(No Model.)

J. C. VETTER & S. G. PUTNAM.

ARMATURE FOR ELECTRIC MOTORS AND DYNAMO ELECTRIC MACHINES.

No. 298,922. Patented May 20, 1884.

Fig. 1.

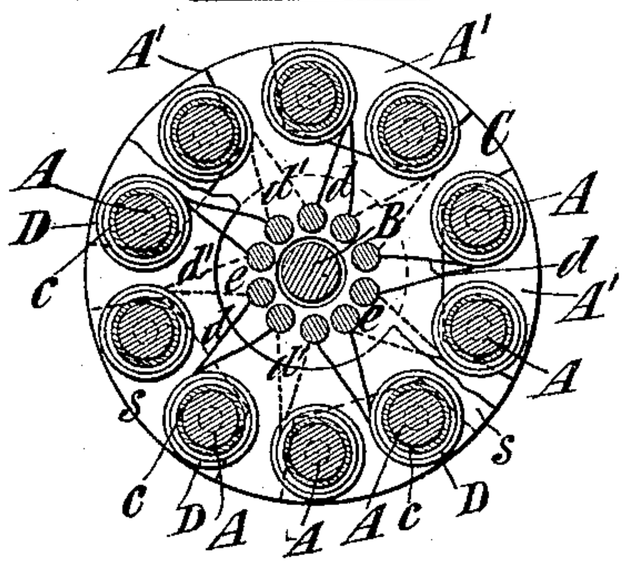


Fig. 2

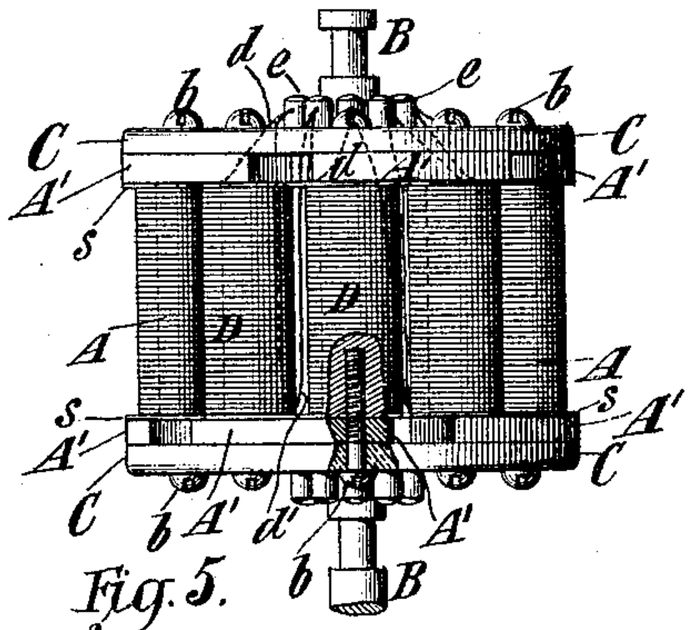


Fig. 5.

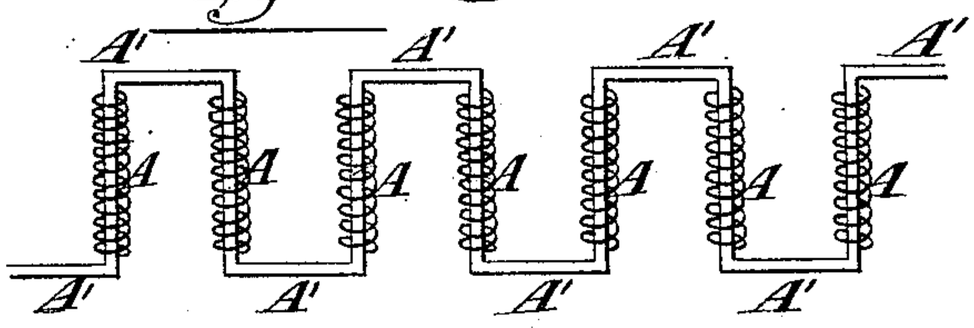


Fig. 4.

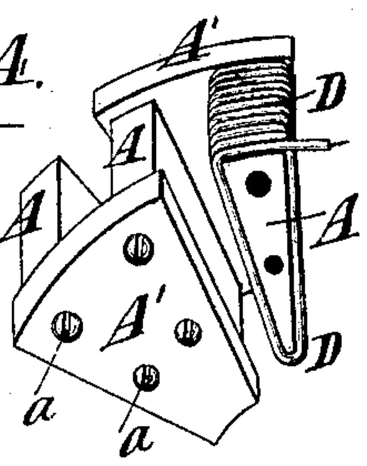
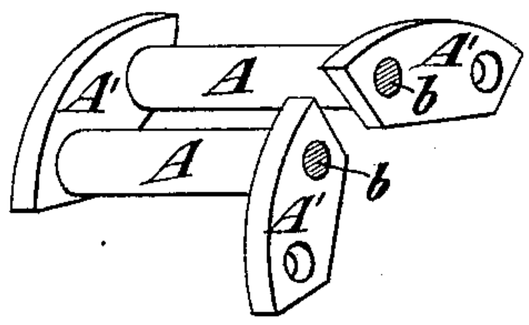


Fig. 3.



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ARMATURE FOR ELECTRIC MOTORS AND DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 298,922, dated May 20, 1884.

Application filed December 5, 1883. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH C. VETTER and STEPHEN G. PUTNAM, both of the city and county of New York, in the State of New York, have invented a new and useful Improvement in Armatures for Dynamo-Electric Machines and Electric Motors, of which the following is a specification.

The armatures which are most generally used in dynamo-electric machines and electric motors are made of heavy iron disks or of wire wound on heavy iron rings. Such armatures are expensive to make, and are so heavy and constructed in such a solid and compact form that they soon grow very hot in use, thus losing much electric energy. It is necessary, however, that there should be considerable iron in the armature-core, and that it should be carefully wound with sufficient wire.

The object of our invention is to provide an armature which shall be of small size and light weight as compared with others of a given power, which is not expensive to make and which has that openness of construction necessary to secure proper ventilation and prevent overheating. The core for a rotary armature must of course be magnetically continuous or circular, but it is not necessarily a solid ring or piece of metal; and our invention consists in a rotary armature having a core which is doubled or returned upon itself, or, in other words, a core which extends from side to side of the armature in its course around or in the direction of the circumference of the armature. By such a construction we obtain a core of great length in an armature of very small diameter, and at the same time obtain an increase in electric energy.

The invention also consists in the combination, in a rotary armature, of a core composed of a circular series of sections wound with wire and extending in the direction of the length of the axis of the armature and side sections connecting the first-mentioned sections, so as to form a core which is magnetically continuous throughout the circumference of the armature and disks or heads of non-magnetic material to which the side sections of the core are secured.

The invention also consists in other details of construction, hereinafter described and referred to in the claims.

In the accompanying drawings, Figure 1 is a transverse section of an armature embodying our invention. Fig. 2 is a plan of the armature, a portion thereof being shown in section. Fig. 3 is a perspective view of a portion of the core. Fig. 4 is a perspective view of a portion of a core of slightly-modified form, also embodying our invention; and Fig. 5 is a diagram or plan view illustrating the doubling or returning of the core on itself in its course around the armature.

Similar letters of reference designate corresponding parts in all the figures.

The core which forms the subject of our invention, instead of passing in its course directly around or in the direction of the circumference of the armature takes the course illustrated by the diagram, Fig. 5, said figure representing the core as laid out flat in a plane. This core is doubled or returned upon itself at short intervals, and comprises parallel portions or sections A and side sections, A′, which together form a continuous core. The sections A only may be wound with wire, as indicated in the diagram, or the sections A and A′ may both be so wound.

Referring now to Figs. 1, 2, 3, and 4, B designates the spindle or shaft of the armature, and C C designate heads, disks, or supporting-walls, secured on the shaft and forming the sides or ends of the armature. The disks or heads C C are of brass, hard rubber, or other non-magnetic material.

In this example of our invention the core-sections A A′ are made separate from each other, and the side sections, A′, are secured to and supported by the heads or disks C, while the sections A extend in the direction of the length of the spindle or shaft B, parallel with each other, and are connected with the side section A′. The sections A form a circular series, and the two sections A A, which are connected with a single side section, A′, at their one end, are connected with different side sections, A′ A′, at their opposite ends. The sections A A′ are of magnetic material, and, being magnetically connected, it will be understood that the general course of the core around or in the direction of the circumference of the armature is as illustrated by the lines in Fig. 5. The core-sections A may be made in various forms. They may be of solid

round iron, as shown in Figs. 1, 2, and 3, or of tubes; or they may consist of strips or plates of iron, set radially to the center of the armature. They may be round, square, or oval in their transverse section, or they may be wedge-shaped in their transverse section, as shown in Fig. 4. In Fig. 4 the sections A are wedge-shaped in their transverse section, and the sections A′ are connected with them by screws *a*. In Figs. 1, 2, and 3 are represented screws *b*, which pass through the heads or disks C and the side sections, A′, and extend into the sections A, thereby securing the sections A A′ together and to the heads or disks C.

On each side of the armature and inside the side sections, A′, are thin sheets or disks *s*, of any non-conducting material. These are used simply to prevent contact of the wire D with the core-sections A′. The core-sections A extend through holes in these sheets or disks, and into direct contact with the sections A′, as shown where broken away in Fig. 2. The core-sections A may be very short, thus bringing the heads or disks C near together, and making the armature of little width as compared with its diameter; or the sections A may be very long, thus giving the armature a long cylindric shape.

D designates the winding of wire upon the core-sections A. When these sections are of irregular shape, as in Fig. 4, the winding will be done as shown in said figure; but when the core-sections A are round the wire D may be wound in the form of round bobbins upon paper or other tubes *c*, and slipped upon the core-sections A before they are connected with the side sections, A′. When the sections A are very long, several sections of wire may be wound or placed on each one, and the ends of the several sections of wire brought down to the commutator. If core-sections A of the form shown in Fig. 4 are used, they may be set very close together, thus giving more separately-wound sections than in any other armature. The coils of wire D on the several core-sections A are all connected with the commutator-pins *e*, as shown in Figs. 1 and 2, the full lines *d* in Fig. 1, designating the terminals which lead from those ends of alternate coils D which are adjacent to the commutator-pins, and the dotted lines *d′* designating the terminals which lead from those ends of intermediate coils D which are at the opposite side of the armature.

The form of armature herein described possesses many advantages. It is very simple and inexpensive in construction, all the core-sections A A′ being interchangeable, and its core-sections being very easily wound. As the wound core-sections A are connected with the side sections, A′, independently of each other, any one section A can be readily taken out for repair, or to be replaced by another, while with an armature constructed as heretofore it is very difficult to remove any wound section of the core. The principal portion of the weight of the armature is near the circumference, and hence it may be rotated very rapidly, and will acquire great momentum, thus rendering it very desirable for small motors or toys. The core-sections A, being wound separately and having air-spaces between them and at or near the center, afford provision for ample ventilation to keep the armature cool. When the armature is made of considerable length, it presents an excellent cylindric form of small diameter about which to construct a field-magnet. The weight of our core or coils being mostly at or near the circumference, we get great momentum, which in a motor with an armature of large diameter is very advantageous. With its rapid revolution and its wound coils set in close juxtaposition, yet not touching, it is an armature which is light, powerful, well ventilated, and most effective.

When the armature is used in a dynamo-electric machine, power is applied to the shaft of the armature; but when in an electric motor a current is sent through the field-magnets and the armature is rotated thereby.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. A rotary armature having a core which is doubled or returned upon itself, or, in other words, a core which extends from side to side of the armature in its course around, or in the direction of the circumference of the armature, substantially as and for the purpose herein described.

2. In a rotary armature, the combination of a core composed of a circular series of sections wound with wire and extending in the direction of the length of the axis of the armature, and side sections connecting the wound sections, so as to form a core which is magnetically continuous throughout the circumference of the armature, and disks or heads of non-magnetic material to which the side sections of the core are secured, substantially as and for the purpose herein described.

3. In a rotary armature, the combination of heads or disks of non-magnetic material, a core consisting of side sections, A′, and sections A, and bobbins D, severally wound on tubes and slipped upon said sections A, substantially as herein described.

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