



# UNITED STATES PATENT OFFICE.

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PRESSURE-GOVERNOR FOR PUMPS.

1,003,163.

Specification of Letters Patent. Patented Sept. 12, 1911.

Application filed November 2, 1909. Serial No. 525,870.

*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 Pressure-Governors for Pumps, of which the following is a specification.

This invention relates to fluid pressure pump governors and is more particularly in the nature of an improvement on the construction disclosed in my prior application Serial No. 503,628, filed June 22, 1909.

The principal object of my present invention is to provide a pump governor of the above character having improved means for accurately adjusting the governor for given cutting-in and cutting-out pressures.

In the accompanying drawing, Figure 1 is a diagrammatic view of a fluid pressure pump apparatus with my improved pump governor applied thereto and Fig. 2 a vertical section of a pump governor embodying my improvement.

The pump governor may comprise, as shown in Fig. 2 of the drawing, a piston 1 contained in piston chamber 2 of a casing 3 for operating an electric pump controlling switch having fixed contacts 4 and movable contacts 5 carried by the piston. Fluid pressure for operating the piston 1 is admitted to and released from the chamber at one face of the piston through a passage 6 leading to ports 7 and 8 in a bushing 9 of a valve piston 10. Through the intermediary of a second valve piston 11 and a spring stem 12 acting on the valve piston 11 the valve piston 10 is subjected to the action of an adjustable spring 13 which tends to maintain said valve piston 10 on a seat 14. A passage 15 having a pipe 16 opening into the pump reservoir 17 leads to the inner face of the valve piston 10 which when seated is consequently subject on a reduced area to the pump pressure. In the opposite or outer position of the parts the valve piston 11 is also adapted to engage a seat 18 and as the spring chamber 19 is open to the atmosphere through a port 20, said valve piston is subject in its outer seated position on a reduced area thereof to atmospheric pressure.

The valve piston 10 being seated, an annular groove 21 therein connects port 8 with a port 22 opening to a passage 23, and as pas-

sage 23 leads to the chamber at the outer face of valve piston 11, when the valve piston is off its seat, communication is open from the main piston 1 to the atmosphere through port 20, a passage 24 being provided through the stem 12 to insure a free communication for the air. A passage 25 leads from the space between the valve pistons 10 and 11 to a point near the upper end of the piston chamber 2 and as the spring chamber side of piston 1 is provided with an atmospheric port 26, the space between the valve pistons is at atmospheric pressure when the main piston is in its cut-in position.

As so far described the governor corresponds with the governor described in my hereinbefore mentioned prior application particularly as shown in Fig. 2 therein and the operation may be briefly described as follows: The electric switch being in its cut-in position, the pump 27 is operated to compress fluid into the reservoir 17 and the spring 13 being adjusted so that when the pump pressure acting on the reduced area of valve piston 10 rises to a degree at which it is desired that the pump cut out, the valve piston 10 will be lifted from its seat. The full area of the valve piston is then exposed to pump pressure and is thereby rapidly shifted to its extreme outer position in which the port 7 is opened to passage 15, thus permitting fluid under pressure to flow through passage 6 to the main piston 1. The main piston is thereupon shifted by the fluid pressure on its lower face to its outer or cut-out position, and the operation of the pump is stopped. The movement of valve piston 10 also seats the valve piston 11, cutting off the atmospheric communication to the passage 23. In the outer position of the main piston 1, the passage 25 is opened to the chamber below the piston, so that fluid under pressure may flow through passage 25 into the space between the valve pistons 10 and 11 and as the fluid pressures on opposite sides of valve piston 10 are thus equalized, a light spring 28 interposed between the valve pistons 10 and 11 operates to return the valve piston 10 to its seat 14. Though passage 15 is closed by the seating of valve piston 10, fluid pressure is maintained on the main piston by providing a passage 29 through the valve piston 10, the air flow-

ing from said passage through the passage 25 which is open at this time to the under face of the main piston 1. The valve piston 11 being on the seat 18 is subject on a reduced area to atmospheric pressure while the full area of its opposite face is exposed to pump pressure. Upon the pump pressure falling to a certain point the pressure of the spring 13 exceeds the pressure on the opposite side of the valve piston 11 and the same is lifted from its seat, opening the passage 23 to the atmospheric port 20, so that the pressure in the piston chamber below the main piston 1 is released and the piston moves downwardly to cut in the pump. As the piston 1 passes the port opening of passage 25, said passage is opened to the spring chamber atmospheric port 26 and so the pressure in the space between the valve pistons 10 and 11 is reduced to atmospheric pressure, while the flow of air from the main piston to the atmospheric port 20, which is of restricted size, tends to increase the pressure on the outer face of the valve piston 11 and thereby causes same to quickly and positively move to seat on the valve piston 10.

It will be noted that the point of cutting-in and cutting-out is determined by the spring 13 in connection with the relative areas of the seats 14 and 18 and any variation in the above will result in a different degree of pressure necessary to operate the parts.

In the above apparatus, the cutting-out point may be accurately determined at any degree by adjustment of the spring 13, but the cutting-in point will then depend on the relative seating areas of the valve pistons 10 and 11. My improvement, however, provides for similarly determining the cutting-in point with accuracy. According to a preferred construction for this purpose I provide a second adjustable spring 30 adapted to act on a movable abutment 31. When the parts are in the cut-in position, the spring stem 12 bears against the valve piston 11 and the flange portion 32 of said stem is arranged to have a certain free movement outwardly before engaging with a portion of the abutment 31. By reason of this clearance between the spring stem and the abutment 31, it will be evident that the pressure of the spring 30 has no influence whatever on the parts as to determining the cutting-out point, as the movement of the valve piston 10 from its seat is subject only to the resistance of the spring 13 as before, and the continued outward movement of the valve piston being assured even after the spring stem 12 engages the abutment 31 by reason of the full area of the valve piston having been opened to the pump pressure. But in cutting-in the tension of the spring 30 may

be adjusted as desired to provide the required resistance for causing the parts to shift to the cut-in position at a given degree of pressure, so that the range between the cutting-in and cutting-out pressures may be varied and accurately maintained as desired.

It will now be clear that by means of my improvement both the cutting-in and the cutting-out points of the governor may be adjusted to any desired degree of pressure by properly adjusting the springs 13 and 30, without being dependent on the exact relative proportioning of the valve piston seats 14 and 18.

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

1. A pump governor comprising a pump controlling device, a piston for actuating the same, a valve piston subject to pump pressure for supplying air to said piston, a spring for opposing the pump pressure on said valve piston, a second valve piston subject to pump pressure for effecting the release of air from said actuating piston, and an additional spring adapted to act upon said second valve piston in conjunction with the other spring.

2. A pump governor comprising a pump controlling device, a piston for actuating the same, a valve piston having a seated position and subject to pump pressure for supplying air to said piston, a spring for opposing the pump pressure on said valve piston, a second valve piston movable with the first valve piston from its seated position and subject to pump pressure for controlling the release of air from said actuating piston, and an additional spring acting on said second valve piston in conjunction with the other spring to oppose the pump pressure thereon.

3. A pump governor comprising a pump controlling device, a piston for actuating the same, a valve piston having a seated position and subject to pump pressure for supplying air to said piston, a spring for opposing the pump pressure on said valve piston, a second valve piston having a seated position and movable with the first valve piston from the seated position thereof, an additional spring adapted to act on the second valve piston, said second valve piston being subject in its seated position to the opposing pressures of the pump and both springs.

In testimony whereof I have hereunto set my hand.

WALTER V. TURNER.

Witnesses:

WM. M. CADY,  
A. M. CLEMENTS.