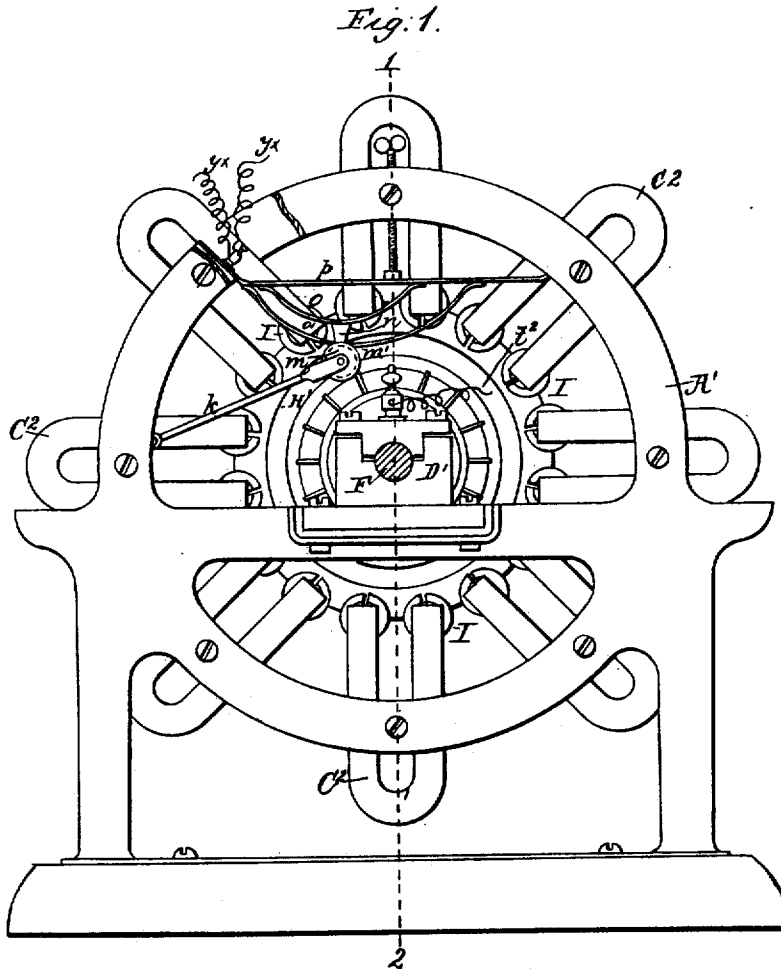
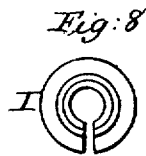
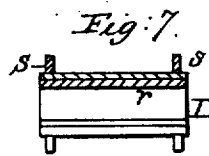


A. P. BERLIOZ.

Electro-Magnetic Machine.

No. 58,960.

Patented Oct. 16, 1866.



Witnesses.
Wm. H. H. H. H.
John Parker.

Inventor
A. P. Berlioz

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Fig. 2

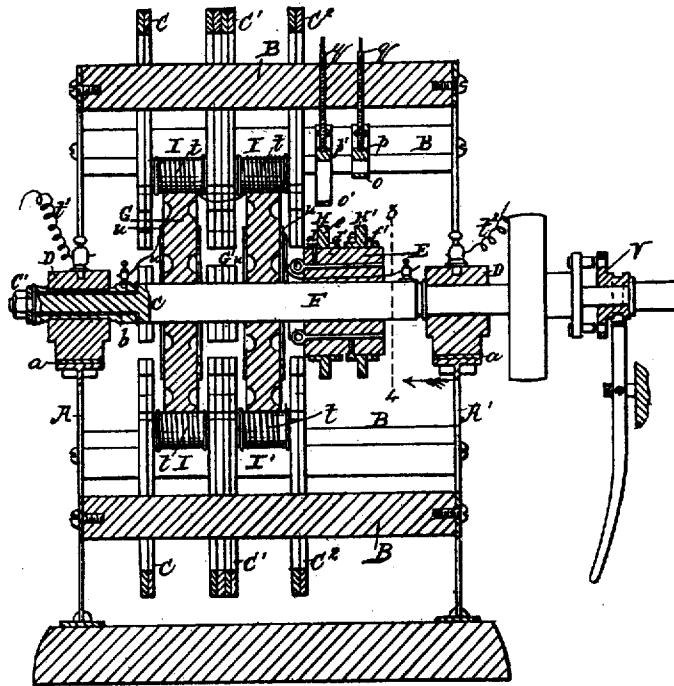


Fig. 5

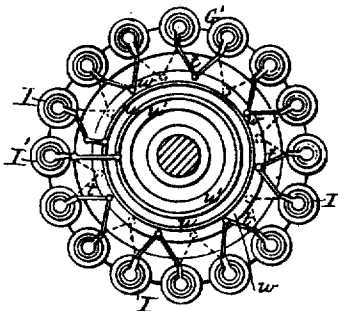


Fig. 6

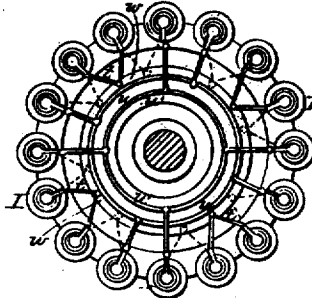


Fig. 3

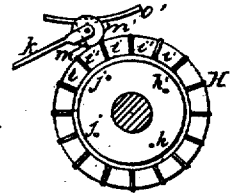
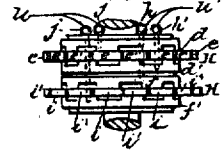


Fig. 4



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UNITED STATES PATENT OFFICE.

AUGUSTE P. BERLIOZ, OF PARIS, FRANCE.

IMPROVEMENT IN ELECTRO-MAGNETIC ENGINES.

Specification forming part of Letters Patent No. 58,960, dated October 16, 1866.

To all whom it may concern:-

Be it known that I, A. P. BERLIOZ, of Paris, France, have invented certain Improvements in Magneto-Electric Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention consists in certain improvements in magneto-electric machines, fully described hereinafter, whereby currents of electricity may be more readily produced and collected than in machines of the ordinary construction.

In order to enable others skilled in the art to make and use my invention, I will now proceed to describe its construction and operation.

On reference to the accompanying drawings, which form a part of this specification, Figure 1 is a side elevation of my improved magneto-electric machine; Fig. 2, a sectional elevation on the line 1 2, Fig. 1; Fig. 3, a section on the line 3 4, Fig. 2, looking in the direction of the arrow; Fig. 4, a plan view of Fig. 3; Figs. 5 and 6, detached views of parts of the machine; Fig. 7, a sectional view of one of the bobbins, drawn to an enlarged scale; and Fig. 8, an end view of the bobbin.

Similar letters refer to similar part throughout the several views.

A and A' are the side frames of the machine, which are connected together by cross-pieces B B. To each cross-piece are secured three permanent horseshoe-magnets, C, C', and C'', which are arranged as shown in Figs. 1 and 2, each magnet consisting of a series of plates, the number of plates in the central magnet, C', being twice that in the magnets C C'', for a purpose described hereinafter.

To the frames A A' are secured boxes D D', each of which is insulated from the frame by a strip, a, of rubber or other suitable material, and in the said boxes turn the journals of a shaft, F, to which are secured two disks, G G', the edges of the latter projecting into the spaces between the inner ends of the magnets, as best shown in Fig. 2.

The end of the shaft F which turns in the box D is reduced in diameter to receive a sleeve, b, between which and the shaft is an insulating-sleeve, c, of rubber, ivory, or other suitable material. The sleeve b is maintained

in its position, so as to turn with the shaft, by a nut, which screws onto the end of the latter, and between the sleeve and the nut is a rubber washer.

On the shaft, near the box D', is an insulated cylinder, on which are two rings, H H', the former consisting of sixteen separate metal sections, e e', and the latter of sixteen similar sections, i i', the sections in each ring being separated from each other by strips of ivory.

On the cylinder E are also metal bands d d' f f', the sections e being connected to the band d, the sections e' to the band d', the sections i to the band f, and the sections i' to the band f'.

Through the cylinder E extend four wires, h h' j j', which are respectively connected with the bands f d' d f'.

To one of the cross-pieces B is hinged an arm, k, at one end of which turns a grooved roller, m, the latter resting on the ring H', and against the upper side of this roller bears a projection, n, on a bow-spring, o, secured to a flexible bar, p, the latter being attached to opposite cross-pieces, B B.

To a similar bar, p', is secured a bow-spring, o', a projection, m', on which bears on the ring H, and against the upper side of each bar p p' bears the lower end of a set-screw, q, which turns in the upper cross-piece B.

At the sides of the disks G G' are insulated metal rings u u', and in the periphery of each disk are sixteen semicircular recesses, in each of which is secured a bobbin, I. Each bobbin I consists of a tube or core, r, composed of two thicknesses of metal, and having near each end a flange, s, and round the tube, between the two flanges, is coiled a silk-covered wire or ribbon, t, the tube and flanges being both split at x to prevent the production of induced currents in the tube.

The wires on the different bobbins are connected to each other by means of insulated metal pins w, driven into the sides of the disks, the ends of the wires on each two adjacent bobbins being attached to the pin between, so that the different wires t form practically a single wire, which passes round all the bobbins. The end of the wire of the first bobbin, I, on the disk G' is connected to the ring u, and the opposite end of the wire from the last bobbin (marked I', Fig. 5) is connected to the ring u' or to one of the bobbins on the adjacent disk G, the bobbins on the latter being arranged

and the wires on the same being connected in the same manner as those on the disk G' , the wire from the last bobbin on the disk G being connected to the ring u on said disk.

The ring u on the disk G' is connected by a conducting-wire with the shaft F , and the ring u on the disk G is connected by a wire with the sleeve b , and to the boxes $D D'$ are secured the ends of conducting-wires $t' t''$. When a rotary motion is imparted to the shaft F the bobbins will be carried between the magnets, and their iron cores will be alternately magnetized and demagnetized, and electric currents, first in one direction and then in another, will be induced in the wire t , in a manner too well known to those skilled in this class of apparatus to need particular description. As one end of the wire t is connected to the shaft F and the other to the sleeve b , the currents from one end of the wire will pass to the sleeve and through the box D to the wire t' , while the currents from the other end of the wire will pass to the shaft and through the box D' to the wire t'' , the positive and negative currents passing alternately to each wire.

When there is a continuous communication of the bobbins with each other, as described, the current produced will be one of intensity. When, however, currents of less intensity and greater quantity are required the bobbins are connected in the following manner:

The bobbins on each disk are divided into series of four bobbins each, Fig. 6, and one end of the wire from the first bobbin of each series is connected to the ring u and the other end from the last bobbin of the series to the ring u' . The rings u of the two disks are then connected by a wire with each other and with the shaft F and the rings u' with each other and with the sleeve b , the currents which are collected on the wires $t' t''$ on the revolution of the disks being greater in quantity, but of less intensity, than those produced when the bobbins are arranged as first described.

As before mentioned, the current which passes to each of the wires $t' t''$ is first positive and then negative. When, however, it is desired to collect all the positive currents on one wire and all the negative currents on the other the following arrangement is made:

The wires $j j'$ are connected with one or both of the rings u and the wires $h h'$ with one or both of the rings u' . As the shaft revolves one of the sections i' will be brought into contact with the roller m and one of the sections e' into contact with the projection m' . If a positive current is now collected on the ring u , it will pass through the wires $j j'$ and rings d and f' to the sections e and i' , to the roller m , in contact with one of the sections i' , while the negative current will pass from the ring u' , through the wires h and h' , rings d' and f , sections e' and i , to the projection m' , in contact with one of the sections e' , the current being conducted from the roller m and projection m' , through the springs $o o'$ and bars $p p'$, to conducting-wires $y y'$, secured to the bars $p p'$, Fig.

1, the positive current passing to the wire y and the negative to the wire y' . As the shaft further revolves the magnetism in the bobbins will be changed and the positive currents will collect on the ring u' and the negative on the ring u . The positive currents will now pass, through the wires $h h'$, bands f and d' , to the sections e' and i , while the negative will pass, through the wires $j j'$, bands d and f' , to the sections e and i' . A section i will now be in contact with the roller m and a section e in contact with the projection m' , and as the section i which was formerly negative is now positive and the section e which was formerly positive is now negative, the positive current will pass to the wire y , as before, and the negative to the wire y' ; and as similar changes will be effected at every sixteenth of a revolution of the disks a constant succession of positive currents will be passed to the wire y and a like succession of negative currents to the wire y' .

It has heretofore been considered necessary that the currents should be rectified so as to be in the same direction as above described, in order that they might be used for the production of an electric light. I have discovered, however, that uncorrected currents may be more advantageously used, the currents passing first from one carbon electrode to the other and then back, so that the electrodes are consumed with equal rapidity.

It has heretofore been customary to conduct the currents generated in the bobbins to insulated rings on the shaft, and to collect them from the said rings by means of springs bearing on the same and communicating with the conducting-wires. This mode of collecting the currents is objectionable, as the surfaces of the rings or springs being exposed are apt to become oxidized or coated with grease or other material which weakens or totally prevents the passage of the current.

By insulating the boxes $D D'$ and the opposite ends of the shaft which turn therein and conducting the currents to the two separated portions of the shaft, as above described, the uninterrupted passage of the current is insured, the bearing-surfaces of the journals of the shaft in the boxes $D D'$ being so great that an oxidation of a portion of the journal will not interfere with the free passage of the current.

When magneto-electric machines are used in light-houses and for other purposes it is frequently necessary to employ two or more machines, either for use separately while one is being repaired or together when the state of the weather is such as to require a light of more than usual brilliancy. If, where two machines are used with one lamp, they are connected by merely joining their exterior conducting-wires, it is almost impossible to produce like currents simultaneously in both machines. The two currents therefore are apt to weaken or destroy each other. To correct this I so arrange the different machines that their shafts F shall be in a line with each other, as shown in Fig. 2, and connect the two axes when the machines

have to operate together by means of a clutch, *v*, or other suitable connecting device, care being taken that the axles shall always occupy the same relative positions. When thus connected the two axles turn together and the two or more machines act as though they were one, so that there is no possibility of two currents of different characters being simultaneously generated and directed to one wire.

The machines may be readily disconnected when one only has to be used by drawing back the clutch *v*.

It will be apparent that any number of machines may be coupled in this manner, and that any number of disks, bobbins, and magnets may be used in one machine, the magnets at each end of the machine being only half the thickness of the others, as they only act from one side.

I have found that by the use of a wheel, *m*, bearing on the edge of the commutating-ring *H'*, between the latter and the projection *n'* on the spring, the currents may be more perfectly connected than when the ordinary rubbing-spring is used. When, however, the use of a wheel would not be admissible, a spring, *o'*, connected to a flexible bar and having a projection, *m'*, which bears on the ring, may be used with advantage.

In place of a sleeve, *b*, the shaft *F* may be divided in the center or at any other point into two portions, connected firmly together, but so as to be electrically separate from each other.

Without confining myself to the precise construction and arrangement of the parts herein described, I claim as my invention and desire to secure by Letters Patent—

1. The shaft *F*, divided into two insulated parts, turning in insulated boxes *D D'*, and connected to the bobbin wire or wires *t*, all substantially as and for the purpose described.

2. The combination of the above and the disks *G*, their bobbins *I*, and the rings *u u'*, when the wires on said bobbins are connected to the shaft, to each other, and to the said rings, substantially as shown in Figs. 2 and 5, for the purpose specified.

3. The spring *c*, its projection *n*, and the roller *m*, in combination with a ring, *H*.

4. The spring *o'*, its projection *m'*, in combination with a ring, *H'*.

5. The combination of two or more machines, constructed as described, when the said machines are so arranged that when their axles are coupled by the within-described devices, or their equivalents, like currents will be simultaneously generated in all the machines.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

AUG. PROSPER BERLIOZ.

Witnesses:

G. RICHARD,
C. TURK.