

No. 633,857.

Patented Sept. 26, 1899.

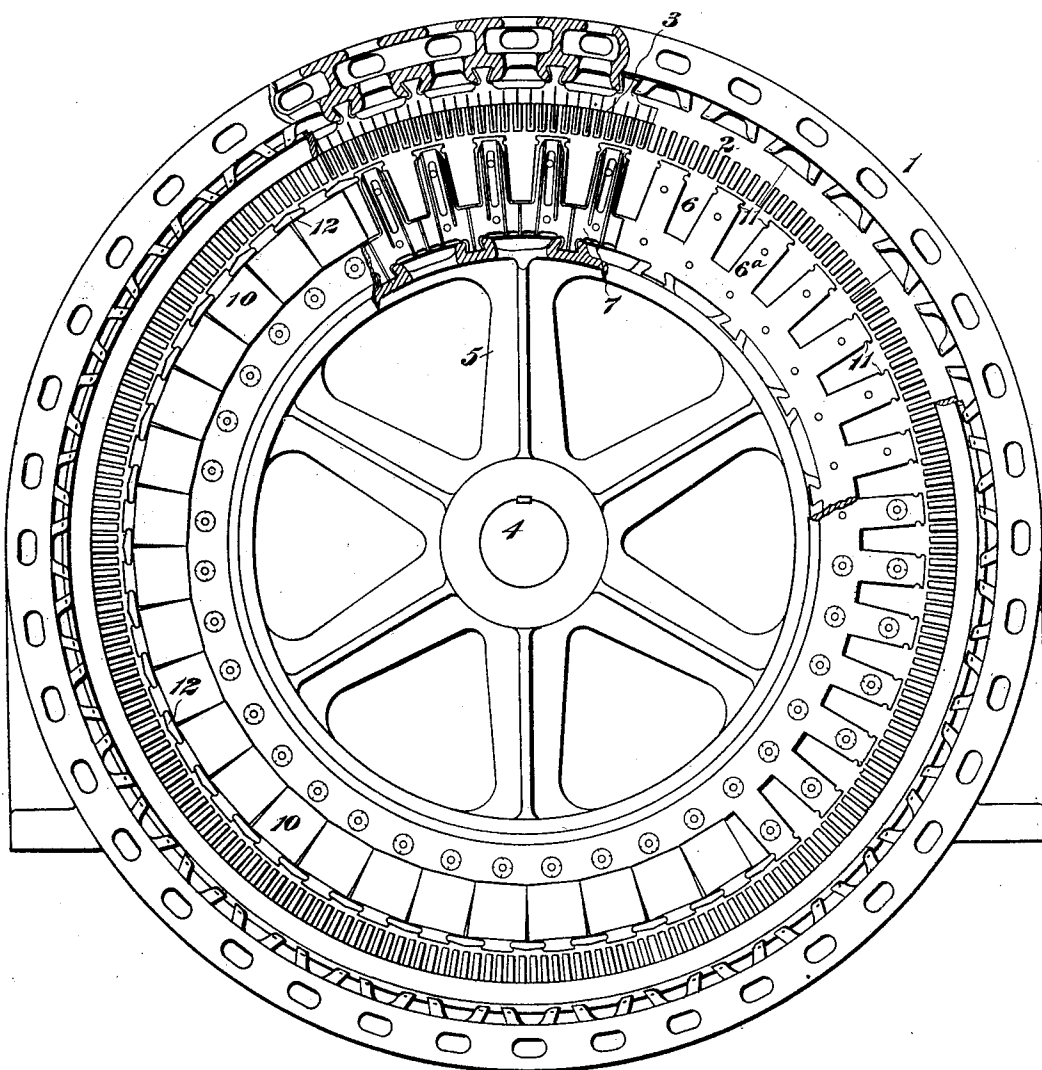
B. G. LAMME.
DYNAMO ELECTRIC GENERATOR.

(Application filed Apr. 14, 1899.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



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2 Sheets—Sheet 2.

Fig. 2.

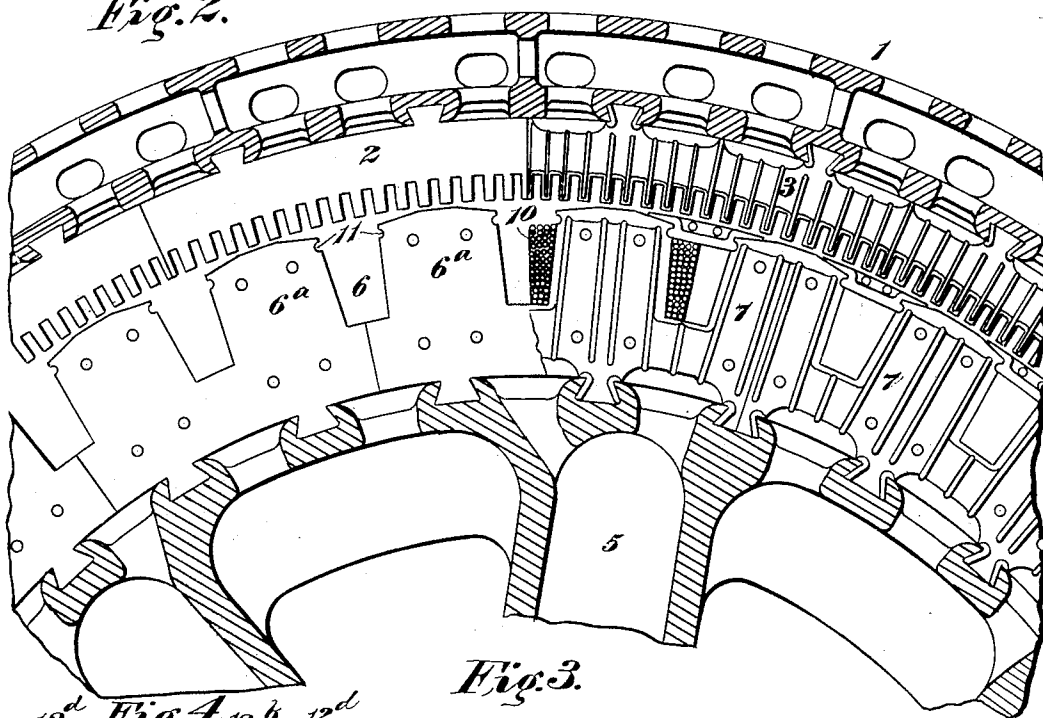


Fig. 3.

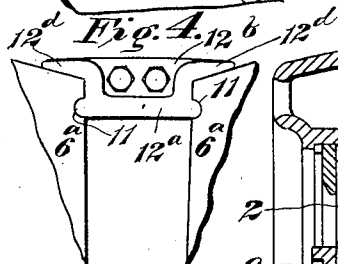
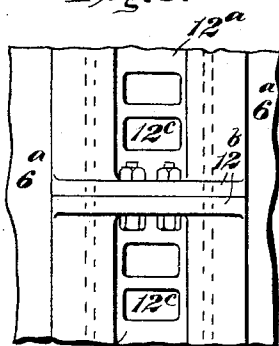


Fig. 5.



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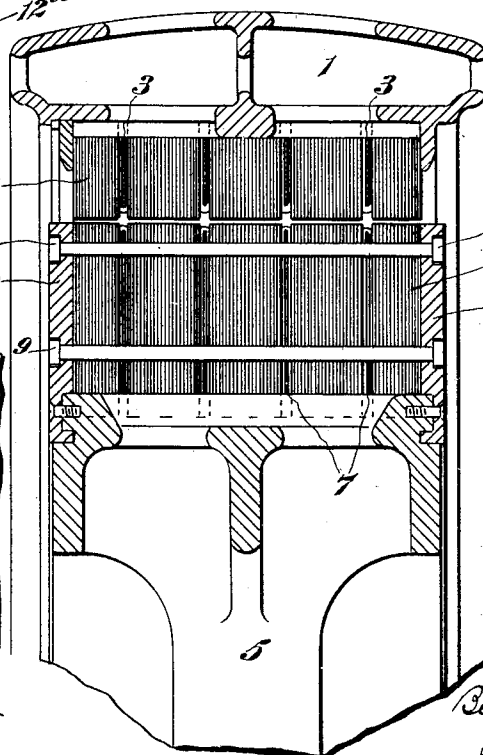


Fig. 6.

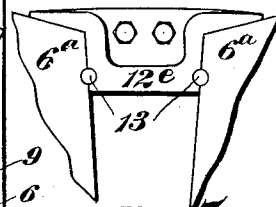
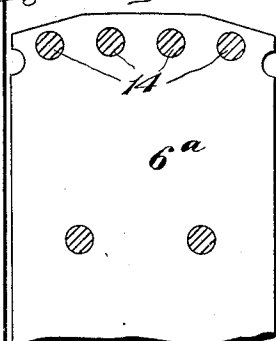


Fig. 7.



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BENJAMIN G. LAMME, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, OF PENNSYLVANIA.

DYNAMO-ELECTRIC GENERATOR.

SPECIFICATION forming part of Letters Patent No. 633,857, dated September 26, 1899.

Application filed April 14, 1899. Serial No. 713,013. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN G. LAMME, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Dynamo-Electric Generators, (Case No. 822,) of which the following is a specification.

My invention relates to dynamo-electric machines; and it has for its object to provide a machine of this character which shall be comparatively inexpensive in construction and the several parts of which shall be so constructed and arranged as to insure proper ventilation of both the stationary and rotating members, insure the retention of the several parts in proper relative position, provide well-balanced and effective magnetic circuits, and minimize the amount of copper necessary for a given output of energy.

In the accompanying drawings, Figure 1 is a view, partially in end elevation and partially in section, of a generator constructed in accordance with my invention, the armature-coils and some of the field-magnet coils being omitted. Fig. 2 is a sectional detail view of a portion of the field-magnet and armature of a machine constructed in accordance with my invention, the structure being substantially the same as that shown in Fig. 1, although of slightly-modified construction as regards certain details. Fig. 3 is a radial sectional view of the portion of the machine shown in Fig. 2. Fig. 4 is a detail view of a portion of two field-magnet pole-pieces and a cooperating coil-retaining wedge. Fig. 5 is a plan view of the part shown in Fig. 4, the ends of the wedge and of the corresponding portions of the pole-pieces being broken away. Fig. 6 is a view corresponding to Fig. 4, but showing a modification. Fig. 7 is a detail end view of a field-magnet pole-piece of modified construction.

Referring now to the details of construction illustrated in the drawings, 1 is the armature-frame of the machine, which is preferably of skeleton open-work construction in order to secure ventilation, economize material, and make the structure as light as is consistent with proper strength. This frame is supported upon a suitable bed-plate or base (not shown) and is provided with an annular lami-

nated core 2, this core being built up of toothed overlapping plates, each of which is provided with a plurality of dovetail projections which fit into corresponding dovetail recesses or grooves in the inner periphery of the frame, as is usual in machines of this general class.

The laminae constituting the core 2 are separated into annular groups or segments by means of spacing-plates 3, which have substantially the same general form as the laminae constituting the core proper, but having lateral ribs, so as to space apart the adjacent core-laminae and thus provide ventilating-passages for the purpose of keeping the temperature of the core within safe working limits. The coils which are fitted into the slots in the core 2 are not shown, but may be constructed and arranged as is usual in machines of this general type, so as to supply to the external circuit or circuits currents of one, two, or more phases, as may be desired.

Mounted concentrically with the frame 1 and core 2 in suitable bearings (not shown) is a shaft 4, on which is keyed a spider 5, the rim and arms of which may be provided with dovetail grooves. Mounted upon this spider is the field-magnet core 6, which is built up of overlapping segmental laminae or plates, each plate having a body portion provided with dovetail projections to fit into the dovetail grooves or recesses in the spider and with radial pole-piece projections 6^a, there being two or more of these projections to each plate. The sides of each pole-piece projection may be parallel, as shown, or the confronting sides of adjacent projections may be parallel, or the shape of these projections may be otherwise varied to suit the desires of the designer or manufacturer. This field-magnet core 6 is divided into a plurality of annular groups or segments by means of ribbed spacing-plates 7, supported in the same manner as are the core-plates proper, and the whole core structure is clamped together by means of heavy end plates 8 and bolts 9, which extend through the end plates, the core-laminae, and spacing-plates. The ventilating-spaces through the field-magnet core are preferably arranged in substantially the same planes as the ventilating-spaces in the armature-core, so that as the field-mag-

net is rotated it will act as a blower to force the air through the openings in the spider, the spaces in its core, the spaces in the armature-core, and the openings in the armature-frame.

The field-magnet coils 10 may be placed upon all of the field-magnet pole-pieces or only alternately, as may be desired. I have shown each pole-piece as provided with a field-magnet coil, the several coils substantially filling the spaces between the pole-pieces; but my invention is not limited to any specific number or arrangement of coils.

In order to retain the coils 10 in position, I provide each pole-piece with side grooves 11 near its outer end, and after the coils are in position I insert between each two adjacent pole-pieces a metal wedge 12, the edges of which are located in the side grooves, in which they make a sufficiently close fit so that the coils and supporting-wedges will be firmly held in operative position. In Figs. 2, 4, and 5 I have shown wedges 12^a, made in two parts, each part having at its inner end a transverse flange 12^b, so that the two parts may be driven into place from the opposite ends of the core and the flanges then bolted together. Since these parts are so formed as to have a wedging action, it is impossible for them to work loose. These wedges are preferably provided with openings 12^c, so as to permit the free passage of air for ventilating purposes, and in the form shown in Figs. 2, 4, and 5 each wedge is also provided with lateral flanges 12^d, that project over the adjacent edges or tips of the pole-pieces. I prefer to make these wedges of some good conducting metal, such as copper or brass, and with the construction here shown they will not only serve to hold the coil securely in position, but will constitute closed secondary circuits adjacent to the pole-tips, and thus tend to equalize the magnetic circuits of the machine by destroying the distorting effect due to armature reaction at the pole-tips.

In Fig. 6 the two-part coil-retaining wedge 12^e is substantially the same in construction and function as that shown in Figs. 4 and 5 except that instead of having side flanges to engage with the side grooves of the pole-pieces the wedge is grooved and pins 13 are driven into the registering grooves, thus securing and locking the wedge against radial movement.

In Fig. 7 I have shown a considerable number of bolts 14 passing through the pole-piece near its outer end, these bolts being employed in this relation in order to serve a double object—that is, they not only serve to clamp the lamine of the core securely together between the end plates, but they also serve, in conjunction with the end plates, as closed secondaries, and thus cooperate with the flanged wedges to destroy the injurious effects of armature reaction, and thus equalize the magnetic circuits of the machine.

Machines constructed in accordance with

my present invention have many advantages over those of the rotary-field type as heretofore constructed. For example, the field-magnet core built up of overlapping plates and bolted together, as shown and described, constitutes a laminated fly-wheel of great strength and permanence of structure. The magnetic circuits are substantially confined to the laminated structure and are therefore uniform, and the fluxes are not obstructed or interfered with by defects or joints in the cast-metal spider. The coils are substantially surrounded on four sides by metal—*i. e.*, by the core proper and the retaining-wedges—so that the heat generated in the coils is readily transferred to the surrounding metal by conduction and is there dissipated by reason of the ventilating openings and passages. The heat generated in the field-magnet coils is thus more effectively dissipated than has heretofore been possible, since it is transferred by conduction at a more rapid rate than is possible by convection alone. It has been found in practice that by employing the construction shown and described the amount of copper necessary for a given output of energy is very much less than in machines of prior construction.

While I have illustrated and described my invention as embodied in a machine having a rotary field-magnet, I desire it to be understood that some of the advantages specified may be obtained by embodying the invention in machines having stationary field-magnets. I therefore do not intend to limit my invention in this respect or in other respects to the exact details shown and described.

I claim as my invention—

1. In a dynamo-electric generator, a rotary, laminated field-magnet core having radial pole-pieces provided with coils and with side grooves adjacent to the outer ends of the coils, metal coil-retaining wedges or plates held in position by projections located in said grooves and projecting over the edges or tips of the pole-pieces.

2. In a dynamo-electric generator, a field-magnet core comprising a plurality of annular laminated segments separated by ventilating-spaces, the outer ends of the pole-pieces of said core being joined by metal coil-retaining wedges that extend over the edges or tips of the pole-pieces.

3. In a dynamo-electric machine, the combination with a stationary frame having a laminated core separated by spacing-plates into a plurality of annular segments, of a spider provided with a laminated core separated by spacing-plates into a plurality of annular segments, the pole-pieces of said core having side grooves near their outer ends, and wedges cooperating with said grooves to retain the field-magnet coils in position.

4. In a dynamo-electric machine, a laminated field-magnet core having radial pole-pieces for the field-magnet coils and two-part metal wedges located between the pole-pieces

adjacent to the outer ends of the coils for retaining the latter in position.

5 5. In a dynamo-electric machine, a laminated, rotary field-magnet core having radial pole-pieces provided with side grooves near their outer ends, end plates and bolts for fastening the core-laminæ together, and coil-retaining wedges coöperating with said grooves and extending over the pole tips or edges.

10 6. In a dynamo-electric machine, a laminated field-magnet core having radial pole-

pieces provided with side grooves near their outer ends, coils on said pole-pieces, and two-part metal wedges having their edges located in adjacent pole-piece grooves, the two parts 15 of each wedge being bolted together.

In testimony whereof I have hereunto subscribed my name this 12th day of April, 1899.

BENJ. G. LAMME.

Witnesses:

WESLEY G. CARR.

H. C. TENER.