

A. CHURCHWARD.
ELECTRICAL APPARATUS.
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1,224,602.

Patented May 1, 1917.

Fig. 3.

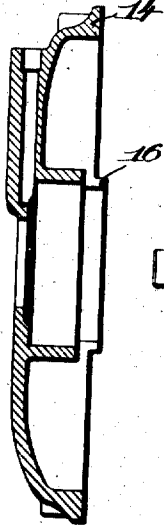


Fig. 1.

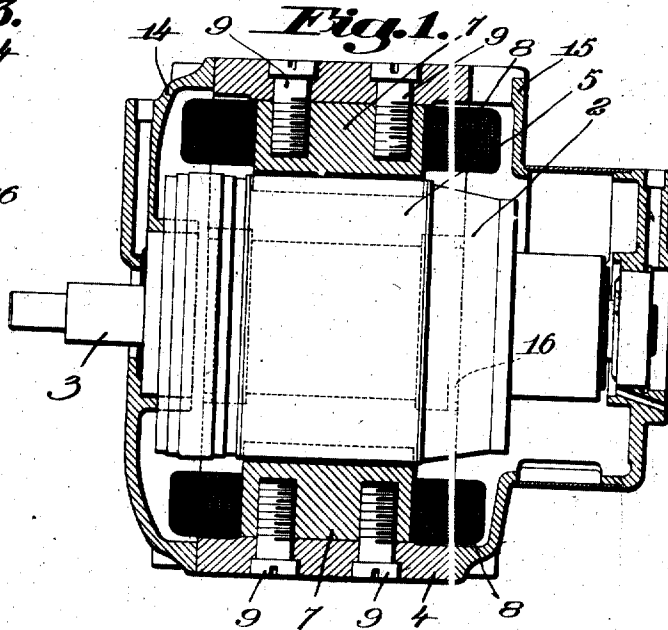


Fig. 2.

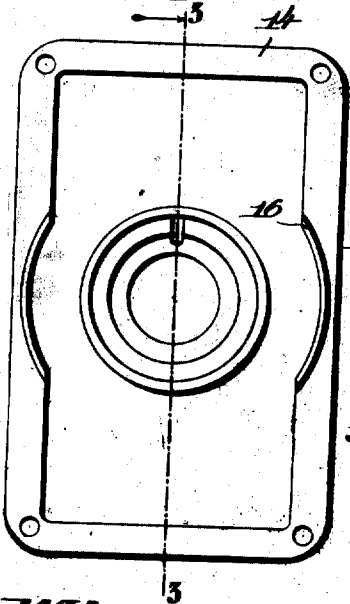


Fig. 4.

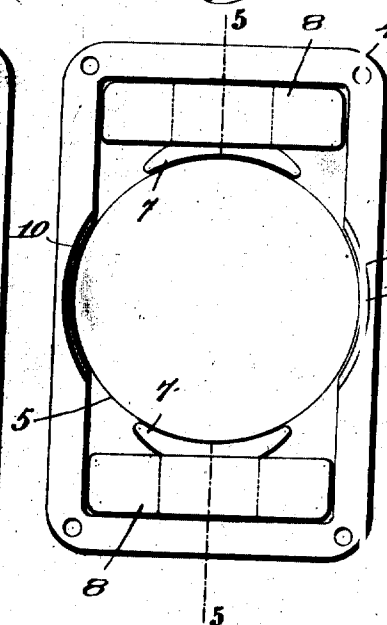
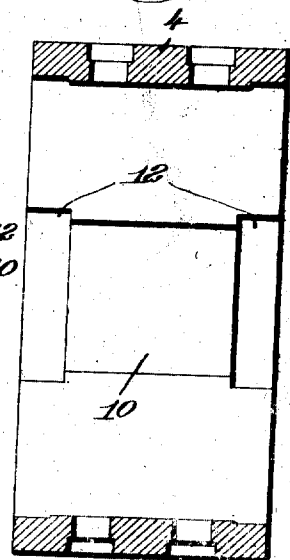


Fig. 5.



Witness

Electrical S. Greenleaf

Inventor

Alexander Churchward
by his attorney
C. H. Phelps, New York

UNITED STATES PATENT OFFICE.

ALEXANDER CHURCHWARD, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO A-B-C STARTER COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

ELECTRICAL APPARATUS.

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To all whom it may concern:

Be it known that I, ALEXANDER CHURCHWARD, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Electrical Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to electrical apparatus and more particularly to electric motors or generators comprising a revolving armature and a stationary field.

It is desirable with this type of apparatus, and more particularly in the smaller units that the electric motor or generator shall be simple and compact in its construction and have a minimum number of parts to enable the apparatus to be constructed at a comparatively low cost and obtain a finished product which is light in weight and occupies a minimum of space.

The object of the present invention is to provide certain new and useful improvements in the construction of a motor or generator of this type having a revolving armature and a stationary field, tending to lessen the cost of manufacture and to produce a superior article.

With this object in view the several features of the invention consist in certain novel features of construction, combinations and arrangements of parts hereinafter described and claimed, the advantages of which will be obvious to those skilled in the art from the following description.

In the accompanying drawings illustrating the preferred form of the invention; Figure 1 represents a plan view partly in section of a motor or generator embodying the several features of the invention; Fig. 2 is a front elevation of one end piece removed from the machine; Fig. 3 is a section in elevation of the end piece taken upon the line 3—3 of Fig. 2; Fig. 4 is a side elevation of the rectangular frame carrying the pole piece; and Fig. 5 is a section in elevation of the frame taken upon the line 5—5 of Fig. 4.

The present invention contemplates certain improvements in the construction and arrangement of the stationary pole pieces enclosing the revolving armature in order

to lessen the cost of manufacture of the apparatus and to provide a construction which is compact and light in weight. To this end the revolving armature is inclosed by a frame having recesses formed in its opposite faces to provide curved surfaces located in proximity to the moving surface of the armature and forming pole pieces for the armature. In order to limit the magnetic field to the effective length of the armature the recesses are counter-bored in order that the curved surface forming each pole piece shall terminate at the end of the armature and leave beyond a free space between the frame and armature to form a suitable air gap.

In the illustrated embodiment of the invention an armature 2 is carried upon a shaft 3 and revolves within a frame 4. The effective length of the armature may be considered as the substantially cylindrical portion of the armature formed by the iron core of the armature, and indicated at 5, in Fig. 1. The present machine is a four pole machine, two of the poles being formed by pole pieces 7 which are surrounded by electrical windings 8, and these pole pieces are secured by set screws 9 upon the ends of the frame which is substantially rectangular in form, as shown clearly in Fig. 4. The other pole faces are conveniently formed by providing recesses 10 which extend in a lengthwise direction throughout opposite sides of the frame to provide curved surfaces located in proximity to the moving surface of the armature and substantially concentric therewith. The length of the curved surfaces is made to coincide substantially with the effective length 5 of the armature by providing counter-bored portions 12 extending inwardly from the opposite ends of each recess, as shown clearly in Figs. 2 and 5. These counter-bored portions serve the dual function of providing a sufficient air gap between the ends of the armature and the iron frame to prevent the magnetic field extending beyond the pole faces proper, and at the same time serve to guide the end pieces and position them properly with relation to the frame and armature. The rectangular frame is formed of iron or other magnetic material and the end pieces indicated respectively at 14 and 15 are formed of aluminum or other suitable non-magnetic material. The end pieces provide

bearings for the armature shaft 3 and are positioned properly with relation to the frame and armature by pilot members 16 which project from the end pieces and are received closely in the counter-bored portions of the frame 4, as shown clearly in Fig. 1. As the end pieces are formed entirely of non-magnetic material the insertion of the pilot members into the counter-bored portions 12 does not tend to distort the magnetic field.

While it is preferred to employ the specific construction and arrangement of parts shown and described, it will be understood that this construction and arrangement is not essential except so far as specified in the claims, and may be changed or modified without departing from the broader features of the invention.

The invention having been described, what is claimed is:—

1. A motor or generator comprising a revolving armature, a frame inclosing the ar-

mature and having recesses formed in the opposite faces to provide pole pieces for the armature, counter-bored portions extending inwardly from adjacent ends of the recesses, an end piece, and pilot members projecting from the end piece and arranged to engage within the counter-bored portions of the recesses to position the end piece properly with relation to the frame and armature.

2. A motor or generator comprising a revolving armature, a frame of magnetic material inclosing the armature and having recesses formed in its opposite faces to provide pole pieces for the armature, counter-bored portions extending inwardly from the ends of the recesses, an end piece of non-magnetic material, and pilot members projecting from the end piece and arranged to be received in the counter-bored portions of the recesses to position the end piece with relation to the frame and armature.

ALEXANDER CHURCHWARD.