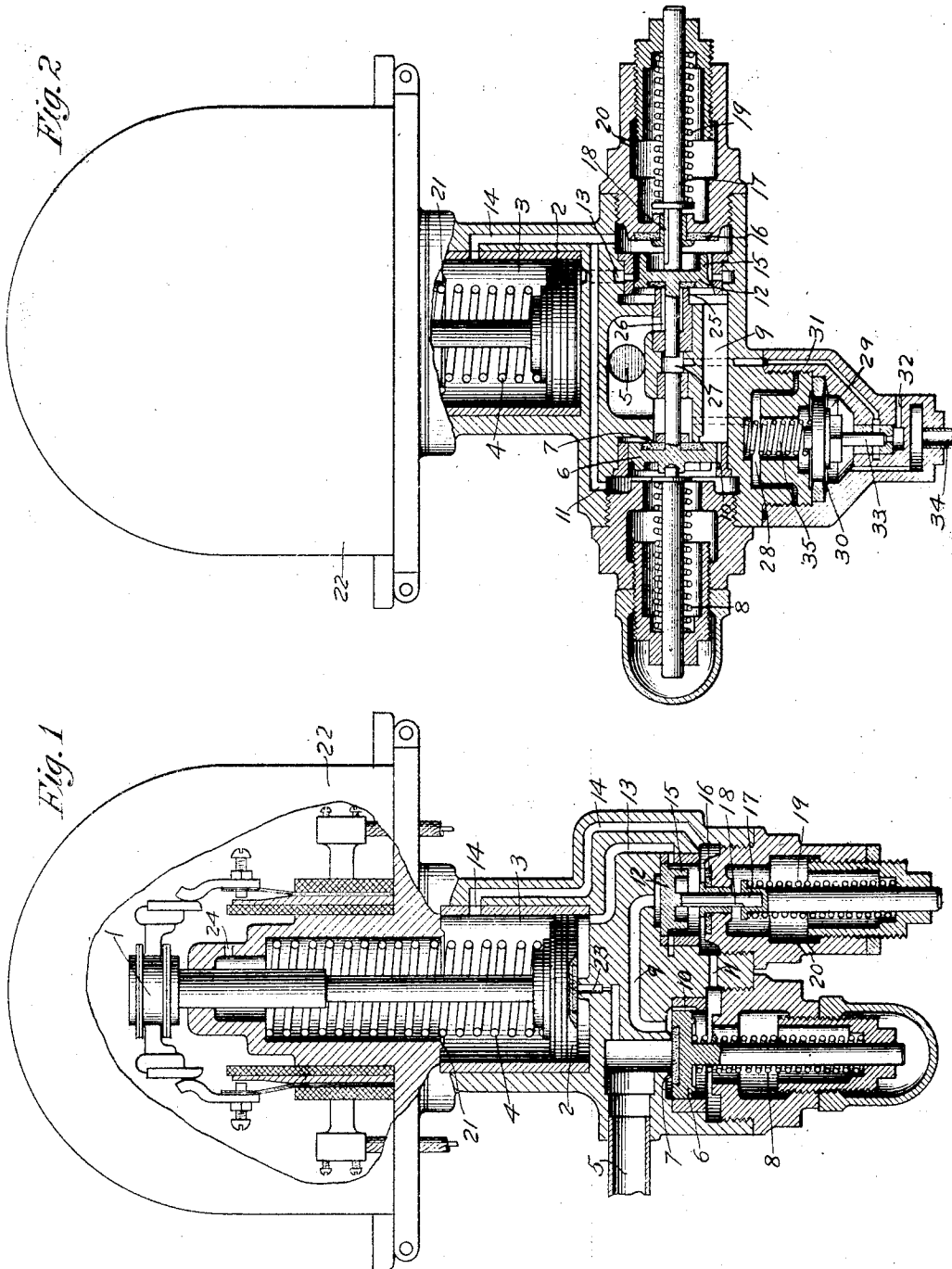


H. M. P. MURPHY.
ELECTRIC PUMP GOVERNOR.
APPLICATION FILED SEPT. 26, 1910.

1,037,039.

Patented Aug. 27, 1912.



WITNESSES
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UNITED STATES PATENT OFFICE.

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ELECTRIC-PUMP GOVERNOR.

1,037,039.

Specification of Letters Patent.

Patented Aug. 27, 1912.

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To all whom it may concern:

Be it known that I, HOWARD M. P. MURPHY, a citizen of the United States, residing at New York, in the county of New York and State of New York, 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, this application being a division of my pending application Serial No. 359,241, filed February 25, 1907.

The principal object of my invention is to simplify the construction of pressure governors of this class, wherein a main 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 the pump pressure for controlling the supply of fluid to and its release from the actuating piston.

Another object of my invention is to provide means for maintaining the fluid pressure on the main actuating piston so as to prevent a return movement of the piston in the event of leakage.

Another object of my invention is to provide an improved governor of the puppet valve type in which a separate spring and regulating device is provided, one for determining the cutting in and the other the cutting out pressure of the pump.

In the accompanying drawing, Figure 1 is a vertical sectional view of one form of governing device embodying my improvement; and Fig. 2 a similar sectional view, showing a modification adapted to be operated by differential pressures.

According to the construction shown in Fig. 1, the main controlling device, or switch 1, is connected to the actuating piston 2, which is normally held at its inner position in the cylinder 3 by means of the spring 4. Pressure from the pump or reservoir is admitted by pipe 5 to the valve piston 6, which is normally held to its seat 7 by the adjustable spring 8, so that only a

small area of the piston 6 is then subject to the reservoir pressure. A port 9 leads from the space outside of this valve seat to the valve piston 12, which controls port 13 leading to the face of actuating piston 2 in cylinder 3. A by-pass groove 10 may be provided around piston 6, and a port 11 leads from the space below the piston to the port 14, which communicates with the cylinder 3 near its outer end. The valve piston 12 has a rib or seat 15, which is adapted to engage gasket 16 in one position and cut off communication from port 14 to the one side of said piston within the seat portion, while the stem 17 is provided with a small groove 18 forming a restricted passage from this space beneath valve piston to the spring chamber and outlet port 20. The adjustable spring 19 determines the point at which the governor cuts in. When the actuating piston 2 is at its outer position it engages the seat 21 for making a tight joint, and a small port 22 is provided for maintaining the pressure upon the actuating piston, this port being closed by the piston when in its inner position. The main controlling device, or switch mechanism, may be covered by a casing 22.

In the normal position of the parts of the governor, as shown in the drawing, the main switch is closed and the pump operates to raise the fluid pressure in the reservoir and through pipe 5 on the small area of valve piston 6, the spring 8 being adjusted to the maximum degree of pressure at which it is desired that the pump shall cut out. When the pump pressure reaches this degree the valve piston 6 is forced slightly away from its seat 7, thereby permitting the pressure to act upon the greater area of the face of the piston and move the same quickly downward, opening the supply of fluid through port 9 to valve piston 12. The equalizing groove 10 is closed by the first part of the downward movement of the piston 6 and the space beneath said piston, and also beneath the valve piston 12 has a free exhaust through the large passage 14 and outlet port 24, so that the pressure then acting on the upper face of piston 12 moves the same rapidly downward against its seat on gasket 16, compressing the spring 19 and opening the port 13 to supply fluid under pressure to the cylinder 3 when it acts upon the

piston 2 to throw the same quickly to its outer position. This movement of the actuating piston closes the exhaust through the passage 14 and shifts the main controlling switch to its open position to cut the pump out of operation. The actuating piston is then held tightly against its seat 21 and the pressure equalizing through passages 14 and 11 upon the piston 6 allows the spring 8 to return the same to its seat 7. As the groove 18 in stem 17 maintains atmospheric pressure beneath piston 12 the parts remain in this position until the pump pressure has diminished to the point at which the spring 19 overcomes the fluid pressure acting on piston 12, at which time the seat 15 is slightly raised from the gasket 16. The fluid pressures acting on opposite sides of the valve piston 12 are then immediately balanced, by the equalization of the reservoir pressure from cylinder 3 through passages 13 and 14, as restricted groove 18 is too small to permit the escape of any considerable volume of fluid, and the spring 19 returns the piston valve 12 rapidly to its inner position, thereby opening communication between ports 14 and 13. As the pressure acting on the piston 2 in cylinder 3 begins to fall, due to the escape of fluid through groove 18 and outlet port 20, the spring 4 moves the piston 2 away from its seat 21 and thereby opens a large by-pass and exhaust passage from the face of the actuating piston through ports 13 and 14 and outlet port 24 to the atmosphere. The spring 4 then acts to return the piston 2 to its inner position and to throw the controlling device to its closed position with a quick, positive and snap-like action, thereby again cutting in the pump.

The ports 13 and 14 are of large capacity, in order to permit the supply or release of a large volume of fluid quickly to or from the cylinder 3 and thereby effect a sudden and positive movement of the piston and controlling switch from one position to the other.

The range of the governor, or the difference between the cutting in and cutting out pressures may be made anything desired by the adjustment of the springs 8 and 19. During the time that the pump is cut out, and after the valve piston 6 has returned to its seat, the pressure upon the actuating piston 2 and the valve piston 12 is maintained by the feed through the small port 23, so that any leakage from the face of the actuating piston is compensated for.

The modified construction shown in Fig. 2 is substantially the same as that of Fig. 1 except that the valve pistons are arranged to operate horizontally instead of vertically, and the valve piston 12 is provided with an additional small seat 25 for controlling the supply of fluid from the reservoir connec-

tion 5 through ports 26 and 13 to maintain the pressure instead of the small port 23 illustrated in Fig. 1. Fig. 2 also illustrates an additional feature of my improvement, comprising an abutment, or diaphragm 30 subject on one side to the reservoir pressure in chamber 28 and on the other side, in chamber 29, to the pressure of another source, such as a reservoir pipe line 34, which may be employed for connecting several reservoirs where each reservoir is provided with a pump for furnishing compressed fluid thereto, and it is desirable that all of the pumps should operate together to raise the pressure in the system to its maximum cutting out point. The stems of the valve pistons 6 and 12 are extended through close fitting guides into a small chamber 27, from which leads a port 31, and the diaphragm 30 is provided with a valve 33 for controlling communication from port 31 to port 32 and the atmosphere. Spring 35 normally holds the valve 33 closed. The operation of this form of my improvement, when used with a single pump and reservoir, will now be readily understood from the foregoing description. When employed in connection with a plurality of pumps and reservoirs connected by a reservoir pipe line, each pump and reservoir being provided with a governor, it is difficult to adjust all the governors to cut in at exactly the same degree of pressure; but with my improved differential pressure attachment, as shown in Fig. 2, the pumps may all be controlled substantially simultaneously, as will now be described: When the pressure has diminished in one reservoir to such a point that this governor operates to cut in its pump, the other governors will be very nearly at their cutting in points also, and as the pressure in the reservoir pipe line begins to increase over that in the other reservoirs, on account of the check at each reservoir, the diaphragm 30 of each of the governors raises the valve 33 and vents the pressure in chamber 27 on the valve stem to the atmosphere, thereby assisting the cutting in spring 19 acting on the valve piston 12 sufficiently to operate the governor to cut in the pump. In the same manner, each pump will be cut in by its governor immediately after any other one of the governors cuts in, and all of the pumps will assist in raising the pressure of the system, thereby distributing the labor equally among all the pumps. After the pumps have all started working, and the pressure is raised to the desired maximum degree, each governor then operates independently to cut out its pump, as before described.

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

1. A pump governor comprising a main

controlling device, a piston for actuating the same, mechanism subject to the pump pressure for controlling the supply of air to operate said piston, and a port for also supplying fluid to said piston.

2. A pump governor comprising a main controlling device, a piston for actuating the same, mechanism subject to the pump pressure for controlling the supply of air to operate said piston, and a restricted port controlled by and adapted to supply fluid to said piston.

3. A pump governor comprising a main controlling device, a piston for actuating the same, mechanism subject to pump pressure for supplying and releasing fluid to and from said piston and operating to cut off the supply of fluid to said piston before the release is established and means for maintaining the pressure on said piston during the interval between the closing of the supply and opening of the release.

4. A pump governor comprising a main controlling device, a piston for actuating the same, a valve device subject to pump pressure for controlling a passage adapted to supply fluid to said piston and a passage adapted to release fluid from said piston and operating to close the supply passage before the release passage is opened, and a port for also supplying fluid to maintain said piston in position during the interval between closing the supply passage and opening the release passage.

5. A pump governor comprising a main controlling device, a piston for actuating the same, a valve device subject to pump pressure for controlling a passage adapted to supply fluid to said piston and a passage adapted to release fluid from said piston and operating to close the supply passage before the release passage is opened, and a restricted port for supplying fluid to the piston when both the supply and release passages are closed.

6. A pump governor comprising a main controlling device, a piston for actuating the same, a valve device subject to pump pressure for controlling a passage adapted to supply fluid to said piston and a passage adapted to release fluid from said piston and operating to close the supply passage before the release passage is opened, and a restricted port controlled by and adapted to supply fluid under pressure to said piston.

7. In combination with a reservoir, a fluid pressure governor comprising a movable abutment subjected to a pressure corresponding to the pressure in said reservoir, means for opposing said pressure on said abutment, a chamber, a movable member therein responsive to fluid pressure, means controlled by said abutment controlling the pressure in said chamber, said chamber being provided with a restricted port connected to

a source of pressure independently of said means and arranged to be closed by said member in one position thereof, and means controlled by said member for controlling the pressure in said reservoir.

8. In combination with a reservoir, a fluid pressure governor comprising a movable abutment subjected to a pressure corresponding to the pressure in said reservoir, means for opposing said pressure on said abutment, a chamber, a movable member therein responsive to fluid pressure, means controlled by said abutment for connecting said chamber alternately to reservoir and to atmosphere, said chamber having a restricted port connecting it to reservoir independently of said means and arranged to be closed by said member when said chamber is connected to atmosphere, and means controlled by said member for controlling the pressure in said reservoir.

9. A pump governor comprising a main controlling device, a piston for actuating same, a valve piston subject on one side to pump pressure for directly controlling communication through which air is supplied to said actuating piston, a spring for opposing the pump pressure on said valve piston, and a second valve piston subject to the opposing pressures of the pump and a spring and adapted to directly control communication through which air is released from said actuating piston.

10. A pump governor comprising a main controlling device, a piston for actuating same, a valve piston subject to the opposing pressures of the pump and a spring for directly controlling communication through which air is supplied to said piston, and a second valve piston subject to and operated by the flow of air from the first valve piston to said actuating piston for also opening communication for supplying air to said actuating piston.

11. A pump governor comprising a main controlling device, a piston for actuating same, a valve piston for controlling a communication for supplying air to said actuating piston, a second valve piston subject on one side to pump pressure, a spring for opposing the pump pressure on said valve piston, said second valve piston being operated by the pump pressure to supply air to the first valve piston and said first valve piston being operated by the flow of air from the second valve piston to open the communication for supplying air to said actuating piston.

12. A pump governor comprising a main controlling device, a piston for actuating same, a valve piston, a spring adapted to hold said valve piston against a seat in one position with a small area exposed to pump pressure, said valve piston having a larger area exposed to fluid pressure as the same

moves away from its seat, to supply fluid to
said actuating piston, a second valve piston
having a seat in one position and subject to
pump pressure on one side, a spring for op-
5 posing the pump pressure on said valve
piston, a restricted discharge outlet from
the seat side of the valve piston, and means
for opening communication from the actu-
ating piston to said seat side of the valve
10 piston when said valve piston moves to its
opposite position.

13. A pump governor comprising a main
controlling device, a piston for actuating
same, a valve piston having a seated posi-
15 tion and subject to the opposing pressures
of the pump and a spring, for supplying

fluid to said actuating piston when moved
from its seat, a second valve piston subject
to the opposing pressures of the pump and
a spring for releasing fluid from said actu- 20
ating piston, and means for balancing the
fluid pressures upon said first piston valve
upon movement from its seat to thereby per-
mit the spring to return same to the seated
position. 25

In testimony whereof I have hereunto set
my hand.

HOWARD M. P. MURPHY.

Witnesses:

ALEXANDER BEGG,
REGINA M. LYONS.