J. KIDDER.

Electro-Magnetic Apparatus.

No. 58,105. Patented Sept. 18, 1866.

Fig. 1.

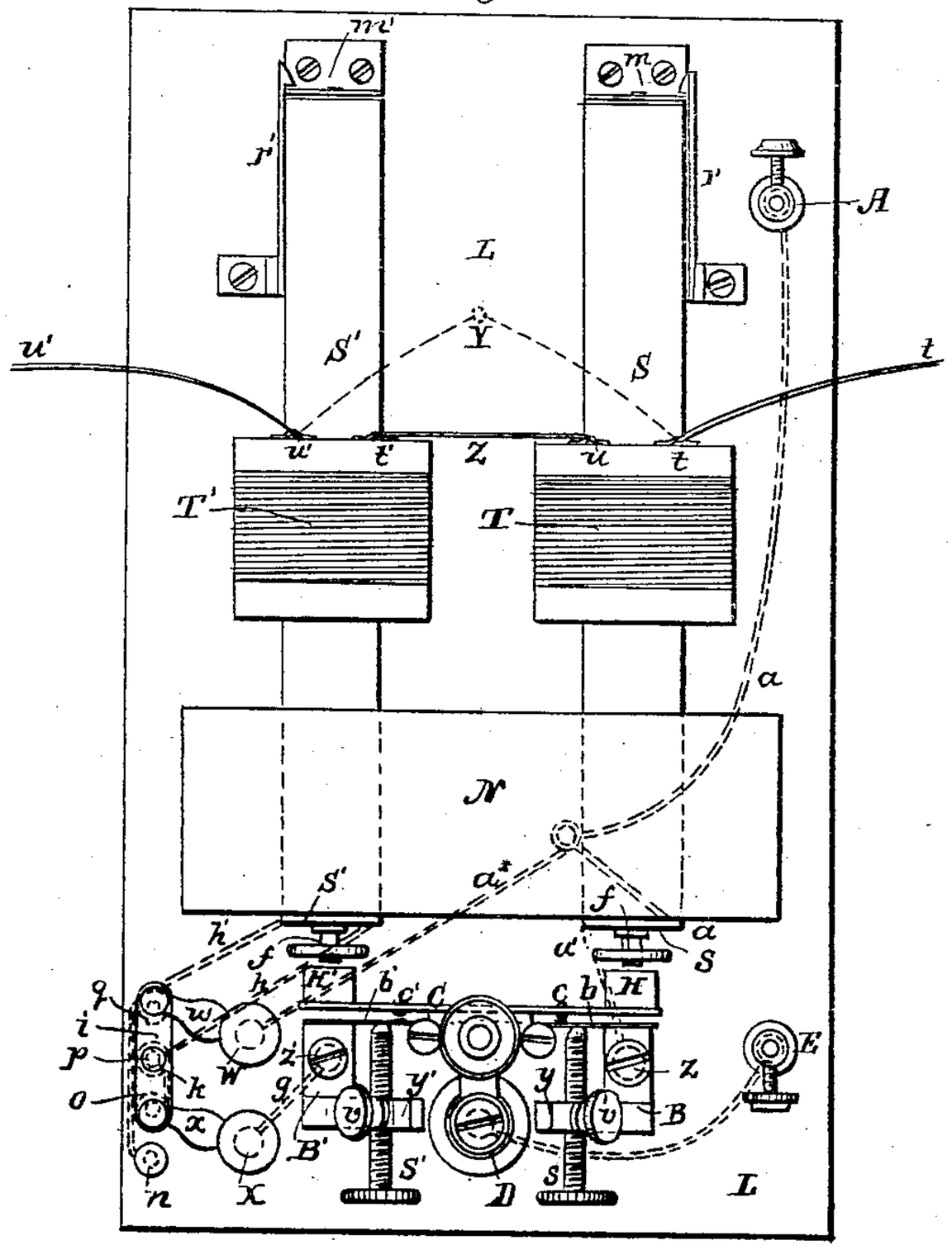
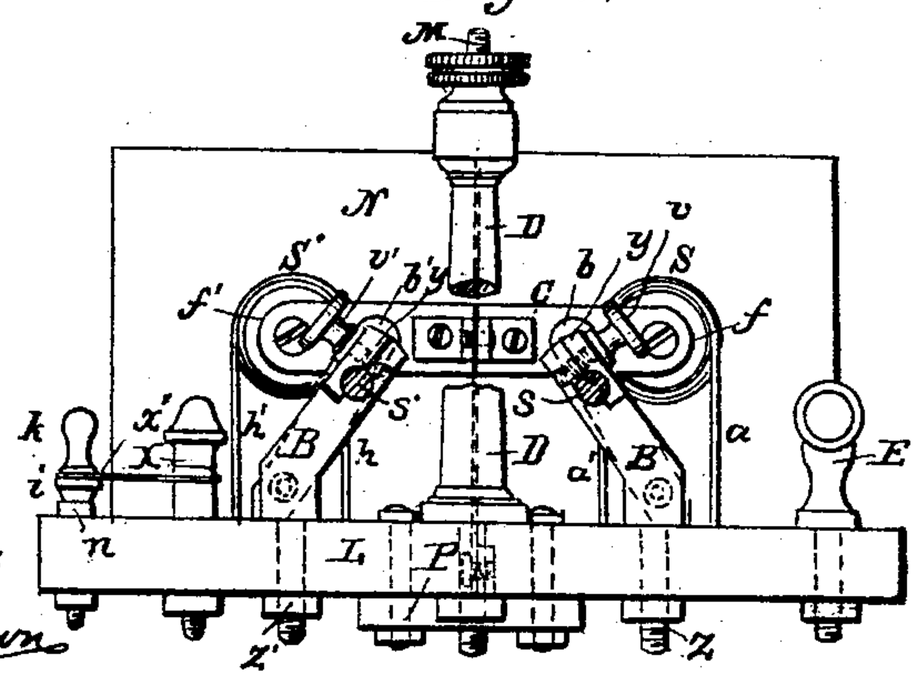


Fig. 2.



Witnesses:

Henry J. Brown

Jas. W. Connolly

Inventor:

Jerome Kidder

UNITED STATES PATENT OFFICE.

JEROME KIDDER, OF NEW YORK, N. Y.

IMPROVEMENT IN MAGNETO-ELECTRIC APPARATUS.

Specification forming part of Letters Patent No. **58,105**, dated September 18, 1866.

To all whom it may concern:

Be it known that I, JEROME KIDDER, of the city, county, and State of New York, have invented certain new and useful Improvements in Electro-Magnetic Apparatus; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan view of an apparatus illustrating my invention. Fig. 2 is an end view of the same.

Similar letters of reference indicate corresponding parts in the several figures.

My invention consists in arranging two helices or systems of helices in connection with a galvanic battery, so that the battery-current is thrown successively through the primary coil of one helix or system of helices and that of the other helix or system of helices—that is to say, is first thrown through one helix or system, then interrupted and thrown through the other, so as to create induced currents in one helix or system of helices, then immediately in succession creating induced currents in the other helix or system of helices.

It consists, further, in so arranging the two helices or systems of helices receiving the induced currents in combination that the current or currents developed in either one may be thrown through the other as a conducting medium, and hence that, by taking the extremities of the connected coils for a closed circuit, as through the body, the current or currents developed on one helix or system of helices will be received, and then the current or currents developed on the other helix or system of helices will be received, so the different currents will pass through the body from one and the other in continued succession.

My invention consists, further, in arranging the helices with relation to the battery-current and the induction-coils, so that the terminal currents produced by the interruption of the primary circuit may be received from the two systems of helices alternately in opposite directions, thus producing equal alternating currents.

It also consists in changing the direction of the primary current in one of the coils, or its equivalent, by reversing the position of the ends of one of the coils receiving the induced currents, making the terminal currents all pass in one uniform direction.

My invention consists, further, in an arrangement to secure the screws pressing against the vibrating spring, or its equivalent, so that they will remain stationary and firm to whatever place adjusted without the use of a binding-nut on the screw itself, so as to be adjusted by my arrangement more easily and perfectly than by the ordinary method of using binding-nuts upon these screws, which latter would not admit of perfect adjustment with facility, because when the screw is advanced to the exact distance required the friction of the ordinary nut to secure it turns the screw a little farther, and makes the perfect adjustment required a difficult matter.

My invention consists, further, in arranging the systems of helices for induction-currents so that they can be exchanged for other helices.

My invention consists, further, in arranging the helices for the induced currents so that a current of high quantity and of low tension may be alternately succeeded by a current of low quantity and of high tension, passing either in the same or in the opposite direction.

To enable those skilled in the art to make and use my invention, I will proceed to describe it with reference to the drawings.

L is a stand, of wood, on which is mounted the block N, in which is fastened one end of each of the two helices S S′, of coarse wire. Each of these helices passes through a spool of fine insulated wire, T T′, and the first ends of the wire of the spools are at *t t′* and the last ends at *u u′*, Fig. 1. The last end *u* of the wire of the spool T on the helix S is connected by a wire with the first end of the wire *t* of the spool T′ on the helix S′. The ends of the helices S S′ most distant from the block have also support, besides suspension, by means of upright hinged metallic strips, kept in place by spring-catches *r r′*.

A and E are metallic posts, having sockets and binding screws to connect with the battery.

B B′ are bases of the upright or inclined metallic supports for the screws *s s′*, which, at their points, press against the springs *b b′*, which are at their bottom ends securely fastened to the lower parts of B B′.

C is an armature, having at each end iron

hammers H H′, opposing the iron screws *f f*, which are inserted into iron cores of the helices S S′. This armature C is supported by an upright spring, *l*, of thin steel-plate, the lower end of which is fastened to a plate, P, secured below the stand L, and the upper end fastened to an arm, D*, on the top of a fixed post, D, by means of a screw on the upper end of the spring and a nut resting on the said arm. By screwing up the said nut the requisite tension may be given to the spring.

The screws Z Z′ fasten the supports B B′ to the stand L. The upright supports B B′ are divided at the top, (shown at *y y′*,) where the screws *s s′* pass, and the separated portions are bound against the screws *s s* by means of other screws, *v v′*.

The disks *n o p q* are for contact at one end with the switches *w x*, which have supports, on which they turn, at W X.

As the helix is wound, *a′* is the first end of the coarse wire of the helix S, and *a* its last end. The first end is joined with the post A, and also continues at *a**, and is joined to the pivot W of the switch *w*.

h′ is the first end of the coarse wire of the helix S′, joined to the disks *p* and *o*, and *h* is the last end of the said wire, connected with the disks *n* and *q*.

The pivot X of the switch *x* is connected with the upright B′ by means of the wire *g*. A piece of ivory or non-conducting material, *i*, connects the ends of the switches *w* and *x*. K is a knob upon this piece of ivory. There are rivets of platinum *c* and *c′*, which, when the bar C vibrates, connect with the platinum disks opposite them on the ends of the springs *b b′*.

I will now proceed to show the operation of the machine. The post A is connected with the positive pole of the battery, and the post E with the negative pole. It will be seen that the positive current of the battery follows through *a* into the helix S, whence it follows the wire *a′* to B, and through the spring *b*, and thence through the platinum disk on the end of this spring, to the platinum rivet *c* on the armature C, when the latter is set in motion, so as to make contact; thence through the spring to the column D; thence by the wire *d* to the post E, and to the negative pole of the battery. The iron core of the helix S is made a magnet by the primary circuit, and, its extremity being the iron screw *f*, attracts the hammer H, drawing away the armature, so as to break the connection between the spring *b* and the armature C. At the time of this interruption there is a powerful induced current developed on the coil T, and the positive of this induced current is at *u*, and *u* is connected with *t′* on the helix T′. The positive of this induced current developed on T is conducted through the helix T′, and then the positive of the current developed on T is extended to *w′*, while the negative is at *t*. Now, when the primary current is interrupted from the helix S by the swing of the armature C, the helix S′ is closed in the battery-circuit through the point *c′* in this wise: The positive of the primary current follows from A over *a* to the pivot W, and over the switch *w* to the disk *q* and the wire *h′*, which is the last end of the helix S′, traversing the said helix, and finally flowing out on the wire *h* to the disk *o;* then along the switch *x* and wire *g* to the base of the metallic upright B′; thence through the spring *b′* to the platinum rivet *c′* of the armature C; thence through the spring *l* to the column D, and thence along the wire *d* to the screw-cup E, connected with the negative of the battery. It will be seen that in this case the battery-current passes through the helix S′ in an opposite direction from that of its passage through the helix S, and consequently the induced current developed upon the helix T′ is in an opposite direction from that developed in the helix T, the positive pole of the current developed on T′ being at *t′*, and the negative at *w′;* or when *t′* has metallic connection with *u*, the current passes through the helix T, as a conducting medium, and then the positive is at *t*.

It will be readily seen that when the apparatus is thus operating, and we use as poles the extreme terminals *w′* and *t* of the fine wire of the two helices T′ and T thus united, we have an equal alternating current—that is, the strong terminal induce currents resulting from the interruption of the battery-circuit are in opposite directions, and they are received alternately from the poles *u′* and *t*. But if we move the ivory bar *i* by means of its knobs *k* so that the switch *w* is placed on the disk *p* and the switch *x* on the disk *n*, then, as will readily be observed, the battery-current passes through the helix S′ in the same direction that it passes through the helix S; consequently the induced currents developed on the helix T′ will in this case be in the same direction as those developed on the helix T′, and they will flow successively in one uniform direction. Also, it will be seen that by this arrangement different qualities of currents, by modifying the power or the quantity or tension, may be made to pass in succession, and either in one uniform direction or in opposite directions. It will be seen that, taking the poles at *t* and *w′*, the current developed on each helix meets with a certain amount of resistance, because of the interposed coil which it has in each case (developed from each helix) to pass through offering a certain amount of resistance. Also, if the points *t* and *w′* be united at Y, Fig. 1, and the point Z be taken as one pole, (which is both *w′* and *t*,) and Y be taken as the other pole, then the currents on T and T′ can also be alternately received through the body; and in this case, though the coil of each helix is immediately closed through the body, it is also closed through the medium of the opposite coil, which likewise receives a certain portion of the developed current, and that proportion received by this opposite coil (as T when using T′, or T′ when

using T) is smaller as the length of the resisting coil is increased.

By means of the screws *v v'* the sections *y y'* of the supports B B' are bound against the screws *s s'*, so as to hold them firmly, admitting of no looseness, (as looseness would not admit of operation,) and yet admitting of easy turning for their advancement or withdrawal, thus facilitating the necessarily delicate, to an easy and perfect, adjustment of the proper amount of pressure of the point of the screws against the springs *b b'* against the platinum points *c c'*.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The construction and arrangement of an electro-magnetic apparatus, whereby the primary current through two helices or systems of helices is thrown successively in opposite directions, or so as to develop induced currents successively in opposite directions, substantially as herein described.

2. The arrangement of the parts of an electro-magnetic apparatus, whereby the currents from two helices or systems of helices are made to flow in succession, one immediately after the other, in a uniform direction, substantially as herein set forth, such currents being either of the same character, made thus more rapid in succession, or of different degrees of tension or concentrative or diffusive influence.

3. For adjusting the screw opposed to the vibrating spring of an electro-magnetic apparatus, the use of the arrangement as represented by *v y*, operating substantially in the manner described.

JEROME KIDDER.

Witnesses:
HENRY. T. BROWN,
J. W. COOMBS.