


Fig. 5.



Fig. 1.



WITNESSES

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ELECTRIC PUMP-GOVERNOR.

950,737.

Specification of Letters Patent.

Patented Mar. 1, 1910.

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To all whom it may concern:

Be it known that I, WALTER V. TURNER, a citizen of the United States, residing at Edgewood, in the county of Allegheny and State of Pennsylvania, have invented new and useful Improvements in Electric Pump-Governors, of which the following is a specification.

This invention relates to pump governors, and more particularly to governors for electric motor driven pumps, wherein the main controlling device, or switch, for opening and closing the circuit to the motor for driving the pump is operated according to the pressure produced by the pump.

My invention is directed mainly to pump governors, wherein an actuating piston is employed for throwing the controlling device, or switch, to its different positions, for cutting the pump into or out of operation, and having means subject to pump pressure for controlling the supply of fluid to and its release from the actuating piston.

In pump governors of this class it has heretofore been proposed to provide means adapted to suddenly supply fluid to and release fluid from the actuating piston, so that said piston will move from one position to the other with a quick, snap-like action, to cause the desirable rapid and sudden shifting of the controlling device, or switch.

Devices of this character have been constructed, which operate very satisfactorily, but it sometimes happens that the valve mechanism for controlling the admission of fluid to the actuating piston, moves slowly at first, so that fluid does not flow thereto, in sufficient volume to effect the desired quick movement of the actuating piston to the opposite end of its stroke, and this slow movement, is apt to give time enough to permit of arcing between the fixed and the movable contacts of the electric switch, thereby burning the contacts more or less.

The principal object of my invention is, therefore, to obviate the above difficulty, and for this purpose my invention comprises in general, a valve mechanism operated by pump pressure, for supplying fluid to the actuating piston, and means operated by the preliminary movement of said piston, for also supplying fluid thereto.

Other features of my invention relating to the improved operation of electric pump

governors, will be hereinafter more fully described and pointed out in the claims.

In the accompanying drawings; Figure 1 is a diagrammatic view, showing one form of pump governor embodying my invention, and connected up to a pump and reservoir; Fig. 2 a central sectional view of the pump governor shown in Fig. 1; Fig. 3 a diagrammatic view, showing another form of pump governor embodying my invention and connected up to a pump and reservoir; Fig. 4 a central sectional view of the pump governor shown in Fig. 3; Fig. 5 a face view of the slide valve for controlling the supply ports to the actuating piston, as applied to the construction shown in Fig. 2; and Fig. 6 a plan view of the seat for the above slide valve, showing the arrangement of ports.

According to the apparatus shown in Figs. 1 and 2, the construction comprises an electric motor driven pump 1, for compressing air or other fluid through pipe 2, into a reservoir 3, which is connected by a pipe 4 to a pump governor 5. The pump governor, in this instance, comprises a casing 6, having a cylindrical chamber 7, containing an actuating piston 8 for rod 9, carrying the movable part of an electric switch, having contact bars 10 and 11, adapted to make contact with stationary contacts 12 and 13 respectively, of an electric circuit 14, for supplying current to the motor driven pump 1.

The actuating piston 8 is operated by the opposing pressures of a spring 15 and fluid under pressure, the admission and release of which to one side of said piston is governed by a valve device contained in a cylindrical chamber, and comprising a double piston 17, having heads 18 and 19, operating respectively in chambers 16 and 21, and a slide valve 20, adapted to be actuated thereby. The piston heads may loosely fit in the cylindrical chamber, or may be provided with equalizing ports, so that fluid pressure may equalize from the valve chamber to the piston chambers 16 and 21.

The high tension regulating device for controlling the pressure on the outer face of the piston head 18, comprises a diaphragm 22, subject to the opposing pressures of an adjustable spring 24 and fluid pressure in chamber 23, and controlling a valve 25, which governs the release of fluid under pressure from the chamber 23 to the exhaust port 26, leading to the atmosphere. In the

cut in position of the pump governor, as shown in Fig. 2, the chamber 23 is open through passage 27, cavity 28 in the main slide valve 20, and passage 29, to chamber 16 and the outer face of the piston head 18.

The low tension regulating device for controlling the pressure on the outer face of the piston head 19, comprises a diaphragm 30, subject to an adjustable spring 31 and the fluid pressure in a chamber 32, for controlling a valve 33, which governs the release of fluid under pressure from a chamber 34, to an exhaust port 35.

The chamber 34 communicates through a passage 35 and a port 36, controlled by a valve 37 provided on the piston head 19, with chamber 21, at the outer face of the piston head 19.

In operation, the operating springs 24 and 31, being adjusted to the desired high and low pressure degrees, respectively, air from the reservoir 3 flows through pipe 4 and passage 38, to the valve chamber between the piston heads, and equalizes into the piston chambers 16 and 21. Air also flows through passage 29, cavity 28 and passage 27 to the high tension valve chamber 23, and when the fluid pressure therein exceeds the limit for which the spring 24 is set, the diaphragm 22 is actuated and opens the release valve 25, and fluid is thereupon vented from chamber 23 and piston chamber 16, the fluid pressure on the outer face of piston head 19 will then shift the piston and main slide valve. In the preliminary movement of the main slide valve, a port 39, which opens into a passage 40, leading to the chamber below the actuating piston 8, is first uncovered.

When seated in its lower position, the actuating piston 8 closes the passage 40, so that the fluid pressure therein has no effect on the actuating piston, but on further movement of the main slide valve 20, a supply port 41 is uncovered, and fluid under pressure flows through a passage 42, to the exposed face of the piston. The piston is thereupon actuated, and uncovers the passage 40, thereby admitting to the face of said piston a large volume of fluid, the passage 40 being wide open. In response to the large supply of fluid thus admitted, the actuating piston and the movable contacts 10 and 11 of the electric switch, move with snap-like rapidity to the cut out position. It will be obvious that a very slight movement of the actuating piston will open the passage 40, so that a quick action is assured, even should the port 41 fail to be fully opened, as might be the case, should the main slide valve move very slowly or stop when the port 41 is partly open. The movement of the piston and main slide valve 20, is limited by a stop 43, and when in position engaging said stop, the main valve 20 closes passage 27, cutting off the further supply

of fluid to the regulating chamber 23, so that the release valve 25 will then close positively, and all possible dribbling or leakage will be prevented. The valve 37 is unseated in this position, so that chamber 32 and the diaphragm 30 are open to pump pressure, and when the pump pressure becomes reduced to that for which the low pressure spring 31 is set, the diaphragm is actuated by the spring and opens the valve 33, releasing fluid from piston chamber 21, through the passage 35 and chamber 34, to the exhaust port 35. The fluid pressure, which has equalized into the piston chamber 16, will then shift the piston and main slide valve 20, to a position in which the large port 41, leading to passage 42 and the actuating piston, is connected to a large exhaust port 44, by a cavity 45 in the slide valve 20. The sudden release of pressure thereby produced, permits the spring 15 to quickly move the actuating piston and the contacts 10 and 11 to their inner position, in which the electric circuit 14 is completed, and the pump set into operation. The valve 37 closes the port 36 and passage 35, preventing further release of fluid, and communication is again established from chamber 16 through passage 29, cavity 28 and passage 27 to the high tension regulating chamber 23.

In Figs. 3 and 4, I have illustrated my invention as applied to another form of pump governor, wherein one regulating diaphragm directly controls the movement of the slide valve for governing the fluid pressure on the actuating piston. In this instance a diaphragm 50, subject to the pressure of an adjustable spring 51, on one side, and to reservoir pressure on the other, through pipe 4, is adapted to actuate the slide valve 52, contained in the valve chamber 53, open to the reservoir through pipe 4. The other parts of the construction may be the same as those described in connection with Figs. 1 and 2.

In operation, the spring 51, being adjusted to the desired high tension, when the pump pressure in the valve chamber 53 and on the diaphragm 50 exceeds the pressure of the spring 51, the diaphragm moves the main slide valve 52, and uncovers passage 40, thereby admitting fluid thereto, but the passage being closed by the actuating piston 8, there is no movement of the piston. On further movement of the slide valve, a port 55 therein, registers with the passage 42, which is in open communication with the face of the actuating piston 8, and fluid from the reservoir then flows to the actuating piston 8, which is thereby moved, and at once opens the admission port 40, and, in the same manner as before described, the actuating piston is thereby suddenly shifted to its outer seat, opening the electric circuit 14 to the pump. When the reservoir pressure be-

comes reduced, the spring 51 actuates the diaphragm 50, and the slide valve 52 moves to a position in which cavity 45 connects the passage 42 to the large exhaust port 44, and closes the passage 40. The sudden release of fluid from the chamber below the actuating piston 8, enables the spring 15 to quickly shift said piston to the lower position, closing the passage 40 and completing the electric circuit 14 to the pump.

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

1. A pressure governor, comprising a controlling device and actuating piston, a valve mechanism operated by pump pressure to admit fluid to said actuating piston, and means governed by said piston for also supplying fluid to operate the piston.

2. A pressure governor, comprising a controlling device and actuating piston, a valve mechanism operated by the rise in pump pressure to a predetermined point, to supply fluid to said actuating piston, and means operated by the movement of said piston for also supplying fluid thereto.

3. A pressure governor, comprising a controlling device and actuating piston, a valve mechanism operated by a variation in pump pressure to first open communication from a source of fluid pressure to a port controlled by said piston, and then admit fluid to said piston, thereby actuating said piston to open said port.

4. A pressure governor, comprising a controlling device and actuating piston, a valve mechanism operated by pump pressure for controlling two ports for varying the pressure on said actuating piston, one of said ports being also controlled by the movement of said actuating piston.

5. A pressure governor, comprising a controlling device and actuating piston, a valve mechanism operated by variations in pump pressure for controlling the admission of fluid to and its release from said actuating piston, and means controlled by said actuating piston for also supplying the fluid for operating said piston.

6. A pressure governor, comprising a controlling device and actuating piston, a valve device for varying the pressure on said actuating piston, and means governed by pump pressure for operating said valve device, said valve device being adapted to control the admission of fluid to said means.

7. A pressure governor, comprising a controlling device and actuating piston, a valve device for varying the pressure on said controlling piston, and means governed by pump pressure for operating said valve device, said valve device being adapted in one position to cut off the admission of fluid under pump pressure to said means.

8. A pump governor, comprising a controlling device and an actuating piston, and a valve mechanism operated by an increase in pump pressure to a predetermined point, to actuate said piston and thereby open a port for supplying fluid to said piston.

9. A pump governor, comprising a controlling device and an actuating piston, and a valve mechanism operated by an increase in pump pressure to a predetermined point, for supplying air to said actuating piston and for opening a port adapted to supply a large volume of fluid to said actuating piston, following upon movement of said actuating piston from its seat.

10. In a pressure governor for pumps, the combination with a controlling device and an actuating piston therefor, of a valve mechanism governed by the pump pressure for controlling the supply of fluid to said actuating piston, and means operated by the preliminary movement of said piston for also supplying fluid thereto.

11. In a pressure governor for pumps, the combination with a controlling device and an actuating piston therefor, of a valve mechanism operated by a rise in pump pressure to first open communication from a source of fluid pressure to a port adapted to be opened by the preliminary movement of said actuating piston, and then admit fluid to and thereby move said actuating piston.

12. In a pressure governor for pumps, the combination with a controlling device and an actuating piston therefor, of a valve mechanism operated by pump pressure to supply fluid to, and thereby move said actuating piston, and means, operated by the preliminary movement of said valve mechanism, for admitting fluid to a port adapted to be opened by the preliminary movement of said actuating piston.

In testimony whereof I have hereunto set my hand.

WALTER V. TURNER.

Witnesses:

R. F. EMERY,
WM. M. CADY.