J. L. CREVELING.

ELECTRIC REGULATION.

APPLICATION FILED APR. 18, 1911.

1,138,632.

Patented May 11, 1915.

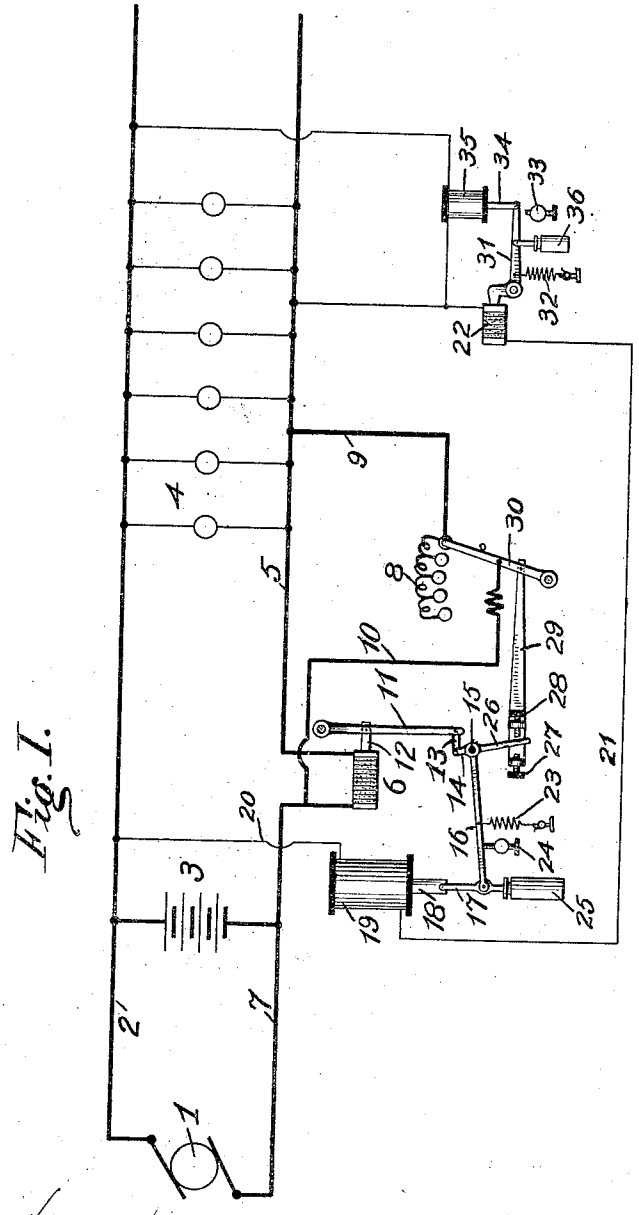


Fig. I.

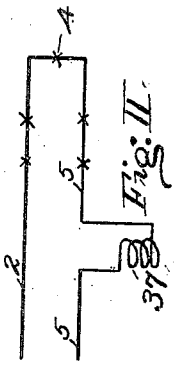


Fig. II.

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ELECTRIC REGULATION.

1,138,632. Specification of Letters Patent. Patented May 11, 1915.

Application filed April 18, 1911. Serial No. 621,813.

To all whom it may concern:

Be it known that I, JOHN L. CREVELING, a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Electric Regulation, as set forth in the annexed specification and drawing, forming a part thereof.

My invention pertains to that class of electric regulation wherein it is desired to automatically regulate an electric circuit in a predetermined manner.

In the drawing Figure I represents one type of electric system embodying the essentials of my invention wherein the same is used to maintain a constant potential across a translation circuit. Fig. II is a modification of the system shown in Fig. I wherein my invention is used to maintain a constant current in a circuit.

In Fig. I, 1 represents a dynamo or generator, the positive lead 2 of which is connected with the positive side of the storage battery 3 and the positive terminals of the translating devices 4. The negative terminals of the translating devices are connected with the wire 5 which is carried to one end of the carbon pile 6, from the opposite end of which the lead 7 is carried to the negative side of the storage battery 3 and the negative side of the generator 1. It will thus be obvious that the voltage impressed upon the translating circuit may be regulated by regulating the pressure upon the carbon pile 6. The variable resistance 8 is placed in shunt around the carbon pile 6 as by the wires 9 and 10 for a purpose which will hereinafter appear. 11 is a lever pivoted at one end and engaging the member 12 whereby motion of the lever may vary the pressure upon the carbon pile 6. The opposite extremity of the lever 11 is connected as by the link 13 with one arm 14 of the T-shaped lever pivoted at 15 provided with arms 16 and 26. The arm 16 is connected with the link 17 connected with the core 18 of the solenoid 19 which is shown as in shunt across the translation circuit through wires 20 and 21 and having in series therewith the small carbon pile 22. 23 is an adjustable spring tending to draw the lever 16 downwardly against the adjustable stop 24 so as to increase the pressure upon the carbon pile 6 and decrease the resistance thereof. Excitation of the solenoid 19 tends to draw the core 18 upwardly and raise the lever 16 against the action of spring 23 and thus increase the resistance 6. 25 is a dash-pot adapted to resist too sudden movement of the core 18. The lever arm 26 is free to move a certain distance between the adjustable limiting screws 27 and 28 and through the instrumentality of said screws may impart motion to the link 29 attached to the lever 30 controlling the variable resistance 8. 31 is a lever normally drawn in a downward direction as by the adjustable spring 32 against the adjustable stop 33. The lever 31 is provided at one extremity with the core 34 surrounded by the solenoid 35 in shunt across the translation circuit upon which it is desired to hold the voltage constant. Excitation of the coil 35 tends to raise the lever 31 and compress the carbons 22 and reduce the resistance thereof. 36 is a dash-pot resisting too sudden movement of the core 34.

The operation of the system shown in Fig. I is substantially as follows: If the generator be running and supplying current to the storage battery and translating devices, current will flow through the lead 2, battery 3 and lead 7 to the generator and also from lead 2 through the translating devices to wire 5 and return through the variable resistance 6 and the variable resistance device 8 in shunt thereto to the lead 7. Current will also flow through the wire 20, solenoid 19, wire 21 and resistance 22 to the wire 5 and tend to lift the core 18 and increase the resistance 6 and swing the lever 26 in such direction as to tend to strike the stop 27 and move the lever 30 in such direction as to increase the resistance 8. Current will also flow from the lead 2 through solenoid 35 to the wire 5 and the strength of solenoid 35 will obviously depend upon the voltage impressed across the translation circuit. I now so adjust the spring 23 and stop 24 that when the voltage across the translation circuit is below the desired value, the carbon pile 6 will be compressed to the desired maximum and the resistance 8 cut out entirely by the lever 30 as indicated in the position shown in the drawing. In this position, the lever 26 may be in contact with the stop 28. I now so adjust the spring 32 that when the voltage which it is desired to hold constant across the translation circuit

is reached, any excess over this voltage will cause the solenoid 35 to raise the core 34, decrease the resistance 22 and thus increase the current in solenoid 19 and cause the same to raise the core 18, lift the lever 16 and lessen the pressure upon the carbon pile 6. With the resistance 8 cut out, this will cause little effect upon the translation circuit until the adjustable stop 27 is engaged by the lever 26 and then a very slight movement of the core 18 will cut in some of the resistance 8 which alone may cause a considerable drop in the translation circuit depending, of course, upon the load. If this drop be less than desired, the solenoid 19 will continue to lift the core 18 and cut in more of the resistance 8. If this resistance cut in at 8 be more than desired, the drop across the translation circuit caused thereby will cause the solenoid 35 to allow the core 34 to be drawn downwardly and increase the resistance 22 and weaken the solenoid 19 in such manner that the core 18 will move in a downward direction, which will compress the pile 6 and reduce this resistance without affecting the resistance 8 until the pile 6 is compressed, then a slight movement will cause some of the resistance 8 to be cut out. In this way it will be noted that owing to the lost motion between the lever 26 and the stops 27 and 28, a considerable variation in resistance 6 may be accomplished without affecting the shunt resistance 8 and by making the lost motion between the lever 26 and its stops 27 and 28 considerable, and by making the lever 30 cause considerable changes in the resistance 8 upon slight movement of the stops 27 and 28, very nearly the entire range of the carbon resistance 6 may be had between movements in different directions of the lever 30. In this way quite appreciable variations may be made in resistance 8 and the carbon pile 6 use to gradually adjust any difference in potential on the translation circuit between these variations. If this be not sufficient to compensate for fluctuations in the translation circuit, then more of the resistance 8 will be cut in and substantially the whole range of the pile 6 may be had for gradual adjustment of the voltage with each value of the resistance 8. In this manner an extremely long range of resistance and carrying capacity is possible with the gradual adjustment effect of the carbon resistance between adjustments of the shunt around the same.

Fig. II shows a portion of a system similar to that shown in Fig. I, in which it is desired to hold the current upon the translation circuit constant instead of the voltage and in this figure 4 represents translating devices which would ordinarily be in series used on a constant current circuit, and the only alteration in the system intended to be brought out in this figure is that the shunt coil 35 of Fig. I is suppressed and the series coil 37 substituted therefor in a manner obvious to those skilled in the art.

I do not wish in any way to limit myself to any details of construction or exact mode of operation set forth in this specification which are given merely to illustrate one type of system embodying my invention, for it is obvious that wide departure therein may be made without departing from the spirit and scope of my invention which is as set forth in the following claims.

I claim—

1. Means for regulating an electric circuit comprehending a regulating element, means for regulating the value thereof, a variable resistance in shunt to said regulating element and means whereby the regulating element operating means operates to increase and decrease said variable resistance without appreciably varying the regulating element.

2. Means for regulating an electric circuit comprehending regulating means, operating means therefor, means for diverting current around said regulating means and means whereby the diverting means is operated by said operating means without appreciably effecting the regulating means.

3. Means for regulating an electric circuit comprehending regulating means and means for operating the same combined with a regulating element in shunt to the first named means and operated by said operating means between variations of said first named regulating means.

4. Means for regulating an electric circuit comprehending a carbon pile having a substantially definite range of operation, operating means controlling the same, a variable resistance in shunt to said carbon pile and means whereby the operating means affects said variable resistance and is free to operate the carbon pile throughout certain movements without affecting said variable resistance.

5. Means for regulating an electric circuit comprehending a regulating element, electromagnetic means for controlling the same, a regulating element in shunt to the first named regulating element and means whereby the operating means affects the latter regulating element and operates the first regulating element throughout substantially its range without affecting the second regulating element.

6. Means for regulating an electric circuit comprehending regulating means, electromagnetic means for operating the same, a regulating element in shunt thereto and means whereby the same is operated by said electromagnetic means between variations of the first named element.

7. In combination with an electric circuit, means for regulating the same, comprehend-

ing a plurality of regulating elements, means for controlling the latter, responsive to fluctuations in said circuit, operating one of the elements for substantially its full range and then affecting another element, while both said elements remain connected with said circuit.

8. In combination with an electric circuit, means for regulating the same, comprehending a regulating element affecting said circuit, another regulating element affecting said circuit, automatic means for controlling said elements and capable of operating one of said elements throughout its range between operations of the other element, while both said elements remain connected with said circuit.

9. The combination with a circuit, of means for regulating the same comprehending a carbon pile having always an appreciable resistance and a regulating element, of means for operating the carbon pile throughout substantially its full range and then affecting the regulating element, said carbon pile being operated to regulate said circuit between effects produced therein by said regulating element.

10. The combination with a circuit, of means for regulating the same comprehending a carbon pile having always an appreciable resistance, and a regulating element, of means for operating the carbon pile throughout substantially its full range and then affecting the regulating element, said carbon pile being operated to regulate said circuit between effects in each direction produced therein by said regulating element.

11. Means for regulating an electric circuit comprehending regulating means, means for operating the same, means for varying the regulating effect thereof, and means connected with said operating means for controlling said varying means between effects produced by the regulating means.

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Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."