No. 665,437. Patented Jan. 8, 1901.

E. M. HEWLETT.

FLUID PRESSURE REGULATOR.

(Application filed Nov. 22, 1899.)

(No Model.)

Fig. 1.

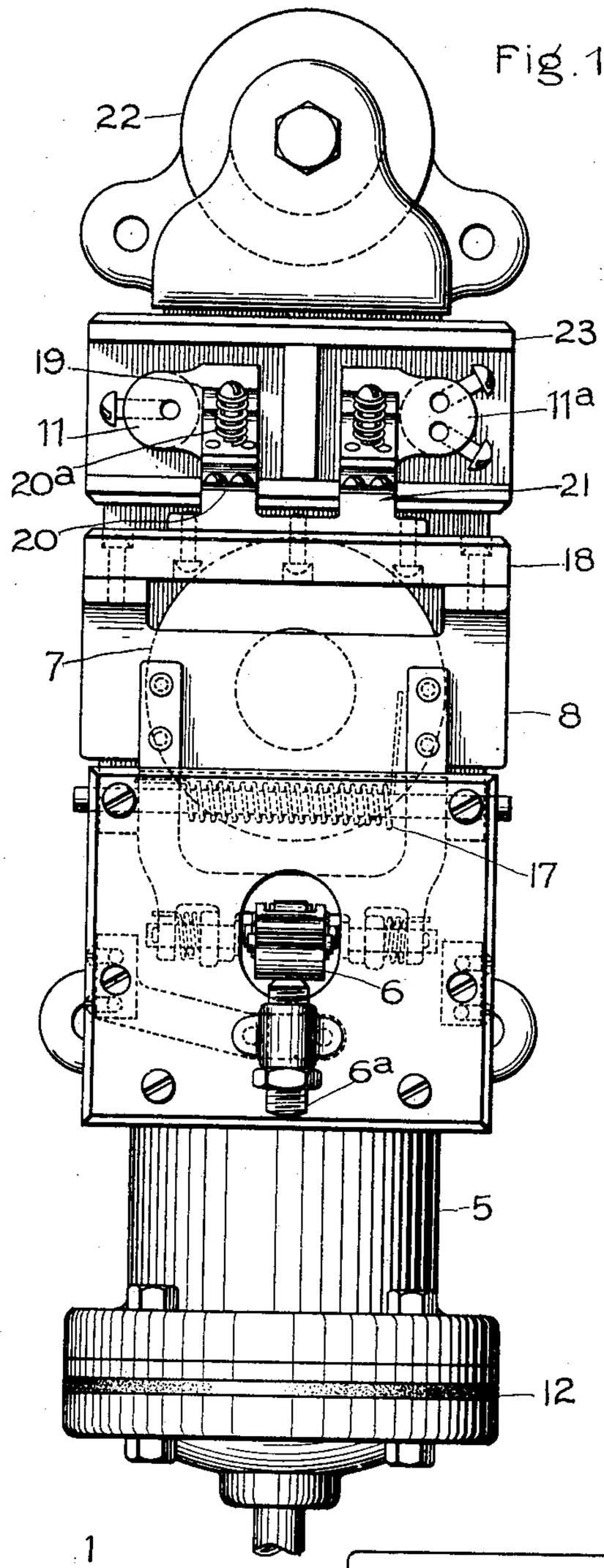


Fig. 2.

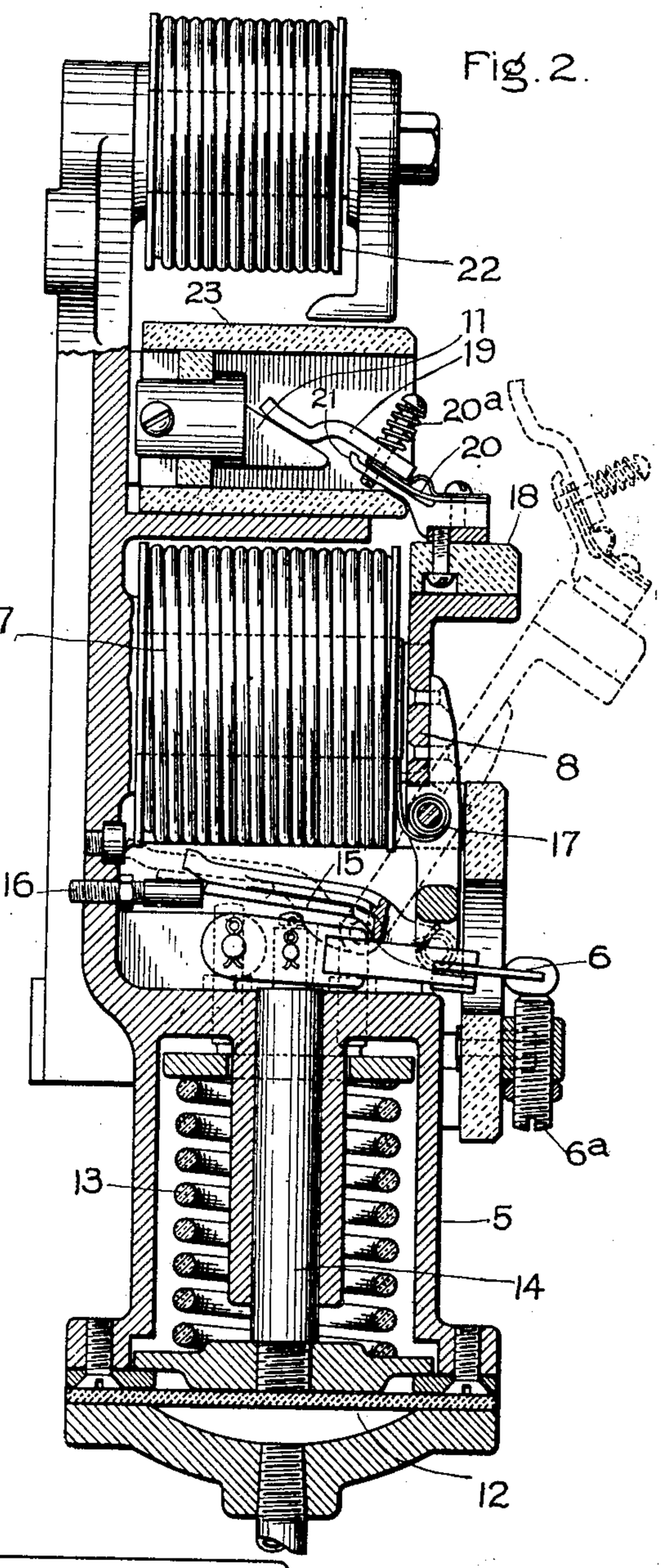
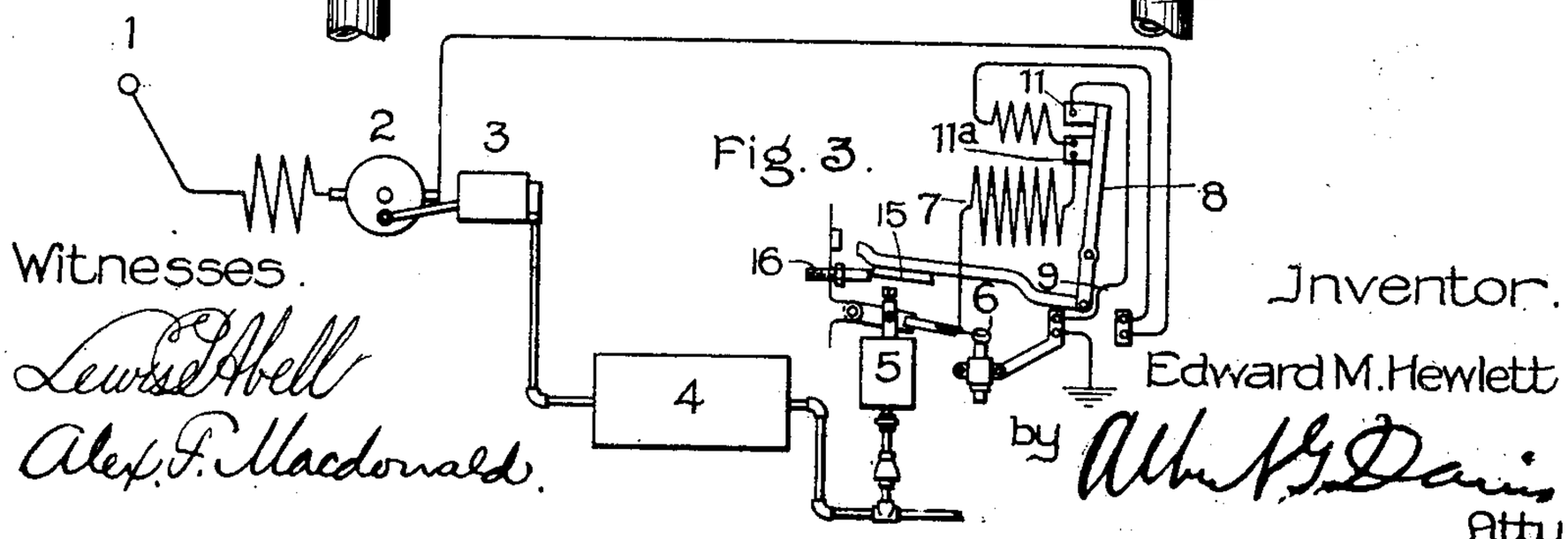


Fig. 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

EDWARD M. HEWLETT, OF SCHENECTADY, NEW YORK, ASSIGNOR TO THE GENERAL ELECTRIC COMPANY, OF NEW YORK.

FLUID-PRESSURE REGULATOR.

SPECIFICATION forming part of Letters Patent No. 665,437, dated January 8, 1901.

Application filed November 22, 1899. Serial No. 737,904. (No model.)

To all whom it may concern:

Be it known that I, EDWARD M. HEWLETT, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Fluid-Pressure Regulators, (Case No. 1,377,) of which the following is a specification.

My present invention relates to regulating devices for fluid-pressure systems in which it is desired to maintain a uniform pressure, and particularly to such systems in which the compressors are operated by electric motors.

In carrying out the invention I provide an operating piston or diphragm controlled by pressure and capable of being set for operation at a determinate pressure, and governed by this device is an electric switch or circuit-closer by which the motor is cut into or out of the operating-circuit.

The invention is particularly designed for operation in connection with air-brake systems applied to electrically-propelled vehicles or cars.

In a prior application for Letters Patent of the United States filed by me, Serial No. 695,669, I have described an organization for accomplishing the same result. My present improvements, however, differ in the arrangement of the controlling-circuits and in the mechanical construction of the governing device, and also in the means for open-circuiting the motor.

Generally speaking, my present organization comprises a switch operated by fluid-pressure for opening and closing the motor-circuit and electromagnetic means for closing a by-pass around the circuit-closer to permit a sparkless opening of the circuit thereat. The controlling-electromagnet is in series with the motor, and the by-pass short-circuits it when completed to prevent damage by heating. The armature of the electromagnetic device which controls the by-pass is provided with a latch to hold it closed when its magnet is deënergized and a trip so mounted as to produce a quick long break at the point at which the by-pass is closed, the tripping device being actuated by the fluid-pressure controller at a later point of time than the main branch.

The various features of novelty in my invention will be more fully described hereinafter and will be definitely indicated in the claims.

In the accompanying drawings, illustrating the invention, Figure 1 is a front elevation of an organization embodying my improvements. Fig. 2 is a side view, partly in section; and Fig. 3 is a diagram of the circuit connections.

Referring first to Fig. 3, which gives a comprehensive view of the system, 1 represents a trolley or other collector through which current is led to the system. 2 represents an electric motor operating a compressor 3, communicating with a reservoir 4, leading to the train-pipes or other distributing system of the fluid-pressure. In air-brake systems it is commonly desired to maintain a pressure of from eighty to ninety pounds per square inch, and this is automatically effected by my improvements, the cylinder 5, in open communication with the train-pipe, being provided with a piston which controls a circuit-closer 6, leading to ground through the wheels of the car. The circuit, when the motor is cut in, includes the coils of the magnet 7, by which a by-pass around the circuit-closer 6 and the coils of the magnet is completed. The armature 8 of this magnet bridges two contacts, completing a by-pass of low resistance or impedance to ground, as indicated at 9. By this organization the electromagnet 7 is cut out of circuit immediately on doing its work and before sufficient time elapses to damage its coils, and it may be therefore placed in series and be of small cross-section, thus rendering its construction cheap. The completion of the by-pass also insures a sparkless opening of the circuit at the contacts 6, since the by-pass is not opened the instant the contacts at 6 open, but remains closed until the controlling-piston makes a longer range of movement, after which it is tripped and the circuit broken at the contacts 11 11^a, which are provided with a blow-out magnet and other provisions for safely rupturing the circuit.

The mechanical details of my construction may be understood from an examination of Figs. 1 and 2. 12 represents a diaphragm, of rubber, in communication with the train-pipe and secured air-tight to a cup-shaped receptacle secured air-tight to the end of the pipe connection with the train-pipe. The diaphragm is held between two flanges bolted together, the upper one of which forms part of a casing 5, containing a coil-spring 13, the lower end of which bears against a disk screwed fast to a stem 14, moving in a guide in the casing. The upper end of the spring bears against a plate, against which abut adjusting-screws for controlling the tension of the spring, as indicated in dotted lines in Fig. 2. Pivotally connected to the stem 14 is a movable lever terminating in the contact 6, with which coöperates an adjacent contact 6^a, capable of adjustment to vary the point of release at different pressures. On the upper end of the stem is mounted a pin engaging a latch 15, coöperating with an adjustable stop 16. This latch is journaled in the lower part of the armature 8 and is under tension of a coil-spring, as indicated in dotted lines. To the armature is fastened a helical spring around its axis, the free end of which bears against the magnet. The spring is indicated at 17. The upper part of the armature carries a strip of insulating material, such as indurated fiber 18, upon which is mounted a bridging-contact 19, being held between two coöperating springs 20 20^a and coöperating with a fixed stop 21. 22 represents the blow-out magnet, and 23 the chute through which the expulsive action on its arc takes place, the relations of which to the circuit will be sufficiently evident from an examination of Fig. 3 in connection with the description hereinbefore given.

In operation when the fluid-pressure reaches a determinate point controlled by the adjustment of the tension of spring 13 and of the stop 6^a the diaphragm is pressed upward, the first effect being to open the contact at 6 6^a. Inasmuch, however, as another branch of the circuit through the blow-out magnet and contacts 11 11^a by way of conductor 9 is maintained of low resistance to short-circuit the branch through coil 7 and contact 6, no damaging sparking occurs at the contacts. Upon a further rise of the piston and the movement of the diaphragm the latch 15 is tripped, permitting the coil-spring 18 to produce a quick throw of the armature to the position indicated in dotted lines in Fig. 2, opening the circuit at the terminals bridged by contact 19 and corresponding to the contacts 11 11^a, and thus cutting out the motor. The quick action and long break, combined with the operation of the blow-out magnet, produce a safe rupture of the circuit. Upon a decline of pressure to a point below the fixed limit the diaphragm retracts and its operating-stem is lowered, the first effect being to close the motor-circuit at the contacts 6 6^a through coil 7, thus starting the motor into operation and raising the air-pressure in the system, but immediately the armature 8 is drawn up, bridging the terminals 11 11^a by contact 19, completing the by-pass, and latched in position by stop 16. The mechanical lock for the armature 8 prevents derangement from jars and its relation to the controlling-diaphragm permits a determinate interval to intervene between the operation of the two circuit-closing devices and permits the motor to be cut in or out with more certainty under a desired pressure variation, also preventing unnecessary starting of the motor from vibration of the parts under minor quick variations of pressure in the train-pipe.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A fluid-pressure governor for an electrically-operated compressor, comprising a movable contact controlled by fluid-pressure, a magnet in circuit therewith, and a short-circuiting by-pass around the contacts completed by the magnet when the circuit is closed.

2. A fluid-pressure governor for an electrically-operated compressor, comprising a controlling-contact operated by fluid-pressure, a magnet in circuit therewith, a by-pass completed when the circuit is closed, a circuit-breaker for said by-pass, and means for tripping said circuit-breaker, after the controlling-contact has been opened.

3. A pressure-governor comprising an electric motor for raising the pressure, a circuit-closer in the motor-circuit responsive to a determinate pressure, a by-pass of low resistance around the contacts of the circuit-closer, and an electromagnet completing the same to prevent sparking when the contacts open when the motor is cut in.

4. A pressure-governor comprising an electric motor for raising the pressure, a pressure-operated circuit-closer in the motor-circuit, a magnet in circuit, and a by-pass short-circuiting the circuit-closer and magnet controlled by the armature of the latter.

5. A pressure-governor comprising an electric motor for raising the pressure, a pressure-operated circuit-closer in the motor-circuit, a by-pass of low resistance around the circuit-closer contacts when closed, and means for opening the two branches through the circuit-closer and by-pass in sequence to prevent arcing.

6. A pressure-governor comprising an electric motor for raising the pressure, a pressure-operated circuit-closer in the motor-circuit, a by-pass of low resistance around the circuit-closer contacts, means for opening the two branches in sequence to prevent arcing at the circuit-closer contacts, and an arc-extinguishing device at the contacts last to open.

7. A governor for fluid-pressure systems, comprising a compressor, an electric motor

operating the same, a pressure-operated circuit-closer, a by-pass around it, an operating-magnet short-circuited by the by-pass, and a latching device for the magnet-armature tripped after the circuit-closer has been opened.

8. A governor for fluid-pressure systems, comprising a pressure-controlled circuit-closer, a magnet in circuit therewith, a short circuit for the magnet and circuit-closer, completed by the magnet-armature, a latch for the armature tripped after the contacts of the circuit-closer open, and a blow-out magnet at the short-circuiting contacts.

9. The combination of a circuit-controlling magnet, a spring-retracted armature, a pivoted elastically-yielding latch at an angle to the armature, and a releasing device for the latch.

10. A pressure-governor comprising an electric motor for raising the pressure, pressure-operated means for closing the motor-circuit on a determinate reduction of pressure, a mechanical lock for holding the circuit closed, and means for opening the lock upon a determinate increase of pressure.

11. A pressure-governor comprising an electric motor for raising the pressure, a pressure-operated circuit-closer, an auxiliary circuit-closer, and mechanical connections directly responsive to fluid-pressure for opening the circuit-closers in sequence at a determinate interval.

12. In an air-pump governor or other pressure-regulating device, a circuit-closer controlled by the pressure, a switch closed by said circuit-closer, and means whereby the pressure opens the switch independent of the action of the circuit-closer.

13. In an air-pump governor or other pressure-regulating device, a circuit-closer controlled by the pressure, a switch closed by said circuit-closer, and means whereby the pressure opens the switch independent of the action of the circuit-closer at a determined pressure substantially above that at which it is closed.

14. In a pressure-regulating device, a circuit-closer controlled by the pressure, a switch shunting the circuit-closer, means whereby the circuit-closer controls one movement of the switch, mechanical means for holding the switch in the position to which it is thrown by the circuit-closer, and means whereby the pressure releases the switch.

In witness whereof I have hereunto set my hand this 20th day of November, 1899.

EDWARD M. HEWLETT.

Witnesses:
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