

Improvement in Electro-Magnetic Apparatus.

No 122,266.

Fig. 2.

Patented Dec. 26, 1871.

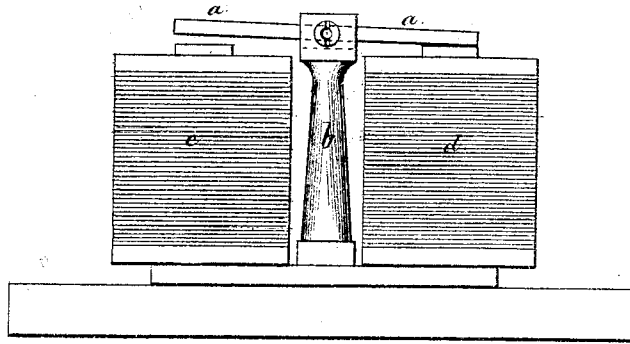
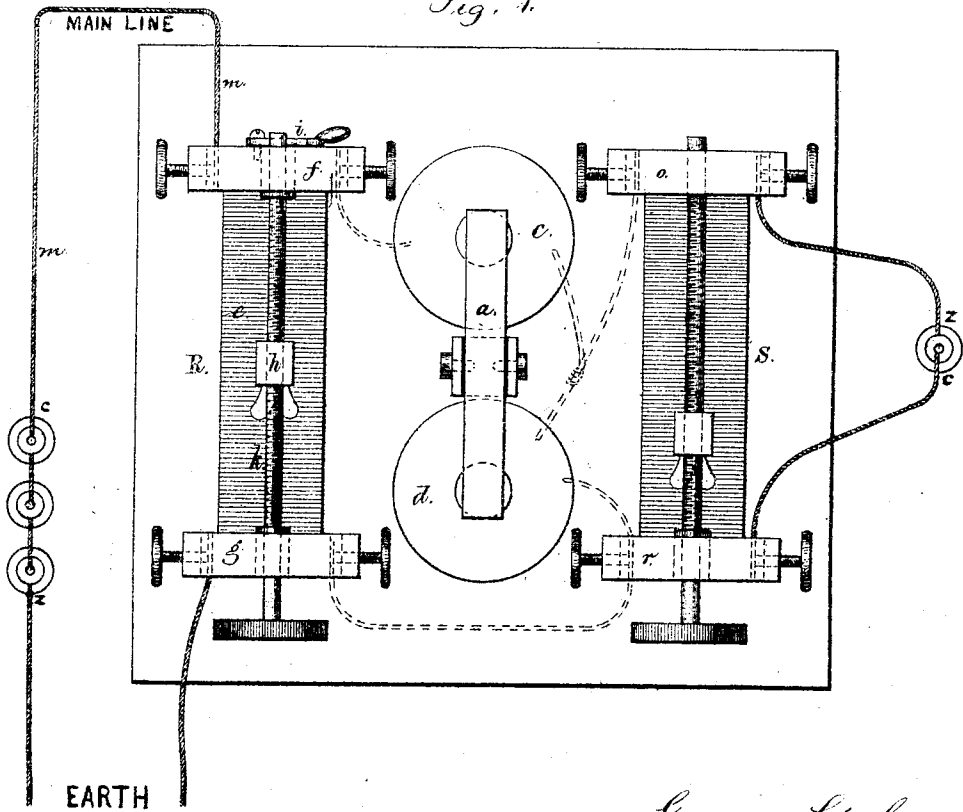


Fig. 1.



Witnesses

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IMPROVEMENT IN ELECTRO-MAGNETIC APPARATUS.

Specification forming part of Letters Patent No. 122,266, dated December 26, 1871.

To all whom it may concern:

Be it known that I, GEORGE LITTLE, of Rutherford Park, in the county of Bergen and State of New Jersey, have invented and made an Improvement in Electro-Magnetic Apparatus for Telegraphs, &c.; and the following is declared to be a correct description of the same.

My invention relates to a vibrating armature operated upon by two helices when the fulcrum for the armature is magnetized by induced magnetism. The electrical currents are so directed that the armature will be vibrated by alternate attraction or repulsion without the use of springs or any device for applying more or less mechanical force for regulating the action of the armature.

Heretofore the retractile force applied to the armature has usually been a spring, and a mechanical adjustment has been applied to the spring or to the cores of the magnet to vary the action of the parts and adjust them according to the magnetic force exerted.

In my device the electrical force is adjusted by two rheostats. One directs the proper portion of the main current through the helices; the second rheostat directs a shunt circuit through one of the helices from a local circuit. When the pulsations pass through the main line the oscillating armature is attracted by the first pole as the currents in the second helix neutralize each other, and when the main-line circuit is broken the local circuit, acting in the second helix, attracts the armature and oscillates it the opposite way, and these operations neutralizing the residual magnetism, cause the vibrations to be very rapid and the movement of the armature to be effected by a very feeble current.

The drawing represents in Figure 1 a plan of my apparatus, and in Fig. 2 a side view of the oscillating armature and its magnet.

The armature *a* is upon pivots supported by the pole *b*, that is connected with the soft-iron cores of the electro-magnets *c* and *d*. These magnets are to be constructed in any usual manner, and I remark that the swinging or oscillating armature will be limited in its movement in either direction by the cores of the magnets, and the parts can be positioned, or set-screws provided, so that the armature will have only the motion required; and the motion of the armature may be employed in operating a relay or local circuit

in moving any telegraphic appliance, or for whatever purpose it may be available. There are two electrical currents applied in these magnets *c* and *d*. When a current is passed through the helix *c* the pole *b* will be polarized, and also the armature, by induced magnetism. If a current is passed through the magnet *d*, the same operations will be the result; but if the magnets are constructed and the currents applied so that opposite polarity is produced, the armature will be acted upon and moved rapidly by the joint action of repulsion and attraction. If, now, the electric circuit in one magnet, *c*, is broken and a reverse electric circuit acts in the other magnet, *d*, the polarity being reversed the armature will oscillate instantly the other way, and residual magnetism will be neutralized.

In my apparatus the electrical currents are applied so as to produce these operations with a very small electrical force, and thereby produce a more rapid and accurate movement of the armature by electro-magnetism than in cases where mechanical devices, such as springs, are resorted to.

The rheostat instrument *R* is made of a coil, *e*, between two heads, *f g*, and the ends of the coil are in metallic contact with such heads. The adjuster *h* is made to move upon the rod *k*, and said rod is insulated from the heads *f g*. I have shown the same as a screw-rod that can be turned to move the adjuster *h*. A switch, *i*, is applied to connect the head *f* with the rod *k*. The main-line wire *m* is connected to the head *f*, and the helices *c* and *d* are connected into the main line by wires passing to each and thence to the head *g*; or the wire may pass through one helix and then through the other. The head *g* is connected to the earth or to the battery, as illustrated. The rheostat *S* is similar to the rheostat *R*. The heads *o* and *r* are connected to the helix *d*.

It will now be evident that the helices *c* and *d* are in the main line, and the strength of current is regulated by the rheostat *R*, a portion of the current passing direct through head *f*, switch *i*, rod *k*, adjuster *h*, coil *e*, and head *g*, the other portion passing through the coils *c* and *d*. The connections are made through the rheostat *S*, so that the polarity of *d* will be reversed by the shunt when the pulsation in the main line is broken. Thereby the armature will be attracted by the core of *d* and repelled from the core of *c*

by induced magnetism. This arrangement of reverse currents causes the parts to free themselves rapidly from magnetism; hence the vibrations of the armature will be very reliable, and great rapidity can be obtained. The currents in *d* neutralize each other when the circuit of the main line is closed, so that the magnet *c* is free to operate; and it is preferable to adjust the force of the local circuit in said helix *d* by the rheostat *S*, so as to shunt off through *d* only that which is required for giving the proper movement to the oscillating armature *a*.

I remark that the main current might be applied in the helix *c*, and only the local in the helix *d*; but the main-line current must in that case be sufficiently strong to overcome the attraction of *d*. In either case the induced magnetism in the armature will be rapidly discharged by the change of polarity.

If the current of the main line is feeble, or only of the required intensity, the adjuster *h* may be moved up to the head *f* so as to cut out the coil *e*; or the rheostat *R* might be dispensed with.

The magnets *c d* might be made double; or

groups of electro-magnets be provided to act on the opposite ends of the vibrating armature; and the armature may be solid or tubular, or polarized, if required.

I claim as my invention—

1. An oscillating armature and two helices connected to the main line, in combination with a local circuit connected with one of the helices, substantially as and for the purposes set forth.

2. An oscillating armature upon a fulcrum connected with the cores of two electro-magnets, in combination with two electric circuits connected with the helices of such magnets, substantially as and for the purposes set forth.

3. The screw-rod *k* of the rheostat, combined with the adjuster *h* and coil *e* to regulate the position of said adjuster, substantially as set forth.

Signed by me this 26th day of October, A. D. 1871.

GEO. LITTLE.

Witnesses:

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GEO. T. PINCKNEY.

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