2 Sheets—Sheet 1

T. A. EDISON.

Dynamo-Electric Machine.

No. 219,393. Patented Sept. 9, 1879.

Fig. 3.

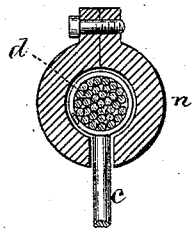
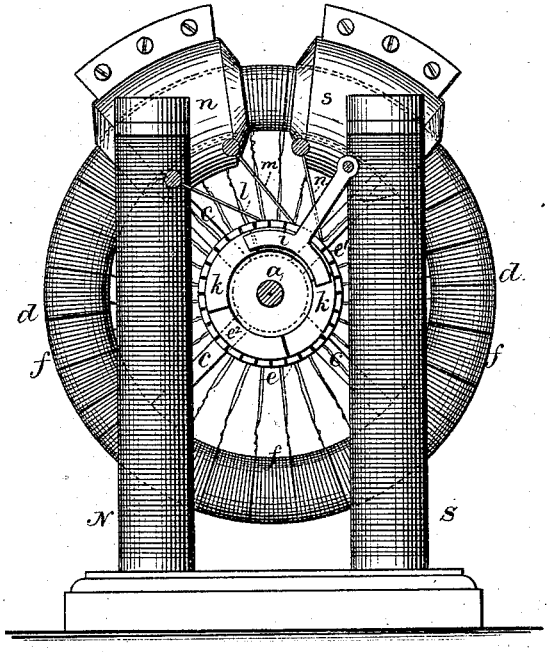
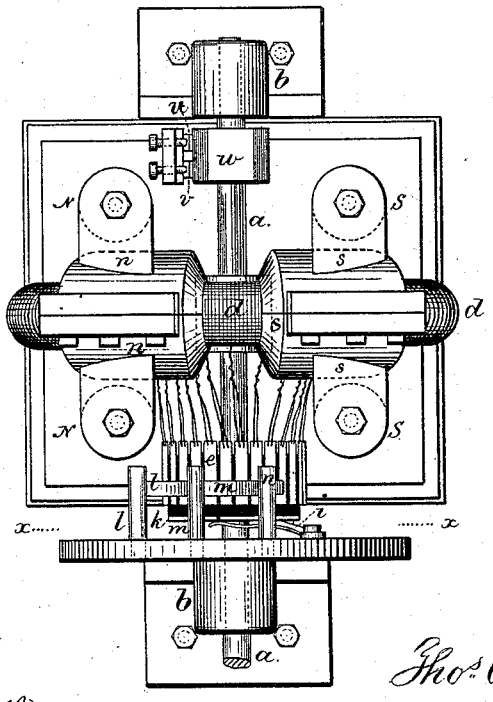


Fig. 2.



Case No. 180.

Fig. 1.



Witnesses

Chas. H. Smith

Harold Serrell

Inventor

Thos. A. Edison

per Lemuel W. Serrell atty

2 Sheets—Sheet 2.

T. A. EDISON.

Dynamo-Electric Machine.

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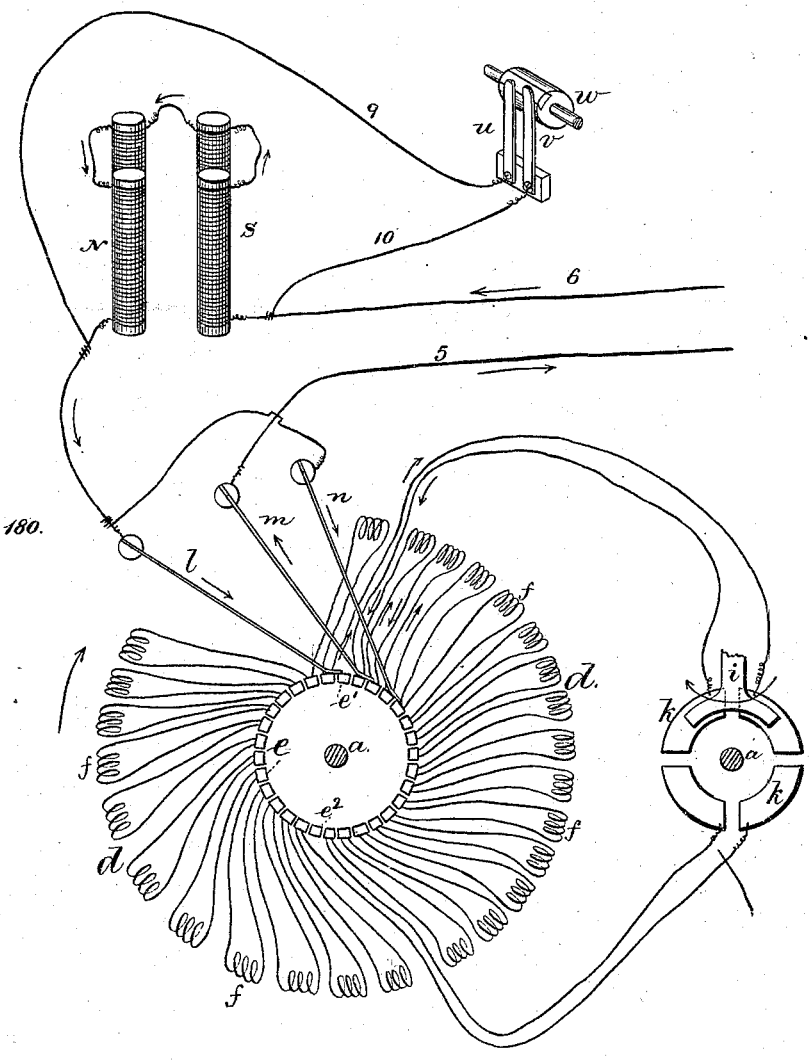
Fig. 4.



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Witnesses

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atty.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY.

IMPROVEMENT IN DYNAMO-ELECTRIC MACHINES.

Specification forming part of Letters Patent No. **219,393**, dated September 9, 1879; application filed July 10, 1879.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the State of New Jersey, have invented an Improvement in Dynamo-Electric Machines, of which the following is a specification.

I make use of a ring supported by arms and revolved between the cores of a field-of-force magnet. There are helices around this ring connected to commutator-plates, and the current is taken off by three springs, two of which are connected together and receive the current of one polarity, and the other spring receives the current of the opposite polarity. The helices of the ring, as they are revolved through the magnetic field of the field-of-force magnets, have the secondary current set up in them, and the same is taken off by the commutators aforesaid.

To insure the entire current passing off by the commutators, and to prevent the secondary current circulating in the helices of the revolving ring, the continuity of the helics or helical sections is interrupted at two or more places; and to avoid the interruption of the line-current, I use a stationary bridge and revolving contact-blocks to close the circuit at the interruption of the helix-wire, when the same is in the line-circuit, through the commutators.

I have discovered that an increased magnetic effect is produced in the field-of-force magnets by periodically shunting the current, as will be more fully described hereinafter.

In the drawings, Figure 1 is a plan of the machine. Fig. 2 is an elevation with the frame removed at the line *x x*. Fig. 3 is a section through the ring and the core-extension of the field-of-force magnet, and Fig. 4 is a diagram of the connections.

The shaft *a* is supported in suitable bearings *b* and revolved by power. Upon this shaft are arms *c*, that sustain the ring *d*. This ring may be of one piece of iron; but I prefer to use fine wire wound into a coil or ring, and having a circular form sectionally, as seen in Fig. 3.

Around the ring *d* there are helices wound in numerous sections, *f*, and the wires are taken off to commutator-plates *e*, as illustrated in the diagram, Fig. 4. One end of one helix-wire is joined to the same commutator-plate *e* as one end of the next helix-wire, except at two or more places around the ring, where there is a break in the metallic connections of the helices. I have shown two such breaks at the blank commutator-bars e^1 e^2, where the wires, instead of passing from the helical sections to such plates e^1 e^2, pass to the secondary commutator-blocks *k*, composed of four insulated blocks, and *i* is a stationary bridge of metal, against which the blocks *k* revolve. These blocks *k* are upon a cylinder of insulated material on the shaft *a*, and revolve with it. The operation will be hereinafter explained.

The field-of-force magnets N S are wound with helices, and there are lateral projecting cores *n s*, with openings through them, in which the ring *d* is revolved, said lateral cores being close to the helices of the rings, but not touching the same, as seen in Fig. 3, so that the helices pass across the magnetic field somewhat the same as in the Paccinoti or Gramme machines.

The commutator-springs *l m n* bear upon the commutator-plates, and the circulation of the electric current will be from the springs *l* and *n*, through the helices that are in the field of magnetic influence, and thence by the spring *m*, or the reverse, according to the polarity of the field-magnets and the direction of revolution, the same polarity of secondary current being set up in the helix-section that is approaching N, that is set in another helix that is moving away from S; hence the springs *l* and *n* are connected to one line-wire, and the opposite polarity of current is set up through *m*, as indicated by the arrows, Fig. 4, said spring *m* connecting to the neutral point between the poles of the field-magnets.

From the foregoing it will be understood that a continuous current is set up in *l m n* from those helix-sections that are passing through the magnetic field. The commutator-springs, however, have to bear upon two of the commutator-plates at the same time to avoid interruption in the current or a spark.

The current passes from *m* out upon the line-wire 5, and returns upon the line-wire 6 to *l n*, or the reverse, and the helices of the field-of-force magnets N S are in this circuit, as shown in Fig. 4.

The secondary commutator-blocks *k*, being insulated, form two breaks in the helix-sec-

tions; but the stationary bridge *i* is in such a position that the circuit is maintained in the helices that are in the magnetic field, such bridge answering the same purpose as it would to connect the helix-wires continuously to the commutator-plates e^1 e^2. The metallic circuit, however, is broken on the opposite side at the commutator e^2, so that currents cannot circulate through the ring of helices.

As the connections are illustrated, it will be seen that the current is always free to circulate through the helices of the field-of-force magnets, and under ordinary circumstances the electric effect will be augmented until the maximum effect is attained. I have discovered that by combining with the field-of-force magnet and the circuit through the same a shunt open and closed periodically, the dynamic effect is greatly increased.

9 and 10 are shunt-wires from the line-circuit at each side of the helices of the field-magnets, and *u v* are springs bearing upon a cylinder, *w*, that is upon the shaft *a*, and is revolved with it. Part of the surface of *w* is of conducting and part of insulating material. When the springs *u v* rest upon the conductor the current is shunted or short-circuited, and, finding a route of less resistance, does not pass through the helices of the field-of-force magnets, and acquires thereby increased volume, as the resistance is less; but so soon as the non-conducting material comes into contact with *u* and *v*, the shunt is broken, and the increased current, having no other route, is obliged to pass through the helices of the field-magnets, and augments the magnetism and increases the current, so that the energy of the machine is promoted by shunting the field-of-force magnets; and this I do every revolution of the shaft *a*, but it may be done more or less frequently.

By the arrangement shown the helices of the ring are not liable to become heated, because the current passes through but a small portion of the ring, and the other parts of the ring are open to atmospheric influence and free to cool.

I claim as my invention—

1. In a magneto-electric machine, a ring of helical sections connected to commutator-plates, and the metallic circuit, interrupted at two or more places, in combination with the field-of-force magnet, the springs *l n*, connected together and to one wire of the circuit, and the intermediate spring, *m*, to the other wire of the circuit, substantially as set forth.

2. The combination, in a magneto-electric machine, of a field-of-force magnet, revolving helix-sections, commutator-plates, to which the helix-sections are connected, the springs *l m n*, the secondary commutator-blocks *k*, and a metallic bridge, *i*, to the same, for maintaining metallic connection in the helices that are within the field-magnets, substantially as set forth.

3. In a dynamo-electric machine, a shunt around the helices of the field-of-force magnets, and means for opening and closing that shunt periodically, for the purposes and substantially as set forth.

Signed by me this 7th day of July, A. D. 1879.

THOS. A. EDISON.

Witnesses:

S. L. GRIFFIN,

FRANCIS R. UPTON.