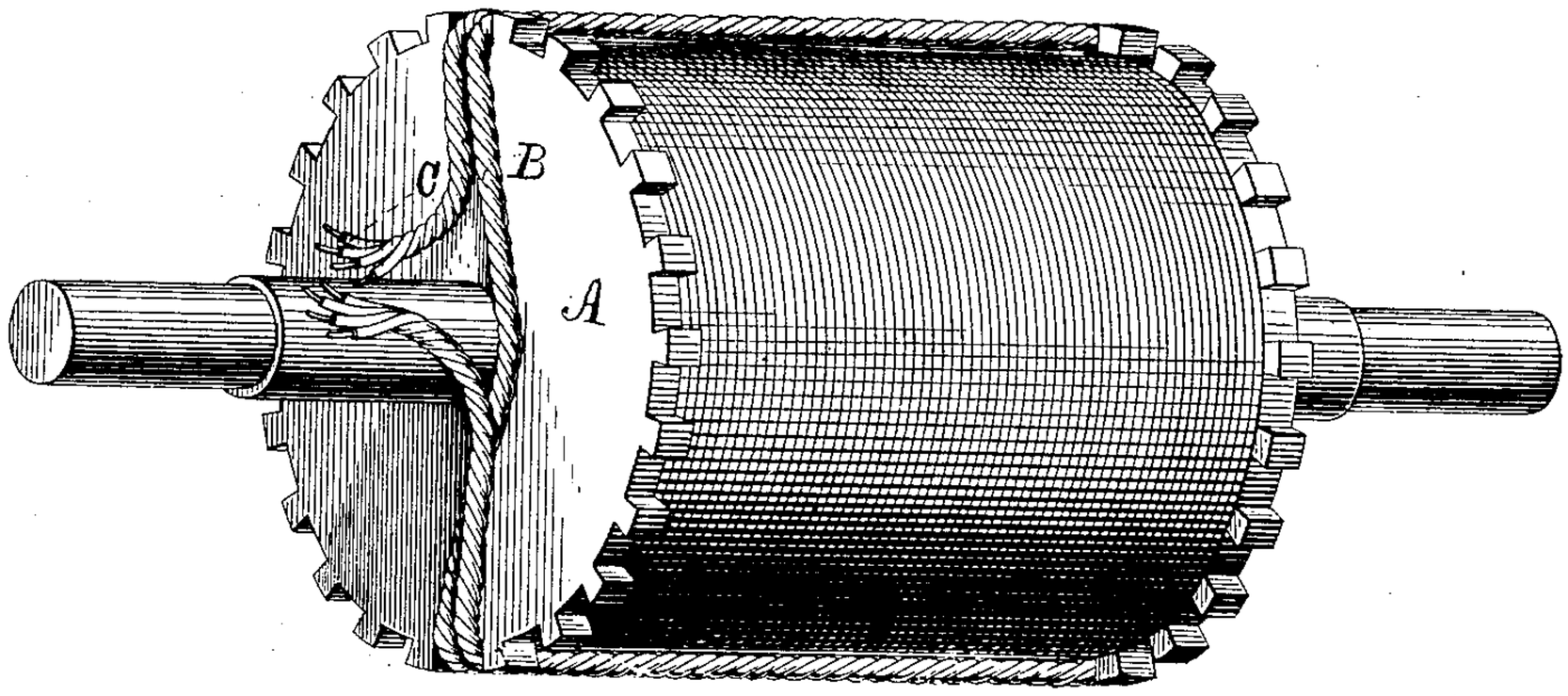
(No Model.)

C. L. HEALY.

ARMATURE FOR DYNAMO ELECTRIC MACHINES.

No. 314,242. Patented Mar. 24, 1885.



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ARMATURE FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 314,242, dated March 24, 1885.

Application filed August 13, 1884. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE L. HEALY, of the city of Brooklyn, in the county of Kings and State of New York, and a citizen of the United States, have invented certain new and useful Improvements in Armatures for Dynamo-Electric Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to the manner of winding the armatures of dynamo-electric machines. Its special purpose is to simplify the construction of large armatures by producing a flexible conductor of low resistance, and to reduce the objectionable effects produced by the generation in the windings of the common forms of such armatures of what is known as "Foucault" currents, and at the same time to more fully utilize the force of the magnetic field.

It is well known that in all the common forms of these armatures, whether they consist of coils of wire or metallic ribbons or bars, some portions of the winding for continuous extents along or around the armature are farther away from the field-magnets than other portions thereof, and hence are acted upon by the field-magnets with correspondingly-varying power, the effect of which in large undivided conductors is to produce an eddying or short-circuiting of the currents in the conductor itself, giving rise to heat and waste of power. These are conditions of such familiarity to those skilled in the art as not to require explanation here.

My invention consists, therefore, in so winding the armature that each and all of the continuous lengths or convolutions of wire or other form of conductor extending along or around the armature shall be acted upon alike by the field-magnets by reason of their all passing through the same portion of the magnetic field; and this I accomplish by winding the armature with a wire that is first bent into a spiral coil, and by preference I employ a number of wires properly insulated from and laid spirally around one another, so as to form a compound conductor of a cable-like form.

In the drawing accompanying this description I show an armature-core, A, of well-known form and construction, about which is wound a compound conductor, B, made in accordance with my invention. One section only of the core is shown as filled; but it is to be understood that in the completed armature all the sections will be filled. Each section is designed to receive two coils or convolutions, as shown; but manifestly they may contain more. It is designed, however, that but a single thickness or layer of the compound conductor shall be wound upon the armature. The several ends of each coil of this conductor can be joined either in series, multiple series, or multiple arc, thereby forming a conductor of varying conductivity. This conductor is connected in any of the usual ways to the commutator-blocks, which are not shown in the drawing, as they are not materially changed for the present construction.

The compound conductor B, as already indicated, consists in the present instance of four wires, C, separately coated with suitable insulating material and arranged in a single cable-like form, so that each wire runs spirally around such cable. The exact manner of combining these wires is not essential so long as they run in regular order around or through the compound conductor from one side thereof to the other. The conductor might, for instance, be composed of three strands running spirally around one another, and every strand might contain three wires arranged relatively in the same manner. In such conductor every wire would appear on the outer surface thereof at regular intervals around it and along its length. Still other ways of winding, in addition to those above referred to, will give an arrangement of wires which will be substantially the same for this purpose.

It will now be plain that when an armature-core is wound with one thickness of such a conductor every wire runs regularly through the whole thickness of the wire-covering from the inside to the outside, so that when this covering or winding is passing through the magnetic field every wire will extend to and fro from the line nearest the field-magnets to the line farthest therefrom of the space through which the winding as a whole moves, and therefore that every wire will be subjected to

the same magnetic influence and to such influence from its maximum point to its minimum point of strength, or through the whole of that portion of the field in which the winding travels, and at the same periphery speed.

It will now be understood that, taking that section of a single wire extending across the surface of the core, the various parts of such section lie proportionately in all parts of the field through which the winding passes, and that, though some parts of such section will be subjected to the minimum power of the field, other parts will be subjected to the maximum power, and yet other parts to the intermediate force of the field. The result is that the potential of each wire will be the same for any given length of the conductor, and where the several ends of each coil are joined together to form one conductor the resulting current is the intensity of one strand and the capacity of the number of strands which form the conductor without the loss from Foucault currents which exists in undivided conductors, like copper bars. So, also, by the spiral arrangement of the wires forming my conductor the neutralizing effects and the consequent tendency of short-circuiting due to the difference of the position of the several wires in the magnetic field in cases where the conductor is formed of several superimposed straight and parallel wires or ribbons are avoided—if not wholly, at least to a great degree.

Metallic ribbons may be used in the place of wires to form my conductor, the ribbons being wound and combined substantially in the manner hereinbefore described for the wires. It is, however, found that conductors of less extent in cross-area are more desirable.

I have spoken of winding the compound conductor on the core of the armature in but one thickness. This is doubtless the best construction; and in case it is desired to increase the thickness of the coil-covering, as in an annular ring-armature, to accomplish this by increasing the size of the conductor by making it of a larger number of wires. I, however, believe that if two or more thicknesses of such conductor were wound upon a core the results would still be more favorable than in the case of a corresponding amount of wire laid in any superimposed layers when the wires are in straight and parallel lengths.

What is claimed as new is—

The combination, in an armature of a dynamo-electric machine, of an armature-core and a winding therefor, consisting of a compound conductor composed of wires insulated from and arranged spirally around one another, substantially as and for the purpose set forth.

CLARENCE L. HEALY.

Witnesses:
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