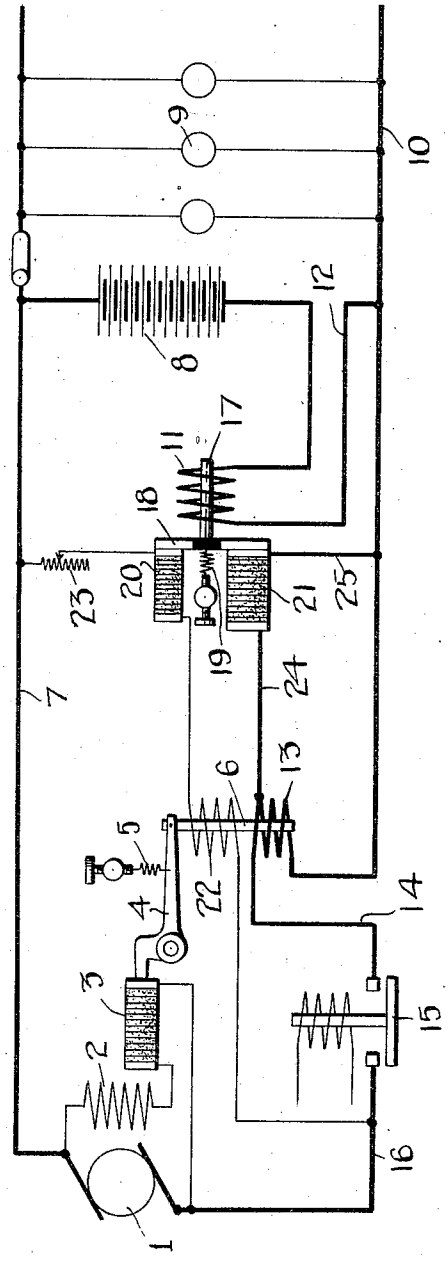
J. L. CREVELING.

ELECTRIC REGULATION.

APPLICATION FILED MAR. 6, 1912.

1,147,005. Patented July 20, 1915.



WITNESSES

Geo. A. Sinz

Marie R. Leahy.

INVENTOR:

John L. Creveling.

By Chas. W. Chapman

ATTORNEY.

UNITED STATES PATENT OFFICE.

JOHN L. CREVELING, OF NEW YORK, N. Y., ASSIGNOR TO SAFETY CAR HEATING AND LIGHTING COMPANY, A CORPORATION OF NEW JERSEY.

ELECTRIC REGULATION.

1,147,005. Specification of Letters Patent. Patented July 20, 1915.

Application filed March 6, 1912. Serial No. 681,975.

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 a particular object to provide means whereby a dynamo driven at variable speeds may be used to properly charge a storage battery and operate lamps or other translating devices.

The drawing is a diagrammatic representation of one type of system embodying the essentials of my invention.

In the drawing, 1 represents a dynamo or generator provided with the usual field coil 2, having in series therewith a regulating device, in this instance indicated as a carbon pile 3.

4 is a lever normally drawn in an upward direction as by means of adjustable spring 5, in such manner as to tend to compress the carbon pile 3 and lower the resistance thereof. The lever 4 carries at one extremity a core of magnetic material 6 and thus motion imparted to the said core will serve to regulate the generator by properly manipulating the resistance 3.

7 represents the positive lead of the generator which is carried to the positive side of the storage battery 8 and lamps or other translating devices indicated at 9. The negative terminals of the translating devices are connected with the wire 10 which is led to one terminal of the solenoid 13, having its opposite terminal connected as by wire 14 with one side of the automatic switch 15, having its opposite terminal connected as by wire 16, with the negative side of the generator 1. The negative side of the storage battery 8 is connected through solenoid 11 with the wire 10 as by means of wire 12. The switch 15 is preferably one of the automatic variety adapted to close the circuit between the generator and battery when the voltage of the generator is equal or very slightly in excess of the battery voltage and to open the circuit when the generator voltage is substantially equal to, or very slightly below, that of the battery, and as many such switches are well-known in the art and the particular type of switch forms no part of my present invention, I have merely indicated conventionally one of the well-known switches of this character to denote its presence in the system. The solenoid 11 is provided with a core of magnetic material 17 carrying the yoke member 18 normally drawn, as by the adjustable spring 19, against the carbon piles 20 and 21, in such manner as to tend to reduce the resistance thereof.

22 is a voltage coil surrounding the core 6 in such manner as to tend, when energized, to pull the core downwardly and increase resistance 3. The coil 22 has in series therewith the adjustable resistance 23 and the resistance 20 indicated as a carbon pile. The solenoid 13 surrounds the core 6 in such manner that, when energized, it tends to draw the core downwardly and increase resistance 3 and this solenoid has in shunt thereto the resistance 21, indicated as a carbon pile, as by means of wires 24 and 25.

An operation of my invention is substantially as follows:—If the generator be runing at such speed that its voltage is slightly above that of the battery voltage, switch 15 will close and current will flow from the generator through lead 7, battery 8 or translating devices 9 to wire 10, that portion flowing through the battery passing through the solenoid 11 and wire 12 to the wire 10 and returning to the generator from wire 10 through wire 25, carbon pile 21, wire 24, wire 14, switch 15 and wire 16 to the generator, an insignificant current flowing through coil 13, owing to the fact that the same is shunted out or short-circuited by the low resistance 21. Current will also flow from the main 7 through resistance 23, resistance 20 and coil 22 to the lead 16, and I so adjust the spring 5 that when the maximum voltage which it is desired to have impressed across the battery terminals is reached, the coil 22 will draw the core 6 downwardly and increase the resistance 3 in such manner as to prevent this maximum voltage from being exceeded throughout speed increases of the generator and thus the generator is regulated for constant potential, the coil 13 being shunted out and performing no part in the regulation. However, if when the generator voltage is raised above that of the battery it shall tend to deliver too great a current to the battery before the voltage

necessary to operate the voltage regulator is reached, this current flowing to the battery through the coil 11 will tend to move the core 17, and I so adjust the spring 19 that, when the maximum desired current of the coil 11 is reached, core 17 will be moved in such manner as to increase the resistance 20 and gradually cut the coil 22 out of action. At the same time, the resistance 21 is increased and the current coil 13 is thrown into action and thus assumes control of the generator to prevent a current greater than that desired being delivered therefrom throughout speed changes.

It will be noted that I have thus produced a system wherein a generator driven at variable speeds may be automatically regulated to charge a storage battery and supply translating devices and that the generator will be either voltage governed or current governed, depending upon the condition of the storage battery, which condition will affect the current supplied thereto and that the shifting from current to voltage regulation will be gradually accomplished.

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 to illustrate one type of system embodying the essentials of my invention, for it will be obvious that wide departure may be made in the way of details without departing from the spirit and scope of my invention, which is as set forth in the following claims:

1. The combination with a storage battery and a generator, of means for regulating the generator comprising operating means for controlling said regulating means responsive to voltage fluctuations, operating means for controlling said regulating means responsive to current fluctuations and battery current responsive means for gradually rendering one of said operating means operative and the other inoperative.

2. The combination with a storage battery and a generator, of regulating means for the generator comprising voltage responsive operating means for said regulating means, current responsive operating means for the regulating means and battery current responsive resistance varying means for determining which of the operating means shall be operative.

3. The combination with a storage battery and a generator, of means for regulating the generator comprising operating means for the regulating means responsive to voltage fluctuations, operating means for the regulating means responsive to current fluctuations and resistance varying means whereby the current supplied by the generator to the battery determines which of said operating means shall regulate the generator.

4. The combination with a storage battery and a generator, of means for regulating the generator comprising operating means for the regulating means responsive to voltage fluctuations, operating means for the regulating means responsive to current fluctuations and means whereby the current supplied to the battery by the generator gradually renders one of said operating means operative and the other inoperative.

5. The combination with a storage battery and a generator, of means for regulating the generator comprising operating means controlling the regulating means responsive to voltage fluctuations, operating means for controlling the regulating means responsive to current fluctuations, means whereby the operating means are gradually rendered operative or inoperative and battery current controlled means for governing the same.

6. The combination with a storage battery, a generator and means for regulating the generator comprising means for operating the regulating means responsive to voltage fluctuations, means for operating the regulating means in response to current fluctuations and battery current controlled means gradually affecting both of said operating means.

7. The combination with a storage battery and a generator, of means for regulating the generator including controlling means therefor comprising a coil responsive to voltage fluctuations and a coil responsive to current fluctuations and automatic resistance varying means responsive to battery current fluctuations for controlling the operation of said coils.

8. The combination with a storage battery and a generator, of means for controlling the generator including controlling means therefor comprising a coil responsive to voltage fluctuations and a coil responsive to current fluctuations and automatic means responsive to battery current fluctuations for gradually rendering one of said coils operative and the other inoperative.

9. The combination with a storage battery and a generator, of means for regulating the generator including controlling means therefor comprising a coil responsive to voltage fluctuations and a coil responsive to current fluctuations and automatic resistance controlling means responsive to battery current fluctuations for determining which of said coils shall regulate the generator.

10. The combination with a storage battery, a generator and a circuit fed thereby, of means for regulating the generator comprising means for operating said regulating means responsive to voltage fluctuations across said circuit, means for operating the regulating means responsive to current fluctuations in said circuit and resistance con-

trolling means for controlling both operating means responsive to battery current fluctuations in said circuit.

11. The combination with a storage battery and a generator, of a regulator for the generator comprising operating means comprehending a coil in shunt to said generator, a coil in series with said generator and resistance varying means for controlling the operativeness of said coils responsive to battery current fluctuations.

12. The combination with a generator having a field circuit and a battery circuit fed by said generator, of means for controlling the generator comprehending a regulating device in the field circuit, means for affecting said regulating device responsive to voltage fluctuations, means for affecting said regulating device responsive to current fluctuations and resistance controlling means for determining which of said affecting means shall be effective in the operation of the regulating device responsive to current fluctuations in said battery circuit.

13. The combination with a storage battery and a generator, of means for regulating the generator comprising operating means for controlling the regulating means in a plurality of ways, and means affected by fluctuations in the current through the battery for changing the control of the regulating means.

14. The combination with a storage battery and a generator, of means for regulating the generator comprising a plurality of coils for controlling the same, and resistance varying means responsive to current fluctuations through the battery for rendering one of said coils operative and the other inoperative.

JOHN L. CREVELING.

Witnesses:
ANNA M. WALL,
M. HERSKOVITZ.