

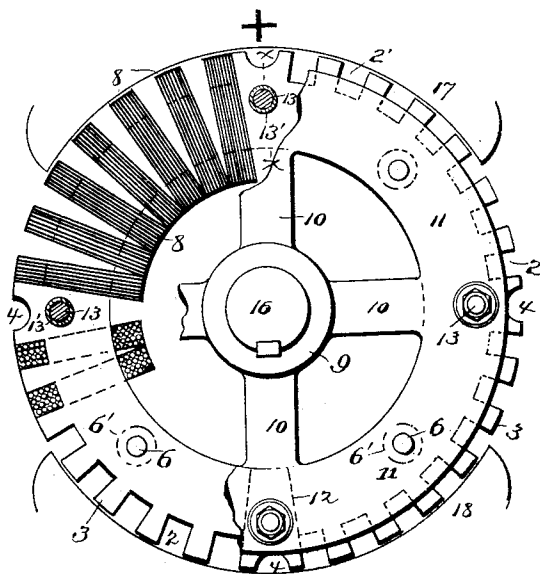
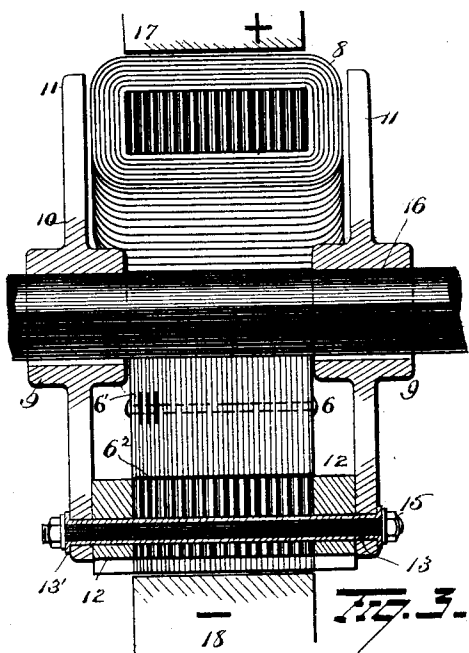
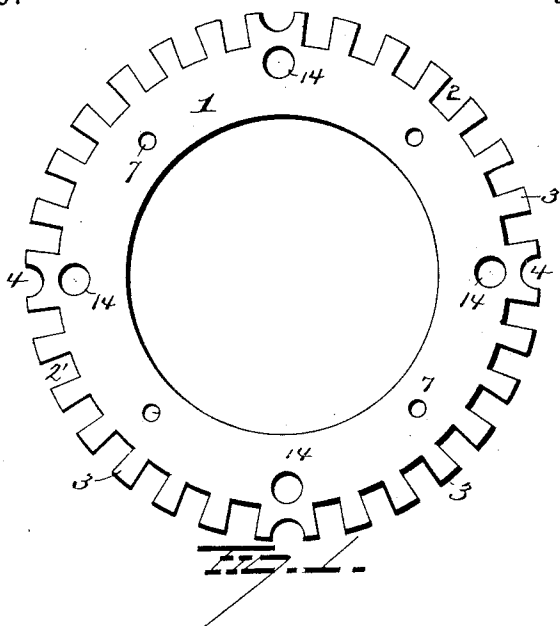
(No Model.)

S. H. SHORT.

ARMATURE FOR DYNAMO ELECTRIC MACHINES.

No. 475,159.

Patented May 17, 1892.



Witnesses  
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# UNITED STATES PATENT OFFICE.

SIDNEY H. SHORT, OF CLEVELAND, OHIO, ASSIGNOR TO THE SHORT  
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## ARMATURE FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 475,159, dated May 17, 1892.

Application filed November 6, 1890. Serial No. 370,540. (No model.)

*To all whom it may concern:*

Be it known that I, SIDNEY H. SHORT, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and  
5 useful Improvements in Armatures for Dynamo-Electric Generators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it ap-  
10 pertains to make and use the same.

My invention has reference to improvements in armatures for dynamo-electric generators and electric motors, and it has more  
special reference to the construction of the  
15 cores of such armatures and to the manner of assembling the parts thereof and connecting them with each other and with the hub of the armature, although my invention is more particularly adapted to the construction of arma-  
20 tures of the Pacinotti or Gramme type. It may also be used with advantage in the construction of armatures of the Siemens and other types.

The main object of my invention is to so  
25 construct the armature-core that its magnetic potential may be very high and may shift with great rapidity without unduly heating the core, and with the view to securing this  
object I construct the armature-core of laminæ  
30 of soft iron, which are not in direct magnetic contact with each other. These laminæ I assemble and fasten together by rivets or bolts of non-magnetic material passing  
35 through the laminæ parallel to the axis of the core, and the ring-core thus produced I connect with the hub-spiders by bolts which are  
either also made of non-magnetic material, or if made of magnetic material are not in mag-  
40 netic contact with the laminæ, so that the core is composed of a series of magnetic plates  
which are in a great measure magnetically independent of each other, are easily satur-  
ated magnetically, and are capable of shifting  
45 their poles with great rapidity, whereby the magnetic inertia of the whole core is reduced to a minimum. In dynamo-electric  
generators and motors provided with such  
cores the practical line of commutation is  
50 very nearly coincident with the theoretical line of commutation and the heating of the

core is reduced to a minimum. In addition thereto by my improved construction I can and do provide for an effective ventilation of the core and for a definite spacing of the armature-coils. From the following detailed  
55 description all this will more fully appear with reference to the accompanying drawings, which form a part thereof and in which I have illustrated an embodiment of my said  
60 invention.

Figure 1 represents a face view of one of the magnetic laminæ of my improved armature; Fig. 2, an end view of an armature constructed in accordance with my invention  
65 with parts broken away and other parts in section. Fig. 3 represents a longitudinal section of my improved armature.

Like numerals of reference indicate like parts throughout all the drawings.

In accordance with my improvement the  
70 core is built up of laminæ 1, made of soft sheet-iron and shaped, as shown in Fig. 1, as a ring or annulus, having rectangular recesses 2 formed in its outer edge, as shown. These recesses 2, which are designed to re-  
75 ceive the armature-coils, are separated from each other by the teeth or projections 3, which at the same time form the side walls of the recesses. By preference, although not necessarily so, these rectangular recesses are  
80 formed in groups in the circumference of each laminæ, and in the drawings I have shown four such groups, each occupying approximately a quadrant of the circle and each  
group separated from the other by a some-  
85 what larger tooth or projection 4. It will now be seen that if a great number of such magnetic laminæ are piled up in such manner that the recesses and projections of each  
correspond to the recesses and projections of  
90 all the others there will be obtained a heavy ring, having in its outer periphery a number of properly-spaced rectangular channels corresponding to the recesses 2, which channels  
95 will be partitioned off by ridges or walls formed by the teeth or projections 3 and 4. In thus building up the armature-ring I interpose small washers 6', of paper or other like  
material, on the rivet-bolts 6, which are made  
100 of copper or other non-magnetic material and

serve to secure together the several laminæ composing the core. I also place similar washers 6<sup>2</sup> around the bolts which connect the core with the hubs. The core thus built up of laminæ, riveted together and separated by the washers, is then wound with the coils, and is provided with hubs 9 9, secured to the core in the following manner:

From each hub extend a number of radial arms 10, which at their outer ends merge into a rim 11, which latter is broad enough to cover the end of the armature-ring, or nearly so, and spacing-blocks 12 are interposed between the rims 11 and the ends of the core at the points where the groups of channels are separated from each other by the enlarged teeth or projections 4 of the iron laminæ, and bolts 13, passing through the rims 11, the spacing-blocks 12, and through the iron laminæ of the core securely fasten the hubs to said core. For this purpose holes 14 are formed in the iron laminæ, as shown in Fig. 1. These bolts 13, if made of iron, are covered with a layer 13' of non-magnetic material and preferably of insulating material; but if made of non-magnetic material—such as copper—they may remain bare, and in either case they are screw-threaded at each end and are there provided with nuts 15.

The washers 6' and 6<sup>2</sup> serve not only to separate the laminæ of its core, but also serve to form air-spaces between the several magnetic laminæ, affording an effective ventilation and cooling of the same should they become at all heated by the shifting of their magnetic poles or by the very slight Foucault currents which may be generated in the laminæ.

It will be understood that the magnetic laminæ formed, as shown in Fig. 1, with their recesses and projections and with the holes 7 and 14 all accurately spaced may be assembled for the formation of an armature-core with very great rapidity, and when riveted together the laminated core may be handled like a solid piece, the coils wound upon the

same, and the hubs bolted to it with great comfort.

The hubs 9, with the arms 10 merging into the rims 11, are preferably made of non-magnetic material having great strength—as, for instance, of German silver, aluminium, or aluminium bronze—and the armature-shaft 16 is keyed to the hubs, as usual, and the armature is mounted between the pole-pieces 17 18 of the field-magnets in the ordinary manner.

In an armature thus constructed each magnetic lamina of the same behaves practically like an independent magnetic system, owing to the fact that there is no magnetic contact between the successive laminæ at any point, as would be the case if the rivets and bolts used for assembling the laminæ were of iron and the bolts for securing the hubs to the core were also of iron, in which case the magnetic inertia of the whole core would be equal to the sum of the magnetic inertia of its laminæ, while in my construction the magnetic inertia of the whole core is only equal to that of a single lamina.

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

A ring-armature consisting of a core composed of magnetically-independent laminæ, rivets extending through the laminæ, and insulating washers encircling the rivets and separating the laminæ, in combination with end pieces, each consisting of an annulus and a hub joined by radial arms, spacing-blocks interposed between the end pieces and core, bolts passing through the end pieces, spacing-blocks and laminæ, and insulating-washers encircling the bolts and separating the laminæ, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

S. H. SHORT.

Witnesses:

A. B. CALHOUN,  
C. J. LEEPHART.