

J. L. CREVELING.
ELECTRIC REGULATION.
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1,018,963.

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Fig. 1.

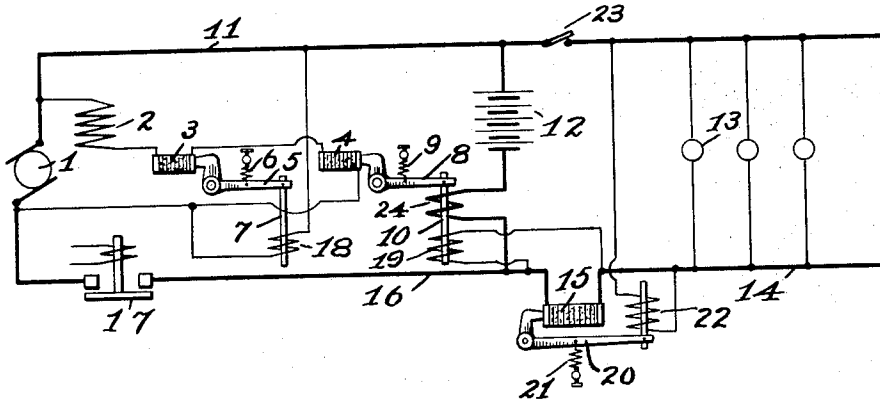
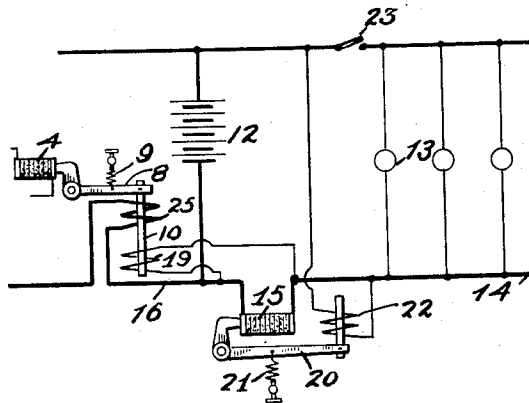


Fig. 2.



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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 generator in a predetermined manner, and has for its particular object to produce means whereby the generator is automatically governed in accordance with the duties thereof.

Figure 1 is a diagram showing one type of system embodying the essentials of my invention. Fig. 2 is a modified form of system embodying the essentials of my invention.

Referring to Fig. 1 of the drawing, 1 represents a dynamo or generator provided with the usual field coil 2, having in series therewith the variable resistances 3 and 4. In this instance indicated as of the carbon pile variety for sake of simplicity. The resistance 3 is controlled by the lever 5 normally drawn in an upward direction as by adjustable spring 6 and provided at one extremity with a magnetic core 7, the motion of which obviously controls the resistance 3. The resistance 4 is controlled by the lever 8 normally drawn in an upward direction as by the adjustable spring 9 and provided at its extremity with a core 10, the motion of which governs resistance 4.

11 represents the positive lead of the generator which is connected with the positive side of the storage battery 12 and the positive side of lamps or other translating devices 13 through the switch 23. The negative terminals of the translating devices are connected with the main 14 communicating with one side of the translation circuit regulating element 15, which is indicated as a carbon pile for sake of simplicity. The other side of the carbon pile 15 is connected as by wires 16 with one side of the usual automatic switch 17, having its opposite terminal connected with the negative brush of the generator. The negative side of the storage battery 12 is connected with the main 16 through the solenoid 24, in such manner that current flowing from the generator through the battery and exciting said

solenoid tends to draw the core downwardly against the adjustable spring 9 and increase resistance 4. The solenoid 19 surrounds the core 10, and when energized by a drop in the potential across the regulating element 15 tends to assist the coil 24 and draw the core 10 downwardly for the purpose as will hereinafter appear. The core 7 is surrounded by the solenoid 18 in shunt across the generator and, when excited, said coil tends to draw the core 7 downwardly against the action of spring 6 and increase the resistance 3.

In that modification of the system shown in Fig. 2 like numerals have been used to indicate like parts, and many of the parts identical with the system of Fig. 1 have been omitted to avoid repetition. The only modification intended to be brought out in Fig. 2 is that the resistance 4 has its series winding 25 in the main circuit instead of in the battery circuit, as shown in Fig. 1.

The operation of my invention is substantially as follows, referring particularly to Fig. 1:—If the generator be running current will flow through the field winding 2 and resistances 3 and 4 and thus excite the field of the generator in a well known manner, and the generator can be regulated by manipulation of either resistance 3 or resistance 4, as will hereinafter more plainly appear. If the speed of the generator be such that its voltage is above that of the battery, switch 17 will be closed and current will flow from the generator through lead 11, battery 12, series coil 24, lead 16 and switch 17. Some current will also flow through the shunt coil 18 which is across the generator, and I now so adjust the spring 9 that when the proper maximum desired charging current is flowing through the coil 24 any increase above this amount will cause the core 10 to be drawn downwardly against the action of spring 9, and the resistance 4 so increased as to hold the current to the battery from increasing throughout increases in speed of the generator. If, now, the battery be charged at this rate until its voltage rise to that point at which it is desired to limit the voltage across the generator and battery circuit, I then so adjust the spring 6 that any further increase in voltage will cause the core 7 to be drawn downwardly and the resistance 3 increased

in such manner as to prevent the generator voltage exceeding this desired limit throughout speed changes. Therefore, if the battery voltage rise further the current flowing through the battery will taper off due to the battery's increase in voltage in a well known manner. If, now, the lamp switch 23 be closed, current will flow through the translating devices which are in circuit and also through the coil 22, and I so adjust the spring 21 that when the maximum desired voltage is upon the translation circuit any increase in voltage will cause the coil 22 to raise the lever 20 against the action of spring 21 and increase resistance 15 in such manner as to cut down the rise in voltage upon the translation circuit and hold the same substantially constant in a well known manner. As the voltage upon the translation circuit is usually considerably less than the voltage across the battery when the generator is charging the same, the resistance 15 will have an appreciable drop across the same which will cause current to flow in the coil 19 which is wound so as to tend to assist the coil 24 and thus require less current in the coil 24 to overcome the spring 9, and in that way readjust the regulator operated by the coil 24 that it will hold a lower current constant when regulating the generator as the drop across 15 increases. That is, the current regulator for the generator has its standard current which it shall hold constant throughout speed changes varied by the action of the lamp regulator through the instrumentality of coil 19. If the generator be running and controlled by the coil 18 as above described at the time the switch 23 is closed, and if the effect of the coil 19 when the lamp switch 23 is closed so adjusts the current regulator that the smaller current now necessary in the coil 24 to operate the same is less than that at the time being delivered to the battery with the generator regulated by the coil 18, the coil 24 will then operate to regulate the generator throughout speed changes, and hold the voltage of the same somewhat below that necessary in the coil 18 to cause the same to regulate the generator for speed changes and, therefore, the whole system will be operated at a lower voltage than that necessary in the coil 18 to regulate the generator, and as this will be more nearly the voltage desired across the translation circuit and held constant by its regulator the drop across the lamp regulator will be less than if the regulation were performed by the voltage regulator for the generator, and less energy will be lost in the regulating member 15.

The only difference between the systems of Figs. 1 and 2 is that the coil 24 in series with the battery in Fig. 1 is suppressed in Fig. 2 and the coil 25 in series with the gen-

erator employed in its stead, and thus it is the total generator current output that is affected by the action of coil 19, rather than that portion of its output delivered to the battery as in Fig. 1. In this modification of system shown in Fig. 2 it is often desirable to have the total generator output decreased when the same is all being delivered to the battery, and for this reason the lamp switch 23 may be so placed that when opened it does not open the connections of the coil 22 but leaves the same always across the translation circuit, and as the coil 22 consumes some current there will always be some drop across the resistance 15, and with the lamps all turned off, as the generator voltage rises as when the battery voltage rises due to charging, the standard current delivered by the generator will be lessened by the coil 19 assisting the coil 25.

I do not wish in any way to limit myself to the exact details of construction nor to the exact mode of operation set forth in this specification and drawing which are given to illustrate an embodiment of my invention, for it is obvious that 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. The combination with a generator, a translation circuit and means for regulating the translation circuit, of means for regulating the generator responsive to voltage fluctuations, means for regulating the generator responsive to current fluctuations and means for affecting the current regulating means affected by the operation of the translation circuit regulator.

2. The combination with a generator, a translation circuit and means for regulating the translation circuit, of means for preventing the generator voltage exceeding a predetermined value, means for preventing current supplied by the generator from exceeding a predetermined value and means for adjusting the value of said current depending upon the operation of the translation circuit regulator.

3. The combination with a generator, a translation circuit and means for regulating the translation circuit, of means for preventing the generator voltage exceeding a predetermined value, means for preventing current supplied by the generator from exceeding a predetermined value and means for adjusting the value of said current depending upon potential differences caused by the translation circuit regulator.

4. The combination with a generator, a storage battery, a translation circuit, and a regulator for the translation circuit, of means for regulating the generator to charge the battery upon a constant current circuit, means for regulating the generator to charge the battery upon a constant po-

tential circuit and means for adjusting the current regulating means affected by the operation of the translation circuit regulator.

5 The combination with a generator, a translation circuit and translation circuit regulator, of a variable resistance affecting the generator, voltage responsive means for controlling said resistance, a resistance for affecting the generator, current responsive
10 means for affecting said resistance and means for affecting the operation of the current operated means affected by the translation circuit regulator.

6. The combination with a generator, a
15 translation circuit and translation circuit regulator, of means for regulating the generator to hold the voltage constant throughout speed increases, means for regulating the generator to hold given currents constant
20 throughout speed changes and means for determining the value of said currents to be held constant depending upon the operation of the translation circuit regulator.

7. The combination with a generator, a
25 storage battery, a translation circuit and means for regulating the translation circuit, of voltage responsive means for regulating the generator to prevent its voltage increasing above a predetermined limit, means for
30 regulating the generator responsive to current fluctuations in a circuit which supplies the battery and means for affecting the operation of the current responsive means affected by the translation circuit regulator.

8. The combination with a generator, a
translation circuit and a translation circuit
regulator, of means for regulating the generator, operating means for affecting the
regulating means in response to voltage
fluctuations, and operating means for affecting
40 the regulating means in response to current fluctuations affected by the operation of the translation circuit regulator.

9. The combination with a generator, a
storage battery, a translation circuit and a
translation circuit regulator, of regulating
means for the generator, operating means
for said regulating means responsive to
voltage fluctuations, operating means for
said regulating means responsive to battery
50 current fluctuations and means for affecting the current responsive means affected by the translation circuit regulator.

10. The combination with a generator, a
storage battery, storage battery circuit, a
translation circuit and a translation circuit
regulator, of regulating means for the generator, means for affecting said regulating
means in response to voltage fluctuations,
means for affecting said regulating means
in response to current fluctuations in the battery circuit and means for affecting the
current responsive means affected by the translation circuit regulator.

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Witnesses:

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