J. L. CREVELING.

ELECTRIC REGULATION.

APPLICATION FILED JUNE 21, 1911.

1,008,244. Patented Nov. 7, 1911.

Fig. I.

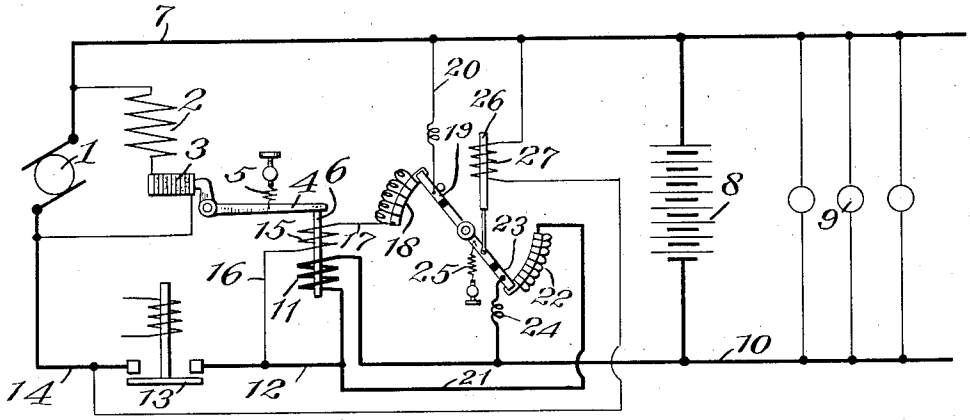
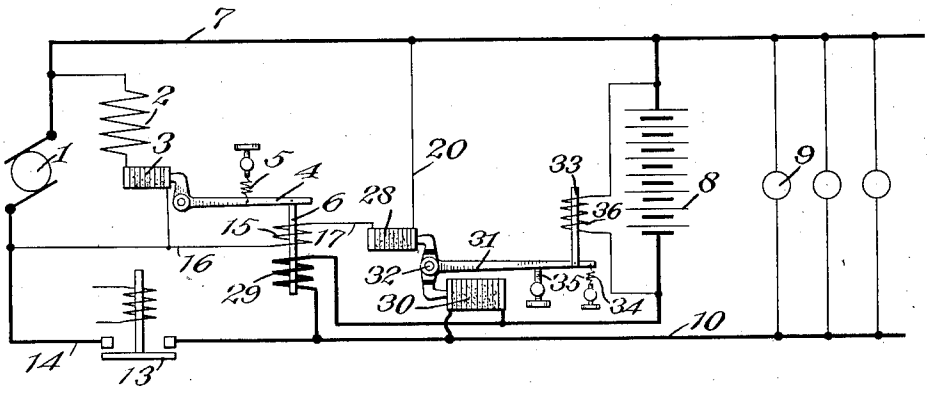


Fig. II.



WITNESSES

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ELECTRIC REGULATION.

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To all whom it may concern:

Be it known that I, JOHN L. CREVELING, a resident of New York, in the 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 regulate a dynamo or generator in a predetermined manner and has for its particular object to provide means whereby a dynamo will be regulated in accordance with the duties thereof.

Figure I is a diagrammatic representation of one type of system embodying the essentials of my invention. Fig. II is a modified form of system comprehending the essentials of my invention.

In the figures like numerals are used to indicate like parts.

In the drawing, referring particularly to Fig. I, 1 represents a dynamo or generator provided with the usual field coil 2 having in series therewith a means for regulating the same, in this instance indicated as a variable resistance of the carbon pile variety. 4 is a lever controlling the resistance 3 and normally drawn in an upward direction as by the adjustable spring 5. The lever 4 carries at one extremity the core 6 and it will be obvious that motion imparted to the said core may, by varying the resistance 3, control or regulate the generator 1. 7 represents the positive lead of the generator connected with the positive side of the storage battery 8 and the positive side of the lamps or translating devices indicated at 9. The main 10 is in connection with the negative side of the storage battery and the lamps or translating devices and is connected with one end of the solenoid 11, the opposite end of which is carried as by the wire 12 to one side of the usual automatic switch indicated at 13 and from the opposite terminal of which the lead 14 is carried to the negative brush of the generator. 15 is a solenoid having one of its ends connected with the lead 12 as by wire 16 and the opposite end connected as by the wire 17 with one end of the resistance device 18 which may be provided with a blank segment at the end thereof as shown. 19 is an insulated controlling lever electrically connected with the lead 7 as by the wire 20. From the wire 12 a heavy wire 21 is carried to one end of the resistance device 22 which may be provided with the blank end segment as illustrated. The said resistance device 22 has in operative relation thereto the usual lever 23 which is connected as by the flexible connection 24 with the lead 10 and thus the wire 21, resistance device 22, lever 23 and wire 24 form a shunt around the coil 11. 25 is an adjustable spring normally tending to swing the levers 19 and 23 into the position shown in the drawing. 26 is a core of magnetic material surrounded by the coil 27 in such manner that excitation of the said coils tends to lift the core and swing the levers in a counter-clockwise direction. The coil 27 is connected across the generator circuit as indicated.

In that modification shown in Fig. II the coil 15 is shown as connected on the generator side of the switch 13 while in Fig. I the said coil is connected on the battery side thereof. In Fig. II the coil 15 is shown as having in series therewith a variable resistance 28 indicated as of the carbon pile variety and the coil 29 is shown in series with the battery circuit and taking the place of the coil 11 in the main circuit in Fig. I. The coil 29 is shown in Fig. II as having in shunt therewith the variable resistance 30 indicated as of the carbon pile variety. In Fig. II the variable resistances 28 and 30 are operated by the lever 31 pivoted as at 32 and carrying at the extremity of the main arm a core 33 of magnetic material surrounded by the voltage coil 36 in this figure shown as in shunt to the battery. The lever 31 is normally drawn in a downward direction as by the spring 34 while the limit of motion it may have in this direction may be defined by the adjustable screw 35. In Fig.

I the coils 15 and 11 are wound in such manner as to assist each other when energized and current is flowing from the generator to the battery or translation circuit, and in Fig. II the coils 15 and 29 assist each other when energized and current is flowing to the battery.

The operation of my invention is substantially as follows, referring particularly to Fig. I: If the generator be running, current will flow through the field winding 2, regulating resistance 3 and the generator will build up in a well-known manner. If the voltage of the generator be above that of the battery, the main switch 13 will be closed and current will flow through the main 7, battery 8, translating devices 9, wire 10, coil 11, wire 12, switch 13 and lead 14 to the generator. If the generator voltage be sufficient to supply the desired maximum current to the battery and translating devices through the coil 11, I now adjust the spring 5 so that any increase above this desired current will cause the core 6 to be drawn downwardly by the solenoid 11 and the resistance 3 increased in such manner as to hold the generator output from exceeding this desired current. If now the generator continue to supply current to the battery until its voltage shall rise to a predetermined amount at which it is desired to start to shift the generator regulation from current regulation due to the coil 11, to voltage regulation due to the coil 15, I then adjust the spring 25 so that the coil 27 will start and cut in the coil 15 through a portion of the resistance 18 and simultaneously shunt out a portion of the current from the coil 11 and in this way cause the voltage coil 15 to play some part in affecting the current regulator for the generator. As the voltage of the battery now increases, the resistance 18 will be decreased and the resistance 22 decreased until the coil 11 is shunted out and the coil 15 in circuit across the mains with as little resistance in circuit therewith as desired and the regulation of the generator will now be voltage regulation due to the coil 15. If now the battery voltage rise further the current delivered thereto will gradually lessen as the voltage of the battery rises in a well-known manner. If now the generator slow down a reverse cycle may take place unless the slowing down of the generator be too sudden for the battery voltage to fall gradually in which case the opening of the main switch may cause the levers 18—23 to return to the position shown in the drawing and then upon starting of the generator again the above outlined cycle will be repeated.

The operation of the system shown in Fig. II may readily be followed from the operation above in connection with the system shown in Fig. I, it only being necessary to remember that the coil 36 will always be in circuit across the storage battery and not affected by the opening of the main switch 13, and the coil 15 is in shunt across the generator and will be dead when the generator is inoperative and the switch 13 is open, and remembering, of course, that the current in the coil 29 which operates resistance 3, in response to current fluctuations, is that current going to the battery only as a differentiated from the total generator current in the coil 11 of Fig. I.

I do not wish in any way to limit myself to the exact details of construction nor to the exact mode of operation outlined in this specification which are given to illustrate embodiments of my invention and in which embodiments wide departure may be made without departing from the spirit and scope of my invention which is as set forth in the following claims:

1. Means for regulating a generator comprehending current controlling means, voltage controlling means and automatic means for gradually shifting the control of the generator from one of said means to the other.

2. Means for regulating a generator comprehending regulating means, operating means therefor responsive to voltage fluctuations, operating means therefor responsive to current fluctuations and automatic means for gradually rendering one of said operating means operative and the other inoperative.

3. Means for regulating a generator comprehending a variable resistance, means for operating said variable resistance responsive to voltage fluctuations, means for operating said variable resistance responsive to current fluctuations and voltage responsive means for adjusting the operating effects of both the voltage and current responsive means.

4. The combination with a generator, a storage battery and means for regulating the generator, of operating means for said regulating means responsive to current fluctuations, operating means responsive to voltage fluctuations and means for adjusting the current values in said operating means in accordance with the voltage of the battery.

5. The combination with a generator, and a storage battery charged thereby, of a regulator for the generator, comprehending means whereby the generator is controlled in response to current fluctuations, means for controlling said regulating means in response to voltage fluctuations and automatic means for gradually shifting the control from one controlling means to the other.

6. The combination with a generator and

a storage battery charged thereby, of means for regulating the generator, means for controlling said regulating means to charge the battery upon a constant current circuit, means for operating the regulating means to charge the battery upon a constant voltage circuit and automatic means for gradually shifting the control of the regulating means from one controlling means to the other.

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