(No Model.)

W. K. FREEMAN.

ARMATURE WINDING FOR DYNAMO ELECTRIC MACHINES.

No. 302,557. Patented July 29, 1884.

Fig: 1.

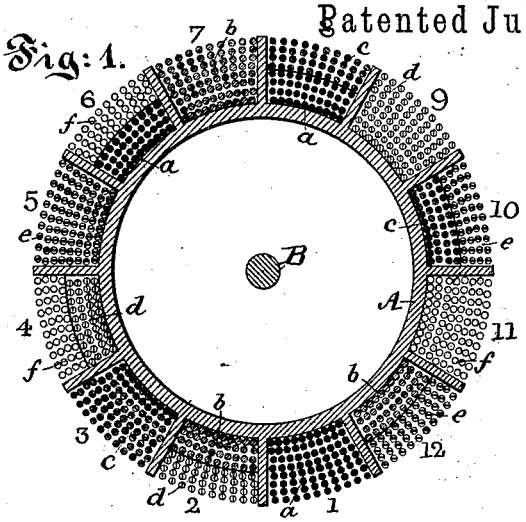


Fig: 2.

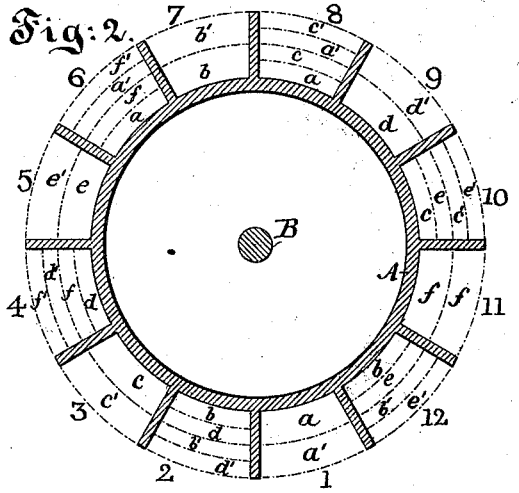
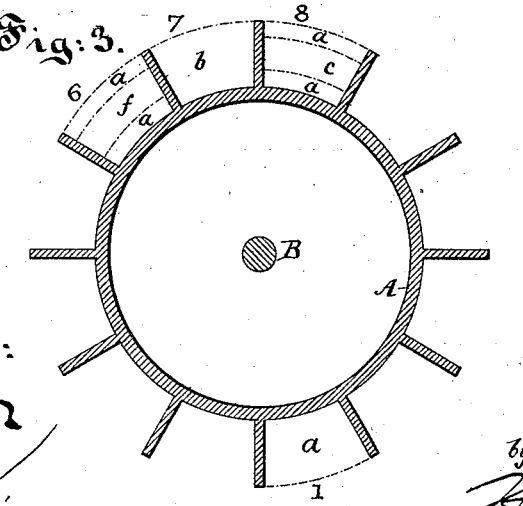


Fig: 3.



Witnesses:

A. H. Gentner

Thos. Toomey.

Inventor:

W. K. Freeman

by his Atty:

H. L. Townsend

UNITED STATES PATENT OFFICE.

WALTER K. FREEMAN, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE MONARCH ELECTRIC COMPANY OF NEW YORK.

ARMATURE-WINDING FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 302,557, dated July 29, 1884.

Application filed November 15, 1883. (No model.)

To all whom it may concern:

Be it known that I, WALTER K. FREEMAN, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Winding Armatures of Dynamo-Electric Machines and Motors, of which the following is a specification.

My invention relates to the winding of armatures for dynamo-electric machines and motors, and more particularly to the manner of distributing the wire in the divisions of a cylindrical armature or carrier, such as is used in a Siemens or other form of dynamo-electric machine in which the armature wires or coils are wound longitudinally upon the exterior of a cylindrical core or carrier.

The object of my invention is to obtain a practically uniform distribution of the wire for the various bobbins or coils of the armature, and practically the same length and exposure to the influences of the magnetic field.

My invention consists in a certain novel and improved method of distributing the armature-wire, the nature of which will be readily understood from the subjoined description, taken in connection with the accompanying drawings, which represent in cross-section a cylindrical armature having its divisions filled with wire applied in accordance with my invention.

I have in the present case illustrated the application of my invention to an armature having twelve divisions or spaces for the reception of armature-coils; but the application of the invention to an armature with a larger number of divisions or spaces, and consequently a greater number of armature bobbins or coils, will be obvious from a description of its application to a twelve-division armature.

Figure 1 illustrates a simple method of carrying out the invention. Figs. 2 and 3 illustrate modifications.

In the drawings, A indicates the periphery of a cylindrical armature of any suitable mechanical construction, and B the armature-shaft, upon which it is mounted or secured. The periphery of the armature is represented as having twelve circumferential divisions or spaces for the reception of armature-wire, numbered from 1 to 12, inclusive. In these divisions the several coils, bobbins, or sections of bobbins (represented by the letters *a b c d e f*) are wound in the following manner: The coil or bobbin of wire indicated at *a* in cross-section is wound, as indicated, with all the layers which are upon the one side of the armature lying in the division or space 1, while all of the layers of said coil which are upon the opposite side are distributed to either side of the diametrically-opposite division, 7, so that a portion of said layers will be in division 6 and another portion in division 8. The coil wound in division 7 is distributed similarly on opposite sides of the diametrically-opposite division, 1, as indicated. In winding coil *a* the turns may be alternately placed in divisions 6 and 8, or I may wind half the entire coil in 1 and 6 and continue with the other half in 1 and 8, or until the division 1 is filled. The two ends of the coil or section are connected to other similarly-wound coils in other planes, or to another coil, as *b*, in the same general diametrical plane, or to the divisions of a commutator or other collecting device in any of the usual or proper ways, depending upon the particular system of connection and commutation that is adopted. Coil or section *a* having been wound as described, I next proceed to wind coil or section *b*, which is disposed, as shown in division 7, upon one side of the armature, and upon the other is laid half in 2 and half in 12. Coil *c* is next wound, and the remaining bobbins *d e f* are wound in the order of the letters of the alphabet, so that their various portions will occupy the relative positions indicated. The bobbins or sections of coils *a* and *b*, which occupy the same general diametrical plane, may be connected in a single bobbin in obvious fashion, the negative terminal of one to the positive terminal of the other, and the remaining terminals to other bobbins, or to a commutator in any proper manner. Coils or sections *e* and *f*, as also *c* and *d*, may also be similarly joined. The various sections or coils *a b c d e f* are, however, to be used in any desirable manner, either separately or combined. I do not limit myself in this respect, as this is a matter well understood in the art, and not making a part of the present invention. The

order in which the various coils *a b c d*, &c., are wound is also immaterial, the result being only to vary the relative positions of those parts of two coils which are in the same armature division. Nor is it necessary that the winding of one coil, *a*, or *b*, or *c* should be completed before that of others is commenced. For instance, coil *a* might be half wound and the completion of its winding reserved until that of *f* and *e* were completed, so that in divisions 1, 6, and 8 the disposition of the wires would be as indicated in Fig. 3. Similar variations might be made in the winding of other coils and those portions of the coils which occupy the same divisions might be thus arranged in very many ways.

In Fig. 1 it will be noticed that each coil *a b c d*, &c., is made to completely fill the divisions 1 3 5 7 9 11, while the distributed portions of said coils upon opposite sides of the armature from the full divisions only half fill their divisions. A modification of this is shown in Fig. 2, in which each coil or section of coil *a b c d*, &c., only partially fills the divisions 1 3 5 7 9, &c. After the armature-carrier has been covered with coils wound in this way a second set (indicated by the letters *a' b' c' d'*, &c.) may be wound over the first set in a similar way to fill out the armature to its proper size. Any number of sets of coils may be thus wound and the currents taken from said sets separately or combined, as desired; or the wires *a'* might be taken as the continuation of the wires *a*, forming thus a single bobbin or section wound in two parts. I do not limit myself in these respects, and many other variations will readily suggest themselves, all, however, embodying the same plan of winding a coil or section so that all of the same which lies upon one side of the armature shall be in the same division, while the portions of said coil upon the opposite side of the armature shall be distributed to either side of the diametrically-opposite division.

It will be obvious that those portions of two coils which lie in the same division, instead of being superposed, may be placed beside one another.

What I claim as my invention is—

1. In a dynamo-electric machine or motor, an armature coil or bobbin wound in the manner described, so that all of said coil or bobbin that is upon one side of the armature shall be in the same armature division, while the portions of said coil upon the opposite side of the armature shall be distributed on either side of the diametrically-opposite division.

2. In a dynamo-electric machine or motor, a cylindrical armature wound with a set of coils or bobbins disposed in the manner described, with the half of each coil that lies upon one side of the armature laid in the same armature division, while the remaining half that lies upon the opposite side of the armature is laid in two equal portions in division to either side of the diametrically-opposite division.

Signed at New York, in the county of New York and State of New York, this 13th day of November, A. D. 1883.

WALTER K. FREEMAN.

Witnesses:

THOS. TOOMEY,

GEO. C. COFFIN.