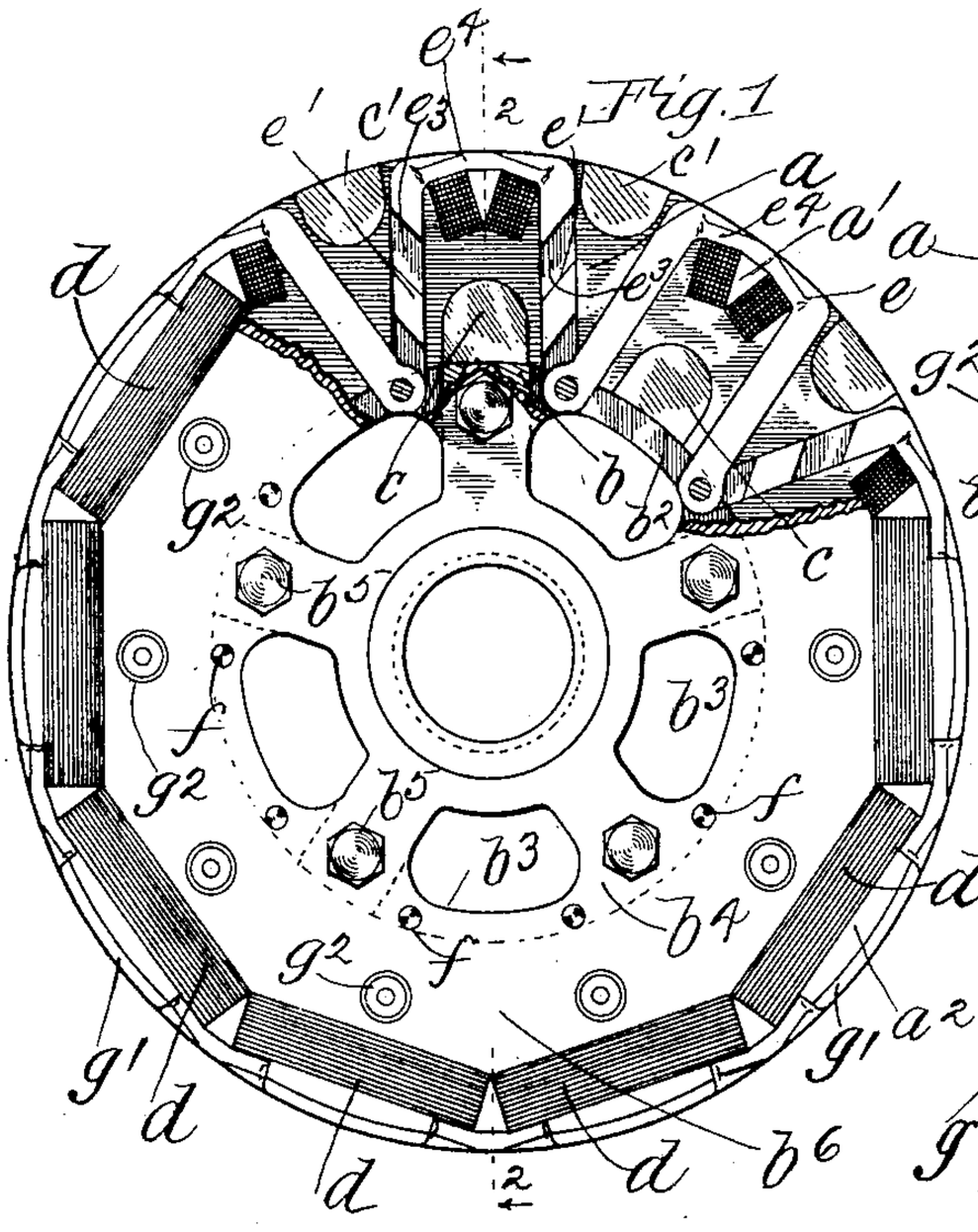
No Model.)

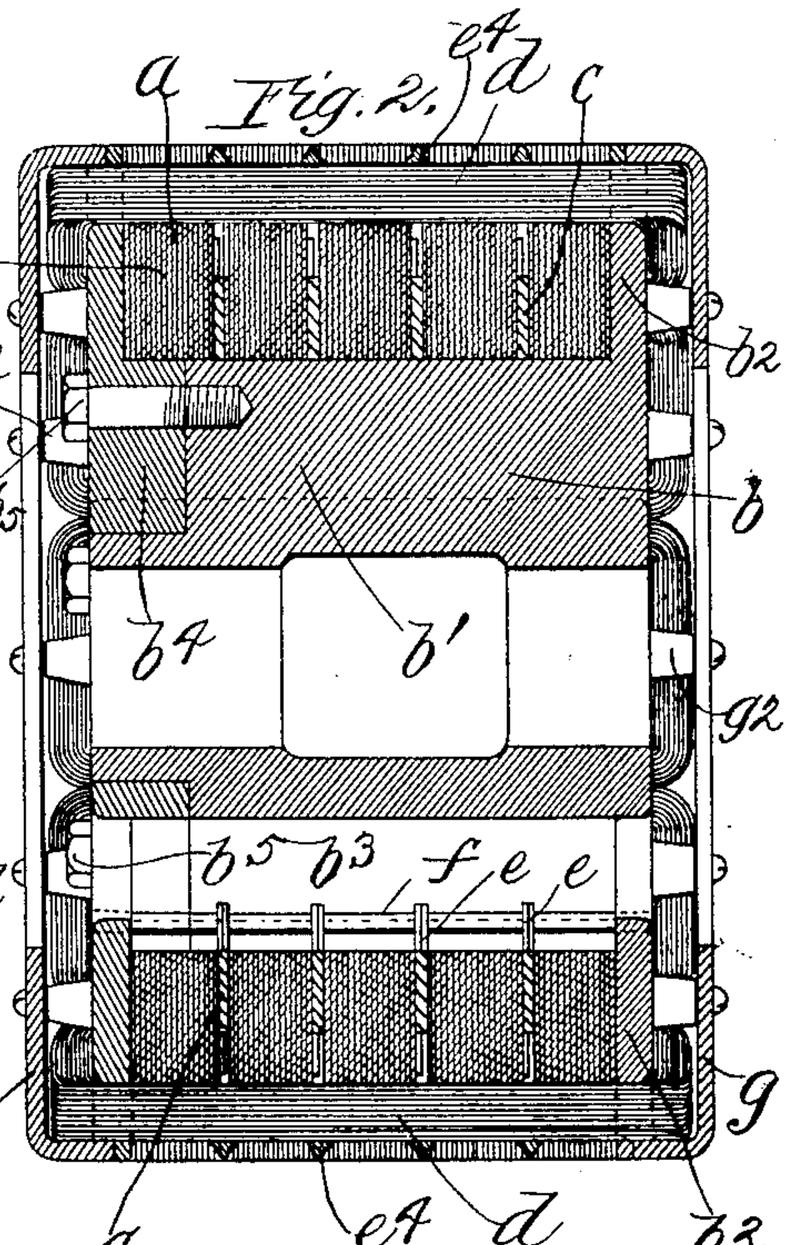
2 Sheets—Sheet 1

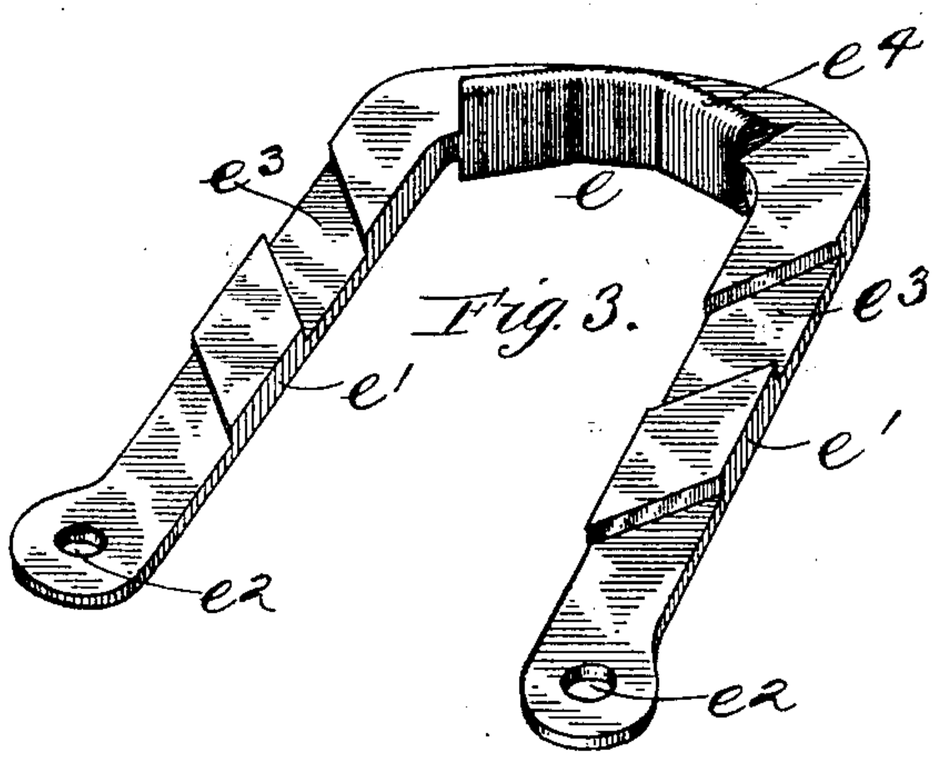
F. P. IDE.

ARMATURE FOR DYNAMO ELECTRIC MACHINES.

No. 561,590. Patented June 9, 1896.







Witnesses:
D. W. C. Danner.
George L. Bragg

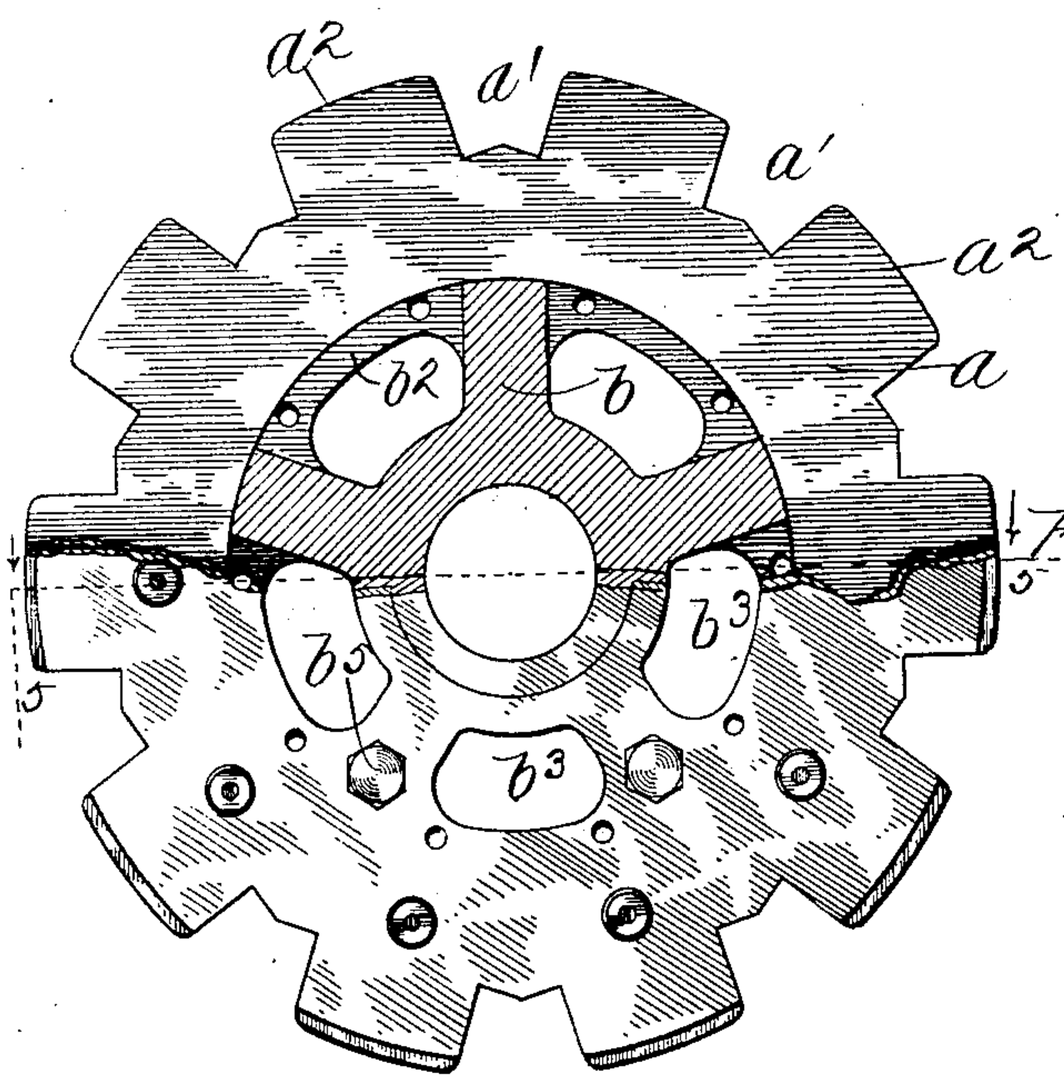
Inventor:
Francis P. Ide,
By Barton & Brown
Attorneys.

(No Model.) 2 Sheets—Sheet 2

F. P. IDE.

ARMATURE FOR DYNAMO ELECTRIC MACHINES.

No. 561,590. Patented June 9, 1896.



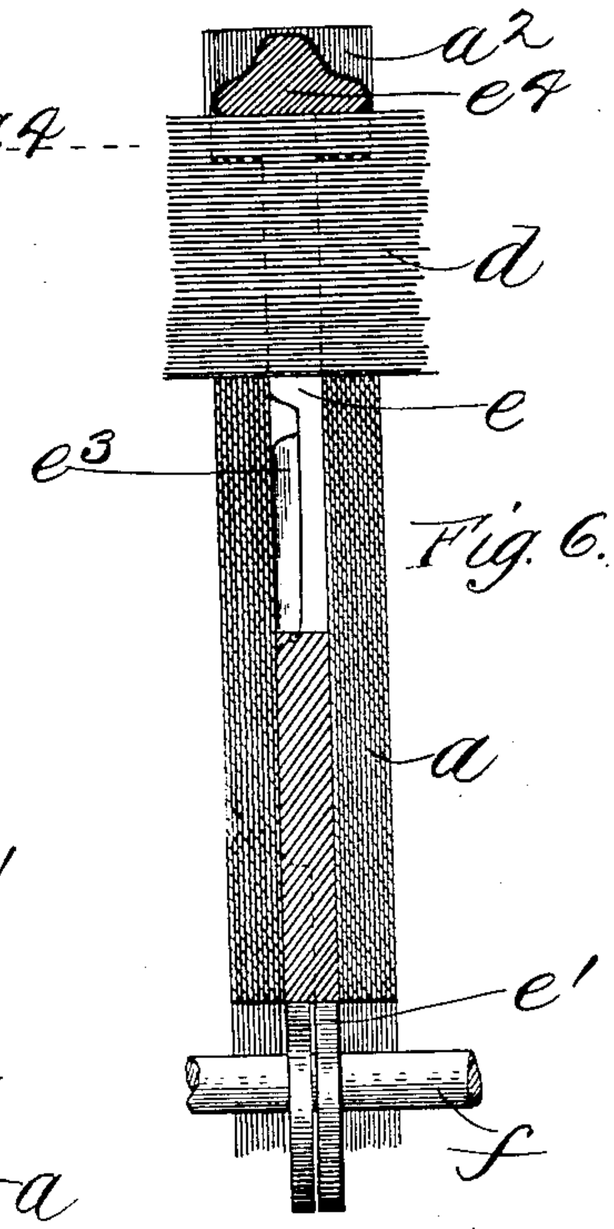
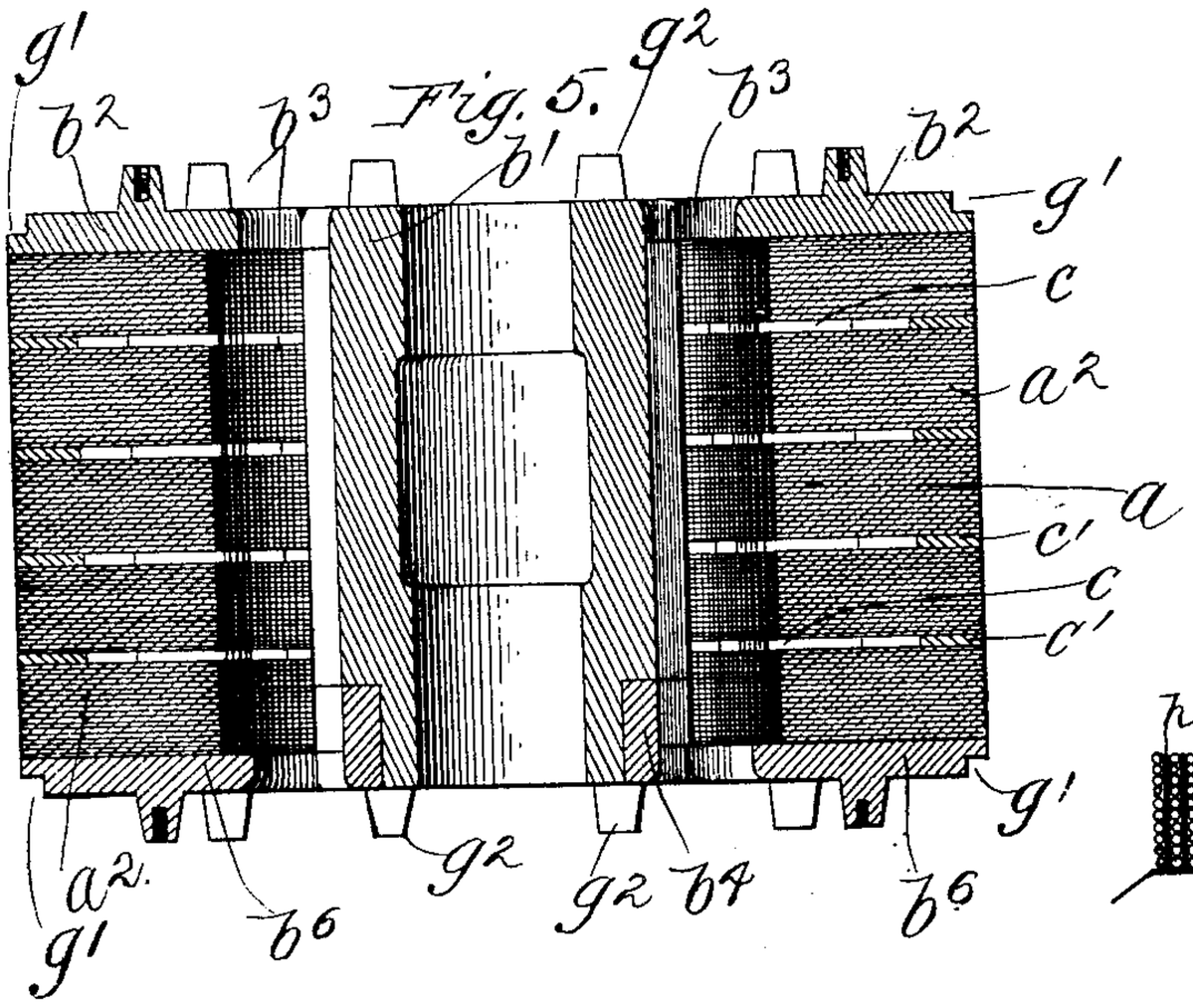


Fig. 6.



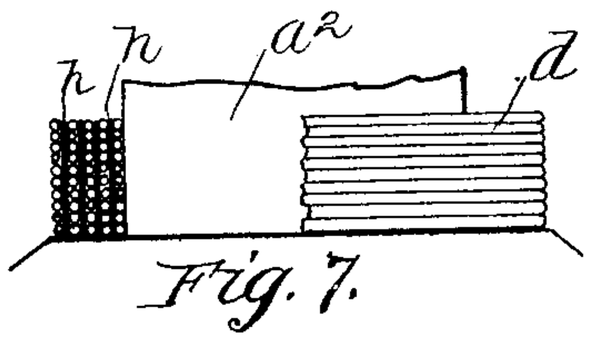


Fig. 7.

Witnesses:
D. P. C. Danner.
George L. Cragg

Inventor:
Francis P. Ide,
By Barton & Brown
Attorneys.

UNITED STATES PATENT OFFICE.

FRANCIS P. IDE, OF EAU CLAIRE, WISCONSIN.

ARMATURE FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 561,590, dated June 9, 1896.

Application filed April 14, 1896. Serial No. 587,492. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS P. IDE, a citizen of the United States, residing at Eau Claire, in the county of Eau Claire and State of Wisconsin, have invented a certain new and useful Improvement in Armatures for Dynamo-Electric Machines, (Case No. 2,) 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 armatures for dynamo-electric machines and electric motors, and has for its object the construction of an armature possessing simplicity and great strength and efficiency, and wherein the parts may be readily assembled and disunited.

The preferred form of armature constructed in accordance with my invention comprises a core composed of thin laminated rings of iron or low-grade steel supported upon a spider which is suitably mounted upon a shaft, the rings being provided with recesses extending inward from the outer circumference, which are alined when the rings are assembled, longitudinal grooves being thus formed in the armature-core, in which armature-coils are disposed, the metal between the grooves in the core being surrounded by the coils. The armature-core is divided into sections perpendicular to the axis of the shaft, distance-pieces being provided to preserve fixed distances between said sections. Retaining pieces or links of U shape are employed, which are disposed about the armature-coils to retain them in position, the arms whereof extend toward the armature-shaft. The adjoining arms of adjacent links overlap at their ends, holes being provided in these overlapping ends through which retaining-rods are passed. Finishing-rings are mounted upon the ends of the armature after the various parts have been assembled to secure the ends of the coils in position and to present a neat and trim appearance to the structure as a whole.

My invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is an end view of an armature made in accordance with my invention, the finishing-ring being removed and parts broken away to show clearly its construction. Fig. 2 is a sectional view thereof on line 2 2 of Fig. 1. Fig. 3 is a perspective view of one of the retaining-links employed to secure the armature-coils in position. Fig. 4 is a detail view showing the construction of the armature-core and the spider supporting the same. Fig. 5 is a sectional view on line 5 5 of Fig. 4. Fig. 6 is a radial sectional view taken through the middle of one of the supporting-links. Fig. 7 is a detail view of the armature.

Like letters refer to like parts throughout the different views.

The armature-core a is composed of laminated rings of iron or low-grade steel, shaped as shown most clearly in Fig. 4. The recesses a' are so shaped that the edges of the projections a^2 are parallel, whereby the armature-coils may be readily placed upon and removed from the same. The laminated rings of the armature-core are supported upon the spider b, which in turn is supported upon a shaft. The spider is composed of two sections, upon the larger one b' of which the major portion of the laminated rings or core-plates are disposed and upon which an end plate b^2 is carried to keep the core-plates upon the spider. The outer edge of plate b^2 conforms to the contour of the laminated rings, while the central portion is cut away at b^3 b^3 to provide ventilation for the armature.

The lesser portion of the core-plates are disposed upon the smaller section b^4 of the spider, which is then secured to the section b' by the bolts b^5. The section b^4 is provided with an end plate b^6, similar to end plate b^2, to keep the core-plates in position. When the two sections of the spider are assembled, the core-plates are securely clamped in place between the end plates b^2 b^6, the grooves a' in the core-plates being alined, whereby longitudinal ribs a^2 are formed upon the exterior of the armature-core, each of which constitutes a core for an armature-coil. Distance-pieces c c' are provided at the interior and exterior circumferences of the armature-core to divide said core into separated sections, as shown most clearly in Figs. 2 and 5, the spaces intervening between the sections serving to ventilate the armature and to radiate the heat produced therein by Foucault currents and hysteresis.

After the armature-core has been thus assembled coils *d d* are disposed about the coil-cores a^2, links *e e*, formed preferably of non-magnetic material, as aluminium-bronze, engaging the adjacent sides of adjoining coils. The arms *e' e'* of the links are passed through the bores of adjoining coils and spaces between the sections of the core. The ends of adjacent arms of the retaining-links overlap, the holes e^2 e^2 provided therein being placed in alinement. Retaining-rods *f f* are passed through these holes to secure the retaining-links in position, the rods in turn being secured in position by frictionally engaging the interior periphery of the armature-core, this engagement resulting from the outward pull exerted by the armature-coils due to the centrifugal force acting thereon. To properly locate the retaining-rods and hold the same in position, I provide holes in the end plates, which serve the further purpose of properly locating the exact position of the retaining-links, as the holes in the arms of the retaining-links must come in line with the holes in the end plates which locate and support the retaining-rods. The retaining-links are preferably made as shown in Fig. 3. Ventilating-recesses e^3 e^3 are provided at an angle to the arms *e' e'*, which act in conjunction with the spaces between the sections of the armature-core to ventilate the armature. The links are provided with an enlarged engaging surface e^4 to prevent the armature-coils from being cut where they are engaged by the links.

After the various parts have been assembled, as above described, finish-rings *g g* are secured in position to secure the projecting ends of the coils *d d* and to impart a neat appearance to the armature as a whole. Recesses *g' g'* are provided in the end plates b^2 b^6 to receive the finish-rings *g g*. The finish-rings are secured upon the armature by screws which engage lugs g^2 g^2, provided upon the end plates b^2 b^6.

The armature-coils are separately wound, each layer possessing but a few turns of wire. Strips of high insulating material *h h* are placed between consecutive layers of winding, whereby all of the conductors possessing considerable difference of potential are well separated, as shown in Fig. 7. The coils are machine-wound in standard forms, baked, and finished, forming one solid unyielding compress of conductors and insulation in condition to be applied to the armature-core. The coils, being of standard size to suit various machines, are readily placed upon the armatures without driving, bending, wedging, or any other treatment which is liable to injure them.

The armature-coils being protected at their ends by the finish-rings *g g*, and being placed well within the circumference of the core, are not liable to be damaged from the usual sources of injury. If a coil should become ruptured by a stroke of lightning or other cause, it may readily be removed and replaced by a sound coil. An injured coil may be removed by slipping off the finish-rings, removing the rods passing through the links securing the particular coil in position, and removing said links, whereupon the coil may readily be removed after its connections have been broken.

The various parts of the armature of my invention may be manufactured in standard sizes, enabling the armature to be assembled with but little machine-work.

Modifications may readily be made without departing from the spirit of my invention, and I do not therefore desire to be limited to the precise construction shown; but,

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

1. In an armature of a dynamo-electric machine, the combination of a core with armature-coils disposed thereon, and U-shaped retaining-links adapted to secure said coils in position, substantially as described.

2. In an armature of a dynamo-electric machine, the combination of a core with armature-coils disposed thereon, with retaining-links surrounding said coils, and retaining-rods adapted to hold said retaining-links in position, substantially as described.

3. In an armature of a dynamo-electric machine, the combination of a core divided into sections, spaces intervening between said sections with armature-coils disposed upon said core, and U-shaped retaining-links passing about said coils and through said spaces and adapted to secure said coils in place, substantially as described.

4. In an armature of a dynamo-electric machine, the combination of a core disposed perpendicularly to the axis of rotation, said core being divided into sections with spaces perpendicular to the axis of rotation intervening and provided with longitudinal ribs, with armature-coils disposed about said ribs, U-shaped retaining-links passing about said armature-coils and through said spaces and adapted to retain rods passing through the ends of said links, substantially as described.

5. In an armature of a dynamo-electric machine, the combination of a core divided into sections with spaces intervening between said sections, said core being also provided with ribs, with armature-coils disposed about said ribs, a support for said core provided with end plates conforming in the contour of their outer edges with the outer contour of said core, retaining-links passing about said coils and through said spaces, and retaining-rods adapted to secure said links in position, substantially as described.

6. In an armature of a dynamo-electric machine, the combination of a core divided into sections with spaces intervening between said sections, said core being also provided with ribs, with armature-coils disposed about said ribs, retaining-links passing about said coils and through said spaces, retaining-rods

adapted to secure said links in position, and finishing-rings secured upon the ends of the armature and inclosing the ends of the coils, substantially as described.

7. In an armature of a dynamo-electric machine, the combination of a core perpendicularly disposed to the axis of rotation composed of laminated rings, said core being divided into sections with fixed spaces intervening between the same, said core being provided with longitudinal ribs, with armature-coils disposed about said ribs, retaining-links passing about said coils and through said spaces, retaining-rods passing through the ends of said links, a support for said core provided with end plates adapted to secure the core-plates of said core together, and finishing-rings secured to said support and inclosing the ends of the coils, substantially as described.

8. In an armature of a dynamo-electric machine, the combination of a core provided with ventilating-passages, with armature-coils disposed thereon, and U-shaped retaining-links adapted to secure said coils in position provided with ventilating-recesses e^3 e^3 which act in conjunction with the ventilating-recesses in the core to ventilate the armature, substantially as described.

9. In an armature of a dynamo-electric machine, the combination of a core composed of laminæ, disposed perpendicularly to the axis of rotation, having longitudinal ribs, with armature-coils disposed about said ribs, a support for said armature-core, and end plates conforming in outer contour with said core secured upon said support and adapted to retain the laminæ of the core in position; substantially as described.

10. In an armature of a dynamo-electric machine, the combination of a core disposed perpendicularly to the axis of rotation, having longitudinal ribs, with armature-coils disposed about said ribs and finish-rings *g g;* substantially as described.

11. In an armature of a dynamo-electric machine, the combination of a core, with armature-coils disposed thereon, and retaining-links adapted to secure said coils in position upon the armature-core, substantially as described.

12. In an armature of a dynamo-electric machine, the combination of a core, with armature-coils disposed thereon, retaining-links adapted to secure said coils in position upon said core, and finish-rings *g g*, substantially as described.

In witness whereof I hereunto subscribe my name this 1st day of April, A. D. 1896.

FRANCIS P. IDE.

Witnesses:
J. T. JOYCE,
W. J. ROGERS.