No. 849,670. PATENTED APR. 9, 1907.

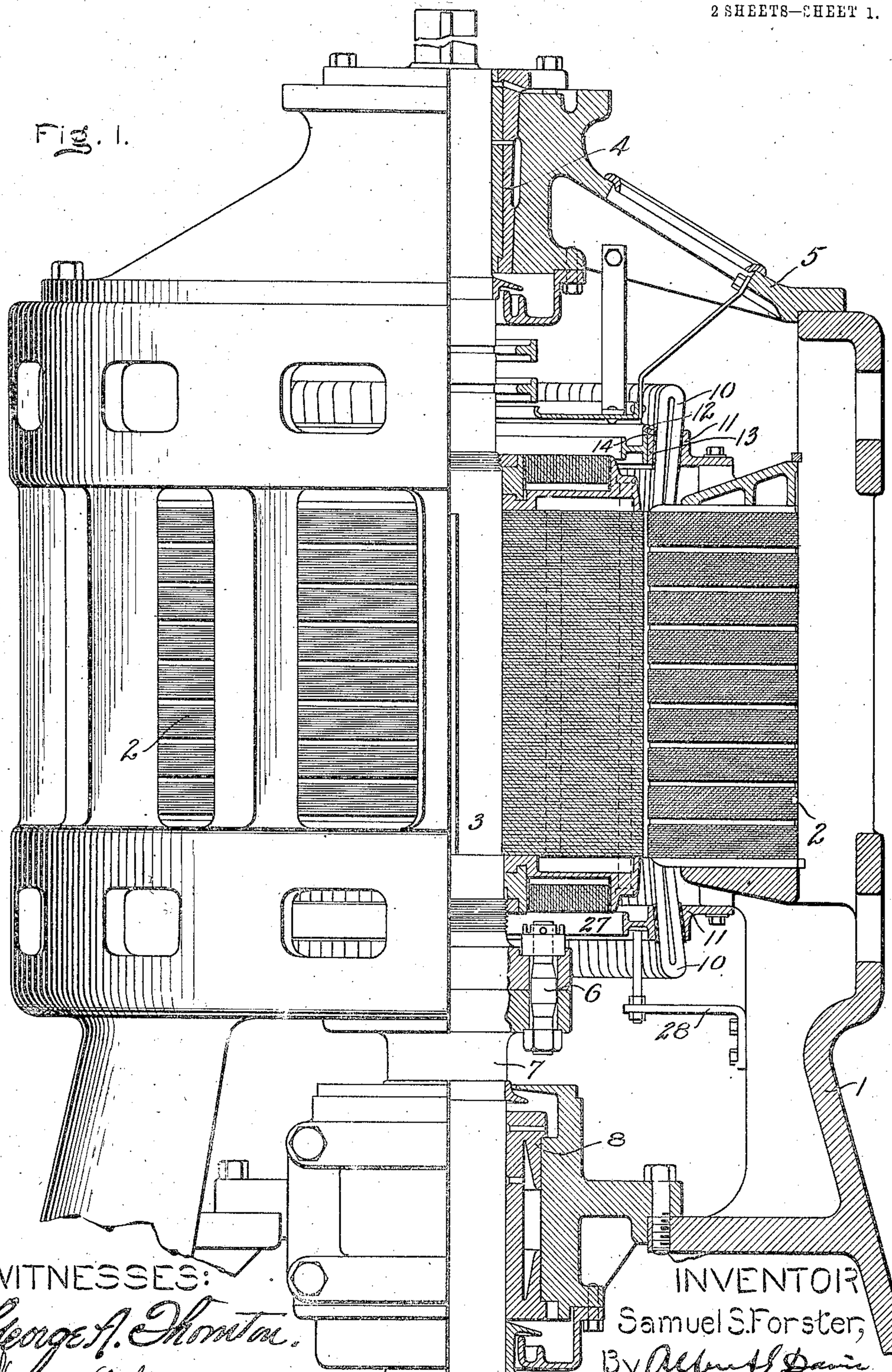
S. S. FORSTER.

DYNAMO ELECTRIC MACHINE.

APPLICATION FILED NOV. 29, 1904.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2

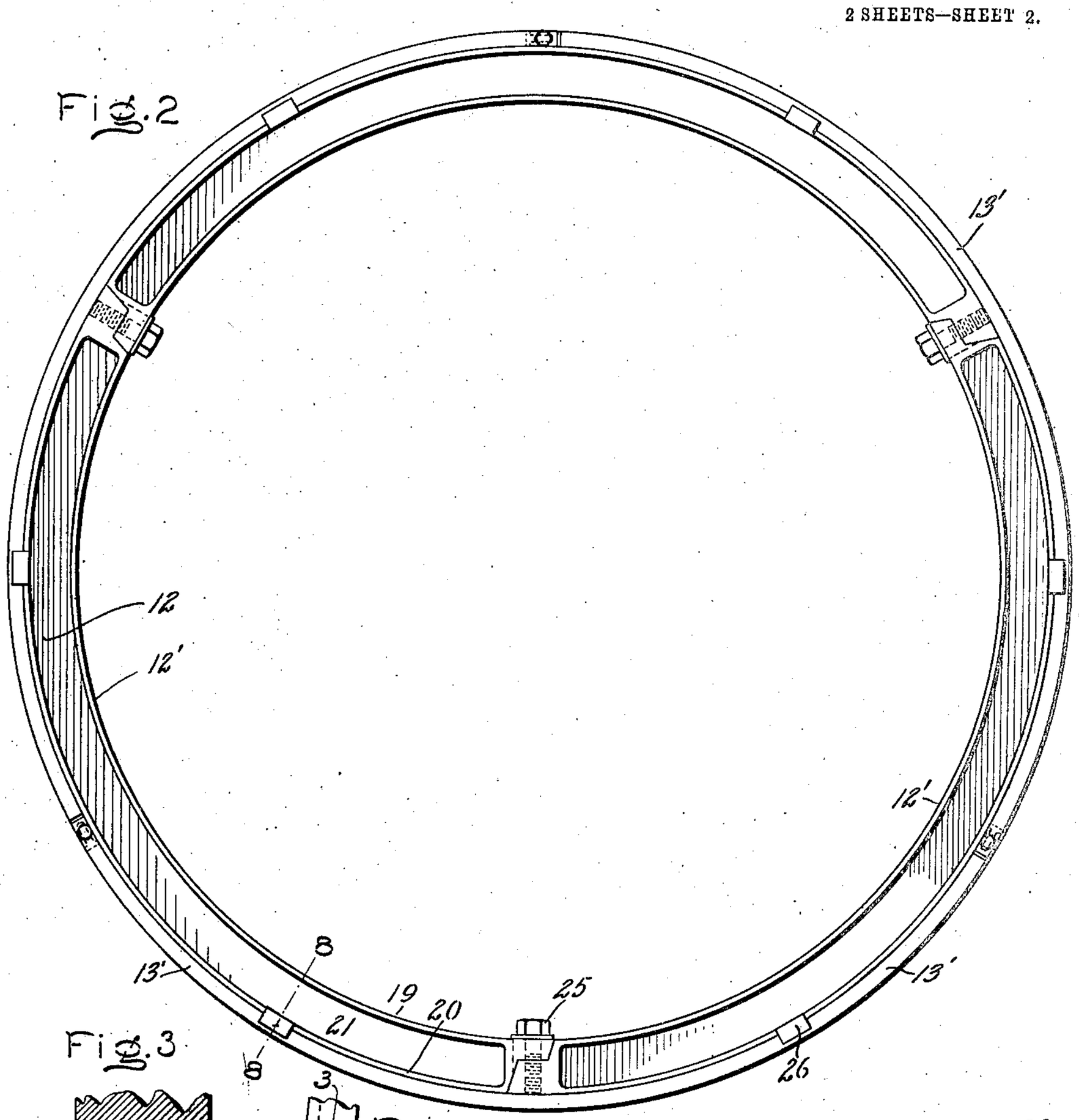


Fig. 3

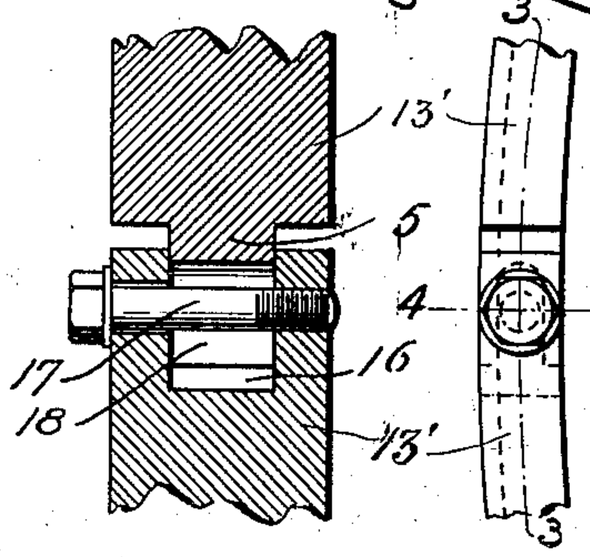


Fig. 4

Fig. 5

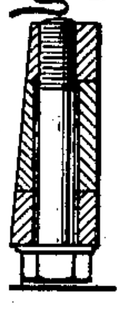


Fig. 7

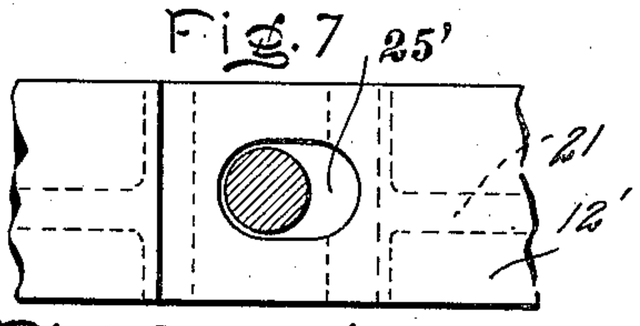


Fig. 6

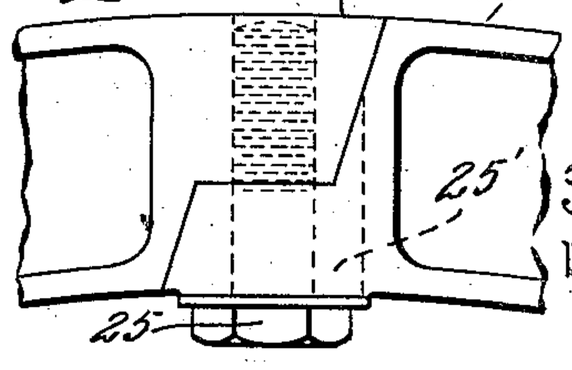
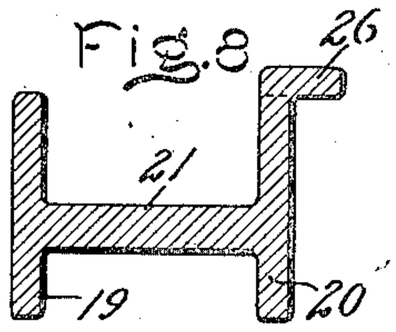


Fig. 8



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UNITED STATES PATENT OFFICE.

SAMUEL S. FORSTER, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

DYNAMO-ELECTRIC MACHINE.

No. 849,670. Specification of Letters Patent. Patented April 9, 1907.

Application filed November 29, 1904. Serial No. 234,759.

To all whom it may concern:

Be it known that I, SAMUEL S. FORSTER, 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.

My present invention relates generally to the structure of dynamo-electric machines, and more specifically to a certain advantageous construction employed to support the end of the armature-conductors in such machines.

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 and described one embodiment of my invention.

Of the drawings, Figure 1 is an elevation, with parts broken away and in section, showing a vertical-shaft dynamo-electric machine equipped with my invention. Fig. 2 is a plan view of one of the internal coil-supports employed. Fig. 3 is a section on the line 3 3 of Fig. 4. Fig. 4 is a plan view, on a larger scale than Fig. 2, showing a portion of the expansible ring. Fig. 5 is a section on the line 4 4 of Fig. 4. Fig. 6 is a plan view showing a portion of the support for the expansible ring. Fig. 7 is an elevation showing the same construction as Fig. 6, and Fig. 8 is a section on the line 8 8 of Fig. 2 of the support for the expansible ring.

Referring to the drawings, 1 represents the main frame of a vertical-shaft alternator adapted to be directly connected to and mounted upon a steam-turbine. The annular armature-core 2 of the machine is secured to the frame 1 in the usual manner. The element of the dynamo-electric machine located in the annular core—in the present instance the revolving field-magnet—is carried by a shaft 3, the upper end of which is journaled in a suitable bearing 4, carried by an end member 5, which is removably secured to the upper end of the frame 1. The lower end of the shaft 3 is coupled at 6 to the upper end of the shaft 7, which may be the main shaft of a steam-turbine. The shaft 7 is shown journaled at its upper end in a bearing 8, suitably secured to the casing 1.

The ends 10 of the armature-conductors project beyond the ends of the core 2, as shown, and are bent outward and rest against annular external supports or cylindrical cover members 11, secured to the ends of the core, as shown. The upper ends 10 are held against the external support 11 by an internal annular member formed in two parts 12 and 13. The part 13, which is wedge-shaped in cross-section, as is clearly shown in Figs. 1 and 5, with the blunt edge of the wedge upward, has its inner surface substantially cylindrical about the shaft 3 as an axis and has its outer surface parallel to the inner surfaces of the hollow cone or shell formed by the upper conductor end 10, from which it is separated by a suitable layer of insulating material 14.

Preferably the part 13 is formed of a number of similar sections 13′, which unite to form an expansible ring. One end of each section 13′ is formed with a tongue 15, while the other end is formed with a slot 16. In assembling the sections 13′ they are arranged so that the tongue 15 at one end of each section enters the slot in the adjacent section. A bolt 17 passes through one wall of each slot 16 and a slot 18 formed in the corresponding tongue 15 and is tapped into the other wall of the slot 16, thus forming a means for adjustably but firmly securing the ends of adjacent sections together.

The portion 12 of the internal coil-supporting member, which may be regarded as a support for the expansible ring, comprises two cylindrical portions 19 and 20, concentric with respect to each other, the shaft 3, and a horizontal web portion 21, integrally engaged with the cylindrical portions 19 and 20. The member 12 is preferably formed of a number of similar sections, as shown at 12′. The ends of each section 12′ are cut away, and the ends of adjacent sections overlap, as is clearly shown in Figs. 2, 6, and 7. The end surfaces of the overlapping ends are beveled, and they bear against beveled shoulders or surfaces formed in the adjacent sections. A radial bolt 25 passes through the inner overlapping portion in one section and is tapped into the outer overlapping portion of the adjacent section. As shown in Fig. 6, the opening 25′ in the inner overlap-

ping portion, through which the bolt 25 passes, is elongated. Lugs or projections 26 are formed on the upper side of the outer portion 20 of the part 12, which engage the upper surface of the part 13.

In assembling the internal coil-support the sections 13′, forming the member 13, are first placed in position and loosely connected together opposite the upper support 11. After this is done the sections forming the member 12 are placed in position, and the bolts 25 are screwed home. When this occurs, the outer part 13 is expanded somewhat, and the conductor ends 10 are locked firmly in place. After the sections 12′, forming the part 12, are rigidly secured together the bolts 17 are tightened, and the part 13 is thus formed into a rigid annular member.

When, as is frequently apt to occur, it becomes desirable to remove the field-magnet from the machine, the bolts 25 are loosened and the part 12 of the internal support is removed. The clearance between the field-magnet and the part 13 is sufficient to allow the removal of the field-magnet without disturbing the part 13. The part 13 is proportioned to be stiff enough and strong enough to hold the conductor ends 10 in place and prevent injury to the insulation by their distortion when the part 12 is removed to allow the removal of the field-magnet, particularly as the machine is not then in operation and subject to the vibration, more or less great, which accompanies such operation. When the field-magnet is again placed in position, the part 12 of the support may be replaced.

As shown, the part 12 is shaped and proportioned to have the strength and rigidity necessary to properly support the ends 10 of the armature-conductor and prevent any distortion thereof during the operation of the machine regardless of any accompanying vibration. The beveling of the ends of the sections 12′ and the elongation of the opening 25′, through which the bolt 25 passes, facilitates the assembly and disassembling of the sections 12′.

It will thus be observed that by the use of my two-part internal support I obtain a construction in which the upper ends of the armature-conductors are held at all times in their proper position with suitable firmness, while at the same time I may readily remove the field-magnet when necessary.

The internal support 27 for the lower ends 10 of the armature-conductors may be substantially similar to the part 12 of the upper internal support. The inner surface of the support 27 should be conical to correspond with the inner surfaces of the cone formed by the armature-conductors. Ordinarily there is no necessity for making the lower support in two parts, as the support does not need to be moved to allow of the removal of the field-magnet. As shown, the lower support 27 may be held in place by brackets 28, secured to the framework 1.

While I have shown my improved internal coil-support as employed at the upper end only of a vertical shaft-generator, it will be readily understood by all those skilled in the art that it may be equally well applied to one or both ends of the core of a horizontal-shaft dynamo-electric machine.

It will be obvious to all those skilled in the art that many changes may be made in the form of my invention without departing from its spirit.

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

1. In a dynamo-electric machine, a core formed of laminæ, end members between which the laminæ are clamped, windings thereon, and means for supporting the end turns or connections comprising an outside cylindrical cover, and internal clamping means, said clamping means comprising a sectional annular member and a second annular member within the first annular member and arranged to expand it, both of said annular members being separable from the core and end members.

2. In a dynamo-electric machine, the combination of a core, windings therein, and means for supporting the end turns or connections comprising an outside cylindrical cover, and internal clamping members, one of said clamping members being formed of segments which engage the end turns or connections, and the other of said clamping members being located within and arranged to support said segments, both of said clamping members being separable from the core.

3. In a dynamo-electric machine, a plurality of conductor portions arranged to form an annular shell, an expansible ring formed of segments the outer surfaces of which engage the conductor portions, an annular member engaging the inner surfaces of said segments, and means independent of said annular member for locking said segments into fixed relation with each other.

4. In a dynamo-electric machine, a plurality of conductor portions arranged to form an annular shell, an annular internal support therefor comprising two annular parts, one of said parts being readily separable from the other.

5. In a dynamo-electric machine, a series of conductor portions arranged to form an annular shell, an annular internal support therefor comprising a portion of slight radial thickness and another portion of considerably greater radial depth normally supporting the first-mentioned portion but readily separable therefrom.

6. In a dynamo-electric machine, an annular core, conductor portions extending therefrom, and an annular internal support for said conductor portions comprising two

parts normally engaging but separable from each other, one of said parts being of greater internal diameter than the other.

7. In a dynamo-electric machine, an annular core, conductor portions extending therefrom, an element normally located within said core but removable therefrom, an internal annular support for said conductor portions formed of two parts, said parts being of different internal diameters, the part having the smaller internal diameter being separable from the other part to allow of the removal of said element.

8. In a dynamo-electric machine, an internal field-magnet, an external armature-core, conductor portions extending from one end of said core, and an internal support for said conductor portions comprising an auxiliary part of greater internal diameter than the field and a main part of less internal diameter than said field-magnet normally engaging said auxiliary portion but separable therefrom to allow of the removal of the field-magnet.

9. In a dynamo-electric machine, an internal field-magnet, an external armature-core, conductor portions extending from one end of said core, and an internal support for said projecting conductor portions formed of two parts normally connected together, one of said parts being of less internal diameter than the other from which it is separable to allow of the removal of the field-magnet from its normal position within said armature-core.

10. In a dynamo-electric machine, the combination of a core, windings thereon, and means for supporting the end turns or connections comprising an outside cylindrical cover, an internal expansible ring, and means for expanding said ring comprising an annular member engaging said ring, said annular member being separable from said core.

In witness whereof I have hereunto set my hand this 26th day of November, 1904.

SAMUEL S. FORSTER.

Witnesses:
BENJAMIN B. HULL,
HELEN ORFORD.