(No Model.) 2 Sheets—Sheet 1.

J. F. McELROY.

DYNAMO ELECTRIC MACHINE.

No. 536,963. Patented Apr. 2, 1895.

Fig. 1.

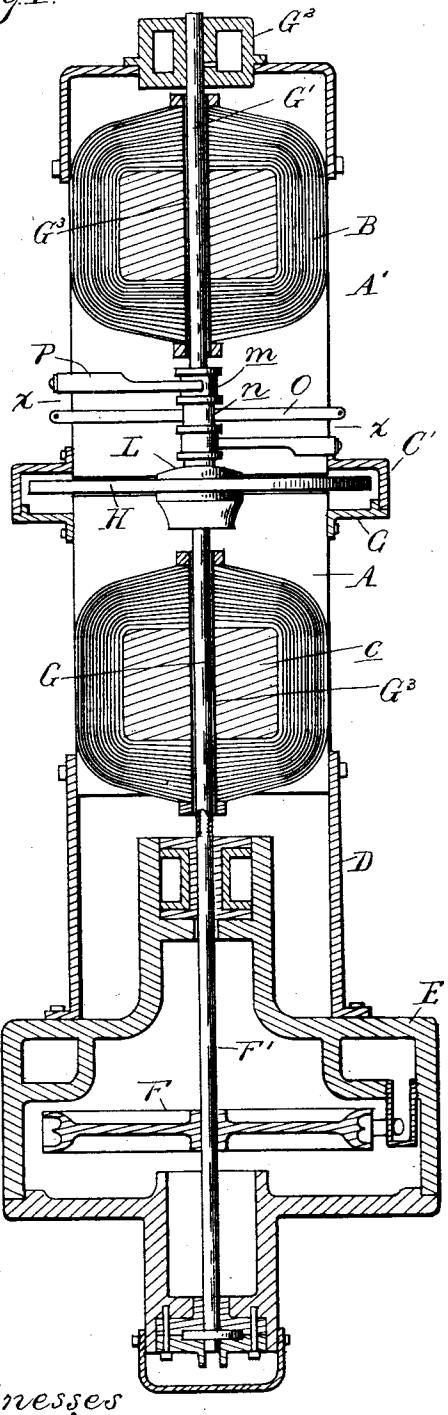


Fig. 2.

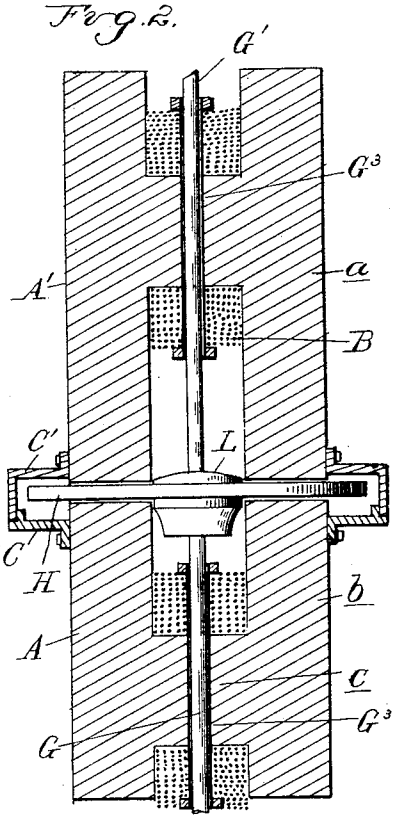
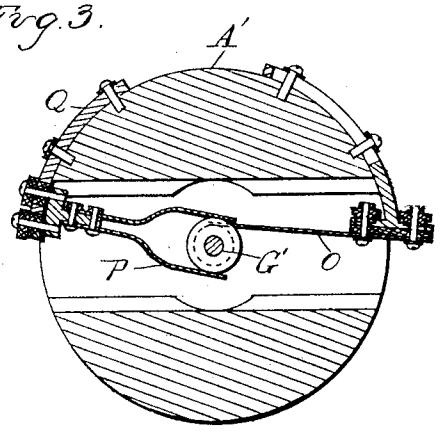


Fig. 3.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

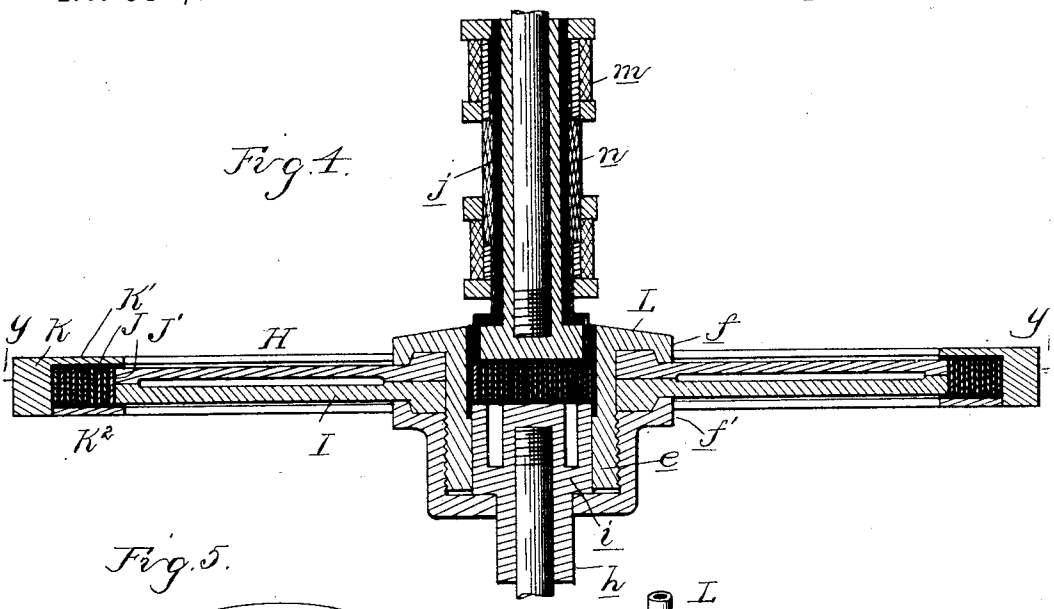


Fig. 5.

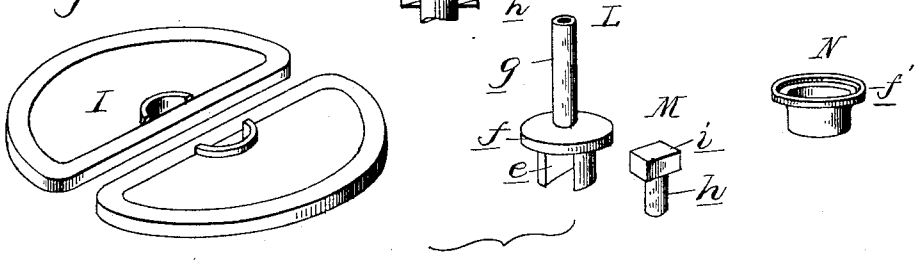


Fig. 6.

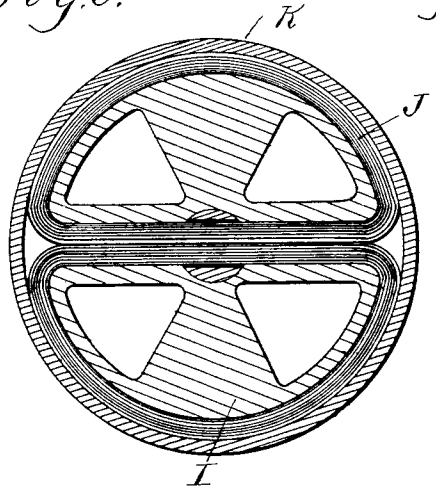
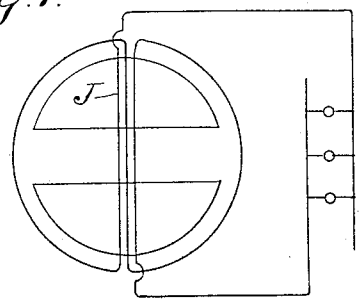


Fig. 7.



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UNITED STATES PATENT OFFICE.

JAMES F. McELROY, OF ALBANY, NEW YORK.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 536,963, dated April 2, 1895.

Application filed July 24, 1894. Serial No. 518,416. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. McELROY, a citizen of the United States, residing at Albany, in the county of Albany and State of New York, have invented certain new and useful Improvements in Dynamos, of which the following is a specification, reference being had therein to the accompanying drawings.

It is the object of my invention to produce a dynamo capable of running safely at a high rate of speed and specially designed to be used in connection with a steam turbine forming an integral part of the machine.

To this end my invention consists in the peculiar construction of the armature and in its arrangement in relation to the field magnet; further in the peculiar construction of the field magnets themselves; further in the peculiar combination of the dynamo and steam turbine all as more fully hereinafter described.

In the drawings, Figure 1 is a vertical central section through my steam turbine dynamo showing the armature in elevation. Fig. 2 is a vertical central section through the field magnets and armature at right angles to Fig. 1. Fig. 3 is a horizontal section on line *x—x*— Fig. 1 looking upward. Fig. 4 is an enlarged vertical central section through the armature. Fig. 5 is a perspective view of some of the parts of the armature as indicated by the letters of reference. Fig. 6 is a horizontal section through the armature on line *y—y* Fig. 4, and Fig. 7 is a diagram illustrating the armature winding.

A and A′ are the field magnets preferably in the form of two similar cylindrical masses of iron or steel arranged one above the other in axial line and slotted diametrically to form the segmental legs or pole pieces *a b* with a connecting portion *c*. The poles of each magnet by this construction form opposite segments of a circle.

B are the energizing coils which may be wound either about the portion *c* (as shown in the drawings) or, as in the usual manner, upon the legs *a b* and these coils are so connected that when a current is sent through them poles of unlike sign will be formed opposite each other in the two magnets. The magnets are firmly held in proper relation to each other by a non-magnetic connection such as the rings C and C′ preferably made of phosphor bronze which are bolted or otherwise connected to the magnets and to each other and form around the poles an annular casing.

D is a standard secured to the magnet A and resting upon the casing E of the steam turbine. F is the turbine wheel and F′ its shaft journaled above and below in the casing E. The armature shaft is divided by its armature into two sections the lower section G being secured in any manner to the upper end of the turbine shaft and the upper section G′ is journaled at the upper end in a bearing G^2 on the magnet A′. The shafts G and G′ pass through tubes G^3 secured in the connecting portions *c* of the magnets and extending out through the windings, said tubes being of larger diameter than the shafts.

H is an armature in the form of a wheel or disk which revolves in the magnetic field formed between the poles of the magnets. It is of the following construction:

I are segments made of wood or other light substance being preferably built up in sections and hollowed out in the center to lighten the structure. Around the periphery of these segments is wound a ribbon conductor J, of copper or other like conductor together with a ribbon S′ of insulating material, such as micanite. The segments when placed together form a circular disk having a continuous winding of the conductor crossing the disk diametrically and returning peripherally on opposite sides thereof. The segments are firmly bound together by a rim or band K, preferably made of steel having an inwardly extending flange K′ upon one side and a corresponding flange formed on the other side by a ring K^2.

The shafts G G′ are preferably secured to the disk by a clamping hub, comprising the members L, M, N (shown in detail in Fig. 5). The member L is formed with the prongs *e* adapted to pass through apertures in the segments and embrace the diametrical windings. It is also provided with an annular clamping flange *f* and a socket *g* in which the shaft G′

is secured. The member M comprises the socket *h* adapted to receive the shaft G and the squared head *i* fitting between the prongs *e* of the member L.

The member N is interiorly screw-threaded to engage with corresponding screw-threads on the projecting ends of the prongs *e* and also has a complementary flange *f'* to the flange *f* on the member L, the whole when secured together forming a strong driving connection between the shafts and the armature and providing means for holding the segments rigidly to place. Whereas I have shown and described means for securing the segments of the armature to the shaft, I do not wish to be limited to these means alone as I deem myself the first person to adopt any such method.

Around the socket *g* is placed an insulating sleeve *j* upon which are secured the collector rings *m* and the commutator *n* suitably connected with the terminals of the conductor J.

O are commutator brushes and P are the collector brushes the latter being constructed to bear upon opposite sides of the ring. The brushes are located in the slot between the poles of one of the field magnets. The brush nearest the armature may be secured to the ring C' and the others to suitable brackets Q attached to the magnet.

The parts being constructed as shown and described it is evident that upon steam being admitted to the turbine F, the latter will be revolved at a high rate of speed, for example one hundred and forty-four revolutions per second. This will cause the disk armature to revolve in the magnetic field formed between the opposite poles of the field magnets and in so doing the generating conductors which cross the field diametrically will cut the magnetic lines of force, one half of the conductor cutting in one direction and the other half in the opposite direction. As the direction of the magnetic flow is reversed upon opposite sides of the center of the field, the effect will be to generate currents of the same direction in each half of the conductor but alternating every half revolution of the disk. The return portions of the conductor passing in a semicircular path around the periphery of the disk will remain inactive, and they are preferably placed outside the circle of the field magnets to obtain the maximum effect of the magnetic lines on the active portions of the conductor.

The object of the commutator is to make the field self sustained, and to prevent any intermittent character of the current, the magnets may be made of hard iron or steel.

It will be observed that the armature has no iron. It is therefore free from the difficulties incident to revolving an iron disk in which magnetic changes are taking place, at such an extremely high rate of speed, and the periphery being formed of a band of best tool steel, can be safely relied upon to resist centrifugal action, so much the more so as the rest of the wheel is constructed to have as little weight as possible. It will be further seen that the shaft being free for a considerable length between its bearings with the armature in the center, will have sufficient flexibility to permit the armature to rotate upon its own center of gravity, and as the poles of the field magnets are in proximity to the side of the disk only, the latter is free to vibrate.

What I claim as my invention is—

1. A disk composed of two like halves, each consisting of a segment having windings crossing diametrically and returning peripherally, and an armature shaft secured to the segments, substantially as described.

2. A disk armature composed of two semicircular segments, each having generating windings crossing diametrically and returning peripherally, the two segments abutted, and an encircling clamping ring to form a rigid wheel, substantially as described.

3. A disk armature comprising the segments I, the conductor and insulating ribbons J and J' wound around said segments, and the peripheral securing band K comprising the flanges K' and ring K^2, substantially as described.

4. The combination with a disk armature comprising the segments I the conductor and insulating ribbons J and J' wound around said magnets and a peripheral band securing the parts together of a clamping hub consisting of the member L provided with the flange *f* and prongs *e*, the member M and the member N having a corresponding flange *f*, substantially as described.

5. In a dynamo the combination with two field magnets in series and arranged in axial line the poles of each forming opposite segments of a circle and the unlike poles of the two magnets opposite each other, of a disk armature revolving in the magnetic field between the magnets and arranged concentrically therewith, said armature having generating windings crossing the disk diametrically, and returning peripherally outside the circle of the poles.

6. In a dynamo the combination with two field magnets arranged with unlike poles opposite each other of an armature revolving in the magnetic field between the two magnets and an armature shaft passing through the fields and journaled in bearings outside the magnets.

7. In a dynamo the combination with field magnets formed of two diametrically slotted iron cylinders arranged in axial line having segmental poles of unlike sign opposite each other, of a disk armature revolving in the magnetic field formed between the two magnets, an armature shaft passing through the axis of the magnets and journaled in bearings outside the magnets.

8. In a dynamo, the combination with the cylindrical field magnets arranged in axial

line and diametrically slotted to form the pole pieces a a' of an armature revolving in the magnetic field between the two magnets, the armature shaft passing centrally through the axis of the magnet and journaled in bearings outside the same, and brushes located in the slot between the poles of one of the magnets, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES F. McELROY.

Witnesses:
H. J. NODINE,
W. P. EDDY.