T. M. FOOTE & C. A. RANDALL.

Telegraph-Keys.

No. 152,356. Patented June 23, 1874.

Fig. 1.

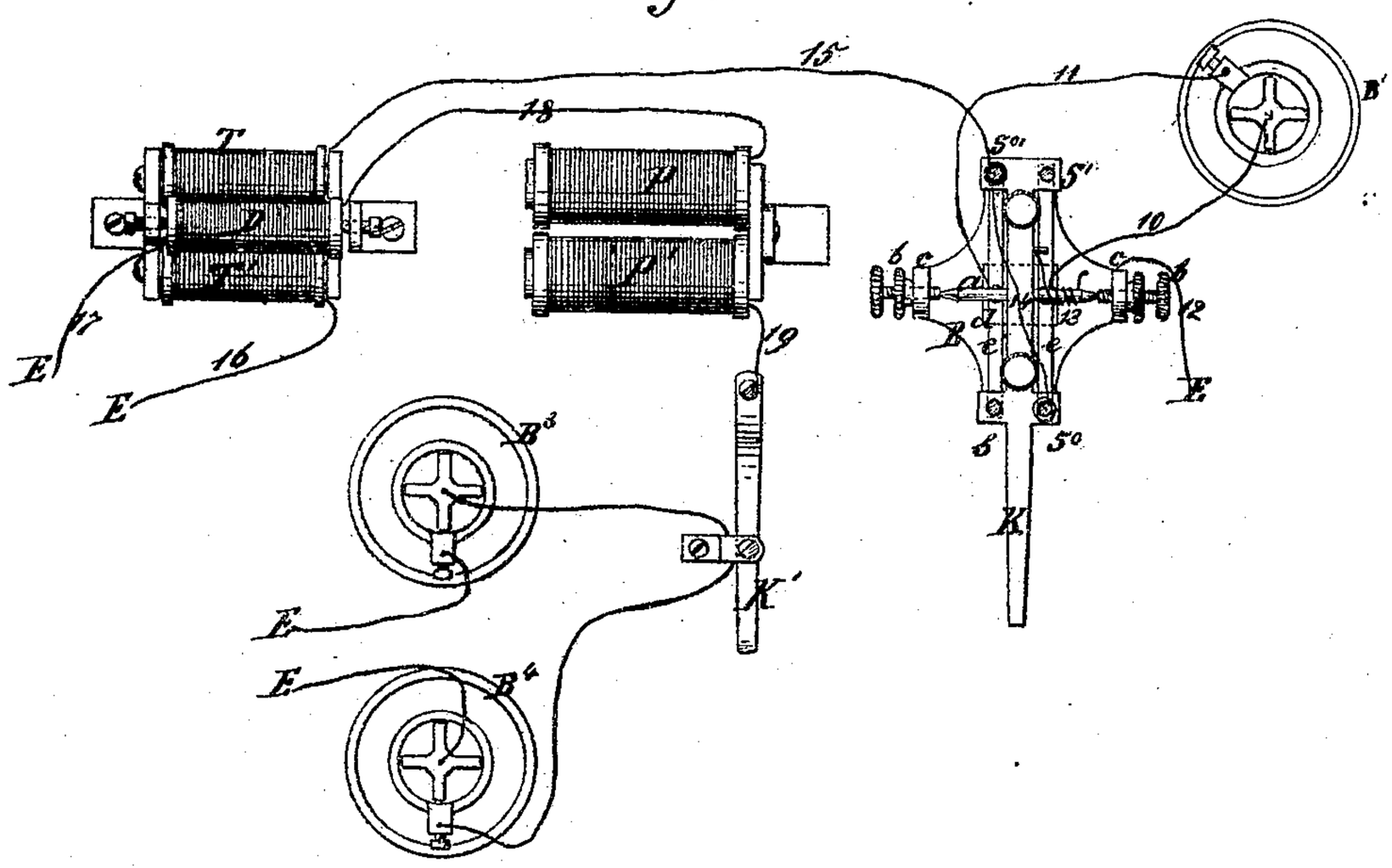
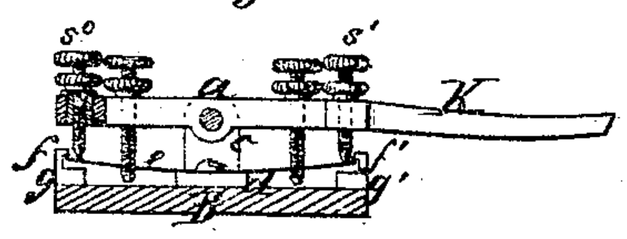


Fig. 2.



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UNITED STATES PATENT OFFICE.

THEODOR M. FOOTE AND CHARLES A. RANDALL, OF BROOKLYN, N. Y.

IMPROVEMENT IN TELEGRAPH-KEYS.

Specification forming part of Letters Patent No. **152,356**, dated June 23, 1874; application filed March 20, 1873.

To all whom it may concern:

Be it known that we, THEODOR M. FOOTE and CHARLES A. RANDALL, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Electro-Magnetic Telegraphs; and we do hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification, in which drawing—

Figure 1 represents a plan or top view of that part of our invention which relates to the arrangement of the different circuits for a telegraphic instrument. Fig. 2 is a sectional side view of the key.

Similar letters indicate corresponding parts.

Our present invention relates to an improvement in the pole-changing key for a telegraphic instrument in which the points of the screws bear upon the ends of springs, so that when the key is moved a sliding contact between the points of the screws and the springs is produced, and thereby a more correct action of the instrument is insured.

Instead of the screws being arranged upon the key, they may, in some instances, be separate and connected beneath the key, and made to act upon a spring seated upon the key.

In the drawing, the letter K designates the lever of our improved key, which is secured to a rod, *a*, that has its bearings in the ends of two screws, *b b*, extending through lugs *c c*, which rise from the bed-plate B. In the lever K are secured four screws, *s s'* and s^{o} $s^{o\prime}$, the screws *s* and *s'* being in metallic contact with said lever, while the screws s^{o} and $s^{o\prime}$ are insulated from the same. On the bed-plate B is secured a plate, *d*, of hard rubber or other non-conductor, and on this plate are fastened two springs, *e e'*, which are parallel to each other, and the ends of which catch against lips *f f'*, projecting from abutments *g g'*, Fig. 2, of hard rubber or other non-conductor, which are fastened to the bed-plate B. Said ends of the springs are situated each beneath the point of one of the screws *s s'* s^{o} $s^{o\prime}$, and these screws are so adjusted that when the key is raised or depressed the tips of two of said screws, *s* s^{o} or *s'* $s^{o\prime}$, are brought in contact with the springs, and that said tips in striking the springs slide thereon, whereby a more correct action of the instrument is insured.

The connection of our key with the type-wheel magnets or coils T T' is as follows: The spring *e* connects, by a wire, 10, with one (say the negative) pole of a battery, B^{1}, and the springs *e'* connect, by a wire, 11, with the positive pole of said battery. From the base-plate B extends a wire, 12, into the earth, the metallic contact between the base-plate and the lever being insured by a wire, 13. The insulated screws s^{o} $s^{o\prime}$ are connected by a wire, 14, and from the screw $s^{o\prime}$ extends a wire, 15, to one end of the helix of the magnets T T'. The other end of this helix connects, by a wire, 16, with the earth.

If the key is depressed so as to bring the screws *s* and s^{o} in contact with their springs *e* and *e'*, a negative current passes through the magnets, as follows: From the battery B^{1}, through wire 10, to spring *e*, through screw s^{o}, wire 14 and 15, to magnets T T', thence through wire 16 to the earth; from the earth, through wire 12, to base-plate B, thence through wire 13 and screw *s* to spring *e'*, and from this spring, through wire 11, back to the battery.

If the key is raised so as to bring the screws *s'* and $s^{o\prime}$ in contact with their springs, a positive current is thrown over the circuit, as follows: From the positive pole of the battery to spring *e'*, thence, through screw $s^{o\prime}$, to wire 15, and through this wire and the helix of the magnets to the earth; through the earth and wire 12 to the base-plate B, thence, through wire 13 and screw *s'*, to spring *e*, and from this spring, through wire 10, back to the battery B^{1}.

When our invention is to be applied to a printing-telegraph we combine with the type-wheel magnets T T' and with the printing-magnets P P' a swinging electro-magnet helix, D. This helix connects at one end, by a wire, 17, with the earth, and at its other end, by a wire, 18, with the helix of the printing-magnets, from which extends a wire, 19, to a key, K'. This key is so constructed that it can be thrown in connection either with a battery, B^{3}, or with a battery, B^{4}, the battery B^{3} being in metallic contact with a screw above the lever, and the battery B^{4} with an insulated anvil beneath said lever, each of the batteries B^{3} and

B^4 being connected with the earth, as indicated by the tellers E.

If this key is raised to such a position that it connects with the battery B^3, a current of known polarity is thrown through the helix of the printing-magnets to that of the swinging electro-magnet, and this current is so gaged that it is not strong enough to charge the printing-magnets, but sufficiently strong to charge the swinging electro-magnet, and to polarize the core of this magnet according to the polarity of the current.

By operating the key K, which connects with the type-wheel magnets, alternate positive or negative currents are sent through the helix of these magnets, and consequently the polarity of the cores of these magnets will at one time correspond with that of the polarity-magnet; but if the current is reversed by the action of the lever K, the polarity of said cores will be the opposite from that of core of the polarity-magnet, and by this change the type-wheel or type-wheels are caused to rotate step by step, and the permanent steel magnet generally used in connection with the type-wheel magnets can be dispensed with.

For the purpose of printing, the key K′ is so placed that a current from the battery B^4 is sent through the helix of the printing-magnets, which is strong enough to change these magnets, and thereby the printing is effected.

In the drawing we have shown a key, K′, for transmitting the currents from batteries B^3 and B^4 over wire 19; but, in practice, we use an automatic transmitter so constructed that the currents from batteries B^1, B^3, and B^4 over circuit-wires 15 and 19 are positively controlled by the simple manipulating of the lettered keys generally used in transmitters of this kind.

Instead of using the polarity-magnet D in the line-circuit with the magnets P P′, a small local battery may be used to effect the polarization of its core.

What we claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the rocking lever of a key provided with screws, as described, of springs upon which the screws make a sliding contact when the lever is raised or depressed, substantially as described.

2. The screws *s s′ s⁰ s⁰′* in a key, K, in combination with a battery and with circuit-connections thereto, substantially as shown, the alternate raising and depressing the lever of said key causing alternate positive and negative currents to be sent over the main circuit.

This specification signed by us this 17th day of March, 1873.

T. M. FOOTE.
CHARLES A. RANDALL.

Witnesses:
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