No. 666,431. Patented Jan. 22, 1901.

J. S. MEAD.

ELECTROTHERAPEUTIC APPARATUS.

(Application filed Aug. 25, 1900.)

(No Model.)

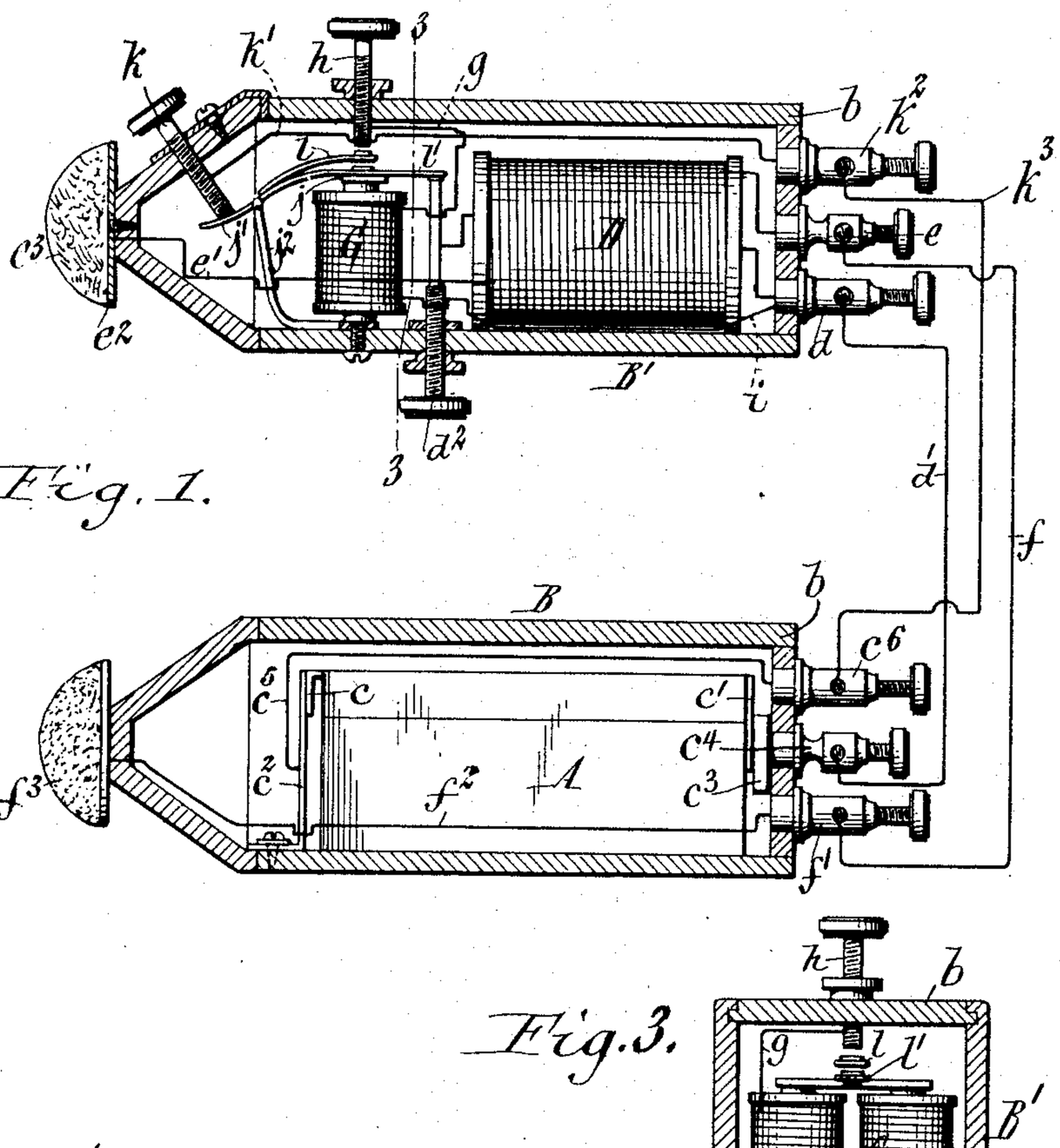

Fig. 1.

Fig. 3.

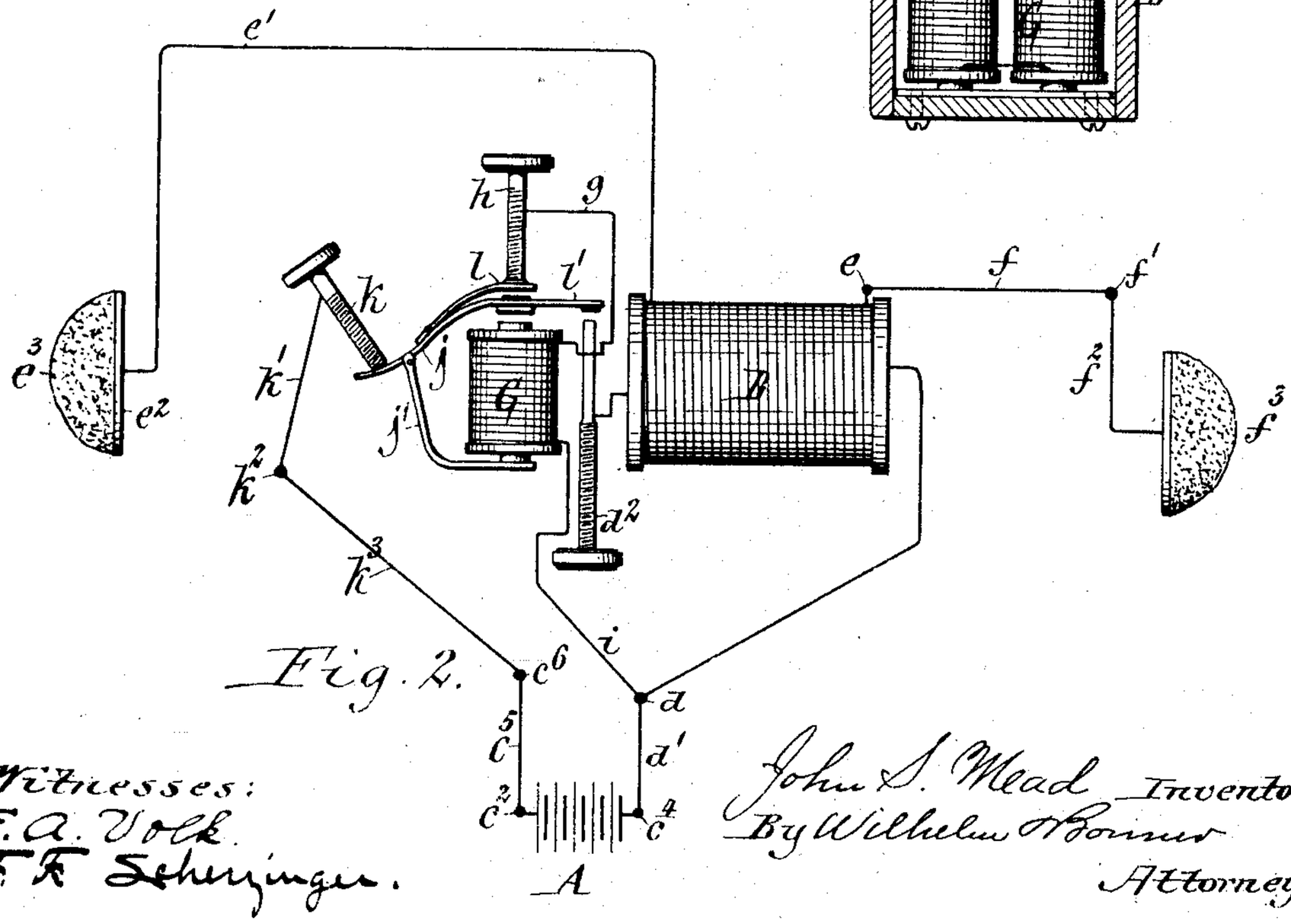

Fig. 2.

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UNITED STATES PATENT OFFICE.

JOHN S. MEAD, OF BUFFALO, NEW YORK, ASSIGNOR TO ALBERT W. COURTNEY, OF SAME PLACE.

ELECTROTHERAPEUTIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 666,431, dated January 22, 1901.

Application filed August 25, 1900. Serial No. 28,023. (No model.)

To all whom it may concern:

Be it known that I, JOHN S. MEAD, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Electrotherapeutic Apparatus, of which the following is a specification.

This invention relates to the class of electric apparatus employed in the treatment of nervous diseases, and more especially to apparatus of this kind which comprises a pair of hollow handles, one of which contains a small battery and the other an induction-coil, flexible conductors connecting the primary coil with the battery, and a pair of body-contacts or electrodes carried by the respective handles and forming the terminals of the secondary coil. Heretofore the vibrator or circuit-interrupter of the apparatus has been operated directly by the induction-coil, but this construction is unsatisfactory, because the action of the vibrator is comparatively weak and unreliable.

The object of my invention is to provide the apparatus with simple means for insuring a powerful and reliable action of the vibrator at all times.

In the accompanying drawings, Figure 1 is a sectional elevation of my improved apparatus. Fig. 2 is a diagram of the same, showing a different position of the automatic switch or vibrator. Fig. 3 is a cross-section in line 3 3, Fig. 1.

Like letters of reference refer to like parts in the several figures.

A is a small battery of any suitable construction, which is arranged in one of the hollow handles or shells B B′ of the apparatus. These handles may be constructed of any suitable non-conducting material, such as hard rubber, or of metal covered with insulating material, and each of the same is provided on one side with a removable lid *b*.

c c′ are the poles of the battery, which bear, respectively, against a contact-spring c^2 and a contact-plate c^3, arranged in the front and rear portions of the handles B. The contact-plate c^3 bears against a binding-post c^4, while the spring c^2 is connected by a wire c^5 with a binding-post c^6, these posts being both arranged at the inner end of said handle.

D is the induction-coil, which is arranged in the rear portion of the other handle B′ of the apparatus. One end of the primary coil is connected with a binding-post *d*, which is arranged at the inner end of said handle and which is connected with the binding-post c^4 by a flexible conductor *d′*. The other end of the primary coil is connected with a contact-screw d^2, which passes through the side of the handle on the front side of the induction-coil. One end of the secondary coil is connected with a binding-post *e*, while its other end is connected by a wire *e′* with a metallic plate or body-contact e^2, arranged at the front end of the handle B′ and having a facing e^3, of sponge or other absorbent material, adapted to be moistened before using the apparatus. The binding-post *e* is connected by a flexible wire or conductor *f* with a binding-post *f′*, arranged on the other handle B, and this binding-post is in turn connected by a wire f^2 with a body-contact f^3, arranged at the front end of the handle B. These body-contacts form the terminals of the secondary coil and are adapted to be placed against the parts of the body through which the electric current is to be passed.

G is an electromagnet arranged in the same handle as the induction-coil and comprising, preferably, two connected coils, as shown in Fig. 3. One end of the magnet-coil is connected by a wire *g* with a contact-screw *h*, passing through the side of the adjacent handle and arranged opposite the electromagnet. The other end of the magnet-coil is connected with the binding-post *d* by a wire *i*.

j is an armature or vibrator arranged between the free end of the electromagnet and the opposing end of the contact-screw *h* and carried by a lever *j′*, which is pivoted between its ends to a standard j^2, as shown. This lever is preferably constructed of spring-steel, so that its front arm, which carries the armature, acts as a spring which draws the armature away from the magnet when the latter is demagnetized. The rear arm of the armature-lever *j′* bears at all times against the in-

ner end of a contact-screw k, which extends through the wall of the hollow handle B'. This contact-screw is connected by a wire k' with a binding-post k^2 on the handle B', and this post is in turn connected with the binding-post c^6 by a flexible conductor k^3. The armature carries elastic switch members or contacts $l\,l'$, which are adapted to bear against the contact-screws h and d^2, respectively. These switch members are so arranged that when the member l bears against its companion contact-screw h the other switch member l' is out of contact with its companion contact-screw d^2, as shown in Fig. 2, and so that when the switch member l is out of contact with the screw h the switch member l' bears against the screw d^2, as shown in Fig. 1. The armature might be arranged to bear directly against the contact-screw h, but it would have a tendency to rebound therefrom and make an imperfect contact. To insure a perfect contact, the armature is provided with the elastic switch member l. It will now be understood that the induction-coil D and the electromagnet G are arranged in separate branches of the battery or generator circuit and that the contact-screws d^2 and h form the terminals of said branch circuits. The members $l\,l'$ of the armature form an automatic switch or make-and-break device which is actuated by the armature and which directs the battery-current alternately through the induction-coil and the electromagnet by contact with said branch terminals.

The contact-screw k is adjustable in the handle B', so that the position of the spring-arm, which carries the armature, can be properly adjusted. The contact-screws d^2 and h are likewise adjustable, so that the distance between their inner ends and the switch members $l\,l'$ can be properly regulated.

The three flexible conducting-cords d', f, and k^3 are provided at their ends with the usual pins or plugs, which are removably clamped in the binding-posts of the two handles B B'.

The operation of the apparatus is as follows: The upper switch member l of the armature j is normally caused to bear against the magnet contact or terminal h by the elastic arm of the armature, while the connection between the switch member l' and the induction-coil terminal d^2 is broken. Upon connecting the flexible conductors d', f, and k^3 with the proper binding-posts the electromagnet j is energized by the current, which latter passes from one pole of the battery through the contact-spring c^2, wire c^5, binding-post c^6, conductor k^3, binding-post k^2, wire k', contact-screw k, lever j', switch member l, contact-screw h, wire g, the electromagnet G, wire i, binding-post d, conductor d', binding-post c^4, and the contact-plate c^3 to the other pole of the battery. At the instant that the armature is attracted the switch member l leaves the contact-screw h and the switch member l' is brought in contact with the terminal screw d^2, thereby interrupting the magnet-circuit and switching the induction-coil into the battery-circuit, the current now passing from one pole of the battery through the contact-spring c^2, wire c^5, binding-post c^6, conductor k^3, binding-post k^2, wire k', contact-screw k, lever j', switch member l', contact-screw d^2, the primary coil of the induction-coil, binding-post d, conductor d', binding-post c^4, and contact-plate c^3 to the other pole of the battery. At the moment that this circuit is established the armature is retracted by its spring-arm and the position of the switch members $l\,l'$ is reversed, again establishing the magnet-circuit, and so on as long as the induction-coil of the electromagnet remains connected with the battery. By thus actuating the vibrator or circuit-interrupter by a separate electromagnet instead of directly from one end of the induction-coil the power of the battery is utilized to better advantage in operating the vibrator, rendering the latter reliable in action.

I claim as my invention—

1. The combination with an electric generator, of an induction-coil and an electromagnet, both included in the generator-circuit, and an automatic switch actuated by said electromagnet and operating to direct the current alternately through said induction-coil and said electromagnet, substantially as set forth.

2. The combination with an electric generator, and two branch circuits connected therewith and each provided with a terminal contact, of an induction-coil and an electromagnet arranged in said branch circuits, respectively, an armature operated by said electromagnet, an automatic switch vibrated by said electromagnet and arranged to bear alternately against the terminal contacts of said branch circuits, and body-contacts forming the terminals of the secondary coil of the induction-coil, substantially as set forth.

3. The combination with an electric generator, of an induction-coil having one of the terminals of its primary coil connected with one pole of the generator, an electromagnet having one of its terminals connected with the same pole of the generator, two contacts forming the other terminals of said electromagnet and said primary coil, a vibrator comprising an armature moved in one direction by said magnet and in the opposite direction by a spring, and switch members carried by said armature and arranged to bear alternately against said terminal contacts, and body-contacts forming the terminals of the secondary coil of the induction-coil, substantially as set forth.

4. The combination with an electric generator, of an induction-coil having one of the terminals of its primary coil connected with one pole of the generator, an electromagnet having one of its terminals connected with

the same pole of the generator, two contacts forming the other terminals of said electromagnet and said primary coil, a vibrator comprising an armature moved in one direction by said magnet and switch members carried by said armature and arranged to bear alternately against said terminal contacts, an elastic lever carrying said armature and included in the generator-circuit, and an adjustable contact also included in said circuit and bearing against said elastic lever, substantially as set forth.

Witness my hand this 21st day of August, 1900.

JOHN S. MEAD.

Witnesses:
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JNO. J. BONNER.