(No Model.)

R. EICKEMEYER.

DYNAMO ELECTRIC AND ELECTRO MAGNETIC MACHINE.

No. 342,588. Patented May 25, 1886.

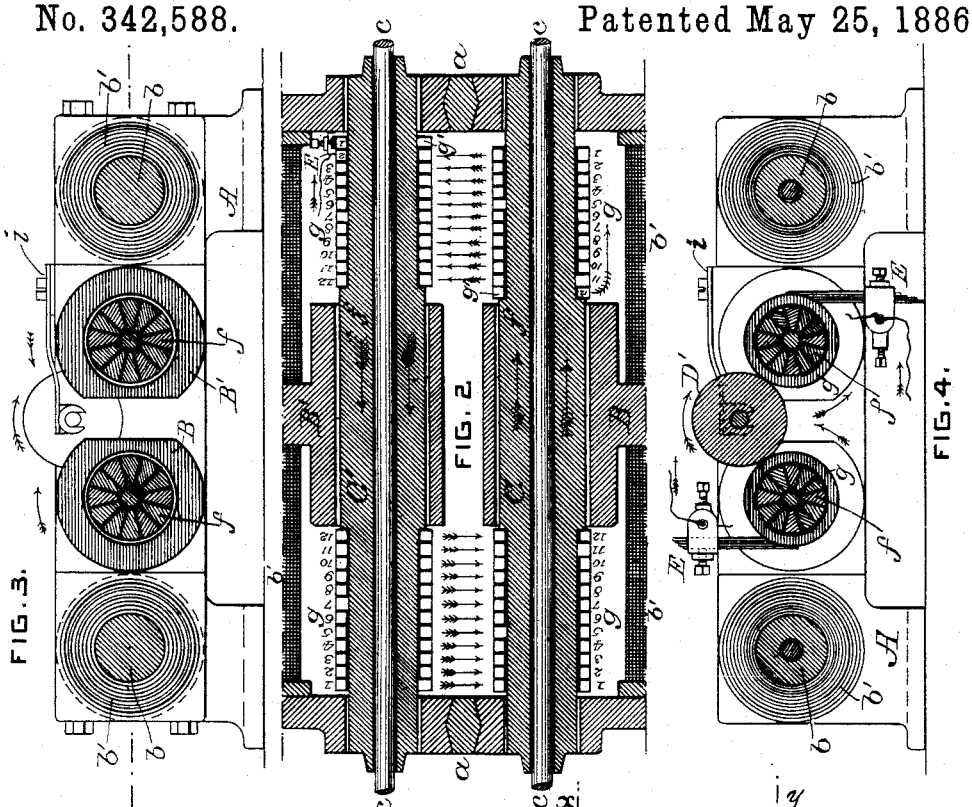

FIG. 3.

FIG. 2.

FIG. 4.

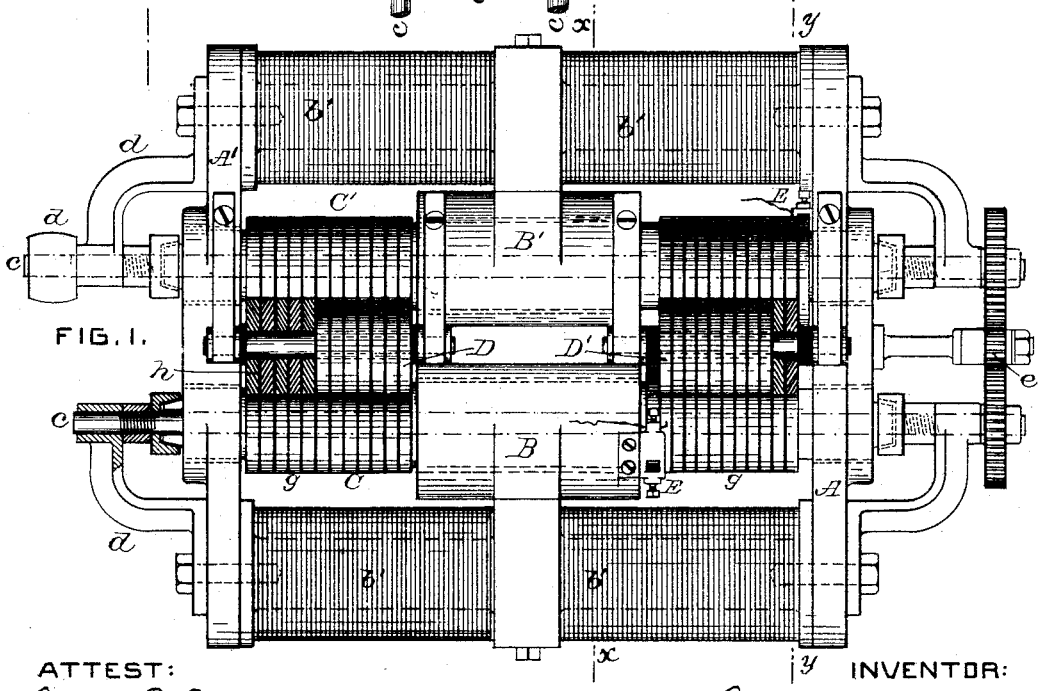

FIG. 1.

ATTEST:

Philip F. Barnett

Howell Burke

INVENTOR:

Rudolf Eickemeyer

By. Wm. C. Wood

Attorney.

UNITED STATES PATENT OFFICE.

RUDOLF EICKEMEYER, OF YONKERS, NEW YORK.

DYNAMO-ELECTRIC AND ELECTRO-MAGNETIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 342,588, dated May 25, 1886.

Application filed December 29, 1882. Serial No. 80,443. (No model.)

To all whom it may concern:

Be it known that I, RUDOLF EICKEMEYER, of Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Dynamo-Electric and Electro-Magnetic Machines; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part of the same, is a clear, true, and complete description of the several features of my invention.

In certain applications for Letters Patent heretofore filed by me, Serial Nos. 76,234 and 78,739, I have shown and described certain improvements in this class of machines, which are in part embodied in the mechanism hereinafter described.

My said prior improvements relate to what are termed "unipolar machines," and those now described pertain to machines of the same class.

In my said prior applications I have illustrated and described machines embodying one revolving armature and others having two; but in the latter variety of machines the two armatures are located within one pole-piece, and are rotated in opposite directions.

Machines constructed in accordance with the principal features of the invention hereinafter described embody two oppositely-polarized pole-pieces, which are each occupied by a revolving armature, and these latter are revolved in the same direction.

After a full description of a machine embodying my present improvements, and certain modifications thereof, the features deemed novel will be specified in the several clauses of claim hereunto annexed.

Referring to the drawings, Figure 1 illustrates, mainly in top view and partially in horizontal section, a machine embodying my present improvements. Fig. 2 is a horizontal central section of the inner portion of the machine. Fig. 3 is a lateral vertical section on line *x*, Fig. 1. Fig. 4 is a lateral vertical section on line *y*, Fig. 1.

As in my prior machines, the end plates, A and A′, serve as parts of the frame of the machine, and also as portions of the field-of-force magnets. As shown in the drawings, each end plate is vertically divided centrally and into two parts, and interposed between them is a section, *a*, of non-magnetic metal, or a material which is a good non-conductor may be used in lieu of metal. The cores *b* of said magnets are parallel with each other and serve as braces in the frame. Each core is provided with a pair of helices, *b′*, so wound as to develop opposite polarities in the central pole-pieces, B and B′, which are interposed between said cores. The pole-pieces are tubular in form, and within them are located the armatures C and C′. The axes *c* of the armatures are mounted in boxes in hangers or brackets *d*, projecting from the end plates, and they are rotatively connected by gearing, as shown, an idle-gear, *e*, enabling both armatures to be revolved in the same direction, power being applied to one of said axes at the pulley *d′*.

Other forms of driving-gearing may obviously be employed, and when metal gears are used the idle-gear is preferably composed of bronze or other non-magnetic metal.

I have shown the connecting-gearing at one end only; but on large machines I prefer to employ gearing at both ends.

It is to be understood that the armatures C and C′ are substantially as heretofore devised by me, and that they may be largely varied in construction without departure from certain features of my present invention.

As here shown, it is to be understood that the axes *c* are of iron, and that they are polarized centrally, so as to present within each pole-piece a pole of opposite polarity thereto—as, for instance, the pole-piece B being polarized "N," the axis of the armature C therein will be polarized "S," and the pole-piece B′ being polarized "S," the armature-axis therein will be "N." It will be seen that these axes are not only polarized by induction from the pole-pieces, but also by way of the end plates from the helices.

The two oppositely-polarized pole-pieces interposed between the cores, as shown, enable the armatures, however constructed, to be located in close proximity to each other however they may be rotated, and therefore the electric connections for coupling them may be of a minimum length, and this construction, combination, and arrangement of the field-of-force

magnet and its pole-pieces constitute an important feature of my invention, regardless of the character of the armatures or the particular form of electric connections employed for the armatures, or the particular polarization of the pole-pieces, or the direction in which the armatures are rotated.

The armature core or axis, composed of iron or other good magnetic metal, affords the best results; but the armature as a whole may be variously constructed—as, for instance, the longitudinal conducting-bars *f* may be composed of copper or other non-magnetic metal, instead of soft iron or steel—but it is to be understood that the bars *f*, as shown in the drawings, are composed of magnetic metal, thus forming compound magnets, which serve as armatures. It will be seen that each axis *c*, with the end plates A and A′, and the adjacent helices and core of the field-of-force magnets, constitute in substance separate magnets of the horseshoe variety, with their poles practically connected by way of the end plates, and while this arrangement, broadly considered, is disclosed in one of my said prior applications for patent, it constitutes a novel and valuable feature in a machine having oppositely-polarized pole-pieces and a pair of co-operating armatures revolving in the same direction as now devised by me, whether said armatures be of the kind shown or otherwise constructed, because said armature-cores are not only polarized by induction from the pole-pieces, but also by way of the end plates from the helices of the electro-magnets, and it is obvious, if the axes *c* be stationary and the conducting-bars be rotatively mounted thereon, that said axes *c*, being polarized, as described, will enable approximately good results to be obtained. If the end plates be not divided, as shown and described, it is obvious that a central portion of the metal of each end plate would be merely neutral, and although that metal would serve no useful purpose in the magnets, I do not preclude myself from using solid end plates.

As in my prior machines, each conducting-bar *f* of each armature has a conducting-ring, *g*, whereby the current induced in and passing over one bar in one armature in one direction is passed to one of the bars in the other armature, over which it passes in the opposite direction, thus enabling the several conducting-bars in both armatures to be connected in a continuous series and form a linear circuit. I couple the coincident conducting-rings of the two armatures by means of outside conductors in the form of a conducting-roller, D, which is complex in construction in proportion to the number of conducting-bars and rings thus employed. If the armatures are solid, or have a series of conducting-bars connected so as to be in substance a solid armature, then one ring would only be needed on each, and the conducting-roller would be a simple disk resting with its periphery on both rings.

As shown in the drawings, each armature has twelve conducting-bars and twenty-four rings, *g*, and therefore one conducting-roller, D, is composed of twelve disks, *h*, insulated from each other, and the other roller, D′, has eleven of said disks. Each disk rests with its periphery upon two coincident rings *g*.

Referring to Figs. 1, 2, and 4, it will be seen that brushes E are in connection with the rings *g′*, which constitute the terminals of the circuit in the machine, and therefore said rings *g′* are not in contact with the conducting-roller.

For causing the conducting-roller to bear with uniformity upon the conducting-rings, its axis has bearings in the spring-arms *i*, which are bolted to the frame of the machine, it being understood that the disks in each roller are not only insulated from each other, but also from their axis.

The arrows in Fig. 2 indicate the direction of the currents in different portions of the machine when the latter is polarized and the armatures revolved, as stated.

The direction of rotation of the armatures and of the conducting-rollers is indicated by arrows in Figs. 3 and 4, and the arrows at the brushes indicate the direction of the electric currents at the terminals.

The machine described is obviously susceptible of ready division as to the service required therefrom—as, for instance, either pair of helices may be cut out from the feeding-circuit, and in that case one armature will be operative as such, while the other will serve only as a coupling medium for connecting the bars in said armature in linear circuit, thus illustrating the peculiar value of conducting-rollers for coupling one armature with another, as well as for coupling the opposite ends of one armature, it being obvious that when one armature serves as a coupling medium, as last described, said armature would be in substance a conducting-roller co-operating with the disk-rollers D D′, or with other forms of coupling devices for connecting the rings of the armatures. It will be seen that said conducting-rollers will be revolved smoothly, the rings on which they rest being revolved in the same time and in the same direction. This feature of employing complex conducting-rollers and conducting-rings for coupling the armature bars or conductors I deem of value not only in machines wherein the armatures revolve in the same direction, but also in such as have been heretofore devised by me wherein the armatures are revolved in opposite directions; but in that case additional rollers will be obviously requisite, two being then necessary in the place of each one employed in the present machine.

Considering one of my armatures as a conducting coupling-roller, as described, when but one armature is employed as such, it will be obvious therefrom that two conducting-rollers may be coupled together so as to operate together, and that the disks at one end of such a coupled roller may be electrically connected to the disks at the other end there-

of, thus providing for the coupling of the bars of two or more revolving armatures having bars in all of which the induced current passes in the same direction.

I am of course aware that roller contacts or conductors have long been used in lieu of brushes for taking off a current from a revolving element in a circuit; but I am not aware that such rollers have ever before been used as coupling media between two revolving elements in a circuit, and I have now for the first time, as I believe, developed their value for coupling two or more revolving armatures in linear circuit, or for coupling the several bars of one armature in linear circuit, as hereinbefore described.

Although the machine now shown by me has only roller-contacts, I will again state that certain features of my invention are independent of any particular form of outside conductors or mechanism for coupling the rings *g* of one armature with those of the other, and, without departure from said features of my invention, it is to be understood that I can employ various forms of coupling media—as, for instance, bow-shaped springs or forks inserted between the armatures after the manner of switch-plugs, in which case said springs could be connected in series with bars from which they should of course be properly insulated.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, substantially as hereinbefore described, of two oppositely-polarized pole-pieces and two oppositely-polarized compound magnets serving as armatures, connected in linear circuit, and each revolving within a pole-piece of a polarity opposite thereto.

2. The combination, substantially as hereinbefore described, of electro-magnets having oppositely-polarized tubular pole-pieces and magnetic armatures within said pole-pieces, revolving in the same direction and polarized oppositely to their respective pole-pieces by induction from said pole-pieces, and also by the helices of said magnets through the cores of said armatures.

3. The combination, substantially as hereinbefore described, of a pair of cores, end plates connected thereto, helices on said cores, tubular pole-pieces of opposite polarity interposed between said cores, and armatures within said pole-pieces, revolving in the same direction, whereby said armatures are located in close proximity to each other, thereby enabling them to be electrically connected in linear circuit by means of outside conductors of minimum length.

4. The combination, substantially as hereinbefore described, of revolving armatures, a conducting-ring on each armature, and a conducting-roller resting upon said conducting-rings and moving in harmony with them, for electrically coupling said armatures in linear circuit.

5. The combination, substantially as hereinbefore described, of a pair of revolving armatures embodying a series of conductors or bars, a series of conducting-rings for said bars, and complex conducting-rollers composed of insulated disks which rest peripherally against and rotate with said conducting-rings and electrically connect the bars of both armatures in linear circuit.

6. The combination, with the revolving armatures and their conducting-rings, of a conducting-roller mounted in spring-bearings, and thereby forced into peripheral contact with the rings of both armatures, substantially as described.

RUDOLF EICKEMEYER.

Witnesses:
HENRY OSTERHELD,
GEORGE NARR.