C. S. JENNINGS.

AUTOMATIC PRESSURE CONTROLLER.

APPLICATION FILED SEPT. 19, 1906.

1,132,777. Patented Mar. 23, 1915.

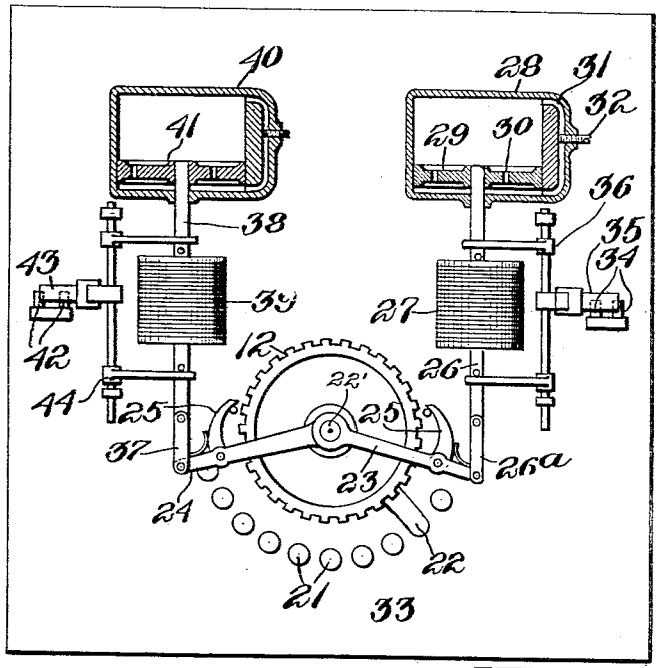


Fig. 2.

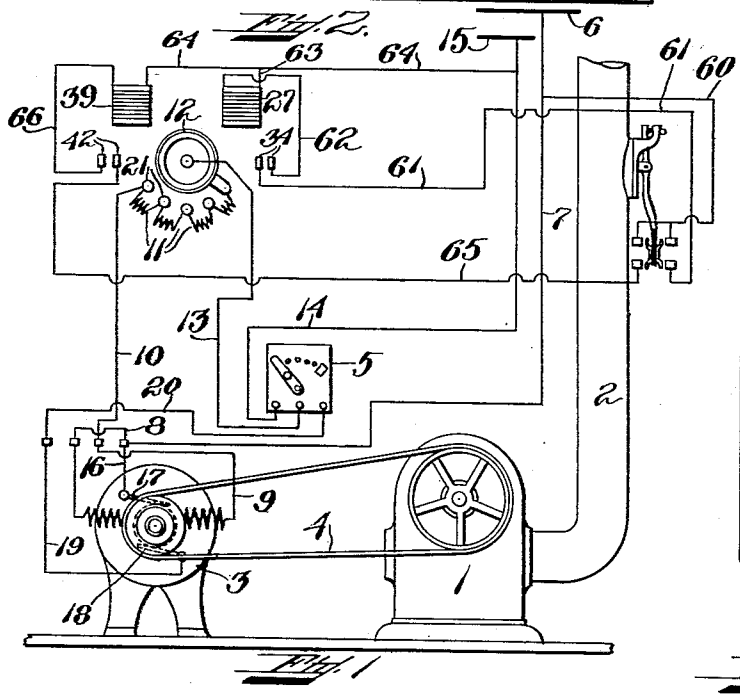


Fig. 1.

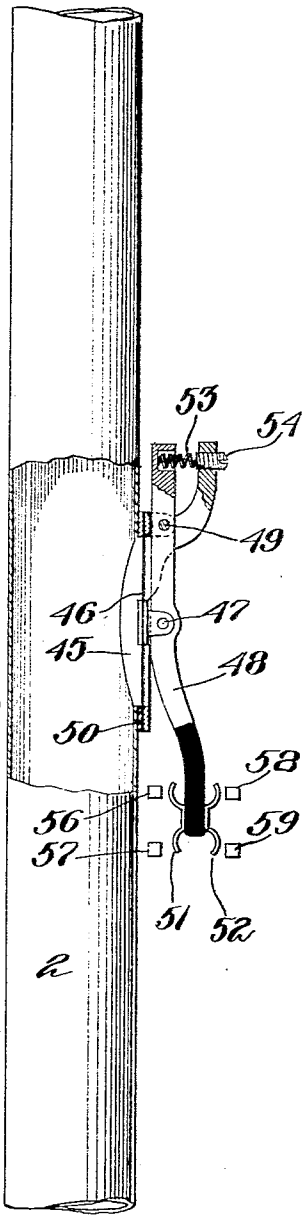


Fig. 3.

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UNITED STATES PATENT OFFICE.

CHESTER S. JENNINGS, OF BROOKLINE, MASSACHUSETTS, ASSIGNOR TO THE LAMSON COMPANY, OF NEWARK, NEW JERSEY, A CORPORATION OF NEW JERSEY.

AUTOMATIC PRESSURE-CONTROLLER.

1,132,777. Specification of Letters Patent. Patented Mar. 23, 1915.

Application filed September 19, 1906. Serial No. 335,210.

To all whom it may concern:

Be it known that I, CHESTER S. JENNINGS, of Brookline, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Automatic Pressure-Controllers, of which the following is a specification.

My invention relates to power controlling apparatus, such for example, as may be used in a pneumatic despatch tube system to maintain a predetermined vacuum or pressure in the tubes. In these despatch tube systems a blower or pump is employed to produce a pressure or vacuum in the transmission tubes, and the blower is driven by a motor whose speed is regulated so as to control the action of the blower or pump and maintain uniform or substantially uniform pressure in the system.

My invention relates particularly to means for controlling the motor according to the pressure in the system, and its object is to produce simple and efficient means to automatically control the action of the motor according to the pressure in the system with which the pump is connected.

To these ends my invention consists of the combination with the air pump and an electric motor for driving the same, of a variable resistance in circuit with said motor and means for regulating this resistance in circuit with said motor and means for regulating this resistance comprising a pair of auxiliary motors, one for increasing the resistance in the motor circuit and the other for diminishing the resistance in the motor circuit, and means controlled by the pressure in the transmission tubes or other chamber with which the pump is connected for selecting and operating one or the other of said motors according to the variation of pressure in the tubes, so as to increase the resistance when the pressure varies in one direction, and to diminish the resistance when the pressure varies in the opposite direction.

Other features of my invention are hereinafter pointed out.

In the accompanying drawings in which is illustrated a form of construction embodying my invention, Figure 1 is a diagram of the device in connection with the supply pipe of a pneumatic despatch tube system; Fig. 2 is a plan view of the automatic controlling rheostat; Fig. 3 shows a section of the supply pipe of a pneumatic system showing diaphragm and switch connected therewith.

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

1 represents a blower adapted to exhaust air from or supply air to the supply pipe 2, which is here intended to represent part of a pneumatic despatch tube system.

3 is the electric motor which operates the pump 1 through the belt 4; 5 is the usual switch or rheostat that is used only in starting and stopping the motor 3. The circuit of the field of the motor 3 is as follows: from the line wire 6 by wires 7 and 8 to one end of the field winding and from the other end of the field winding by wires 9 and 10 to a series of resistances 11. Thence via a ratchet wheel 12 and wire 13 to the starting rheostat 5, and from the rheostat 5 by wire 14 to line wire 15. The circuit of the armature of the motor 3 is from the junction of wires 7 and 8 by the wire 16 to brush 17; through the armature and brush 18 to wire 19 and thence by a wire 20 to starting switch 5 where it joins the wire 14. The resistances 11 are connected with contacts 21 which are in the path of an arm 22 carried by the ratchet 12. This ratchet 12 is loose on a stud 22′ that also carries two arms 23 and 24. The arms 23 and 24 carry opposed pawls 25 and 25ª to engage the ratchet 12 and as will be clear, when one of said arms is vibrated, the ratchet wheel 12 will be rotated step by step in one direction, and when the other of said arms is vibrated, the ratchet wheel will be rotated step by step in the opposite direction. The arm 23 is connected by a link 26ª with a rod 26, and said rod extends through a coil 27, the rod 26 and coil 27 constituting a solenoid. At its upper end, the rod 26 extends into a cylinder 28 and has fastened to it a piston 29. The piston 29 and cylinder 28 constitute a dash pot to yieldingly resist or retard the movement of said rod. The piston is made with ports 30 through it for the passage of the contents within the cylinder from one side of the piston to the other as said piston moves with the rod. Also in order to provide for regulating the resistance offered by the contents, the cylinder 28 is made with a bypass 31 which is controlled by the valve

screw 32. In this way, the action of the dash pot may be regulated to control the speed of this auxiliary motor made up of the coil 27 and rod 26. The coil 27 and cylinder 28 are fixed to the base plate 33, and this base plate 33 also carries a pair of contacts 34 coöperating with a bridge piece 35 carried by but insulated from a frame 36 on rod 26. This bridge piece is so adjusted that when the rod 26 is at its lowest point, the contacts 34 are connected, but when current flows through coil 27, the rod 26 is lifted and the bridge piece 35 is carried away from contacts 34. The contacts 34 are in circuit with coil 27 and therefore the current is cut off from said coil as soon as the rod 26 is lifted and the rod 26 falls back to its lowermost position again, upon reaching which the bridge piece reëstablishes the connection between contacts 34 and the rod is again lifted.

The arm 24 is connected by a link 37 with a rod 38 extending through a coil 39 fixed to the plate 33 and projecting at its upper end into the cylinder 40. The rod 33 carries at its upper end a piston 41 and said piston and cylinder 40 like the cylinder 28 and piston 29, constitute a dash pot. Alongside of coil 39 is a pair of contacts 42 fixed to plate 33 so as to coöperate with a bridge piece 43 carried by a frame 44 of the rod 38. The pipe 2 is cut away as at 45, and in this opening is fixed a diaphragm 46 pivoted at its middle 47 to a lever 48 pivoted at 49 to the frame 50 surrounding the opening 45. The lever 48 at one end carries two bridge pieces 51 and 52 and at its other end said lever is acted upon by the spring 53 whose pressure is adjusted by means of a screw 54 so that when the predetermined normal vacuum or pressure exists in the pipe 2, the lever 48 is balanced with the bridge pieces 51 and 52 out of engagement with the contacts 56, 57, 58 and 59. The two contacts 56 and 58 are connected by the wires 60 and 7 with line wire 6, while contact 59 is connected by wire 61 with one of the contacts 34. The other contact 34 is connected by wire 62 with one end of the coil 27. The other end of the coil 27 is connected by wires 63, 64 and 14 with line wire 15. The contact 57 is connected by the wire 65 with one of the contacts 42 and the other contact 42 is connected by the wire 66 with one end of the coil 39, the other end of said coil being connected with the wire 64, which is in turn connected through the wire 14 with the line wire 15. It will thus be seen that when the pressure in the pipe 2 varies in one direction, the contacts 56 and 57 will be connected and a circuit will be completed through the coil 39 and rod 38 will be reciprocated as above described so as to rotate the ratchet wheel 12 in a direction to increase the resistance in the circuit of the motor 3. It will also be seen when the pressure in the pipe 2 varies in the opposite direction, the bridge piece 52 will connect contacts 58 and 59 and the circuit will be completed through the coil 27 and rod 26 will be reciprocated as above described to rotate the ratchet wheel 12 in the opposite direction so as to reduce the resistance in the circuit of the motor 3.

There is thus provided a pair of motors, each of which actuates the ratchet 12 intermittently, that is, step by step, one serving to rotate said ratchet in one direction and the other serving to rotate said ratchet in the opposite direction. The advantage of this is that there is an interval of time between the step movements of the ratchet 12 to allow the change of resistance in the circuit of motor 3 to act through motor 3 and pump 1 on the pressure in the pipe 2 before the resistance is again changed.

In the constructions heretofore proposed, a rotating motor has been employed which was started, stopped and reversed to control the resistance in the circuit of the pump driving motor, but the objection to this construction has been either that when the motor was stopped its momentum would carry it beyond the necessary point after its current was automatically cut off by the pressure in the pipe, or the like, or that the delay in overcoming the inertia of the motor when started by the automatic pressure-controlled means delayed the changing of the resistance in the motor circuit. On the other hand, this apparatus is quickly responsive to any change of pressure in the pipe 2 beyond a predetermined point and the resistance in the circuit of the motor is accurately varied according to changes of pressure in pipe 2.

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 States is:

1. In an automatic pressure controller, the combination of an air-transmission tube, a pump communicating with said tube, an electric motor for driving said pump, a variable resistance in circuit with said motor, and means for regulating the resistance of said motor circuit comprising two auxiliary motors with one acting to increase the resistance in said circuit and the other for diminishing the resistance in said circuit, and means controlled from substantially but a single point by the pressure in said air-transmission tube for selecting and singly operating one or the other of said auxiliary motors according to the variation of pressure in said tube, so that one of said auxiliary motors when selected will increase the resistance in said circuit when the pressure varies in the tube in one direction, and the other of said auxiliary motors when

selected will diminish the resistance in said circuit when the pressure in the tube varies in the other direction.

2. In an automatic pressure controller, the combination of an air-transmission tube, a pump communicating with said tube, an electric motor for driving said pump, a variable resistance in circuit with said motor, and means for regulating the resistance of said motor circuit comprising two auxiliary motors with one substantially invariably acting, whenever operative, to increase the resistance in said circuit and the other for similarly diminishing the resistance in said circuit, and means controlled by pressures in said air-transmission tube of but one sign, atmospheric pressure being regarded as zero for the purpose of determining said sign, said means adapted to select and operate one or the other of said auxiliary motors according to the change of pressure in said tube either way from a determined normal pressure to be maintained therein, so that one of said auxiliary motors when selected will increase the resistance in said circuit when the pressure varies in the tube in one direction, and the other of said auxiliary motors when selected will diminish the resistance in said circuit when the pressure in the tube varies in the other direction.

3. In an automatic pressure controller, the combination of an air-transmission tube, a pump communicating with said tube, an electric motor for driving said pump, a variable resistance in circuit with said motor, and means for regulating the resistance of said motor circuit comprising two auxiliary motors with one acting to increase the resistance in said circuit and the other for diminishing the resistance in said circuit, and means controlled by the pressure in said air-transmission tube for selecting and operating one or the other of said auxiliary motors while leaving the other idle, according to the variation of pressure in said tube, so that one of said auxiliary motors when selected will increase the resistance in said circuit when the pressure varies in the tube in one direction, and the other of said auxiliary motors when selected will diminish the resistance in said circuit when the pressure in the tube varies in the other direction, said motors having provisions for gradually varying said resistance substantially regardless of violent and sudden variations in pressure in said tube.

4. In an automatic pressure controller, the combination of an air-transmission tube, a pump communicating with said tube, an electric motor for driving said pump, a variable resistance in circuit with said motor, and means for regulating the resistance of said motor circuit comprising two auxiliary motors, independently driven with respect to said pump, with one acting to increase the resistance in said circuit and the other for diminishing the resistance in said circuit, and means controlled by the pressure in said air-transmission tube for selecting and operating one or the other of said auxiliary motors according to the variation of pressure in said tube, so that one of said auxiliary motors when selected will increase the resistance in said circuit when the pressure varies in the tube in one direction, and the other of said auxiliary motors when selected will diminish the resistance in said circuit when the pressure in the tube varies in the other direction.

5. In an automatic pressure controller, the combination of an air-transmission tube, a pump communicating with said tube, an electric motor for driving said pump, a variable resistance in circuit with said motor, and means for regulating the resistance of said motor circuit comprising two auxiliary motors with one acting to increase the resistance in said circuit and the other for diminishing the resistance in said circuit, and a device controlled by the pressure in said air-transmission tube for selecting and operating singly one or the other of said auxiliary motors according to the variation of pressure in said tube, so that one of said auxiliary motors when selected will increase the resistance in said circuit when the pressure varies in the tube in one direction, and the other of said auxiliary motors when selected will diminish the resistance in said circuit when the pressure in the tube varies in the other direction.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses, this fifteenth day of September A. D. 1906.

CHESTER S. JENNINGS.

Witnesses:

HOWARD R. DUNBAR,

H. D. WATERHOUSE.