(No Model.) 2 Sheets—Sheet 1.

N. C. BASSETT.

ARMATURE FOR MOTORS AND GENERATORS.

No. 456,925. Patented July 28, 1891.

Fig-2-

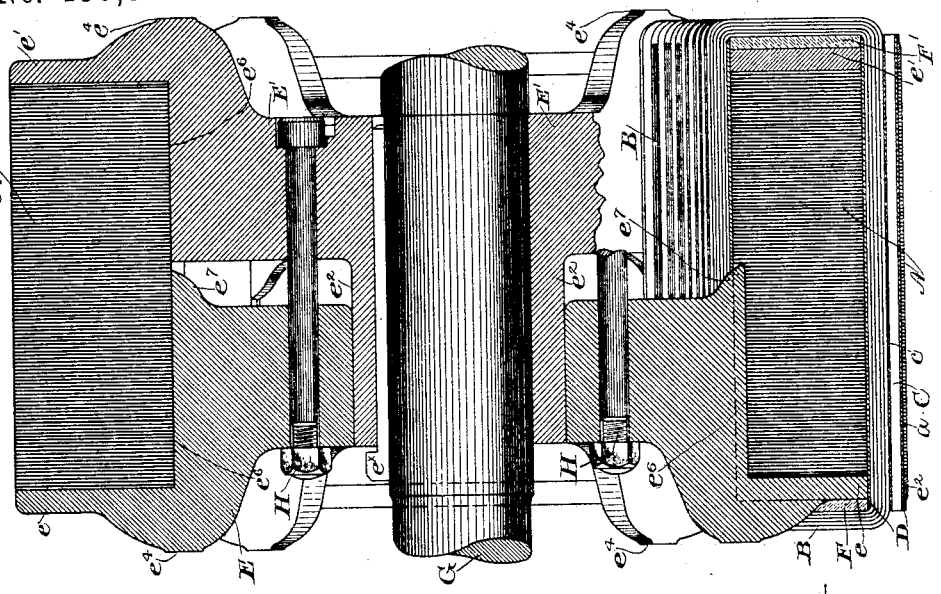

Fig-3-

Fig-4-

Fig-1-

WITNESSES-

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(No Model.) 2 Sheets—Sheet 2.

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Fig-6-

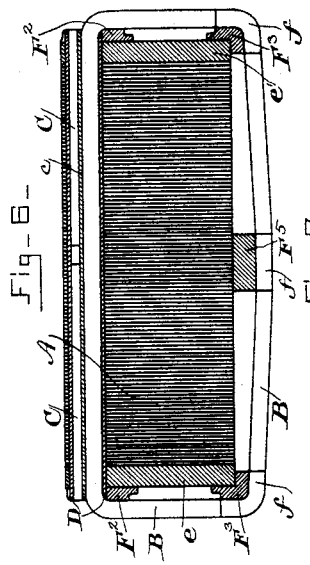


Fig-7-

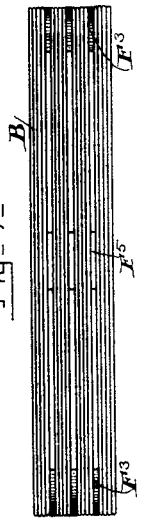


Fig-9-

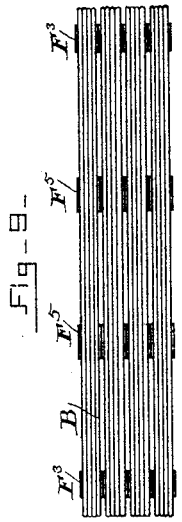


Fig-10-

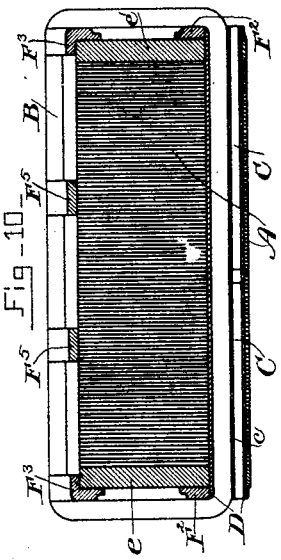


Fig-5-

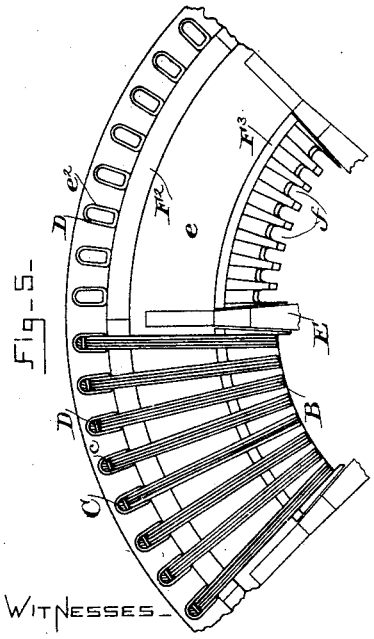
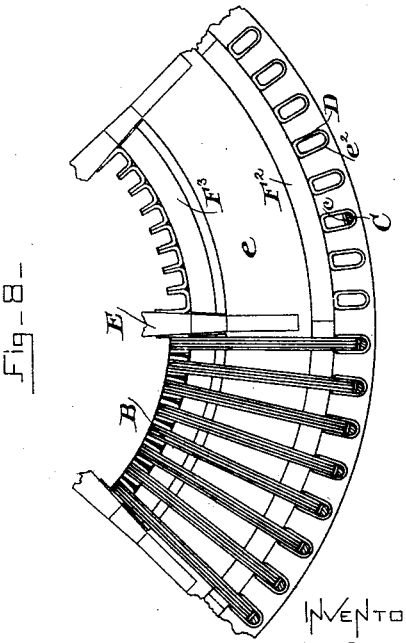


Fig-8-



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UNITED STATES PATENT OFFICE.

NORMAN C. BASSETT, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THE THOMSON-HOUSTON ELECTRIC COMPANY, OF CONNECTICUT.

ARMATURE FOR MOTORS AND GENERATORS.

SPECIFICATION forming part of Letters Patent No. 456,925, dated July 28, 1891.

Application filed February 27, 1891. Serial No. 383,105. (No model.)

To all whom it may concern:

Be it known that I, NORMAN C. BASSETT, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented a certain new and useful Improvement in Armatures for Motors and Generators, of which the following is a specification.

My invention relates to improvements in iron-clad armatures in which the armature-coils, instead of passing over the periphery of the armature-core, are passed through perforations near the periphery, so as to allow the iron of the core to extend between and around said coils and form an iron periphery. The advantages of this construction in reducing the resistance of the magnetic circuit and protecting the coils from injury are well known.

The object of my present improvement is partly to facilitate the winding of such armatures, which has hitherto been a matter of considerable difficulty.

Other features of my present invention concern the manner of supporting the laminated core and of separating and insulating the coils, as hereinafter explained.

In the accompanying drawings, Figure 1 is an end elevation of the armature, showing some of the coils in place. Fig. 2 is an axial section of the same. Figs. 3 and 4 are sections respectively through the exterior and interior portions of the coil. Figs. 5, 6, and 7 are respectively an end elevation, a vertical section, and an under side view of a portion of an armature embodying my invention modified in some respects. Figs. 8, 9, and 10 are similar views of another modification.

The armature-core A is made up of plates which are held together between the two heads *e e'* of gun-metal, which are cast with the two halves of the supporting-frame E and E'. The object of forming the heads *e e'* and the spiders E E' of integral castings of gun-metal is to avoid the passage of the lines of force therethrough. The usual iron heads and spiders absorb considerable energy by heating in consequence of the eddy-currents set up by the constant shifting of the lines of force therein. With my construction the heads and spiders are magnetically short-circuited by the laminated iron core and practically no lines of force traverse them, and there is no heating except the slight amount due to the current changes in the interior armature-wires. The spider E' is mounted on a shaft G and keyed fast thereto, as shown at $e^{\times}$. Its hub e^2 is prolonged, and upon the prolongation is mounted the spider E, the said parts E E' being pressed or driven together in a powerful press and held by a drive-joint, so as to clamp the armature laminations and hold them firmly in place by the mere adhesion of this joint. The bolt H, passing through the two spiders, may, however, be used for safety. The two spiders are provided on their outer sides with faces e^4, which project beyond the coils and which receive the pressure from the press when they are driven together, so as to bring the spiders truly into place.

It will be noticed that there are no bolts passing through the laminations of the armature-coil. This gives greater facility in construction and is preventive of eddy-currents. The under or inner side of the core-laminations are sustained by the longitudinally-extending shoulders e^6 of the spiders E E', and these shoulders are prolonged, as shown at e^5, into lugs, so as to overlap one another on the alternate arms of the spiders. This gives a continuous support for the laminations from end to end of the armature.

The laminations or core-plates are punched through or formed with holes or perforations *a*, this being done, preferably, at the time the laminations themselves are stamped out in the die-press. Holes e^2, corresponding to hole *a*, are bored through the heads *e e'* when the spiders are cast. This, when the core is assembled, leaves continuous perforations extending longitudinally through the same from end to end, through which the coils of the armature-winding may be passed. The insulation of the coil from the core is effected by means of a paper tube D, which extends through the perforation *a*, so as to form an insulated lining therefor. The said tube projects a slight distance beyond each armature-head, and to support these projecting portions and prevent their being broken down by the armature-winding, which is a frequent and

troublesome occurrence with previous constructions, an insulating-plate F or F′ is placed against each armature-head with its periphery resting against and supporting the ends of the paper tubes. On the inner side of the armature-core insulating plates or supports, preferably of the form hereinafter described, are also placed. Thus thorough insulation of the core from the coils is provided for. The wire is then to be wound around the core and through the perforations. To wind these perforations full of wire in such manner as to bind the coil in place against displacement, due to centrifugal force and torque, has been a matter of great difficulty. I accomplish this result with comparative ease by proceeding in the following manner.

As shown in Fig. 3, instead of forming the perforations of such size as to just receive and tightly bind the quantity of wire assigned to each coil, I make said perforations considerably larger than the cross-section of the coils they are to receive. Having then insulated the perforations and the ends and interior of the armature, as above described, I wind the wire through the perforations and round the interior of the core until the perforation is, say, somewhat over half full. An insulating follower plate or strip *c* is then placed over the coil so wound, and a wedge or plug C is driven into the unoccupied portion of the perforation above said follower, driving the latter down onto the coils and binding the wires tightly within the perforations. As the winding is a comparatively easy matter until the perforation has been nearly filled, it will be seen that by this expedient the coil may be quickly and easily wound, and then bound tightly in place, so as to resist displacement either outwardly by centrifugal force or circumferentially by the torque on the wires.

As shown in Fig. 6, two plugs or wedges C may be employed instead of one, and, as represented in Figs. 5 and 6, the insulating head-plates F F′ may be replaced by rings or segments F^2 F^3, respectively, at the inner edge of the paper tubes and at the inner corner of the armature-core. In this case the rings or segments F^3 should lap over the corner of the armature-core, so as to be held in place against the centrifugal force and the tension of the wires. I also prefer to place a third piece of insulation F^5 on the interior of the armature-core of thicker material than ring F^3, so as to raise the coil B away from the interior of the armature and insure a tight winding by bending the coil.

In Figs. 5, 6, and 7 the armature-core itself is not covered with insulation, but left bare, the paper tubes and rings, segments, or pieces F^2 F^3 F^5 being relied upon to insulate the coil from the core. This leaves free radiation of heat from the armature-core and the exterior of the armature on the sides or heads *e e′* and on the interior surface. More than one insulated ring segment or section F^5 may be used, as shown in Figs. 9 and 10. The insulating and supporting rings or segments F^3, as well as the insulating supporting-pieces F^5, may be provided with channels or grooves *f* (see Figs. 5 and 6) to receive and hold in place the armature-coils. These rings, segments, or pieces may be made of porcelain, papier-maché, or other suitable material, and to cushion them, so as to obviate the tendency to break when the coils are wound tightly in place, a sheet of asbestus, which has been soaked in shellac-varnish, may be placed between said insulating and supporting pieces and the armature-core, so as to form a more or less elastic cushion or bed therefor.

What I claim as new, and desire to secure by Letters Patent, is—

1. An iron-clad armature having longitudinal holes or perforations near its periphery, or surface coils wound through and partly filling said holes, and a wedge or wedges of insulating material driven into said holes, so as to compress the coils and bind them within the holes.

2. The combination of the armature-core having longitudinal perforations near its periphery or surface, the coils wound in said perforations so as to leave a part thereof unoccupied, an insulating plate or follower placed against the coil, and a wedge driven into the perforation so as to take up the unoccupied space and bind the coil tightly in place.

3. The combination of an iron-clad armature having longitudinal perforations near its periphery or surface, insulating-tubes within said perforations and projecting beyond the armature ends, end plates of insulating material supporting the inner sides of the projecting ends, and coils wound through said perforation and over said insulated end plates.

4. The combination of the annular perforated armature-core, the insulating-tubes through and projecting from said perforation, the insulating end plates supporting the ends of such tubes, one or more insulating-pieces on the inner side of the core, and armature-coils wound over said insulated plates and pieces and through the perforations.

5. The combination, with the annular armature-core and the coil wound thereon, of the coil supporting end rings and the central raising piece or bridge projecting above the end rings and over which the coil is wound and tightened.

6. The combination, with a laminated annular armature-core, of end plates between which it is clamped, and the supporting-spiders for said end plates, having shoulders or lugs overlapping one another, as described, for engaging and supporting the inner side of the armature-core.

7. The combination, with the annular laminated armature, of the clamping end plates therefor and the spiders supporting said end plates, having a hub and socket drive-joint

and faces brought into true or correspondent relation and projecting beyond the coils for engagement with a press-table.

8. The combination, with an armature-core and a porcelain or equivalent insulating-plate on which the wire is wound, of the cushion or bed-sheet, substantially as described, interposed between the said insulating-plate and the core.

9. An iron-clad armature having holes or perforations, coils wound through and partly filling said holes, and wedges driven into said holes so as to compress the coils and bind them therein.

10. An iron-clad armature having holes near its surface, coils wound through and partly filling said holes, and wedges driven into said holes so as to bind the coils therein.

11. An armature having an iron-clad or continuous surface with holes near said surface, coils partly filling such holes, and insulating material tightly filling the space not occupied by the coils.

NORMAN C. BASSETT.

Witnesses:
JOHN W. GIBBONEY,
BENJAMIN B. HULL.

Corrections in Letters Patent No. 456,925.

It is hereby certified that in Letters Patent No. 456,925, granted July 28, 1891, upon the application of Norman C. Bassett, of Lynn, Massachusetts, for an improvement in "Armatures for Motors and Generators," errors appear in the printed specification requiring correction as follows: In line 85, page 2, the comma after the word "periphery" should be stricken out, and in line 86, same page, the hyphen between the words "surface" and "coils" should be stricken out and a *comma* inserted instead; and that said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 24th day of October, A. D. 1893.

[SEAL.]

JNO. M. REYNOLDS,
Assistant Secretary of the Interior.

Countersigned:

JOHN S. SEYMOUR,
Commissioner of Patents.