No. 687,991. Patented Dec. 3, 1901.

A. CHURCHWARD.

DYNAMO FRAME.

(Application filed June 12, 1899. Renewed June 28, 1901.)

(No Model.)

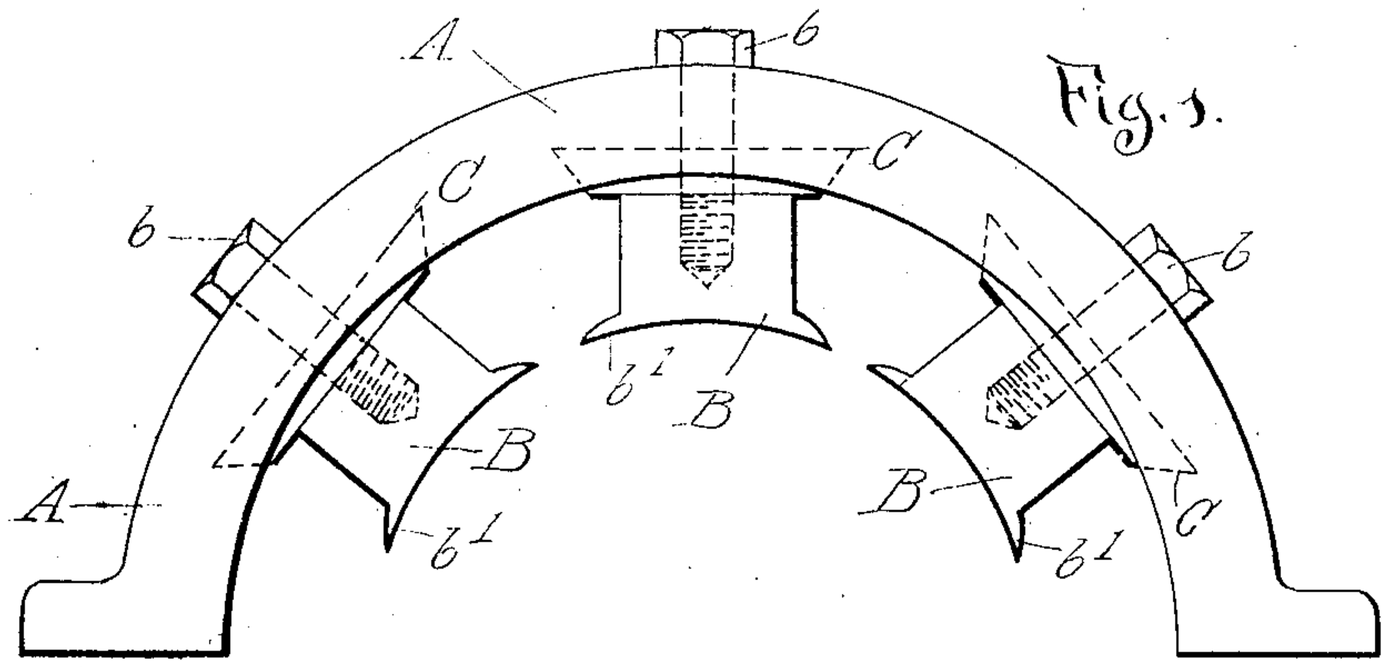

Fig. 1.

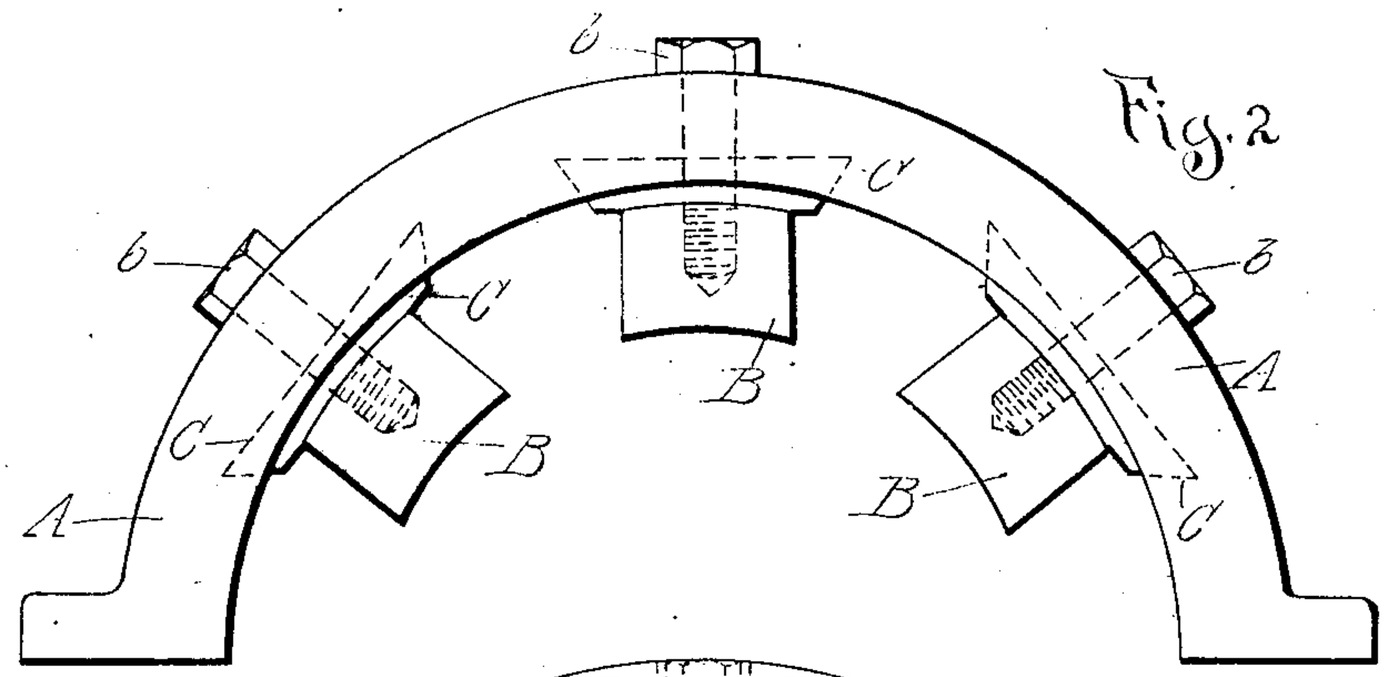

Fig. 2

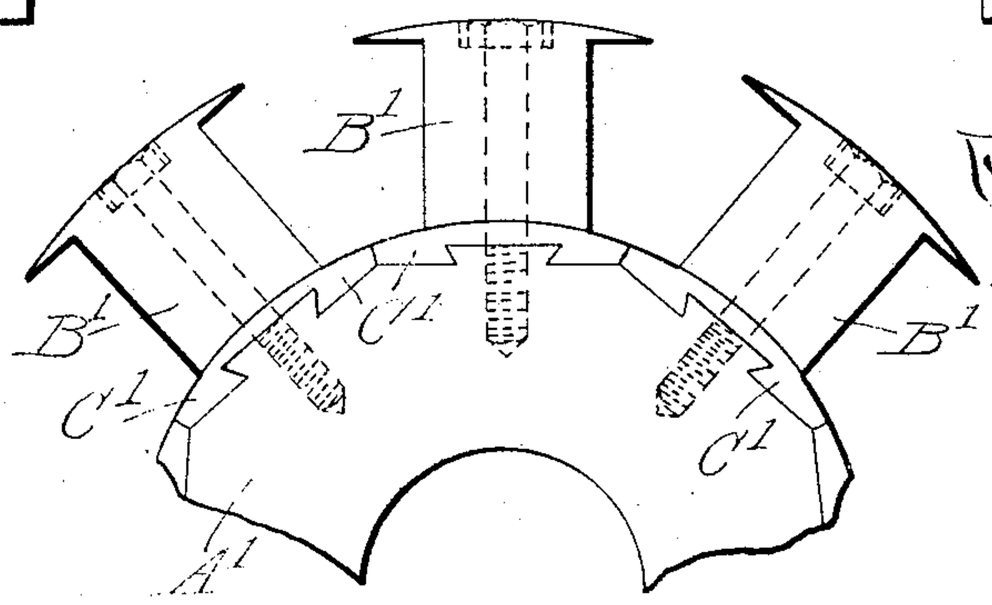

Fig. 3.

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UNITED STATES PATENT OFFICE.

ALEXANDER CHURCHWARD, OF CHICAGO, ILLINOIS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

DYNAMO-FRAME.

SPECIFICATION forming part of Letters Patent No. 687,991, dated December 3, 1901.

Application filed June 12, 1899. Renewed June 28, 1901. Serial No. 66,392. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER CHURCHWARD, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Dynamo-Frames, of which the following is a specification.

This invention relates to improvements in the frames or field-castings of dynamo-electric machinery, and has for its object to provide an improved composite cast and wrought iron or steel construction possessing both electrical and mechanical or structural advantages over the previous art in this line. It is well known that cast-iron yokes or fields give the best results in regard to regulation, are cheaper, more easily worked, and make more perfect castings. The permeability of cast-iron, however, is not high enough to warrant its use in many cases for the pole-pieces, which are better made of wrought or laminated iron or cast-steel, having high permeability; but when such poles are used in connection with cast-iron frames or yokes provision must be made for an area of contact at the juncture of the pole-piece with the yoke or field-casting much greater than the area of the pole-piece, it being clear that as cast-iron is practically saturated at fifty thousand lines of force per square inch, while wrought or laminated iron or steel does not become saturated at much less than twice that amount, an area of contact between the two materials equal to about twice the area of the wrought-iron must be provided in order not to overtax the capacity of the cast-iron. By present methods the pole-pieces are often cast into the yoke; but this is not always satisfactory, as the joint between cast-iron and wrought or laminated iron cast into it is liable to be so poor as to require an excessive amount of copper to force the magnetism through it and as it is frequently desirable to be able to remove the poles from the frame for convenience in shipping and erecting or repairing. It is also customary to bolt separate pole-pieces to the yoke and provide the increased area of contact by an enlargement or flange at the base of the pole-piece. This, however, renders it impossible to wind the field-coils separately and slip them over the poles in the many cases where the free end of the pole is also enlarged or flanged and generally increases the cost of construction in any case.

With the above points in view my present improvement contemplates the use of separate detachable pole-pieces bolted directly to the frame in such manner as to meet all requirements in the matter of large contact area, but without the use of enlarged base-flanges, which would prevent the field-coils from being slipped over the pole after separate winding. To this end I cast into the frame-points where the poles lead off pieces of wrought-iron or cast-steel properly proportioned to afford the necessary area of contact with the cast-iron and then bolt the wrought-iron or steel pole-pieces directly to these plates. Being of the same permeability the lines of force will pass between the poles and plates without loss and will also pass without loss between the plates and cast-iron, owing to the large area of contact between them. At the same time the removability of the poles enables the field-coils to be wound independently and placed upon or removed from the poles without difficulty whenever found desirable.

In the accompanying drawings, Figure 1 shows in side elevation a section of the frame or yoke of a dynamo-electric machine provided with my improvement. Fig. 2 is a similar view of a construction slightly modified from that shown in Fig. 1. Fig. 3 is a side elevation of a rotary field-casting with its poles applied in accordance with my improvement.

As shown in Fig. 1, A designates the cast-iron yoke or frame section, and B the wrought or laminated iron or steel pole-pieces secured thereto. The latter are removably secured to the yoke in any suitable manner, as by bolts *b*, and are herein shown as provided at their inner or free ends with flanges *b'* to prevent any possibility of the field-coils slipping from them when applied in the usual manner.

C designates the wrought-iron or steel plates, which are cast into the yokes A to afford contact-surfaces for the pole-pieces B. These plates are made of any suitable shape and of such dimensions as to afford ample area of contact with the cast-iron yoke and will become so nearly fused by the heat of the metal

poured around them in forming the casting as to become practically integral with the yoke. The inner surfaces of the plates will then be trued off to afford a fair bearing for the bases of the pole-pieces, which will be firmly clamped in place against the plates by the bolts *b* after the field-coils, which are conveniently wound separately, have been slipped over the poles from their outer or base ends. The bolts *b* also form paths for the lines of force and aid in forming a perfect connection in case the cast joint should prove in any way defective. By removing the bolts *b* the poles and coils may be removed or replaced, as desired.

The truing off of the surfaces of the plates and the meeting ends of the pole-pieces may be accomplished either by planing or by boring and turning, as found convenient. In Fig. 1 the surfaces are shown as planed off, while in Fig. 2 they are shown as bored and turned concentrically with the axis of the machine. In the latter figure also the flanges *b'* are omitted, so that the field-coils could be slipped over them without removing the poles from their position on the yoke; but even in this case my improved construction is desirable and economical. In Fig. 3 a rotary field-casting A' is shown as provided with poles B', which are bolted to wrought-iron or steel plates C', that are cast into the field-casting A', my improvement being thus obviously applicable to this type of machine also.

I claim as my invention—

1. The combination with a cast-iron field-casting or frame of a dynamo-electric machine, of wrought-iron or steel plates cast into said frame, wrought-iron or steel pole-pieces seated against said plates, and means for securing the pole-pieces removably in position thereon.

2. The combination with a cast-iron field-casting or frame of a dynamo-electric machine, of wrought-iron or steel plates cast into said frame or field-casting, wrought-iron or steel pole-pieces seated against said plates and provided with enlargements or flanges at their free ends only, and bolts applied between the field-casting and pole-pieces to secure the latter detachably in contact with the plates.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two subscribing witnesses, this 6th day of June, A. D. 1899.

ALEXANDER CHURCHWARD.

Witnesses:
HENRY W. CARTER,
ALBERT H. GRAVES.