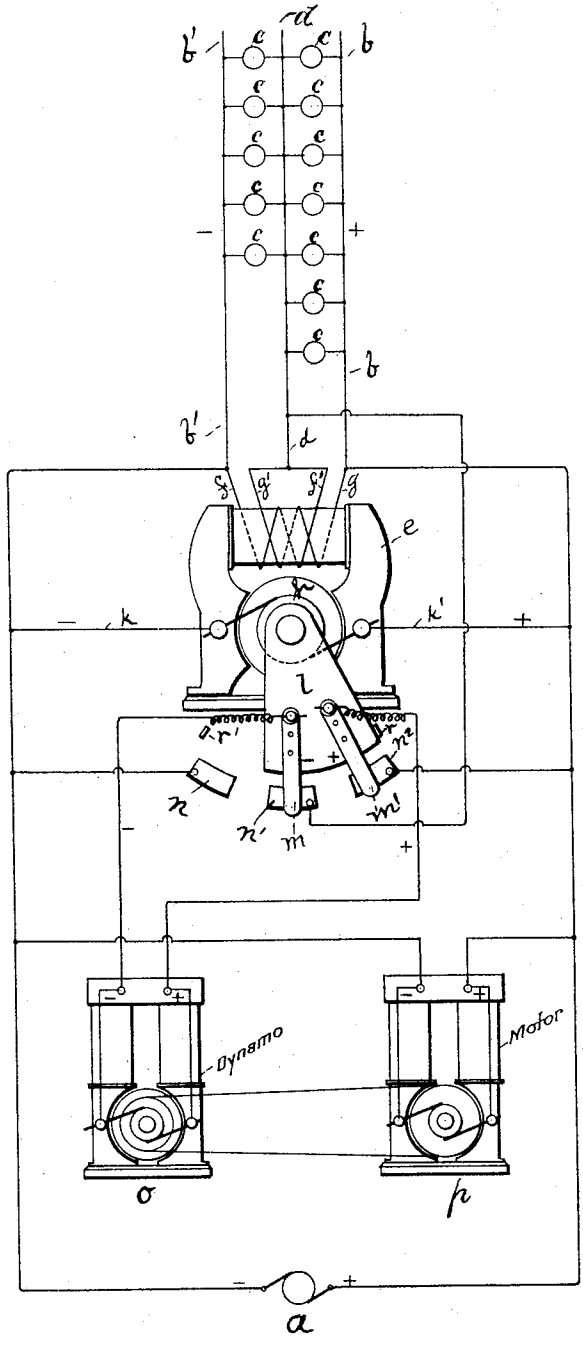
(No Model.)

C. D. HASKINS.

SYSTEM OF ELECTRICAL DISTRIBUTION.

No. 589,430 Patented Sept. 7, 1897.



Witnesses:

A. D. Lawrence.

John W. Sinclair.

Inventor:

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CHARLES D. HASKINS, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS.

SYSTEM OF ELECTRICAL DISTRIBUTION.

SPECIFICATION forming part of Letters Patent No. 589,430, dated September 7, 1897.

Application filed July 6, 1896. Serial No. 598,160. (No model.)

To all whom it may concern:

Be it known that I, CHARLES D. HASKINS, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Systems of Electrical Distribution, (Case No. 17,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to improvements in an automatic potential-equalizer for multiple-series systems of electrical distribution, and its object is to provide simple and effective means for insuring a prompt automatic regulation of the difference in electrical potential between the several branches of multiple-series circuits, whereby all translating devices of a multiple-series system may be subjected to the same difference in potential between their respective terminals, irrespective of any difference that may exist between the number of such devices in one portion and the number of the same in another portion of such multiple-series system.

As to the prior art, reference is made to Letters Patent No. 274,290, granted to Thomas A. Edison, March 20, 1883. In my system herein described two wires only are run from the source of electrical energy to the distributing-circuits, no third wire or compensating-wire being required or desirable.

In order that the difference in potential between the different portions of the distributing-circuits which contain the translating devices may be kept practically at the same voltage, I have provided, in addition to the source of electrical energy, a dynamo-machine adapted to be driven by an electric motor or other suitable means, which is put into action automatically by a differential electromagnetic circuit-changer connected with the different portions of the multiple-series circuits.

I have illustrated my invention diagrammatically in the accompanying drawing, wherein the source of electrical energy a is illustrated as connected in circuit with main conductors b b', between which conductors are connected the translating devices $c\,c\,c$ in multiple series. An equalizing-wire d extends throughout the district of distribution along with and parallel to the main conductors b b', and is connected in a well-known manner to all the multiple-series branches which contain the translating devices $c\,c\,c$. The electromagnet e of the automatic switching device is supplied with two differentially-wound helices having their ends $f\,f'$ and $g\,g'$ connected to main conductor b' g to main conductor b, while f' and g' are connected to the equalizing-wire d. The armature h of the automatic switching device is electrically polarized by a current flowing in the circuit $k\,k'$, within which circuit its coils are included. Rigidly attached to armature h is the projecting arm l of insulating material, upon which are carried two switch-spring contacts $m\,m'$, adapted to make contact with the stationary switch-contacts $n\,n'\,n^2$ as the arm is actuated in either direction by movement of the armature h. The contact n is connected directly with the conductor that leads from source a to main conductor b', and contact n^2 is connected with the conductor which leads from source a to main conductor b', while contact n' is connected to equalizing-wire d.

The dynamo-electric machine o, which is represented as being supplied with power by the motor p, is connected to the switch-spring contacts m and m' in the manner indicated by the plus and minus signs.

r and r' are stops, which limit the excursion of arm l.

The source of electrical energy a consists of a dynamo or dynamos of suitable capacity. The distributing-circuits consist of suitable conducting-mains b and b', connected with positive and negative terminals, respectively, of the source of energy a. The translating devices are connected, as shown, between the mains b and b', the equalizing-wire d serving to divide the multiple branches containing the translating devices into two parts.

When the energy consumed on opposite sides of the wire d is practically equal, the difference in electrical potential between the equalizing-wire d and each of the mains b b' will be the same. This is the desired condition for efficient operation. The circuits are accordingly run so that normally the en-

ergy required to do the work will be as nearly equal as possible in each of the two halves or parts of the distributing-circuits—that is, on opposite sides of the wire *d*. As is well known, such uniformity in the number or resistance of the translating devices will be disturbed in practice, and it is the object of my invention, as above described and illustrated, to compensate electrically for such disturbance by increasing the supply of current in one or the other from time to time, as may be required, the apparatus which I have invented being adapted to do this work automatically.

The widest variations which occur in the resistance of the translating devices on the different sides or branches is found to be about ten per centum in systems which obtain in practice. I therefore provide a dynamo, as dynamo *o*, which shall have a capacity of about one-tenth that of the source *a*, its electromotive force being about one-half of that of the source of energy *a*. This dynamo *o* may be driven by a motor *p*, supplied by current from the dynamo or dynamos *a*, as shown. Other suitable means may be employed for driving the motor *p* or for driving the dynamo *o*, as may be desired.

The electromagnet *e*, when energized, produces a field of force for the armature *h*, the direction of the movement or oscillation of the armature *h* being determined by that of the polarity of the electromagnet *e*. The polarity of this electromagnet *e* will vary according to the predominating current through the differential coils *f f' g g'* thereof, which predominating current will be determined by the resistance of the translating devices. If the resistance of the translating devices between wire *b* and wire *d* is less, then the predominating current will be in a direction to turn the armature *h* in the direction indicated by the arrow, so that the dynamo *o* will be connected to supply current to the side *b d*, as shown. On the other hand, in case translating devices are removed from the side *b d*, marked plus, or added to the side *b' d'*, marked minus, so that the direction of the predominating current through electromagnet *e* is reversed, then the direction of the movement of the armature *h* will be reversed, so that contact *m'* will come in contact with the contact *n'*, while arm *m* will come in contact with the contact *n*, and thus the current from the dynamo *o* will be always directed to that side of the distributing-circuits which contains the greater number of translating devices—that is, the greater number with respect to energy required. As thus constructed and arranged, it will be seen that the electromagnetic switching device, having its coils wound differentially and connected as described, will act automatically to connect the dynamo *o* with one side or portion of the distributing-circuits or with the other, as required by the distribution of the translating devices. Thus the potential will be maintained practically equal in the opposite sides or portions of the distributing-circuits.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a multiple-series system of electrical distribution, the combination with main and equalizing conductors, of a generator from which the main conductors are led, an electromagnetic switching device having two relatively movable elements, namely an armature and a magnet, one of said elements being connected with said conductors and adapted to have its polarity changed as the load predominates in one branch of the system or another, the other of said elements being polarized in a constant direction and means controlled by said switching device for maintaining a balance between the branches of the system, substantially as described.

2. In a multiple-series system of electrical distribution, the combination with main and equalizing conductors, of a generator from which the main conductors are led, an electromagnetic switching device having two relatively movable elements, namely, an armature and a magnet, one of said elements being connected with said conductors and adapted to have its polarity changed as the load predominates in one branch of the system or another, the other of said elements being polarized in a constant direction, and a dynamo-electric machine adapted to be included in circuit with one branch or another of the system by said switching device, substantially as described.

3. In a multiple-series system of electrical distribution, the combination with main and equalizing conductors, of a generator from which the main conductors are led, an electromagnetic switching device comprising an electromagnet having differentially-wound helical portions or coils connected in multiple series with the main and equalizing conductors and an armature which is polarized in a constant direction, and means controlled by said switching device for maintaining a balance between the branches of the system, substantially as described.

4. In a multiple-series system of electrical distribution, the combination with main and equalizing conductors, of a generator from which the main conductors are led, an electromagnetic switching device comprising an electromagnet having differentially-wound helical portions or coils connected in multiple series with the main and equalizing conductors and an armature which is polarized in a constant direction, and a dynamo-electric machine adapted to be included in circuit with one branch or another of the systems, by said switching device, substantially as described.

5. In a system of electrical distribution, the combination with main and equalizing conductors, with which the translating devices are connected in multiple series, of a genera-

tor from which the main conductors are led, an auxiliary generator or source of electricity and a switching device for connecting the latter generator in circuit with one branch or another of the system, said switching device comprising an electromagnet having differentially-wound helical portions or coils connected in multiple series with the main and equalizing conductors and an armature which is polarized in a constant direction, said switching device being arranged to connect the auxiliary generator in circuit with the overloaded branch of the system, substantially as described.

6. In a system of electrical distribution, the combination of main and equalizing conductors, of a generator from which the main conductors are led, translating devices being connected in multiple series with said conductors, a switching device comprising an electromagnet having differentially-wound helical portions or coils connected in multiple series with the main and equalizing conductors and an armature which is adapted to be polarized in a constant direction, said armature having a winding included in circuit with said generator, and means controlled by said switching device for maintaining a balance between the branches of the system, substantially as described.

In witness whereof I hereunto subscribe my name this 27th day of June, A. D. 1896.

CHARLES D. HASKINS.

Witnesses:

GEORGE L. CRAGG,

JOHN W. SINCLAIR.