No. 751.655. PATENTED FEB. 9, 1904.

I. KITSEE.

TELEPHONY.

APPLICATION FILED JAN. 9, 1901.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

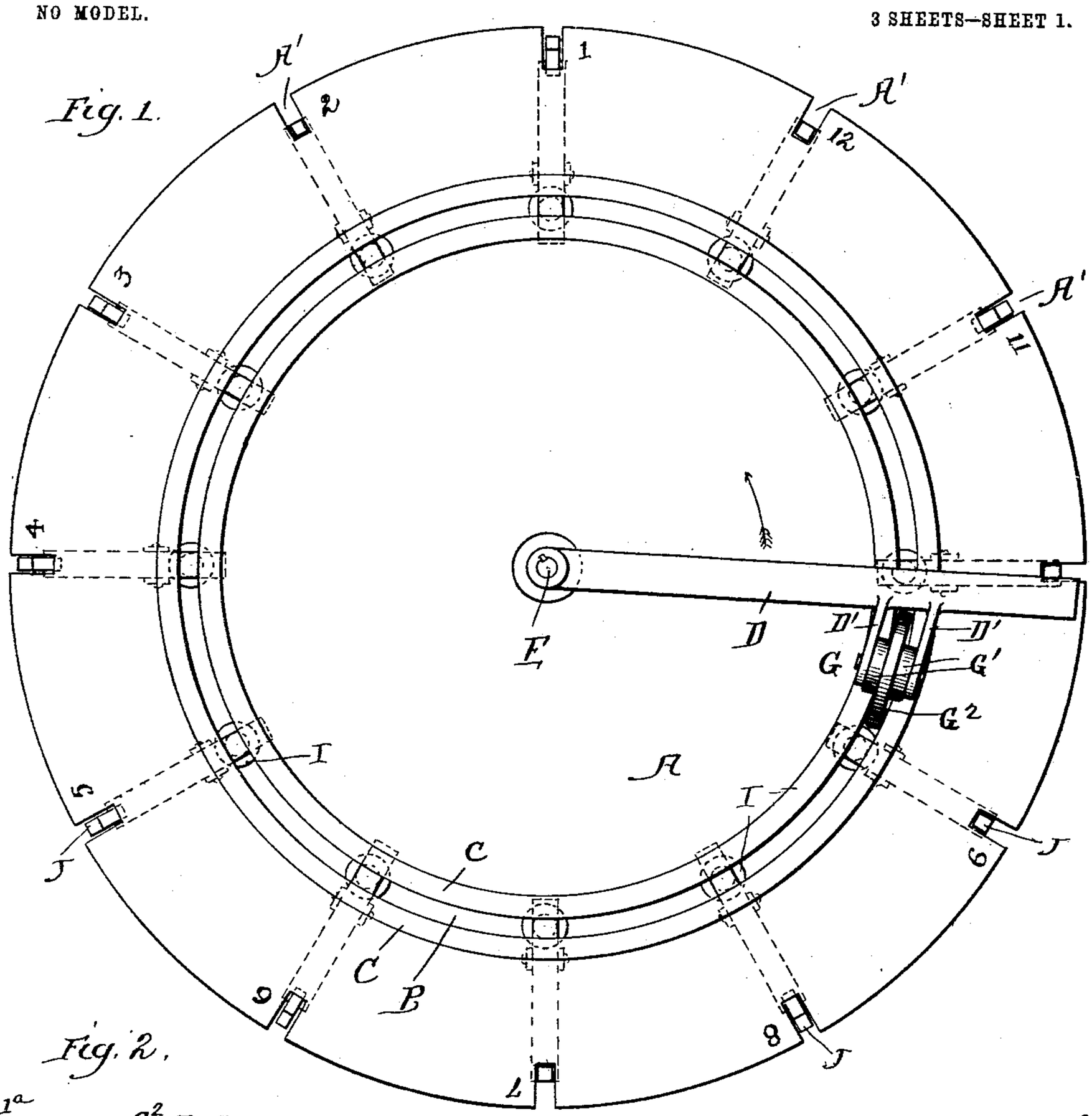
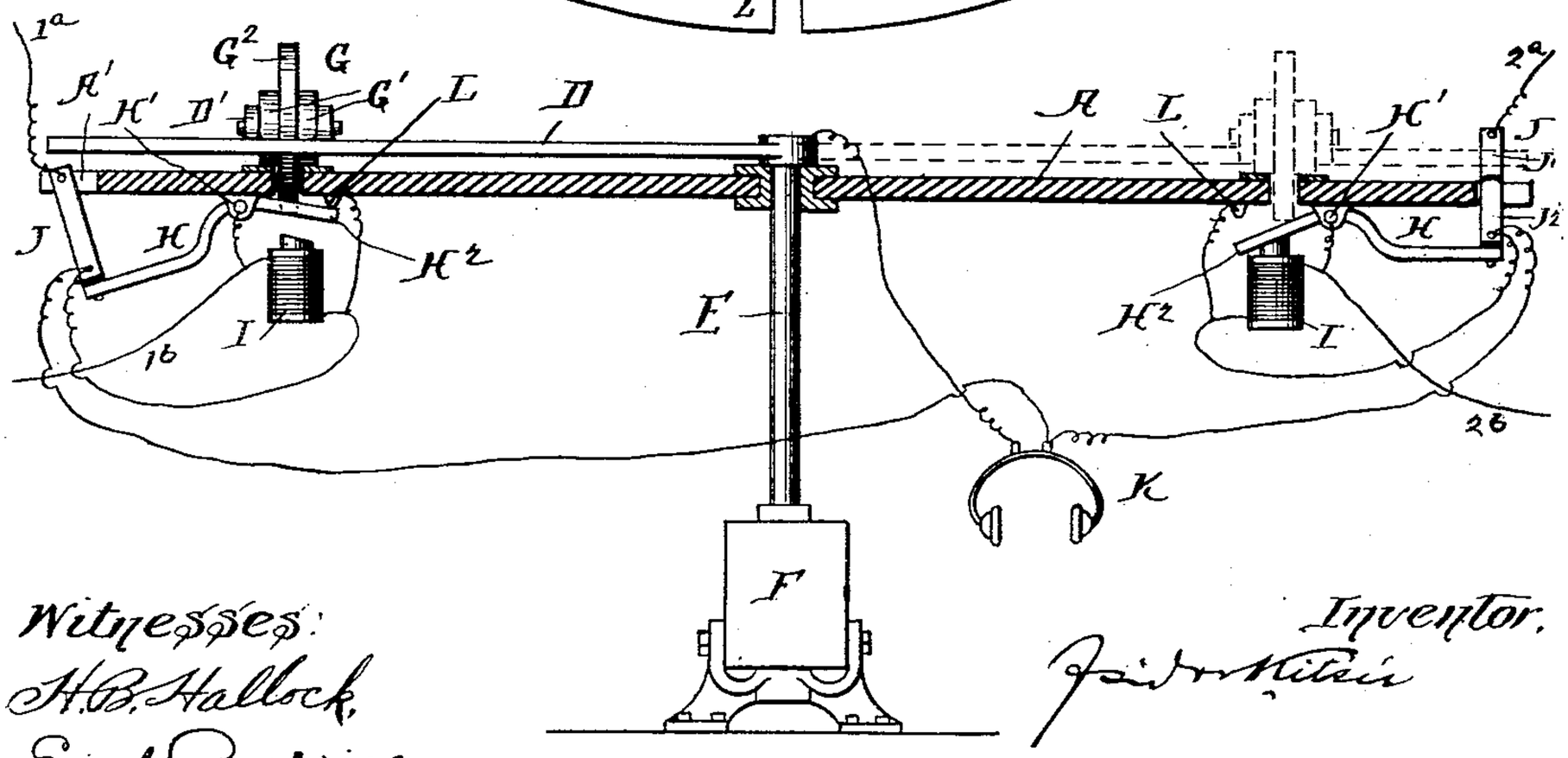


Fig. 2.



Witnesses:
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Edith C. Stilley.

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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 3.

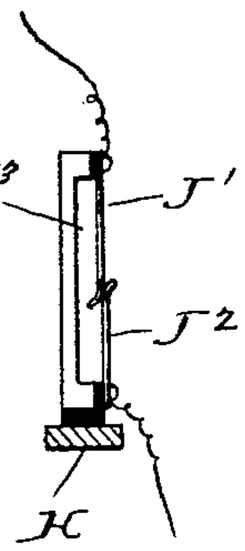


Fig. 4.

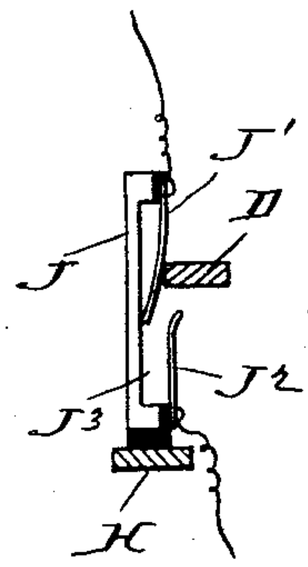


Fig. 5

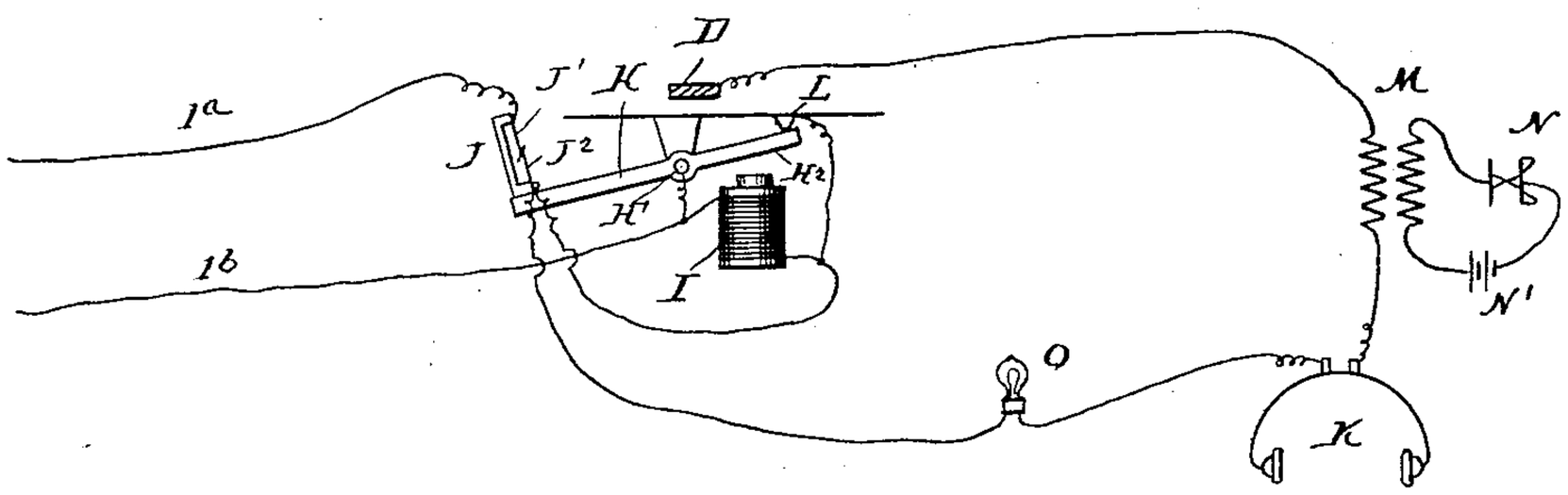
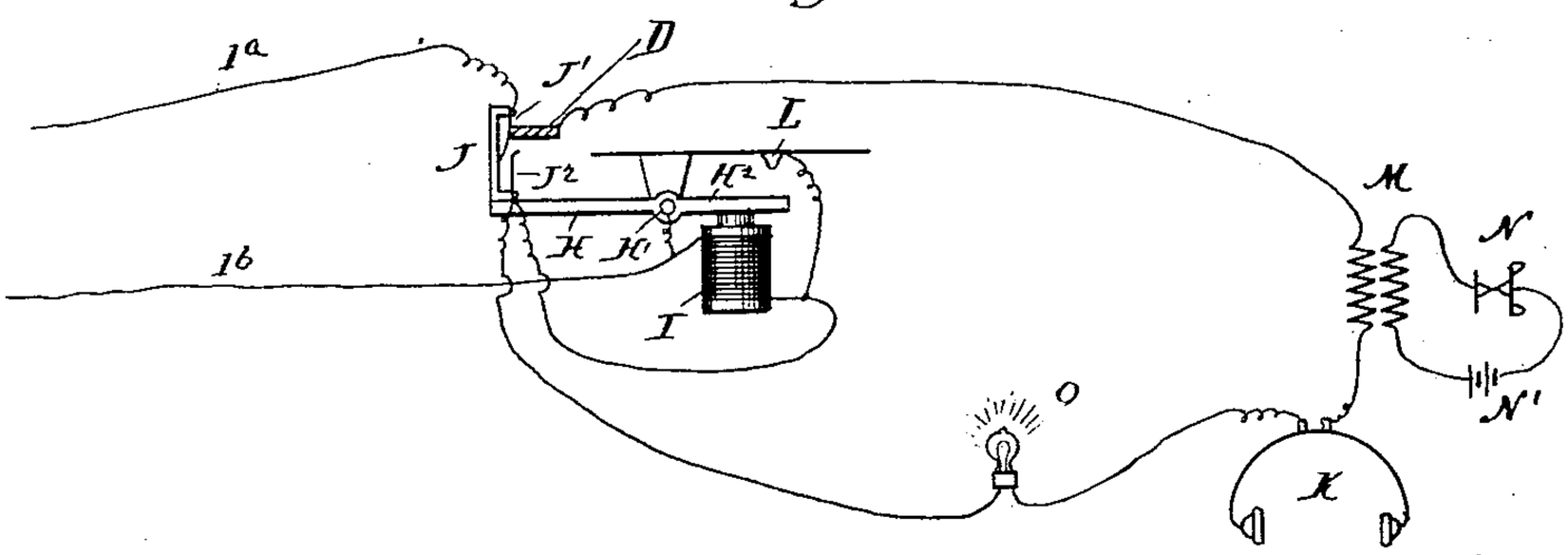


Fig. 6.



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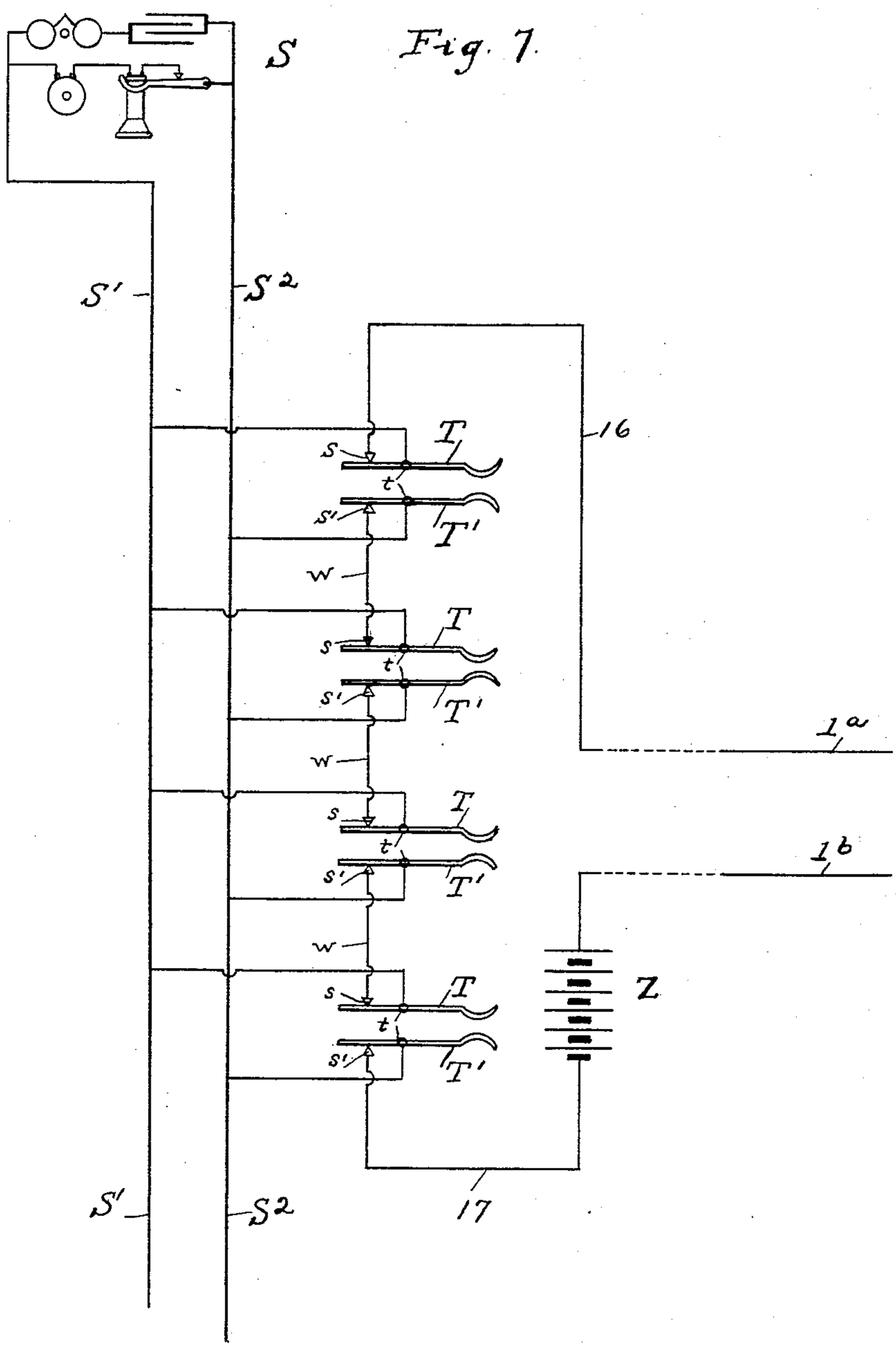
NO MODEL. 3 SHEETS—SHEET 3.

Fig. 7.



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INVENTOR

Isidor Kitsee

No. 751,655. Patented February 9, 1904.

UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA.

TELEPHONY.

SPECIFICATION forming part of Letters Patent No. 751,655, dated February 9, 1904.

Application filed January 9, 1901. Serial No. 42,642. (No model.)

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 Telephony, of which the following is a specification.

My invention relates to telephony, and has more special reference to that part of the operations in a telephonic exchange which relates to the "calling up" of the exchange by a subscriber and to the connection of the operator's phone to the circuit of said subscriber.

In all systems wherein two or more outlying or subscriber's stations are connected to one common central or exchange station an annunciator consisting of an electromagnetic device or an incandescent lamp notifies the operator at the exchange that the subscriber designated by said annunciator wishes to communicate with the exchange and the operator's phone has to be connected to the circuit of this subscriber. As practiced to-day these operations are attended with many disadvantages. First, in a system with thousands of subscribers' circuits converging in one central exchange very often two or more annunciating devices in charge of one operator are actuated at one and the same time. The operator has to select from all these circuits calling the one to attend first, and as during the time that he attends to that one circuit new calls are made it is obvious that the operator has always to keep in mind as much as possible the order of the circuits calling. This mental strain greatly retards the operator in his work and is one of the reasons why two operators are generally stationed at one desk. Second, the fact of leaving the operator the choice of selecting which of the calling subscribers he shall connect first opens the door to favoritism. Subscribers favorably known to operators will be served before subscribers not on good terms with the operator. Third, as practiced to-day two operations are involved in answering the call—first, connecting the operator's phone to the circuit calling and, second, disconnecting his phone from the circuit calling. Fourth, secrecy of communication is of great consequence in telephony; but with the system of to-day the operator has the privilege of being able to listen to part or the whole of the conversation, even after intercommunication between two subscribers is established.

It is the aim and object of my invention to eliminate these disadvantages.

Referring to the drawings, Figure 1 is a plan view of the device embodying my invention. Fig. 2 is a cross-section of the same. Fig. 3 is a detail side view of the movable stop, showing the spring-contacts in their normal positions. Fig. 4 is a similar view showing the contacts separated by means of the revolving arm. Fig. 5 is a diagrammatical view of this system, showing one circuit the parts of which are in the position they assume when the line is not in use. Fig. 6 is a similar view showing a circuit parts of which are in a position they assume when the line is in use. Fig. 7 is a diagrammatic view illustrating the manner in which a subscriber's circuit is normally connected with one or the other of the magnets I through the wires 1^a and 1^b.

A is a support provided with the slot B.

C C are tracks upon each side of the slot.

D is an arm secured to the shaft E, journaled in the support. Said shaft is adapted to be revolved by the motor or other suitable means F.

G is a wheel or other traveling means journaled in the lugs or similar supports D', formed with or secured to the arm D. The part G' of the wheel is adapted to rest upon the tracks C. The flange G^2 of the wheel protrudes through the slot B.

H is a lever pivoted or otherwise secured, preferably at H', and H^2 is the armature forming part of said lever.

J is a stop secured to the lever H. Said stop is composed of the contact-strips J' and J^2.

K is the operator's receiver, and A' represents the slots through which the stops J protrude above the support.

L is a contact-point adapted to electrically connect with the armature H^2 when the lever H is in its normal position.

M is the inductorium of the local phone, N the transmitter of same, and N' its battery.

O is the annunciator, preferably in the shape of an electric light designed to glow if the respective circuit to which it is connected is calling.

1^a and 1^b are parts of a subscriber's circuit.

I will first describe the device placed in the circuit of the subscriber. This device is plainly illustrated in Figs. 5 and 6 and consists of an electromagnet and its armature. One terminal of the coil of the electromagnet is electrically connected to one part of the subscriber's circuit, 1^b, and the other terminal of the coil is electrically connected to the contact-spring carried by the armature, or rather by the lever, one end of which serves as the armature. This contact-spring is normally in electrical contact with a second contact-spring, and this second contact-spring is in electrical contact with the other part of the subscriber's circuit, 1^a. It is therefore seen that the coil of the electromagnet is in series with the circuit of the subscriber; but to prevent the energizing of the core of this electromagnet through the closing of the circuit the coil of the electromagnet is shunted through the conducting-armature, one terminal connecting direct and the other terminal connecting through the contact L. No matter, therefore, if the circuit of the subscriber is open or closed as long as the armature rests against the contact-point L the electromagnet will not be energized; but if the circuit is closed and at the same time the connection between armature and contact-point L broken then the core of the electromagnet will be energized and the armature is drawn toward the core and held there as long as the circuit remains closed.

I will now describe the connection of the annunciating-lamp and of the operator's phone as to the subscriber's circuit. The lamp O, which carries the number of the subscriber, is connected with one terminal to the contact-spring J^2 and with the other terminal to the movable arm D, and in the circuit of this lamp is inserted in series the receiver of the operator's phone and the secondary of the inductorium of said phone. Normally—that is, when the movable contact D is out of contact with the spring J'—the circuit including the lamp O, the receiver K, and the secondary of the inductorium M is open; but as soon as the movable contact D presses against the spring J' and breaks the contact of this spring with the spring J^2 then the circuit, including lamp and the receiver of the operator's phone, is placed in series with the subscriber's circuit, as is clearly illustrated in Fig. 6, wherein the part 1^a of subscriber's circuit is in electrical contact with spring J', contact D, secondary of the inductorium M, receiver K, lamp O, spring J^2, coil of electromagnet I, and part 1^b of same circuit. It will thus be apparent that with the aid of the electromagnet and the circuit connections, as described, the following different conditions of the devices relative to each other and to the subscriber's circuit can be brought about: First, all parts of the device are at rest and in their normal position, as shown in Fig. 5, and the subscriber's circuit is open, the lamp O will not glow, and the operator's phone will be out of contact with said circuit. Second, the armature of electromagnet I is momentarily pressed downward and out of contact with point L, thereby breaking the shunt around the coil; but the circuit of the subscriber being still open the armature will resume its normal position as soon as the pressure is removed. Third, the armature of electromagnet I is momentarily pressed downward and out of contact with point L, thereby breaking the shunt around the coil. The subscriber at the same time is calling and has therefore closed his circuit. The current will flow through the coil of the electromagnet, will energize the core, and will draw the armature toward it and still farther away from the contact-point L and will hold the armature there as long as the circuit remains closed; but the circuit, including the lamp and receiver, is still open. Fourth, the armature of the electromagnet I is momentarily pressed downward and out of contact with the point L, thereby breaking the shunt around the coil. The subscriber at the same time is calling and has therefore closed his circuit. The current will flow through the coil of the electromagnet, will energize the core, and will draw the armature toward it and farther away from the point L and will hold the armature there as long as the circuit remains closed. The movable contact now presses against the spring J', breaking the contact between J' and J^2 and inserting its circuit in series as to the subscriber's circuit. The current formerly flowed from J' direct to J^2, but will now flow from J' to D, from D to M, from M to K, from K to O, and from O to J^2, thereby lighting the lamp O and enabling the operator to listen through the receiver K to the talk of the subscriber, and he answers said subscriber with the aid of the microphonic transmitter N, battery N', and inductorium M, the secondary of which is in the circuit including the movable contact D, and as long as the circuit remains closed these conditions will remain. Fifth, conditions are as in fourth; but the operator, through the insertion of the cord-plug or other device in the switchboard, will break the contact of the circuit with the battery or other source of electricity located at the central station. The holder of the springs J' and J^2, which was placed in the path of the movable contact D through the downward movement of the armature, will resume its normal place—that is, away from the path of the movable contact D—as soon as the armature is released through the demagnetization of the core of the electromagnet. The two springs J' and J^2 will

again electrically connect, and the armature will again be brought in contact with the point L. The circuit, including the lamp and the receiver, is brought out of contact with the subscriber's circuit and the electromagnet I is again shunted.

Let us assume that each of the circuits in charge of the operator is provided with one of the electromagnets described and that automatically and in order the magnets of the different circuits are tested—that is, the shunt removed to find out if the circuit is closed—and let us assume that if the circuit of one or the other of the magnets tested is closed the movable contact D will press the spring J′ of this particular magnet away from the spring J^2. It is apparent that these automatic movements will first test in order each circuit for the purpose of finding out if the circuit is calling and, second, will call the attention of the operator, through the lighted lamp, that the particular circuit is calling and, third, will connect the circuits calling in order with the operator's phone. It will therefore be seen that, first, the wheel in making one revolution will test in succession all the circuits attached to the device. This testing is accomplished through the opening of the shunt as a resultant of the pressing down of the armature of the electromagnet. Second, if the wheel encounters a circuit calling, therefore closed, the stop of the particular electromagnet will be raised. Third, as the arm is in front of the wheel the raising of the stop will not interfere with the movements of the arm before the whole revolution is completed. Fourth, as soon as the arm in its next succeeding revolution reaches the place where the magnet of the calling-circuit is situated the stop will prevent further progress of the arm, and the pressing of the arm on the spring of the stop will automatically connect the operator's phone with this particular circuit. Fifth, the breaking of the circuit either at the subscriber's station or at the exchange will demagnetize the core, and therefore displace the stop and break the connection of the operator's phone. From all this it is readily understood that each circuit is automatically tested, and each calling-circuit is not only automatically connected to the phone, but the order of the connection is such that the calling-circuits detected during one revolution will be connected with the phone before the calling-circuits detected during the next succeeding revolution.

The motive power may consist of an electric motor or any of the well-known contrivances; but I prefer an electric motor of very slow speed, and as electric motors are more efficient the greater the speed it is best in such case to gear the shaft to the motor by a reducing-gear. The speed of the arm may vary according to requirements, and a revolution every two seconds on a device wherein two hundred circuits are to be tested will answer the purpose.

The stop J, with its appended springs, should be shaped in a manner so that it will slip downward as soon as the armature is released through the breaking of the circuit, and the force exerted by the arm should therefore not be too strong. In some cases it may even be necessary to provide the part of this arm designed to come in contact with the spring of the stop with a wheel, so as to facilitate the "slipping out of the contact" of the stop from the arm, and in such cases the wheel will make the electrical connection and has therefore to be of conducting material.

I have described the armature as provided with the stop J and the wheel as being connected to the arm by means of lugs; but as I am the first to provide an automatic testing device the details of the construction may vary without departing from the scope of my invention, which, broadly considered, is: to automatically test the circuits and to automatically connect the operator's phone to the circuits calling and to make such connections in order as the circuits call, and I call such a device a "call-detector." Wherever, therefore, I make use in this specification or in the claims following this specification of the words "call-detector" or "automatic call-detector" I understand under them a device which automatically tests the circuits for the purpose of finding out if said circuits are calling or not; but as it was the desire of the Office to illustrate one method of connecting the device just described with one or the other of the outlying or subscribers' stations I have shown in Fig. 7 the simplest manner in which this connection can be made, leaving it to the person employing this my invention to vary, change, or entirely rearrange this connection so as to bring it in conformity with the central systems as now practiced. Coming now to this view, Fig. 7, which illustrates in diagram a subscriber's circuit, a series of jacks connected thereto, and the terminals of the testing device connected to said jacks, S designates a subscriber's station with its usual devices and arrangements. S′ S^2 designate the line-wires connected to said subscriber's station and centering in the exchange. T T′ form jacks connected to the wires S′ and S^2, respectively, which jacks are pivotedly secured at *t*. In juxtaposition to the part T and normally connected thereto is the contact-point *s*, and in juxtaposition to the part T′ and normally connected thereto is the contact-point *s*′. The contact-point *s* of the first of the jacks is connected through wire 16 with one of the circuits containing the electromagnet which forms part of the testing device, as illustrated in Figs. 1, 2, 5, and 6. In this figure the wire 16 is connected with the wire 1^a leading to the electromagnet, adapted to automatically connect and disconnect the opera-

tor's phone to the circuit of the subscriber stationed at S. The contact-point s' of the last of the jacks is connected through wire 17 and source of current Z with wire 1^b, leading to the other terminal of the electromagnet to which 1^a is connected. Wire *w* connects the contact-point s' of one jack to contact-point *s* of the jack following. Thus it will be seen that normally the subscriber's circuit S′ and S^2 is in electrical connection with one or the other of the electromagnets I, and if the subscriber by removing his receiver completes the circuit the electromagnet pertaining to this circuit will be energized, and the arm in making its rotation will be estopped through the raising of the stop J, and the operator, notified through the lighting of the lamp O, will be able to communicate with the subscriber and connect his circuit, according to his wishes, with a second subscriber's circuit; but as soon as through the inserting of the plugs between the jack parts T and T′ the curved ends are raised it is obvious that the straight ends are brought together and out of contact with the points *s* and s', thereby breaking the circuit including the electromagnet I, and this circuit will remain broken as long as the plug remains inserted in the jack.

I have described and illustrated one method of connecting the electromagnet of the testing device to its respective circuit, also the manner in which the circuit may be broken through the insertion of the plug; but it is obvious that in the different systems in use the point of connection and disconnection may have to differ.

The device itself is so far removed from the operator as to make it a practical impossibility for him to tamper with same, and for this reason the arrangement of connecting the two circuits for the purpose of intercommunication must include the arrangement for cutting out the testing-magnets, as otherwise the operator's phone remains connected with these two circuits till their conversation is at an end, and the operator would be compelled to wait for the termination of their conversation before being able to connect his phone to another subscriber calling. This certainly is out of the question, and therefore the testing-magnet has to be cut out as soon as the wishes of the subscriber calling are ascertained, so as to enable the operator to connect with a second circuit calling. Formerly the operator could at will connect or disconnect his phone with the circuit calling at any period he desired. He could listen to the conversation of two subscribers for any length of time, and the great necessity in telephony—secrecy—could not be obtained. With my device inserted only one of two conditions can exist: either the test-magnet is automatically cut out of the circuits through the insertion of the plugs or cords connecting the two circuits for the purpose of intercommunication or the insertion of the plugs will not automatically disconnect the testing-magnet. In the first place the operator will have no means to again connect his phone for the reason that the terminals of his phone are secured to parts of the device, and in the second place the operator will have no means at any time to disconnect his phone and will have to wait till these two subscribers cease communications, a state which no management of an exchange will allow. It will therefore be readily seen that, first, it is not at the will of the operator to connect his phone with one or the other circuits preferred; second, the operator cannot hold the connection of the phone for any length of time desired, as this connection ceases as soon as the two circuits are connected for the purpose of intercommunication; third, the phone is automatically connected with the second circuit calling as soon as the first circuit is connected for the purpose of intercommunication. Broadly speaking, therefore, in this respect my device is a positive means for preserving secrecy in telephonic communications from the employees of the exchange.

I have in the drawings illustrated the device as being of circular form, because this form offers advantages over others, but other forms may be adapted and the contact may travel from side to side instead of in a circle; so, also, can the position of the device be changed from horizontal and vertical; so, also, can the arm be replaced by other means.

As it was necessary for me to show the practical operation of my method, I have illustrated the preferred manner; but parts of this device may be altered or others substituted for same without departing from the scope of my invention, and I reserve the right to file application claiming the method.

Wherever in this specification or in the claims following this specification I make use of the terms "test" or "testing," I understand under them the automatic testing of a telephonic circuit for the purpose of ascertaining if said circuit is closed at the subscriber's station for the purpose of calling up the central.

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

1. In telephony a device for automatically testing outlying or subscribers' circuits, said device comprising an electromagnet inserted in the circuit to be tested, a shunt around said electromagnet, and means to automatically open and close said shunt.

2. In a telephonic-call detector, a series of electromagnetic devices normally inoperative, and means to nullify said inoperativeness, means to remove said nullifying means, and means to connect each of said electromagnetic devices to a subscriber-circuit.

3. In telephony, a "call-detector" provided

for each of the circuits to be tested, with an electromagnet, movable means operatively connected with a motor to automatically actuate the armatures of said electromagnets in order, means for said electromagnets to retard the movements of said movable means, and means to connect the operator's phone to the circuit calling.

4. In telephony, a device consisting of a plurality of electromagnets, connected each to an outlying or subscriber circuit, a shunt around each of said electromagnets, a movable arm adapted to open the shunt of each of said magnets in order, means operatively connected to the armature of each of said electromagnets to retard the movement of the arm, and means operatively connected with said movable arm to electrically insert in the circuit calling the receiver of the operator's phone.

5. In telephony, the combination of an operator's phone and an annunciator, means to connect said operator's phone with one part of one of the subscriber-circuits, a movable contact and means to connect said annunciator and operator's phone with said movable contact, said contact adapted to automatically break the subscriber-circuit and insert the circuit including said annunciator and operator's phone in series with said subscriber-circuit.

6. In a device to test in order circuits connected to said device, electromagnetic means connected to the circuits to be tested, means to make inoperative said electromagnetic means, means to make operative said electromagnetic means, an operator's phone and traveling means adapted to automatically insert the operator's phone in the circuit to be tested.

7. In telephony, a device adapted to automatically test if a subscriber's circuit is calling, said device substantially consisting of a traveling contact, a series of electromagnets, means for each of said electromagnets to estop the progress of said traveling contact, and means to connect thereby an operator's phone in series to the subscriber's circuit.

8. In telephony, a call-detector substantially consisting of a series of electromagnets normally connected each to a subscriber's circuit, but normally inoperative, a traveling contact adapted to make said electromagnets operative in order, and means for each of said electromagnets to estop the traveling contact when made operative and simultaneously energized through the closing of the subscriber's circuit to which it is connected, in combination with means to insert in said subscriber's circuit the operator's phone.

9. A device of the class described, consisting of a series of stationary electromagnets, means to normally make inoperative said electromagnets, each of said electromagnets connected to a subscriber's circuit, traveling means adapted to automatically and in order nullify the inoperativeness of said electromagnets, and means operatively connected to each of said electromagnets and to the traveling means respectively, to break the circuit of the subscriber to which said electromagnet is connected and to insert in said circuit a second circuit containing the operator's phone.

10. In a device of the class described a series of circuits connected thereto, contacts adapted to be separated for each of said circuits, an operator's phone and a traveling contact adapted to separate said separable contacts and adapted thereby to insert in said break said operator's phone, said device also provided with means to automatically test each of the circuits in order, to ascertain if the subscriber is calling.

11. In a device of the class described a series of electromagnets normally shunted and a traveling arm adapted to automatically and in order break the shunts of said electromagnets.

12. In a device of the class described, a series of electromagnets, an armature for each of said electromagnets, said armature normally shunting said electromagnet, and traveling means adapted to break the shunt through the displacement of said armature from its normal position.

13. In a device of the class described, a series of electromagnets, an armature for each of said electromagnets, said armature provided with contacts normally contacting with each other, said contacts forming part of a subscriber's circuit to which said electromagnet is connected, and a traveling arm adapted to break the connection between said two contacts.

14. In a device of the class described, a series of electromagnets, each connected to a subscriber's circuit, means to make normally inoperative said electromagnet, and traveling means adapted to nullify said first means, in combination with the circuit of an operator's phone, part of which is carried by said traveling means and is adapted thereby to be inserted in said subscriber's circuit.

15. In a device of the class described, a series of electromagnets connected each to a subscriber's circuit, said electromagnets normally made inoperative through the shunting of their coils, traveling means to open said shunts in order, and means carried by the armatures of said electromagnets to obstruct the path of travel of the traveling means as soon as said electromagnets are energized through the closing of their subscriber-circuits, during the time that the shunts of said electromagnets remain open.

16. In a device of the class described, an electromagnet, an armature for said electromagnet, said armature operatively connected to a device carrying two contacts normally closed, one of said contacts electrically connected to one part of a subscriber's circuit, the second of said contacts connected to one terminal of the coil of the electromagnet and one

terminal of the circuit of the operator's phone respectively, the second terminal of said coil in electrical connection with a second part of said subscriber's circuit, said armature normally shunting said coil.

17. In telephony, in combination with a circuit containing an annunciator and an operator's phone, a contacting arm adapted to automatically revolve, said contacting arm carrying one terminal of said circuit, and in further combination with an electromagnet, to the armature of which the second terminal of said circuit is connected, the armature normally shunting the coil of said electromagnet and adapted to be displaced through said traveling contact, a contact-spring carried by said armature and electrically connected to part of the subscriber's circuit, a second contact-spring carried by said armature and electrically connected to the second terminal of the circuit containing the annunciator and operator's phone, said traveling contact adapted to connect with the first-named contact-spring when said spring is placed in its path through the operation of the armature due to the energizing of the electromagnet.

In testimony whereof I hereby sign my name, in the presence of two subscribing witnesses, this 17th day of December, A. D. 1900.

ISIDOR KITSEE.

Witnesses:
EDITH R. STILLEY,
CHAS. KRESSENBUCH.