(No Model.)

W. H. KNIGHT.

ARMATURE WINDING FOR DYNAMO ELECTRIC MACHINES.

No. 389,658. Patented Sept. 18, 1888.

Fig. 1

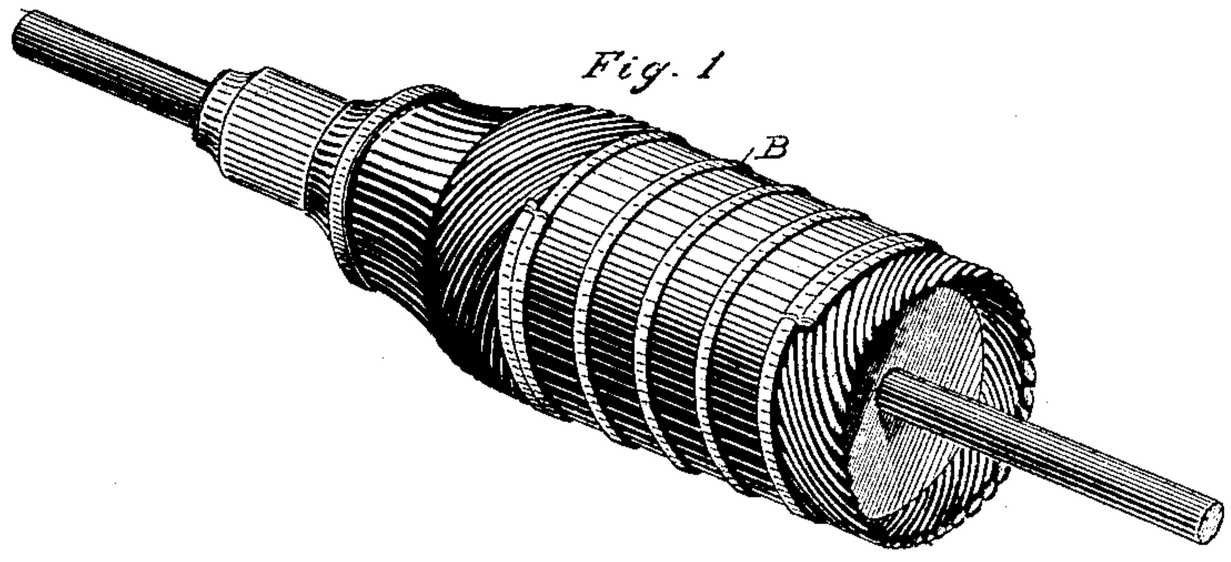

Fig. 2

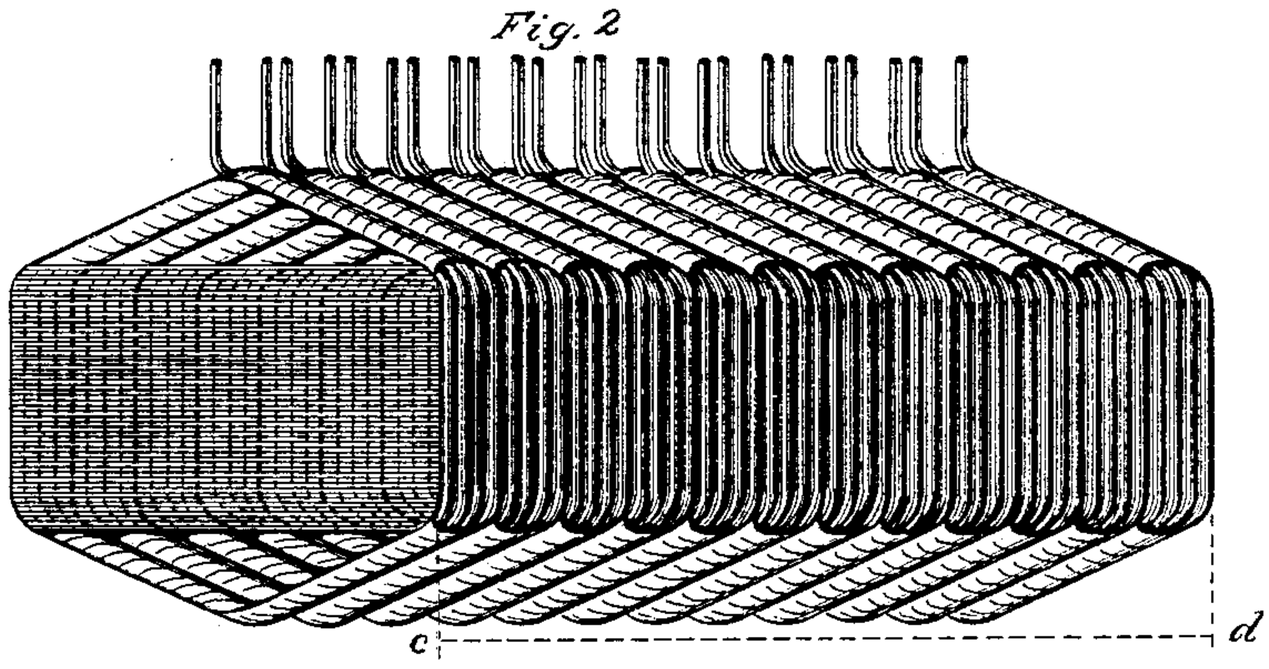

Fig. 3

Fig. 4

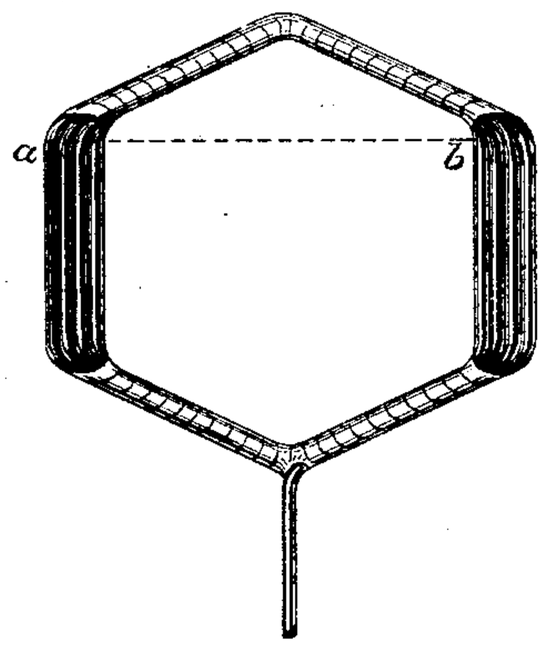

Fig. 6

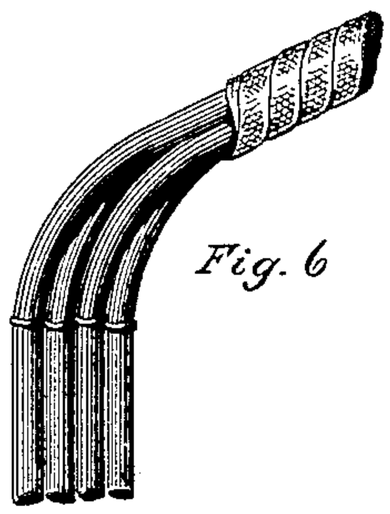

Fig. 5

WITNESSES

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ARMATURE-WINDING FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 389,658, dated September 18, 1888.

Application filed June 6, 1888. Serial No. 276,224. (No model.)

To all whom it may concern:

Be it known that I, WALTER H. KNIGHT, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Armatures for Dynamo-Electric Machines, of which the following is a specification.

My invention relates to a method of armature-winding, especially adapted to armatures of the cylindrical or drum type, by which several objectionable features in the present modes of winding may be avoided.

In the present drum-armature winding it is customary to do the winding by hand and to have the layers at the ends pile up upon each other, so that when the armature is worked to its full capacity there is a tendency to an accumulation of heat at that point. These ends also permit an accumulation of dirt, which is apt to interfere with the insulation.

My invention consists in making up the winding into a mat, which may be made by machinery, and then applying the same to the ordinary cylindrical core of magnetic material. This mat may be easily wrapped around the core, the binding-straps put around it, and connection made with the commutator. When in position, the wires at the end of the armature are in the form of a hollow cylinder projecting beyond the core, each wire coming out from the periphery of the armature and passing over to the diametrically-opposite point, not by a direct diametric path, as at present, but passing around in a cylindrical surface or shell, so that all of the wires taken together make up the hollow cylinder mentioned above.

My invention is illustrated in the accompanying drawings, wherein—

Figure 1 represents the mat or the wrapping in position on an armature. Fig. 2 is the mat before being applied. Fig. 3 is a plan of an individual coil. Fig. 4 is an end elevation thereof. Fig. 5 is a side elevation, and Fig. 6 is a detail showing a corner of a coil.

In the manufacture of each coil the first step is to wind up a sufficient number of turns of wire into the form shown in Fig. 5. The distance from the point *a* to the point *b* is exactly one-half the circumference of the core. This coil may be wound on a former and the wires bound together in any suitable manner. A number of these coils are then laid upon one another, as shown in Fig. 2, and the whole made up into a firm mass by proper insulating material. Thus formed, the mat or wrapper is ready for application to the core. The distance on the mat from *c* to *d* is exactly the circumference of the core. Such a mat is taken and simply wrapped about the cylindrical core.

It is then bound down tightly by the straps B. We have then the ordinary Siemen's winding with wires at the end extending beyond the core in the form of a hollow cylinder. Each wire of the parallel transverse series as it comes from the periphery passes out diagonally in a cylindrical surface or shell to the edge and then turns under and passes back in a diagonal direction to a point diametrically opposite that at which it left the core. The ends of the coils are left free, as shown in Fig. 2, and each pair is then connected by a screw or other connector to one of the radial arms of the commutator. The winding is then complete. The advantages of this arrangement are at once apparent. The whole winding can be made up by machine in large quantities as an article of manufacture and a mat can be applied to an armature-core in a short time by an ordinary workman. This avoids the present laborious method of hand-winding. An injured armature can be readily rewound by an inexperienced person. The wires at the end are thoroughly ventilated and no chance for the lodgment of dirt is afforded. It will be found also that there is always the minimum difference of potential between adjacent wires, and the danger of burning out is much lessened. Any individual coil can also be rewound without interfering with the rest, by threading a wire through by hand.

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

1. The combination, with a cylindrical armature-core, of a winding therefor having parallel peripheral wires, which at the end of the core are crossed to opposite polar points in a surface concentric with the core, the wires having in said surface an outward and an inward direction on the inside and outside of said surface, respectively, and the winding having commutator-connections at successive points, by which construction the end wires of the cylindrical armature are exposed and ventilated.

2. The combination, with a cylindrical armature-core of magnetic material, of a closed circuit winding therefor having commutator-connections at successive points and its end wires crossed over between opposite polar points in an inward and outward series, arranged to form a hollow extension from the periphery of the core concentric therewith.

3. The combination, with a cylindrical armature-core of magnetic material, of a winding therefor having its end wires extended beyond the periphery of the core a certain distance in an outside series and then turned back to opposite polar points in a corresponding inside series, substantially as described, thereby forming an open extension of wires from the end of the core concentric therewith.

4. As an article of manufacture, a mat or wrapper of insulated electrical conductors forming the winding for a drum-armature of a dynamo-electric machine.

5. A mat or wrapper of wires for a drum-armature, having a series of coils, the opposite wires of which are a distance apart substantially equal to half the armature periphery.

6. A mat or wrapper of wires for a drum-armature, having a series of parallel transverse wires equal in length to the core of the armature, and diagonal connecting-wires adapted to extend beyond the core when the wrapper is in position.

7. A mat or wrapper of wires for a drum-armature, consisting of a series of coils with free ends, bound together so that the whole may be bent around the core and when in place form a complete winding.

8. A mat or wrapper of wires for a drum-armature, consisting of a series of overlapping coils with free ends, substantially as described.

9. A mat or wrapper of wires for a drum-armature, consisting of a series of overlapping coils with free ends, each coil having several turns, and the whole bound together so as to be readily bent around the core.

10. A drum-armature winding consisting of a series of overlapping coils, each having two straight parallel sides corresponding to the longitudinal peripheral wires a distance apart equal to half the armature periphery, and connections between said sides longer than the armature diameter and curved at the end into a surface concentric with the core.

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Witnesses:
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