(No Model.)

E. A. SPERRY.

ARMATURE FOR ELECTRIC MACHINES.

No. 479,030. Patented July 19, 1892.

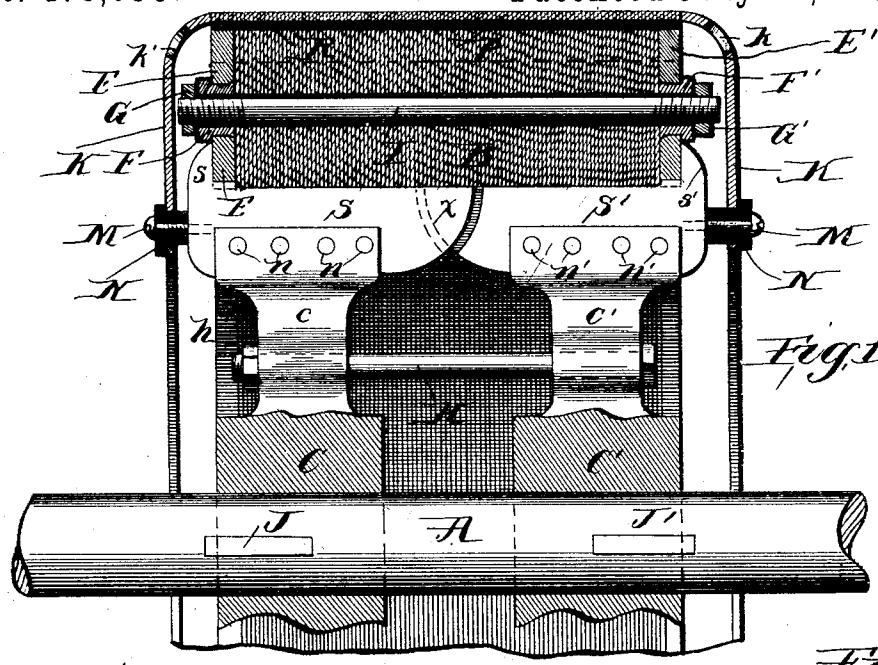

Fig. 1.

Fig. 5.

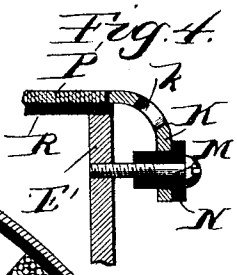

Fig. 4.

Fig. 2.

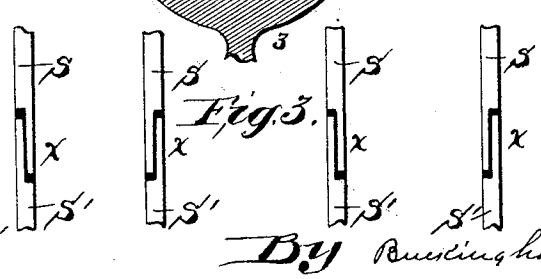

Fig. 3.

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UNITED STATES PATENT OFFICE.

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ARMATURE FOR ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 479,030, dated July 19, 1892.

Application filed December 17, 1891. Serial No. 415,397. (No model.)

To all whom it may concern:

Be it known that I, ELMER A. SPERRY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new, useful, and Improved Armature for Electric Machines, of which the following is a specification, reference being had to the accompanying drawings, in which similar letters of reference indicate like parts in all the figures.

In the drawings, Figure 1 is a longitudinal sectional view of a portion of an armature embodying my improvement. Fig. 2 is a cross-section of the same through one of the hubs. Fig. 3 is a view showing the manner in which the supports overlap each other. Fig. 4 is a detail view showing an alternate form of securing the retaining-cap to the end of the armature, all of which will be more fully explained hereinafter; and Fig. 5 is another detail view of the core-supports.

My invention relates more particularly to ring-armatures; but some features of it may be applied to drum-armatures as well, and, while it is designed that all features should be used together, some may be used without the others.

My invention further relates to the method of supporting the core in ring-armatures and to placing the binding upon the exterior surface, which last feature may also be applied to drum-armatures.

In the figures, A is the armature-shaft, and B is the armature-core, made up in the usual way of thin disks or rings of soft iron and insulated from each other. The core is grooved longitudinally upon its periphery, as shown at *d* in Fig. 2, for the reception of the armature-coils. Upon the ends of the armature-core are the somewhat thicker rings E and E′, through which and the core of the armature pass the insulated tie-bolts I. Upon the shaft A are two hubs C and C′, keyed thereto by means of the keys J and J′. These hubs are preferably formed with the radially-projecting arms *c* and *c′*, Fig. 1, and shown in section at *c′ c′ c′*, Fig. 2.

H, H, H, and H are screw-bolts passing axially from one hub to the other, and by means of the nuts *h* on each of these bolts the hubs may be drawn toward each other. The arms *c* and *c′* are grooved upon their outer edges, as shown in Fig. 2, where the grooves run parallel with the axis of the shaft, and in them are placed the radially-projecting thin supports S and S′, Fig. 1, and shown in section at S′, S′, and S′ in Fig. 2. These supports are insulated from the arms *c′ c* of the hubs, as shown in Fig. 2, and are secured therein by the bolts or rivets *n′ n′*, &c., which are of course also insulated from the supports S and S′.

The supports S and S′ are provided with the projections *s* and *s′* upon their outer ends and overlap one another at their inner ends between the hubs, as shown at *x*, Figs. 1 and 3. The projections *s* and *s′* on the supports S and S′ bear, respectively, against the end plates E and E′ of the armature-core, and by the tightening of the screw-bolts H H, &c., the hubs C and C′, and with them the supports S and S′, are drawn toward each other against the end rings and hold the armature-core firmly in position. Sufficient distance is allowed between the hubs and the core to admit of winding the coils. The rings E and E′ are notched upon their inner circumference at *e* and *e′* to receive the edge of the supports S and S′, and through which rotation of the core is transmitted from the shaft. As above stated, the inner ends of the supports S and S′ overlap each other at *x*, and the ends are preferably halved, as shown in Figs. 3 and 5. The successive pairs of supports around the shaft are made to overlap in alternate directions, as shown, also, in Fig. 3, which shows the arrangement when the four arms are straightened out. This construction assists in preventing any relative displacement of the hubs upon the shaft and in rendering the entire structure firm and rigid. The end rings E and E′ are somewhat thicker than the rings constituting the core of the armature to cause compression of the rings of the armature-core between the tie-bolts and also to receive the strains in the transmission of rotation from the shaft to the core through the supports S and S′. It is not advisable to make these plates of great thickness, for in such case Foucault currents would be generated therein. It is also necessary that the tie-bolts be insulated from the plates to prevent the gen-

eration of currents in the tie-bolts as conductors. If the rings E and E′ are only moderately thick where the tie-bolts I pass through, the pressure of the rings against the bolts would cut through the insulation between them under the pressure of rotating the armature, and to utilize only moderately-thick rings E and E′ to prevent the formation of Foucault currents and at the same time to give a large bearing-surface between the plate and the tie-bolts is one of the objects of my invention. I accomplish this by securing to the rings the axially-extending projections F and F′, through which the tie-bolts pass and from which they are insulated by insulating material placed between, as shown by the heavy lines in the figures. Nuts G and G′ on the ends of the tie-bolts serve to draw the rings together, and insulation is placed between the nuts on the bolt and the face of the projection, as shown. The length of these projections is sufficient to give a large bearing-surface on the tie-bolt I and prevent cutting of the insulation. The method of securing this projection to the ring, which I have shown in the drawings, is to rivet it on the inside, leaving a shoulder against the outside. I do not wish to limit myself in this regard, however, but I may screw it into the ring or secure it in any other way that may seem desirable. The coils are wound in the grooves, and after the winding is completed insulation put over, (shown at R R in the figures,) and then the exterior binding is put on. This binding is in the form of a laminated sheath made up of thin annular rings of magnetic metal, preferably formed of the same material as the rings of the core. (Shown at P P in the figures.) These rings are insulated from each other either individually or in groups and take the place of band wires. Their purpose is to soften the heating effect of the toothed armature on the pole-pieces and to give the same effect as an iron-clad armature without the great disadvantage of winding which exists in an iron-clad armature, where the wires are drawn through grooves or inserted through narrow openings in them, holes, &c. These rings may either be cemented in place or they may be held by the saucer-shaped cups K, which bear against the ends of the sheath P and which may be secured to the supports S and S′, as shown in Fig. 1, or directly to the rings E and E′ (shown in Fig. 4) by means of the screw M, passing through the insulating-bushing N. These cups are provided with ventilating-holes *k* and are preferably formed of high-resistance metal, such as an alloy of aluminium and silver, which I call "aluminium-silver," which offers about fifty times as much resistance as German silver to the passage of Foucault or other currents which may be generated in it.

Although I have shown the hubs with radially-projecting arms, in which the supports are placed, and consider that the better construction, I do not limit myself in that regard; but if I prefer I may place the supports in grooves cut in any portion of the hubs, in which they may be secured and from which they may extend radially.

I claim and desire to secure by Letters Patent—

1. In an armature for electric machines whereof the core is made up of thin rings or disks, axially-extending projections secured to the end disks or rings through which the tie-bolts pass and from which they are insulated.

2. In an armature for electric machines whereof the core is made up of thin rings or disks insulated from each other, a thicker ring or disk on the end of the core, having axially-extending projections secured thereto, in combination with tie-bolts passing through the projections and insulated therefrom.

3. In an armature for electric machines whereof the core is made up of thin rings or disks insulated from each other, a thicker ring or disk on each end of the core, provided with axially-extending projections, said projections being provided with a shoulder bearing against the outer side of the ring and riveted on the inner side, in combination with tie-rods passing through the projections and insulated therefrom.

4. In an armature for electric machines, a laminated sheath surrounding the coils and the core, said sheath consisting of a series of thin annular metallic rings insulated from the coils and the core.

5. In an armature for electric machines, a laminated sheath surrounding the coils and the core, said sheath consisting of a series of thin annular rings of magnetic metal insulated from the coils and from the core.

6. In an armature for electric machines, a laminated sheath surrounding the core and the coils, said sheath consisting of a series of thin annular rings of soft iron insulated from the coils and the core.

7. In an armature for electric machines whereof the coils are wound in grooves in the core, a laminated sheath covering the coils and the core and insulated therefrom, said sheath consisting of thin annular rings of soft iron.

8. In an armature for electric machines, a laminated sheath covering the coils and the core and insulated therefrom, said sheath consisting of a series of thin annular metallic rings and retained in position by caps rotating with the armature and bearing against the ends of the sheath.

9. In an armature for electric machines, a laminated sheath covering the coils and the core and insulated therefrom, said sheath consisting of a series of thin annular metallic rings, in combination with caps secured to the armature and insulated therefrom and bearing against the ends of the sheath.

10. In an armature for electric machines, a laminated sheath covering the coils and the core and insulated therefrom, said sheath

consisting of a series of thin annular metallic rings, in combination with caps bearing against the ends of the sheath and rotating with the armature and provided with ventilating-holes.

11. In an armature for electric machines, a laminated sheath covering the coils and the core and insulated therefrom, said sheath consisting of a series of thin annular metallic rings, in combination with caps of aluminium-silver rotating with the armature and bearing against the ends of the sheath.

12. In a ring-armature for electric machines, the combination of the shaft, two hubs mounted thereon, supports secured to the hubs and insulated therefrom, those of one hub bearing against one end of the armature-core and those of the other hub bearing against the other end of the armature-core, and means for drawing the hubs together on the shaft and clamping the core between the supports, coils upon the armature-core, and a laminated sheath covering the coils and insulated therefrom, with caps secured to the supports borne by the hubs, insulated therefrom, and bearing against the ends of the sheath.

13. In a ring-armature, in combination with the core and the shaft, two hubs mounted upon the shaft, supports secured to the hubs and insulated therefrom, those of one hub bearing against one end of the armature-core and those of the other hub bearing against the other end of the armature-core, and means for forcing the hubs toward each other on the shaft and clamping the armature-core between the supports.

14. In a ring-armature, in combination with the core and the shaft, two hubs mounted upon the shaft, supports secured to the hubs and insulated therefrom, those of each hub overlapping those of the other between the hubs and bearing against the respective ends of the armature-core, with bolts passing through the two hubs and adapted to draw the hubs together, whereby the core is clamped between the supports, substantially as described.

15. In a ring-armature, two hubs mounted upon the armature-shaft, supports secured to the hubs and insulated therefrom and bearing against the inner side of the core, the supports secured to each hub overlapping those of the other in alternate order between the hubs and bearing against the respective ends of the armature-core, with bolts passing through the hubs and adapted to draw them together, whereby the core is clamped between the supports.

16. In a ring-armature, in combination with the core, two hubs mounted upon the armature-shaft, supports secured to the hubs and insulated therefrom and bearing against the inner side of the core, the supports secured to each hub overlapping those of the other between the hubs and bearing against the respective ends of the armature-core, with bolts passing through the hubs, adapted to draw them together, whereby the core is clamped between the supports.

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