(No Model.) 2 Sheets—Sheet 1.

A. HARDING.

DYNAMO ELECTRIC MACHINE.

No. 385,458. Patented July 3, 1888.

Fig. 1.

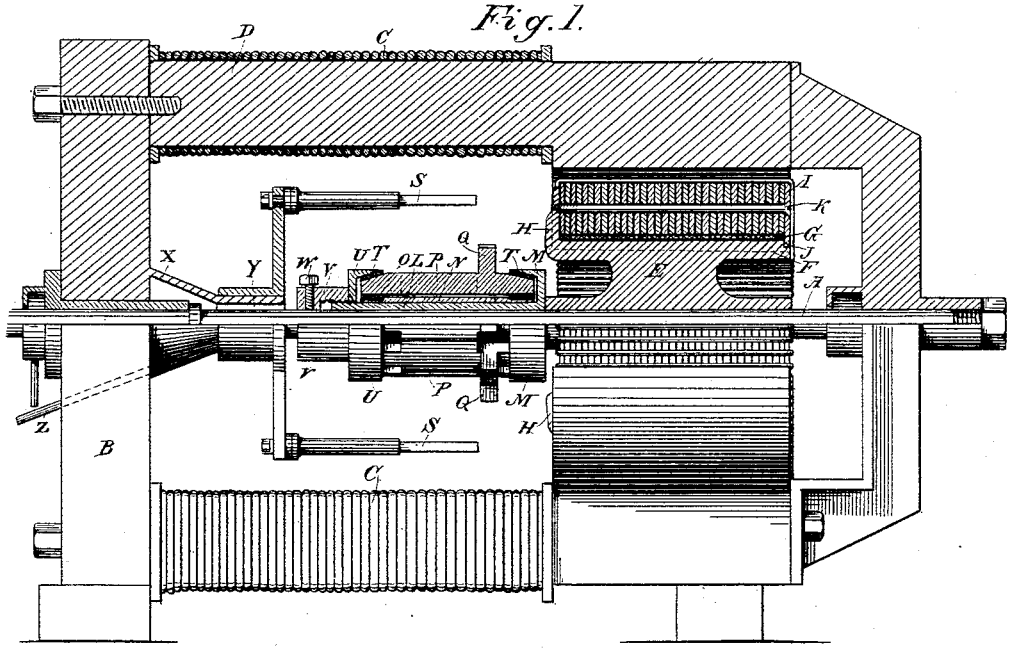


Fig. 2.

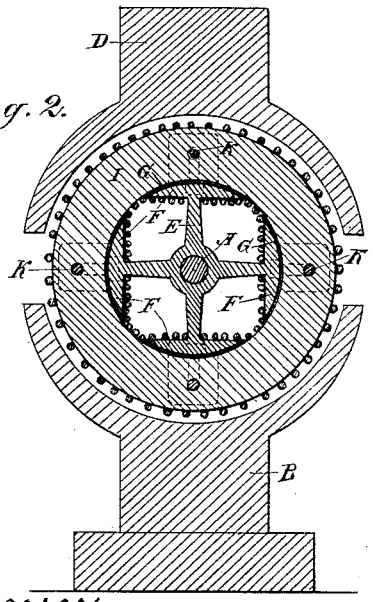
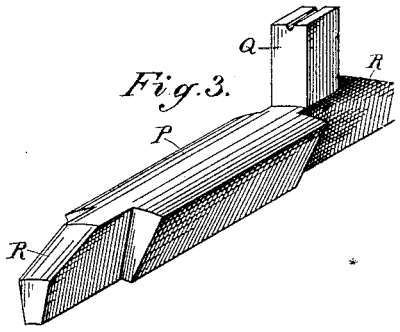


Fig. 3.



Witnesses,
Geo. H. Strong.
J. H. Bruce.

Inventor,
Aug. Harding.
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attys.

(No Model.) 2 Sheets—Sheet 2.

A. HARDING.

DYNAMO ELECTRIC MACHINE.

No. 385,458. Patented July 3, 1888.

Fig. 4.

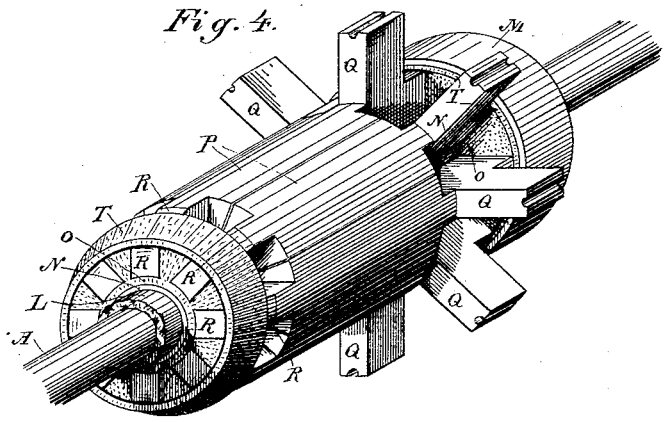


Fig. 5.

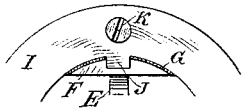
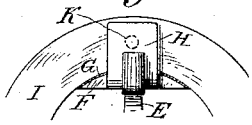


Fig. 6.



Witnesses,
Geo. H. Strong.
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By Dewey & Co.
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UNITED STATES PATENT OFFICE.

AUGUST HARDING, OF OAKLAND, CALIFORNIA.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 385,458, dated July 3, 1888.

Application filed June 11, 1887. Serial No. 241,076. (No model.)

To all whom it may concern:

Be it known that I, AUGUST HARDING, of Oakland, county of Alameda, State of California, have invented an Improvement in Dynamo-Electric Machines; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to certain improvements in the construction of dynamo-electric machines; and it consists of certain details, which will be more particularly described by reference to the accompanying drawings, in which—

Figure 1 is vertical elevation of the half of the machine below the horizontal axis and a vertical central section of the half above the axis. Fig. 2 is a transverse vertical section taken through the revolving armature. Fig. 3 is an enlarged perspective view of one bar of the commutator. Fig. 4 is an enlarged perspective view of the commutator. Figs. 5 and 6 are front and rear end views of the armature, showing its attachment to the spider.

The object of my invention is to provide an improved and convenient construction of the frame of the revolving armature and of the commutator-sections, so that the parts may be easily separated or assembled. The different parts of the armature are perfectly and completely separated from each other, and the commutator by its construction overcomes the common difficulty of short-circuiting.

A is the horizontal shaft, which extends through and is supported upon the frame-work B, being properly journaled at opposite ends. These ends are made separate from the horizontal portions which carry the field-magnets, and are bolted to them, as shown.

C C are the "field-magnets," so called, the coils of which are wound upon the horizontal bars D to any desired thickness, although in the present case I have only shown one layer each for the field-magnets and for the revolving armatures.

E is the spider, which is made of any non-magnetic materials, as brass or bronze, and is keyed upon the shaft A, so that its arms project radially and serve to support the rings of which the armature is formed. Upon the ends of the arms E of the spider are formed the segmental plates F, and upon the exterior of these plates is placed a non-conducting substance, G. The rear end of the spider has the arms turned up, as shown at H, to serve as an abutment against which the rings I are supported, and also to serve as an attachment to receive the screw-bolt which enters these arms, and thus holds the rings in place.

The rings I, of which the armature is formed, slip over the arms of the spider, the rear or inner one abutting against the upturned ends H, and the others following in succession, as shown in Fig. 1, until the outer or front end has been reached. The outer ring is formed with inwardly-projecting lugs J, which enter corresponding notches in the end F, and thus prevent them from turning round. The bolts K are then passed through the rings corresponding in position with each of the arms E of the spider, and the inner ends of the bolts screw into the upturned ends H, as before described. As the inner edges of these rings I rest upon the insulating material G, which is placed upon the segments F, it will be seen that they are very perfectly insulated from the spider and shaft and its connections.

The commutator is made as follows: Upon the shaft A, near the rear end of the revolving armature just described, is fixed a sleeve, L, having the end nearest the armature turned over to form a sort of cap, M, the interior of which shows an inclined face. This cap may, if desired, be made separate from the sleeve and fixed thereto. Outside the sleeve L is a second sleeve, N, the ends of which have a smaller outside diameter than the central portion, and upon these ends the slotted insulating-rings O are placed. The commutator-sections P are made, as plainly shown in Figs. 3 and 4, having an upwardly-projecting arm, Q, on each, to which the wires from the armature are soldered. The sections P are made in the form of sectors in transverse section, but the ends are made considerably narrower than the central portion, as shown at R, and these ends fit into and are supported by the slotted insulating-rings O, before described. When these sectors have been laid around the central portion as closely together as it is intended to have them stand, there will be considerable spaces left between the extensions R at each end, and this admits air between

these parts and prevents their becoming loaded with dust or foreign matter, so as to interfere with or spoil the insulation. These projecting ends R fit in the slotted insulating-rings at the ends of the sleeve N, and the central portions of the sectors P are slightly separated from each other, so that as the commutator revolves the stationary brushes, which are supported upon the arms or holders S and which rest upon the periphery of the commutator, will take the electric current from each of the sections successively as they pass. Outside of the ends R, which are beveled or inclined, as shown, are placed the insulating-pieces T, and it will be seen that when the ends of the sectors P are forced into the cap M they will be firmly held in place and at the same time completely insulated. At the opposite end is a similar cap, U, which fits over that end of the inclined portions R of the commutators, and the whole is forced together by means of a sleeve, V, which screws upon the inside sleeve, L, thus drawing the parts firmly together. This collar V may be held after being screwed up by a set or lock nut, W. From the upright portion of the frame B a cone or tapering shell, X, extends toward the commutator a short distance and then has its end made cylindrical and extended parallel and near the shaft, as shown at Y, and upon the outside of this sleeve are fixed the arms which support the brush-holders S. The conical portion of this shell, which increases in diameter toward the frame B, has an inclined duct or passage, Z, connected with its lower portion, through which any oil which may fall from the journal-boxes will be carried off and discharged outside the machine, and thus prevented from falling upon the coils and spoiling the insulation or doing other damage.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a dynamo-electric machine, the spider formed of non-magnetic material having the radial arms of narrow cross-section in the direction of rotation, and having the expanded plates or segments at their outer ends with an exterior coating of insulating or non-conducting material, in combination with the independent armature rings or disks having their peripheries resting upon the non-conducting material upon the exterior of the segments, and the insulating-wire wound around the disks, substantially as herein described.

2. The spider composed of radial arms having outwardly-turned portions at one end and provided with the cylindrically-curved segments extending from one end to the other of the arms, with an insulating material upon the periphery of the segments, in combination with the independent rings or disks fitting outside the segments and separated therefrom by insulating material, the front end disk being provided with lugs which enter corresponding depressions at that end of the spider to prevent it from turning upon the same, and bolts extending through the rings and screwing into the upturned flanges at the rear end to hold them in place, substantially as described.

3. A commutator consisting of independent sectors surrounding a common center, having the ends or extensions R made thinner than the central portion, with which the brushes form contact, and slotted insulated rings supporting the ends, so that air-spaces are formed between them, substantially as described.

4. In a dynamo-electric machine, the commutator consisting of independent sectors having their ends reduced in the direction of the commutator circumference and supported in slotted insulated rings, with insulating material upon the outside of these ends, in combination with a fixed hollow cap having an inclined inner face, in which one end of the sectors are forced, and a movable cap having an inclined inner face for receiving the opposite ends of the sectors, substantially as herein described.

5. Commutator-sections having tapered ends reduced in the direction of the commutator circumference, a fixed and a movable cup-shaped cap having each an inclined face for receiving the tapering ends, and the slotted insulating-rings, in combination with a screw collar or sleeve bearing against the movable cap and locking and holding the sections in place, substantially as herein described.

In witness whereof I have hereunto set my hand.

AUGUST HARDING.

Witnesses:
S. H. NOURSE,
H. C. LEE.