(No Model.)

W. E. ATHEARN.

POLE CHANGING KEY.

No. 252,346. Patented Jan. 17, 1882.

Fig. 1.

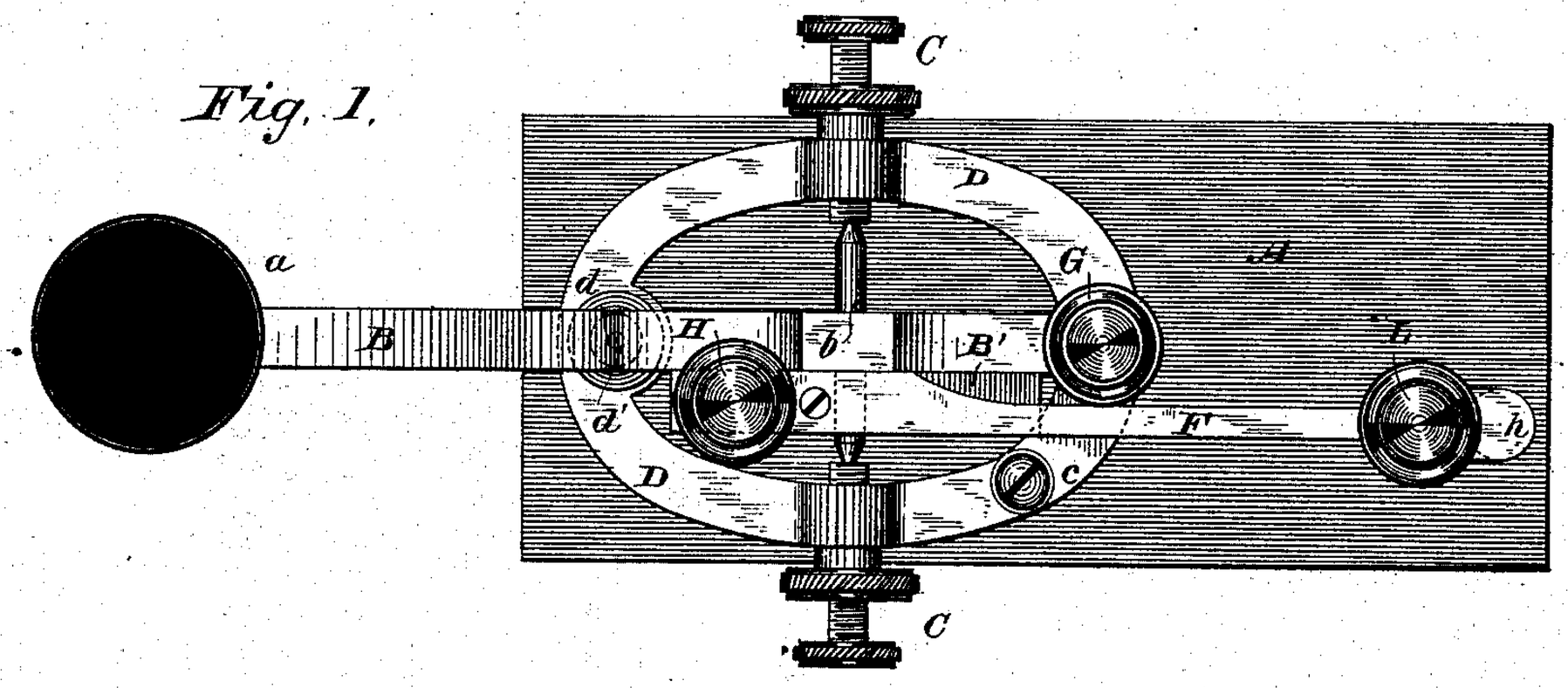


Fig 2.

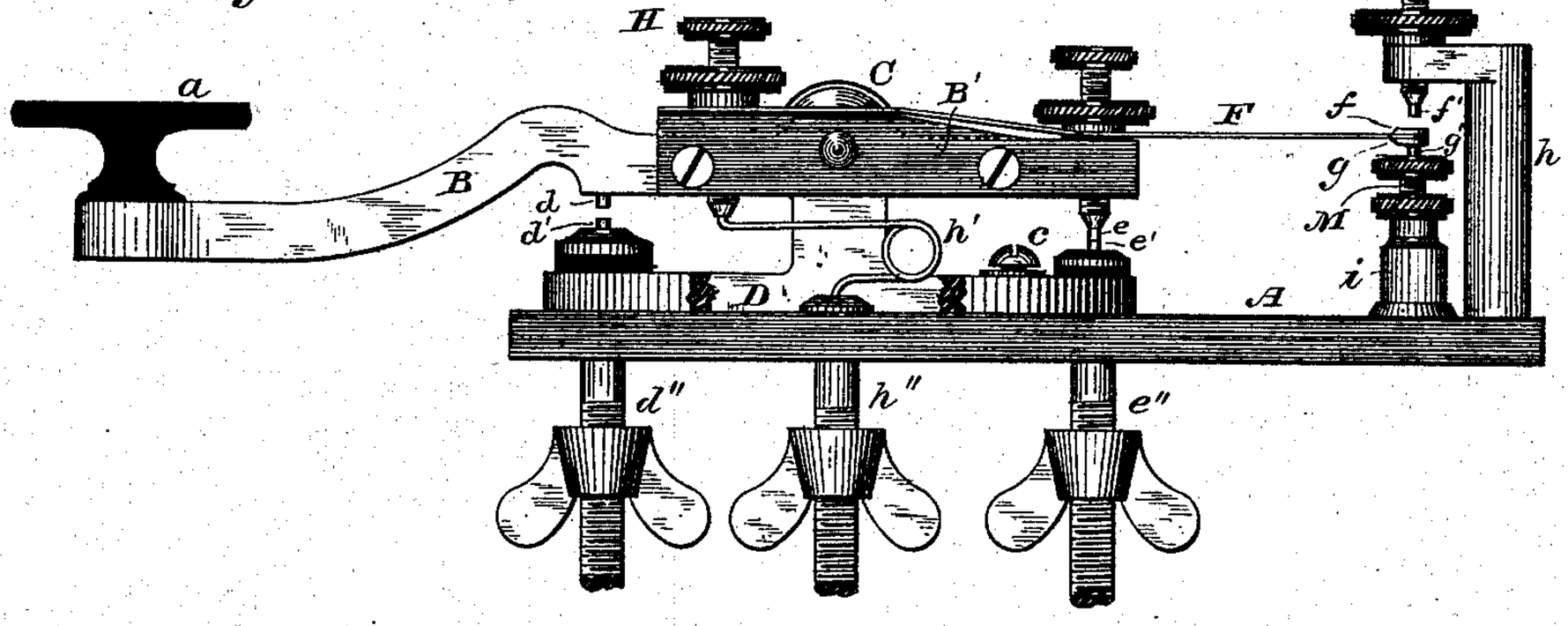
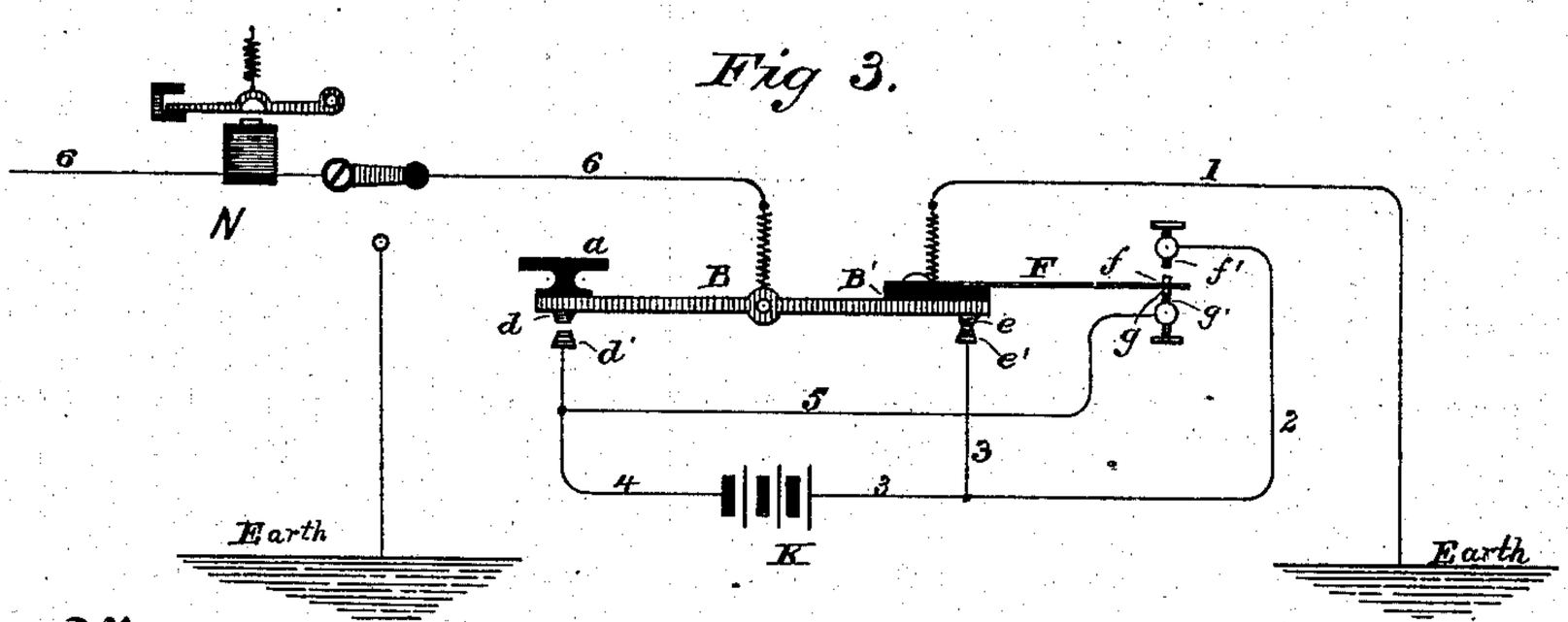


Fig 3.



Witnesses:

Wm A Skinkle

Miller C. Earl

Inventor:

William E. Athearn

by his Attorney,

Frank L Pope

UNITED STATES PATENT OFFICE.

WILLIAM E. ATHEARN, OF NEW YORK, N. Y.

POLE-CHANGING KEY.

SPECIFICATION forming part of Letters Patent No. 252,346, dated January 17, 1882.

Application filed October 26, 1881. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E ATHEARN, a citizen of the United States, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in Pole-Changing Keys, of which the following is a specification.

My invention relates to that class of telegraphic keys employed in transmitting messages by means of alternating positive and negative electric currents, commonly called "pole-changing keys."

In making use of currents of alternating polarity for telegraphic transmission it has been customary to adopt one of two methods. The first consists in permanently connecting the battery at the sending-station with the earth by a wire proceeding from a point not far from midway between its poles, thus dividing the battery into two equal, or nearly equal, sections. Currents of alternating polarity are sent upon the line-wire by completing its circuit first with one section and then with the other of the divided battery. The second method consists in connecting the opposite poles of a battery alternately with the earth and with the line-wire. The latter method is usually considered preferable in practice, as it requires a battery of only one-half the number of elements, for the reason that the same series of battery-cells furnishes both the positive and negative currents.

My invention consists in certain improvements in the mechanical construction of the pole-changing keys employed for transmitting currents after the method last described—that is, from the opposite poles of an undivided battery.

In the accompanying drawings, Figure 1 is a plan view of my improved key or transmitter, and Fig. 2 represents a side elevation of the same. Fig. 3 is a theoretical diagram, showing the arrangement of circuits as applied to the key.

Referring to Figs. 1 and 2, A represents a supporting-base, of hard rubber or other suitable insulating material, upon which are mounted the key and its attachments.

The key-lever B is mounted in the usual manner upon a metallic base or support, D, by means of its transverse axis *b*, which is mounted between adjustable screws C C, which are inserted in standards projecting from the base. The base D is provided with a binding-screw, *c*, for securing the line-wire and placing it in electrical connection therewith.

The lever B is provided with two sets of contact-points, *d d'* and *e e'*, of which *d* and *e* are in electrical connection with the lever B, one of them, as *e*, being carried on an adjustable screw, G, while the points *d'* and *e'* are supported by and are in electrical connection with the upper ends of the bolts *d''* and *e''*, respectively. These bolts extend downward through but are insulated from the metallic base D and the supporting-base A, and serve to secure the key to the operator's table and as binding-screws for making the necessary circuit-connections.

Against one side of the lever B is secured a block, B', of suitable insulating material, such as hard rubber, upon which is mounted a flexible arm or spring, F, bearing at its free end two contact-points, *f* and *g*, preferably of platinum or other infusible metal. This end of the arm F plays between two contacts, *f'* and *g'*, which are carried by the adjustable screws L and M, supported upon the posts *h* and *i*. The spring F makes contact with one or the other, according as the lever B is raised or depressed. At the opposite end of the arm F an adjustable screw, H, projects through the block E and engages with the end of a flexible spring, *h'*. The opposite end of this spring is electrically connected with an insulated bolt, *h''*, thus placing the said bolt in electrical connection with the arm F.

It will be observed that by insulating the adjustable screw H from the key-lever and the binding-post *h''* from the base I am enabled to employ the spring *h'* in the place of the coils of thin wire which have heretofore been used for making the necessary electrical connection between the stationary binding-post and the movable pole-changing arm. The spring *h'* tends to raise the end *a* of the key-lever, thus separating the contact-points *d d'* and *f f'* and closing the contacts *e e'* and *g g'*, which is the normal position of the key lever. The contact-points *d'* and *e'* are electrically connected with the contacts *g'* and *f'*, respectively.

The arrangement of circuits will be more

readily understood by reference to Fig. 3. In this figure K represents the main battery, one pole of which is connected by a wire, 3, with the contact-point *e'*. This contact-point is also connected, as hereinbefore stated, with the contact-point *f'* by a wire, 2. The other pole of the battery K is connected by a wire, 4, with the point *d'*, and also by the wire 5 with the contact-point *g'*. The flexible arm F is connected by a wire, 1, with the earth, while the key-lever B is connected with the line-wire 6, in which may be included the receiving-instrument N and a switch, O, for cutting out the key when receiving.

The operation of the key is as follows: When the key-lever is in its normal position a circuit is completed from the earth, through the wire 1, arm F, contacts *g* and *g'*, wires 5 and 4, battery K, wire 3, contacts *e* and *e'*, and key-lever B, to the line-wire 6, sending a positive current from the battery K to line. By depressing the key-lever by means of the button *a* the contacts *g g'* and *e e'* are separated and the contacts *f f'* and *d d'* brought together. When the lever is in this latter position the circuit is from the earth through the wire 1, arm F, contacts *f* and *f'*, wires 2 and 3, battery K, wire 4, key-lever B, and line-wire 6, sending a negative current to the line. In this manner alternating positive and negative currents are sent upon the line-wire by operating the key after the manner of an ordinary Morse key.

It will be seen by reference to Fig. 1 that it is essential to the proper working of the key that the contact-points be so adjusted that the circuit through the points *f* and *f'* or *g* and *g'* should be complete at the moment the circuit is closed through the contacts *d d'* or *e e'*; otherwise a wavering or irregular current would be transmitted. The screws L and M should therefore be so adjusted that the points upon the arm F shall strike against their respective contacts *f'* or *g'* before a contact is made between the points *d d'* or *e e'*. The resiliency of the spring F will allow the key lever to be moved until such contact is made, and by its pressure insure a reliable electrical connection.

I have shown and described my transmitter as being operated by hand, in the same manner as an ordinary Morse key; but it is evident that an electro-magnet and its armature may be applied in place of the button *a* for actuating it by means of a local battery and independent key, in a well-known manner. It is evident, moreover, that, instead of securing the insulating-block B' against the side, it may be placed at the end of the lever B. This change would make it necessary to transfer the adjustable screw H to the opposite side of the axis *b* from that represented in the drawings. A suitable spring for exerting a downward pressure upon this screw would then be substituted for the spring *h'*—for example, a coil-spring, which might be extended by depressing the button *a*.

I am aware that pole-changing keys have been constructed in which the key-lever has been provided with contact-points vibrating between two yielding springs. Keys constructed upon this plan, however, are both complicated and liable to become out of order by use.

It has, as before stated, been found necessary in the keys hitherto used to employ thin wires for the purpose of making the necessary connections with the movable parts of the key, so as not to retard its movement. These are very liable to become broken and disarranged. The peculiar construction of the key herein described renders it free from these objections and at the same time convenient for manipulation.

I claim as my invention—

1. In a pole-changing key or transmitter, the combination, substantially as hereinbefore set forth, of a pivoted lever, vibrating between and alternately making contact with two independent stationary contact-points, and a flexible arm secured to but insulated from said lever, vibrating between two stationary adjustable contact-points.

2. The combination, substantially as hereinbefore set forth, of the key-lever and its metallic base, the insulated flexible arm, and the spring *h'*, insulated from the lever and base, but in electrical connection with the flexible arm.

In testimony whereof I have hereunto subscribed my name this 21st day of October, A. D. 1881.

WILLIAM E. ATHEARN.

Witnesses:
CHARLES A. TERRY,
WILLIAM H. KENYON.