(No Model.)

C. E. LONG.

ARMATURE FOR MAGNETO ELECTRIC MACHINES.

No. 249,148. Patented Nov. 1, 1881.

Fig. 1

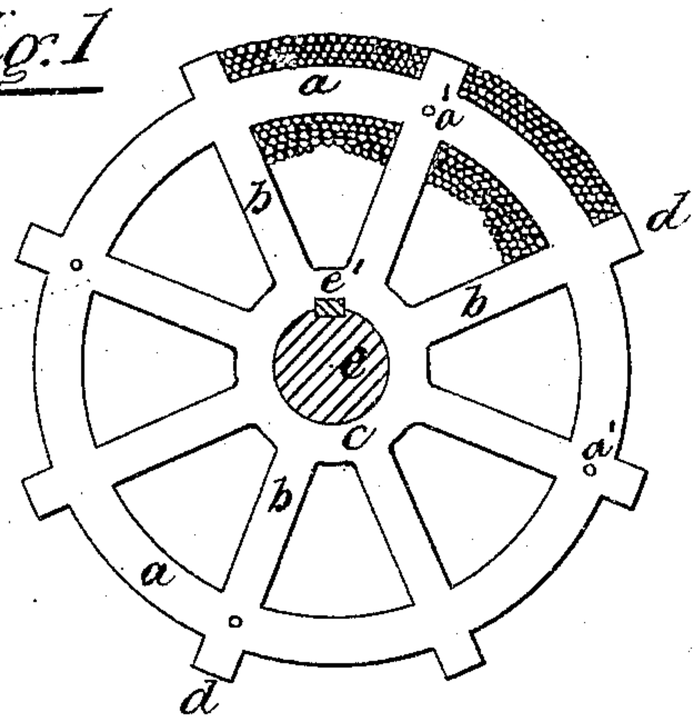


Fig. 3

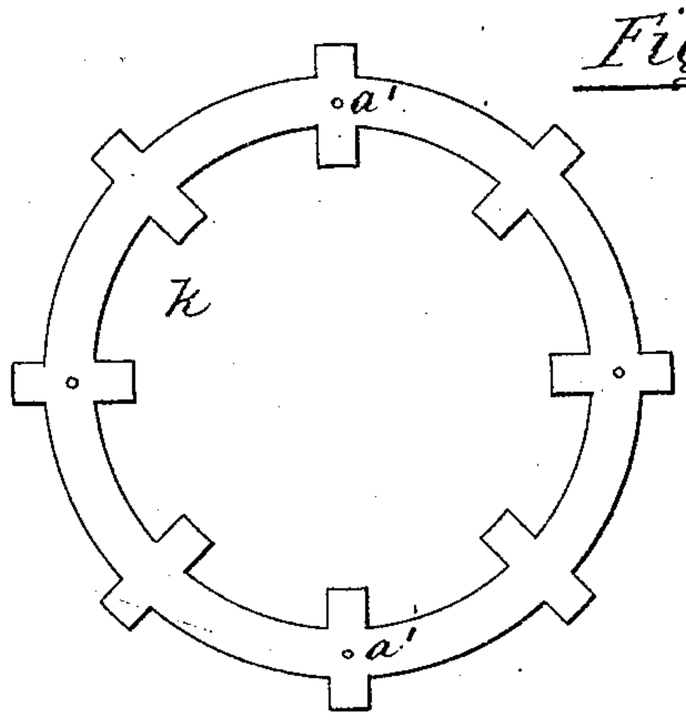


Fig. 2

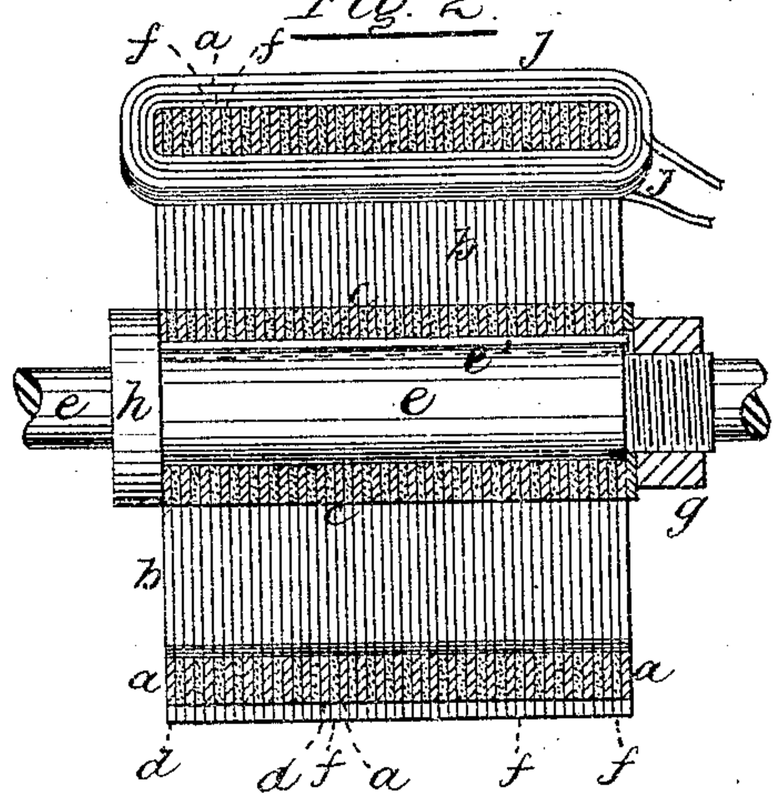


Fig. 4

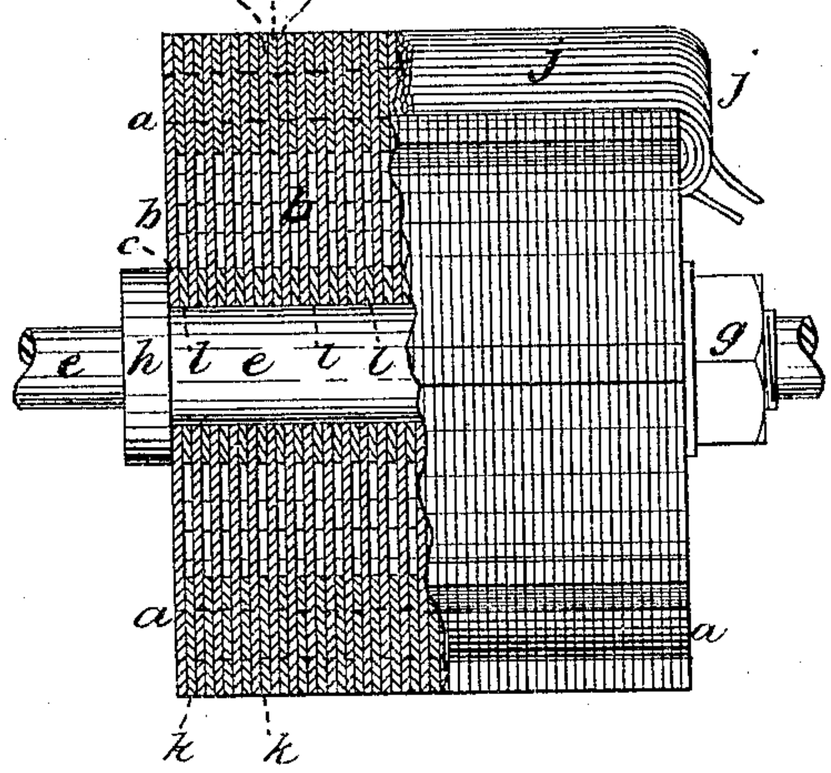


Fig. 5

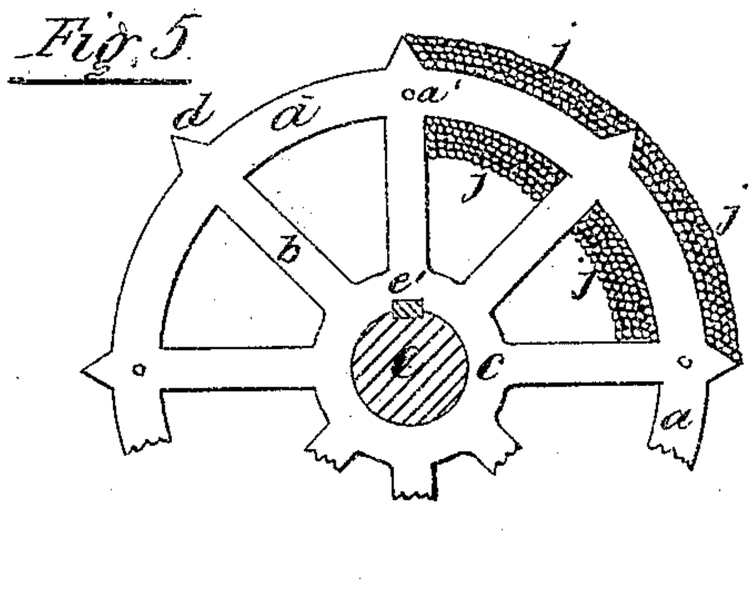
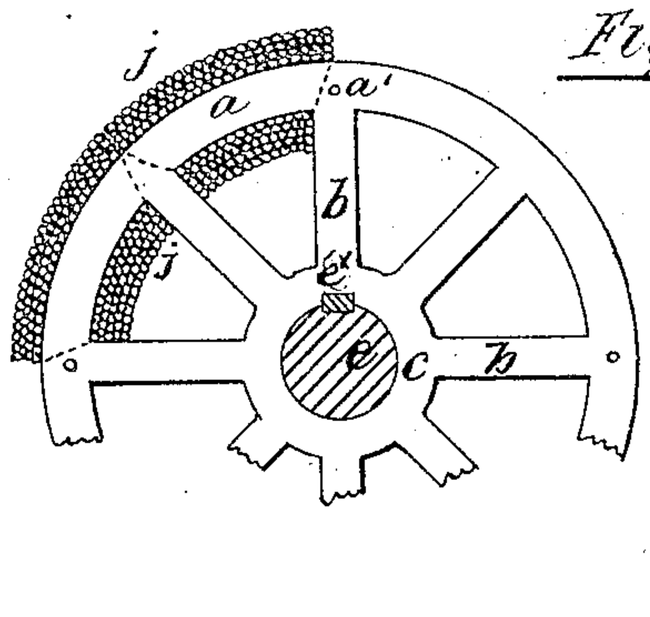


Fig. 6



Witnesses.
H. D. Williams,
Ernest G. Baker.

Charles Edward Long.
Inventor.
per Alfred Shedlock.
Atty.

UNITED STATES PATENT OFFICE.

CHARLES E. LONG, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF, ABRAHAM M. LORYEA, OF SAN FRANCISCO, CALIFORNIA, AND BERNARD LANDE, OF NEW YORK, N. Y.

ARMATURE FOR MAGNETO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 249,148, dated November 1, 1881.

Application filed October 7, 1881. (No model.)

To all whom it may concern:

Be it known that I, CHARLES EDWARD LONG, of the city of New York, county and State of New York, have invented certain new and useful Improvements in Armatures for Magneto-Electric Machines, of which the following is a specification.

This invention relates to the construction of armatures for magneto-electric machines, and particularly to that class known as "ring" or "Gramme" armatures; and it has for its objects the simplification of construction, accuracy and facility in securing the supporting-shaft concentrically therein, the winding of the induced conductor in uniform and equal sections or bobbins, and the dissipation of heat by conduction and radiation.

It consists in forming the body of the armature of a number of sheet-metal plates alternating with plates of a non-magnetic material, all of said plates being cut in the form of a wheel with central hubs concentric with the rims and with or without external projecting poles or pieces in line with the spokes. The supporting-shaft fits into central holes in these plates, and a spline or key on the shaft passes through a keyway formed in the central holes, the whole being held firmly to the shaft by means of a nut and fixed collar thereon. Insulated wire is wound around the ring formed by the rims of the plates, in the ordinary manner, each section or bobbin being separated by the spokes, and as these are equidistant perfect guides are provided to insure an equal amount of wire in each bobbin or section, which is of considerable importance to enable the armature to produce a steady and uniform current as it revolves between the poles of the field-magnets of the machine.

I propose in some cases to make the sheet-iron plates with no hubs or spokes, or with only short spokes or internal projecting pieces to lay between the internal windings of the sections of wire, depending on the spokes of the non-magnetic plates to hold the armature on the shaft, and also to alternate these spokeless iron plates with the iron plates provided with hubs and spokes, so that the ring upon which the wire is wound will be all iron; and I may in some cases make the non-magnetic dividing plates spokeless. In both of these last two cases air-spaces will be left between the spokes of the plates, thus facilitating the dissipation of heat generated in the ring and conveyed therefrom by conduction down the spokes.

In the accompanying drawings, forming part of this specification, Figure 1 is a transverse section of an armature made according to my invention, showing clearly the form of one of the sheet-iron plates, which is also the form of the intermediate non-magnetic plates. Fig. 2 is a longitudinal sectional elevation of the same. Fig. 3 shows the form of a plate without any hub and spokes. Fig. 4 is a longitudinal view of an armature partly in section, composed of plates, Fig. 3, and plates shown in Fig. 1, alternating. Fig. 5 represents part of a plate in which the pole-pieces are modified in form, and Fig. 6 is another modification.

The form of the sheet-iron plates is shown in Fig. 1, *a* being the rim; *b*, the spokes; *c*, the hub, and *d* the external projecting pieces or poles. These iron plates are placed on the shaft *e*, alternating with the non-magnetic plates *f*, of the same form, as shown in Fig. 2, the whole being clamped firmly on the shaft between the nut *g* and fixed collar *h*. The spline or key *e'* causes the armature composed of said plates to rotate with the shaft *e*. The insulated induction-wire is wound over the rims *a*, between the pole-pieces *d d* and spokes *b b* which form perfect guides therefor. Two sections or bobbins, *j j*, of wire only are shown, it being understood that all the sections of the rims will be filled with wire, and the adjoining ends of the sections connected together and fastened to the commutator-plates, as in the ordinary Gramme armature. The heat generated in the armature is by conduction conveyed down the spokes *b* both of the iron plates and non-magnetic plates as fast as it is generated, from whence it is dissipated by radiation.

For the non-magnetic plates *f*, I propose to use a composition or material which is a conductor of heat, and non-magnetic metals may be advantageously used.

When it is desired to make the part of the armature surrounded by the wire *j* wholly of

iron, then I make each alternate plate *k* of the form shown at Fig. 3—that is to say, with no hubs and spokes. Fig. 4 represents such an armature, partly in section. Air-spaces are left between the spokes *b*, and washers *l l*, equal in thickness to that of the plates *k*, are placed between the hubs *c c*. These plates *k* may be made of the non-magentic material, if desired, or the plates with the spokes and hubs made of non-magnetic material, and the plates *k* of iron.

Fig. 5 represents part of an armature made according to my invention, in which the pole-pieces *d d* are reduced at their outer ends, so that the wire of the different sections cover the whole of the periphery of the armature when wound, the pole-pieces merely acting as guides for the proper winding of the sections; or the pole-pieces of the iron plates may be eliminated entirely and the non-magnetic plates provided with projections of this form.

Fig. 6 represents another modification, in which the projecting pieces or poles are entirely removed from the periphery of the armature.

The plates in all the forms shown may be further held together by means of rods passed through the holes *a'* in the rims *a*.

It is obvious that armature-bodies constructed as described may be wound according to the well-known Siemens method, so I do not wish to confine myself to any particular method of winding, as my improved armature is adapted for any method of winding in which the wire is placed longitudinally on it or parallel to its axis. United States Letters Patent to J. E. Braunsdorf, No. 226,483, dated April 13, 1880, and to H. S. Maxim, No. 228,544, dated June 8, 1880, show means for keeping armatures of the Gramme type cool by making the same of iron rings connected together so as to leave air-space between them, so I do not claim, broadly, an armature composed of iron rings or plates; but

What I claim, and desire to secure by Letters Patent, is—

1. An armature for magneto-electric machines composed of a series of iron plates, separated by plates of non-magnetic heat-conducting material, provided with projections extending to or beyond the surface of the coils of insulated wire wound thereon, substantially as and for the purpose hereinbefore set forth.

2. In an armature for magneto-electric machines, in combination, a series of iron plates, a series of plates of non-magnetic material, and a central shaft upon which the two series of plates are clamped in alternate order, each of the plates being composed of a ring, spokes, projecting pole-pieces in line therewith, and a central hub having a hole to fit over the shaft and by means whereof the completed armature is retained concentric with the shaft, substantially as and for the purposes hereinbefore set forth.

In witness whereof I have hereunto set my hand at New York, county and State of New York, this 1st day of October, A. D. 1881.

CHARLES EDWARD LONG.

In presence of—

ERNEST G. BAKER,

H. D. WILLIAMS.