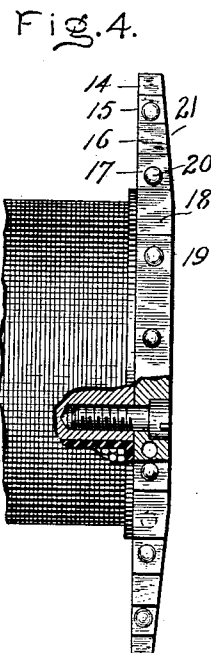
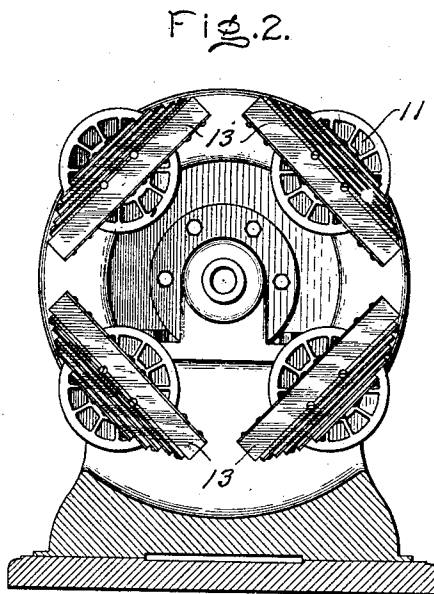
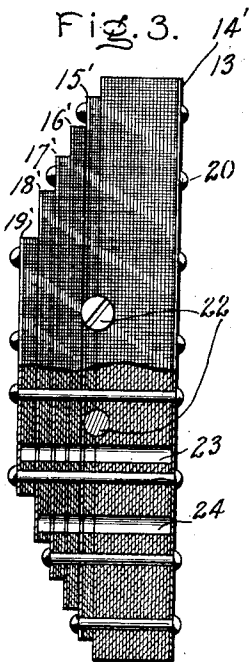
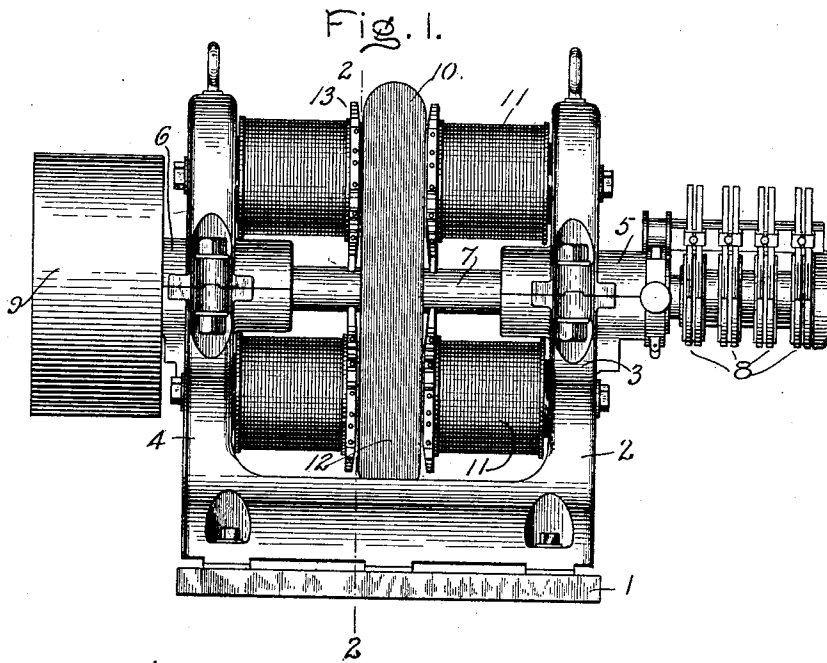


C. M. GREEN.
DYNAMO ELECTRIC MACHINE.
APPLICATION FILED NOV. 8, 1904.

905,814.

Patented Dec. 1, 1908.



WITNESSES:

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UNITED STATES PATENT OFFICE.

CHARLES M. GREEN, OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

DYNAMO-ELECTRIC MACHINE.

No. 905,814.

Specification of Letters Patent.

Patented Dec. 1, 1908.

Original application filed August 12, 1903, Serial No. 169,176. Divided and this application filed November 8, 1904, Serial No. 231,849.

To all whom it may concern:

Be it known that I, CHARLES M. GREEN, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Dynamo-Electric Machines, of which the following is a specification.

The object of my present invention is to improve the construction of dynamo electric machines.

More particularly my invention relates to constant current generators of the well known type called Brush machines or Brush are light machines, though all of the features of my invention are not limited to such machines.

My invention consists in certain novel features of construction and arrangement which will be pointed out in the claims annexed to and forming a part of this specification.

For a better understanding of my invention reference may be had to the accompanying drawings in which I have illustrated one embodiment of my invention.

Of the drawings, Figure 1 is an elevation of a dynamo electric machine in which my invention is embodied; Fig. 2 is a section taken on the line 2 2 of Fig. 1, and Figs. 3 and 4 are views showing the details of construction of the pole pieces.

In the particular form of my invention which I have illustrated in the drawings, I have shown a dynamo electric machine known as the Brush machine.

Referring to the drawings, 1 represents a base of suitable construction on which the generator frame 2 proper is adjustably mounted. Bearing blocks 5 and 6 carried by end portions 3 and 4 of the frame 2 support suitable bearings in which the tubular shaft 7 is mounted. This shaft carries at one end suitable commutator members 8 and at the other end a power-receiving pulley 9. The shaft also carries intermediate its ends an armature 10 which revolves between pole pieces 11 which project inwardly from the upper extensions 3 and 4 of the frame 2. As is well known, in Brush machines the

opposing field poles on opposite sides of the armature are of the same polarity, adjacent poles on the same side of the armature being of different polarities.

The armature 10 is of the well known type ordinarily employed in the Brush machine, the core of the armature being formed of magnetic material arranged in layers concentric with the armature shaft. The armature proper is inclosed by a shield 12. This shield is claimed in my application for Letters Patent covering improvements in dynamo electric machines, Serial No. 169,176, filed by me on the 12th day of August, 1903, of which my present application is a division.

The pole pieces between which the armature rotates may be the ordinary construction for machines of this character but I prefer to modify the pole tips or shoes which in this type of machine extend laterally from the field pole proper a considerable distance in the following manner: Each pole tip 13 comprises a number of parallel sections 14, 15, 16, 17, 18 and 19. Each section is composed of a number of laminae of magnetic material, the planes of the laminae being all parallel to the axis about which the armature rotates and tangential to circles described about the axis of revolution of the armature and passing through the middle points of the laminae. The sections forming one pole tip or shoe differ in size from each other, the section 14 being the longest and the section 19 the shortest, and the intermediate sections are arranged progressively between the sections 14 and 19 so that a row of steps is formed at each end of the pole tip giving the effect of a tapered pole tip. Rivets 20 secure the sections together. Stiffening strips 14', 15', 16', 17', 18' and 19' are placed at one side of the sections 14, 15, 16, 17, 18 and 19 respectively. The laminae composing the sections are shaped so that the thickness of the ends of the pole tips are tapered as shown at 21 in Fig. 4 to increase their reluctance. The pole tips are secured to the body of the pole pieces by bolts 22 which are threaded into the ends of the pole pieces. The heads of

these bolts are let into the laminated pole tip so that the outer ends of the bolt heads are flush with the face of the pole tip.

In order to obtain a proper distribution of magnetic flux in the pole tips of the shoe I have formed one pair each of channels or spaces 23 and 24 in each end of each pole shoe. These channels extend perpendicularly through the laminae of the pole shoe. Channels 23 are symmetrically placed one on each side of the middle of the pole shoe and are separated from the middle of the pole shoe by about one-third of the distance between the middle of the shoe and the end of the shoe. The channels 24 are also symmetrically placed on opposite sides of the middle of the shoe, being located about midway between the middle of the shoe and the ends of the shoe. The channels are preferably cylindrical in cross-section and are of a diameter somewhat greater than half of the thickness of the portions of the pole shoe at which they are located. The material reduction in the cross-section of the shoe at these portions tends to throttle the flux tending to flow in a direction parallel to the plane of the armature rotation. A reduced cross-section of the shoe at the portions at which the channels are located insures that the magnetic material of the shoe shall be quite highly saturated with magnetism at these points. If it is found that the throttling action produced by these channels is too great in any particular design, it may be reduced by partially filling the channels with magnetic material.

The use in dynamo electric machines of pole shoes of laminated material materially reduces the core losses of the machine, as is well known. This is especially true of machines of the type hereinbefore described and illustrated, on account of the disposition of the magnetic circuit of the armature and the flow of the current in the armature conductors. Prior to my invention, however, so far as I am aware, no machines of this character have been provided and successfully operated with laminated pole shoes, owing to the peculiar difficulties experienced in the commutation and regulation of machines of this character. With the pole shoe constructed in accordance with my invention, however, I am able to obtain the characteristic regulation desired in machines of this character and to properly commutate the currents flowing in the armature conductors. These results are obtained largely, I believe, by the use of the channels 23 and 24 which throttle the flux flowing parallel to the face of the pole shoe insure a magnetic saturation of the pole shoe at the portions where the channels are located, thus insuring a distri-

bution of flux which is suitable for proper commutation and will produce proper regulation of the machine.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a machine of the character described, a revolving armature, and a pole shoe at one side of said armature, said shoe being laminated perpendicularly to the plane of revolution of the armature and the laminae having their permeability reduced in certain portions.

2. In a machine of the character described, a revolving armature, and a pole shoe at one side of said armature, said shoe being formed of magnetic material laminated perpendicularly to the plane of revolution of the armature and having throttling spaces formed in the laminae.

3. In a machine of the character described, a revolving armature, and a pole shoe at one side of said armature, said shoe being formed of magnetic material laminated perpendicularly to the plane of revolution of the armature and having throttling channels formed in the magnetic material, said channels extending perpendicularly to the laminae.

4. In a dynamo electric machine, a revolving armature, and a pole shoe at the side of said armature, said pole shoe comprising laminae of magnetic material arranged in sections, said laminae being tangential to circles described about the axis of revolution of the armature and passing through the middle points of the laminae, the sections being of different lengths whereby a pole shoe is formed having tapered ends.

5. In a machine of the character described, a revolving armature, and a pole shoe therefor composed of laminae of magnetic material arranged in sections, each lamina being in a plane perpendicular to a line passing from its middle point to intersect the axis of revolution of the armature at right angles, the sections being of unequal length and arranged to form tapered pole shoe tips.

6. In a machine of the character described, a revolving armature, a plurality of pole-pieces on each side of the armature, each pole-piece on one side of the armature facing a pole-piece on the opposite side of the armature of the same polarity, and adjacent pole-pieces on the same side of the armature being of different polarities, a pole shoe for each of said pole-pieces, each of said pole-shoes consisting of a number of sections of laminae of magnetic material, said sections varying in length and being arranged to form a pole-shoe having tapering tips.

7. In a machine of the character described, a revolving armature, a plurality of pole pieces on each side of the armature, each

pole piece on one side of the armature facing
a pole piece on the opposite side of the ar-
mature of the same polarity and adjacent
pole pieces on the same side of the armature
5 being of different polarities, a pole shoe for
each pole piece, each pole shoe consisting of
a number of sections of laminæ of magnetic
material, said sections varying in length and
being arranged to form a pole shoe having

tapering tips which extend laterally a con- 10
siderable distance from the pole piece.

In witness whereof I have hereunto set
my hand this 3rd day of November, 1904.

CHARLES M. GREEN.

Witnesses:

JOHN A. McMANUS, Jr.,
DUGALD McK. McKILLOP.