(No Model.)

S. H. SHORT.

ARMATURE.

No. 587,871. Patented Aug. 10, 1897.

Fig. 1.

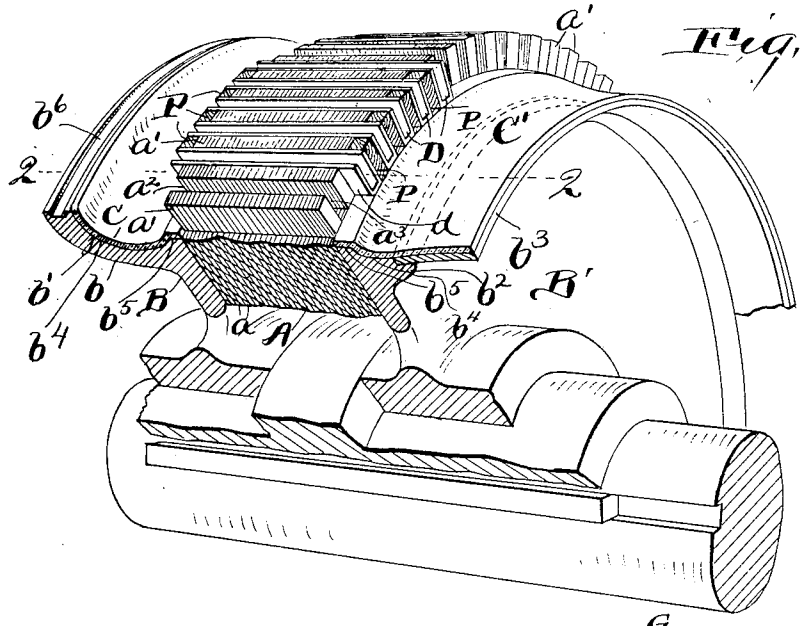


Fig. 2.

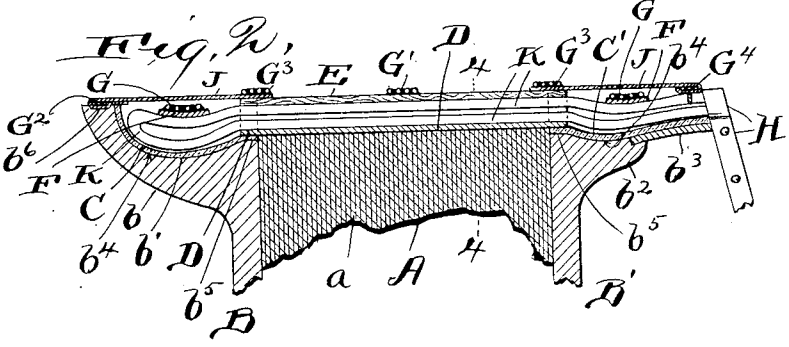


Fig. 3.

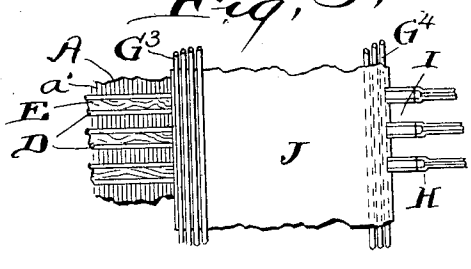
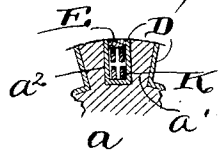


Fig. 4.



Witnesses:
E. B. Gilchrist
A. M. Rankin

Inventor:
Sidney H. Short,
By his Attorneys,
Thurston & Bates.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

SIDNEY H. SHORT, OF CLEVELAND, OHIO.

ARMATURE.

SPECIFICATION forming part of Letters Patent No. 587,871, dated August 10, 1897.

Application filed March 13, 1897. Serial No. 627,418. (No model.)

To all whom it may concern:

Be it known that I, SIDNEY H. SHORT, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Armatures; 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 appertains to make and use the same.

The object of my invention is to provide an armature for a dynamo-electric machine in which an economical and efficient insulation shall be provided at those places where the inductors rest and in which the inductors shall be effectively held in place and protected.

The invention consists of the combination of parts hereinafter specified, and definitely pointed out in the claims.

The drawings clearly illustrate my invention.

Figure 1 is a perspective view of a portion of an armature embodying as much of my invention as is installed previous to the winding of the armature, showing also the plugs P, which are placed after winding. Fig. 2 is a radial section of the same, being taken on the line 2 2 of Fig. 1, but showing also the inductors in place and the parts which are added subsequent thereto. Fig. 3 is a plan of a portion of the surface of the armature, near the commutator end thereof; and Fig. 4 is a transverse section on the line 4 4 of Fig. 2.

Referring to the parts by letters, A represents the core, composed of the usual laminations a and embraced by the end rings B and B′, which surround the armature-shaft. The laminations are formed with teeth a', leaving notches a^2 between them, which, when the core is built up, form long slots a^3, in which lie the inductors K. The inductors K extend from a commutator-lead across the core in one slot and then turn and pass back through another slot to another commutator-lead. These inductors are formed of insulated wire or ribbons; but in order to insure against the armature becoming short-circuited it is necessary to provide additional insulation between the inductors and the core A and end rings B and B′.

The end ring B is formed with the outwardly-extending flange b, having in its outer periphery a concave annular recess b', in which the inductors K as they bend back from one slot to pass into another are intended to lie in the finished machine. To the surface b', forming the recess b', I secure the insulating-covering C by gluing paper or other suitable material in layers to said surface.

The end ring B′ has a flange b^2 projecting from it, and from this flange extends the additional flange b^3, formed of stiff insulating material, which reaches to and engages with the commutator-leads. The external surface b^4 of these two flanges is shaped so as to form a concave annular recess, and this surface is insulated by covering it with layers of paper or other suitable insulating material.

In order to properly protect the inductors in the slots a^3, I form troughs D, of insulating material, which are placed in the slots. These troughs I prefer to make of paper, linen, and mica cemented together by varnish. The sides of these troughs extend up flush with the top of the slots, while their ends d project beyond the core at each end. The peripheral surface of the end rings B and B′ is cylindrical for a short distance from the core, as shown at b^5. These surfaces when covered by the insulation C C′ are flush with the bottoms of the slots a^3. Therefore the bottom of the trough as it overhangs will be in contact with these insulating-coverings C C′ and will be supported by said cylindrical surfaces b^5. The amount of projection of the trough beyond the core is equal to the width of the cylindrical surface b^5. Thus the insulating-surface in the recess upon which the windings lie becomes a continuation of the bottom of the trough, and the inductors are effectively prevented from having even their insulating-windings contact with the core at its corners or at other points. The point where the inductors begin to bend after leaving the core thus takes place at the corner of the trough instead of the corner of the core, and thus disastrous wearing of the inductor-insulation is avoided.

Referring to Fig. 1, it will be seen that at the ends of the teeth of the armature core or laminations and between the projecting ends of the insulation-troughs D there is a space

bounded by the laminations on one side and by the sides of the trough extensions on two sides and on the bottom by the insulated covering over the cylindrical portion of the armature-head b^5, one end and one side being left bare. This space is filled after the armature is wound by a plug P, of insulating material, which will just fit the space described. This plug is usually made of hard wood, and it supports the extensions of the insulation-troughs beyond the slot, and, finally, after the armature is completed the bands G^3, hereinafter referred to, pass over the outer ends of these plugs and keep them in place.

The slots in which the inductors lie across the core are deeper than is necessary to accommodate the windings, and thus a space is left above the latter. After the windings K, which extend from the commutator-leads H across the surface of the insulation C', through the insulating-troughs D, and over the surface of the insulation C, are in place a strip E, of wood, or fiber, or other insulating material which is mechanically strong, is placed in the space outside of the inductors in the slots. This strip fits tightly between the upper edges of the insulating-trough D and securely holds the inductors in place in the trough.

As the armature revolves centrifugal force tends to displace the inductors at either end of the core, and it is necessary to bind them in place. This I accomplish as follows: A pad of insulation F, made, preferably, of the same material as the trough, is placed over the inductors in the recesses beyond the core and is firmly held in place by binding-wires G, thoroughly soldered together with soft solder. It is desirable to put one or more binding-wires around the face of the armature-core, as shown at G', in order to insure the retention of the strips E in the slots. Those strips render any additional insulation beneath this binding-wire unnecessary, however. This binding-wire is soldered together in the same manner as the wires G and is of small enough diameter so that there is plenty of room for it in the air-gap.

In order to protect the windings at either end of the core from dust, moisture, &c., I surround them with a shield J, made, preferably, of canvas. A strip of canvas, of sufficient length to reach around the periphery of an end ring and of a width somewhat greater than the amount of projection of the inductors beyond the cores is first provided. One edge of one of these canvas sheets is firmly secured to the outer end of the end ring B by means of the binding-wire G^2, which binds the said edge in the groove b^6, provided on the outer cylindrical face of the end ring. After this edge is secured in place the canvas is doubled back on itself, as shown, and its outer edge is secured to the core at its corner by binding-wires, as shown at G^3. The other canvas sheet is similarly secured at the other end of the armature, but in this case the outer binding-wires G^4 surround the armature-inductors themselves. It will be noticed that the binding-wires G^3 G^3 serve to bind the inductors and the plugs P in place as well as the canvas. The turns of each wire are thoroughly bound together with soft solder. (Shown in Fig. 2, but omitted in Fig. 3 for convenience of illustration.)

The binding-wire G^4 being back of the end of the commutator-leads, as shown in Figs. 2 and 3, radial spaces I are left between the outer ends of the leads and therefore any dirt which may tend to lodge between the commutator-leads or may be thrown out from the central portion of the armature by centrifugal force will not be held by the binding-wire G^4, but will fly out of the spaces I.

Having thus described my invention, I claim—

1. In an armature, the combination, with a slotted core, of an end ring at each end of the core having peripheries adapted to support the armature-inductors beyond the core, insulating-covering surrounding said peripheries and protecting the inductors from them, and troughs of insulating material in the core-slots, said troughs projecting beyond the core, for the purpose specified.

2. In an armature, the combination of a core having slots extending across its surface, an end ring having a peripheral recess adapted to support the inductors beyond the core, an insulating-covering surrounding said periphery, inductors in the core-slots, and extending onto said insulating-covering, means for binding said inductors onto said covering, a protecting-shield bound at one edge at or near to the outer edge of the armature and at the other edge around the armature-core whereby the same binding serves to hold the inductors in the core and the shield in place, for the purpose specified.

3. In an armature, the slotted core A and the end rings B and B', each of said end rings having the cylindrical portion b^5 and a recessed surface extending beyond said portion, insulating material covering said cylindrical portion and recessed surface, the top of the insulating material around the cylindrical portion being substantially on a line with the bottom of the core-slots whereby a bend of the inductors at the edge of the core is prevented, for the purpose specified.

4. In an armature, the slotted core A and the end rings B and B', each of said end rings having the cylindrical portion b^5 and the surface b^4 extending beyond said portion, insulating material covering said cylindrical portion and surface b^4, the top of the insulating material around the cylindrical portion being substantially on a line with the bottom of the core-slot, insulating material in the core-slots projecting beyond the core and thus overlapping the covering on the said cylindrical portions of the end rings, for the purpose specified.

5. In an armature, the combination of a core, and an end ring having a flange of in-

sulating material extending to the commutator-leads, a covering of insulating material surrounding the periphery of the end ring, armature-inductors crossing the core and held on said insulating material by a binding insulated from them, and a shield bound around the inductors inside of the end of the commutator-leads whereby the inductors are protected from dust from the outside, and spaces are left between the ends of the commutator-leads for the escape of dirt from the inside of the armature, for the purpose specified.

6. In an armature, the combination of the laminated core having the slots a^3, the end rings B B′ having the cylindrical parts b^5 next to the core, and the concave annular surfaces b' b^4 outside of said cylindrical parts, insulating-coverings for said surfaces and parts, and the troughs of insulating material lying in said slots and extending beyond the same, the projecting ends being supported upon said cylindrical parts, substantially as specified.

7. In an armature, the combination of the laminated core having the slots a^3, an end plate B′, and an annular flange b^3 of insulating material secured to said end ring and projecting laterally therefrom, with the armature-inductors, and the commutator-leads, which contact with the edge of said flange b^3 and are secured to the inductors, substantially as specified.

8. In an armature, the combination of the laminated core having the slots a^3, and two end plates, one having an annular flange b which is curved outwardly, its diameter being substantially the same as the diameter of the laminations, substantially as specified.

9. In an armature, the combination of the laminated core having the slots a^3, and two end plates, one having an annular flange b which is curved outwardly, its diameter being substantially the same as the diameter of the laminations, the outer periphery of this flange having an annular groove b^6, substantially as specified.

10. In an armature, the combination of a laminated armature having grooves a^3, and end plates, with troughs of insulating material in said grooves and extended beyond the ends thereof, and plugs placed between the projecting ends of said troughs, substantially as specified.

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

SIDNEY H. SHORT.

Witnesses:
E. L. THURSTON,
ALBERT H. BATES.