(No Model.)

J. A. I. CRAIG.

DYNAMO ELECTRIC MACHINE.

No. 249,017. Patented Nov. 1, 1881.

FIG. 1.

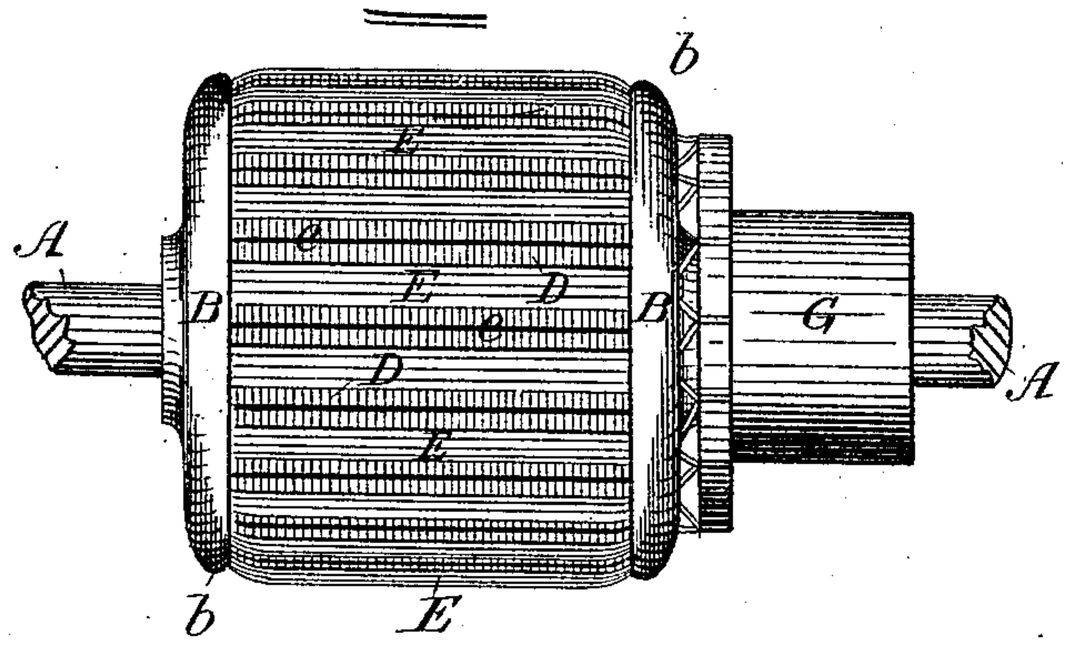


FIG. 2.

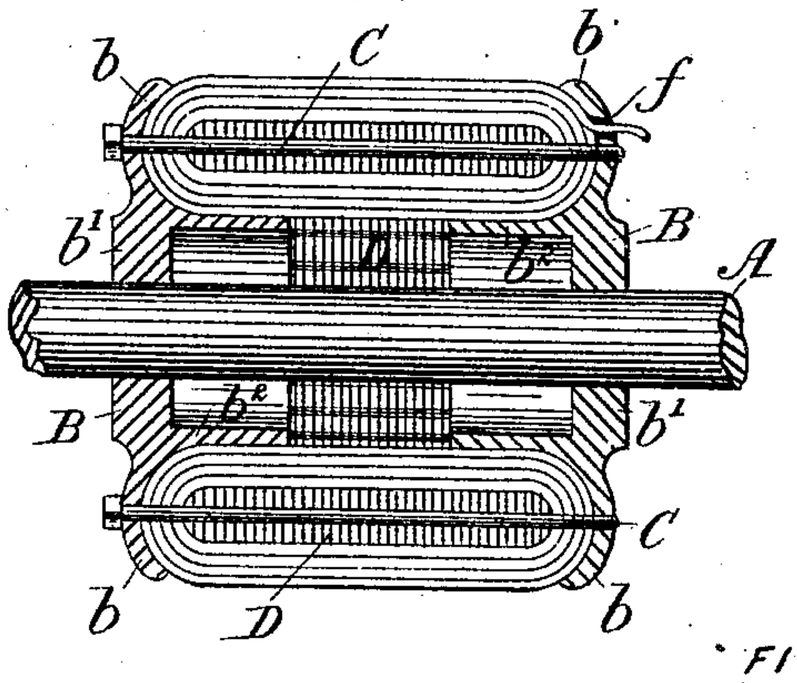


FIG. 3.

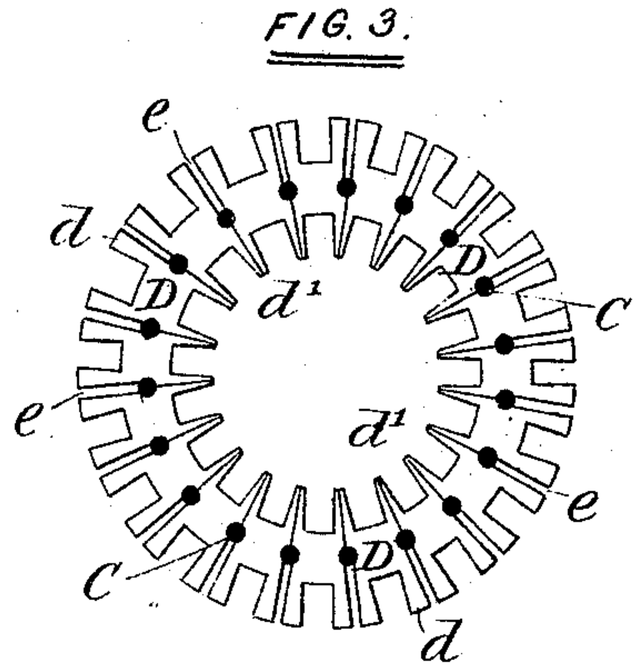
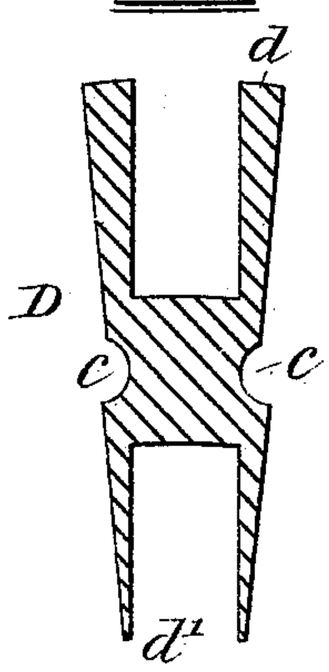


FIG. 4



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UNITED STATES PATENT OFFICE.

JOSEPH A. I. CRAIG, OF MONTREAL, QUEBEC, CANADA, ASSIGNOR OF TWO-THIRDS TO EDWIN RUTHVEN WHITNEY AND CHARLES LUCIEN BOSSÉ, OF SAME PLACE.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 249,017, dated November 1, 1881.

Application filed August 17, 1881. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH A. I. CRAIG, of the city of Montreal, in the district of Montreal and Province of Quebec, Canada, have invented certain new and useful Improvements in Dynamo-Electric Machines; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention relates to improvements in the armatures used in dynamo-electric machines, and has for its object to enable each bobbin or coil to be applied to or removed from the armature independently of each other, and to provide for more rapid magnetization and demagnetization of the iron forming the cores upon which the insulated copper wire is wound; also, permitting the metallic periphery of the bobbins to be revolved very close to the poles of the magnets and allowing the parts at all times to be kept perfectly cool by the free passage of air between the segments longitudinally with the coils, the armature at the same time presenting a close continuous ring throughout its circumference.

Heretofore it has been the custom when the cores of the armatures have been made up of a number of thin plates of metal to form each plate in one piece of an annular configuration the full size or diameter of the armature, and between each annular ring or pairs of same, annular air-spaces have been made by means of washers placed between them, or by plates of different configuration being used alternately in making up the armatures, or each plate has been insulated from the other, all these methods being very objectionable. In the first instance, (when cooling the metal has been the desideratum,) from the fact that when the air-spaces run in an annular path or are made concentric with the peripheries of the annular plates, the external air, instead of being retained close to the metal, is practically driven out of said spaces during the revolution of the armature, and in the second place, on account of a continuous metal ring not being presented throughout the whole circumference of the armature, the magnetization and demagnetization of the metal in its passage from one pole to the other must necessarily be accomplished with difficulty, and thus much of the strength of the current will be wasted.

Now, my invention is designed to overcome the difficulties named, and may be thus briefly described: Instead of fitting annular plates together to make up the armature as is done at present, I first stamp from thin metal a number of segments, which are placed one on top of another, and the insulated wire wound round them to form a bobbin, which is then slid over or between pins or rods projecting from collars which cover the ends of the armature, one bobbin after another being put in place until the armature is complete. These segments are so formed and put together that air-spaces will be presented longitudinally with the coils between each pair of bobbins on the periphery, and the pins or rods be in the center of each segment and the inner edges of the latter touch each other in such a manner as to present a continuous ring of metal throughout the whole circumference of the inner part of the core. For full comprehension, however, of my improvements reference must be had to the accompanying drawings, in which similar letters of reference indicate like parts, and where—

Figure 1 is a side view of an armature embodying my invention; Fig. 2, a section through same; Fig. 3, a view showing arrangement of segments, and Fig. 4 a detail of one of said segments.

A represents the shaft upon which the armature is mounted, collars B B of the shape shown, and to be hereinafter more particularly described, being provided to cover the ends of the armature. Through these collars, as shown in Fig. 2, I run pins or rods C C, their ends being preferably screwed into one collar and their other extremities provided with nuts. When, however, one collar has been secured in position on the shaft A, and the rods C C inserted, I take a number of segments, D D, which I first cut or stamp from sheets of soft iron of such configuration that there will be projections or teeth on their outer and inner surfaces, as shown, respectively, at *d d'*, and after placing these segments one on top of an-

other until the desired width of armature is attained, I wind insulated copper wire E round same longitudinally in the spaces between the projections or teeth *d d'* and finish same in such a way as to make a complete bobbin. The segments D D, as shown in Figs. 3 and 4, have cut through them semicircular channels *c c*, (centrally between the inner and outer projections,) so that when one bobbin is placed alongside another there will be a circular groove or aperture for one of the rods C on each side and between the bobbins, which can thus be securely held in place to form a ring when the other collar B is slipped onto the shaft A and the ends of the rods C C secured therein.

e e are air-spaces left between each of the segments and extending from the rods C C outward to the periphery of the armature in such manner as to form grooves across the face of the latter longitudinally with the coils E on either side of the bobbins. The edges of the segments which extend inside the rods C C toward the shaft A fit closely up against each other, and thus establish a complete and unbroken ring around the inner circumference of the armature.

Each of the collars B B is constructed with a curved flange, *b*, projecting outward from a hub, *b'*, which is keyed to the shaft A. This flange covers the end of the armature and carries the pins or rods C C, as described, besides having a number of holes marked *f* in Fig. 2 cut through same for the passage of the wires to their connection with the commutator G, said holes being large enough to also permit of the free passage of air to the interior of the armature. Another annular flange, b^2, is formed on the hub *b'*, and extends inside the armature, close to the projections *d'*, and parallel with the shaft A, thus giving a solid support for the bobbins.

When my improved armature is in operation the core is kept cool by the air which is drawn into the longitudinal spaces *e e*, the fact of these spaces being at right angles to the line of motion insuring the retention within them of the cool air during each revolution, and in this manner, and by the aid of the air drawn inside through the holes *f* in the collars, allowing all the heat generated to be neutralized.

The peculiar arrangement of the pieces used to make up the armature, as described—viz., in a great number of segments fitting around and bound together by iron pins—gives me an advantage over those constructions of armature where the plates are of whole annular rings—*i. e.*, by utilizing the principle that a small piece of metal is more susceptible of magnetization and demagnetization than a large piece, I am enabled, while producing better results, to attain my end in a very simple and inexpensive way, since it will be seen that each bobbin or coil may be wound and inserted or removed separately without interfering with the rest of the armature.

I lay no claim to the construction of armatures from thin sheets or annular rings of metal insulated from each other, and having projections on their outer and inner edges, between which the insulated wire is wound, as I am aware that this device has been patented in Great Britain by A. de Méritens, on the 17th September, 1878, under No. 3,658; nor do I seek to cover the arrangement of these annular rings with intermediate plates or washers, so as to leave air-spaces between their flat sides, as this principle has been already covered by Letters Patent of the United States No. 228,544, granted to Hiram S. Maxim on the 8th June, 1880; but

What I claim as my invention, and desire to secure by Letters Patent, is as follows:

1. An armature for a dynamo-electric machine, having its core made up of segments of sheet metal arranged side by side and carrying the wire coils forming pieces or sections, such sections being in magnetic contact in a circle around the armature-shaft, so as to form a complete magnetic ring, substantially as described.

2. An armature for a dynamo-electric machine, made up of separate bobbins formed of sheet-metal segments carrying the wire coils inserted between and held together by the flanged collars B and rods C, substantially as described.

3. An armature for a dynamo-electric machine, made up of plates of sheet metal, and having air-passages formed by cutting away the edges of the plates or segments, and extending longitudinally across the armature between each pair of bobbins, substantially as described.

4. In combination with an armature substantially such as described, the collars B B, provided with outwardly-curved flanges *b*, supporting-rods C C, and flanges b^2, projecting inside the armature parallel with its shaft, substantially as and for the purposes set forth.

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