(No Model.)

T. H. HICKS.

ALTERNATING CURRENT DYNAMO.

No. 465,994. Patented Dec. 29, 1891.

Fig. 1.

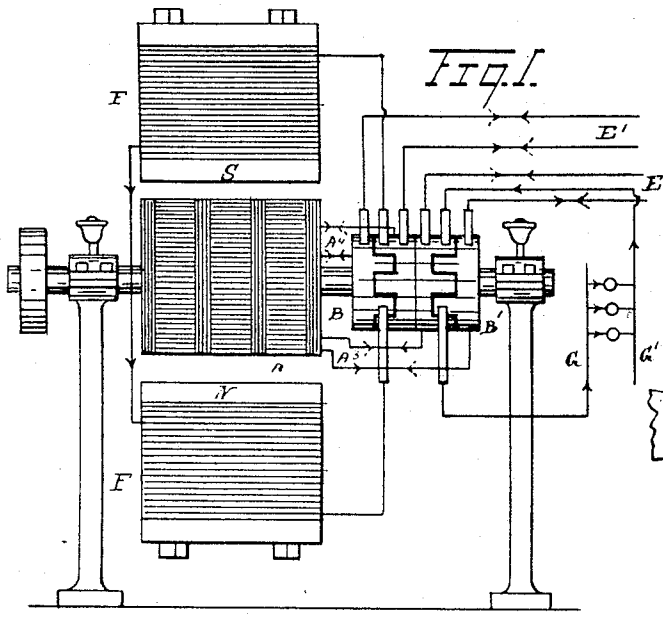


Fig. 2.

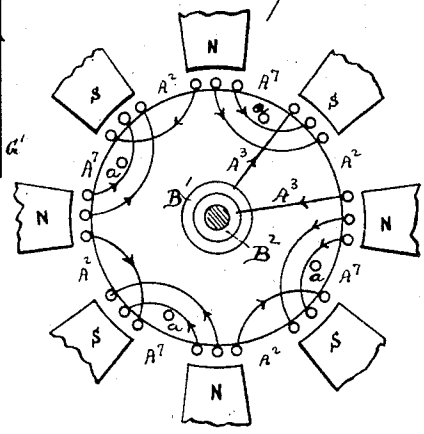


Fig. 3.

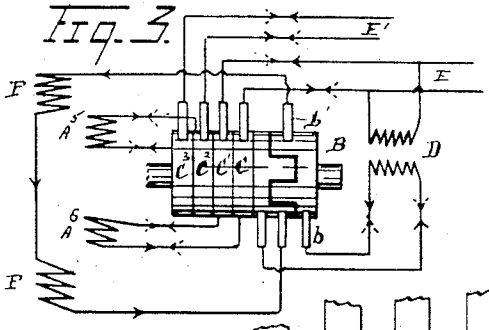


Fig. 4.

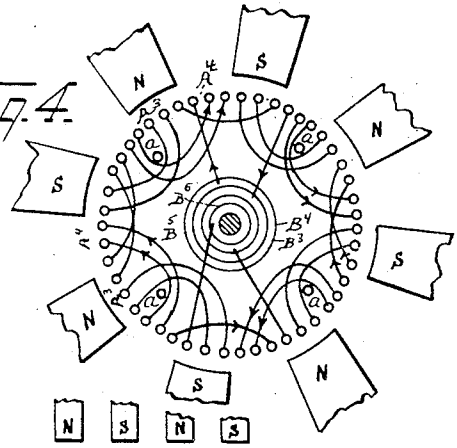


Fig. 5.

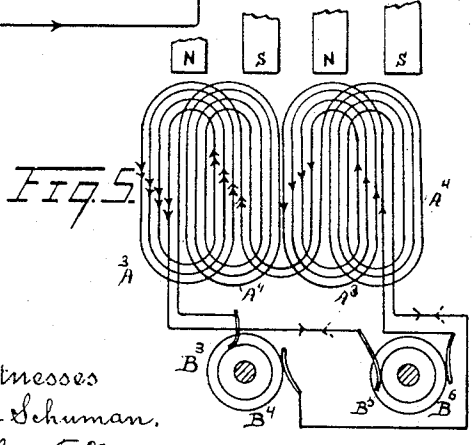
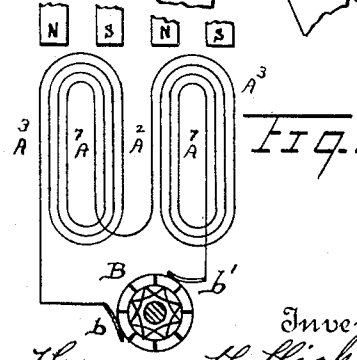


Fig. 6.



Witnesses
John Schuman.
John. F. Miller.

Inventor
Thomas H. Hicks.
By his Attorney
Newell S. Wright.

UNITED STATES PATENT OFFICE.

THOMAS H. HICKS, OF DETROIT, MICHIGAN, ASSIGNOR OF ONE-HALF TO H. L. OBETZ, OF SAME PLACE.

ALTERNATING-CURRENT DYNAMO.

SPECIFICATION forming part of Letters Patent No. 465,994, dated December 29, 1891.

Application filed March 9, 1891. Serial No. 384,293. (No model.)

To all whom it may concern:

Be it known that I, THOMAS H. HICKS, a subject of the Queen of Great Britain, residing at Detroit, in the county of Wayne and State of Michigan, have invented a certain new and useful Improvement in an Alternating-Current Dynamo; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention refers to new and useful improvements in dynamos; and it consists in the mode or manner of arranging and connecting the armature-coils and of constructing and arranging the field-poles and collector devices, which I carry out as hereinafter fully described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation embodying features of my invention, showing a dynamo having two armature-circuits and a double commutator. Fig. 2 is an end view of an armature arranged between radial field-poles having one armature-circuit. Fig. 3 is a diagram view showing two armature-circuits and additional features of my invention. Fig. 4 is an end view of the armature shown in Fig. 1 and similar to Fig. 2, but showing, in addition, a second armature-circuit. Fig. 5 shows the coils of two armature-circuits spread out and each circuit terminating in separate collector-rings. Fig. 6 represents two coils of one armature-circuit spread out and connected in linear series to a commutating device.

In Fig. 5 a portion of one circuit is indicated by single arrow-heads and a portion of the other circuit is indicated by double arrow-heads. Since it is only necessary to use one-half of the armature for one circuit, then it is evident, also, that the other half can be covered with inductors to supply current to a second circuit; or, in other words, one set of field-poles is sufficient to energize two armature-circuits. To obtain such beneficial results the field-poles of opposite sign must be alternately arranged and the width of each field-pole and space between the poles in the direction of rotation must be equal to each other, and the armature-coil should be so arranged and wound upon the drum of iron that an armature having only one circuit wound upon it will have only half the number of coils that there are field-poles, each coil occupying an arc of the circumference equal to either two field-poles and one space or else two spaces and one field-pole, the arc of the circle in either case being equal. This will be clearly understood by reference to Figs. 2 and 6. In Fig. 6 I show the manner of winding and connecting the coils of one circuit and the width of the coils occupied in the space opposite the field-poles. The spaces between the two coils and the space left in the center of each coil I show to be equal to each other, and each coil is shown to occupy a space equal to two field-poles and one space. N S denote field-poles of opposite sign. A is the armature. A^3 A^3 indicate two coils of one armature-circuit, A^2 the spaces between the coils, and A^7 the spaces left in the center of the coils. B represents a commutating device to which the coils are connected by brushes *b b'*. In Fig. 2 I show the terminals of a single armature-circuit ending in two rings B' B^2.

A^3 A^3 A^4 A^4 in Figs. 4 and 5 represent two armature-circuits, which are equal in every respect the one to the other, and each terminates in separate collector-rings, one set of rings marked B^3 B^4 and the other B^5 B^6. In said figures I show that the second set of armature-coils are laid in the spaces and openings formed in the construction of the first set, the second set crossing the first set on the ends of the armature. An armature wound as above described has forty-eight feet of No. 11 wire in each circuit. The diameter of armature was seven inches and its length six inches. The number of field-poles was eight; speed of armature was eleven hundred and sixty. Each circuit showed, when tested separately, sixty-five volts; but when the two circuits were joined in linear series the total voltage was only eighty. An armature being wound with two circuits, as described, and connected in the circuits of a dynamo of similar construction will make the most powerful kind of an alternating motor, provided the fields of the motor be excited by a straight-

ened current. Such a construction I show in Fig. 3, in which C C′ C^2 C^3 are distributing-rings for the two armature-circuits A^5 A^6. B is a commutator for straightening the current from a transformer D, located in one of the main alternating circuits E E′ for the field-coils F F.

Fig. 1 shows a dynamo having two armature-circuits similar to Figs. 4 and 5. I show in this figure a double commutator B B′, one for exciting the fields and the other for supplying a continuous current for other purposes, as shown at G G′. I show also two alternating circuits E E′. The full and dotted arrow-heads indicate these alternating circuits. The fields may also be excited from a a transformer current commutator, as in Fig. 3, if desired. This is more practical for isolated lighting, especially when one dynamo is required to furnish current for two purposes requiring different voltages—such, for example, as incandescent alternating current lighting and electroplating. Of course it will be clearly understood that the coils forming one armature-circuit may be connected in multiple arc and still come within the scope of my invention.

In winding the armature I prefer to employ pins *a*, inserted in each end of the armature-drum, arranged between the separate sets of coils, where they cross each other on the end of the armature, as shown in Fig. 4, one set of coils being wound to the right and the other set being wound to the left, thus enabling four pins to suffice for winding eight coils.

What I claim as my invention is—

1. In an alternating-current machine, the combination, with field-poles of opposite magnetic sign alternately arranged with each other, of an armature rotatable between said field-poles, wound with an inductor, forming coils A^3, connected in series, each coil having a center space one-third the width of the coil, and each pair of coils separated from each other by a space equaling said center space, said field-poles each of a width conforming radially to the width of said center space of the armature-coils and spaced from each other a distance equal to the width of each pole, substantially as described.

2. In an alternating-current dynamo, the combination, with field-poles of opposite sign alternately arranged with each other, of an armature rotatable between said field-poles and having two distinct circuits, each terminating in separate distributing-collectors and each collector distributing alternating current to separate circuits E E′, said armature wound with conductors forming coils A^3, having a center space one-third the width of the coil and separated from each other by a space equaling the center space, said field-poles each of a width conforming radially to the width of said center space of the armature-coils and spaced from each other a distance equal to the width of one pole, substantially as described.

3. In an alternating-current dynamo, an armature having two distinct circuits, each terminating in a separate commutator rotatable with the armature, from each of which commutators separate circuits of continuous and alternating currents are supplied, the coils of one circuit forming spaces A^2 A^7, of a width equaling each other and each equaling in width that of the parallel conductors forming one-half of the coil, and the coils of the other circuit constructed in a similar manner and laid upon the spaces of the first-named coils, substantially as described.

4. In an alternating-current machine, an armature having separate circuits, each circuit terminating in collector-rings and having a commutator for straightening a portion of the current for the fields and other translating devices, said rings and commutator rotatable with the armature between field-poles of opposite magnetic sign alternately arranged with each other, the coils of one circuit forming spaces A^2 A^7, of a width equaling each other and each equaling in width that of the parallel conductors forming one-half of the coil, and the coils of the other circuit constructed in a similar manner and laid upon the spaces of the first named coils, substantially as described.

5. In an alternating-current machine, an armature wound with two armature-circuits, the coils of one circuit crossing the coils of the other circuit at the ends of the armature, and pins *a* to hold the coils in position, located at the ends of the armature between the two sets of coils, said coils wound the one to the right and the other to the left about said pins, substantially as described.

6. In an alternating-current dynamo, the combination, with field-poles of opposite magnetic signs alternately arranged at equal distances from each other and each made of a width equal to the distance each is spaced from the adjacent pole, of an armature wound with coils arranged in pairs, each coil having convolutions forming a central opening the width of the opening and of the parallel conductors on each side of the opening, each of a width equaling the width of one of the field-poles, the two coils of each pair crossing each other at the ends of the armature and filling the said spaces of one another, each pair of coils when arranged upon the armature occupying an arc of its circumference equal to the total width of two field-poles and two field-spaces and extending the length of said armature, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

THOMAS H. HICKS.

Witnesses:
N. S. WRIGHT,
JOHN F. MILLER.