

(No Model.)

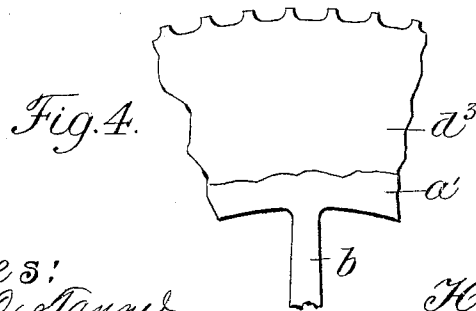
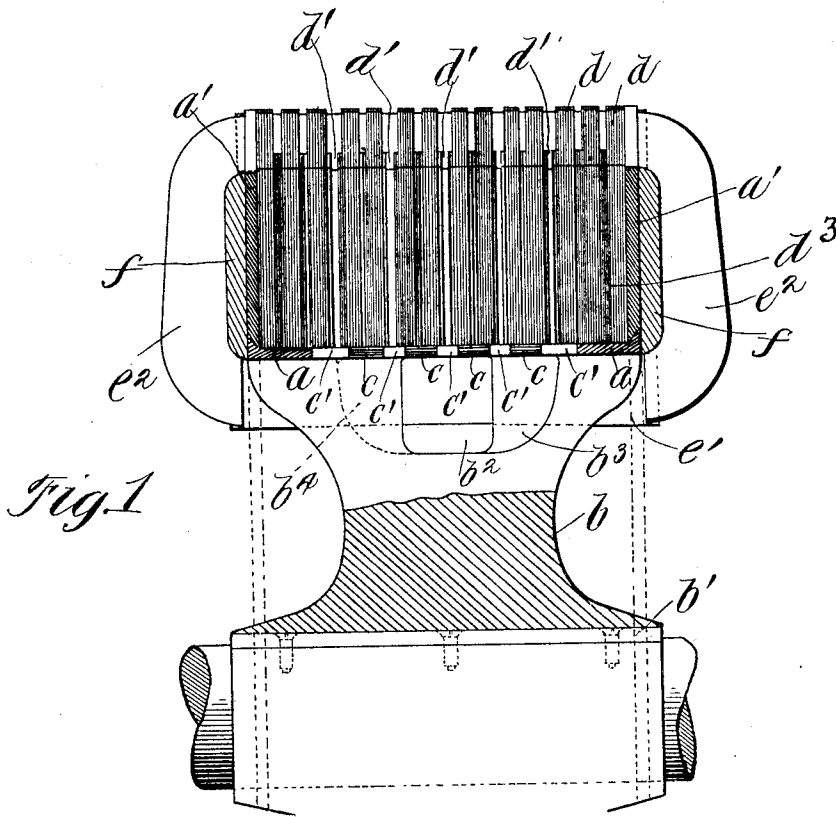
2 Sheets—Sheet 1.

H. H. WAIT.

ARMATURE FOR DYNAMO ELECTRIC MACHINES.

No. 584,431.

Patented June 15, 1897.



Witnesses:
Dr. Wm. C. Tanner,
John H. Sinclair.

Inventor:
Henry H. Wait,
By Boston & Brewster
Attorneys.

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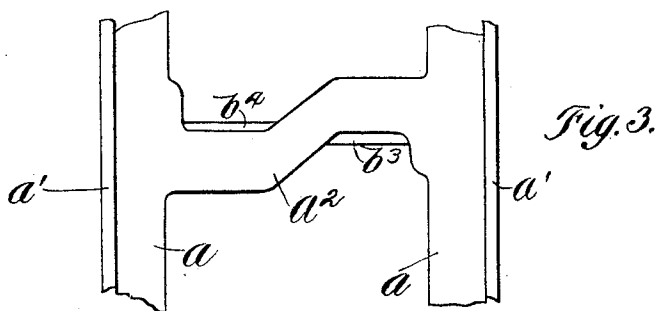
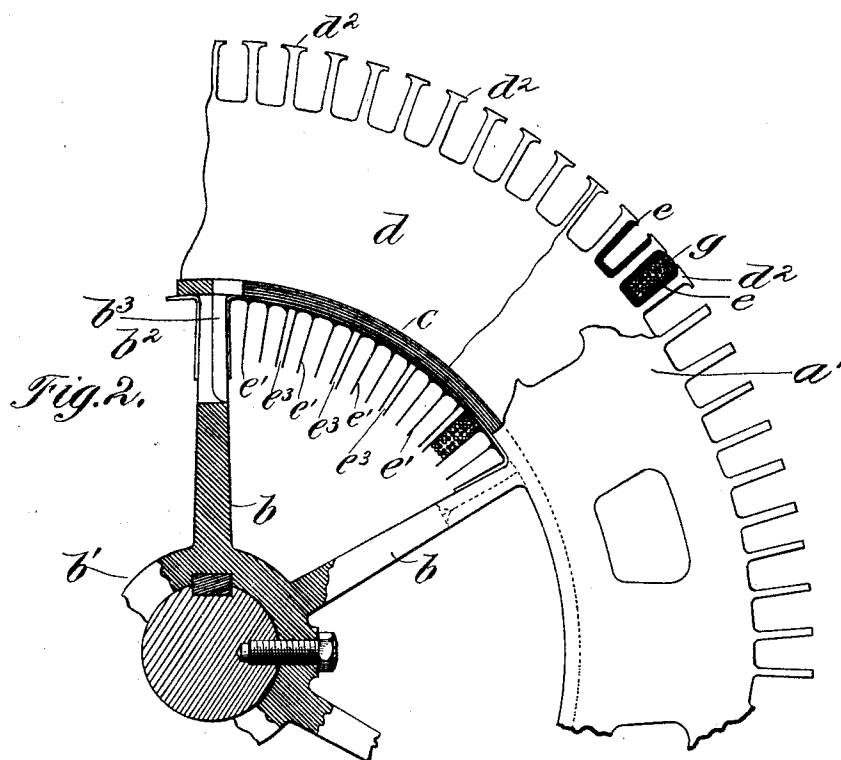
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Witnesses:

Dr. Hitt C. Tamm.
John H. Sinclair

Inventor:
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By Carter & Brown
Attorneys.

UNITED STATES PATENT OFFICE.

HENRY H. WAIT, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN
ELECTRIC COMPANY, OF SAME PLACE.

ARMATURE FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 584,431, dated June 15, 1897.

Application filed February 27, 1896. Serial No. 581,012. (No model.)

To all whom it may concern:

Be it known that I, HENRY H. WAIT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Armatures for Dynamo-Electric Machines, (Case No. 6,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to an armature for dynamo-electric machines, my object being to provide an improved construction of armature whereby openings or passages are provided through the armature-core for the passage of air to ventilate the armature and thus prevent undue heating.

A further object of my invention is to so construct the armature as to throttle or prevent the cross-magnetization due to the armature-coils, and, furthermore, to dispense with the bands usually employed upon the periphery of the armature for maintaining the armature-coils in position.

The armature of my invention is of the Gramme-ring type and comprises a spider upon which are mounted disks or rings of laminated material to constitute the armature-core. To provide passages for the air, spaces are left between the laminated disks or rings at intervals, thus forming radial openings through which the air may pass. The armature-coils are wound in insulated troughs, which may be made of any desired insulating material, preferably shellacked pasteboard or paper, spaces being left between some of the troughs for the passage of air to the ventilating-spaces between the laminated rings. The spider is so constructed that annular chambers are provided between the armature-core and the troughs containing the armature-coils, the chambers communicating with the spaces between the armature-disks and also with the spaces between the insulating-troughs, whereby air may pass through the spaces between the troughs, thence to the annular chambers and to the spaces in the armature-core communicating therewith. The spokes or arms of the spider are cut away or provided with recesses to thus afford a pas-

sage between the insulating-troughs and the arms of the spider through which air may find access to the annular chambers. The armature-coils on the exterior periphery of the armature-core are wound in insulating-troughs adapted to rest between projecting teeth provided upon the laminated rings, spaces thus being left between adjacent coils communicating with the spaces upon the interior of the armature-core. In order to dispense with bands upon the periphery of the armature, the projecting teeth are provided with enlarged ends, and a wedge, preferably of wood, is driven between the teeth upon the top of the armature-coils, thus maintaining the coils in position and preventing their being thrown from between the teeth by centrifugal force.

In order to prevent or throttle the cross-magnetization due to the armature-coils which tend to set up a magnetic field threading the coils and finding a return-circuit through the pole-pieces, I so proportion the cross-section of the projecting teeth that the metal thereof becomes highly saturated during the operation of the machine, thus choking or throttling the lines of force which the armature-coils tend to generate. In designing Gramme-ring armatures it is usually necessary, in order not to make the armature of too great diameter, to construct the core with the greatest dimension lying parallel to the axis of rotation, and with such increased lateral dimension it would be necessary in order to make the projecting teeth of sufficiently small cross-section to decrease the width of the teeth upon each of the laminated rings or disks to such an extent as to render the armature mechanically imperfect, as the teeth would thus not be sufficiently strong and rigid. In order to overcome this objection and at the same time secure in the armature teeth of the requisite dimensions to insure the necessary strength, teeth are cut away from a portion of the laminated rings constituting the armature-core. By this provision the teeth may be designed to furnish the requisite strength, the cross-section of the completed core being reduced or divided at the periphery by the removal of teeth from the laminated rings, as above mentioned. This construction also facilitates the design-

ing of the armature, as the proper cross-section of the teeth may be calculated for the ideal form of armature-core in which the core is of square cross-section, and when it becomes necessary to change the dimensions of the core as mechanical considerations dictate the teeth may be removed from the rings of said core sufficiently to secure the necessary reduction in or division of its cross-section.

I will describe my invention more in particular by reference to the accompanying drawings, in which—

Figure 1 is a sectional view illustrating the armature of my invention. Fig. 2 is a partial view of the armature of my invention, some of the parts being shown in section and but one of the armature-coils being shown in position. Fig. 3 is a partial view looking upon the periphery of the spider which supports the armature-core. Fig. 4 is a detail view of a section of a laminated disk from which teeth have been cut for preventing cross-magnetization.

Like letters refer to like parts in the several figures.

The spider comprises a rim in the form of a cylindrical portion *a* and flanges *a' a'*, extending perpendicular thereto. The rim is supported upon arms or spokes *b*, which are mounted upon the hub *b'*. The central portion of the cylinder *a* of the rim is cut away except at points opposite the spokes or arms, and rings *c c* of insulating material are placed in the space thus formed and extend about the rim, resting upon the ends of the arms *b*. Annular spaces or chambers *c' c'* are thus provided in the rim. The armature-core is formed from laminated disks or rings *d d*, clamped between the flanges *a' a'*. At intervals spaces *d' d'* are provided between the disks, the spaces *d'* communicating with the annular chambers *c'*. Projecting teeth *d²* are provided upon the peripheries of some of the laminated rings, as illustrated, the teeth being provided with enlarged ends. Troughs *e e* of insulating material are placed between the teeth *d² d²*, within which the armature-coils are adapted to be wound. Likewise, troughs *e' e'* are provided upon the inner face of the armature-core, the troughs *e* and *e'* being joined by troughs *e² e²*, curved at their ends and adapted to fit the ends of the troughs *e e'*. The troughs may be made of any insulating material—as, for instance, paper covered with shellac. The armature-coils are thus thoroughly insulated from the armature-core, and dirt or dust accumulating in the openings through the armature-core cannot impair the insulation of the armature-coils. Rings *f f* of wood are preferably interposed between the troughs *e² e²* and the flanges *a' a'*. After the armature-coils have been placed in position within the troughs wedges *g*, preferably of wood, are driven between the teeth upon the top of the armature-coils and rest against the enlarged ends of the teeth to thus maintain the coils in position. By the employment

of the wedges *g* and the teeth with enlarged ends bands upon the periphery of the armature for holding the armature-coils in position may be dispensed with. Spaces *e³ e³* are provided at intervals between the troughs *e' e'*, whereby air may pass to the annular chambers *c' c'*, and from thence to the spaces *d' d'* between the laminated rings of the armature-core.

The arms or spokes *b* are cut away upon the ends, thus leaving an opening *b³*, extending laterally through the arm. The arm *b* is provided with a recess *b³*, communicating with the opening *b³*, the recess *b³* being of a depth equal to about one-half the thickness of the arm. A path is thus afforded whereby air may pass through the recess *b³* to the annular chambers *c' c'* upon the right, as shown in Fig. 1. Likewise a recess *b⁴* is provided upon the face of the arm opposite to that carrying the recess *b³*, the recess *b⁴* thus affording communication with the annular chambers *c' c'*, as shown in Fig. 1. The cross-piece *a²* of the rim, as shown more clearly in Fig. 3, has an angular form, whereby the upper ends of the recesses *b³ b⁴* may not be sealed by the said cross-piece. The recesses or openings *b³ b⁴* and the openings *e³ e³* between the troughs thus afford access for the air to the annular chambers *c' c'*, which are in communication with the spaces *d' d'* of the armature-core, and these communicate with the spaces between the armature-coils upon the exterior of the armature. Ventilating-passages are thus provided through which air may pass during the operation of the machine to prevent undue heating of the armature-core.

The cross-section of the teeth *d² d²*, provided upon the laminated rings, is proportioned so that during the operation of the machine the metal becomes highly saturated and thus chokes or throttles the cross-magnetization, as before described. This is accomplished by cutting away the projecting teeth from a portion of the laminated rings, as indicated at *d³*, by which the cross-section of the metal at the periphery is reduced or divided and the desired results are secured.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an armature for dynamo-electric machines, the combination with an armature-core formed of annular plates or disks of laminated material sectionally disposed, of radially-extending ventilating-passages provided between the said sections, a spider whereon the said core is mounted, central portions of the periphery of which being cut away to afford communication with the said radial passages, coils wound upon the said core, and spaces provided between the said coils on the outer and inner circumferences of the armature communicating with the openings in the periphery of the spider and the ventilating-passages provided in the armature-core, substantially as described.

2. In an armature for dynamo-electric machines, the combination with laminated rings or disks comprising the core, spaces being left between said disks at intervals to form
 5 radially-extending ventilating-passages, of a spider carrying the said core, the central portion of the periphery of the spider being cut away, bands or rings of insulating material mounted in the space thus formed and separated from one another to form spaces connecting with the ventilating-passages in the
 10 core, armature-coils surrounding said core, spaces being provided between said coils on the outer and inner circumference of the armature to thus afford passages for the circulation of air from the interior to the exterior of the core of the armature; substantially as described.

3. In an armature for dynamo-electric machines, the combination with rings or disks of laminated material, spaces being provided at intervals between said disks to form ventilating-passages, of insulating-troughs, and
 25 ventilating-spaces being provided between said troughs and affording communication with the ventilating-passages in the armature-core; substantially as described.

4. In an armature for dynamo-electric machines, the combination with rings or disks of laminated material constituting the core, spaces being provided between said disks at intervals to form ventilating-passages, of annular chambers provided at the inner circumference of said core and communicating with said ventilating-passages, insulating-troughs surrounding the armature-core, and
 35 armature-coils wound within said troughs, spaces being provided between said troughs for the admission of air to the annular chambers; substantially as described.

5. In an armature for dynamo-electric machines; the combination with a core formed of rings or disks of laminated material, ventilating-passages being provided between said
 45 disks at intervals, of annular chambers provided at the inner circumference of said core and communicating with said ventilating-passages, troughs of insulating material en-

circling said core, armature-coils wound within the said troughs, spaces being provided between said troughs to admit air to the annular chambers, and an armature-spider, the arms or spokes thereof being cut away or provided with recesses to afford passage for air
 50 to the annular chambers; substantially as described. 55

6. The herein-described toothed armature for dynamo-electric machines, composed of annular plates of laminated material section-
 60 ally arranged, with ventilating-spaces between the said sections, the said plates being provided with teeth upon their peripheries, a portion of the said teeth upon the plates being cut away to prevent cross-magnetiza-
 65 tion, by permitting the teeth upon the armature-core to become highly saturated during the operation of the machine, substantially as described.

7. In an armature for dynamo-electric machines, the combination with a core formed of rings or disks of laminated material, teeth being provided upon the peripheries of a part only of said rings, and armature-coils wound
 70 between said teeth, the combined cross-section of said teeth being such that during the operation of the machine the metal of the teeth becomes highly saturated to throttle or prevent the cross-magnetization due to the
 75 armature-coils; substantially as described. 80

8. The herein-described armature for dynamo-electric machines, the body of which is composed of plates or disks of laminated material, teeth being provided upon the peripheries of said laminated disks, armature-
 85 coils wound in the recesses between the said teeth and lateral intervals or spaces between the teeth upon the laminated plates provided by cutting away a portion of the teeth upon the plates or disks, and thereby reducing the
 90 cross-section of the teeth of the armature, substantially as and for the purpose specified.

In witness whereof I hereunto subscribe my name this 13th day of November, A. D. 1895.

HENRY H. WAIT.

Witnesses:

JOHN W. SINCLAIR,
 W. CLYDE JONES.