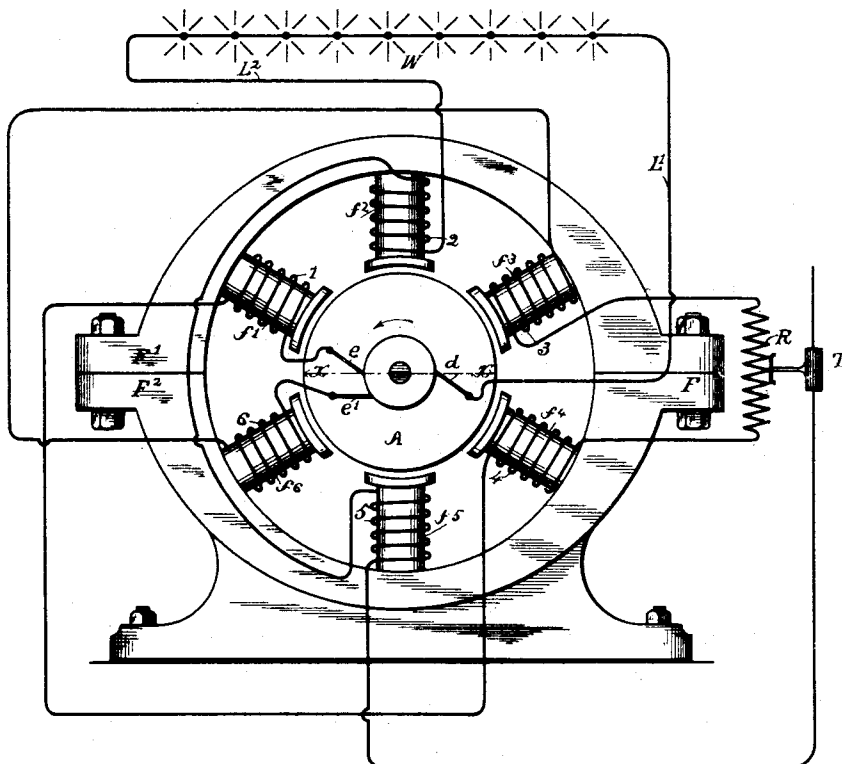


(No Model.)

A. G. WATERHOUSE.
DYNAMO ELECTRIC MACHINE.

No. 538,757.

Patented May 7, 1895.



WITNESSES:

George Brown Jr.
Hubert C. Tenev

INVENTOR,

Addison G. Waterhouse.
By Charles A. Tenev

Att'y.

UNITED STATES PATENT OFFICE.

ADDISON G. WATERHOUSE, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR, BY
MESNE ASSIGNMENTS, TO THE WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, OF SAME PLACE.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 538,757, dated May 7, 1895.

Application filed February 4, 1889. Serial No. 298,597. (No model.)

To all whom it may concern:

Be it known that I, ADDISON G. WATERHOUSE, a citizen of the United States, residing in Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Dynamo-Electric Machines, (Case No. 282,) of which the following is a specification.

The object of the invention is to provide an electric machine or generator which will operate to automatically regulate either for maintaining a constant current with a varying electromotive force, or a constant electromotive force while producing a variable current.

The invention consists, in general terms, in constructing the field-magnet with divided pole pieces, six, eight, or more in number, the strengths of which are to a greater or less extent independently controllable.

The invention will be described especially in its application to dynamo-electric generators, although it is applicable to a certain extent to electric motors.

In the drawing is shown an end view of such portions of an electric generator as are necessary to illustrate my invention.

Referring to the drawing, A represents an armature of any suitable character, such, for example, as a Siemens bobbin, a drum, or a ring armature. The field-magnet which is represented at F, consists, in this instance of an annular back piece composed of two sections, F^1 , F^2 , bolted together, or fastened in any convenient manner. Each half of the back piece is provided with three polar projections, f^1 , f^2 , f^3 , and f^4 , f^5 , f^6 , respectively, which are wound with coils 1, 2, 3, 4, 5 and 6. All the pole pieces of one of the sections F^1 are designed to be of a given character, say, north, while those of the other, F^2 , are of the opposite character, south. The armature is provided with a commutator and with two collecting brushes d , e , placed in such position as to make contact in the line of maximum commutation, which is represented by the dotted line x , x . An auxiliary contact brush e' , is also provided for receiving current independently of the brushes d and e . The aux-

iliary brush e' is connected through the coils 6 and 3 with one end of a resistance R. The brush e is connected through the coils 1 and 4 with the other end of the resistance R. The brush d is connected with the conductor L^1 , leading to the work-circuit, while the conductor L^2 , leading therefrom is connected through the coils 2 and 5, with the contact device T, which is adjustable along the resistance R. By means of this adjustable contact device, the relative resistances of the two branch circuits derived from the brushes e and e' may be controlled. The currents derived from either of these brushes may be used for establishing the field magnetism either alone or together, or in combination with the work-circuit. The currents derived from the different brushes may be employed to assist each other or may be used differentially for the purpose of regulation, but these particular features need not here be described in detail.

The current which passes through the brush e to the contact device T energizes the field-magnet poles f^1 , and f^4 , which are the poles receiving the greatest amount of magnetization by reason of the displacement caused by the rotation of the armature. The poles f^3 and f^6 are dependent upon the current derived from the brush e' , and as the displacement increases, the relative value of the currents received through the brush e' increases, thereby tending to increase the magnetization of those poles, and thus tending to maintain an even distribution of magnetic field. The poles f^2 and f^5 are directly dependent upon the current passing to the work-circuit, and therefore tend to increase or diminish in value accordingly as more or less current is used in the work-circuit. It will be noticed, however, that each set of pole-pieces is independently controllable, and that the adjustable resistance may be employed for balancing the ultimate polarization of the machine at all times, so that there will be an equal distribution of lines of force about the armature.

While I have shown the field-magnet as having six polar projections, it is obvious that eight or more may be employed if desired, and it is also evident that two auxiliary

brushes may be employed if desired, in a manner well understood, without departing from the spirit of my invention.

I claim as my invention—

- 5 1. In a dynamo-electric machine, the combination with a field-magnet having two poles, each derived through three or more pole-pieces, of two contact brushes connected with
10 through the coils of those pole-pieces of opposite polarity, from the magnetization of which the revolution of the armature tends to detract, and a third brush applied to the commutator in advance of the line of maximum commutation, and connected with a
15 point on the commutator of different potential through the coils of those pole-pieces the magnetization of which the revolution of the armature tends to augment.
- 20 2. In a dynamo-electric machine, the combination with two poles each having three or

more pole-pieces, of two contact brushes connected with each other through the work-circuit and through the coils of those pole-pieces of opposite polarity from the magnetization 25 of which the revolution of the armature tends to detract, and a third brush applied to the commutator in advance of the line of maximum commutation, and connected through the coils of the pole-pieces, the magnetization 30 of which the revolution of the armature tends to augment, with a point on the commutator of different potential, and means for controlling the relative values of the currents flowing through said sets of coils. 35

In testimony whereof I have hereunto subscribed my name this 2d day of February, A. D. 1889.

ADDISON G. WATERHOUSE.

Witnesses:

W. D. UPTGRAFF,
CHARLES A. TERRY.