(No Model.)

C. E. BALL.

DYNAMO ELECTRIC MACHINE.

No. 259,077. Patented June 6, 1882.

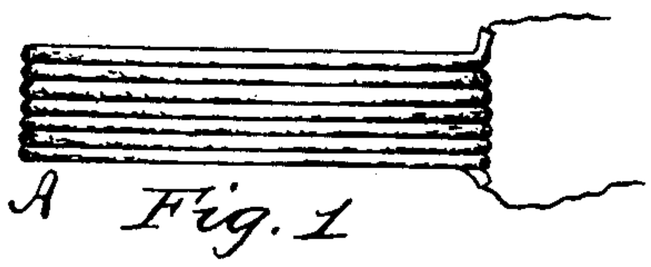

Fig. 1

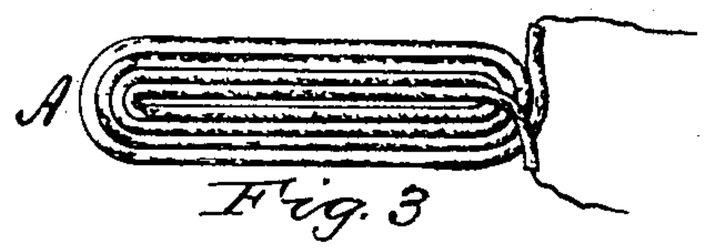

Fig. 3

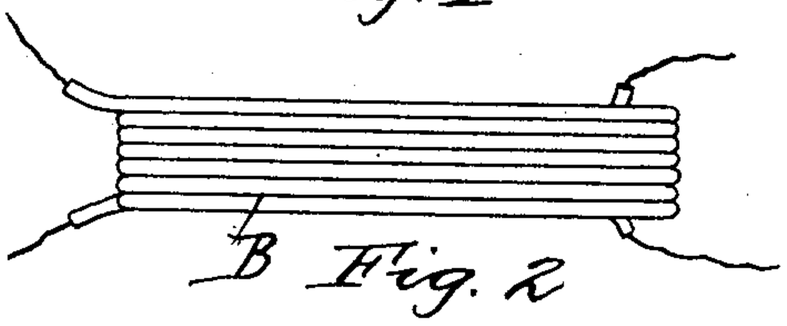

Fig. 2

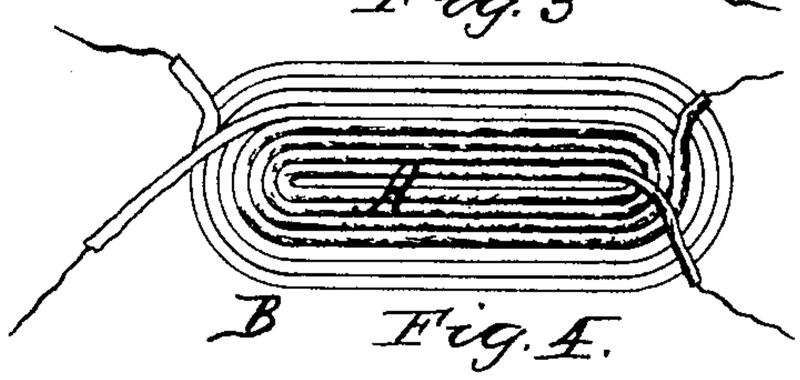

Fig. 4.

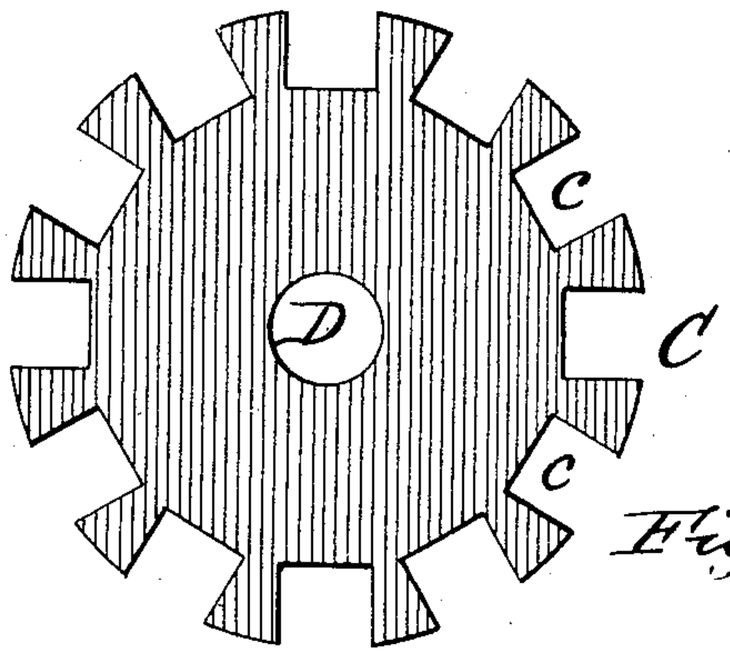

Fig. 5

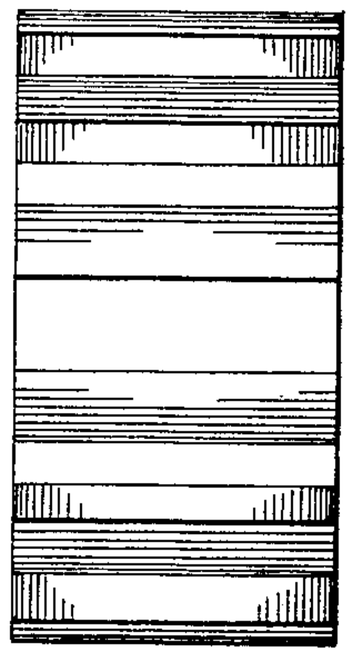

Fig. 6

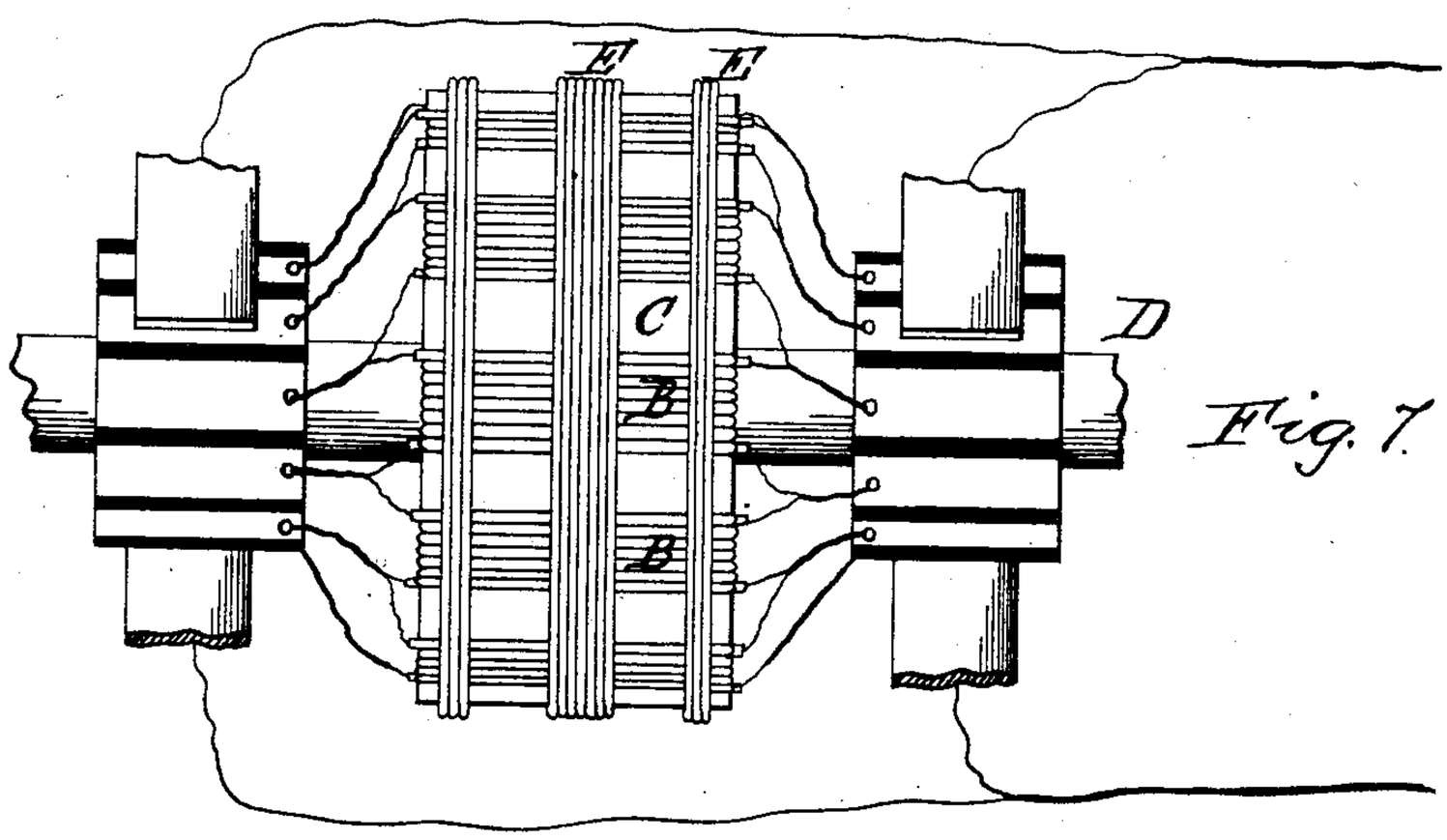

Fig. 7.

WITNESSES:

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UNITED STATES PATENT OFFICE.

CHARLES E. BALL, OF PHILADELPHIA, PENNSYLVANIA.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 259,077, dated June 6, 1882.

Application filed February 25, 1882. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. BALL, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Dynamo-Electric Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, which form part of this specification, in which—

Figure 1 is a plan of one of the core-bobbins. Fig. 2 is a plan of the same covered with an external bobbin. Figs. 3 and 4 are side elevations, respectively, of Figs. 1 and 2. Fig. 5 is an elevation of wood disk for holding said bobbins. Fig. 6 is a face view of same, and Fig. 7 is an elevation of an armature embodying my invention.

The primary object of my invention is to avoid heating the armatures of dynamo-electric machines when in operation.

A further object of my invention is to utilize all the material and all of the currents produced in the armatures of such machines.

Heretofore the armatures of dynamo-electric machines have generally consisted of iron cores surrounded by insulated wires, said cores being so constructed and arranged that no outlet was afforded for any currents of electricity generated therein. Such armature-cores have been made generally in the form of an endless ring, in which any electric current generated therein circulated constantly without finding any outlet or means of escape, the result being the production of heat, frequently involving the burning of the armature-coils.

I have discovered that if an outlet be afforded for such currents generated in the core they may be advantageously utilized and the heating of the armature avoided.

In carrying my invention into effect I form the armature-core of a series of bobbins of iron wire, preferably copper-plated and duly insulated. The ends of the bobbins are connected to one another, and with a commutator, like the coils of a Gramme armature, by means of which their currents are led off, either to the external or working circuit or to the field-magnets. Around each iron bobbin is wound another bobbin of insulated copper wire. The ends of the copper bobbins come out on the opposite side of the armature from those on which the ends of the iron bobbins come, and are connected in the usual manner to one another and with a commutator. The compound bobbin thus produced consists of an inside bobbin of iron wire, forming the core, and an external surrounding bobbin of copper wire. These compound bobbins are placed on a wooden cylinder with an axial opening to receive the armature-shaft, the periphery of said cylinder having longitudinal grooves, in which the bobbins rest, their ends being connected, as already specified. To secure the bobbins on the cylinder they are banded with wire, or otherwise suitably fastened.

Referring to the accompanying drawings, A indicates a bobbin composed of iron wire, and produced by winding the wire helically on a former. The iron wire is preferably copper-plated, though this is not indispensably necessary, and is insulated before being wound by wrapping it with cotton or other suitable insulating material. Around this iron-wire bobbin, while it is yet on the former, insulated copper wire is wound helically to form a second or external bobbin, B, the ends of the two bobbins being led out on opposite sides—that is, the ends of the iron bobbin at one side and the ends of the copper bobbin at the opposite side. A sufficient number of these compound bobbins being provided, they are, after the removal, of course, from the former, fitted in the longitudinal grooves *c c* of a wooden cylinder, C, which is designed to be mounted on a rotating shaft, D. The ends of all the iron bobbins are then united to form one series, and are connected with a commutator, E, and the ends of the copper bobbins are in like manner connected to each other, forming another series, and led to a commutator, F, on the opposite side or end of the armature. The bobbins are secured in place by bands of wire G, or in any other suitable manner. The currents taken from the commutators may be run together into the exterior circuit and to the field-magnets, or those from the iron bobbins used to feed the field alone, the exterior circuit taking only the currents from the external or main bobbins.

I prefer to use iron wire copper-plated for the internal or core bobbins for this reason:

iron, as a core, is of course necessary in order to induce a current, and copper, being a better conductor, will carry off the currents with less resistance than iron will. If the internal and external bobbins be connected or run into the same circuit, a portion of the whole current generated in both will pass by way of the internal bobbins. If the latter were wholly of iron, too much resistance would be opposed and heat would be produced; but by employing copper-plated wire such currents, as well as those generated in the iron, will find a medium over which they can travel with but slight resistance. The bobbins being made fast to the cylinder, a complete armature is thus produced, and is operated in the usual manner by rotation in proximity to the pole or poles of a magnet or magnets.

What I claim as my invention is—

1. An armature for dynamo-electric machines, comprising a core composed of bobbins of iron wire and an external helix or wrapping of copper wire, the wire of both the core and the helix being wound in a direction parallel with the axis on which they revolve, substantially as described.

2. A compound bobbin consisting of an internal bobbin of iron wire and an external bobbin of copper wire surrounding the internal bobbin, both said bobbins being wound in a direction at right angles to the direction of revolution, and having their terminals taken out at opposite sides of the armature, substantially as described and shown.

3. An armature composed of a cylinder of wood or other non-conducting material, and having secured thereto, substantially as set forth, a series of compound bobbins, each compound bobbin consisting of an internal or core bobbin of insulated iron wire and an external surrounding bobbin of insulated copper wire, both said bobbins having the wires of which they are composed wound in a direction at right angles to the direction of the revolution of the said armature, the ends of the bobbins being respectively connected as set forth—*i. e.*, the iron bobbins in one series and the copper bobbins in another series, both leading to a commutator or commutators, as set forth.

4. An armature having a core composed of a magnetic material, which is connected to a commutator, and having a surrounding helix connected to another commutator, so as to collect separate currents from the core and from the helix, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 17th day of February, 1882.

CHAS. E. BALL.

Witnesses:

S. J. VAN STAVOREN,

CHAS. F. VAN HORN.