2 Sheets—Sheet 1.

T. A. EDISON.

MAGNETO ELECTRIC MACHINE.

No. 264,643. Patented Sept. 19, 1882.

Fig. 2.

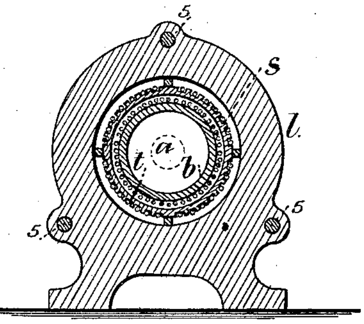


Fig. 4.

Fig. 6.

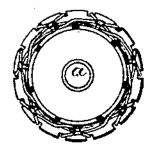


Fig. 1.

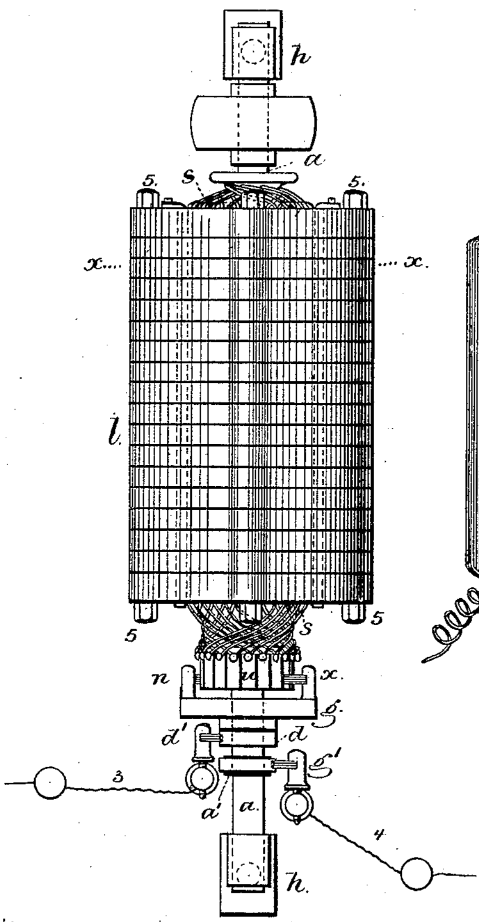


Fig. 3.

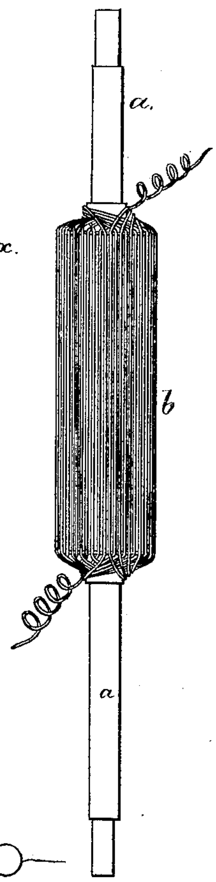
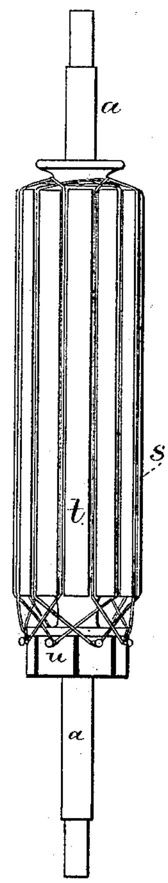


Fig. 5.



Witnesses
Harold Serrell
Geo. T. Pinckney

Inventor
Thomas A. Edison
per Lemuel W. Serrell
atty

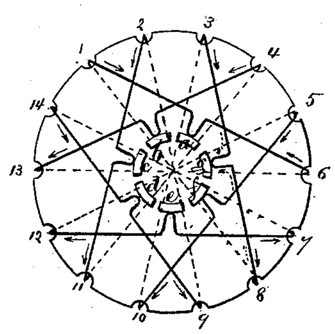
N. PETERS, Photo-Lithographer, Washington, D. C.

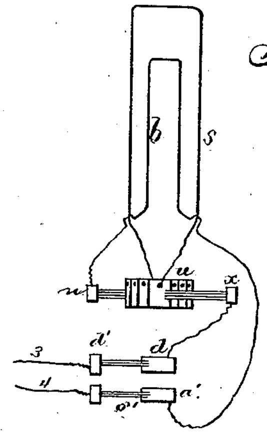
T. A. EDISON.

MAGNETO ELECTRIC MACHINE.

No. 264,643. Patented Sept. 19, 1882.

Fig. 7





Witnesses/
Harold Serrell
Geo T. Pinckney

Inventor
Thomas A Edison
per Lemuel W. Serrell
atty.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY, ASSIGNOR TO THE EDISON ELECTRIC LIGHT COMPANY, OF NEW YORK, N. Y.

MAGNETO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 264,643, dated September 19, 1882.

Application filed May 12, 1879. Patented in Belgium June 16, 1879, No. 48,341; in England June 17, 1879, No, 2,402; in Italy June 23, 1879; in Victoria August 16, 1879, No. 2,685; in France August 25, 1879, No. 130,910; in Sweden September 24, 1879; in Spain October 4 1879; in Norway January 20, 1880; in Austria-Hungary January 22, 1880; in Denmark June 11, 1880, and in Germany February 7, 1881, No. 12,033.

To all whom it may concern:

Be it known that I, THOMAS ALVA EDISON, of Menlo Park, in the State of New Jersey, have invented an Improvement in Magneto-Electric Machines, (Case No. 177,) of which the following is a specification.

In this machine I employ a cylinder the surface of which is covered with a coil of wire wound around it lengthwise and parallel to the axis of rotation. The electric current, passing through the coil, converts the cylinder into a magnet. One side of the cylinder is of north polarity and the opposite side is of south polarity. A shell of iron is employed, within which this magnetic cylinder is revolved, and by induction the shell becomes magnetized. Hence the magnetic forces in the shell revolve around the same in harmony with the revolving magnetic cylinder.

There is a space between the revolving magnetic cylinder and the inside of the shell, within which space there are longitudinal wires connected in a peculiar manner to the commutator, and in the wires an induced current is set up in consequence of the revolving magnetic forces crossing and cutting these wires as the magnetic cylinder revolves within the shell, and from the commutator the current is taken to the line-wires.

In the drawings, Figure 1 is a plan of the magneto-electric machine complete. Fig. 2 is a cross-section of the same at the line *x x*. Fig. 3 is a plan of the revolving field-magnet. Fig. 4 is an end view of the same. Fig. 5 is a plan of the shell surrounding the field-magnet and the induction-coil. Fig. 6 is an end view of the same. Fig. 7 is a diagram showing the manner of winding the induction-coil, and Fig. 8 is a diagram of the circuit-connections.

The shaft *a* is provided with a cylinder, *b*, of iron. It may be either solid or hollow and made of cast-iron or coiled iron wire. The same is wound with a parallel coil of insulated wire, the wire passing from the shaft radially, then along one side of the cylinder, across the other end, back again on the other side and across the end, and so on until the entire surface of the cylinder is covered with wires that are parallel, or nearly so, to the axis of the cylinder. One end of this insulated wire passes along the shaft in a groove to the insulated ring *a'* and the other is connected to the commutator spring or brush *n*, that is insulated upon a disk, *g*, affixed to and rotating with the shaft *a*. The other commutator-spring, *x*, is connected to the ring *d* upon the shaft *a*. The spring *d'* rests against the ring *d*, and to it the line-wire 3 is connected, and the spring *g'* rests against the ring *a'*, and to it the ground or return wire 4 is connected, or vice versa.

It is to be understood that this magneto-electric machine may be employed in a circuit containing electric lights, or any other instrument or device operated by electricity to which the current generated may be adapted.

The shaft *a* is mounted in bearings or a frame, *h*, and revolved by competent power. the shell *l* is made of coiled iron wire or of iron rings secured together by bolts 5; and between the rings there are sheets of paper or other insulating material to separate the rings and prevent the magnetic currents circulating in the direction of the axis of rotation; but the rings are each magnetized by induction from the magnetic cylinder *b*, and the lines of magnetic force radiate from the cylinder to the rings, and as the cylinder *b* revolves within the shell, these lines of magnetic force are moving around rapidly with the magnetic cylinder.

In magneto-electric machines the most potential currents are set up in wires that are moved across the lines of magnetic force. I therefore place longitudinal wires in the space between the revolving magnetic cylinder and the shell, so that such wires are crossed by the lines of magnetic force as the same revolve.

The induction-coil is composed of the parallel wires *s* upon the surface of the thin cylinder *t*. Such wires cross the end of the cylinder *t* at the opposite end to where the commutator-bars *u* are placed, and at the commutator such wires are united to the circular range of bars *u*, that are insulated, and upon which the springs *n* and *x* rest.

The wire of the parallel induction-helix is substantially endless, and it is wound with reference to obtaining a continuous current. The diagram, Fig. 7, illustrates the manner of winding the wires. The number of parallel coils may be more or less than that shown; but I find the object desired can be attained the best by using an even number of parallel coils longitudinally of the case and an odd number of commutator-plates. The current set up in coils within the magnetic field of the north pole will be all in one direction, and the currents set up in the coils within the field of the south pole will be all in the other direction. I wind the wires in such a manner that, while the wire is continuous and the current flowing through the whole of it, the current will pass by two wires of the induction-coil to one commutator-plate and then away, and will enter by an opposite commutator-plate and pass by two wires out into the coil and circulate through the same to the other commutator-plate. Suppose the springs to rest upon commutator-plates *a* and *e*. The current will flow toward *a* from wires 1 and 6 and away from *e* by wires 12 and 7. By following the arrows it will be found that the entire coil is a complete circuit, in which the parallel portions of the wires in the south field of magnetic influence have a current energized in one direction and in the north field in the other direction, thus obtaining the dynamic effect, and there is no break or pulsation of the current. The springs touch one commutator before leaving another.

Of course the current is reversed in the parallel portions of the wires successively. For instance, the current in 7 and 14 is reversed as the magnets and brushes travel around together. As the spring passes from *e* to *d* the current in 14 is reversed and passes out from *d* by 14 and to 7 in the reverse direction and to 12, as before. As the spring passes from *a* to *g* the current in 8 and 7 is reversed. It passes from 6, as before, and, crossing, is reversed in 1, and, returning in 8 in opposite direction, is taken off by *g*. The dotted arrows indicate these successive changes of direction, whereby the currents are made to flow by two wires to each commutator in succession from the entire magnetic field. The current will flow from spring *g'* through *a'*, thence through the parallel coils of wires around the cylinder *b* to the commutator *n*, thence by the bar upon which it rests along the parallel induction-coil at one side of the cylinder *t*, returning along the other side to the commutator-bar and by the spring *x* to the ring *d* and spring *d'* to the line.

It is to be borne in mind that the parallel induction-coil *s*, cylinder *b*, and commutator-bars *u* remain stationary and the commutator-springs *n x* revolve around the bars *u*, being turned by the shaft *a*, and the commutator-springs are to be located with reference to the revolving magnetic cylinder, so as to take off the current at the place of greatest energy. The current will be continuous, or nearly so, and travel in one direction. There will, however, sometimes be a spark between the commutator-bars when the circuit of the parallel induction-coil is interrupted; but this will be lessened by having the commutator-springs bent to rest on more than one commutator-bar.

It will be apparent that the shell and parallel induction-coil may be revolved if the magnetic cylinder remains stationary or revolves in the opposite direction; and I remark that the cylinder supporting the parallel induction-coil *s* may be of any suitable material; but I prefer and use vulcanized fiber.

The parts of this machine are not liable to become heated under ordinary circumstances of use, because the wires are not wound one on the other, and the atmosphere has an opportunity to circulate. I however apply a fan in some instances upon the shaft *a* within a case communicating with the internal portions of the machine, so as to induce a current of air through the same.

I claim as my invention—

1. The cylinder *b*, serving as a field-magnet and wound with a continuous wire for producing magnetic poles on opposite sides of the cylinder, substantially as set forth.

2. The combination of a cylinder wound with a continuous wire and serving as a field magnet, an inductive coil concentric thereto, consisting of a single layer of wire and an inclosing magnetic case, substantially as set forth.

Signed by me this 21st day of April, A. D. 1879.

THOMAS A. EDISON.

Witnesses:

STOCKTON L. GRIFFIN,
WM. CARMAN.