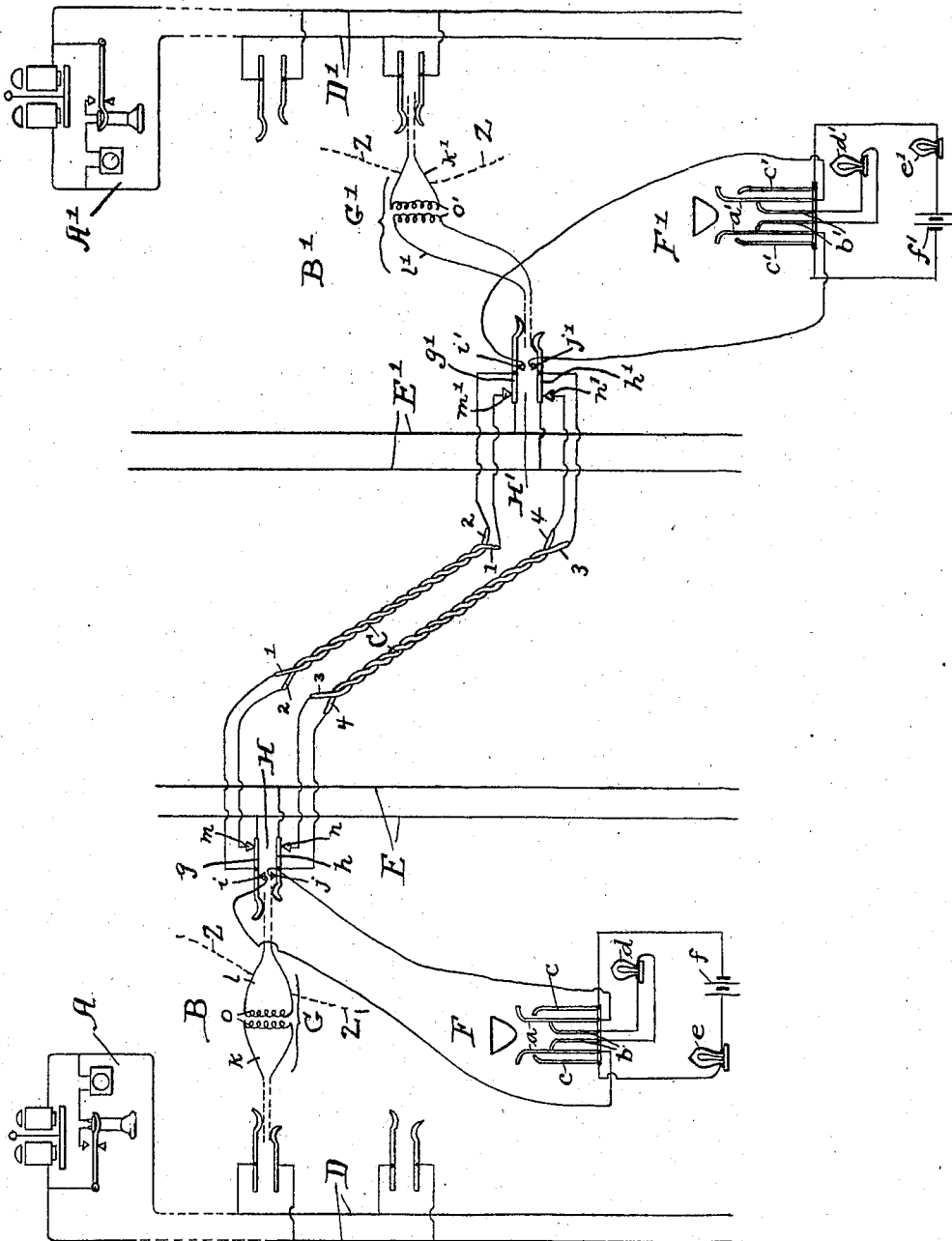


No. 824,032.

PATENTED JUNE 19, 1906.

I. KITSEE.
TELEPHONY.

APPLICATION FILED APR. 10, 1905.



Witnesses
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TELEPHONY.

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No. 824,032.

Specification of Letters Patent.

Patented June 19, 1906.

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To all whom it may concern:

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

My invention relates to an improvement in telephony, and has more special reference to a system of long-distance telephony wherein two metallic circuits are connected together with the interposition of an inductive circuit.

In the drawing, which illustrates in diagrammatic view my invention, A is an outlying or subscriber's station located in one city, and A' is an outlying or subscriber's station located in a second city more or less remote from the first.

B is a center or exchange in the first city, and B' a center or exchange in the second city.

C is the line of transmission, running between the two cities and connecting these two exchanges with each other.

In both exchanges similar characters indicate similar parts, with the exception that in the second or right-hand station the designation of the various parts has the numeral "1" added thereto—in other words, the right-hand exchange is a duplication of the left-hand exchange.

D is the switchboard, usually employed in such exchanges, and as this switchboard and the connection of its jacks may be substantially the same as now practiced in the leading systems I only illustrate in conventional signs part of said switchboard without showing in detail the construction and connections of the same.

G is the connecting-cord in its entirety, consisting of the two circuits *k* and *l*, inductively related to each other through the repeating device *o*.

E is a long-distance switchboard provided with the jack H. This jack consists of the two movable parts *g* and *h* and also the stationary contacts *i*, *j*, *m*, and *n*. These stationary contacts *i* and *j* are connected with what is technically called the "annunciating-key"—that is, a type of switch whereby with the aid of the movable part annunciating devices are brought in and out of contact with the jack-circuits. In the drawing this switch arrangement is designated as an entirety by the letter F. The stationary contacts *i* and *j*

are normally connected to the pair of spring-contacts *a* of the switch F. This pair of contact-springs *a* are connected with the pair of spring-contacts *b*, including in their circuit the annunciating device, here shown as the lamp *d*.

c represents a pair of spring-contacts normally out of contact with the pair *a* and include in their circuit the battery *f* and the annunciating device *e*, also shown as a lamp.

The line of transmission C consists of two pairs of wires, one pair comprising the insulated conductors 1 and 2 and the other pair comprising the insulated conductors 3 and 4. 1 and 2 are twisted together so as to produce a great inductive effect on each other, and 3 and 4 are also inductively twisted together. At the exchange B the near terminal of 1 is connected to the movable part *g* of the jack H and the near terminal of 4 is connected to the other movable part *h* of said jack. The near terminals of 2 and 3 are connected to the stationary contacts *m* and *n*, respectively. At the exchange B' the near terminal of 2 is connected to the movable part *g'* and the near terminal of 3 to the movable part *h'* of the jack H', while the near terminals of 1 and 4 are connected to the stationary contacts *m'* and *n'*, respectively.

As long as the jacks are in their normal condition—that is, as long as the stationary contacts connect with the movable parts of the jacks—the pair of wires 1 and 2 are metallically connected to each other in the exchange B through *m* and *g*, and at the exchange B' through *m'* and *g'*, and the pair of wires 3 and 4 are metallically connected with each other in the exchange B through *n* and *h* and in the exchange B' through *n'* and *h'*. The pair of wires 1 and 2 are electrically connected to the wire pair 3 and 4 in the exchange B through the spring pair *a* connecting with the pair of springs *b*, circuiting as to each other through the lamp *d*. At the exchange B' the pair of wires 1 and 2 are in electrical connection with the pair of wires 3 and 4 through the pair of springs *a'* connecting with the pair of springs *b'*, circuiting as to each other through the lamp *d'*.

It is supposed that the subscriber of station A has called up the exchange B for the purpose of communicating with the subscriber at station A'. The operator at the exchange B manipulates the annunciating-

key F in a manner so that the spring-contacts *a* disconnect from the spring-contacts *b* and connect with the pair of spring-contacts *c*. The lamp *d* is therefore cut out and the battery *f* with the lamp *e* is placed in the circuit. The flow of the battery starting from the positive pole will therefore be through lamp *e*, lighting the same, through one of the contacts of the pair *c*, through one of the contacts of the pair *a i g m* and 1 and 2, will flow through this circuit to the exchange B', thence through *m'* and *g'*, one contact of the pair *a'*, one contact of the pair *b'*, lamp *d'*, lighting the same, and will return through the other contact of the pair *b'*, the second contact of the pair *a'*, *j'*, *h'* and *n'*, and will then flow through wires 3 and 4 back to the exchange B, and as these wires are connected, through points *n* and movable part *h*, one of the springs *a*, one of the springs *c*, with the other pole of the battery, it is obvious that the circuit is established and that the two lamps *e* at station B and *d'* at station B' will remain lighted till the operator at B' has answered the call. To answer this call, it is only necessary for the operator at B' to insert the plug connected to the cord G' in the jack H'. Through this insertion the metallic connection between the wires 1 and 2, as well as the metallic connection between the wires 3 and 4, will be broken at the exchange B'. At the same time the wires 2 and 3 will be brought out of contact with the annunciating-switch F'. Through this manipulation the annunciating-lamp *e*, which formerly was lit at B, will now be extinguished, and the operator at B will thereby be notified that the operator is ready for communication. The operator at B will then replace his annunciating-key F in its normal position and will connect, through the cord G, the subscriber A with the jack H. Through this connection the metallic contact between 1 and 2, as well as the metallic contact between 3 and 4, will be broken and the key-circuit will be brought out of contact with the jack. We will therefore have a metallic line from A connecting electrically with the part *k* of the connecting-cord G, inductively connected with the part 1. This part 1 is electrically connected, through the jack parts *g* and *h*, with the wires 1 and 4, respectively. These wires run along the whole line between the exchanges and end at the exchange B'; but at this exchange they are now free and unconnected, and as the operator at this exchange has now inserted one part of the cord G' into the jack H' and the other part of this cord into the jack of the switchboard D' the wires 2 and 3 are in electrical connection with the part 1' of the cord and through same inductively related to the part *k'* of said cord, which cord is electrically connected to the station A'. We therefore have a circuit con-

necting metallically its subscriber with one exchange and connecting inductively the two exchanges with each other.

I have only shown one station centering with its circuit in the exchange; but it is obvious that in reality a series of such subscribers' stations center therein, as otherwise the exchange would be unnecessary.

I have placed one lamp directly in the circuit; but it is obvious that the usual arrangement of operating the lamps through an electromagnet inserted in the line may be substituted.

I have not shown one operator's phone; but I have indicated the place where the same may be inserted by the lines *z*.

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

1. In combination with two outlying stations connected each through an all-metallic circuit with an exchange, the exchanges more or less remote from each other, a line of transmission connecting inductively said exchanges with each other, said line of transmission consisting of two pairs of wires, the two wires of each of said pairs twisted in intimate relation with each other, and means at each exchange to connect the outlying station with said line of transmission.

2. In combination, two exchanges, each exchange provided with the terminals of a series of outlying stations centering therein each with an all-metallic line, two switchboards for each of said exchanges, one of said switchboards connected to said all-metallic lines, a line of transmission comprising two pairs of wires the wires of each pair in inductive relation as to each other, the terminals of both pairs connected at one end in one exchange to the second of said switchboards and with the other end at the second exchange with the second switchboard therein, means at each exchange to produce an all-metallic line of said two pairs, said means embracing an annunciating device, means at each exchange to break connection with said first means and make connection with a second means including a source of current, and means at each exchange to connect the line of transmission to an outlying circuit, said means adapted to change the connection of the transmitting-line at both exchanges so as to convert the former metallic lines into a line inductively connecting one exchange with a second exchange.

3. In combination with two exchanges wherein all-metallic lines center, a line of transmission inductively connecting both exchanges with each other, means at each exchange to convert said line into a straight metallic line including annunciating devices and means to connect said line with one or the other of the metallic lines of the outlying

stations, said means reconverting the line of transmission into a line inductively connecting both exchanges with each other.

5 4. In combination three lines of transmission, two of said lines comprising an all-metallic circuit, the third of said lines comprising two pairs of conductors, the wires of each pair inductively related to each other, and means to connect one wire of each pair

to one of said circuits, and the remaining wire of each pair to the second of said circuits.

In testimony whereof I hereby sign my name this 7th day of April, 1905.

ISIDOR KITSEE.

Witnesses:

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