

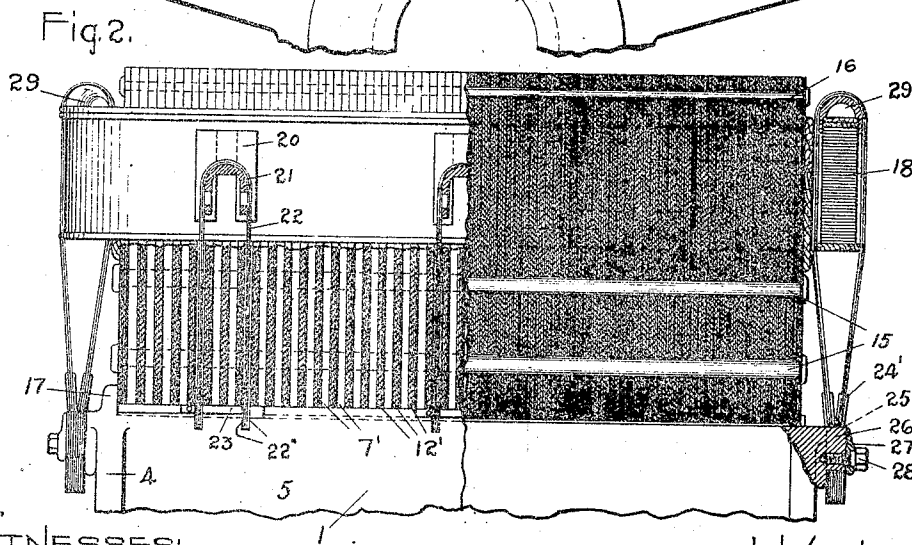
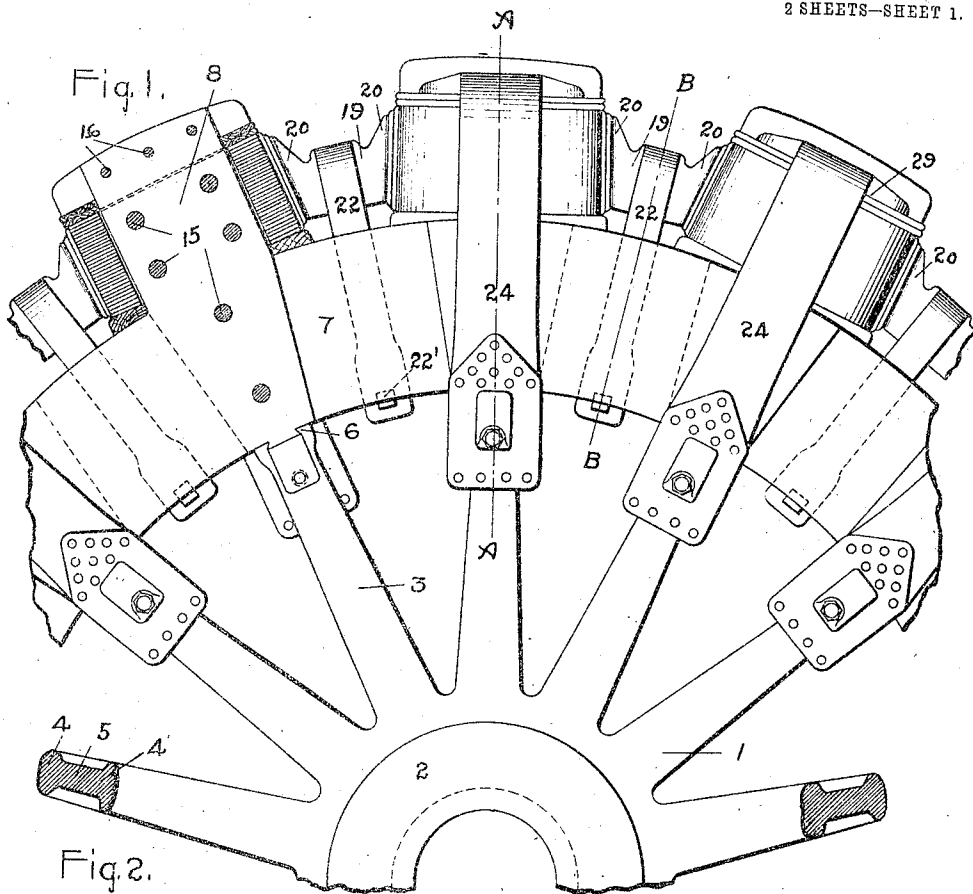
No. 896,323.

PATENTED AUG. 18, 1908.

H. G. REIST.  
DYNAMO ELECTRIC MACHINE.

APPLICATION FILED JULY 10, 1903.

2 SHEETS—SHEET 1.



WITNESSES:

*Ant. L. Chapman*  
*Helen Orford*

INVENTOR:

Henry G. Reist,  
by *Allen H. Davis*  
Att'y

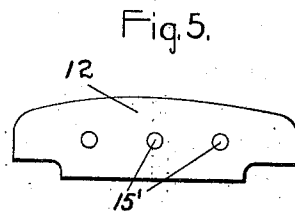
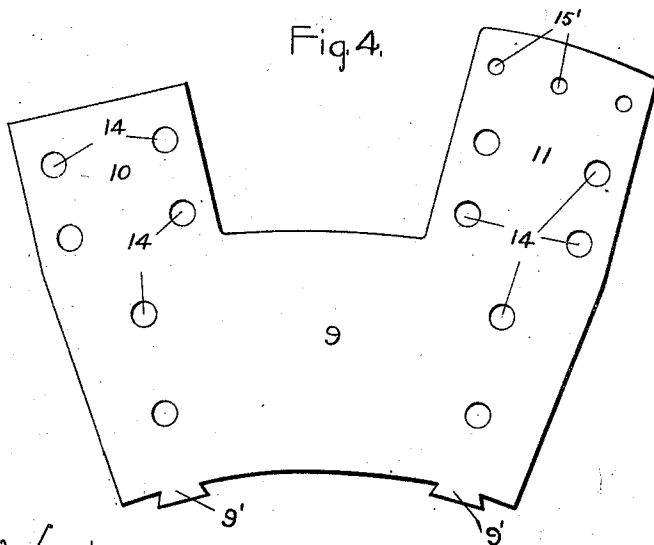
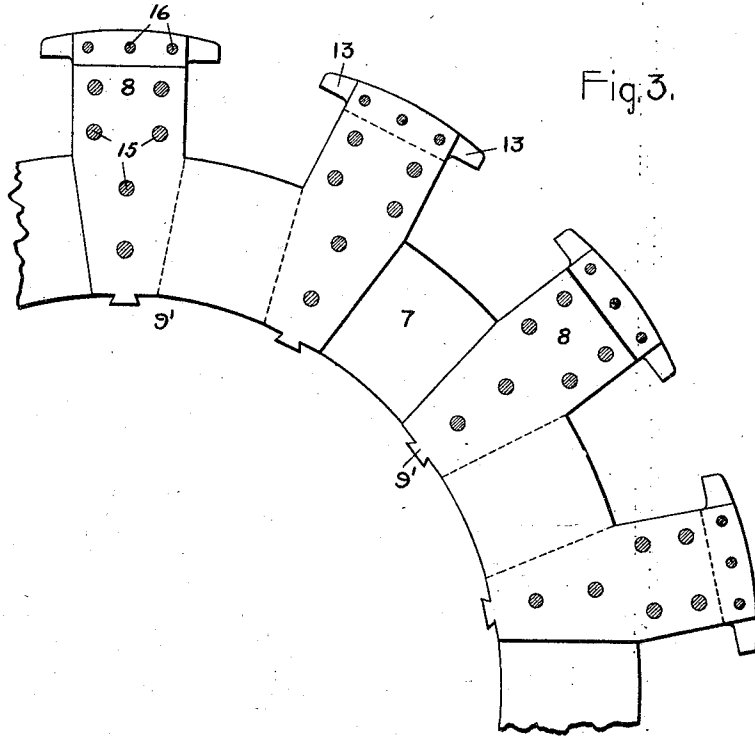
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2 SHEETS—SHEET 2.



WITNESSES:

*Robert L. Chapman*  
*Allen Orford*

INVENTOR:  
Henry G. Reist.  
by *Alfred S. Davis*  
ATTY.

# UNITED STATES PATENT OFFICE.

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

## DYNAMO-ELECTRIC MACHINE.

No. 896,323.

Specification of Letters Patent.

Patented Aug. 18, 1908.

Application filed July 10, 1903. Serial No. 164,960.

*To all whom it may concern:*

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

The general object of my present invention is to improve the construction and thereby the operation of dynamo-electric machines.

Among the particular objects of my invention is the improvement in the construction of the rotary field member of a dynamo-electric machine to enable it to better withstand the stresses produced when run at an extremely high speed such as commonly occurs when such machines are directly connected to steam turbines or the like.

My invention consists in various features of construction and arrangement by which the objects of my invention are attained.

The various features of novelty which characterize my invention will be pointed out in the claims annexed to and forming a part of this specification.

For a better understanding of my invention, reference may be had to the accompanying drawings in which I have illustrated the rotating field member of a dynamo-electric machine embodying my invention.

Of the drawings, Figure 1 is a plan partly in section illustrating the general construction of the field magnet; Fig. 2 is a sectional elevation, the right-hand portion of the view being taken on the line A A of Fig. 1 and the left-hand portion being taken on the line B B of Fig. 1; Fig. 3 is an elevation showing the method of assembling the laminae composing the field structure; and Figs. 4 and 5 are elevations showing the outlines of the laminae employed.

Referring to the drawings, the field support or supporting member 1 is shown as consisting of a hub 2 provided with a plurality of arms 3. Preferably the arms 3 are formed integrally with the hub 2 and consist each of two portions 4, having an elliptical cross section, connected by a web portion 5 (see Fig. 1). The arms 3 are provided at their outer ends with undercut grooves 6.

The magnetic circuit of the field member comprises an annular body or ring 7 provided with polar projections 8. Preferably the ring 7 and polar projections 8 are formed of

laminae of magnetic material. In the preferred form of my invention, each of the laminae out of which the ring and the main portion of the pole pieces are formed consists of a curved portion 9 provided with two outwardly extending substantially rectangular radial polar portions 10 and 11 and with two inwardly extending similar tenon portions 9'. The polar portions 10 and 11 differ from each other in the fact that the polar portion 11 is longer than the portion 10. The outer edge of the portion 11 is curved substantially concentric with the axis of revolution of the field member. The outer edge of the portion 10 is straight and at right angles to the side edges of the portions. The tenons 9' are separated by a distance sufficient to allow them to be placed in the grooves 6 carried by adjacent arms 3.

In assembling the laminae, some of them are reversed with respect to others; that is to say, the longer portions 11 of some of the laminae are interleaved with the shorter portions 10 of other laminae. In practice I prefer to assemble the laminae in sections 12', each section consisting of several laminae which may or may not be riveted together. The laminae in each section are similarly placed but alternate sections are reversed with respect to each other. By this arrangement each pole portion 8 consists of a plurality of alternate long and short portions 10 and 11 and the body of the ring 7 between the pole portions consists of parallel arc shaped portions separated by spaces 7' clearly shown in Fig. 2.

The pole portions 8 are completed by inserting tip members 12 between the portions 11 at the end of the portions 10. Each tip member consists of one or more, preferably more, similar laminae 12. The laminae 12 have their outer edges curved and are of a width equal to the difference in the length of the portions 10 and 11 but are of a length greater than the width of the portions 10 and 11 so that portions 13 project beyond the body of the pole piece to form the pole tips. The pole tips thus formed have a comparatively high reluctance by reason of the spaces between adjacent end portions 13. This is advantageous as is well known to all those skilled in the art.

Holes 14 are formed in the laminae through which bolts or pins 15 are passed to secure the assembled laminae together. Register-

ing holes 15' formed in the outer end of the portions 11 and in the laminae 12 receive pins 16 which secure the tips 12 in place. When, as in the construction shown in the drawing, the field member is placed with its axis vertical, lugs 17 are formed on the lower side of the outer end of each arm 3 against which the outer laminae abut and by which they are carried.

Each pole portion is provided with a coil 18 preferably formed out of edge-wise wound strips of conducting material. These coils are placed on the pole portion before the tip laminae 12 are secured in place and these laminae when secured in place firmly lock the coil against radial movement.

In order to firmly hold the sides of the coils against the body of the pole piece to prevent any distortion which might otherwise take place due to the centrifugal forces created at the high speeds at which the field member may be rotated, members or braces 19 are placed between the coils. Each member 19 consists of two bearing portions 20 which abut against the outer surfaces of adjacent coils and which are connected by a portion 21.

The members 19 are secured in position by means of retaining members 22 preferably formed of one or more strips or straps of sheet steel or the like which pass over the connecting portions 21 of the members 19. The ends of these straps project through the spaces 7' in the ring 7 existing between alternate sections of laminae. Apertures 22' are formed in the ends of these straps and keys or wedges 23 pass through these apertures and bear against the inner peripheries of the laminae forming the ring 7 to lock the strips and thereby the members 19 in place.

Retaining members 24 similar in general to the members 22 embrace the end portions of the coils and are provided at their ends with apertures 25 and are hooked over lugs 26 which project from the arms 3. Caps 27 secured in place by bolts 28 lock the members 24 to the arms 3. Bearing members 29 may be placed between the members 24 and the coils 18 if desired. I prefer to secure, by riveting or the like, relatively heavy terminal pieces 22'' and 24' to the ends of members 22 and 24 respectively; in which the apertures 22' and 25 respectively are formed, though this is not essential.

It will be readily understood that the spaces 7' form ducts through which air is drawn as the field member revolves. The external pole pieces which in the construction shown are solid *i. e.* not provided with ventilating ducts, make very effective vanes. The air currents thus produced pass out through spaces between adjacent pole pieces and assist in cooling both the revolving field and the coöperating external armature. Each of the spaces between the field poles in the construction shown is open at its ends

and is practically unobstructed throughout its length. As a result the air set in motion by the field poles acting as vanes is not checked by obstructions in the spaces between the field poles, and is not necessarily limited to the air passing through the spaces 7'.

Features of my invention illustrated and described but not claimed herein, are claimed in my co-pending application, Serial No. 264,940, filed originally April 16, 1902 and renewed June 12, 1905.

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

1. A field magnet made up of similar sections, each section having a short polar portion and a long polar portion, said sections being assembled so that the long portions in each pole are separated by short portions, and pole tip members located between the long portions and having their outer edges flush with the outer ends of the poles.

2. A field magnet core for a dynamo electric machine formed of laminae each having a portion entering into or forming a part of two pole pieces, said portions being of unequal length, and windings surrounding each of said pole pieces and removable therefrom without disassembling said laminae.

3. A field magnet for a dynamo-electric machine formed of laminae each having a portion entering into or forming part of two pole pieces, said portions being of unequal length, and pole tip pieces secured between the longer of said portions and having their outer edges flush with the outer ends of said latter portions.

4. A field magnet core structure formed of similar laminae, each of said laminae having substantially rectangular polar portions of unequal lengths, some of said laminae being reversed with respect to the others, pole-tips secured to the longer of said polar portions and having their outer edges flush with the outer ends of said portions, and windings on said portions.

5. A magnet core structure formed of similar laminae, each of said laminae being provided with polar portions of unequal lengths, but of substantially the same widths, and windings carried by said polar portions.

6. A magnet core structure composed of similar laminae, each of said laminae comprising polar portions of unequal length and a curved connecting portion, and windings placed on each of said polar portions.

7. A magnet core structure composed of similar laminae, each of said laminae comprising two polar portions of unequal length and a connecting portion, and windings placed on each of said polar portions.

8. In a dynamo-electric machine, a spider provided with arms and having projections formed on said arms, and apertured coil-retaining devices, said projections passing through said apertures.

9. In a rotating field magnet, a spider provided with arms, said arms having projections formed on their sides, and coil-retaining loops or straps hooked over said projections.

10. In a dynamo-electric machine, a magnetic circuit comprising an annular ring provided with polar projections, said ring having spaces formed in it between the polar projections, coils on said polar projections and braces therefor extending between adjacent portions of adjacent coils and retaining devices therefor passing through said spaces and secured in place by keys or wedges which bear against the inner periphery of the ring.

11. In a dynamo-electric machine, a magnetic circuit comprising portions formed of alternate laminæ and spaces, coil retaining devices, each of said devices having one portion passing into one of said spaces and another portion passing into another of said spaces, and securing means for said coil retaining devices engaging the edges of said laminæ.

12. In a dynamo-electric machine, a rotating field magnet comprising a ring provided with outwardly extending polar projections, coils on said polar projections, wedge-shaped pieces located between adjacent coils, and retaining members passing over said wedges, said retaining members being secured to said ring portion by devices engaging the inner periphery of said ring.

13. In a field magnet, an annular mass of laminated material provided with outwardly extending pole pieces, said mass being formed by assembling similar laminæ each of which comprises two polar portions and a connecting portion, said laminæ being assembled so that the polar portions are solid and the ring portions between the pole portions are com-

posed of alternate spaces and laminations, and coil-retaining devices passing through said spaces.

14. In a field magnet, an annular mass of magnetic material having external pole piece extensions and formed with radial spaces between the pole pieces, and coil retaining devices, each of which has a portion passing through one of said spaces and another portion passing through another of said spaces, said retaining devices being secured in place by means engaging the inner, curved surface of said annular mass.

15. In a field magnet, a ring provided with externally-projecting pole pieces, coil-securing members located between adjacent pole pieces, and retaining devices therefor locked in place by devices engaging the inner periphery of the ring.

16. In a dynamo electric machine, a rotating field magnet comprising a ring provided with outwardly extending polar projections, coils on said polar projections, braces extending between adjacent sides of adjacent coils, and retaining members therefor secured to the ring by devices engaging the inner periphery of said ring.

17. In a dynamo electric machine, a rotating field magnet comprising a ring provided with outwardly extending polar projections, coils on said polar projections, braces therefor extending between adjacent sides of adjacent coils, and securing devices for the braces in the form of straps or yokes looped about the braces and secured to the ring.

In witness whereof, I have hereunto set my hand this 6th day of July, 1903.

HENRY G. REIST.

Witnesses:

BENJAMIN B. HULL,  
HELEN ORFORD.