

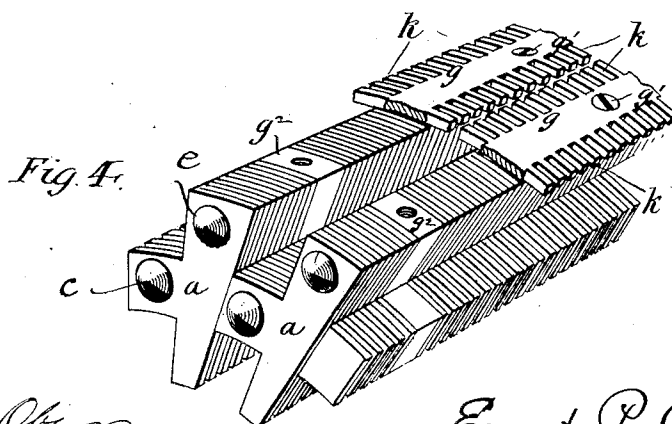
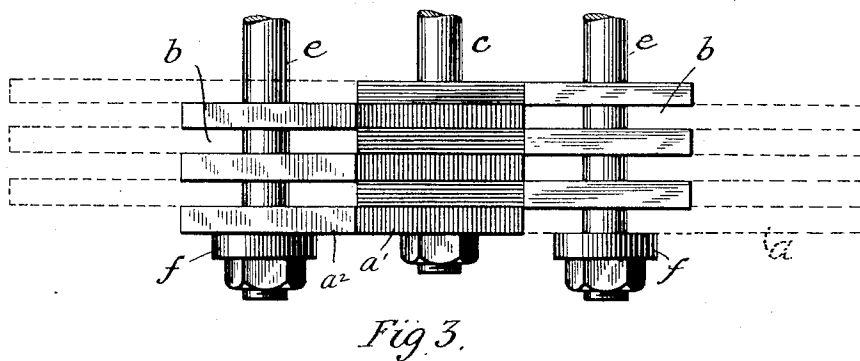
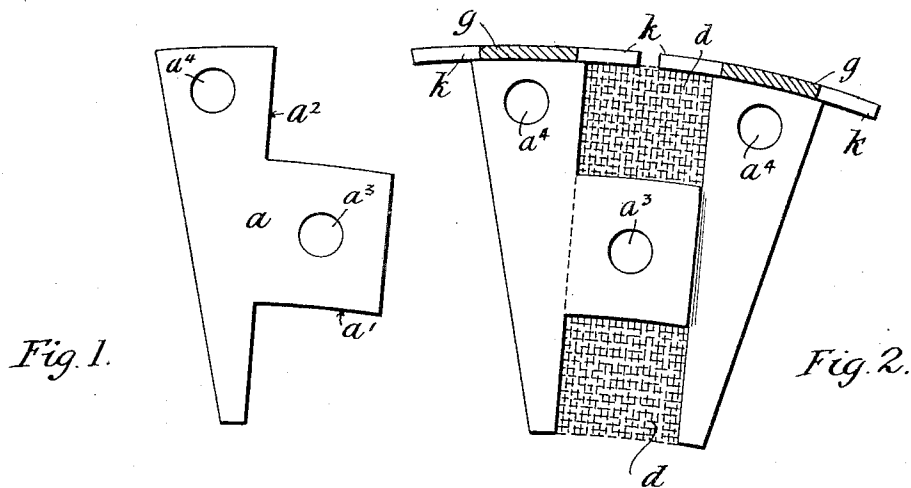
(No Model.)

E. P. CLARK.

ARMATURE FOR DYNAMO ELECTRIC MACHINES.

No. 582,269.

Patented May 11, 1897.



WITNESSES:

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ARMATURE FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 582,269, dated May 11, 1897.

Application filed July 16, 1896. Serial No. 599,354. (No model.)

To all whom it may concern:

Be it known that I, ERNEST P. CLARK, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Armatures for Dynamo-Electric Machines, of which the following is a full, clear, and exact description.

The purpose of this invention is to provide an armature for dynamo-electric machinery which shall admit of rapid and inexpensive construction, be easily insulated to a higher degree than is now generally possible, and allow repairs to be quickly effected without removing the armature from the machine.

To these ends the invention consists of a number of segments, each composed of punchings from sheet-iron, of a novel form and assembled in a peculiar manner, hereinafter fully described, and illustrated in the accompanying drawings.

I am aware that many forms of sectional armature have been invented, but all previous forms contain one or more of three defects, as follows:

In one style, of which several variations have been constructed, the component parts of each section lap over the ends of the next section, leaving spaces or gaps between the punchings of equal width with the iron at all points except at the places where the different sections lap together, with the result that the armature only contains a little over half the iron it should for its external dimensions.

In another form joints occur between the different sections, formed by simply abutting the sections against one another. In this form the parts are held together by the supporting-spider, and a fault in this form of armature is in the excessive magnetic resistance of the imperfect joints.

Another fault found in all forms of sectional armatures heretofore constructed is in the fact that the conductors are held in place by means of banding-wires or other devices, which must be destroyed before it is possible to remove a damaged section, and after such removal and replacement with a new section the said bands or devices must be again replaced with great labor before the armature

can be used, thus rendering it impossible to effect such repairs without removing the armature from the machine and performing a large amount of work.

In my armature, on the contrary, the full sectional area of the iron is preserved throughout. The joints offer a tight-fitting surface many times greater in area than the sections of the core, thus making them of practically no magnetic resistance. All parts are firmly bolted together. Rigidity is maintained without reference to the spiders, and banding-wires are altogether dispensed with, while any section may be easily and quickly removed and replaced without disturbing any other part of the armature and without removing it from the machine.

In the accompanying drawings, Figure 1 shows the shape of the iron plates punched from sheet metal of which the armature is built up. Fig. 2 is an end view of a single section of the armature, showing the relative positions of the plates or punchings which make up the section. Fig. 3 is a plan of a portion of an armature-section; and Fig. 4 is a perspective view of a portion of an armature, illustrating the manner of securing the coils in place.

The armature is of the Gramme type, with grooves on the outside and inside of the ring. It is made up of sections, each of which is provided or formed with one coil space or groove on each side. Each section is built up of plates a , all of which are of the same shape—viz., similar in general to the letter H with one side removed, the cross-piece a' of the H forming the core upon which the coil is wound, and the side portion a^2 of the H helping to form the grooves on each side of the core. Each plate is provided with perforations a^3 and a^4 , respectively, located in the cross-piece and upper portion of the side of the plate.

In assembling a section the plates are arranged in tiers or piles, with their side pieces a^2 alternately to the right and left and with their cross-pieces a' overlapping each other, thus making the cross-section of the armature-section the shape of the complete letter H. As the plates overlap each other at the

cross-pieces only, that portion of the section will be solid, while the sides will have the spaces or gaps *b*. A bolt *c*, passed through the middle perforation *a*³, will hold the section together temporarily while the coil or coils represented by *d* are wound on. This winding may be done with great facility by placing the section bodily in a lathe, using a suitable chuck. When the required number of sections have been completed in this manner, the entire armature is assembled by placing the sections together so that the side pieces of the plates of the adjacent sections will pass into the corresponding spaces or gaps *b*, and when properly in place the holes *a*⁴ will be in alinement, and the armature is made a solid and rigid structure by bolts *e*. All gaps in the armature are thus closed, and instead of depending upon the cross-section of the abutting joints of the plates for magnetic conductivity I have the broad contacting surfaces of the side pieces, which make the resistance very low. The armature is supported upon the shaft by a suitable spider at one or both ends, the bolts *e* passing through the arms of the spider, as indicated at *f*, Fig. 3.

As a means for holding the coils in the grooves I propose to secure to the top of each tooth of the armature (the tooth being formed by the parts *a*²) an iron strip *g*, which shall overhang on each side sufficiently to cover nearly one-half of the groove, as indicated in Fig. 4. These strips, which are provided with teeth *k* along their edges to prevent eddy currents, will be secured in place by means of screws *g'*, which pass into blocks *g*², interposed at suitable points in the armature-core. The blocks will be of the same shape as the plates *a*, but will be thicker to receive the screws. These strips *g* are made of soft iron, and, being fastened to the projections of the core, render the armature in effect "iron-clad" and from their rigidity serve the purpose of band-wires very effectively.

To remove and replace a section in case of accident, it is only necessary to disconnect the terminals of the damaged coils from the commutator, remove two of the strips or plates, remove two of the bolts from holes *a*⁴, and then lift out the armature-core section with its coils. A new section is then inserted, the bolts replaced, strips put on and fastened with their screws, the wires fastened to the commutator, and the armature is complete once more without the necessity of removing it from the machine. This method of construction thus secures many advantages—viz., cheapness of construction, the armature being assembled of punchings of a form securing low cost of production and being machine-wound, facility of insulating, great mechanical strength, low magnetic resistance, ease of repair in case of damage, and provides an armature of a form now generally acknowledged as the best.

I claim as my invention—

1. An armature-core for dynamo-electric machines and motors, built up of sections each of which is composed of iron plates or punchings having the general shape of the letter **H** with one of its sides removed, the said plates being in tiers or piles and arranged in the section with their side pieces alternately to the right and left and with their cross-pieces overlapping each other, substantially as described.

2. An armature-core for dynamo-electric machines and motors, built up of sections each of which is composed of iron plates or punchings having the general shape of the letter **H** with one of its sides removed, the said plates being in tiers or piles and arranged in the section with their side pieces alternately to the right and left and with their cross-pieces overlapping each other, and with the side pieces of the adjacent sections interleaving with one another, substantially as and for the purpose set forth.

3. An armature-core for dynamo-electric machines and motors, built up of sections each of which is composed of iron plates or punchings having the general shape of the letter **H** with one of its sides removed, the said plates being in tiers or piles and arranged in the section with their side pieces alternately to the right and left and with their cross-pieces overlapping each other, and with the side pieces of the adjacent sections interleaving with one another, and bolts passing through the adjacent interleaved side pieces to hold the sections together, substantially as described.

4. An armature-core for dynamo-electric machines and motors, built up of sections each of which is composed of iron plates or punchings having the general shape of the letter **H** with one of its sides removed, the said plates being in tiers or piles and arranged in the section with their side pieces alternately to the right and left and with their cross-pieces overlapping each other, in combination with coils located in the grooves between the side pieces and surrounding the overlapping cross-pieces, substantially as described.

5. The combination of a laminated toothed armature, and iron strips secured to the top of the teeth and overhanging the grooves on each side thereof for the purpose of retaining the coils in place.

6. An armature-core for dynamo-electric machines built up of sections each of which is formed along its sides with alternate projections and spaces, and the sections so assembled that the projections of one will fill the spaces in the other, thus producing a solid structure, the said projections extending radially as well as circumferentially, thereby producing a core with both internal and external projecting teeth.

7. A laminated toothed armature-core for dynamo-electric machines, constructed in

sections which interlock with each other, provided with iron plates secured to the teeth and adapted to hold the coils in position against centrifugal force.

- 5 8. The combination of a laminated toothed armature, and iron strips secured to the top of the teeth and overhanging the grooves on each side thereof for the purpose of retaining

the coils in place, said overhanging portions being toothed or comb-like. 10

In testimony whereof I subscribe my signature in presence of two witnesses.

ERNEST P. CLARK.

Witnesses:

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WM. A. ROSENBAUM.