No. 850,329. PATENTED APR. 16. 1907.

H. W. YOUNG.

ELECTRIC AND PNEUMATIC GOVERNOR.

APPLICATION FILED JAN. 22, 1906.

2 SHEETS—SHEET 1.

Fig. 1

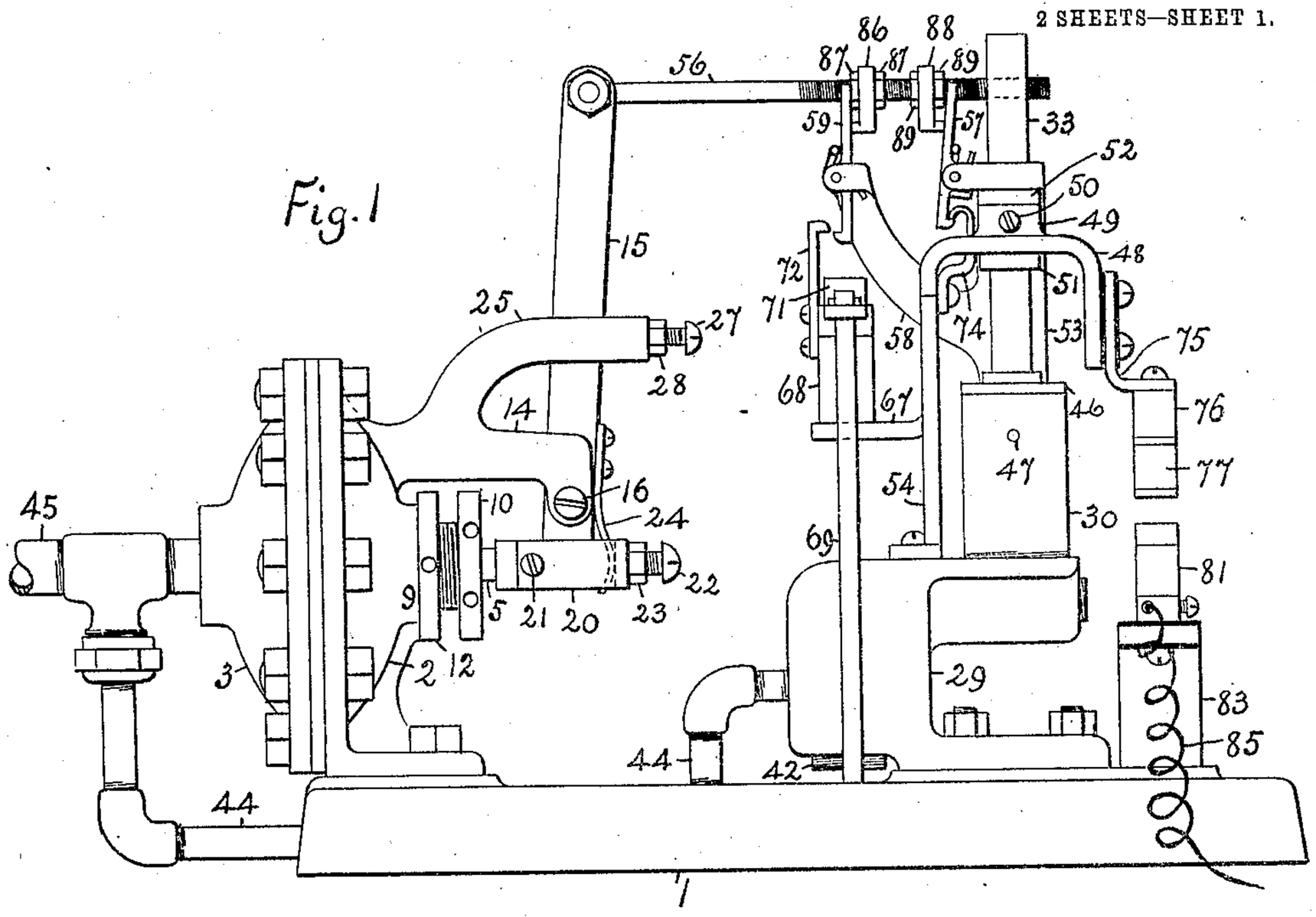
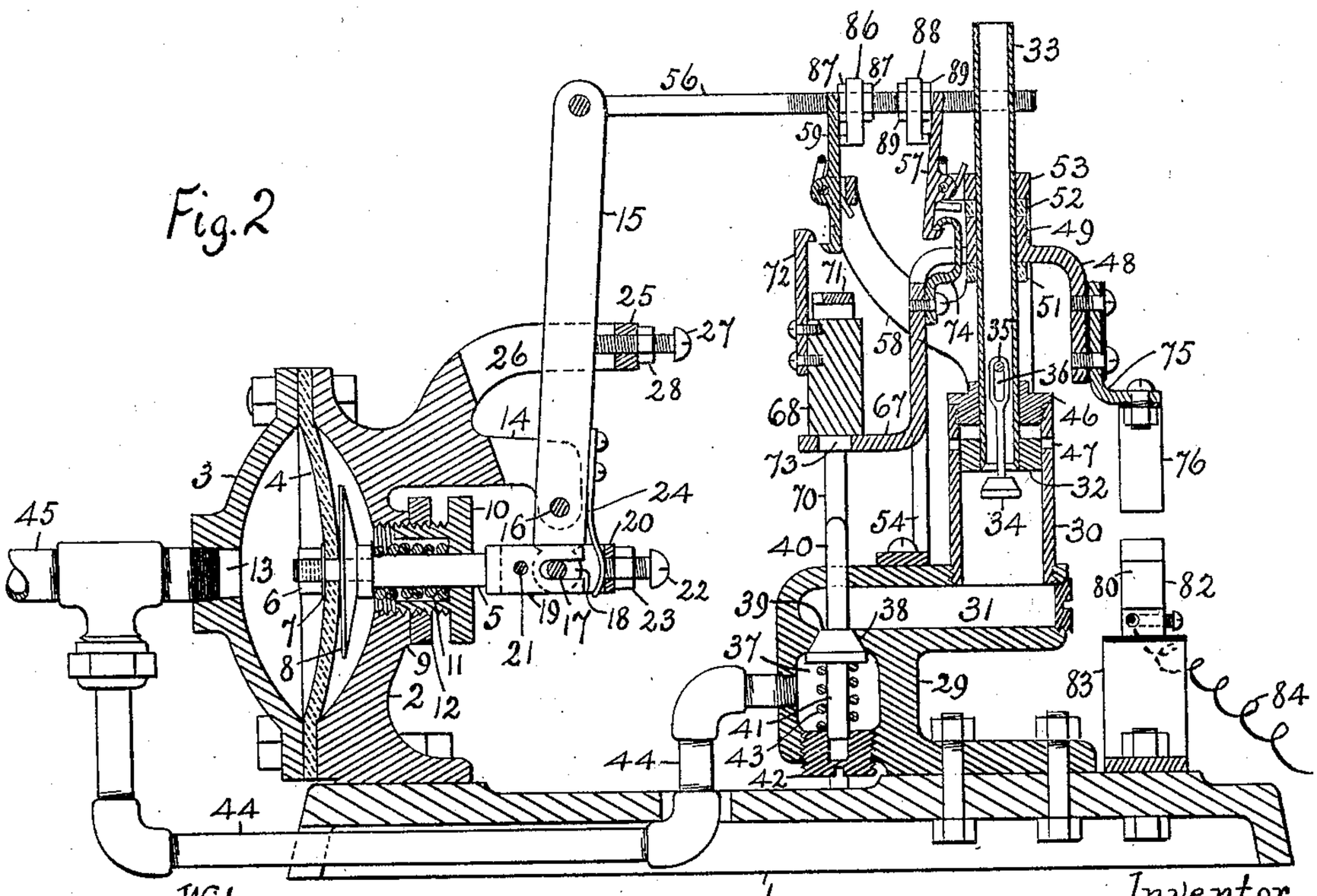


Fig. 2



Witnesses.

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2 SHEETS—SHEET 2.

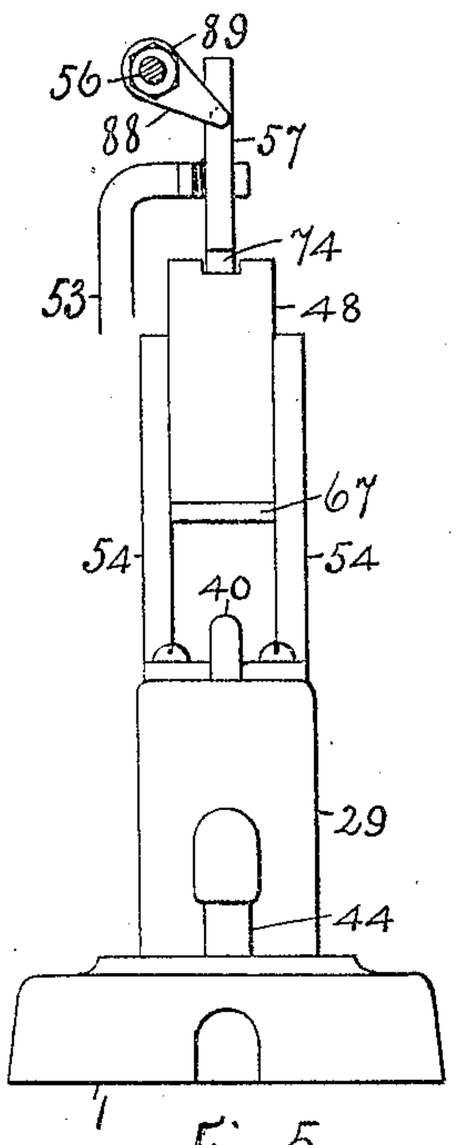

Fig. 5

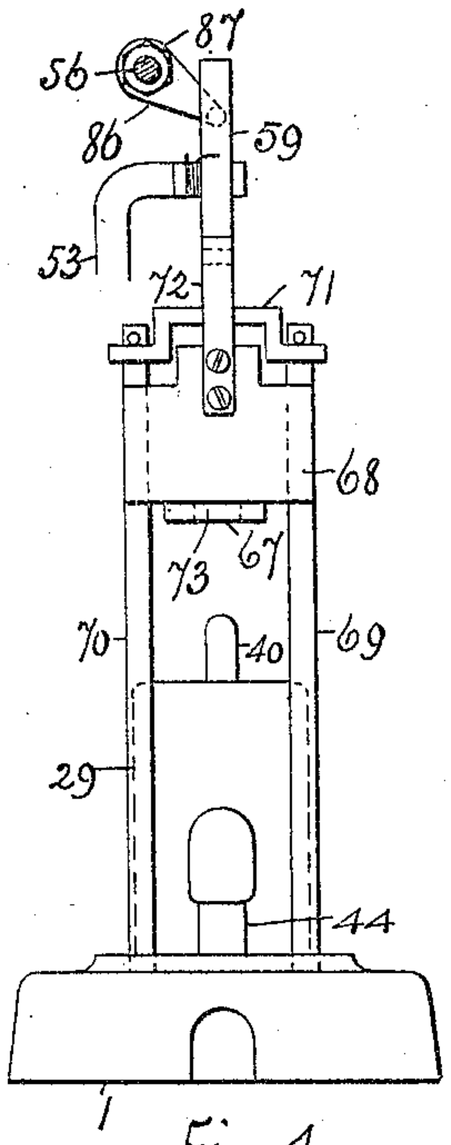

Fig. 4

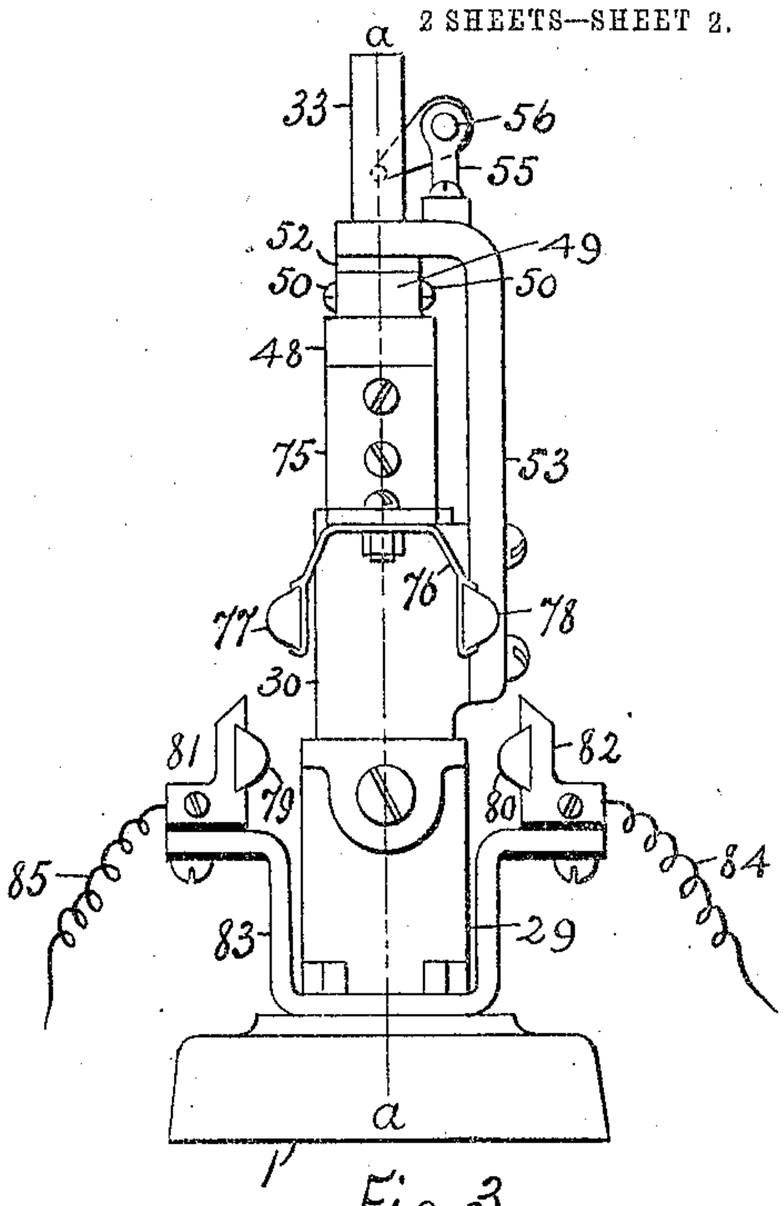

Fig. 3

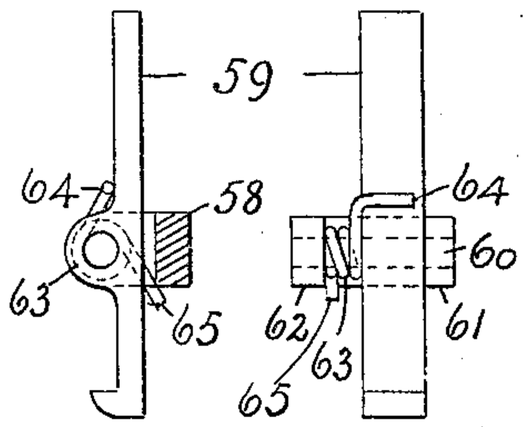

Fig. 6 Fig. 7

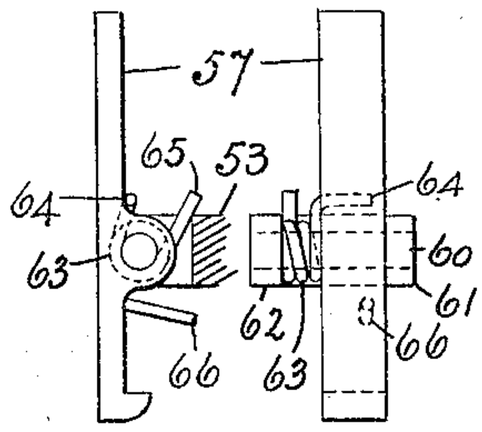

Fig. 8 Fig. 9

Witnesses.
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UNITED STATES PATENT OFFICE.

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ELECTRIC AND PNEUMATIC GOVERNOR.

No. 850,329. Specification of Letters Patent. Patented April 16, 1907.

Application filed January 22, 1906. Serial No. 297,147.

To all whom it may concern:

Be it known that I, HARRY W. YOUNG, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electric and Pneumatic Governors, of which the following is a specification.

This invention relates to means operative by pneumatic pressure to control the flow of electric current to the motor by which the pneumatic pressure is produced, the circuit to the motor being formed whenever there is a predetermined minimum pressure and broken as soon as the maximum pressure is reached, so that the pressure shall be constant between a fixed maximum and minimum amount.

Where car-brakes are operated by pneumatic pressure, it is highly necessary to keep a uniform pressure, and especially so with urban traffic, where the stops are frequent, crossings numerous, and the danger of collisions with vehicles and pedestrians is of almost momentary liability. It is also desirable that the means employed shall be simple and durable as well as thoroughly efficient.

In this invention the electrical control has been accomplished without any liability of destruction of any part by the electric current.

The invention is illustrated in the accompanying drawings, in which like parts are indicated by the same reference characters, and wherein—

Figure 1 is a side elevation. Fig. 2 is a central vertical section of Fig. 1 with some parts not in section. (See also line *a a*, Fig. 3.) Fig. 3 is an elevation of the right-hand end of Fig. 1. Fig. 4 is an elevation view of the drop-weight, its guides, &c., looking from the left-hand end of Fig. 1. Fig. 5 is an elevation view of the guides, &c., for the piston-yoke from the same position as Fig. 4. Fig. 6 is a front view of the weight-suspension latch. Fig. 7 is a side view of Fig. 6. Fig. 8 is a front view of the yoke-suspension latch. Fig. 9 is a side view of Fig. 8.

All of the parts are carried by a base-plate 1. At one end of the base-plate there is a case 2, having a cover 3 inclosing and securing a flexible diaphragm 4, a stem 5 being secured to the diaphragm by a nut 6 and washer 7 at one side and a hubbed plate 8 at the opposite side. The case has a hub 9 tapped to receive a follower 10, which bears against a spring 11, which abuts the hub of plate 8 at its opposite end, and a check-nut 12 secures the follower when it has been adjusted to cause the spring to force the diaphragm to resist the pneumatic pressure operating against it through opening 13 in communication with the air-reservoir. (Not shown.) Case 2 has a projection 14, on which is fulcrumed a lever 15 by a screw 16. The lower end of the lever has a pin 17 passing through it and extending beyond each side, and each side extension enters a slot 18, formed in jaws 19 of stem 5 at each side of the lever end. Over the jaws is a yoke 20, secured to each jaw by a screw 21. At the outer end of yoke 19 there is a screw 22 with a check-nut 23 to bear against a spring 24, secured to lever 15. The object of this arrangement is to relieve spring 11 when subjected to severe pressure and prevent the loss of resiliency or the "set" of the spring.

Above projection 14 there is another projection 25, having a slot 26 to receive lever 15 with a screw 27 at its outer end to limit the movement of spring 11 against the diaphragm 4. The screw has a check-nut 28.

At the opposite end of base-plate 1 from the diaphragm-case there is a stand 29, with a cylinder 30 mounted thereon and in communication with a passage 31 in the stand. The cylinder has a piston 32 with a hollow piston-rod 33 passing therethrough, with a valve 34 suspended within the piston-rod by a pin 35 in a slot 36 of the suspension-rod, so that the valve can leave the piston-rod end open, as shown, or close the opening when the piston is to be forced upward. A chamber 37 is formed in stand 29 with an opening 38 to the passage 31. A valve 39 controls the opening. The valve has an upper stem 40 projecting above stand 29 and a lower stem 41, guided in a nut 42, with a spring 43 around the stem to close the valve. From chamber 37 there is a pipe 44, communicating with pipe 45 from the air-reservoir to the diaphragm. Cylinder 30 has a cover 46 and vents 47. Piston-rod 33 has attached thereto a yoke 48 by screws 50 in its hub 49, and cushioning-rings 51 52 of soft material are placed above and below hub 49. 52 abuts standard 53, secured to cylinder 30, (best seen in Fig. 3,) which guides the upper

end of piston-rod 33. King 51 abuts cylinder-cover 46. These cushions deaden the blows incident to the rapid ascent and descent of yoke 48. Secured to stand 29 are guides 54 for yoke 48 to prevent any tendency to turn. Above standard 53 a bracket 55 (see Fig. 3) guides a screw-threaded rod 56, pivotally secured to the upper end of lever 15. Pivotally supported on standard 53 is a latch 57, and on arm 58 of the standard is another latch 59. By reference to Figs. 6, 7, 8, 9, on an enlarged scale, it will be seen that these latches are supported on pins 60 between jaws 61 62 with a space between the latch and jaw 62 occupied by a spring 63 over pin 60, having extended ends, end 64 bearing against and forcing the latch for engagement and end 65 bearing against the latch-supports to insure the ends 64 in enforcement. As latch 57 has its hub toward its support, it is provided with a stop-pin 66 to limit the movement of the latch.

Yoke 48 has a horizontal extension 67 on its diaphragm side adapted to catch and elevate weight 68 after it has dropped to open valve 39, which admits pressure to carry up the piston, the weight being guided by rods 69 70, secured in base 1 and having a tie 71 at the top. A latch 72 is secured to weight 68 and is adapted to engage latch 59 and support weight 68 when not resting on extension 67, which has a hole 73 to pass over and clear stem 40. Yoke 48 has a spring-catch 74, adapted to engage latch 57. Opposite projection 67 the yoke 48 has insularly attached thereto a bracket 75, to which is secured a yielding support 76 for carbons 77 78, adapted to contact with fixed carbons 79 80, secured in terminals 81 82 on stand 83, secured to base-plate 1 and carrying conductors 84 85.

Upon rod 56 there is an arm 86, adapted to press against latch 59 and secured in adjustment by check-nuts 87, and another arm 88, secured in adjustment by check-nuts 89, is adapted to press against latch 57.

The governor is represented at the time the electrical circuit is broken by an accumulation of maximum pressure upon the diaphragm 4. As the pressure against the diaphragm decreases the top of lever 15 will move toward cylinder 30, carrying rod 56, and arm 88 will press the upper end of latch 57 to free it from spring-catch 74, the latch and catch now supporting yoke 48, piston 32, and its rod 33 and the movable carbons 77 78 out of contact with the fixed carbons 79 80 and breaking the circuit between conductor 84 from the source of electrical energy and 85, leading to the compressor-motor. While the decrease of pressure has been going on arm 86 has traveled away from latch 59 and allowed its spring end 64 to move the latch into engagement with the latch 72 of weight 68 and to suspend the weight. When the allowed minimum pressure has been reached, latch 57 and catch 74 will be disengaged, and the yoke, piston, and movable carbons will descend by gravity, the circuit will be reëstablished, and the motor will operate the compressor. This will continue until diaphragm 4 moves back lever 15, rod 56, and arm 86 to disengage latch 59 from latch 72 at the predetermined accumulation of maximum pressure. The weight 68 will then descend by gravity to stem 40, open valve 39, and admit pressure to passage 31, close valve 34 and the piston 32, yoke 48 and its projection 67, weight 68, and carbons 79 80, will be carried up by pneumatic pressure and suspended by latch 57 and catch 74, the circuit being broken and the motor stopped. These operations will be repeated as maximum and minimum pressures are reached.

The means herein employed enable a very fine graduation of maximum and minimum pressures, and the closing and breaking of the circuit is instantaneous.

I claim—

1. In an electric and pneumatic governor, a diaphragm operative by pneumatic pressure; a cylinder, a piston having a hollow piston-rod and a valve therein; fixed carbons having electrical conductors thereto and therefrom; movable carbons carried by the piston and its rod, and means operative by pneumatic pressure to lift the piston and the movable carbons and break the circuit upon the accumulation of a maximum pressure, and to drop the piston and the movable carbons and close the circuit when a minimum pressure is reached, substantially as and for the purposes specified.

2. In a governor, a diaphragm actuated by fluid-pressure; a cylinder, a piston in the cylinder actuated in one direction by fluid-pressure, and in the opposite direction by gravity: fixed and movable carbons and electrical conductors therefor; and means operative by the diaphragm to release the piston and carbons for action by gravity to form the electrical circuit, and by fluid-pressure to break the circuit.

3. In a governor, a diaphragm actuated by fluid-pressure in one direction and by resilient means in the opposite direction; a lever movable by the diaphragm, a rod thereto attached and arms on the rod; a cylinder having a piston and rod operative in one direction by fluid-pressure and in the opposite direction by gravity; a support; latches on the support which engage the arms aforesaid; a catch adapted to engage one of the latches; a weight, and a latch thereon adapted to engage the other latch; fixed carbons having electrical conductors; movable carbons supported by the piston and its latch; a support for the weight, also carried by the piston, to the weight's latch; a pressure-passage to the piston, a valve controlling the passage, a stem projecting from

the valve and adapted to be depressed by the falling of the weight, to open the valve, admit pressure to the cylinder, lift the piston and movable carbons and break the circuit.

4. The combination of a fluid-pressure diaphragm, a cylinder having a piston actuated by fluid-pressure in one direction and by gravity in an opposite direction; movable carbons and a weight elevated by the piston; fixed carbons and electrical conductors therefor; a fluid-passage to the cylinder and a valve to control it; means to suspend the piston and the carbons; means to release the piston and movable carbons to form an electrical circuit, by gravity; and means to release the weight and by its gravity open the valve and break the circuit.

5. In a governor, a fluid-pressure diaphragm, a cylinder, a piston therein, movable carbons supported by the piston, fixed carbons and electrical conductors, a weight elevated by the piston, means to suspend the piston and movable carbons until a minimum pressure is reached, and then to release the piston and carbons to act by gravity to form the electrical connection; means to suspend the weight before the piston descends, and to hold it in suspension until a predetermined increase of pressure is reached, and to then release the weight to act by gravity to apply pressure to the piston for its elevation, the elevation of the carbons and the breaking of the circuit.

6. In a governor, a diaphragm deflected in one direction by fluid-pressure, and in the opposite direction by resilient means, means to adjust the resiliency, and means for its relief when subjected to extreme pressure.

7. In a governor, a cylinder mounted over a fluid-pressure passage and open to the same, a piston in the cylinder, a hollow piston-rod extending through the piston, a valve suspended from the piston-rod to leave a free passage through the piston and its rod when the piston is not subjected to pressure, and to close the passage when pressure is introduced into the cylinder for the movement of the piston.

8. In a governor, a stand, a chamber in the stand, a valve in the chamber having a stem projecting above the stand, resilient means to close the valve, a fluid-pressure passage to the chamber, a fluid-pressure passage from the chamber and controlled by the valve; a cylinder mounted above and open to the latter passage, a piston in the cylinder, and means operative by gravity to open the valve, admit pressure to the cylinder and operate the piston.

In testimony whereof I affix my signature in presence of two witnesses.

HARRY W. YOUNG.

Witnesses:
WILLIAM C. STOEVER,
RANSOM C. WRIGHT.