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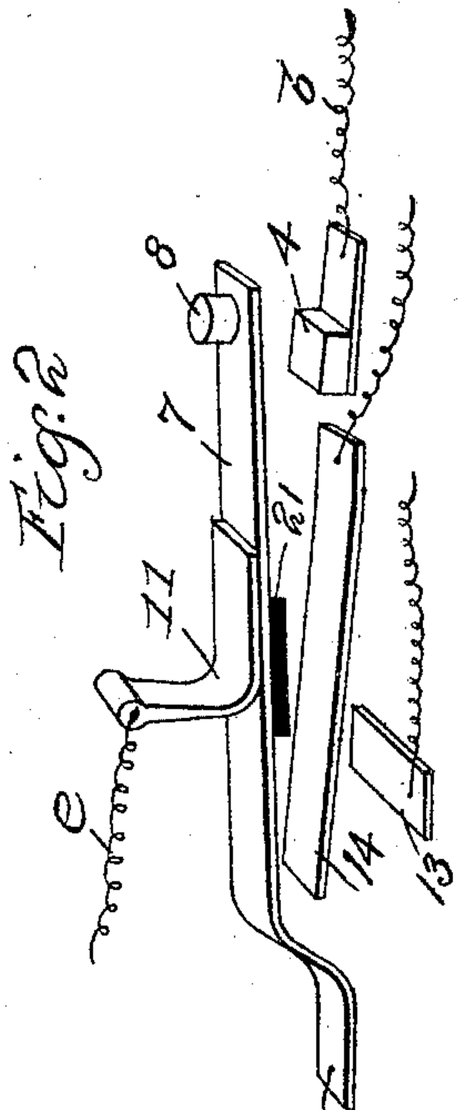
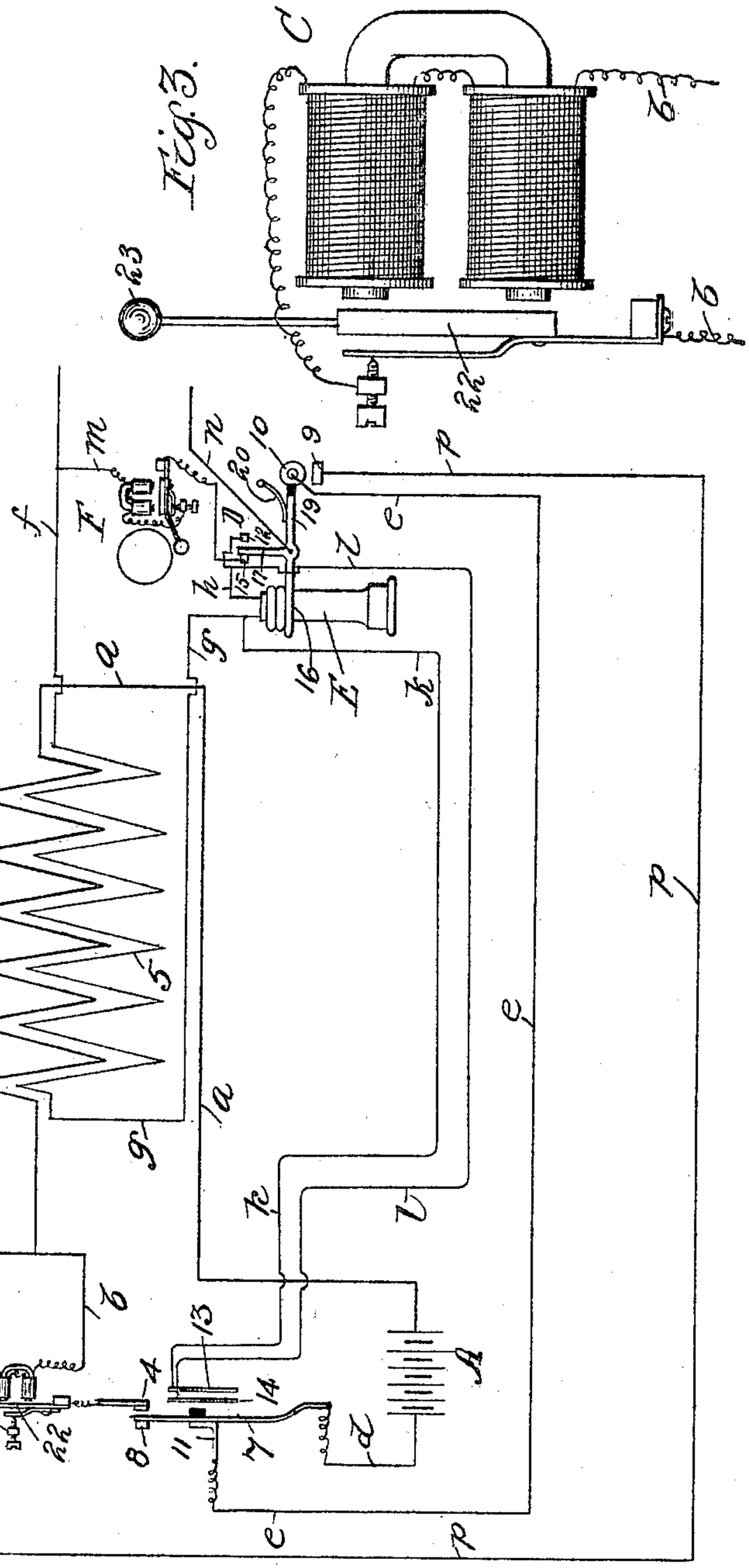
F. H. BROWN.

ELECTRIC SIGNALING APPARATUS FOR TELEPHONE SYSTEMS.

(Application filed May 3, 1897.)

(No Model.)





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UNITED STATES PATENT OFFICE.

FRED H. BROWN, OF CHICAGO, ILLINOIS.

ELECTRIC SIGNALING APPARATUS FOR TELEPHONE SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 622,646, dated April 4, 1899.

Application filed May 3, 1897. Serial No. 634,854. (No model.)

To all whom it may concern:

Be it known that I, FRED H. BROWN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Electric Signaling Apparatus for Telephone Systems, of which the following is a specification.

This invention relates to electric signaling apparatus for telephone systems.

The object of the invention is to provide a signaling apparatus for telephone systems that is simple, economical, and efficient and wherein the use of a magneto-generator is avoided.

The invention consists, substantially, in the construction, combination, location, and relative arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawings, and finally specifically pointed out in the appended claims.

Referring to the accompanying drawings and to the various views and reference-signs appearing thereon, Figure 1 is a view in diagram illustrating the principles of my invention. Fig. 2 is a detail view, slightly in perspective, showing the arrangement for cutting out of circuit the receiver at the local station when a signal is sent therefrom. Fig. 3 is a detail view showing a form of rheotome employed in connection with my invention.

In the drawings reference-sign A designates a suitable battery; B, an induction-coil, one terminal of the primary 6 of which is in circuit through connection *a* with one pole of the battery A. The other terminal of the primary 6 of the induction-coil is in circuit respectively through connections *b c* with a contact 4 and the local transmitter G. A suitable rheotome C is arranged in circuit with connection *b*, whereby when said circuit is closed between the poles of the battery A an interrupted current is sent through the primary 6 of the induction-coil. The other pole of battery A is in circuit through connection *d* with a suitable circuit-closing device, which, as shown, may comprise an arm or lever 7, normally held out of contact with contact 4 and which may be provided with a push-button 8, by which said arm may be moved to make contact with point 4 and close the battery-circuit therethrough, and thence through the primary 6 of the induction-coil. Of course it will be understood that I do not confine myself to this specific construction and arrangement, as many other forms of circuit-closing devices may be employed and still fall within the spirit and scope of my invention. The local transmitter G is in circuit through connection *p* with a contact 9, through which circuit is made or broken by a contact 10, carried by, but insulated from, a suitable lever D. The insulated contact 10 is included in circuit through connection *e* with a contact 11, with which the arm 7 contacts when said arm is in its normal position.

From the foregoing description it will be seen that when the battery-circuit is completed through contact 4—that is, when the lever or arm 7 is depressed to make contact therewith—the circuit is broken through arm 7 and contact 11 and the full strength of the battery-current energizes the primary coils 6 of the inductorium, the current being interrupted by means of the rheotome C. It will also be seen from the foregoing description that when the circuit is broken through contact 4—that is, when the arm 7 is released and is permitted to return to its normal position—circuit is completed through contact 11, and now if circuit should be completed through contacts 9 10 it will be seen that the battery-circuit is closed through the transmitter of the local station, and thence through the primary coils 6 of the inductorium.

I will now describe the leads of the secondary 5 of the induction-coils and the arrangement of the receiver, signal-bell, and the receiver cut out. One of the terminals of such secondary is included in circuit through connection *f* with the line-wire. The other terminal of the secondary 5 is included in circuit through connection *g* with the coils of the receiver E, and thence through connection *h* to an insulated contact-point 12. Two normally-separated contacts 13 14 are respectively in electrical connection through connections *k l* with connections *g h* at points respectively intermediate the induction-coil and receiver and the receiver and point 12. From this it will be seen that when circuit is closed between the points 13 14 the receiver is cut out or shunted from the circuit of the secondary of the induction-coils. A polarized signal-bell F of any suitable, conven-

ient, or well-known form of construction is arranged in circuit through connection *m* with the terminal connection *f* of the secondary of the induction-coil B and an insulated contact-point 15.

The lever designated generically by reference-sign D may and, as shown, preferably does comprise a three-armed lever, though I do not desire to be limited or restricted thereto, as many mechanical variations therefrom would readily suggest themselves to persons skilled in the art and still fall within the spirit and scope of my invention. In the particular form shown the three-armed lever is pivotally mounted, and one of the arms 16 thereof serves as a support for the receiver E, the weight of such receiver serving to cause another arm 17 to make constant contact with the point 15 and to break contact between points 9 10, said contact 10 being carried by, but insulated from, the third arm 19 of such lever. The lever D is in circuit through connection *n* with the return line-wire or the ground. The arm 17 of the lever is arranged to vibrate between and to respectively make contact with the points 12 15, according as the receiver is placed upon or removed from the arm 16 of lever D—that is, according as said lever D is rocked in one direction or the other. If desired, any suitable arrangement may be provided for rocking said lever, so that the arm 17 thereof may normally make contact with point 12, and the contact 10, carried by arm 19, may normally make contact with point 9. I have shown as illustrative of the idea a spring 20, arranged to effect this purpose.

In practice, and as clearly shown in Fig. 2, I prefer to arrange the contacts 13 14 in position to be closed upon each other when the arm 7 is depressed to break the circuit through contact 11 and to complete the circuit through contact 4. It is important, however, that the strips or contacts 13 14 be insulated from said arm 7, and therefore I mount a strip 21 of insulation on said arm and I arrange the contacts 13 14, which may be in the form of springs superposed upon, but normally out of contact with, each other, in position for the top one of said springs or strips to be engaged by the block or strip of insulation 21, carried by said circuit-closing arm 7, and depressed into contact with the other of said springs or strips when said arm is depressed, as above explained.

The operation will be readily seen and understood from the foregoing description and is as follows, supposing the parts to be in their normal position and the receiver hung upon the arm 16 of the lever D: Now suppose it is desired to signal the local from a distant station. The current sent over the line-wire from the distant station will take the following course: through connection *f*, connection *m*, signal-bell F, to point 15, through arm 17, and return, or to ground through connection *n*. Thus it will be seen that the call or signal bell is sounded, and the current which effects such work is not required to traverse at the local station any circuit in which is interposed a resistance, and therefore the full energy of the signaling-current is utilized in effecting a sounding of the bell. When the call or signal has been received at the local station, the receiver is removed from its support on arm 16 of lever D, and thereupon the circuit in which the signal or call bell F is located is broken by the arm 17 breaking contact with point 15 and making contact with point 12. At the same time the circuit is closed through points 9 10. From this it will be seen that the circuit through the receiver is closed as follows: from the line-wire through connection *f*, the secondary coils 5 of the induction-coils, connection *g*, the receiver, connection *h*, point 12, arm 17, and the return or ground connection *n*. Thus a person at the local station can receive the transmitted message and can send a message in the following manner: The primary 6 of the induction-coils under the above conditions is included in the following closed circuit with the battery A: from one pole of the battery through connection *d* to arm 7, contact 11, connection *e*, contact 10, contact 9, connection *p*, the local transmitter G, connection *c*, the primary coils of the inductorium B, and connection *a* to the other pole of the battery. The variable resistance interposed in this circuit by reason of the vibrations of the diaphragm under the influence of the sound-waves of the voice against the variable contact of the transmitter in the well-known manner varies the current flowing through the primary of the induction-coil and reproduces the electrical undulations or impulses in the secondary coil, and hence in the line-circuit, and hence also in the receiving instrument at the distant station, in a manner well understood. Now suppose it is desired to send a signal from the local station. The parts being in their normal position and the receiving instrument E being supported upon the arm 16 of the lever D, the receiver E is removed from its support and circuit-closer 7 is depressed, as by means of the push-button 8, thereby breaking the circuit including contact 11 and completing the circuit through connection *d*, circuit-closer 7, contact 4, rheotome C, connection *b*, the primary coils of the inductorium, and connection *a* to the battery A. Thus the full strength of the battery-current is utilized in energizing the primary of the induction-coils, and by reason of the interruptions in said circuit, due to the location therein of the rheotome C, an induced current is generated in the secondary of such induction-coil, which current flows from the terminals of such secondary through the connection *f* to line and connection *g*. Now it will be remembered that the actuation of the circuit-closer 7 effects a closing of the contacts 13 14 upon each other, and therefore instead of the induced current flowing through the local re-

ceiver such receiver is shunted, the induced current passing from connection *g* through connection *k*, contacts 13 14, connection *l*, connection *h*, contact 12, arm 17 of lever D, and thence to line or ground wire *n*, thereby effecting an actuation of the signal or call bell at the distant station and the signaling-current being shunted around the local receiver. The removal of the receiver establishing circuit through contact 12 to arm 17 and through contact 9 to contact 10, it will be seen that immediately on releasing the circuit-closer 7—that is, upon reëstablishing the battery-circuit through contact 11 and the primary of the induction-coils—the apparatus is in proper relation to transmit as well as to receive messages.

In order that the rheotome C, which is placed in the circuit of the primary of the induction-coil, may be operative for accomplishing the duties required of it, although placed in the battery-circuit—that is, in order to prevent a too rapid make and break of this circuit—I suitably weight the armature 22 of such rheotome, as shown at 23, Fig. 3, the inertia of such weighted armature serving to prevent a too-rapid vibration of such armature, and hence serving to prevent a too-rapid make and break of the circuit. This is necessary, as will be readily seen, in order to secure a synchronous action of such rheotome and the signal-bell at the distant station. In other words, I employ a polarized bell F for the signal-bell, and in order to reduce the frequency of alternation in the secondary of the induction-coil to a point enabling the vibrator of the receiving or signal bell to perform its mechanical movements or vibrations in harmony therewith I reduce the frequency of interruption of the primary current, and to that end I weight the armature of the rheotome C, so that the inertia thereof will lessen its rapidity of vibration to the required degree.

While I have shown only one inductorium, it is obvious that in order to reduce resistance I may employ two or more or any desired number of such coils with the primaries connected up in multiple, as will be readily seen and understood by persons familiar with the art. I therefore do not desire to confine or limit myself to the exact number of inductoriums employed.

From the foregoing description it will be seen that I provide an exceedingly-simple signaling apparatus for telephone systems—one which is thoroughly efficient and economical and one wherein the use of a magneto or other form of generator operated by hand is avoided and entirely dispensed with.

In my companion application, Serial No. 634,853, filed of even date herewith, I have shown an arrangement wherein the signal is produced by the harmonic vibrations of the diaphragm of the receiver. I do not, therefore, claim such specific arrangement herein.

Many variations, changes, and alterations in the details of construction and arrangement would readily suggest themselves to persons skilled in the art and still fall within the spirit and scope of my invention. While, therefore, I have shown and described a specific construction and arrangement as illustrative of an operative embodiment of the principles of my invention and as embodying the best form and arrangement in which I at present contemplate carrying my invention into practice, I do not desire to be restricted thereto; but,

Having now set forth the object and nature of my invention and a form of apparatus embodying the same and having explained the construction, arrangement, function, and mode of operation thereof, what I claim as new and useful and of my own invention, and desire to secure by Letters Patent of the United States, is—

1. In a signaling apparatus for telephone systems, an induction-coil, a battery having one of its terminals connected to one terminal of the primary of said induction-coil, a circuit connection leading from the other terminal of said battery, a switch-lever arranged in said circuit, a pair of contacts so relatively arranged with respect to said switch-lever that when said lever is contacting with one of said contacts it is out of contact with the other, a circuit connection from one of said contacts to the other terminal of the primary of said induction-coil, an electromagnetic interrupter arranged in said circuit connection, an auxiliary-circuit connection leading from the other of said contacts, a local transmitter arranged in said auxiliary-circuit connection, means for normally holding said switch-lever in position to close said auxiliary circuit to the battery, and to open the electromagnetic interrupter-circuit, a line-wire included in circuit with the secondary of said induction-coil and a distant signaling device arranged in said line-circuit, as and for the purpose set forth.

2. In a signaling apparatus for telephone systems, an induction-coil, a battery having one of its terminals connected to one terminal of the primary of said induction-coil, a circuit connection leading from the other terminal of said battery, a switch-lever arranged in said circuit, a pair of contacts so relatively arranged with respect to said switch-lever that when said lever is contacting with one of said contacts it is out of contact with the other, a circuit connection from one of said contacts to the other terminal of the primary of said induction-coil, an electromagnetic interrupter arranged in said circuit connection, an auxiliary-circuit connection leading from the other of said contacts, a local transmitter arranged in said auxiliary-circuit connection, means for normally holding said switch-lever in position to close said auxiliary circuit to the battery, and to open the electromagnetic interrupter-circuit, a local receiver, a switch actuated thereby for opening or closing said auxiliary-circuit connection, the secondary of said induction-coil being arranged in the line-

wire circuit and a signal-bell arranged in said line-wire circuit, as and for the purpose set forth.

3. In a signaling apparatus for telephone systems, an induction-coil, a battery arranged in circuit with the primary of said induction-coil said circuit being normally open, a transmitting instrument, a receiving instrument, a support for said receiving instrument forming a switch adapted to cut out of circuit said transmitting instrument when the receiving instrument is placed thereon and to cut into circuit said transmitting instrument when said receiving instrument is removed, an electromagnetic interrupter arranged in the normally open circuit from the battery to the primary of said induction-coil, a switch-lever, contacts controlled thereby, one of said contacts arranged in circuit with said transmitting instrument and another of said contacts arranged in circuit with said interrupter and said battery, whereby when said lever is moved into connection with one of said contacts said transmitter is cut out of circuit with the primary of the induction-coil and said interrupter and battery are cut into said primary circuit, regardless of the receiver-switch, a line-wire included in circuit with the secondary of said induction-coil and a signal-bell arranged in said line-circuit, as and for the purpose set forth.

4. In a signaling apparatus for telephone systems, an induction-coil, a battery having one of its terminals connected to one terminal of the primary of said induction-coil, a wire leading from the other terminal of said battery, a switch-lever electrically connected to said wire, an auxiliary circuit, contacts controlled by said switch-lever, one of said contacts arranged in said auxiliary circuit, an electromagnetic interrupter arranged in circuit with another of said contacts and with the other terminal of the primary of said induction-coil, a transmitter arranged in said auxiliary circuit, a line-circuit including the secondary of said induction-coil, a receiving instrument, a support therefor, contacts controlled by said support, one of said contacts arranged in said auxiliary circuit whereby when said receiver is removed from its support said auxiliary circuit is closed and when said receiver is replaced upon its support said auxiliary circuit is opened, without regard to the opening and closing of said auxiliary circuit by the actuation of said switch-lever, a circuit in shunt with the line-circuit at the distant station, a signal device arranged in said shunt-circuit, said shunt-circuit arranged to be opened by the removing of said receiving instrument at the distant station from its support, a shunt-circuit for the local receiver and a switch actuated by the movements of said switch-lever for closing said shunt-circuit, as and for the purpose set forth.

In witness whereof I have hereunto set my hand, this 30th day of April, 1897, in the presence of the subscribing witnesses.

FRED H. BROWN.

Attest:
J. R. BELL,
S. E. DARBY.