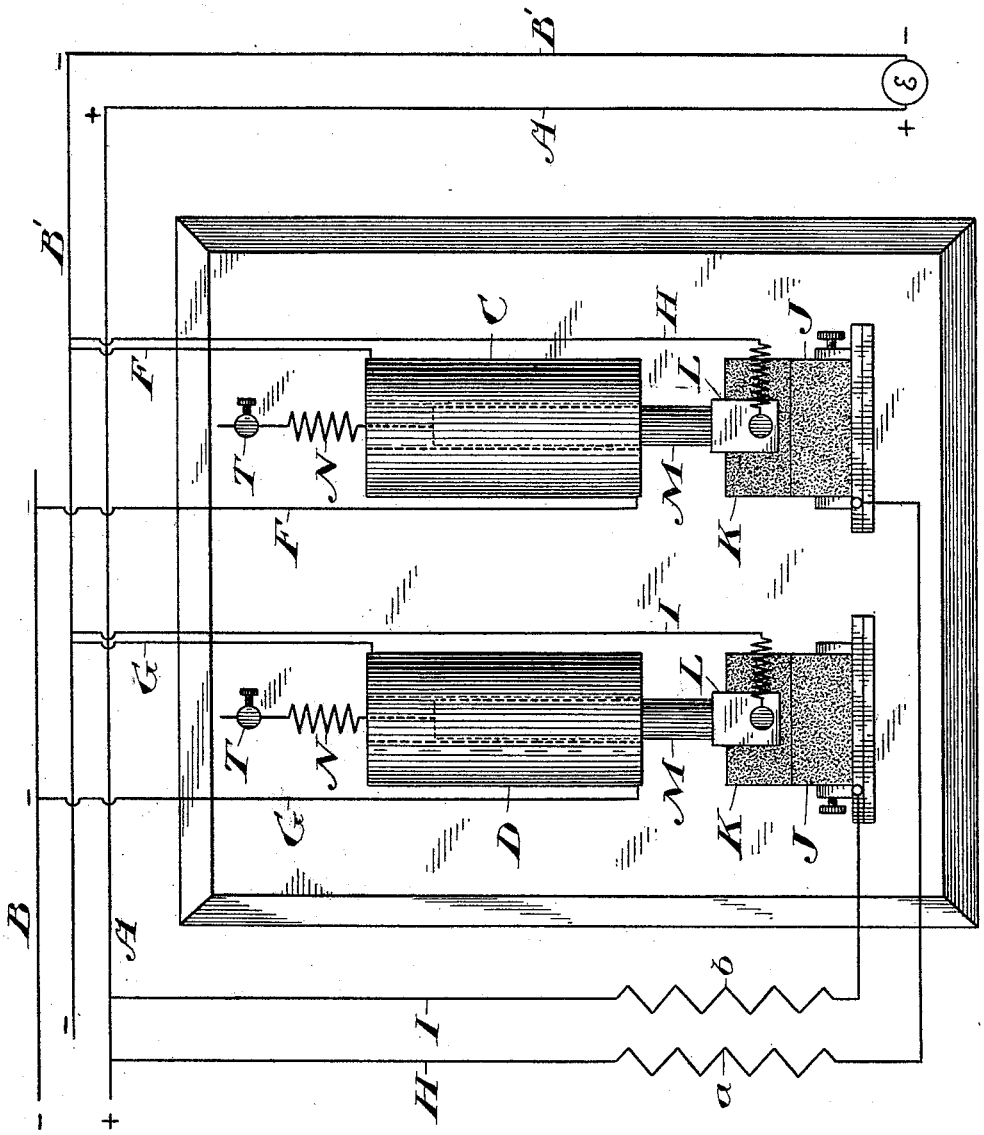
(No Model.)

H. D. SYMMES.

AUTOMATIC REGULATOR FOR DYNAMOS.

No. 524,845. Patented Aug. 21, 1894.



Witnesses
Fred Clarke
A. M. Neff.

Inventor
Henry D. Symmes
by
Ridout & Maybee
Attys.

UNITED STATES PATENT OFFICE.

HENRY D. SYMMES, OF ST. CATHARINES, CANADA.

AUTOMATIC REGULATOR FOR DYNAMOS.

SPECIFICATION forming part of Letters Patent No. 524,845, dated August 21, 1894.

Application filed June 6, 1894. Serial No. 513,670. (No model.)

To all whom it may concern:

Be it known that I, HENRY DAVID SYMMES, of the city of St. Catharines, in the county of Lincoln and Province of Ontario, Canada, have invented a certain new and useful Automatic Electric Regulator for Dynamos, of which the following is a specification.

The object of my invention is to devise an automatic regulator for dynamos, and it consists, essentially, of one or more solenoids through which the current in the main circuit passes, and one or more resistance circuits with contacts therein, arranged as a shunt to the main circuit, each solenoid being adapted to break contact in the corresponding resistance circuit when a current of more than a pre-determined number of ampères passes through the main circuit, the whole being arranged in detail, substantially as hereinafter more particularly described, and then definitely claimed.

The drawing is a plan view showing the general arrangement of my invention.

Referring now to the details of said drawing by letter—A and B represent the wires of the main circuit, one of which (A) is connected to the positive terminal of the dynamo E and the other is connected, as hereinafter described, to the wire B′ leading to the negative pole of said dynamo.

C and D represent two solenoids which are arranged in series in the circuit so that any current flowing over the main circuit will have to pass through these solenoids before the circuit can be completed with the dynamo E. These solenoids C and D are connected in the circuit in multiple arc, as regards one another, so that a definite proportion of the whole current passes through each one.

F and G are the wires connecting the solenoids in the circuit, and these wires are so connected that they lead into the solenoids from the main wires B and return to the circuit by connecting with the wire B′. This last wire, it will be understood is only sufficiently long to enable other solenoids to be connected in the circuit, and it will be evident that, if only two solenoids are used as shown in the drawing, the said wire B′ could end at the point where it is connected with the wire G.

H and I indicate resistance circuits which are arranged to form a shunt to the main circuit (one being provided for each solenoid) and are connected to the main wire A and lead to the return wire B′.

a and *b* represent resistances placed in the circuits H and I which need no further description, as any of the well-known resistances will be suitable. The devices for breaking the circuit are interposed in these shunt circuits H and I and may be described as follows:

J are carbon contacts which are placed in said circuits H and I, and their companion contact pieces K are connected to jaws L which are connected to plungers M adapted to work in the solenoids C and D. The upper ends of these plungers are connected to the adjustable tension springs N which may be clamped by the binding screws T to give any desired tension. The tension of one of these springs N is preferably less than that of the other, so that the plunger to which it is connected will be lifted by the passage of a greater current through the solenoid than is required to lift the other. A similar effect can of course be produced by a difference in the winding of the solenoids.

Of course it will be obvious that as many solenoids may be connected between the wires B and B′ as may be necessary to provide for extreme variations in the current flowing through the main circuit.

The operation of my device is as follows: When the current is being used in the main circuit, it flows over the main wire A through the main circuit and returns over the wire B, from which it flows through the solenoids and through the wire B′ to the dynamo E. When no current is used on the main circuit, the whole current from the dynamo passes through the resistance circuits H and I. Now, if a load, requiring more than a pre-determined ampèrage, is thrown on the main circuit, it will of course be understood that one of these resistance circuits is thrown out of the circuit and that the current that would usually flow through this is fed to the main circuit. To automatically throw said resistance out of circuit is the object of the solenoids and plungers, which object is accomplished as follows: If the current passing through the main circuit (which current has to pass through the solenoids) is of more am-

pèrage than the solenoid is gaged for, the plunger is raised against the power of the spring, and breaks the contact between the contact-pieces J and K and hence cuts out one of the resistance circuits. The next solenoid is arranged to lift its plunger at a certain pre-determined increase in the ampèrage of the current over that at which the first solenoid operated, and if this ampèrage is reached, this second resistance is cut out of circuit. Now if the load on the main circuit is decreased, of course the same amount of current will not flow through the solenoids and hence if the ampèrage falls below a certain amount, the spring will force one of the plungers down and put one of the resistances in the circuit, thus effectually regulating the current from the dynamo.

Although I prefer to arrange the solenoids in multiple arc, they might also be arranged in series as regards one another.

From the above description, it will be seen that as the resistance in the path of the current from the dynamo is automatically adjusted in correspondence with the current flowing in the main circuit, that the current is automatically and effectively regulated.

My invention is particularly adapted for use with dynamos running an electric street car service, where the current in the main circuit is constantly varying, owing to constant changes in the number of cars taking power from the trolley wire.

What I claim as my invention is—

1. In an automatic electric regulator for dynamos, two or more solenoids arranged in series as regards the main circuit, and in multiple arc as regards one another, in combination with two or more resistance circuits connecting the positive and negative wires of the main circuit, each having a contact therein and each solenoid being arranged to break its corresponding resistance circuit when a current of more than a pre-determined number of ampères passes through the main circuit, substantially as and for the purpose specified.

2. In an automatic electric regulator for dynamos, two or more solenoids arranged in series as regards the main circuit, and in multiple arc as regards one another, in combination with two or more resistance circuits connecting the positive and negative wires of the main circuit, each having a contact therein, the solenoids being arranged to cut out their corresponding resistance circuits at successive increases in the ampèrage of a current passing through the main circuit, substantially as and for the purpose specified.

3. In an automatic electric regulator for dynamos, two or more solenoids each arranged to divert a proportionate amount of the current passing through the main circuit in combination with two or more resistance circuits connecting the positive and negative wires of the main circuit and each having a contact therein, each solenoid being arranged to cut out its corresponding resistance circuit at successive increases in the ampèrage of a current passing through the main circuit, substantially as and for the purpose specified.

4. In an automatic electric regulator for dynamos, two or more solenoids through which all the current of the main circuit passes, in combination with two or more resistance circuits connecting the positive and negative wires of the main circuit and each having a contact therein, the solenoids being arranged to cut out their corresponding resistance circuits at successive increases in the ampèrage of the current passing through the main circuit, substantially as and for the purpose specified.

5. An automatic regulator for dynamos comprising the following elements: two or more solenoids C, D arranged in series as regards the main circuit, and in multiple arc as regards one another, plungers M adapted to work in said solenoids, springs acting on said plungers, two or more resistance circuits H, I, and contact pieces J and K interposed in said circuits, one set of said contact pieces being connected to the said plungers and arranged to break the resistance circuits when the plungers are raised, substantially as described.

St. Catharines, May 26, 1894.

HENRY D. SYMMES.

In presence of—

HUBERT COLLIER,

F. G. LOCKE.