2 Sheets--Sheet 1.

L. DRESCHER.

Magneto-Electric Machine.

No. 168,560. Patented Oct. 11, 1875.

Fig: 1.

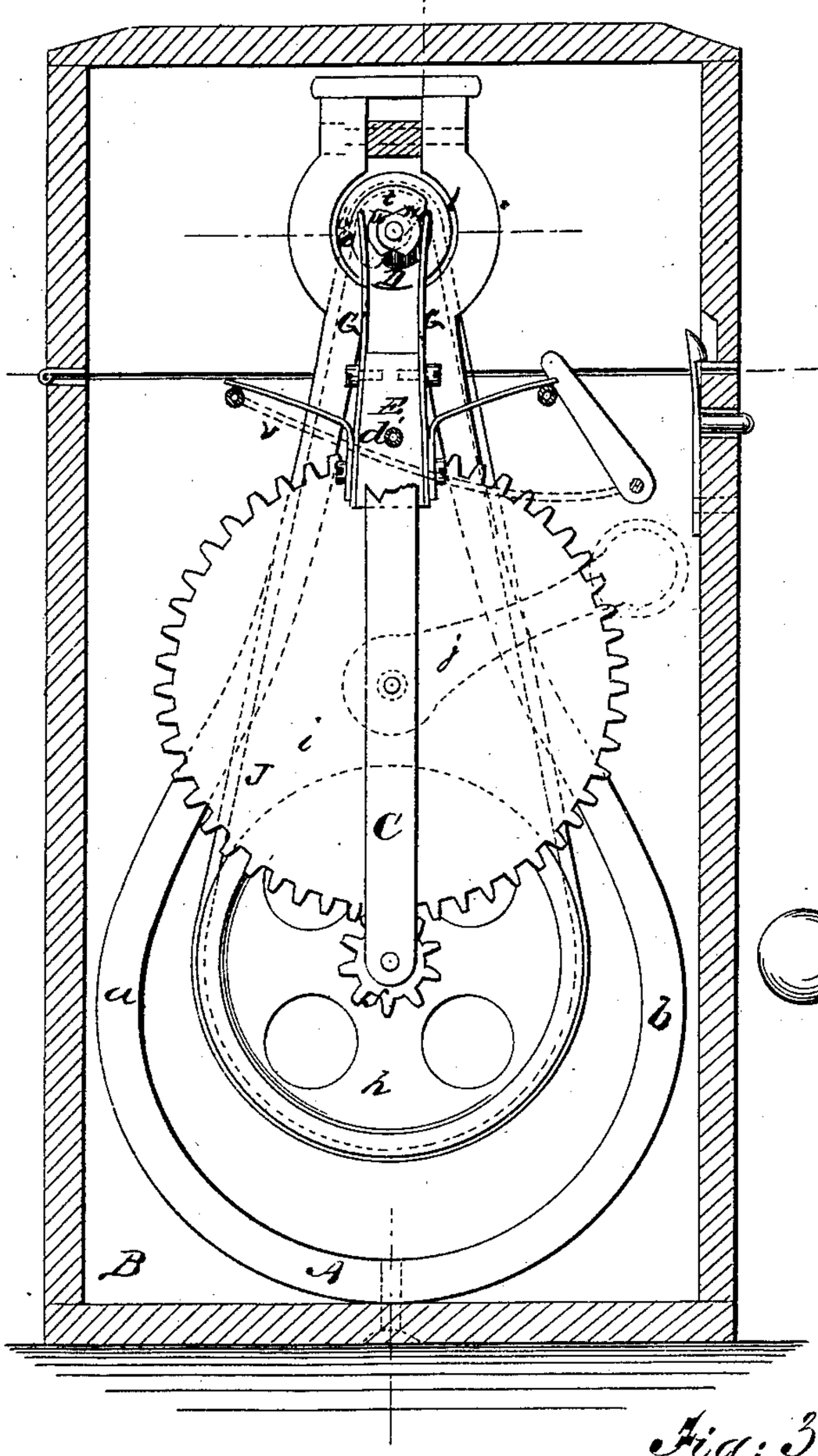


Fig: 2.

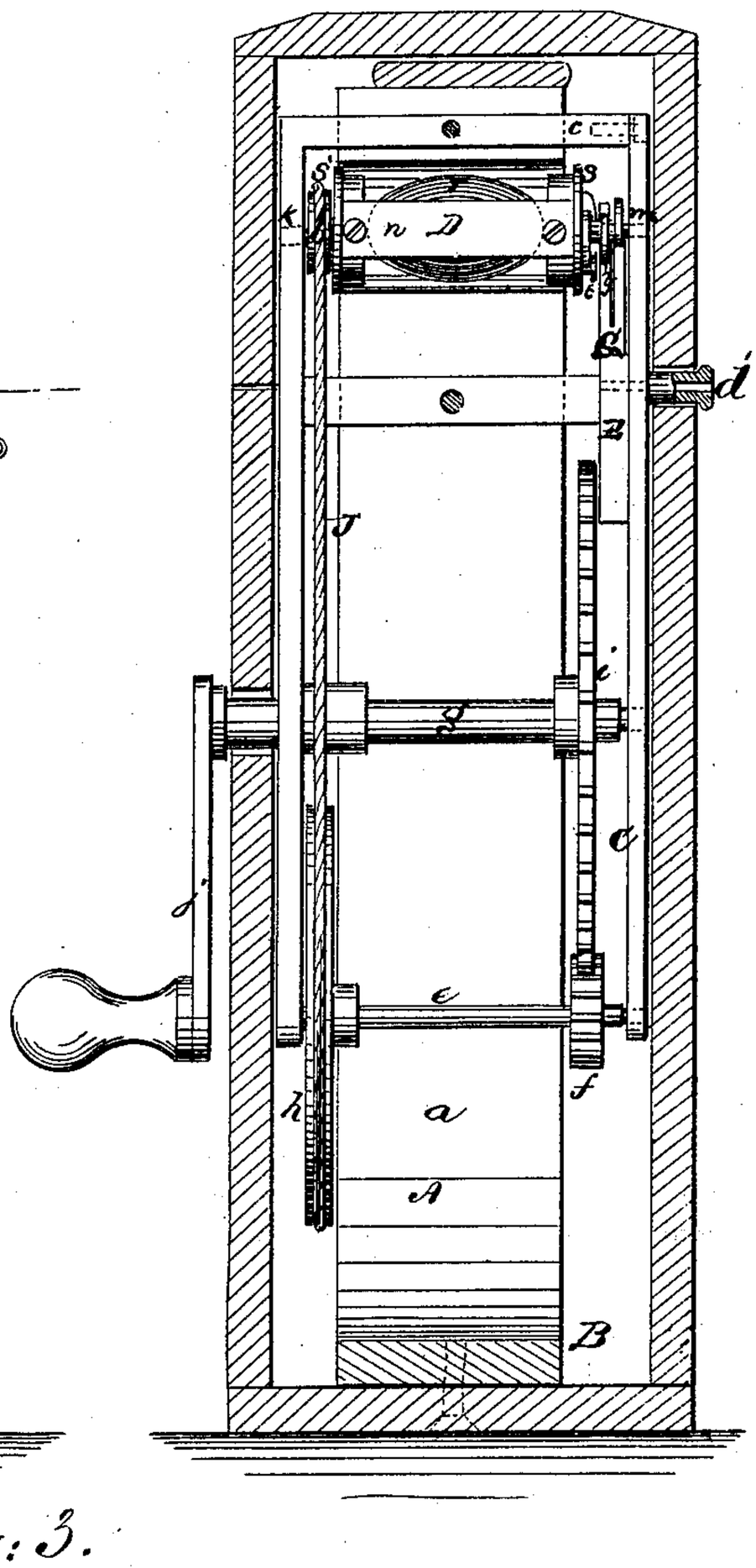
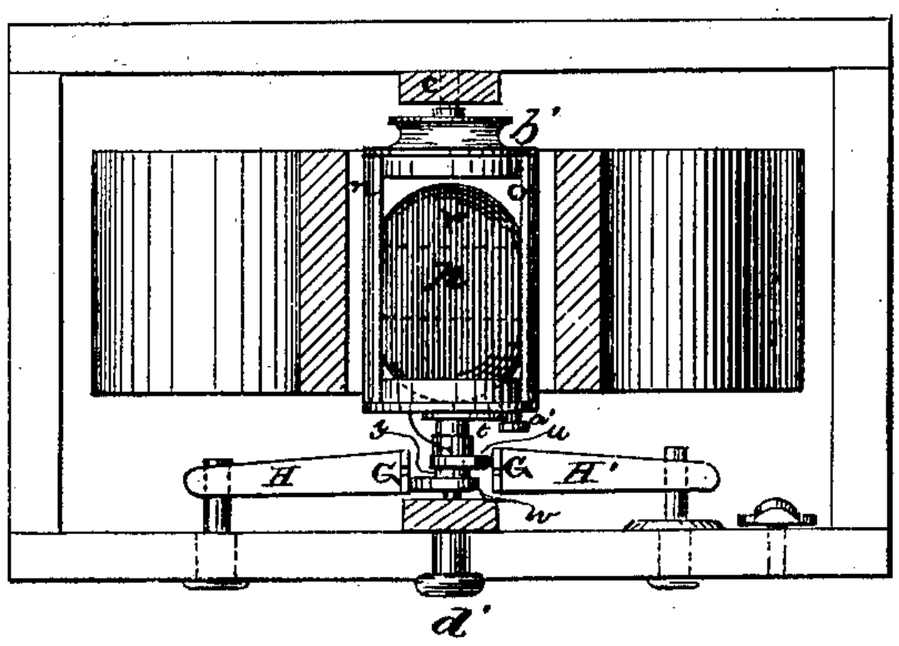


Fig: 3.



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2 Sheets--Sheet 2.

L. DRESCHER.

Magneto-Electric Machine.

No. 168,560. Patented Oct. 11, 1875.

Fig. 4

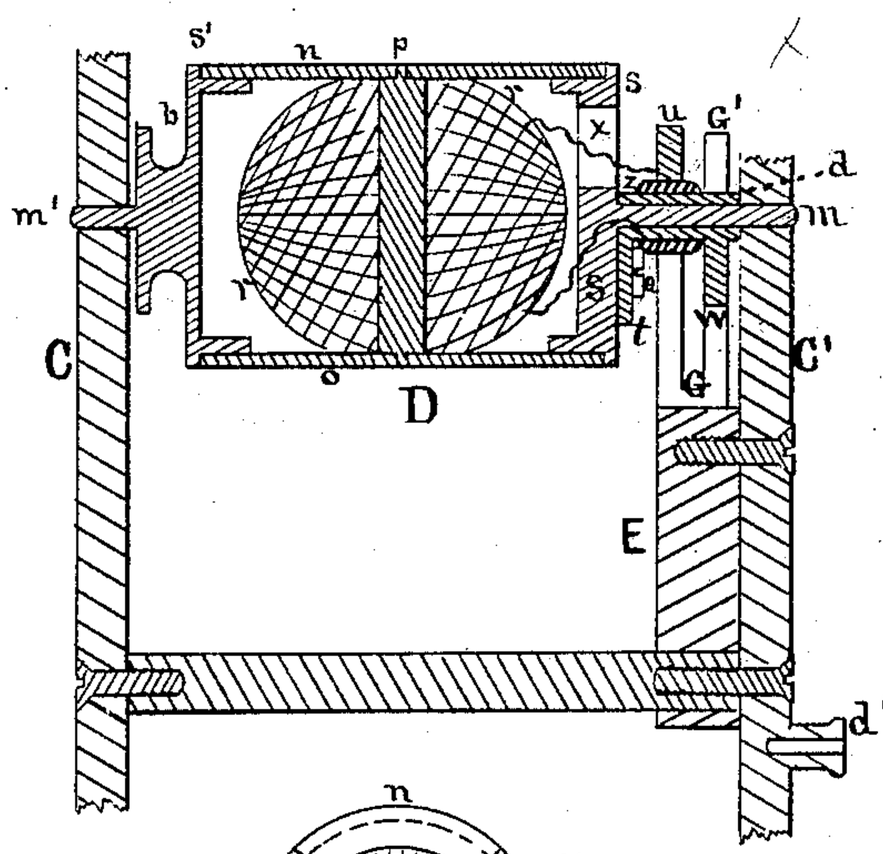


Fig. 5

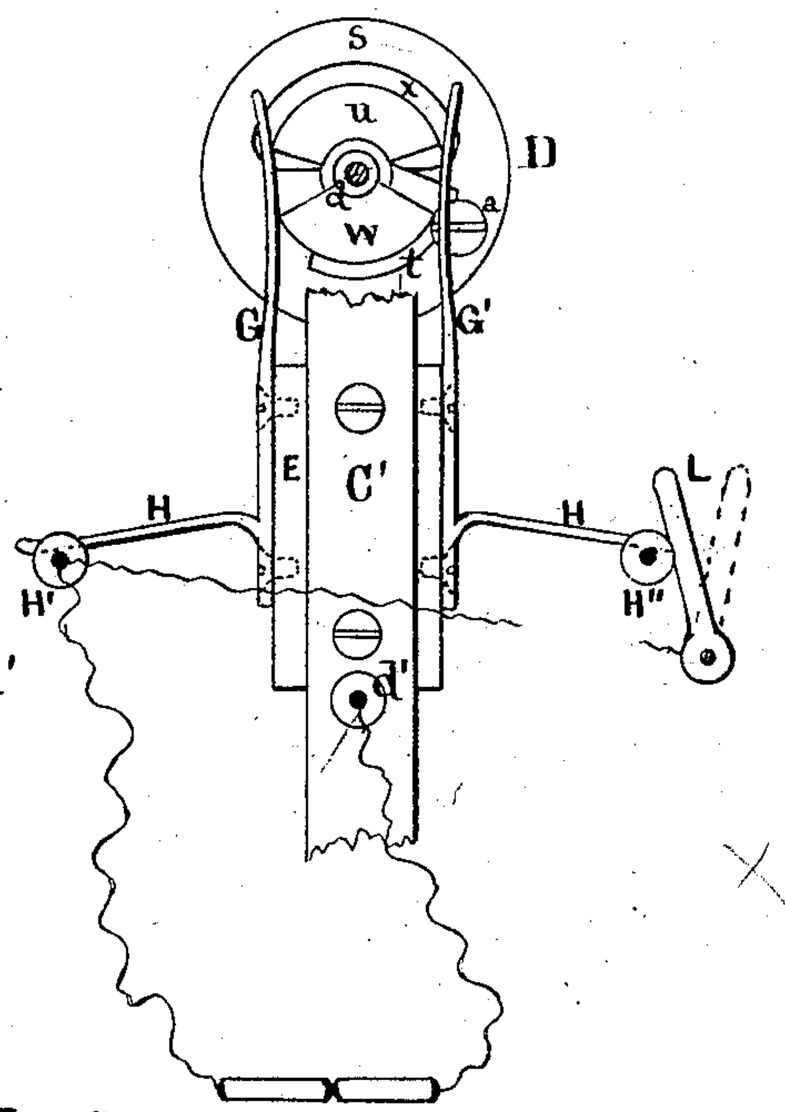


Fig. 6

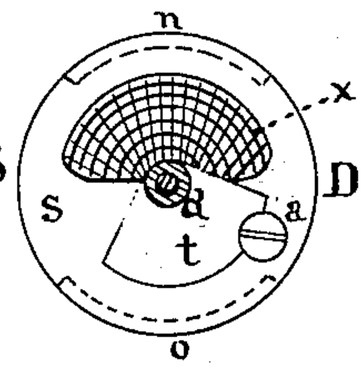


Fig. 7

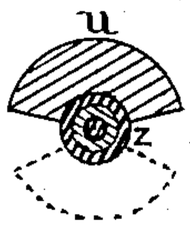


Fig. 8

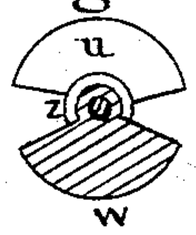


Fig 9

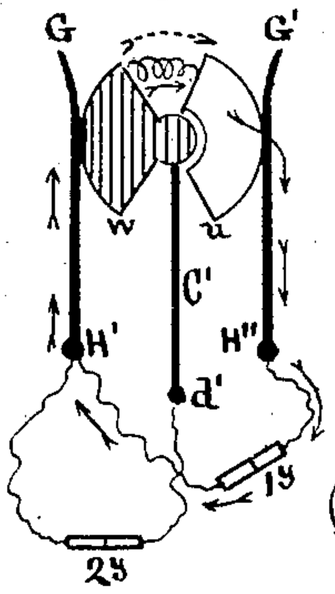


Fig. 10

Fig. 11

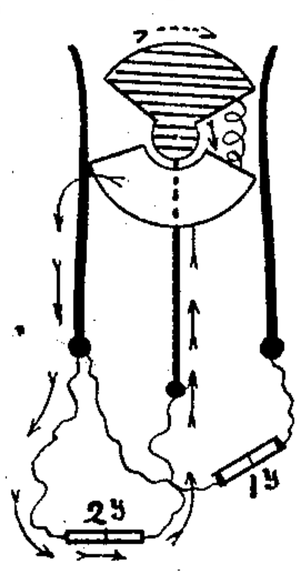


Fig. 12

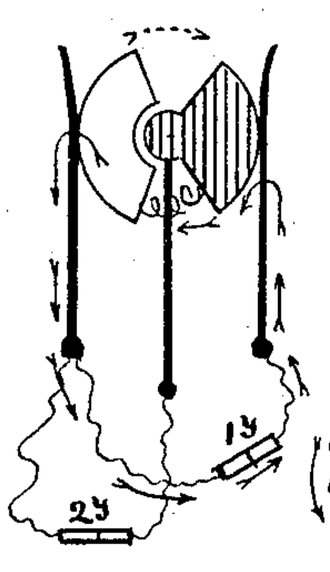


Fig. 13

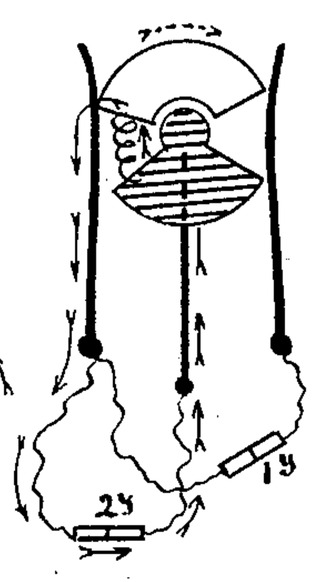
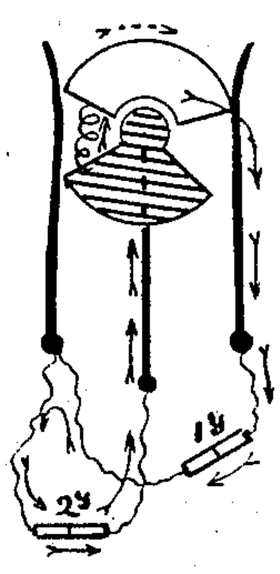


Fig. 14



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J. M. Burr.

Inventor,
Luis Drescher M. D.
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UNITED STATES PATENT OFFICE.

LUIS DRESCHER, OF NEW YORK, N. Y.

IMPROVEMENT IN MAGNETO-ELECTRIC MACHINES.

Specification forming part of Letters Patent No. **168,560**, dated October 11, 1875; application filed October 13, 1874.

To all whom it may concern:

Be it known that I, LUIS DRESCHER, M. D., of the city and State of New York, have invented an Improved Magneto-Electric Machine, of which the following is a specification:

This invention relates to improvements in that class of magneto-electric machines which are constructed with a revolving helical armature; and it consists, first, in so constructing the machine, as hereinafter fully described, as that a new intermediate circuit may be formed at the moment the usual primary circuit is broken, the second new circuit automatically closing and leading off at the moment of its induction the secondary current generated in the helix by the reinduction of its coils during the momentary interruption of the first circuit. By this means two different electrical currents of different qualities and characteristics are derived at pleasure from one and the same helix in the one machine, viz: the primary induced current, ordinarily obtained from this class of machines, producing marked electrolytical and mild physiological effects; and also a second induced current of great physiological intensity and power, similar, in fact, to the "extra" current secured by the use of a battery-cell, in combination with an electro-magnet, and which, being a current of a higher order, produces severe physiological but no electrolytical effect. It consists, second, in so arranging the cams or commutators which open and close the circuits as to permit a change in their adjustment about the axis of the helix with which they are made to revolve, so as to alter at pleasure their relation to the poles and armature of the permanent magnet, and thereby modify the intensity of the currents derived from the machine.

In the accompanying drawings, Figure 1 is a side elevation of my improved magneto-electric machine, with its case in section; Fig. 2 an end view, and Fig. 3 a plan or top view, of the same; Fig. 4, a central vertical section through the helix and its bearings, drawn upon an enlarged scale; Fig. 5, an end view of the same, with the upper part of the supporting-bar broken away; Fig. 6, an elevation of the end of the revolving electro-magnet, illustrating the combination of the adjusting-sector of the cams therewith; Figs. 7 and 8, sectional views of the two commutator-cams enlarged; Figs. 9 to 14, diagrams, illustrating in detail the operation of my machine.

A is a permanent horseshoe-magnet; D, an electro-magnet which rotates between the poles of the permanent magnet A; C C′, metallic bars, secured midway between the arms of the magnet, in a right line therewith, on either side thereof, to support the electro-magnet and the gearing, by which it is made to revolve. *g* is a shaft revolved by a crank, *j*, and supported at either end about midway the length of the magnet in suitable bearings formed in the bars C C′. *i* is a large toothed wheel meshing into a pinion, *f*, upon a lower shaft, *e*, arranged to revolve in bearings in the bars C C′, and which carries a grooved pulley-wheel, *h*.

The electro-magnet D consists of a helix, *r*, (see Fig. 4,) of fine insulated copper wire, coiled around a bar, *p*, of soft iron, which is confined between two parallel soft-iron plates, *n o*, arranged at right angles thereto, and secured at either end to the perimeters of two cylindrical metallic heads, *s s′*. *m m′* are short journals secured centrally to the outer face of each of the heads *s s′*, to project therefrom in a right line coincident with its axis, and these journals are supported in suitable bearings formed to receive them in the bars C and C′ respectively, (see Fig. 4,) on either side of the permanent magnet A. The plates *n o*, connected by the cross-bar *p* and supported between the poles of the magnet A, constitute an armature for said magnet, and electrical currents are induced in the coil *r*, wrapped about the cross-bar *p*, by the revolution of said armature. This revolution is produced by means of a small pulley, *b*, formed or secured upon one of the journals *m′* of the armature, an endless cord being carried around said pulley *b* and the larger pulley *h*, as shown by dotted lines in Fig. 1, which in turn is made to revolve by means of the crank *j*, and the toothed gearing meshing into the pinion *f* upon the shaft of said pulley *h*, as shown in Fig. 2. The opposite journal *m* of the revolving electro-magnet D is sufficiently extended to receive a sleeve, *d*, (see Fig. 4,) which encircles the same between the head *s*

and the bearing-bar C. To the inner end of this loose sleeve *d* is secured a segmental plate, *t*, (see Fig. 6,) of somewhat smaller radius than the head *s*. The segmental plate *t* and the sleeve *d* to which it is secured thus admit of adjustment about the journal *m* with reference to the armature-plates *n o* of the poles of the electro-magnet D, and, when adjusted, are firmly secured by means of a set-screw, *a*, (see Figs. 4 and 6,) so as to revolve therewith. A segmental opening, *x*, Figs. 4 and 6, is cut in the head *s*, through which one end of the wire-coil *r* is carried. Two metallic segmental plates or cams, *u w*, are secured upon the sleeve *d*, the one, *w*, directly in contact therewith and the other, *u*, insulated therefrom by the interposition of any suitable non-conducting material, *z*. (See Figs. 7 and 8.) These cams project radially from the sleeve *d* in parallel planes, but in opposite directions, as shown in Figs. 4 and 5. The arc of the insulated cam *u* is made to describe a greater arc than that of the cam *w* attached to the shaft, so that if the arc included by the one be one hundred and fifty degrees, that of the other shall be about one hundred and twenty-five degrees; these proportions, however, being necessarily varied according as cams of greater or smaller radius are used. The outer end of the wire helix *r* of the electro-magnet D is carried through the opening *x* in the head *s* and secured to the insulated cam *u*, the inner end of the helix being secured to the journal *m* with which the second cam *w* is in direct contact. G G′ are metallic springs, so secured to a block, E, of non-conducting material attached to the supporting-bar C below the bearing of the journal, as to project upwardly on each side of said journal, and bear tangentially against the cams *u w*. B, Figs. 1 and 2, is a wooden case in which the permanent magnet A and its attachments, as described, are inclosed and properly secured.

H′ H″, Fig. 5, are metallic sockets, formed in the case B, to receive the detachable electrodes of the apparatus, and which are connected respectively with the springs G G′ by means of elastic metallic strips H H, extending from each spring, so as to bear upon its appropriate socket, as shown in Figs. 1 and 5. *d′* is likewise a socket, formed in or secured to the bar C′, which supports the journal *m* of the helix *r*, so that said bar serves as a conductor from said journal and the cam *w*, which is in contact therewith, to the socket *d′*.

L, Figs. 1 and 5, is a switch-lever, connected by a fixed conducting-wire or metallic strip with the electrode-socket H′ of one of the springs, and so pivoted as to admit of being thrown at pleasure into contact with the electrode-socket H″ of the other spring.

My improved magneto-electric machine is operated by turning the crank *j* either to the right or left, thus producing, by means of the intermediate gearing, a corresponding rapid revolution of the electro-magnet D between the poles of the permanent magnet A. This revolution of the electro-magnet D induces an electric current in its helix *r*, whenever a circuit is closed between the ends of the coil, and by establishing an electrical conductor between the springs G G′, their contact with the cam *u w*, during each semi-revolution of the helix, closes such a circuit, so that an electric current is thereby obtained. This electric current is not constant, owing to the interruption of the circuit when the springs change cams at each semi-revolution, but, as the springs bear against the cams during the greater part of each revolution, and the interruptions of the current are very brief, the electric current thus obtained in a circuit closed by the two springs is "wave-like" in movement, having a maximum and minimum of intensity between each interruption, and is distinguished by the gentle shocks given thereby. This current, produced directly by means of the magnet A and its helix or revolving armature D as the generating-factors, is a primary induced current, and its production is common to this class of magneto-electrical machines. Its quality and intensity may be varied by altering the relative position of the cams, whose action interrupt the current, with reference to the armature-plates *n o*, whose action produce it, the required change of adjustment being made at pleasure, by loosening the set-screw *a* and turning the sector *t* about its axis.

The current is obtained for practical purposes by means of electrode-wires, inserted in the sockets H′ H″, connected with the two springs G G′, but a circuit may also be closed for this current by turning the switch-lever L into contact with the socket H″, as shown in Figs. 1 and 5 of the drawing.

At the moment the primary current is interrupted by the shifting of the springs upon the cams, the helix itself becomes a rheometer, each spiral of the coil inducing, at the moment of interruption, a current in the adjacent spiral. The secondary current, thus instantly induced in the helix by the interruption of the primary current as its generating-factor, is but of momentary duration, and, when passed through suitable conductors, is distinguished by its high velocity and consequent intensity, giving severe shocks and producing marked physiological, but no electrolytical effects, being similar in all particulars to the "extra current" obtained by the combination of a battery-cell with an electro-magnet.

By means of the different proportions of the segmental commutator-cams *u w*, the tangential arrangement of their springs, and the combination of a second closed circuit with the closed circuit of the primary current, I am enabled with my machine to obtain this secondary current as readily as the primary current, and to furnish the one or the other, or the two together, without change of helix, or the removal or modification of any part of the machine.

The production of the two electric currents, during each revolution of the helix, is fully illustrated by the diagrams, Figs. 9 to 14, wherein the shaded cam represents that in direct contact with the journal *m*, and the white cam represents that which is insulated therefrom. G G′ represent the springs; C′, the journal-bar forming a conductor from the shaded cam to the socket *d′*; 1^y, the closed circuit from one spring to the other, and 2^y the closed circuit from the one spring G to the shaded cam, independent of the second spring. The dotted arrows indicate the direction in which the helix is supposed to be revolving, and the solid arrows the course of the electrical currents.

In the position of the cams, illustrated in Figs. 9 and 12, the two springs bear simultaneously upon both cams, so that the circuit is closed for the primary current directly through the cams and springs and their electrodes. The instant, however, that the circuit for the primary current is broken by the withdrawal of the shaded cam from its spring—which, because of the difference in their proportions, must, in all cases, occur before the contact of the opposite insulated cam is broken—the secondary circuit closed through the journal *m* and bar C′, and the spring, which is still in contact with the insulated cam, conducts away the secondary current at that moment generated. (See Figs. 10 and 13.)

I claim as my invention—

1. Segmental commutator-cams *u w*, embracing arcs of different degrees, combined with the helix *r*, tangential insulated springs G G′, and electrical conductor C′ *d′*, of a magneto-electric machine, substantially as and for the purpose herein set forth.

2. In a magneto-electric machine, constructed substantially as herein described, wherein a primary circuit may be established at will between the opposite poles of the helix, through the commutator-cams, their springs, and a conducting-medium between the springs, the combination of electrodes, the one connected directly with one of the cams independently of the springs, and the other with any given point of the aforesaid primary circuit, whereby a second circuit may be established, which shall be automatically closed at each semi-revolution of the helix, at the moment the primary circuit is opened, all substantially as and for the purpose herein set forth.

3. In a magneto-electric machine, constructed with a revolving helix, the combination of the commutator-cams which open and close automatically the circuit induced in the coil, with a collar encircling the shaft or arbor of the helix, substantially as and for the purpose herein set forth.

4. A magneto-electric machine, constructed substantially as herein described, to deliver both primary and secondary electric currents from the same helix, in manner as herein set forth.

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