

(No Model.)

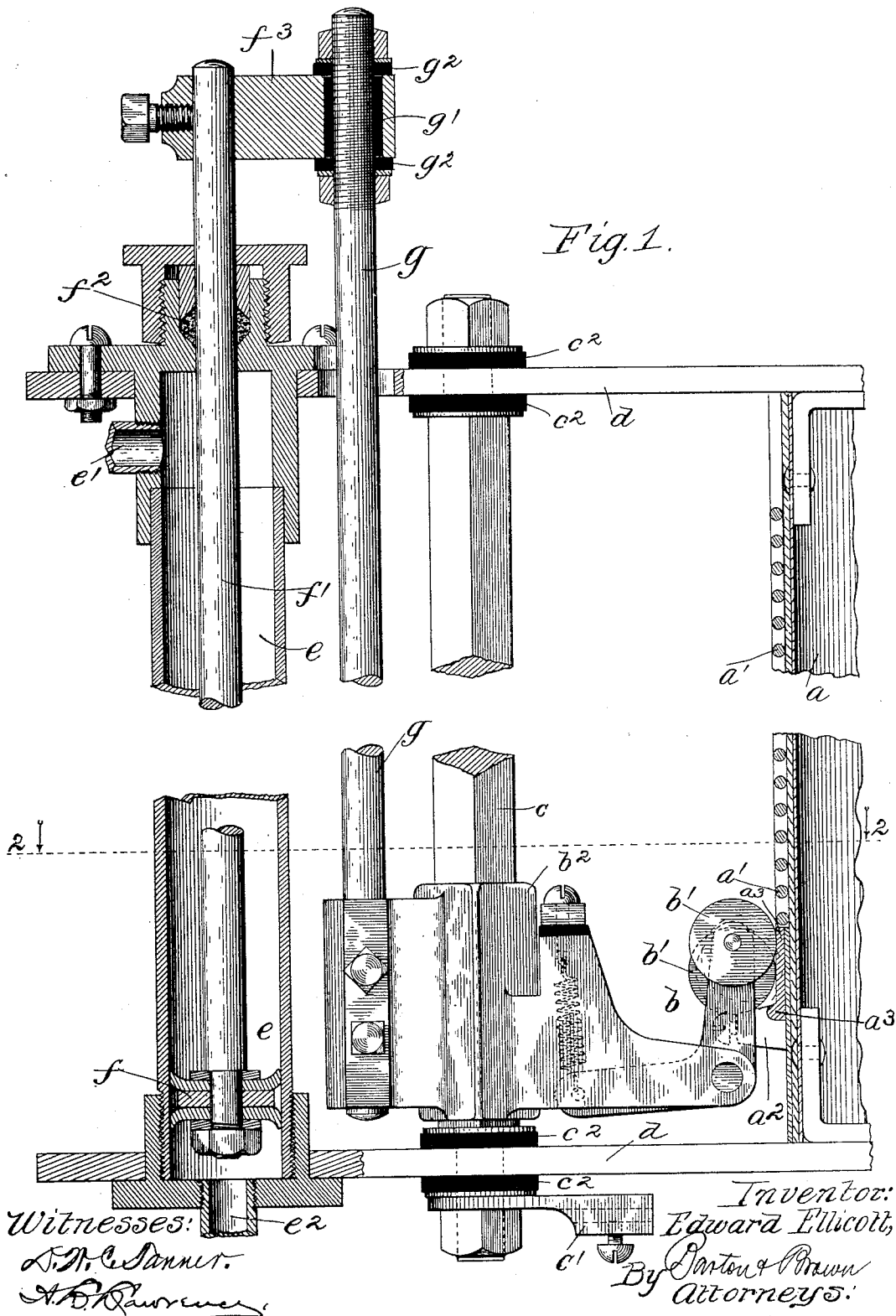
3 Sheets—Sheet 1.

E. ELLICOTT.

MEANS FOR CONTROLLING ELECTRIC CURRENTS.

No. 580,663.

Patented Apr. 13, 1897.



Witnesses:
J. H. C. Sanner.
A. D. Lawrence.

L. H. C. Parker.

A. B. Lawrence

Inventor:
Edward Ellicott,
Denton & Brown
Attorneys.

Edward Ellicott,

By *Antou & Brown*
Attorneys.

Attorneys:

E. ELLICOTT.

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Fig. 2.

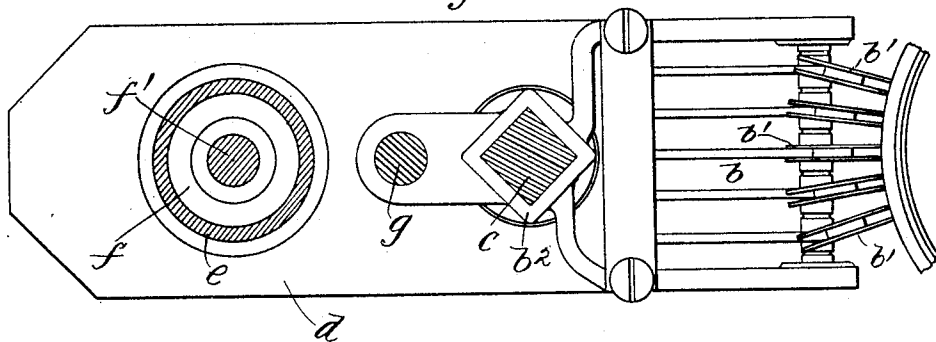


Fig. 3.

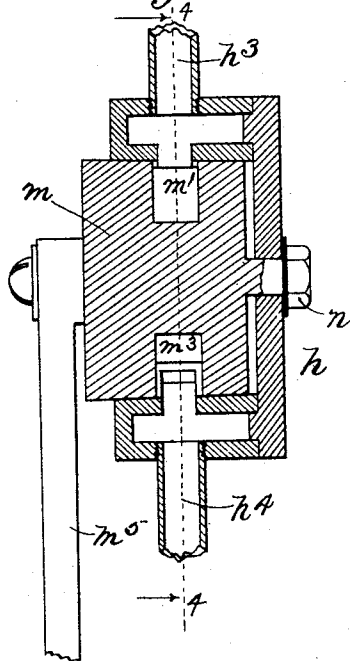
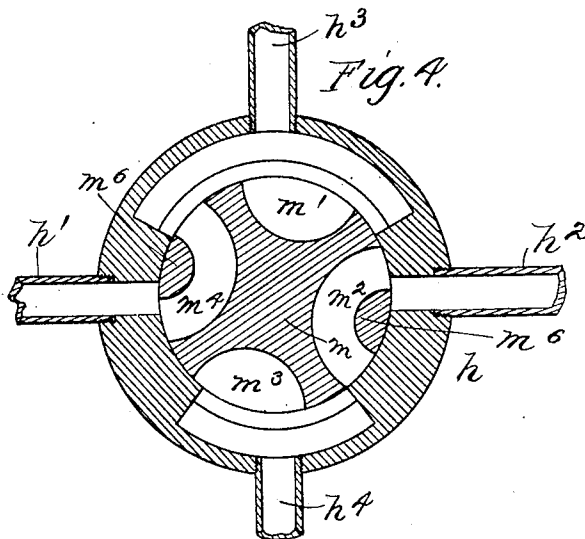


Fig. 4.



Witnesses:
S. H. Ganner.
A. D. Lawrence.

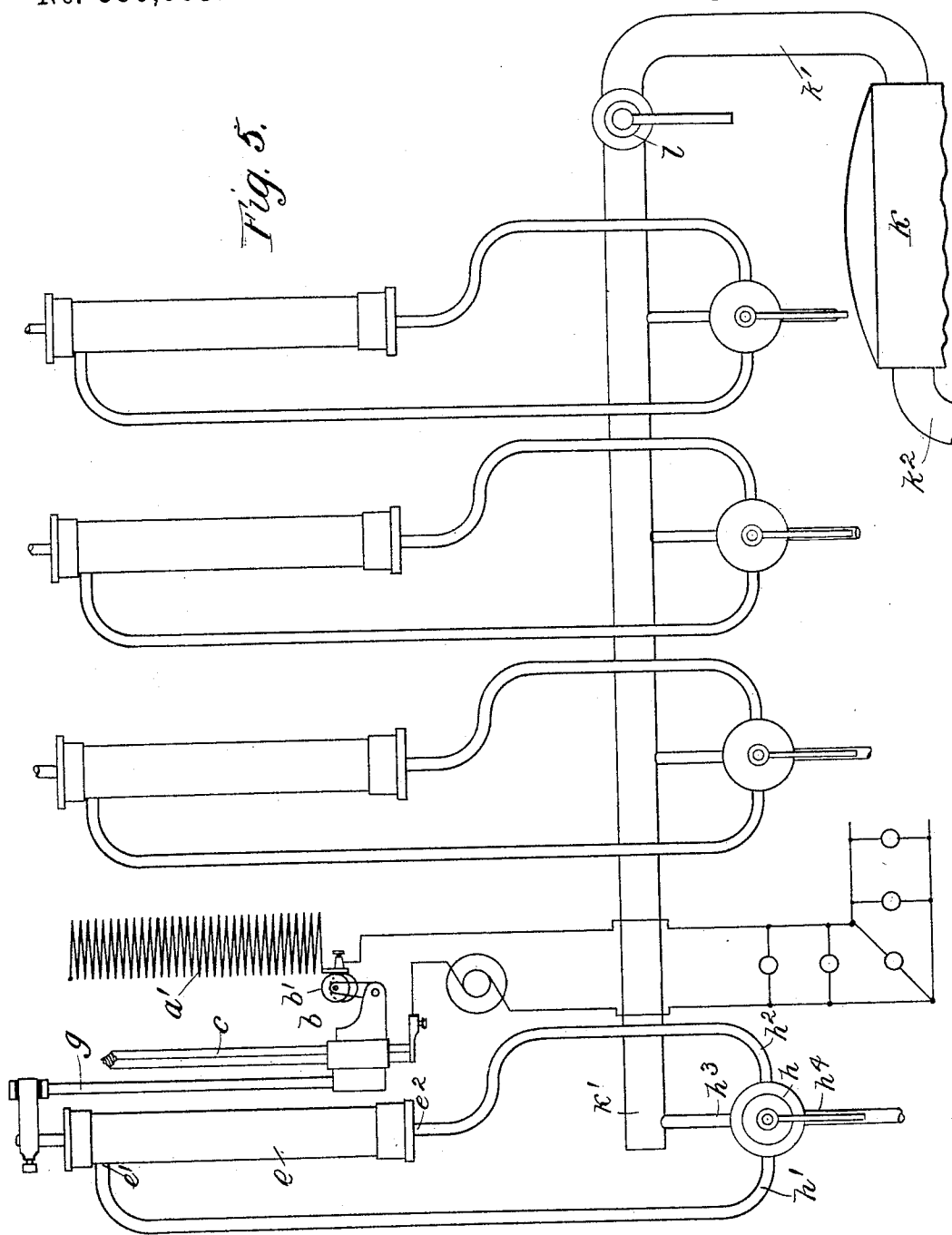
Inventor:
Edward Ellicott,
By Barton & Brown
Attorneys.

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By Barton & Brown
Attorneys.

UNITED STATES PATENT OFFICE.

EDWARD ELLICOTT, OF CHICAGO, ILLINOIS.

MEANS FOR CONTROLLING ELECTRIC CURRENTS.

SPECIFICATION forming part of Letters Patent No. 580,663, dated April 13, 1897.

Application filed August 6, 1896. Serial No. 601,842. (No model.)

To all whom it may concern:

Be it known that I, EDWARD ELLICOTT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Means for Controlling Electric Currents, (Case No. 3,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to improved means for controlling electric circuits, the object thereof being to provide means for governing the said circuit or circuits promptly and efficiently from any distant point found most convenient and enable a single operator to control simultaneously varying amounts of resistance in a large number of circuits.

The device of the present application is particularly applicable to the control of the electric lights of a theater, and I will describe the same as adapted for this purpose.

The controlling device now in ordinary use in theaters consists of a rheostat constructed of any desired length of resistance-wire wound upon a slightly-flattened cylinder and a traveling contact adapted to be moved the length of the cylinder and engage the successive coils of wire wound thereon. Connection is made with the traveling contact and one end of the resistance-wire in series with the circuit to be controlled, and as the said contact is moved along the cylinder the desired resistance is thereby cut into or out of circuit. This is accomplished manually or by means of gear-wheels connected with a main shaft, the movement of which is accomplished by the operator when a number of these devices are to be controlled at the same time.

As the lamps of a theater, and especially those behind the scenes, are arranged in a large number of banks or groups to afford opportunity for varying the light effects, it is apparent that a correspondingly large number of controlling devices are necessitated, which, on account of their number, preclude the idea of individual adjustment except to a limited extent. The banks or groups are composed of lights of different colors, and because individual adjustment of the different banks

is not practicable it has been found impossible to attain the finer effects in lighting which could otherwise be had. Furthermore, it has been necessary to retain these controlling devices within reach of the operator, who must stand at the "prompt entrance" of the stage to note the light effects, and because of this the danger of short-circuiting the current, is very imminent, and accidents from this cause are by no means infrequent.

My improved rheostatic controller, which I have devised more particularly to obviate the difficulties to be met with in stage-lighting, consists of a rheostat-cylinder upon which resistance-wire is wound and a traveling contact engaging the said wire, which is thoroughly insulated except in the path of the said contact. The traveling contact is actuated by a piston fitting closely within a cylinder, the movement of the said piston and contact being controlled by a valve or valves conveniently situated for the manipulation of the operator.

My invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a vertical sectional view of the device. Fig. 2 is a cross-sectional view of the same. Fig. 3 is a vertical section showing the controlling-valve in detail. Fig. 4 is a similar view on line 4 4 of Fig. 3. Fig. 5 is a diagrammatic view showing a number of the controlling devices as connected for use in a theater.

Like parts are denoted by the same letters of reference throughout the several figures.

Upon the rheostat-cylinder *a*, provided throughout its length with asbestos insulation, is wound the resistance-wire *a'*, of any desired length, which is then entirely covered with insulating material except along the path of the traveling contact *b*, which has a vertical movement the length of the cylinder, being adjustably mounted by means of the collar *b²* upon the upright *c*. The contact wheels or rollers *b'* bear upon and successively engage the exposed portions of the coils of the wire *a'* as the said traveling contact is moved the length of the cylinder. Binding-posts *c'* and *a²* are connected with the terminals of the circuit to be regulated. At the lower end of the rheostat-cylinder is

provided a short-circuiting strip a^3 , formed integrally with binding-post a^2 , with which the resistance-wire is connected and upon which the contact-wheels bear, thereby cutting all resistance out of circuit when the traveling contact is at its lowest position of adjustment.

The metallic upright c , of square cross-section, connected with the binding-post c' , is mounted by means of insulating-bushings c^2 in the frame of the device d and serves to conduct the current from binding-post c' to the traveling contact b , mounted and vertically adjustable upon the said upright. Behind the said upright is provided the cylinder e , wherein the closely-fitting piston f plays, the said cylinder having ports e' e^2 at its ends above and below the said piston. The piston-rod f' extends through the stuffing-box f^2 and is secured to the horizontal arm f^3 . At the other end of the arm is secured the rod g , connected with the collar b^2 , which serves to operate the traveling contact b , the said arm being insulated by the bushings g' and washers g^2 . The four-way valve h is connected with the ports e' e^2 by pipes h' h^2 . Pipe h^4 is open to the air, and pipe h^3 is connected with the main supply-pipe k' .

I preferably employ compressed air as a motive power for the above device, although liquid or steam pressure might be advantageously employed instead.

In Fig. 5 is shown a receiver k , connected with a pump supplying compressed air thereto by the pipe k^2 . The supply-main k' conducts the air under pressure from the receiver to the controlling-valves h . A supply-valve l is provided in pipe k' , which controls the flow of air therethrough. The central section m of valve h , rotatably mounted in a taper bored recess, is provided with four ports m' m^2 m^3 m^4 , which are adapted to register with the openings communicating with the four inlet and outlet pipes when rotated by the handle m^5 into the various operative positions. When the semicircular portions m^6 are opposite the openings to pipes h' h^2 , the cylinder connections are both closed and the device remains inoperative; but if it is desired to alter the resistance, say decrease it, the contact being in engagement with the resistance-wire, handle m^5 will be moved to the left and air will enter above the piston, but will not escape from below the same until the said central section is rotated beyond the position shown in Fig. 4. The air in the lower portion of the cylinder will therefore offer a resistance to the downward movement of the piston, while air under pressure from the receiver is being slowly admitted above the piston. Consequently the traveling contact will be moved very slowly downward. By turning the handle farther to the left the lower end of the cylinder is opened to the external air through port m^2 and the compressed air therein is allowed to escape through the pipe h^4 . The traveling contact

is thus moved downward along the cylinder until the desired resistance is cut out, when by a quick movement of the handle port m' is brought before the opening to pipe h^2 , so that the lower end of the cylinder fills with air under pressure at the same time port m^3 registers with the opening to pipe h' , but it is of such dimension that the said pipe is not opened to the external air through pipe h^4 .

Should it be desired to cut resistance in circuit, the above-described operation will be reversed by moving the handle of the valve to the right. When this occurs, port m^2 serves to supply air to the lower end of the cylinder and move the piston and traveling contact upward. Port m^4 permits the escape of air from the upper end of the cylinder, and port m' serves to refill the said upper end of the cylinder with air under pressure when the device is brought to rest. At the back of the valve-casing is provided a threaded nut n , which is adapted to take up wear and maintain the valve parts in close engagement, thereby preventing any leakage of air. By thus providing the extra or secondary ports m' m^3 the valve is adapted to leave both ends of the cylinder filled with air under pressure while the device is inoperative, and, in addition, the valve may be actuated so that the said ports will afford a limited passage for the air to and from the pipes connected with the cylinder in place of the ports m^2 m^4 and a more closely-graduated movement of the traveling contact be secured than when the ports last named afford passage for the air.

By so arranging the ports that the air is admitted to one end of the cylinder before it escapes from the other a gradual start is insured for the traveling contact and greater evenness and regularity in the operation of the device is attained.

It becomes entirely practicable for a single operator to secure the closest adjustment of the lighting effects of a large number of groups or banks of lamps when the same are connected with a system of improved rheostatic controllers, above described.

Very often it is desirable to have varying resistances in different groups of lamps cut into and out of circuit at the same time and at different rates of speed. Accordingly the operator will close the supply-valve l and then adjust each of the individual controlling-valves h to admit the proper amount of air to the end of the cylinder desired, when the supply-pipe k' is again filled with air under pressure by opening the valve l . It may be necessary to have one of the banks of lights remain unchanged. If so, the valve h , controlling the rheostat corresponding thereto, will be left closed. Another group is to come rapidly to full candle-power, and the controlling-valve is accordingly thrown wide open to admit air to the upper end of the cylinder. Still another group is to be slowly dimmed, and the valve corresponding thereto is adjusted to admit a small amount of air below the piston.

Thus when the entire system of controllers is adjusted and the proper moment arrives valve *l* is thrown open and each controller performs its desired function without further attention from the operator, or a part of the rheostatic controllers may be thus adjusted to operate automatically and a part be left under the manual control of the operator.

As it is necessary to have the controlling-valves alone within reach of the operator, it is apparent that the rheostatic controllers above described may be placed in any convenient location, being properly connected by pipes with the said valves. This affords more space upon the stage-level, where it is most needed, and does away with the danger attendant upon short-circuiting the current.

The limit to the numerous effects which an operator is enabled thus to produce by employing my improved means for controlling various circuits of colored lights now found in the modern theater is set only by the skill and ingenuity exercised by the operator in varying the many combinations within his control.

Numerous modifications of my invention will readily suggest themselves to one skilled in the art to which it appertains, and I do not wish to be understood as limiting the application of my invention to the rheostatic controller herein shown and described.

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

1. In a controlling-valve, the combination with chambers or openings in the casing thereof communicating with the connections of said valve, of a central rotatable portion wherein are provided upon opposite diameters ports $m' m^3$ and $m^2 m^4$ adapted to be rotated into position to connect the adjacent chambers or openings in the valve-casing, and portions or stops m^6 adapted to be rotated before a part of said openings or chambers and close the same, substantially as described.

2. In a controlling-valve, the combination with chambers or openings communicating with the valve connections of a rotatable portion wherein are provided ports $m' m^2 m^3 m^4$ adapted to be rotated into or out of communication with the said chambers or openings, and portions or stops m^6 adapted to close a part of the said chambers or openings when rotated before the same, substantially as described.

3. In a controlling-valve, the combination with a valve-casing, of pipes $h' h^2 h^3 h^4$ con-

nected therewith, four chambers or openings, each communicating with one of said pipes, rotatable central portion m provided upon opposite diameters with stops m^6 adapted to close the openings to pipes $h' h^2$, ports $m^2 m^4$ adapted to connect the pipes $h^3 h^4$ with the adjoining chambers or openings in the valve, effecting the connection with pipe h^3 before connection is made with pipe h^4 , and ports $m' m^3$ adapted to connect but two adjoining chambers or openings at one time, as the said central portion is rotated into its various operative positions, substantially as described.

4. In a system of electric lighting consisting of a plurality of circuits adapted to be independently controlled, the combination with said circuits of a plurality of rheostatic controllers respectively connected therewith and adapted to be actuated to cut variable resistances into and out of said circuits, each of said devices consisting of a resistance a' , a piston f connected with and controlling said resistance connected in circuit, a cylinder e wherein said piston is actuated, and a governing-valve h adapted to be independently adjusted to direct the flow of an actuating fluid to either side of said piston; an actuating fluid under pressure, and a main valve regulating the flow of said fluid to the several governing-valves of the system whereby the devices regulating the resistances may be simultaneously actuated individually to control their respective circuits, substantially as described.

5. The combination with a plurality of electrical circuits, of rheostatic controllers respectively connected therewith, each of said controllers consisting of a resistance adapted to be cut into and out of the respective circuit with which the device is connected, a cylinder, a piston moving therein connected with and controlling the said resistance, and a valve h provided with ports $m' m^2 m^3 m^4$ adapted to control the flow of an actuating fluid to and from the cylinder and admit said fluid to either side of the piston previous to permitting the flow thereof from the opposite side of said piston; an actuating fluid under pressure; and a main valve controlling the flow of said fluid to the several valves of the controlling devices, substantially as described.

In witness whereof I hereunto subscribe my name this 4th day of June, A. D. 1896.
EDWARD ELLICOTT.

Witnesses:

GEORGE P. BARTON,
JOHN W. SINCLAIR.