H. A. BALCOME.

DYNAMO ELECTRIC MACHINE.

APPLICATION FILED JULY 1, 1907.

911,364.

Patented Feb. 2, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

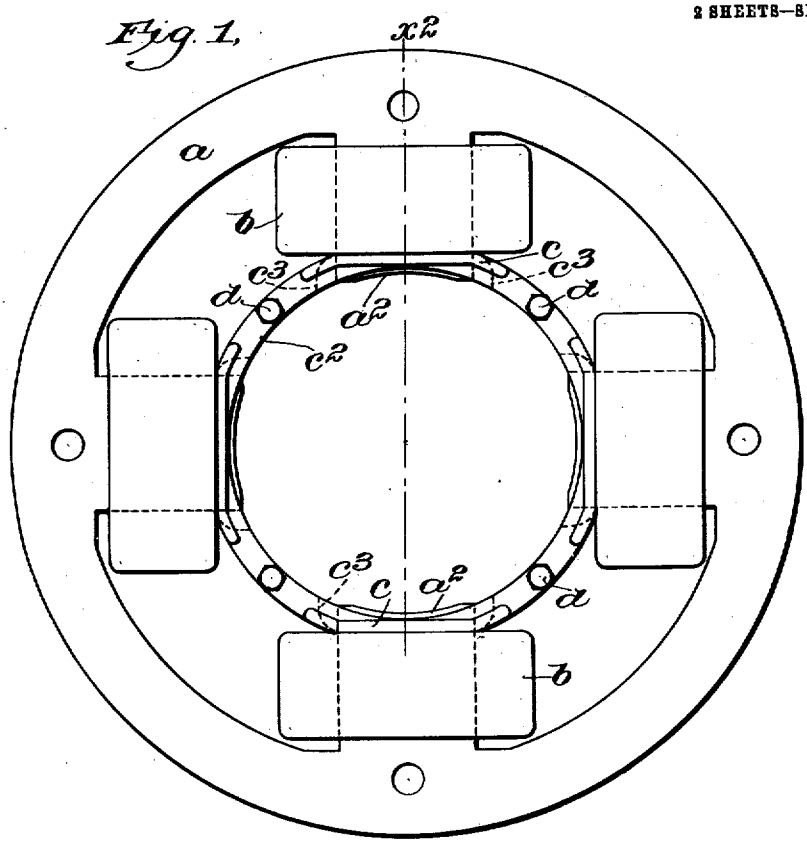
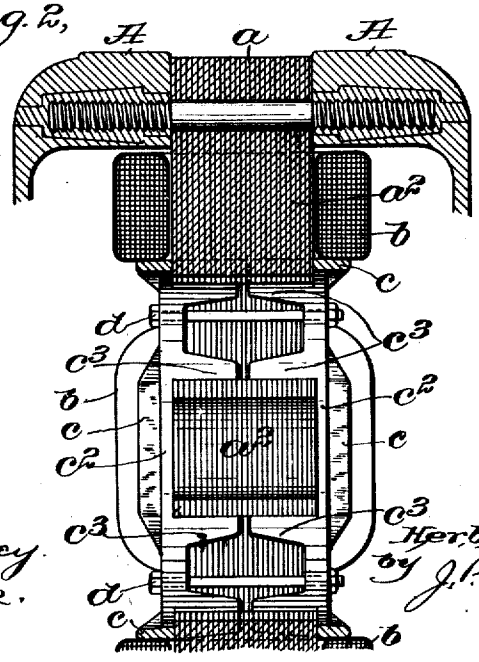


Fig. 2.



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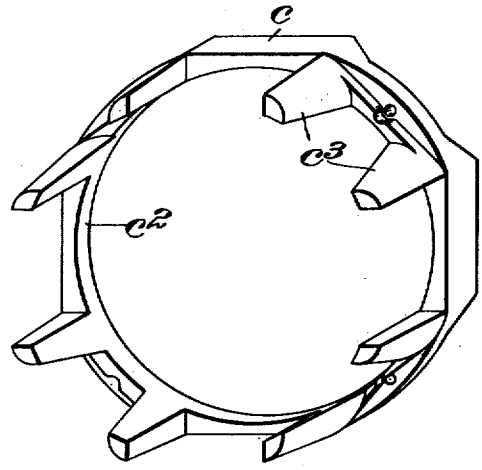
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Fig. 3.



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UNITED STATES PATENT OFFICE.

HERBERT A. BALCOME, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO HOLTZER-CABOT ELECTRIC COMPANY, A CORPORATION OF MASSACHUSETTS.

DYNAMO-ELECTRIC MACHINE.

No. 911,364. Specification of Letters Patent. Patented Feb. 2, 1909.

Application filed July 1, 1907. Serial No. 381,622.

To all whom it may concern:

Be it known that I, HERBERT A. BALCOME, a citizen of the United States, residing in Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Dynamo-Electric Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The present invention relates to an electric motor, the purpose of the invention being to produce a motor which will deliver the greatest amount of energy or power, with the least possible expenditure of material and labor in its construction.

In order to accomplish this end, it is necessary that all the material used should be the most efficient for the particular duties which it is designed to perform. Soft or low carbon steel is commonly used for the field magnets of such motors, but on account of the long delay necessary to obtain this, the great cost of machining, and the general unsatisfactory results attending the use of this metal for small or medium size motors, it is desirable to use some other metal. Cast iron, often used, does not fill the requirements on account of the low magnetic efficiency per unit of weight, so that the only other metal which can be used is wrought iron.

It is the usual practice to use wrought iron for the core of the armature, this being laminated in the form of sheets assembled together until the required volume of iron is obtained. The use of wrought iron for the field, however, if made in the form of a forging is very expensive, so that in order to reduce the cost of construction, it is desirable to employ some practicable method of building the field of iron sheets as laminæ which may be stamped out to shape in a press and then assembled together. It is a fact, moreover, that within certain limits the output and efficiency of an electric motor armature depends on the amount of copper which there is in its construction, that is, the percentage of copper to iron, the output increasing with the increase in percentage of copper. In order that the percentage of copper may be great, it is necessary that the slots or channels in the core for the reception of this copper should be as large as possible, but as it is undesirable for practical reasons to increase the depth of the slots more than is necessary, it is desirable to make the slots as wide as possible. Armatures having wide slots, however, cannot be operated in a magnetic field having plain polar projections without vicious sparking, heating, etc., and it becomes necessary that some special formation be resorted to in order to give such magnetic flux distribution as shall nullify the effects usually produced by wide slots.

To make such a polar formation an integral part of the field stamping is impracticable, as it is impossible to get the field or exciting coils on the polar projections over such formation without increasing the size of the motor as a whole. It becomes necessary, therefore, to utilize a detachable polar formation or shoe which may be readily attached in close magnetic proximity to the stamped pole extremities after the field exciting coils are in position, and the present invention is embodied in a construction which provides for the desired polar formation, at the same time preserving all the advantages above described, the construction also having other advantages which will be hereinafter pointed out.

Figure 1 is a side elevation of the field core of a four-pole motor completely assembled: Fig. 2 is a vertical section on line x^2 of Fig. 1, showing also a portion of the motor frame: and Fig. 3 is a perspective view of one of the rings which forms the polar extensions.

The particular construction herein chosen for illustration is the same as that shown and described in an application filed by me July 1, 1907, Serial No. 381,621, and, for convenience, the main part of the motor frame, together with the armature and armature support, are omitted from the drawings, since those parts do not enter into the present invention, and do not need to be shown for the proper understanding thereof.

The field core is made up of the laminæ a cut to form the polar extremities a^2 and adapted to be clamped together between the side members A of the motor frame, as indicated in Fig. 2. These side members constitute the main frame of the motor which carries the field, the armature bearings, and other parts, and the members are held together with the laminæ which constitute the field core between them by cross members

A^2 which are shown as held in place by masses of Babbitt metal A^3. The polar extremities a^2 receive the coils b in the usual way, the construction thus far described not differing in general arrangement from that of motors heretofore manufactured.

In order to extend the polar extremities beyond the laminæ so as to obtain a gradually decreasing and increasing magnetic strength as the change is made from one polarity to the other, the motor is provided in accordance with the present invention with the polar extensions c which are formed in annular members or rings c^2 having projecting portions c^3 which project inward towards each other from opposite sides along the edges of the laminated polar extremities. These rings are placed in position at opposite sides of the field core, as best shown in Fig. 2, and are clamped together by means of transverse bolts d which not only hold them firmly in position, but also clamp the laminated polar extensions firmly in place, thereby preventing the laminæ from setting up vibrations. The portions c and c^3 form enlarged and extended polar faces which approach each other, the main body of the ring constituting a magnetic conductor from one pole to the other which, however, is not objectionable, but rather assists in affording a wave form of magnetic change from one polarity to the other. This construction admits of building up a laminated wrought iron field, the laminæ being cut with straight polar projections over which the field coils can be slipped into place, the necessary extended polar pieces being supplied by the annular members which also serve to clamp all the parts together and to hold the coils in place. This admits of the use of an armature having wide slots capable of containing a large percentage of copper so as to produce a very efficient motor, the field construction, however, being such that this type of armature can be employed without sparking when the motor is running under a heavy load.

A further advantage of this construction consists in the fact that motors of different capacity can be produced by simply varying the number of laminæ in the field and armature, using identically the same frame and ring castings.

Claims.

1. In an electric motor, the combination with a laminated field core provided with polar extremities; of extended pole pieces formed on annular members at opposite sides of the field core; and means for clamping said members together with the laminæ of the field core between them.

2. In an electric motor, the combination with a laminated field core provided with polar extremities adapted to receive coils; of annular members at opposite sides of said field core, said members being provided with extended portions to form pole faces; and transverse clamping members to hold said annular members in position with the polar extremities clamped between them.

3. In an electric motor, the combination with a laminated field core provided with polar extremities; of annular members at opposite sides of said field core provided with projections extending towards each other at opposite sides of the polar extremities, said members also being provided with an enlarged portion to afford polar extensions; and means for clamping said annular members together, and to the field core, substantially as described.

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

HERBERT A. BALCOME.

Witnesses:
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W. E. COVENEY.