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H. G. REIST.

DYNAMO ELECTRIC MACHINE.

APPLICATION FILED MAY 7, 1904.

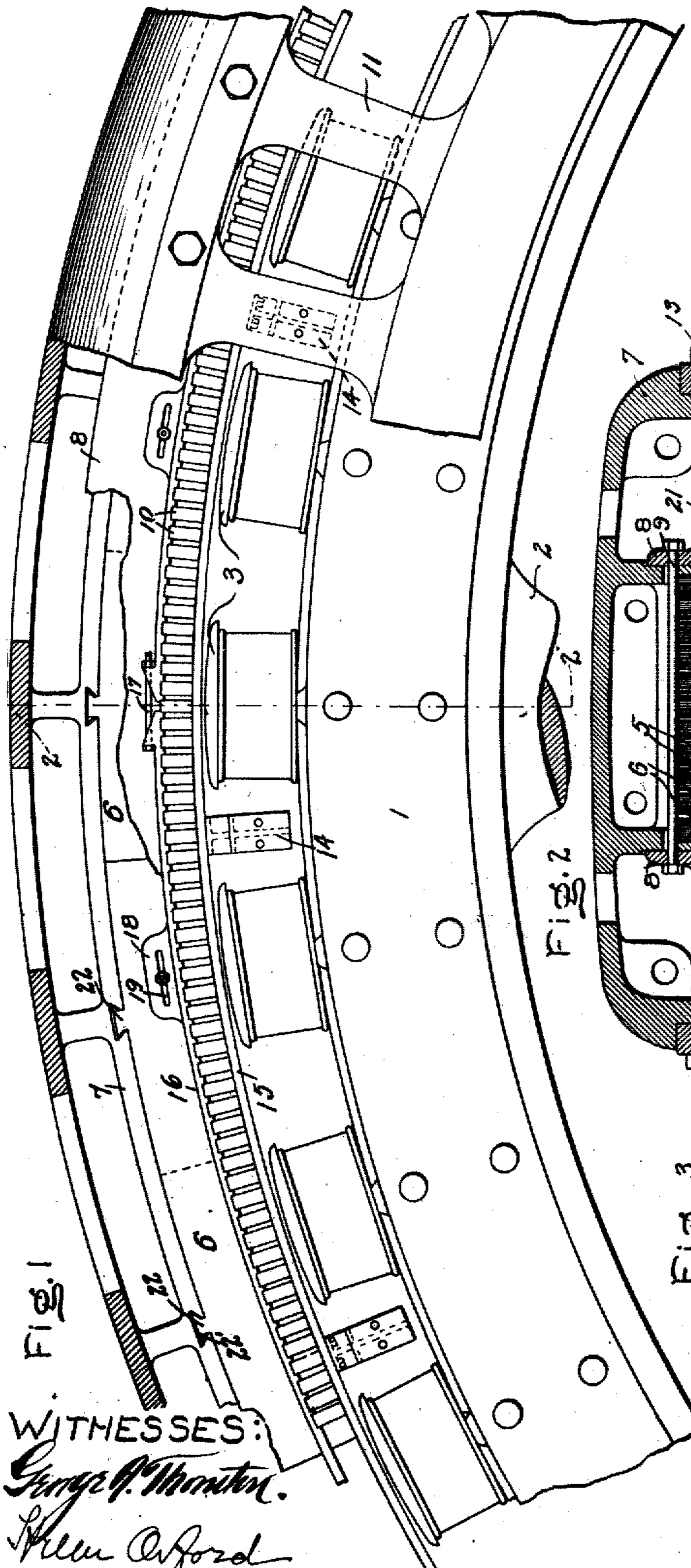

Fig. 1.

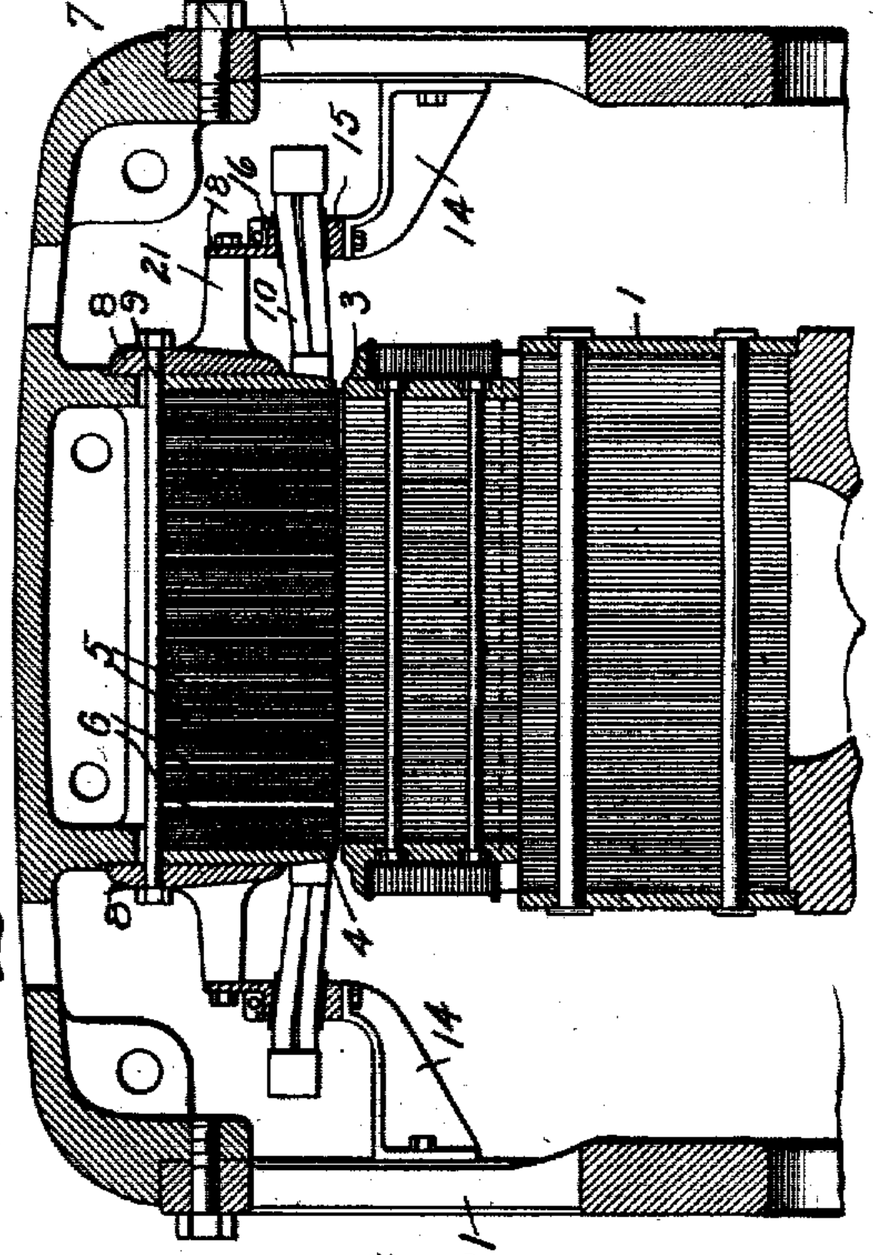

Fig. 2.

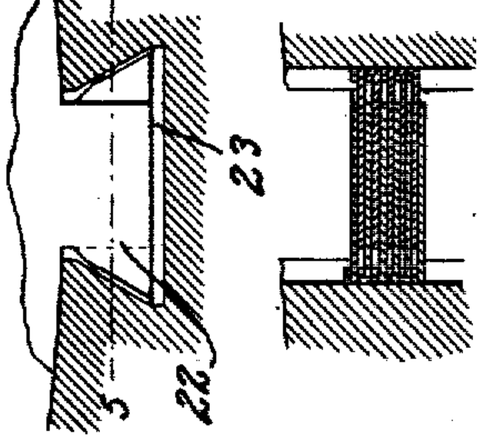

Fig. 4.

Fig. 5.

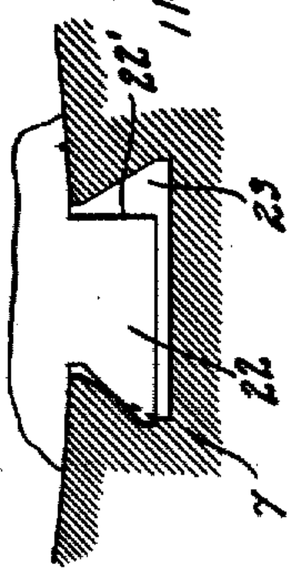

Fig. 3.

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UNITED STATES PATENT OFFICE.

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DYNAMO-ELECTRIC MACHINE

No. 811,792 Specification of Letters Patent. Patented Feb. 6, 1906.

Application filed May 7, 1904. Serial No. 206,867.

To all whom it may concern:

Be it known that I, HENRY G. REIST, a citizen of the United States, residing at Schenectady, in the county of Schenectady and State of New York, have invented certain new and useful Improvements in Dynamo-Electric Machines, of which the following is a specification.

My present invention relates to a dynamo-electric machine; and it consists in certain features of construction and arrangement, some of which are particularly useful with alternators of comparatively large size, while others are not limited to any particular type or size of machine.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of my invention, however, reference may be had to the accompanying drawings and description, in which I have illustrated one embodiment of my invention.

Of the drawings, Figure 1 is an elevation with parts broken away, showing a portion of a large alternator. Fig. 2 is a section on the line 2 2 of Fig. 1. Fig. 3 is a diagrammatical section showing the relative arrangement of the tenon on a punching and the slot into which it enters before the tenon is inserted. Fig. 4 is a similar view showing a number of tenons in place, and Fig. 5 is a section on the line 5 5 of Fig. 4.

Referring to the drawings, 1 represents a ring of magnetic material which may be laminated, as shown, and which is supported by the spider-arms 2 of the revolving element of a large alternator. The ring 1 carries on its outer side a number of polar portions 3.

The stationary external armature 4, cooperating with the revoluble field member, comprises a core consisting of a number of sections 5, separated by ventilating-spaces of laminæ 6, which are dovetailed into an annular supporting member 7, which may be formed in sections, if desired. The laminæ 6 are clamped between end clamping members 8, secured together by bolts 9. It will be understood that the end clamping members 8 may be formed in sections, if desired. Slots are formed in the laminated armature-core adjacent its inner periphery in the usual manner to receive armature-conductors 10, the ends of which extend outward from the core substantially parallel to the axis of revolution of the revoluble member.

Annular radially-extending members 11, which may be formed in sections, if desired, are removably secured to the member 7 by bolts 13. The members 11, with the member 7, serve to inclose the revolving polar projections and the armature-core and windings and to give rigidity to the armature construction. A number of brackets 14 are secured to the inner side of the member 11 in any suitable manner. The inner ends of the brackets 14 carry a ring or member 15, which is concentric with the axis of the machine, the ring being secured to the brackets in any suitable manner. The projecting ends of the armature-conductors 10 rest against the outer periphery of the ring or member 15.

An adjustable annular member 16, concentric with the ring 15, engages the outer edges of the projecting ends of the conductors 10 to hold them firmly against the supporting-ring 15. The ring 16 may be divided at one or more points, and the abutting ends may be connected by bolts 17. This forms means for adjusting the circumference of the ring 16 to more or less firmly press the projecting ends of the conductors 10 against the ring 15. The ring 16 may be formed, if desired, with projecting portions 18, having slots 19 formed in them, through which bolts may pass to secure the ring to the ends of projections 21, formed for the purpose upon the clamping member 8. By this construction the ring 16 may be rigidly secured in place independently of its engagement with the projecting ends of the conductors. The portions 18 and projections 21 may be dispensed with, however, in many cases.

The laminæ 6 are all similar in construction, each being arc-shaped and formed with two tenons or dovetailed projections 22 on its outer periphery which extend into the undercut grooves 23, formed for the purpose in the member 7. The outer side edge 22′ of each tenon is radial. The inner edges of the tenons on each lamina are undercut, however, at an angle of thirty degrees or thereabout to the adjacent edge of the lamina proper. The outer end edge of each tenon is substantially concentric with the axis of the machine. The side walls of the slot 23 are both inclined at an angle of forty-five degrees to the face of the support 7 and the engaging edge of the adja-

cent lamina. The distance between the tenons is so proportioned to the distances between the slots that when the tenons and slots are juxtaposed a portion of the undercut tips of the tenons 22 overlaps the edges of the slots, as shown in Fig. 3. When the tenon is forced into the slot, the overlapping edge is turned up, as is clearly shown in Figs. 4 and 5. The laminæ when assembled break joints with each other in the usual manner. As a result overlapping tip portions of the tenon 22 are alternately bent up at opposite sides of slots 23, as clearly appears in Fig. 5, into the space between the radial edge of the tenon above it and the side wall of the slot. As is clearly shown in Figs. 3 and 4, the tenon is of a length somewhat less than the depth of the slot 23. When, therefore, the tenons are forced into place, the outer edge of each lamina is firmly forced against the support 7. After each layer of laminæ or a number of layers of laminæ have been assembled it is desirable to hammer the tenons in the slots firmly together, though with the thin iron ordinarily employed in the manufacture of armatures the laminæ are so flexible that the tenons may be easily forced in the slots by hand. Hammering the tenons into place still more firmly locks the laminæ against their support. The method of assembling laminæ described insures a construction in which all of the laminæ are rigidly locked to their support, and this without the nice proportioning of parts which is necessary with other methods of assembling.

It will of course be understood that while particular degrees of angularity specified for the tenon edges and the walls of the slot work very well in practice these angles may be varied without departing in any way from the spirit of my invention. It will be further understood that my invention is not limited to use with laminæ having tenons on their outer convex edges or with laminæ the edges of which are curved. This method of assemblage may be employed in the construction of the revolving element of a dynamo-electric machine as well as of the stationary element and in the field member as well as in the armature member. Moreover, the number of tenons on each lamina may be varied without departing from the spirit of my invention, and where each lamina is provided with two or more tenons some of the advantages of my invention may be obtained where only part of the tenons are provided with portions overlapping the groove.

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

1. In a dynamo-electric machine, an annular core, conductors projecting from said core, a casing surrounding said core, brackets formed on said casing, a ring supported by said brackets against which the projecting conductors rest, and a ring concentric with and surrounding the first-mentioned ring and engaging the outer edges of said conductors.

2. In a dynamo-electric machine, an annular core, conductors projecting from said core, a casing surrounding said core, brackets formed on said casing, a ring supported by said brackets against which the projecting conductors rest, a ring concentric with and surrounding the first-mentioned ring engaging the outer edges of said conductors, and means for varying the circumference of said ring.

3. In a dynamo-electric machine, an annular core, conductors projecting from said core, a casing surrounding said core, brackets formed on said casing, a ring supported by said brackets against which the projecting conductors rest, a ring concentric with and surrounding the first-mentioned ring engaging the outer edges of said conductors, and means for rigidly securing said second ring to the core.

4. In combination, a support formed with a plurality of undercut grooves, laminæ each formed with a pair of tenons which enter grooves in said support, said tenons and said grooves being of different shapes, and adjacent layers of laminæ breaking joints whereby when the tenons are forced into the grooves portions of the tenons are bent and a space is left between other portions of the tenons and the walls of the slot into which bent-up portions of the tenons of the laminæ in an adjacent layer are received.

5. In a dynamo-electric machine, a laminated core, dovetail projections on the laminations of said core, and a support formed with retaining-slots adapted to receive said projections, the edges of said projections having a different slope from the sides of said slots.

6. In combination, a support having undercut grooves formed in it, and laminæ secured to said support by tenons entering said grooves, each lamina being formed with two tenons, portions of the side edges of which are separated by a distance less than the distance between the corresponding portions of the walls of the grooves in which they enter.

7. In combination, a support having undercut grooves formed in it, laminæ secured to the support by tenons entering said grooves, each of said laminæ being formed with a plurality of tenons, the tenons and grooves being so proportioned and shaped that when assembled a portion of one at least of the tenons will be distorted.

8. In combination, a support having undercut grooves in it, and laminæ secured thereto by tenons entering said grooves, each of said laminæ being formed with two tenons, portions of the side edges of which are separated by distances different from the distances between corresponding portions of the side walls of the grooves.

9. In combination, a support having an undercut groove formed in it, and a lamina provided with a tenon which enters said groove, one side of said tenon being undercut more than the corresponding wall of said groove, and the parts being so arranged that when the tenon is forced in the groove a portion at the tip of the tenon is turned up.

10. In a dynamo-electric machine, an external armature comprising an outer annular supporting-frame and an inner annular core, armature-conductors carried by the core, the ends of said conductors projecting beyond the core, a radial stiffening member connected to one end of said supporting-frame, and means carried thereby for supporting the projecting ends of the armature-conductors.

11. In combination, a support having grooves cut in it, the sides of which are undercut at an angle of about forty-five degrees with the face of the support, and laminæ secured to said support by tenons entering said groove, one side of each tenon being undercut at an angle of about thirty degrees with the face of the support.

12. In combination, a support having undercut grooves formed in it, laminæ secured to said support by tenons entering said groove, one edge of one tenon on each lamina being undercut, the angle between the undercut edge of the tenon and the body of the lamina being less than the angle between the wall of the slot and the face of the support, and the parts being so proportioned and arranged that a portion of the undercut side of the tenon is turned up by the wall of the slot in assembling the laminæ on the support.

13. In a dynamo-electric machine, a laminated core, dovetail projections on the laminations of said core, and a member slotted to receive said projections and adapted to support said core, the edges of said projections making a more acute angle with the adjacent edges of the laminations than the sides of the slots in said member make with the adjacent surface of said member.

14. In a dynamo-electric machine, a laminated core, a slotted member supporting said core, projecting dovetails on the laminations of said core engaging the slots in said member, said projections having only one edge sloping, and adjacent projections in the same slot being arranged with their sloping edges facing in opposite directions.

15. In a dynamo-electric machine, a laminated core, a slotted member supporting said core, projecting dovetails on the laminations of said core engaging the slots in said member, said projections having only one edge sloping, and a portion of said projections having their sloping edges facing in an opposite direction to the sloping edges of the other projections.

16. In a dynamo-electric machine, a laminated core, a slotted member supporting said core, projecting dovetails on the laminations of said core engaging the slots in said member, said projections having only one edge sloping, and a portion of said projections having their sloping edges facing in an opposite direction to the sloping edges of the other projections, said sloping edges making a more acute angle with the adjacent edges of the laminations than the sides of the slots in said member make with the adjacent surface of said member.

In witness whereof I have hereunto set my hand this 6th day of May, 1904.

HENRY G. REIST.

Witnesses:

BENJAMIN B. HULL,

HELEN ORFORD.