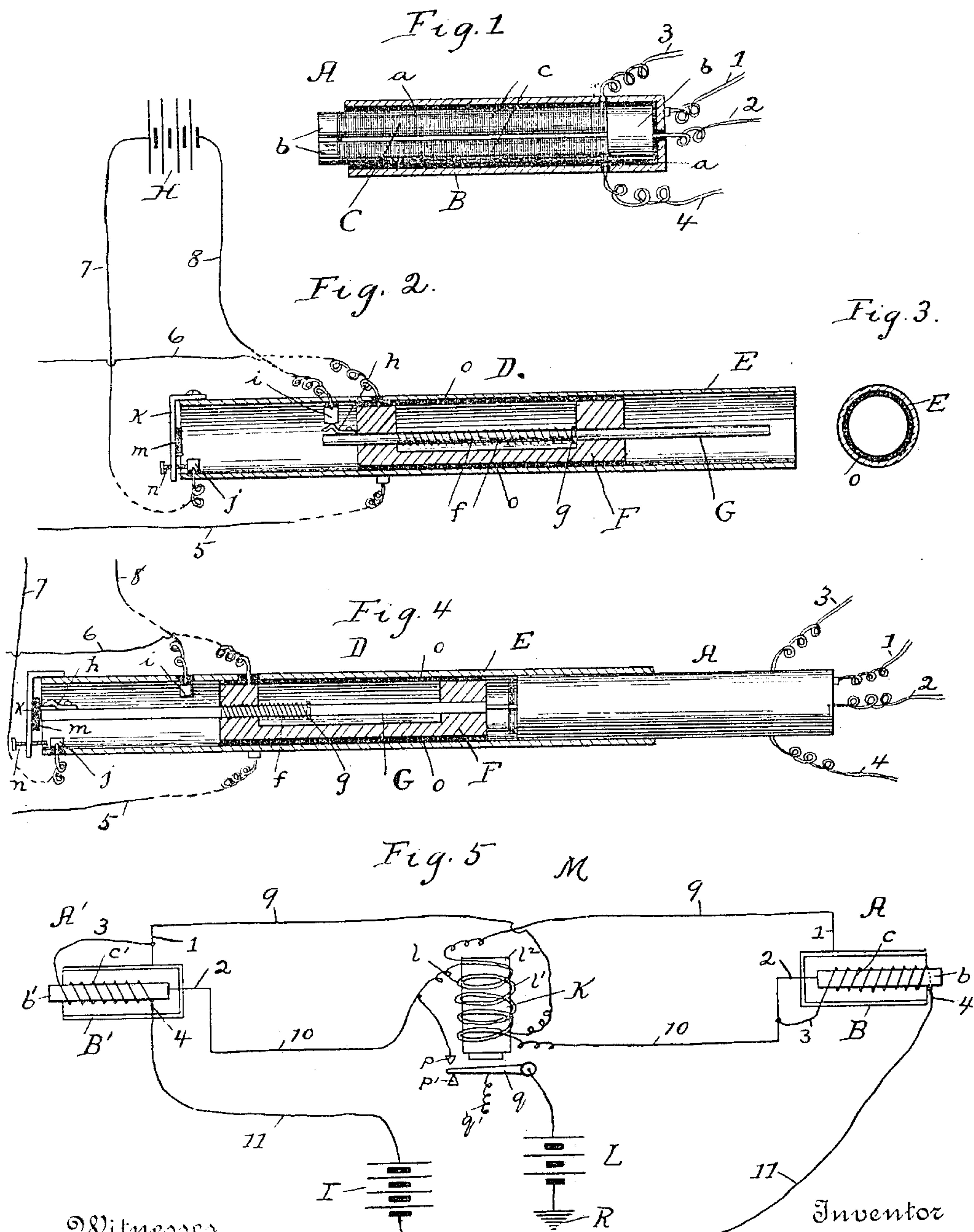


No. 818,767.

PATENTED APR. 24, 1906.

I. KITSEE.  
TELEPHONIC DEVICE.  
APPLICATION FILED JUNE 15, 1903.

2 SHEETS—SHEET 1.



Witnesses  
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Inventor  
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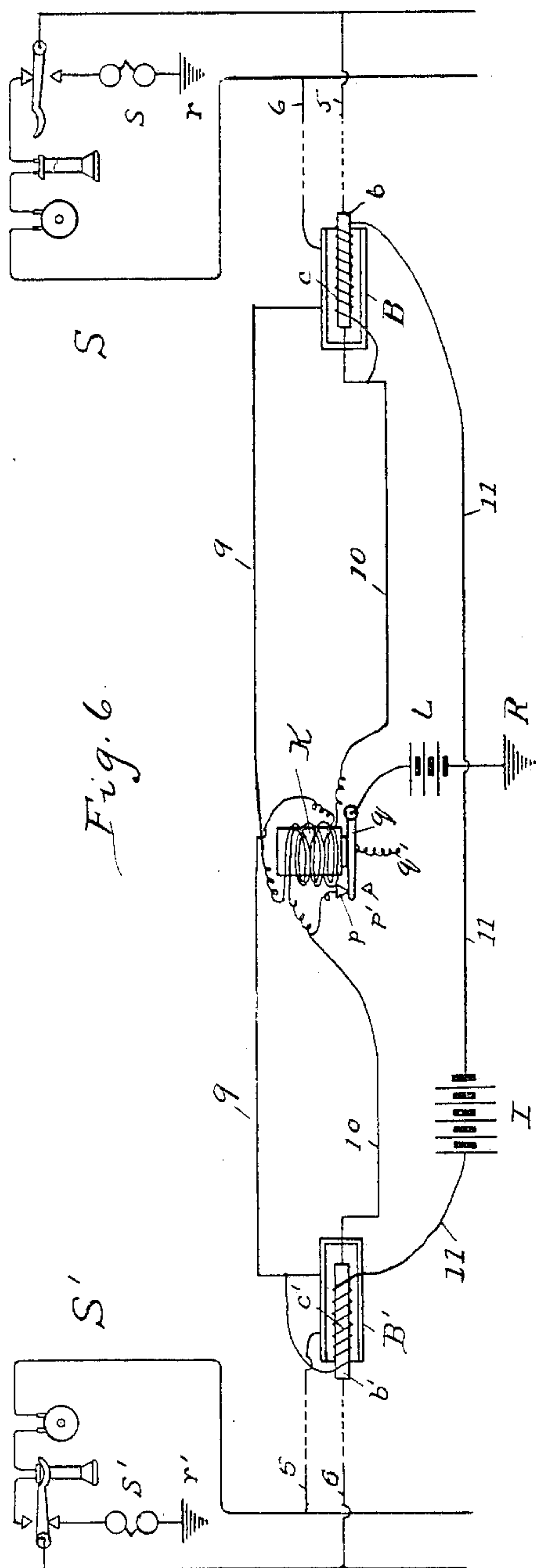


Fig. 6

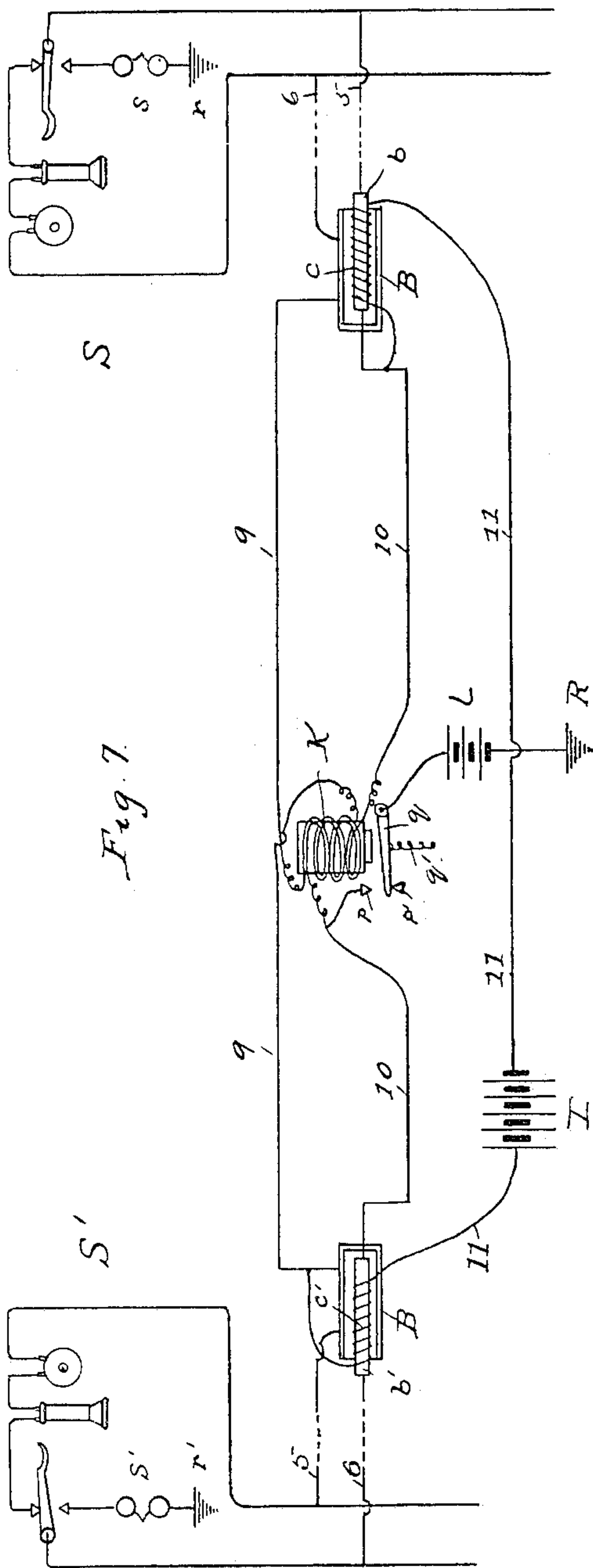


Fig. 7

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# UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA.

## TELEPHONIC DEVICE.

No. 818,767.

Specification of Letters Patent.

Patented April 24, 1906.

Application filed June 15, 1903. Serial No. 161,619.

*To all whom it may concern:*

Be it known that I, ISIDOR KITSEE, of the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Telephonic Devices, of which the following is a specification.

My invention relates to an improvement in telephonic devices, and has more special references to the plug and jack for same used in central stations.

Two substations are today connected for the purpose of intercommunication through what is technically called "connecting-cord" or "plug." The main operations are as follows: The operator is made aware of the calling of the subscriber through the lighting of the lamp connected to the respective circuit. She ascertains the number of the subscriber called for, inserts one plug of the cord-circuit into the jack of the circuit calling and one plug into the jack of the circuit to be called. She then rings up the desired subscriber, and these two subscribers' circuits are, after the second subscriber has answered, ready for intercommunication. When the conversation is at an end—that is, when one or the other of the subscribers has replaced his receiver on the hook—the operator is made aware of the fact through supervisory and pilot lamps and has then to take these plugs out of their respective jacks and clear the line.

It is the object of my invention that the manual labor consisting of the clearing of the line should be dispensed with, and it is also the aim of my invention that the ringing up should be automatically performed.

For this purpose my invention consists in the devices and arrangements as will hereinafter be described, illustrated in the drawings, and more clearly pointed out in the claims following the specification.

Referring to the drawings, Figure 1 is a longitudinal section through the plug, the magnet being in elevation. Fig. 2 is a longitudinal section through one of the jacks of the switchboard, showing the same in its normal position and its connection diagrammatically to a source of electricity. Fig. 3 is an end view of the shell or tubing of this jack with its inner insulation. Fig. 4 is a longitudinal section of one of the jacks, showing a plug inserted in same. Fig. 5 is a diagrammatic view of the plug-circuit. Fig. 6 is a diagrammatic view illustrating two sub-

scribers' stations connected together through my improved plugs, one of the stations being rung up. Fig. 7 is a similar view illustrating the same circuits in a position ready for communication.

In Fig. 1, A is the plug proper, consisting of the conducting shell or tube B, the electromagnet C, embracing the soft-iron core *b*, and the coils *c*. The plug also embraces the insulation *a*, insulating the electromagnet and core of same from the shell or tube B. The shell is electrically connected with wire 1, the core *b* is electrically connected with wire 2, and the terminals of the coils *c* are electrically connected with the wires 3 and 4. I have after repeated experiments found that the electromagnet, substantially as illustrated in Fig. 1 and substantially of the same dimensions, is best adapted for the purpose in view. Each of the legs of this electromagnet is of semicircular form and the windings consist of four layers of No. 30 wire. The outer diameter of this plug is one-half inch and the length of the plug is substantially about two and three-fourths inches. With three cells the electromagnetic pull of the core is sufficiently strong for all purposes; but it is obvious that the shape of the core, as well as the number of windings of the coils, may differ according to requirements.

In Fig. 2, which illustrates the preferred form of the jack, D is the jack proper, embracing the conducting shell or tube E, the stationary soft iron F, the movable conducting piece or rod G, preferably held in position with the aid of the spring *f* and the collar *g*. To this movable conductor or rod is secured the contact *h*, here in the shape of a spring, and to the shell E is secured the contact *k*, provided with the adjustable screw *n*. This contact is adapted to be pressed outwardly with the aid of the movable conductor or rod G. To the shell are secured, but insulated therefrom, the stationary contacts *i* and *j*. The shell E is electrically connected to the wire 5, this wire being a continuation of one of the line-wires of the outlying subscriber's station, and the stationary piece of soft iron F is in electrical connection with wire 6, being a continuation of the second line-wire of the outlying subscriber's station. To the contacts *i* and *j*, respectively, is connected, through wires 8 and 7, the source of current H. I have not illustrated the different de-



vices usually placed in the circuit of one or the other of the subscriber's lines—such, for instance, as an annunciator or operator's phone, &c.—because these devices do not form part of my invention and may be placed at any desired points in the circuits 5, 6, 7, and 8, as is indicated in the drawings by the dotted lines. The outer shell E is insulated from the soft iron F by the insulation *o*, which I preferably make in the shape of a paper tube fitting over the piece of soft iron. The contact *k* is provided with the insulation *m*. Normally, therefore, the electrical connection of the jack D is as follows: The two line-wires of the respective circuit are connected, through 5 and 6, with the shell and soft iron, respectively. The movable rod G, and therefore the soft iron F, is, through the spring *h* and contact *i*, electrically connected with one pole of the battery H. The shell E is, through contact-point *j*, screw *n*, and contact *k*, in electrical connection with the other pole of the battery H. When, therefore, the subscriber closes his circuit, the current generated at H will flow through 7, *j*, *n*, *k*, 5 and will return through 6, F, G, *h*, *i*, and 8 to the other pole of said battery, not counting the intervening devices inserted in the circuits 5 6 or 7 8. The subscriber therefore is enabled to call up the operator through the closing of the circuit at his station to actuate such annunciating device as lamps, &c., and to communicate with her with the aid of her phone inserted in one or the other of the circuits described.

In Fig. 4 the plug, as illustrated in Fig. 1, and the jack, as illustrated in Fig. 2, are shown; but the plug is illustrated as being inserted into the jack in a manner so as to make electrical contact with same and to break the electrical contact of the jack with the source of current H. As was illustrated in Fig. 1, the shell B of the plug A is electrically connected to wire 1, and as this shell is now, with the plug inserted in the jack, in electrical connection with the shell E of said jack, it follows that wire 1 is electrically connected with the circuit-wire 5 of the outlying subscriber's station, and as, as is illustrated in Fig. 1, the wire 2 is connected to the core *b* of the electromagnet C, and as this core is now in electrical contact with the soft iron F of the jack it follows that wire 2 is electrically connected with the circuit-wire 6 of the outlying subscriber's station. At the same time the former connection of the shell E with wire 7 of the battery H and the former connection of the soft iron F with wire 8 of the same battery is broken.

In Fig. 5, M is the connecting-cord as an entirety, of which A and A' are the plugs proper. 9 and 10 are the conducting-lines of the cord, line 9 being connected, through wires 1, with the shells B and B', respec-

tively, and line 10, through wires 2, with the cores *b* and *b'*, respectively. One of the terminals of the coils *c* is connected, through wires 4 and 11, to one pole of the battery I, the other pole of which is connected, through wires 11 and 4, with one terminal of the coil *c'*. The second terminal of the coil *c* is connected, through wire 3, with the cord-line 10 and the second terminal of the coil *c'* is connected, through wire 3, with the cord-line 9. The battery I is therefore connected in multiple arc as to the two cord-lines 9 and 10. As long as these two lines 9 and 10 are not connected at their terminals—that is, as long as the shell B is not connected electrically with the core *b* or the shell B' not connected electrically with the core *b'*—the circuit of the battery I is open and no current will flow through its circuit or through the coils to the cord-lines; but as soon as either B is connected with *b* or B' is connected with *b'* a path for the electric current is established. In the lines 9 and 10 are inserted the coils *l* and *l'* of the electromagnet K in a manner so that if the current is flowing in the same direction through 9 and 10 simultaneously the action of one of the coils on the soft-iron core *l*<sup>2</sup> will be neutralized through the action of the second of said coils on said core, and this core will therefore remain in its neutral or unmagnetized state; but if the current is only flowing through line 9 or through line 10 alone, then the coil connected to such line will be in a position to energize the core *l*<sup>2</sup>. In proximity to the core *l*<sup>2</sup> is the armature *q*, normally resting on the contact *p'* through the action of the spring *q'*, but adapted to be contacted with the contact *p* as soon as the core *l*<sup>2</sup> is energized. This armature *q* is connected with one pole of the source of current L, grounded with the other pole at R. Normally therefore—that is, when the electromagnet K is not active—the circuit of the battery L is not closed and no current will flow through the same.

In Fig. 6 the connecting-cord is shown in operation and connecting the subscribers' stations S and S'. It is assumed that the station S has called up the central and that the operator has connected the circuit of S with the circuit of the subscriber asked for, (in the drawing illustrated, as S'.) This subscriber has not as yet answered. As will be seen, the usual bridge-circuit at the subscriber's stations is entirely omitted, so also are the derived circuits containing the alternating bell and condenser omitted. Instead of these derived or bridge circuits, circuits are established to the ground *r* and *r'*, including the ordinary make-and-break bells *s* and *s'*, adapted to be actuated by a direct current. The normal position of the device and arrangement of circuits at the subscriber's station are shown at S' and the arrangement of



the circuits adapted to communicate either with the central or with a second subscriber is illustrated at S. As said above, this figure illustrates the connection of two subscribers, wherein one subscriber has called for a connection with a second subscriber and wherein the central is in the act of calling up this second subscriber. The electrical connection in this case is as follows: From the battery I the current will flow through the coil  $c'$ , wire 9, shell B, wire 6, through the line of the subscriber and devices inserted in said line back through the second line, wire 5, core  $b$ , coil  $c$ , and wire 11 to the other pole of the battery. The path, including wires 5 and 6 and line-wires of  $S'$ , is interrupted for the reason that the lever at the subscriber's station is still at the lower point and out of contact with the upper contact. At the same time the current flowing through 9, and therefore the coil attached to said line, will energize the core of the electromagnet K, thereby bringing in contact the armature  $q$  with the contact  $p$ , establishing a circuit for the battery L, as follows: Battery L, armature  $q$ , contact  $p$ , part of line 10, core  $b'$ , wire 6, one line of the subscriber's circuit, bell  $s'$ , ground  $r'$ , ground R, back to the battery L. The bell, as stated above, is supposed to be of the usual type of make and break and will therefore ring as long as the lever will be in contact with the grounded circuit. In Fig. 7 the same connection is shown as in Fig. 6 with the exception that the subscriber at station  $S'$  has through the removing of his receiver from the hook, answered the call and with the exception that through this removing the lever, formerly in contact with the grounded circuit, is now out of contact with same and is contacted with the other line of its main circuit. Through the breaking of this grounded circuit the path for the current of the battery L is interrupted and the bell will cease ringing. At the same time through the closing of the main line at  $S'$  a second path is established for the battery I, and this path consists of wire 11, connecting the positive pole to coil  $c'$  through said coil, wire 5, one leg of the main subscriber-line, and back through the second leg of said line, wire 6, core  $b'$ , wire 10, coil  $l'$ , through part of wire 10, coil  $c$ , back to the battery through wire 11. The current generated by this battery I has therefore a double path. One path includes cord-wire 9 and coil  $l$  and the second path includes wire 10 and coil  $l'$ , and as the action of these two coils is to oppose each other in their magnetizing effect on the core  $l^2$  it is obvious that this core will be demagnetized and the armature  $q$  will fall away from the point  $p$  and will come to rest at  $p'$ . It is proposed that the battery I shall furnish the "talking-currents," and both of these subscribers S and  $S'$  can now commu-

nicate with each other. I have not taken into consideration in the description of these two figures the intervening devices placed in the central station and I have not taken into consideration the different parts of the jack into which in reality the plugs are inserted, and I have shown the two wires 6 and 5 as being directly connected without the intervention of any jack parts to the plug proper, this for the purpose of simplification.

From the description so far it can be deduced, first, normally the subscriber-circuit is connected through the jack with the battery H, and the subscriber has it in his power, through the closing of his circuit at his station, to call up the central and communicate therewith; second, the operator at central, after having ascertained the wishes of the subscriber and after having ascertained that the called-up subscriber is not busy, connects the two subscribers, calling and called for, by simply placing the two plugs of one plug-circuit into the respective jacks; third, as the circuit of the subscriber calling is closed the battery attached to this plug-circuit will energize the electromagnet of both plugs, and both plugs will therefore adhere to the jack by magnetic action; fourth, the circuit called for will be automatically "rung up" through the action of the grounded battery; fifth, the ringing will cease automatically as soon as the called-for subscriber has answered; sixth, as long as one or the other of the subscribers wishes to communicate the plugs will remain in their position, but will be automatically released as soon as both subscribers have placed their receivers on the hooks, for the reason that then both paths for the battery connected to the cord-circuit are interrupted.

Among the other advantages of this system are the following: First, at the subscriber-station it is not necessary to place the comparatively dear alternating bells and condensers; second, it is not necessary to bridge or otherwise branch the main circuit at such station; third, at the central station it is unnecessary to have generators of alternating currents and to transmit such currents of sufficient strength to actuate bells, which transmission is always harmful; fourth, at the central such devices as supervisory or pilot lamps will be made unnecessary, and, in fact, the whole arrangement of connecting and disconnecting be simplified.

I have described this system in conjunction with the automatic ringing up; but it is obvious that this feature may be dispensed with without departing from the scope of my invention.

I have illustrated the tube or shell E of the jack as to extend beyond the stationary soft iron F, for the reason that the plug when inserted should be to a great part inclosed in



said tube, so that falling plugs will not be able to disturb its position.

The manner of forming all contacts is illustrated in the most convenient form; but it is obvious that the shape of same may vary according to requirements.

Wherever I have in this specification or in the claims following this specification referred to "connecting-cord" or "cord-plug," I understand under the same the device necessary to connect electrically two outlying stations with each other for the purpose of intercommunication. From the illustration and description of same it is apparent that the connecting-cord carries the current necessary for intercommunication between the two subscribers connected. It is also apparent that the circuit including the source of current is in multiple arc as to the circuits connected. It is therefore advisable that the shunting of telephonic circuits through such bridge should be prevented, and the coils *c* and *c'* may be made to act as the necessary impedance; but where a separate impedance is desired such may be inserted in the circuit in any of the well-known manners.

I have described and illustrated the connecting-cord as to embrace two plugs, each provided with electromagnetic means; but in some systems each subscriber in charge of an operator is provided with a separate cord normally connected to his circuit. In this case, as is obvious, the connecting-cord does not need to embrace two plugs, and the connecting means therefore needs only to include one plug and only one connecting-magnet.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In telephony a connecting-cord consisting of the cord proper, two plugs electrically connected to said cord, each of said plugs embracing an electromagnet and a source of current, said source of current connected in multiple arc as to the two conductors of said cord.

2. In telephony a device adapted to connect two outlying circuits electrically with each other, said device consisting of two conducting-lines, two plugs carrying the terminals of said lines, each plug provided with an electromagnet, a third line including a source of current and connected to the first two lines, said third line including the coils of said electromagnets.

3. In combination with two jacks to which the terminals of two outlying telephonic circuits are electrically connected, a connecting-cord consisting of two metallic conductors constituting the line proper, two plugs carrying the terminals of said conductors and adapted thereby to connect said conductors with said jacks, each plug provided with an

electromagnet connected to a current-carrying circuit, said current-carrying circuit in electrical contact with said lines.

4. In combination with two outlying telephonic circuits, a jack for each of said circuits, each jack embracing a stationary soft iron and stationary and movable contacts, a plug for each of said jacks, each plug embracing an electromagnet and connecting means, said connecting means comprising metallic lines constituting the cord proper and a third line containing a source of current.

5. In combination a connecting-plug and jack for same, the plug-embracing means, electromagnetic in their action, to retain the same in position when placed in said jack, said jack normally connected to a source of current.

6. As a means to electrically connect two telephonic circuits, a connecting-cord consisting of two conductors insulated from each other but electrically connected to a circuit containing a source of current, two electromagnets inserted in said circuit, each of said electromagnets carrying one of the terminals of each of said conductors.

7. In telephony, a connecting-cord, an electromagnet provided with two coils, each of said coils connected to one of the lines forming said cord, in a manner so that the energizing influence of the coil inserted in one of said lines is neutralized by the energizing influence of the coil inserted in the second of said lines and means in proximity to the core of said electromagnet to connect to one or the other of said lines a grounded source of electricity.

8. In combination with the terminals of two telephonic circuits a connecting-cord electrically connecting said terminals with each other, said cord provided with means, electromagnetic in their action, to retain said connection as long as one or the other of said telephonic circuits is closed at the station of said circuit, and to break said connection automatically as soon as both of the circuits are open at their respective stations, said connecting-cord carrying with it the energy necessary for intercommunication between said stations.

9. In telephony, means to connect two outlying circuits, in combination with two jacks carrying the terminals of said outlying circuits, said jacks normally connected to one source of current and adapted to be disconnected from said source and connected with a second source through the insertion of the plugs of said connecting means, said jacks embracing stationary soft iron.

10. In a telephonic system wherein two or more outlying stations center in one exchange a connecting-cord for said exchange, said connecting-cord adapted to connect two of said outlying stations for the purpose of

intercommunication, and embracing three  
conducting-lines, two electromagnetic plugs,  
and a source of current, this source of current  
connected through the coil of one of said  
5 electromagnetic plugs to one line of said plug and  
connected through the coil of the second  
electromagnetic plugs to the second line of  
said plug.

In witness whereof I hereby sign my name,  
in the presence of two subscribing witnesses, 10  
this 12th day of June, A. D. 1903.

ISIDOR KITSEE.

Witnesses:

EDITH P. STILLEY,  
R. W. WILLRAHAM.