(No Model.)

W. M. MORDEY.

DYNAMO ELECTRIC MACHINE.

No. 555,963. Patented Mar. 10, 1896.

Fig. 2

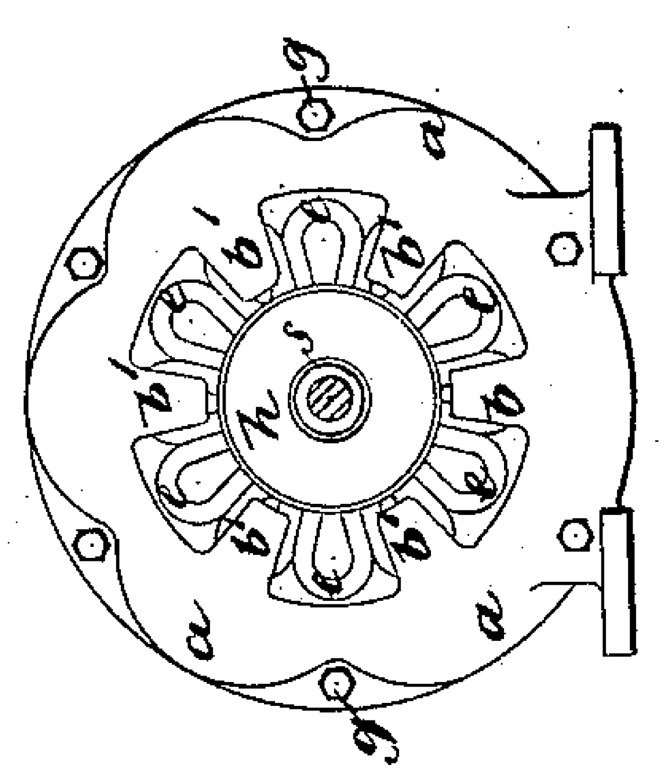


Fig. 4

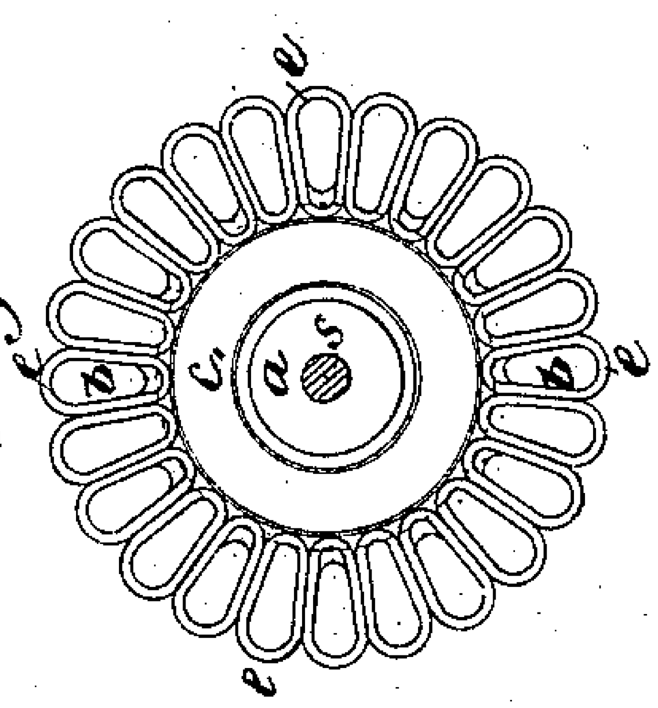


Fig. 1

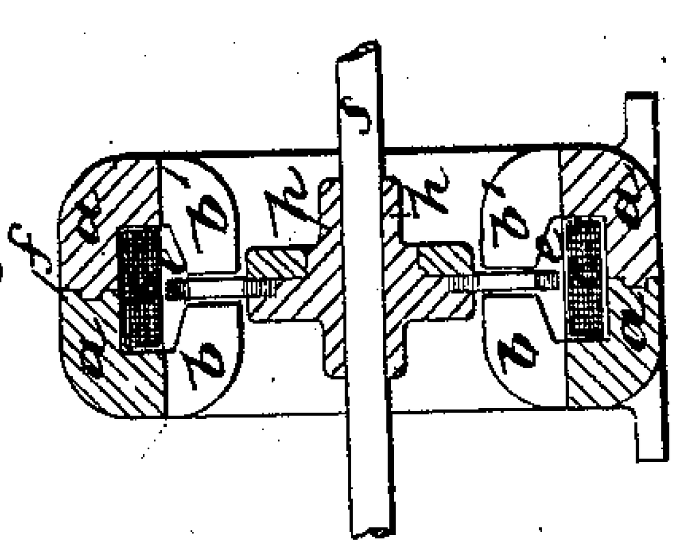
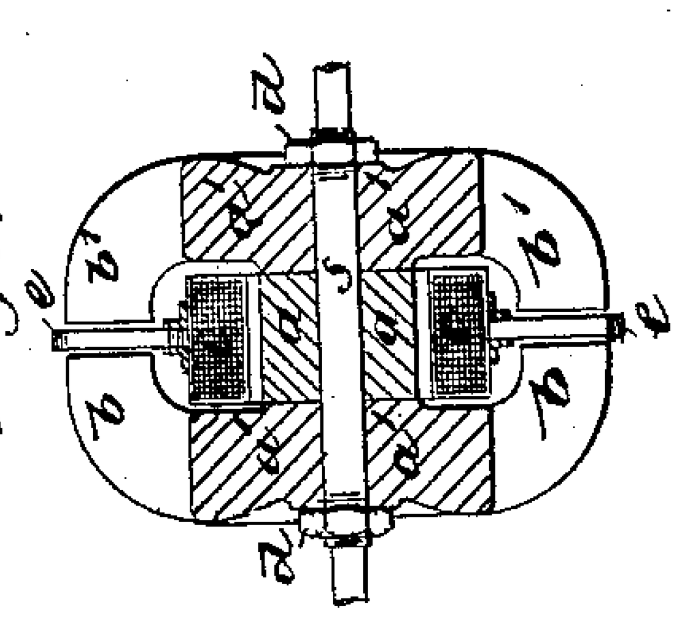


Fig. 3.



Witnesses.
W. Cross.
D. S. Fiducia

Inventor.
W. M. Mordey.

ANDREW B GRAHAM, PHOTO-LITHO. WASHINGTON, D.C.

UNITED STATES PATENT OFFICE.

WILLIAM MORRIS MORDEY, OF LONDON, ENGLAND.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 555,963, dated March 10, 1896.

Application filed April 21, 1891. Serial No. 389,819. (No model.) Patented in England June 8, 1887, No. 8,262; in France January 7, 1888, No. 188,024; in Belgium March 15, 1888, No. 81,044, and in Italy June 30, 1888, XLVI, 103.

To all whom it may concern:

Be it known that I, WILLIAM MORRIS MORDEY, a subject of the Queen of Great Britain and Ireland, residing at Lambeth, London, in the county of Surrey, England, have invented Improvements in Dynamo-Electric Machines, (for which I have obtained Letters Patent in Great Britain, No. 8,262, dated June 8, 1887; in France, No. 188,024, dated January 7, 1888; in Belgium, No. 81,044, dated March 15, 1888, and in Italy, XLVI, 103, dated June 30, 1888,) of which the following is a specification.

This invention has reference to improvements in dynamo-electric machines of those kinds used principally for the production of alternate currents.

In alternate-current machines, such as those of Wilde, Siemens, and others, where the armature consists of a number of coils arranged circularly with their axes arranged parallel to the shaft of the machine, or in the form of Ferranti, where the armature consists of a sinuous conductor, the field-magnets, which are numerous, are arranged in two parallel circles facing one another with the armature between them. Usually the armature revolves and the field-magnets are fixed. Sometimes the armature is stationary and the fields revolve. This form of field is costly to construct, and is inefficient as regards energy.

Now the object of this invention is to simplify the construction and increase the efficiency of dynamo-electric machines of the kind referred to. For this purpose I use in conjunction with an armature consisting of an annular series of coils without iron cores a field-magnet having a single exciting coil or winding that supplies the whole inductive effect, and two series of pole pieces, polar extensions, projections or elongations (hereinafter called "polar extensions") arranged at opposite sides of the armature-coils, one series being of opposite polarity to the other. The relative arrangement of the armature-coils and field-magnet can be variously modified.

In the accompanying drawings, Figure 1 is a longitudinal section, and Fig. 2 is an end elevation, of a dynamo-electric machine constructed according to this invention, and in which the field-magnet is in the form of an iron ring arranged to surround the armature-coils, the field-winding being arranged within the field-magnet and preferably so as to also surround the armature-coils. Fig. 3 is a longitudinal section, and Fig. 4 a transverse section through the plane of the armature, of a dynamo-electric machine constructed according to this invention, in which the field-magnet is so arranged that its core and winding extend through and are concentric with the annular series of armature-coils.

In the arrangement illustrated in Figs. 1 and 2 the armature consists of a number of coils *e e* carried by the hub *h* and without the iron cores usually employed.

The whole periphery of the armature is surrounded by the iron field-magnet *a a*, forming what is practically a ring of iron. Inside this ring the magnetizing field coil or winding *c c* is placed, the convolutions of this coil also surrounding the armature peripherally. From the outer iron ring *a a* polar extensions *b b'* project inward toward the axis of the armature, such polar extensions facing one another with the armature *e e* between them. Thus there are a number of similar magnetic poles *b b* on one side of the armature faced by a number of opposite magnetic poles *b' b'* on the other side of the armature. The whole of these poles or polar projections are magnetized by the peripheral winding *c c*.

All the polar extensions on either side of the armature may be regarded as one common pole of the common electromagnet, which is excited by the coil *c c*. In the case of an ordinary alternate-current machine I make the number of pairs of polar projections on each side of the armature half that of the coils *e e*. The magnet *a a* may be of wrought-iron, but I prefer to make it of soft cast-iron. I prefer to make it in two portions, divided as shown in Fig. 1, the two portions being machined true on their inside faces *f* and then bolted together as shown at *g g*, Fig. 2, after the armature-coils *e e* and the field coil or winding *c c* have been inserted in place, or any other suitable mode of dividing the field-magnet may be adopted.

In the arrangement of dynamo-electric machine illustrated in Figs. 3 and 4, which is the form I prefer to adopt in practice, the armature is stationary and the field-magnet is arranged to rotate.

a a is the internal portion or core of the field-magnet in the form of a cylinder, preferably of wrought-iron. This is surrounded by a single magnetizing-coil or winding *c c*, which may be wound directly on the core *a*, or may be supported, as shown, by the stationary armature. At each of the sides or ends of the core *a* is placed a cast-iron piece *a*, having parts *b b'*, forming polar extensions which project radially outward and then turn in toward one another, and between them the armature is placed. The core *a* and the cast-iron pieces *a' a'* with their polar extensions *b b'* are keyed or otherwise attached to the shaft *s* and are further secured in place by the nuts *d d*, screwed on the shaft.

The armature consists of non-magnetic material and comprises an annular series of coils *e*, formed of copper ribbon wound with the requisite number of turns, a ribbon of insulating material being wound between the turns, as well understood. Each coil is made without the iron or magnetic core usually employed, and may be without any core, as shown in Fig. 4, where the polar extensions *b* can be seen through the hollow centers of the coils. When cores are used I prefer to make them of a non-metallic substance—such as slate, porcelain, marble or glass. By thus dispensing with the use of iron in the construction of the armature I greatly increase the efficiency of the machine. It will be seen that the two series of polar extensions form an annular magnetic field of less width than the radial width of the armature-coils, and that the radial portions only of the coils are located between and opposite the polar extensions.

As will be obvious, I do not limit myself to the exact forms of armature and field hereinbefore described, as the principal of my invention can be applied in various ways.

For the production of continuous currents I may make use of the improved arrangement of field magnet and armature, joining up the armature-coils in any known or suitable manner, and providing a commutator. I may for this purpose make the ratio of the number of armature-coils with regard to the pole-pieces or polar extensions differ from that which I use in the alternate-current machines.

What I claim is—

1. In a dynamo-electric machine, a stationary non-magnetic armature having an annular series of coils and two series of rotating magnetic poles at opposite sides of said armature-coils.

2. In a dynamo-electric machine, the combination with two annular series of magnetic polar extensions, each series being of opposite polarity to the other, of a non-magnetic armature having an annular series of armature-coils arranged between said two series of polar extensions substantially as described.

3. In a dynamo-electric machine, the combination of two rotary annular series of magnetic polar extensions arranged in two parallel planes, each series being of opposite polarity to the other, and a stationary non-magnetic armature having an annular series of coils arranged in a plane between said series of magnetic polar extensions substantially as herein described.

4. In a dynamo-electric machine, the combination of a non-magnetic armature having an annular series of coils and a field-magnet having a single winding and two series of polar extensions arranged at opposite sides of said armature-coils, one series being of opposite polarity to the other substantially as herein described.

5. In a dynamo-electric machine, the combination of a stationary non-magnetic armature having an annular series of armature-coils, and a rotary field-magnet having a single winding and two series of polar extensions arranged at opposite sides of said armature-coils one series being of opposite polarity to the other substantially as herein described.

6. In a dynamo-electric machine, the combination of a stationary non-magnetic armature having an annular series of armature-coils, and a single rotary field-magnet having a single field winding and core extending through and concentric with the annular series of said armature-coils and formed with two series of polar extensions of opposite polarity located at opposite sides and in close proximity to the respective sides of said armature-coils, substantially as herein described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM MORRIS MORDEY.

Witnesses:
ARTHUR WARSNAM,
WM. THOS. MARSHALL.