Oct. 16, 1928. 1,687,512

H. G. REIST

ROTOR

Filed Jan. 13, 1928

Fig. 1.

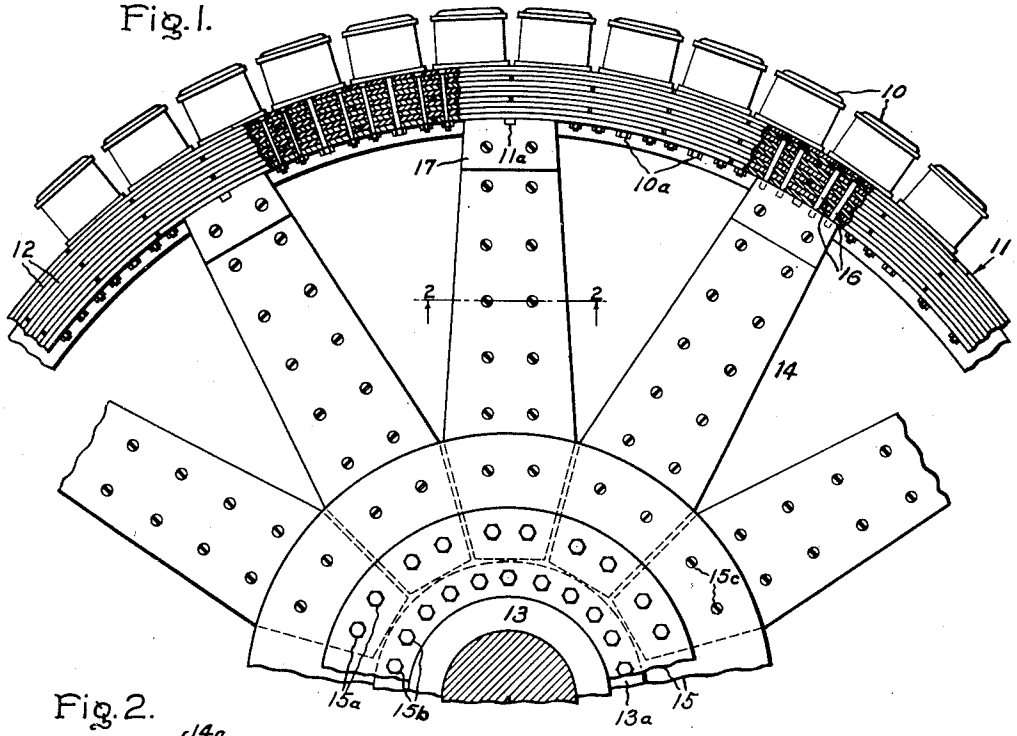


Fig. 2.

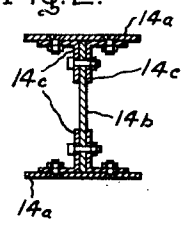
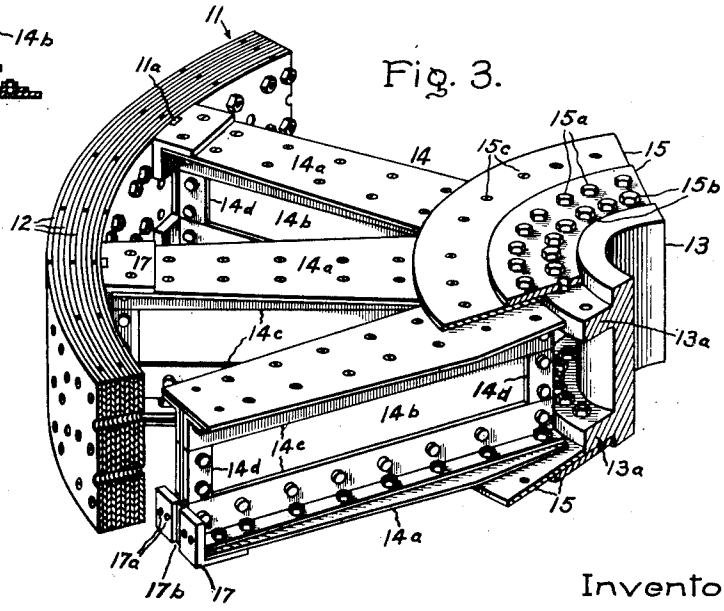


Fig. 3.



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UNITED STATES PATENT OFFICE.

HENRY G. REIST, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ROTOR.

Application filed January 13, 1928. Serial No. 246,629.

My invention relates to rotors for dynamo-electric machines.

It has been the practice heretofore in constructing rotors for dynamo-electric machines to rigidly connect the pole pieces and the rim, to which they were secured, to the spokes or hub structure. The centrifugal force exerted on the pole pieces has made it necessary to use a heavy rim, and as this rim was rigidly fastened to the hub structure it has been difficult to determine what portion of the stresses in the spokes have been due to centrifugal force. As a result, in designing these rotors the hub structure has been made much larger than would be required to support the load of the magnetic structure because of the uncertainty in the centrifugal stresses to which it is subjected.

The primary object of my invention is to construct the rotor in such manner that the centrifugal stresses in the magnetic structure, which includes the rim and the pole pieces, will not be transmitted to the hub or other central supporting structure. I accomplish this by fastening the pole pieces to the rim or annular body and supporting the same on a central supporting structure in such manner that torque is transmitted from one to the other without transmitting centrifugal stresses from the annular body to the central supporting structure. In this way any uncertainty in the design of the rotor is practically eliminated as the annular body resists the action of centrifugal force substantially altogether by circumferential tension stresses therein, and the central supporting structure is only required to support the weight of the magnetic structure, withstand stresses due to vibration, and transmit torque between the annular body and the rotor shaft. These stresses are determinable in my improved construction with a fair degree of accuracy, and particularly those due to centrifugal force, which are the greatest, so that it is possible to obtain a much more satisfactory design than in prior constructions.

A further object of my invention is to provide a rotor construction which can readily be fabricated of plates and suitable structural shapes.

My invention will be more fully set forth in the following description referring to the accompanying drawing and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

In the drawing, Fig. 1 is a fragmentary end view of my improved rotor partly broken away; Fig. 2 is a transverse section on the line 2—2 of Fig. 1, and Fig. 3 is a perspective view of a portion of the rotor with the pole pieces removed.

Referring to the drawing, the form of my improved rotor illustrated includes a magnetic structure comprising pole pieces 10 and an annular body 11 which is mounted on a central supporting structure secured to the rotor shaft. The annular body 11 is made of a plurality of curved overlapping staggered plates 12 bolted together with the convex surfaces thereof outwardly presented so as to constitute the continuous annular body 11 to which the pole pieces 10 are bolted at 10^a.

In order to avoid any uncertainty in the distribution of centrifugal stresses between the magnetic structure and the central supporting structure, the former is mounted on the latter so as to be movable radially outward therefrom when its circumference is elongated under centrifugal stresses, but is prevented from rotating relative thereto. In this way, centrifugal stresses in the magnetic structure are resisted substantially altogether by circumferential tension in the annular body 11 as there are no radially acting forces restricting the radial outward movement thereof.

The central supporting structure comprises a hub 13 and radially extending spokes 14 of I-shaped cross-section which are arranged with their major axes extending axially of the rotor and secured to the hub 13 by annular plates 15. These annular plates, which are bolted together at 15^a, are also bolted at 15^b to flanges 13^a formed on the hub 13 and at 15^c to the spokes 14. It is preferred to fabricate the spokes 14 of suitable plates 14^a and 14^b secured together by angles 14^c and space blocks 14^d bolted thereto to form I-shaped sections, although other suitable forms of spokes may be employed.

The connection between the spokes 14 and the annular body 11 which transmits torque between them without exerting radially acting forces resisting the outward movement of the annular body when its circumference elongates under the action of centrifugal force may be of any suitable form but in the construction illustrated, it comprises radially

arranged pins 16 carried by the body 11 and slidably fitted in openings 17[a] formed in angle brackets 17 which are bolted to the ends of the spokes 14. The annular body 11 is firmly seated on the spokes by keys 11[a] which are arranged in key ways 17[b] formed in the angle brackets 17.

It is apparent that centrifugal stresses in the magnetic structure will be resisted substantially altogether by circumferential tension in the annular body 11 as there are no radially acting forces which resist the outward movement of the annular body relative to the central supporting structure, the pins 16 transmitting torque only from one to the other. This makes it possible to determine the stresses in the rotor and design the same with a reasonable factor of safety without the use of more material than actually required to withstand the stresses to which the rotor is subjected.

By fabricating the rotor of plates and structural shapes as above described, the use of patterns and castings is avoided and the rotor can for this reason be cheaply and readily constructed.

Various modifications of my improved rotor will occur to those skilled in the art, so that I do not wish to be limited to the particular arrangement shown and described except as set forth in the appended claims.

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

1. A rotor for dynamo-electric machines having a central supporting structure, a plurality of overlapping plates connected together to constitute a unitary annular body surrounding said central supporting structure, a plurality of pole pieces secured to said annular body and means for forming a driving connection between said central supporting structure and said annular body for guiding the latter in its movement away from and toward the former under the action of centrifugal force so that centrifugal force acting on said annular body will be resisted substantially altogether by tension stresses therein.

2. A rotor for dynamo-electric machines having a central supporting structure, a plurality of curved overlapping plates having their convex surfaces presented outwardly and connected together to constitute a unitary annular body surrounding said central supporting structure, a plurality of pole pieces secured to said annular body, and means for forming a driving connection between them and for guiding said annular body in its movement away from and toward said central supporting structure under the action of centrifugal force so that centrifugal force acting on said annular body will be resisted substantially altogether by tension stresses therein.

3. A rotor for dynamo-electric machines having a central supporting structure, a plurality of overlapping staggered plates connected together to constitute a unitary annular body surrounding said central supporting structure, a plurality of pole pieces secured to said annular body, and means including radially arranged pins slidably connecting said central supporting structure and said annular body for transmitting torque from one to the other so that centrifugal forces acting on said annular body will be resisted substantially altogether by tension stresses therein.

4. A rotor for dynamo-electric machines having a central supporting structure comprising spokes of I-shaped cross-section with their major axes extending axially of the rotor, a plurality of overlapping plates connected together to constitute a unitary annular body surrounding said central supporting structure, a plurality of pole pieces secured to said annular body, and means forming a driving connection between said central supporting structure and said annular body and for guiding the latter in its movement away from and toward the former under the action of centrifugal force so that centrifugal force acting on said annular body will be resisted substantially altogether by tension stresses therein.

5. A rotor for dynamo-electric machines having a central supporting structure comprising spokes of I-shaped cross-section with their major axes extending axially of the rotor, a plurality of overlapping plates connected together to constitute a unitary annular body surrounding said central supporting structure, a plurality of pole pieces secured to said annular body, and means including radially arranged pins slidably connecting said central supporting structure and said annular body for transmitting torque from one to the other so that centrifugal forces acting on said annular body will be resisted substantially altogether by tension stresses therein.

In witness whereof, I have hereunto set my hand this 10th day of January, 1928.

HENRY G. REIST.