

No. 687,992.

Patented Dec. 3, 1901.

A. CHURCHWARD.
DYNAMO ELECTRIC MACHINERY.

(Application filed Dec. 18, 1899. Renewed Aug. 14, 1901.)

(No Model.)

Fig. 1.

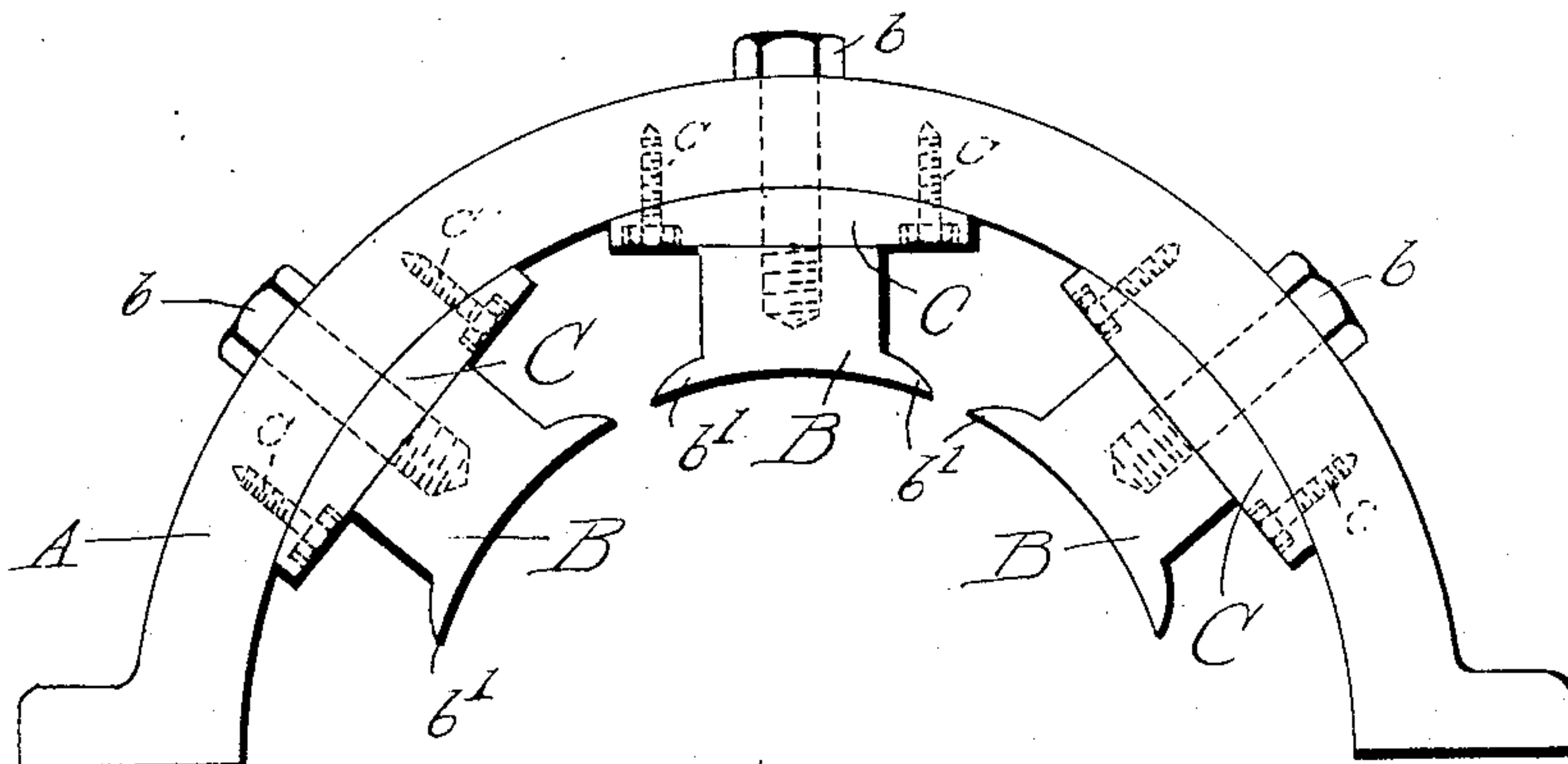


Fig. 2.

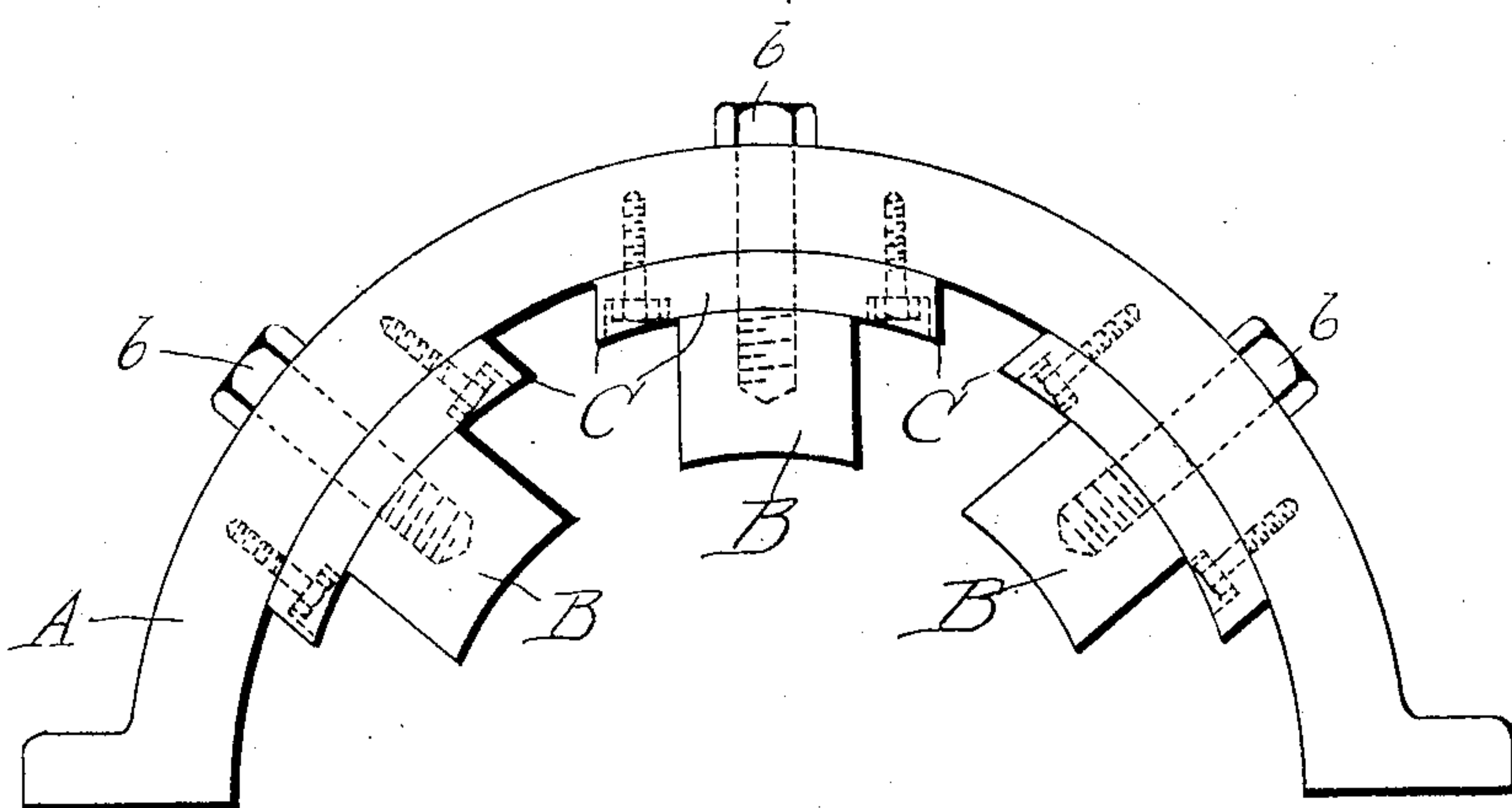
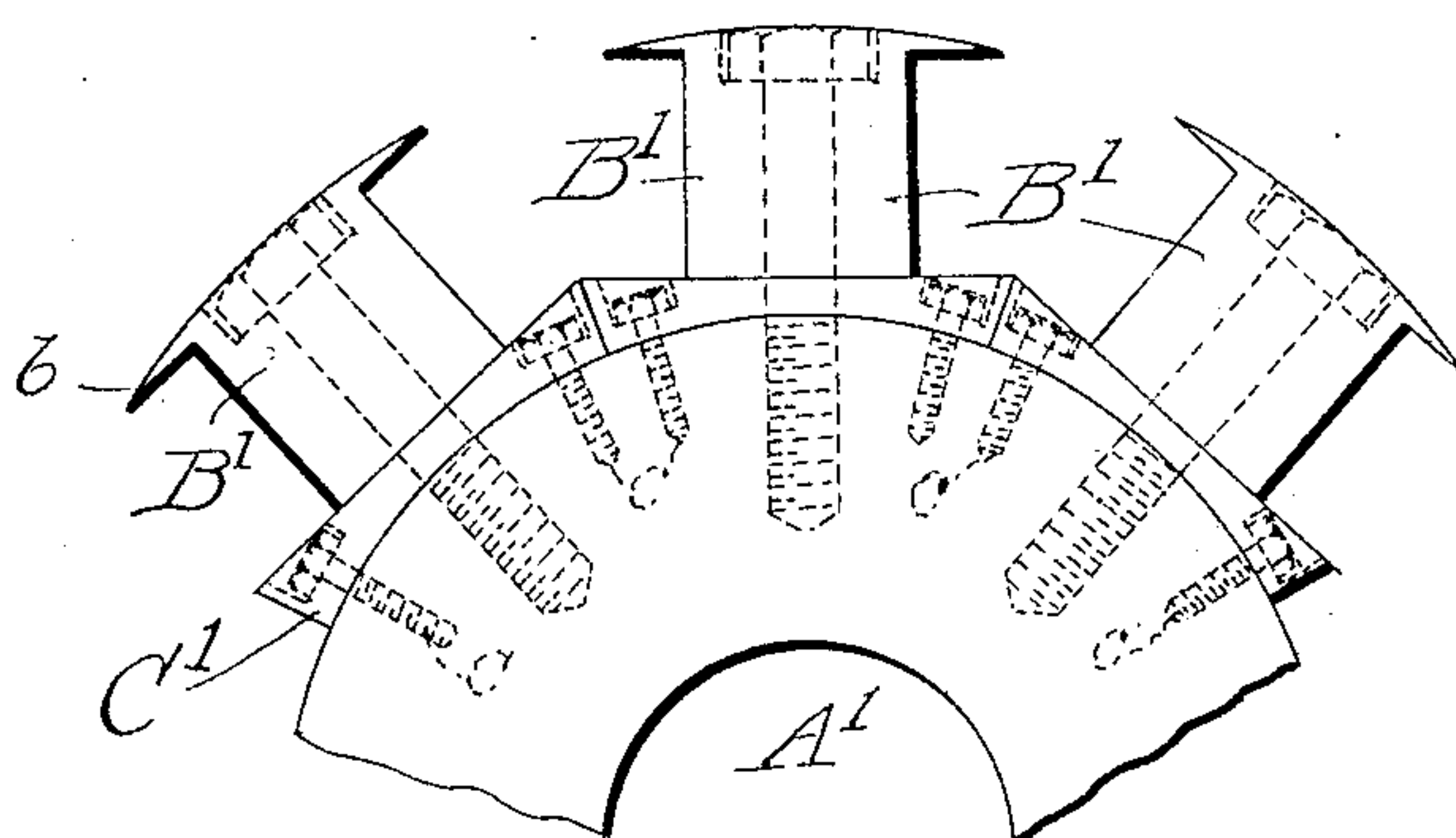


Fig. 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

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

DYNAMO-ELECTRIC MACHINERY.

SPECIFICATION forming part of Letters Patent No. 687,992, dated December 3, 1901.

Application filed December 18, 1899. Renewed August 14, 1901. Serial No. 72,055. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER CHURCHWARD, a citizen of the United States, residing at 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 for 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 the matter of 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 of higher 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-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 or frame; but this is not always satisfactory, as the joint between cast-iron and wrought-iron or steel 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 or yoke for convenience in shipping and in erecting or repairing. It is also customary to bolt separate pole-pieces to the yoke or frame 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.

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

In the accompanying drawings, Figure 1 shows in side elevation a section of a 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 field-frame section, and B its wrought or laminated iron or steel pole-pieces. 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 off them when applied in the usual manner.

C designates the wrought-iron or steel plates which are inserted between the yoke A and poles B. These plates are made of any suitable shape and of such dimensions as to afford an ample area of contact with the cast-

iron yoke. They are secured to the yoke by suitable bolts or screws *c*, and the clamping of the pole-pieces by the bolt *b* also serves to hold the plates in close contact with the yoke
5 or frame, as well as to hold the pole-pieces securely seated against said plates. The contacting surfaces of the frame, plates, and poles are trued off by planing or by boring and turning to afford a fair bearing against each other,
10 and the field-coils are conveniently wound separately and slipped over the poles before the latter are clamped in place. By removing the bolts *b* the poles and coils may then be repaired or replaced, as desired.
15 In Fig. 2 the flanges *b'* (shown at the free ends of the poles in Fig. 1) are omitted, so that the field-coils could be slipped over them without removing the poles from the yoke; but even in this case my improved construction is desirable. In Fig. 3 a rotary field-casting
20 *a'* is shown as provided with pole-pieces *B'*, which are bolted to wrought-iron or steel plates *C'*, that in turn are bolted to the field-casting, as before, my improvement being
25 thus obviously applicable to this type of machine also.

I claim as my invention—

1. The combination with the field-casting or frame of a dynamo-electric machine, of wrought-iron or steel plates secured to said
30 frame, wrought-iron or steel pole-pieces seated against said plates, and means for securing the pole-pieces removably in position on said plates, substantially as described.

2. The combination with the field-casting
35 or frame of a dynamo-electric machine, of wrought-iron or steel plates bolted to said frame or field-casting, wrought-iron or steel pole-pieces seated against said plates, and bolts applied between the frame or field-casting
40 and the pole-pieces and passing through the plates to clamp the pole-pieces removably to the frame or field-casting with the plates intervening, substantially as described.

In testimony that I claim the foregoing as
45 my invention I affix my signature, in presence of two subscribing witnesses, this 11th day of December, A. D. 1899.

ALEX. CHURCHWARD.

Witnesses:

HENRY W. CARTER,
ALBERT H. GRAVES.