No. 785,674. PATENTED MAR. 21, 1905.

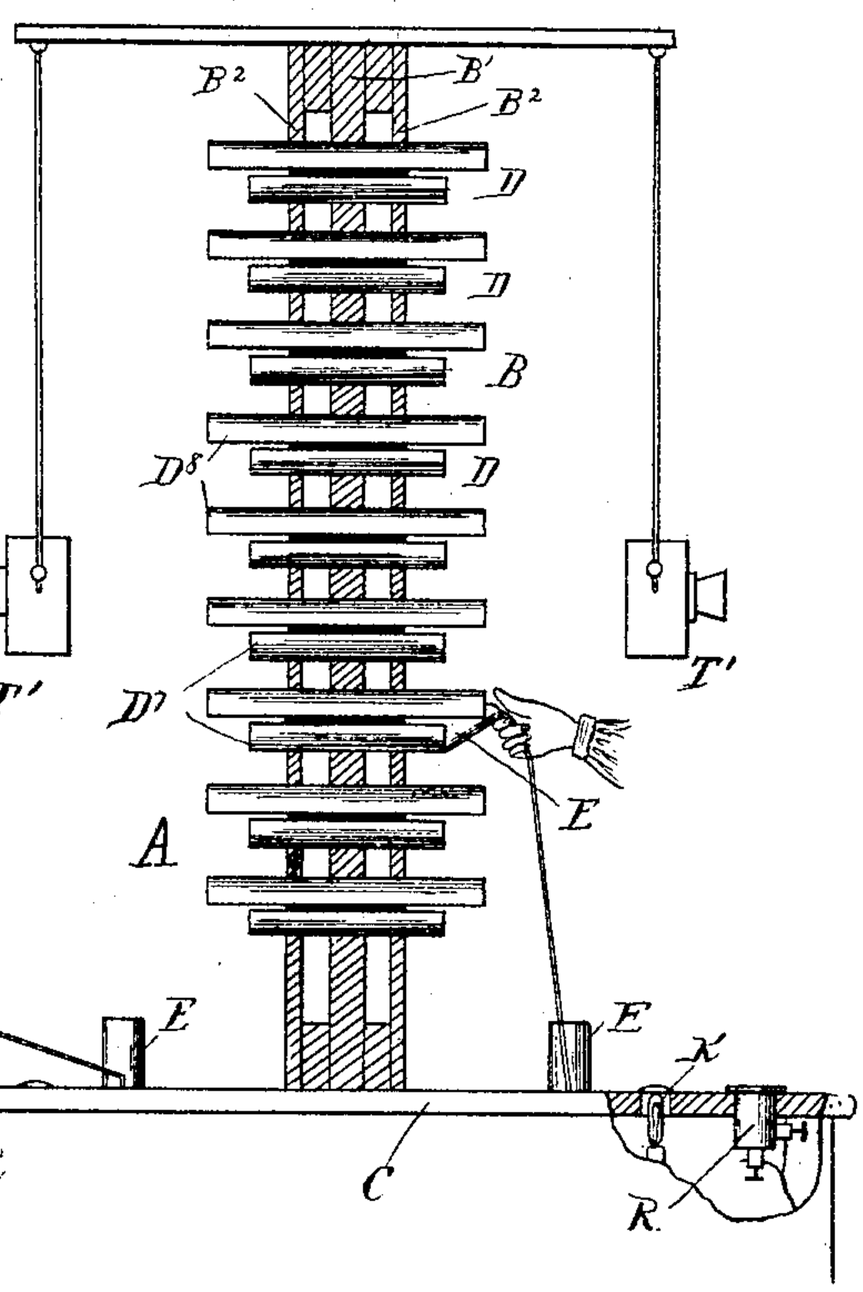
I. KITSEE.

TELEPHONE SYSTEM.

APPLICATION FILED AUG. 4, 1902.

4 SHEETS—SHEET 1.

Fig 1.



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4 SHEETS—SHEET 2.

Fig. 2

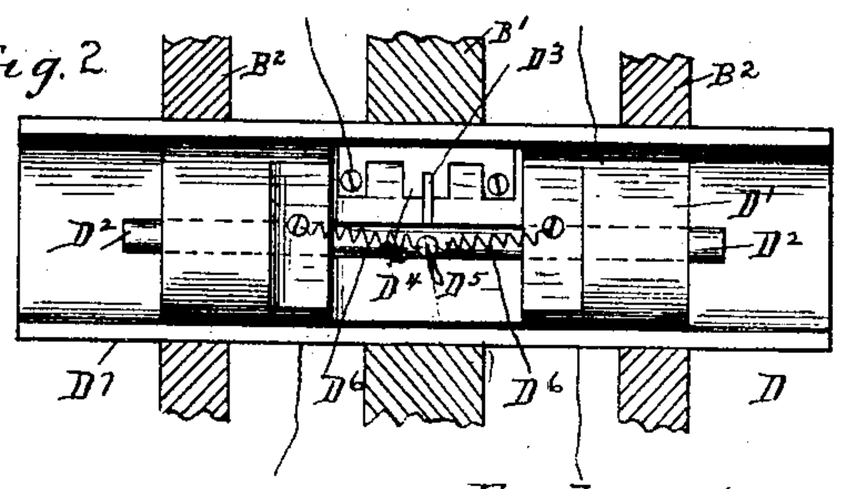


Fig. 6.

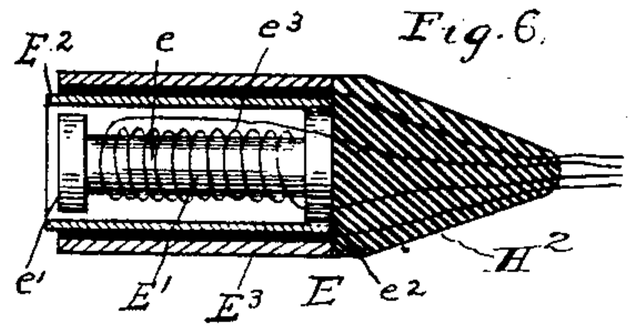


Fig. 4

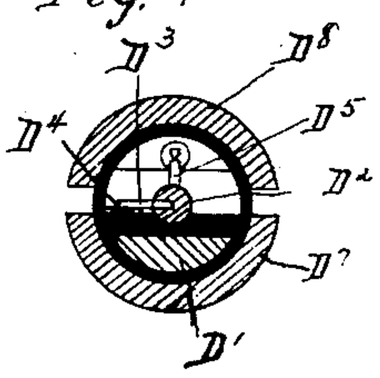


Fig. 3

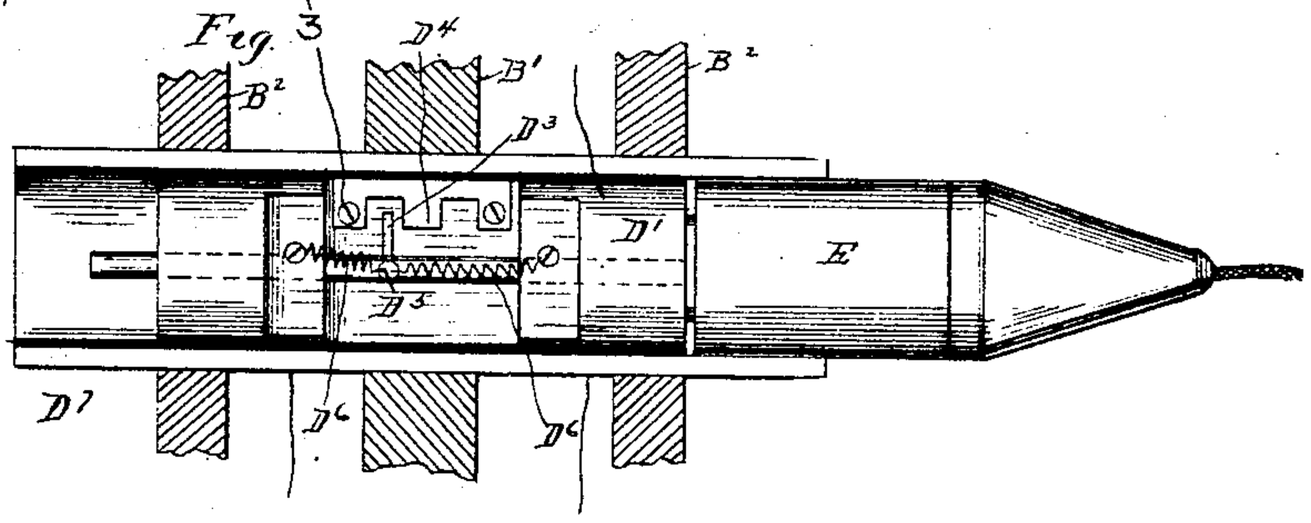
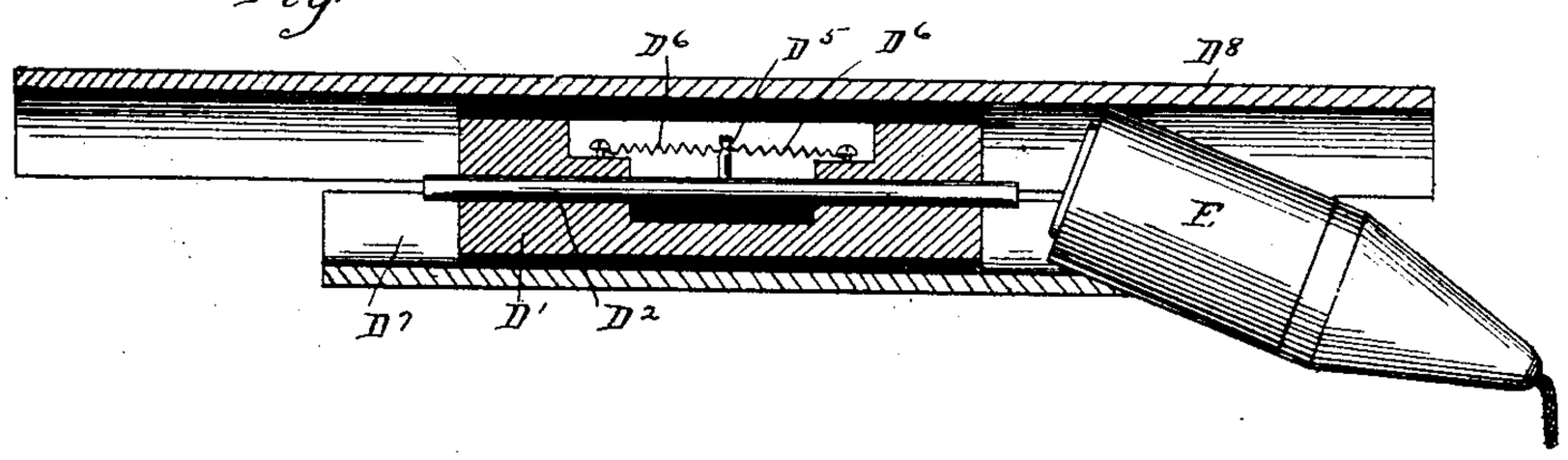


Fig. 5



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4 SHEETS—SHEET 3.

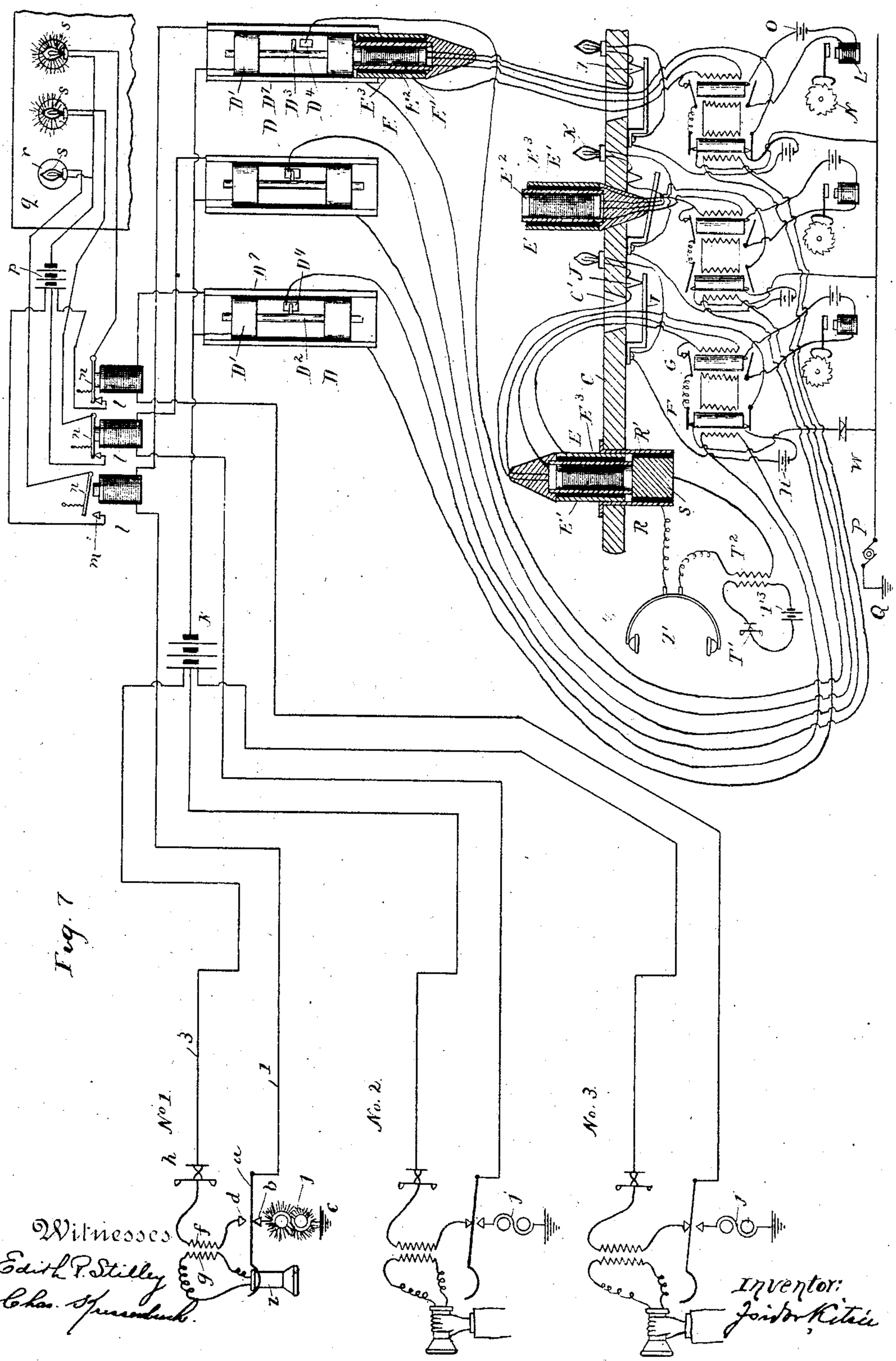
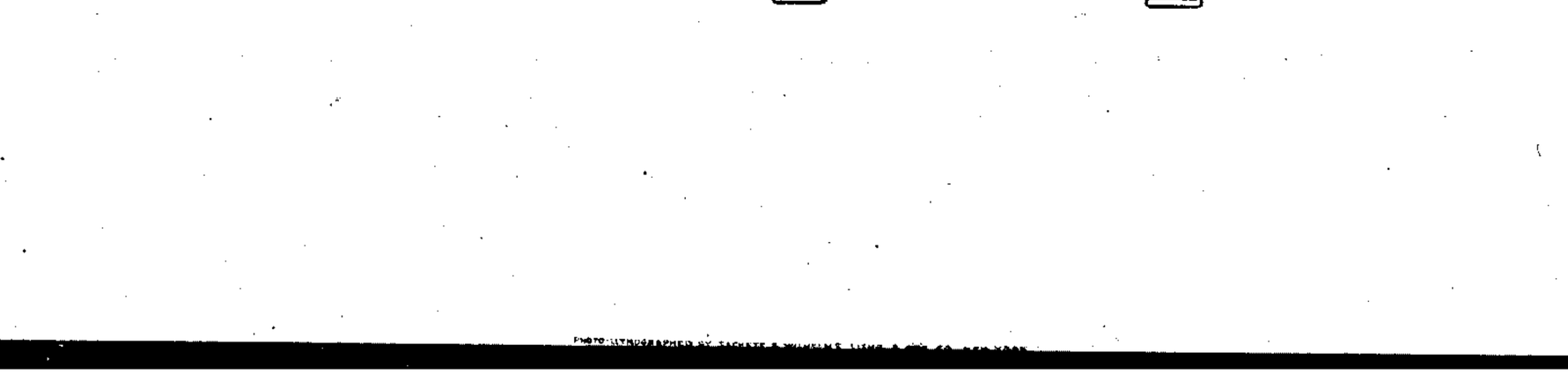


Fig. 7



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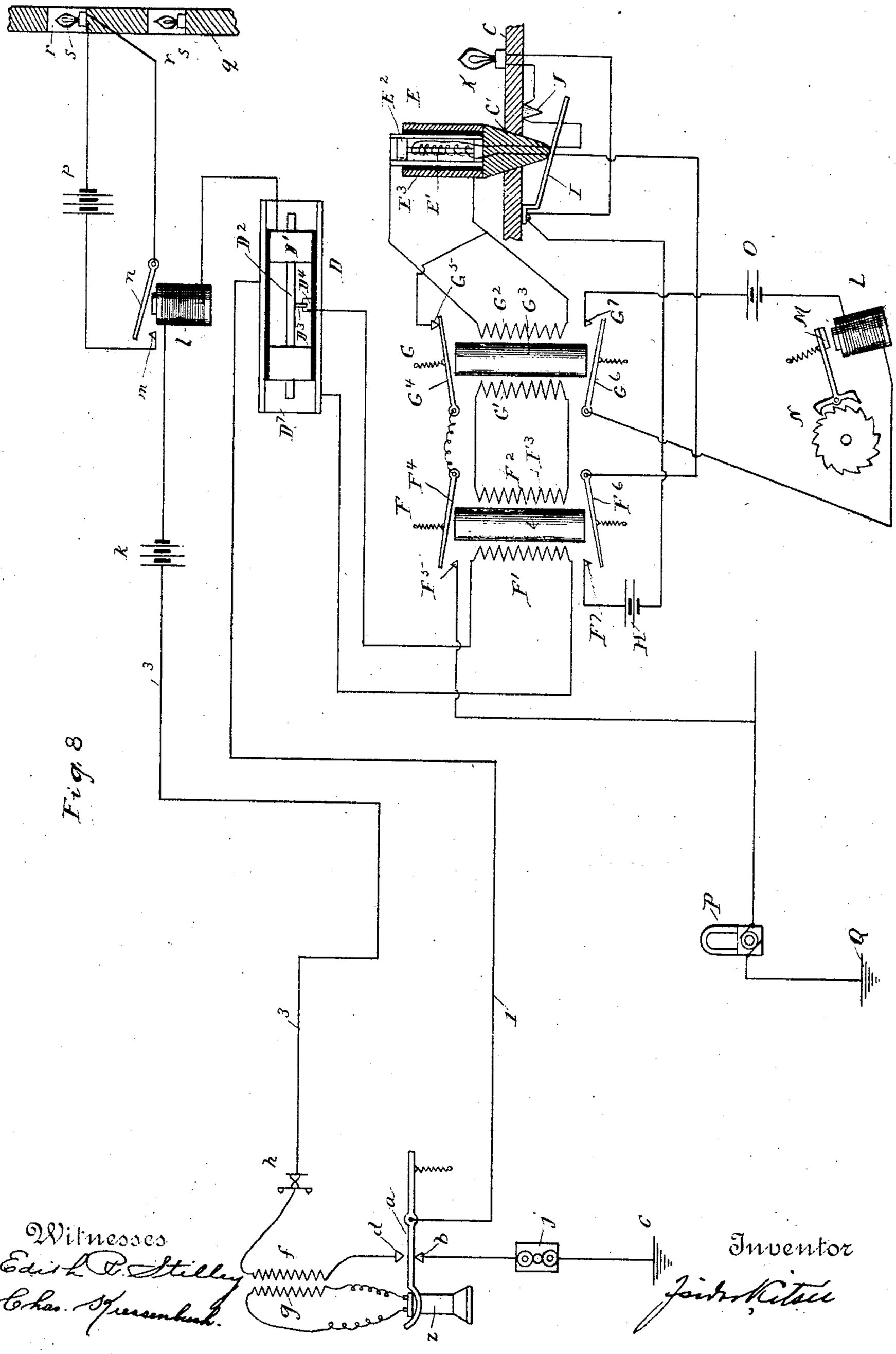
4 SHEETS—SHEET 4.

Fig. 8



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No. 785,674. Patented March 21, 1905.

UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA.

TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 785,674, dated March 21, 1905.

Original application filed February 24, 1902, Serial No. 95,281. Divided and this application filed August 4, 1902. Serial No. 118,336.

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 Telephone Systems, of which the following is a specification.

My invention relates to an improvement in telephone systems, and has more special reference to systems wherein two or more outlying subscribers' circuits are centered in one exchange and are provided therein with a common source of electric energy.

The present case is a division of my pending application, Serial No. 95,281, filed February 24, 1902, and is designed to cover a novel form of jack and plug adapted for use in connection with the system illustrated, described, and claimed in the application above referred to.

The invention consists, substantially, in the novel construction, combination, and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claims appended hereto.

Referring now to the drawings, in which similar characters indicate similar parts, Figure 1 is a vertical section through one of the operators' switchboards, showing the same in use from either side. Fig. 2 is a plan view of one of the jacks in one of the switchboards with the upper shell removed, showing the parts in their normal positions. Fig. 3 is a similar view to Fig. 2, only showing a plug inserted in one end. Fig. 4 is a transverse section through one of the jacks. Fig. 5 is a vertical longitudinal section through one of the jacks. Fig. 6 is a longitudinal section through one of the plugs. Fig. 7 is a diagram illustrating three subscribers' stations and their connections at the exchange. Fig. 8 is a diagram showing one subscriber's station and its connection at the exchange.

As before premised, the present case relates primarily to the construction of the jack and plug of a telephone system invented by me and described and claimed in an earlier application, Serial No. 95,281, filed February 24, 1902; but in order to obtain an intelligent understanding of the relation and operation of the herein-described jack and plug it is necessary to describe the system, inasmuch as the operation of the jack and plug is entirely dependent upon the arrangement of the circuits illustrated in said application.

Referring, therefore, to the details of the drawings, the letter *a* represents the receiver-lever within the subscriber's station.

b is a contact-point electrically connected with the ground *c*.

d is a contact-point electrically connected to one terminal of the primary *f* of an inductorium.

g is the secondary of the inductorium, in which the receiver *e* is placed.

h is the transmitter, and *j* is the bell.

1 and 3 are the main wires, leading from the subscriber's station to the exchange.

k is a common battery to which the wire 3 leads.

l is an electromagnet placed in series in the wire 3.

m is a contact-point; *n*, the armature of the electromagnet *l*.

q is the electric light-board, which has the openings *r* formed through the same, in each of which openings are placed electric lights *s*, which lights are in a circuit formed by wires leading from the contact *m*, through a common battery *p*, through the light, and back to the armature *n*.

A is one of the operators' switchboards and desk.

B represents the switchboard, and C the desk upon each side of the same.

D represents the jacks in the switchboard, each of which jacks is composed of a soft-iron core D′, which passes longitudinally through the same, and the rod D^2, which normally projects a slight distance from the core D′. The central portion of the core D′ is cut away, so as to expose the rod D^2, and extending from this rod in the center is the pin D^3, which normally lies in contact with a plate D^4, insulated from the plug D′.

D^5 is a pin extending upward from the rod D^2 in the center, and D^6 represents springs connected to the pin and extending out from each side of the same and secured to the plug at each end for the purpose of holding the rod D^2 in the center.

D[7] is a semicircular shell secured below the plug D′ and insulated therefrom.

D[8] is a semicircular shield arranged above the core D′ and insulated therefrom.

E is one of the plugs, which consists of the electromagnet E′, provided with the soft-iron core *e*, which has the two soft-iron face-plates *e′* and *e²* and the soft-iron shell E² in magnetic contact with the face-plate *e²* for the purpose of concentrating the lines of force at that end which is provided with the face-plate *e′*. Around this core is wound the coil *e³*. This plug also consists of the outer conducting-shell E³, insulated from the magnetic shell E².

F is an induction-coil composed of the primary coil F′ and the secondary F².

F³ is a soft-iron core around which the two coils are wound. F⁴ is a pivoted armature adapted to be attracted by the core F³ when energized, and F⁵ is a contact-point with which the armature F⁴ is adapted to make contact. At the opposite end of the core is arranged a pivoted armature F⁶, which is adapted to make contact with the point F⁷ when attracted by the core.

G is a second induction-coil, of which G′ is the primary and G² the secondary.

G³ is the core around which the primary and secondary are wound. G⁴ is a pivoted armature adapted to be normally in contact with the point G⁵, but to be pulled away from the same when the core G³ is energized. G⁶ is a pivoted armature arranged at the opposite end of the core G³, and when said core is energized said armature is adapted to make contact with the point G⁷.

C′ represents openings formed through the operators' desks C, and underneath these openings are arranged the springs I, which are normally in contact with the contacts J.

H is a battery included in the wire leading from spring I to the contact F⁷.

K is the desk electric light.

L is an electromagnet, and O is a battery, both of which are included in the circuit extending from contact G⁷ to armature G⁶.

M is an armature adapted to be attracted by the magnet L, and N is a step-by-step indicating device adapted to be actuated by armature M.

P is an electromagneto ringing device, and Q is the ground with which it is connected.

R is the socket in which the plugs are placed to connect any one of the lines with the operator's phone. This socket consists of the metallic shell R′, which is adapted to make contact with the shell E³ of the plug and inside of the shell R′, and insulated therefrom is the metallic plug S, which is adapted to make contact with the core of the plug.

T is the operator's receiver, T′ the transmitter, and T² is the inductorium of the operator's phone, and T³ is the operator's battery.

I will first describe the connection and wiring at the subscriber's station, as is more fully illustrated in Fig. 8. I have in my arrangement as illustrated omitted the branch circuit containing the alarm and the condenser as usually employed in the systems of to-day, and I leave one line of the metallic circuit normally disconnected in its entirety from the hook-lever manipulated through the removing of the receiver, and I not only connect normally the second line to this hook-lever, but bring the hook-lever normally in contact with a grounded alarm. This arrangement has the advantage that the condenser can be entirely omitted, and it also has the advantage that the comparatively dear alarm-bell of to-day can be replaced by a comparatively cheap alarm-bell to be used with the interrupted current. In fact, I prefer to use a highly inductive contrivance, one which retards greatly the flow of induced currents, so as to retard as much as possible the flow of earth-currents through that branch of the circuit which is normally connected through the lever with the ground. In the case where the polarized bell of to-day is replaced by a device such as described the source of electricity P, which is grounded at Q, can then be either a direct and straight or interrupted current; but, if it is desired, this part of my invention may be omitted, and the bridge as usually employed may be replaced.

The drawing Fig. 8 clearly illustrates the circuit consisting of wires 1 and 3 as normally broken, because the wire 3 normally disconnects from the wire 1 and only connects therewith through the lever *a* when the receiver *z* is removed, and this lever comes in contact then with the contact *d*, which is the terminal of the line-wire 3. This line-wire connects in series the transmitter *h* and the primary *f* of the inductorium, the secondary *g* of which is connected to the receiver *z*. The wires 1 and 3 form the circuit of the subscriber centered in the exchange, and the wire 3 is therein connected to the common battery *k*.

The first radical departure in my invention from the systems of to-day consists in the employment of a light-board and in the position of the same relative to the different switchboards and operators attending thereto. I omit entirely the supervisory lamps of the present systems, and substitute therefor the light-board, wherein each subscriber's circuit is provided with an annunciator, preferably in the shape of an electric lamp, and this lamp-circuit is preferably placed in a local circuit adapted to be operated by a relay placed in series in the subscriber's circuit. The light-board is placed at right angles to the switchboards, so that the operators attending to said switchboards can through a slight movement of the head readily ascertain which of the lights on this light-board are lighted. The light-board presents for this purpose a double front—that is, the lights in this board can be

distinguished from both sides, front as well as rear, as is clearly illustrated in Fig. 8, in which *q* represents the light-board, *r* the openings, and *s* the electric lights in same. The function of this light-board is to notify, through the state of the different lamps it contains, the status of the different circuits connected thereto, if said circuits are "busy" or if said circuits are idle. The lighting of a lamp indicates that the circuit connected thereto is employed and can therefore not be used by any of the operators for the purpose of connecting the same to a calling subscriber. The light-board therefore takes the place of the so-called "testing" of to-day and makes unnecessary that operation of the operator which to-day pertains to the testing of the line. The operator having a call for a certain line, looks up to the light-board and ascertains if the circuit of the called-for subscriber is busy or not. If the lamp designating the number of the desired subscriber is not lighted, the circuit is not busy and the connection can be made. If, on the contrary, the lamp designating his number is lighted, then the circuit is busy and the connection cannot be made. Each lamp carries on each side the number of its subscriber, and the opening may also be provided, if necessary, with a magnifying-glass, and it is obvious that with such arrangement the operator can easily ascertain by a mere look at the board if the number desired by her is busy or not.

Each subscriber's circuit has connected thereto in series at the desk of the operator in charge of said circuit the primary of an inductorium, the secondary of which is in inductive relation to the plug-cord with which each of said circuits is provided.

In the experiments carried out for the purpose of ascertaining the necessary resistance and inductive values between primaries and secondaries I found that it would be impractical to give the secondary a high-resistance value if this secondary should be connected through the plug to the circuit called, an operation which will later on be more fully described, and as a result of these experiments I prefer the arrangement as illustrated in Fig. 8, in which the primary of the inductorium connected in series to the subscriber's circuit is provided with a secondary of high-inductive value and wherein this secondary is connected in series with a high-inductive secondary of a second inductorium the low-resistance primary of which is connected to a plug-circuit. In other words, I make use of two induction-coils or transformers, the first induction-coil being in reality a step-up and the second induction-coil being in reality a step-down transformer. In Fig. 8 this arrangement is illustrated as to consist of the step-up transformer consisting of the core F^3, the primary F', and the secondary F^2, and the step-down transformer consisting of the core G^3, the secondary G', and the primary G^2. The primary F' of the first or step-up transformer is connected in series to the circuit 1 3, and the secondary F^2 of this transformer is connected in series to the secondary G' of the second or step-down transformer, the primary of which is connected to the plug-circuit.

The present invention also contemplates a construction of plug having an electromagnet and two conducting parts insulated from each other, each part connected to one contact of the plug-circuit forming the terminals of the primary G^2. This plug E, as illustrated in Fig. 6, includes the electromagnet E', consisting of the soft-iron core *e*, provided with the two soft-iron face-plates e' and e^2 and the soft-iron shell E^2 in magnetic contact with the face-plates e^2 for the purpose of concentrating the lines of force at that end which is provided with the end plate e'. Around this core is wound the coil e^3. The plug E also consists of the outer conducting-shell E^3, insulated from the magnetic shell E^2. To this outer shell is connected, as said above, through the cord one terminal of the primary G^2, the other terminal of which is connected to the face-plate e' or its equivalent, the face-plate e^2 in electrical contact with the face-plate e' through the core *e*. The plug proper is also provided with a handle H^2, preferably made of wood, as is usual, and this handle is shown as of a conical form; but it is obvious that any other non-conducting material may be employed. This material should be non-conducting, so that the operator's hand will not contact with any part of the circuit.

The invention further consists in the arrangement whereby the ringing-circuit is automatically connected to the circuit called through the insertion of the plug. This arrangement is clearly illustrated in Fig. 8.

P designates the source of ringing-current, which is grounded with one terminal at Q. A branch at the other terminal connects with a contact-point F^5 in proximity to the armature F^4 of the core F^3 of the inductorium F. This armature is in electrical contact with the armature G^4 of the inductorium G, and in proximity to this armature is the contact G^5, connected through the plug-circuit with the outer shell E^3 of the plug E.

Normally—that is, when the circuit to which the inductorium F belongs is idle—the armature F^4 is drawn by its spring out of connection with the contact F^5, but the armature G^4 is normally connecting with the contact G^5. Should now the subscriber of the circuit consisting of the wires 1 and 3 remove his receiver from the hook, thereby closing the circuit, then the core F^3 will be energized, the armature F^4 will be drawn toward that core and in contact with the point F^5, closing the circuit consisting of the ground Q, source of current P, contact F^5, armature F^4, armature G^4, contact G^5, and shell E^3 of the plug E; and if, as will later on be more fully described,

the shell E^3 connects through the insertion of the plug with the grounded circuit-wire of the subscriber called, then it is obvious that the generated current in P will find a path through the circuit just described and the grounded circuit-wire of the subscriber called.

In the general description later on to be given I will set forth the manner in which the ringing-circuit is broken as soon as the subscriber called has taken his receiver from the hook.

This system also provides means whereby the calls are automatically registered. This arrangement is illustrated in Fig. 8 and consists of electromagnet L, provided with the armature M and ratchet-wheel N in proximity to that part of the armature adapted to move the ratchet-wheel one or more points, as desired, through the energizing of the core of the electromagnet L. The coil of this electromagnet is connected to the circuit consisting of the battery O, armature G^6, and contact-point G^7 of the inductorium G. Normally this circuit is open, for the reason that the armature is drawn from its contact G^7 by its spring; but when through the insertion of the plug (as will later on be more fully described) the same connects with the circuit called and the subscriber of this circuit answers by removing his receiver then the core of the inductorium G will be energized and the armature G^6 will be drawn upward and in connection with the contact G^7, closing the circuit containing the electromagnet L, whereby the armature will be drawn toward its core and will manipulate the ratchet-wheel. This ratchet-wheel connects with any of the well-known registering devices, and as it is the practice to illustrate a registering device by showing only the mechanism actuating the same and the ratchet-wheel I do not deem it necessary to illustrate in the drawings or describe in the specification a complete registering device, as the construction of such devices does not form the subject-matter of this my invention and is well understood by persons versed in the art.

I will now describe the switchboard. The first innovation is that both sides of the same can be used in the connection of subscribers and that therefore each is provided with the necessary operator's desk, as is well illustrated in Fig. 1, wherein an operator is stationed on each side of the board. In this figure the center partition of the switchboard is designated by the letter B′, and this center board is adapted to carry the different circuits designed to be connected to the different jacks. To this center board are also secured the spring-jacks D, with their shields D^8, preferably in the shape of a semicircle, as illustrated. The center board is closed on each side with an end board, (designated in the drawings by the letter B^2.) The second innovation consists of the construction of the spring-jack. This spring-jack embraces the following parts, (illustrated in detail in Figs. 2, 3, 4, and 5:) The core of soft iron D′, provided with the movable pin D^2, longitudinally centered through the two springs D^6, connected to the pin-head D^5. This movable pin is provided with the contact D^3, normally in contact with the contact-plate D^4, secured to but insulated from the soft-iron core. The spring-jack consists also of the semicircular conducting-piece D^7, in proximity to but insulated from said core. The contact-plate D^4 is provided with means to connect thereto one line of the subscriber's circuit, and the soft-iron core is provided with means to connect thereto the other line of said circuit. The second line of the circuit is connected to the semicircular shell D^7. As long as the contact D^3 connects with the contact-plate D^4 that part of the circuit centered in the exchange is unbroken; but as soon as through the insertion of the plug E the pin D^2 is pushed inward, breaking the contact between D^3 and D^4, the circuit is broken and the plug-circuit may be made part of the subscriber's circuit.

I will now describe the *modus operandi* of my invention, taking for granted that the subscriber's station is provided with an arrangement as illustrated more specially in Figs. 7 and 8. I have in these figures, as was clearly stated in the description of the drawings, omitted the permanent connection of one of the circuit-wires through a condenser and alarm device with the lever *a*, and I have connected this lever with the interposition of an alarm device to the ground *c;* but it is obvious that the usual arrangement of condenser and bell may be used. In this case the source of ringing-current P should not be grounded and the armatures F^4 and G^4 should be provided with two metallic parts insulated from each other, and the contact-point F^5 and G^5 should be duplicated, so that one contact-point of each of the armatures shall connect with one line of the source P and the other contact of each of the armatures shall connect with the second line of said source. Normally—that is, when the circuits are idle—the flow of the battery *k* is interrupted, because one of the line-wires, in the drawings the line-wire 3, is out of electrical contact with the second line-wire, in the drawings the line-wire 1, and with the exception of this break the circuit is a continuous one, as follows: Commencing at the break in the subscriber's station, as in Fig. 8: contact *d*, primary of inductorium *f*, transmitter *h*, wire 3, common battery *k*, coil of electromagnet *l*, soft-iron core D′, movable pin D^2, contact D^3, contact-plate D^4 of the spring-jack of the first switchboard, passing then to the spring-jack of the second switchboard, where the connection is the same as in the spring-jack just described, and from the contact-plate D^4 of the spring-jack of the last switchboard to one terminal of the primary F′ of the

inductorium F, the other terminal of which is connected to the semicircular shell D^7 of the spring-jack of the last switchboard, and connects then to the semicircular shell of the spring-jack of the switchboard preceding till the semicircular shell of the spring-jack of the first switchboard is reached, where the same connects with the second line-wire in the drawing, the line-wire 1, connected at the subscriber's station to the lever *a* in electrical connection through contact *b* and alarm *j* with the ground *c*. It is now supposed that the subscriber No. 1 wishes to communicate with the exchange. He removes, as usual, the receiver *z* from the hook *a*, thereby bringing this lever or hook in contact with the point *d*. This closes the subscriber's circuit, and the current-flow of the battery *k* has a continuous path, as is illustrated in Fig. 8, from the positive pole of said battery through wire 3, transmitter *h*, primary of inductorium *f*, contact *d*, lever *a*, line-wire 1, through the shell D^7 of its particular spring-jack, the primary F′ of the inductorium F, its spring-jack proper, the coil of electromagnet L, back to the negative pole of said battery. In Fig. 7 the coils of electromagnets *l* are placed in the line 1 instead of the line 3, as illustrated in Fig. 8. This difference of placement does not alter the principle or working of the arrangement and only illustrates the flexibility of the system described. As soon as the contact between *d* and *a* at the subscriber's station is established the electromagnet *l* is energized through the flow of the current, and in consequence the armature *n* is brought in contact with the point *m*, thereby closing the local circuit containing the battery *p* and the lamp *s* of the light-board *q*. At the same time the core F^3 of the inductorium F will also be energized, and in consequence thereof the armature F^6 will be brought in contact with the point F^7, thereby closing the circuit containing the battery H, the operator's lamp K with its shunt I, and the coil e^3 of the plug E; but at the same time the armature F^4 will be drawn in contact with the point F^5, which point is in contact with one terminal of the ringing-generator P. The lighting of the two lamps *s* in the light-board and K at the operator's desk will at one and the same time first notify every operator in the room that the particular circuit is busy and, second, notify the operator having charge of this circuit that the same is calling, and the current-flow through coil e^3 will energize the core *e* of the plug E. The operator being aware, through the lighting of the lamp, that the subscriber is calling, removes the plug E of this particular circuit from the opening, in which it is held normally in an upright position, and places it face downward in the listening-jack R, as is clearly illustrated in Fig. 1 by the left-hand operator and as is also illustrated in Fig. 7, wherein the circuit No. 3 is illustrated as in the act of calling and wherein the plug of said circuit is placed in the operator's listening-jack. The removing of the plug from its place allows the shunt-arm I to connect with the contact J, thereby shunting the lamp K and extinguishing the same. The operator ascertains now the circuit-number desired and, having ascertained this number, looks at the light-board to find out if the same is busy or not, and if the desired number is idle she inserts the plug E in the spring-jack denoting this circuit, as is clearly illustrated by the right-hand operator in Fig. 1 and in Fig. 7, wherein subscriber No. 1 is illustrated as called up and wherein the plug of circuit No. 2 is placed in the jack of circuit No. 1, thus indicating that circuit No. 2 was calling for circuit No. 1. It was clearly set forth in the description of the drawing that the plug consists in part of an electromagnet, and the insertion of the plug will therefore result therein that the same is drawn tightly at the face-plate of the jack in which it is inserted and will through this operation uncenter the pin D^2, thereby breaking the contact between it and the contact-plate D^4. At the same time it will connect that part of the circuit called connected to the semicircular shield D^7 of the jack, through the plug-shell E^3, with one terminal of the primary G^2 of the plug-inductorium G and will connect that part of the circuit called which is connected to the soft-iron core of the jack, through the contact of the same with the core of the plug, with the other terminal of said primary. The circuit called therefore will, as shown in Fig. 7, consist of the ground *c*, the alarm *j*, contact *b*, lever *a*, wire 1, coil of electromagnet *l*, semicircular shell D^7, plug-shell E^3, that wire of the plug-cord connected to said shell and contact G^5, respectively, contact G^5, armature G^4, armature F^4, contact F^5, ringing source P, and ground Q. As long as the subscriber called does not answer by removing his receiver that part of his circuit consisting of point *d*, primary *f* of receiver, transmitter *h*, wire 3, and battery *k* is cut out and his alarm or other annunciator *j* is actuated by the ringing-current. Should the subscriber called answer by removing his receiver from the hook, then this hook will contact with the point *d*, breaking the contact with the grounded circuit containing the alarm. This alarm will therefore cease to ring and the following circuit will be established: lever *a*, wire 1, coil of electromagnet *l*, shell D^7 of spring-jack, shell E^3 of the plug, primary G^2 of inductorium G, core *e* of the plug, soft-iron core D′ of spring-jack, battery *k*, wire 3, transmitter *h*, primary *f*, and contact *d*. Through the flow of this current the core of the electromagnet *l* will be energized, the armature *n* will contact with the point *m*, and the lamp *s* of the light-board *q* will light; so, also, will the core G^2 of the inductorium G be energized, drawing away from its contact G^5 the armature G^4, thereby

breaking the electrical connection with the circuit containing the ringing alarm. Through this operation all the connections of the circuits between it and the ground are broken. At the same time the armature G^6 will be drawn in contact with the point G^7 and the circuit containing the battery O and electromagnet L will be established, operating the armature M and through it the ratchet N, which ratchet operates the meter device. The communication between the circuit called and the circuit calling is now established through the inductoriums F and G.

In the switchboard with which I experimented I used seven cells for the energizing of the plug, and I found that the contact between the plug and the jack-core was firmly enough established not to be broken through the falling of the other plugs. I have carried on communication between two circuits through substantially the arrangement as illustrated in the drawings and described above. These experiments were carried out with the help of two assistants, and the correctness of each of the arrangements was thereby established. As long as communication lasts the plug will remain in connection with the spring-jack, and to guard the same more efficiently against other dropping plugs the upper part of the jack is provided with a semicircular shield D^8. When the party calling replaces his receiver on its hook, then the electromagnet *l* and the core of the inductorium *f* and the core of the plug E will be demagnetized. This plug will break its connection with the spring-jack and will, guided by the weight with which the plug-circuit is usually provided, return to its normal place, and the lamp *s* of the light-board will be extinguished; but the lamp of the circuit called will be lit till the party called has also replaced his receiver.

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

1. In a telephone system, a switchboard, a series of jacks for said switchboard, consisting each of a soft-iron core provided with a movable device adapted to connect normally with one part of the circuit to which said jack is connected, and adapted to be moved out of contact with said part through the insertion of the connecting-plug, and a conductor connected to a second part of the circuit, said conductor insulated from said core.

2. In a telephone system, a spring-jack consisting of a stationary soft-iron core provided with a movable pin, a contact-plate secured to but insulated from said soft-iron core, and a conductor in proximity to said soft-iron core, the movable pin provided with means to electrically connect with said conductor.

3. In a telephone system, a spring-jack consisting of a semicircular conductor insulated from but partially inclosing a soft-iron core, said soft-iron core provided with a movable pin centered with the aid of springs, said core also provided with an insulated contact-plate normally contacted with said movable pin.

4. In a telephone system, a spring-jack consisting of a stationary conducting-plate, a stationary soft-iron core in proximity to said conducting-plate, a contact-plate normally in electrical contact with said soft-iron core through movable means, but adapted to be brought out of contact with said core through the insertion of a connecting-plug.

5. A telephonic switchboard provided with a series of spring-jacks, each of which is provided with a shield extending beyond the face of the switchboard, substantially as and for the purpose specified.

6. In a telephonic system wherein two or more outlying circuits center in one exchange, a switchboard for said exchange, said switchboard provided with a series of jacks, said jacks consisting of two stationary conductors and a movable pin adapted to be pushed inward through the insertion of a connecting-plug and adapted to break the circuit through this inward movement, one of said stationary conductors being of soft iron.

7. A telephonic switchboard provided with a series of jacks, each of which is provided with a protecting-shell extending beyond the face of the switchboard, substantially as and for the purpose specified.

8. A telephonic switchboard provided with a series of jacks, each of said jacks consisting of a stationary conductor, a stationary soft-iron core insulated from said conductor, said iron core provided with movable means normally in contact with a second stationary conductor, in combination with a series of plugs for said switchboard, each of said plugs provided with an electromagnet, and adapted to break the electrical connection between the movable means and the second stationary conductor.

9. In combination with a telephonic switch-jack having a stationary soft-iron core and movable contact means, an electromagnetic plug adapted to adhere to the soft-iron core through its magnetic force and adapted thereby to actuate the movable means with which said switch-jack is provided.

10. In a telephonic exchange a switchboard, a series of jacks for said switchboard, each jack consisting of two stationary conductors insulated from each other, one of said stationary conductors connected directly to one part of a subscriber's circuit, each of said jacks also provided with a stationary soft-iron core in electrical contact with a second part of said subscriber's circuit, said soft-iron core provided with movable means to electrically connect with the second stationary conductor, said stationary conductor in electrical contact with one coil of an inductorium.

11. In a telephonic exchange, a switchboard, a series of jacks for said switchboard, each

jack consisting of two stationary conductors insulated from each other, one of said stationary conductors connected directly to one part of a subscriber's circuit, each of said jacks also provided with a stationary soft-iron core in electrical contact with a second part of said subscriber's circuit, said soft-iron core provided with movable means to electrically connect with the second stationary conductor, said stationary conductor in electrical contact with one coil of an inductorium, in combination with an electromagnetic plug adapted to adhere to the soft-iron core through its magnetic property and adapted thereby to move out of contact with the second conductor the movable means with which the soft-iron core is provided.

12. In a telephonic switchboard, a switch-jack and a plug for said jack, the switch-jack adapted to normally connect parts of a subscriber's circuit, and the plug adapted to disconnect said connected parts, the switch-jack provided with a soft-iron core and movable means for said core, and the plug provided with an electromagnet.

13. In a telephone system wherein two or more circuits center in one exchange, a switchboard for said exchange, terminals of the outlying circuits connected to said switchboard, a jack for each of said circuits, said jack consisting essentially of a soft-iron core and means in proximity to said core to change the electrical connection of the circuit to which said jack relates, in combination with a connecting-plug, said connecting-plug consisting essentially of an electromagnet.

14. In a telephone system wherein two or more circuits center in one exchange, a switchboard for said exchange, terminals of the outlying circuits connected to said switchboard, a jack for each of said circuits, said jack consisting essentially of a soft-iron core and means in proximity to said core to change the electrical connection of the circuit to which said jack relates, in combination with a connecting-plug, said connecting-plug consisting essentially of an electromagnet, said electromagnet adapted to be energized and to remain energized throughout the period during which the circuit calling remains electrically closed.

15. In a telephone system wherein two or more circuits center in one exchange, a switchboard for said exchange, a series of circuits connected to said switchboard, a jack for each of said circuits, said jack consisting essentially of a soft-iron core, and means in operative relation to said core to change the connection of the circuit to which said jack relates, in combination with a plug, said plug consisting essentially of an electromagnet and means to connect one circuit to a second circuit, said means including a coil in inductive relation to the outlying circuit to which said plug pertains.

16. In a telephone system, two or more outlying circuits centering in one exchange, a switchboard provided with terminals for each of said outlying circuits, said terminals in electrical connection with a jack consisting essentially of a stationary soft-iron core and movable means adapted to change the electrical connection of said circuit, in combination with a series of plugs each of which is in inductive relation with one outlying circuit, each of said plugs consisting essentially of terminals adapted to connect one circuit to a second circuit and an electromagnet adapted to be energized when the plug is placed in position and to remain energized throughout the period during which the calling-circuit is closed.

17. In a telephone system, an exchange provided with a switchboard containing the terminals of two or more incoming circuits, a jack for each of said circuits, said jack consisting essentially of a soft-iron core, and means to change the connection of said circuit, and a series of plugs for said switchboard, each of said plugs being in inductive relation to one of the incoming circuits and consisting essentially of an electromagnet and connecting means, said plugs being adapted to adhere to said jacks as long as said electromagnets are energized.

18. In a telephone system wherein two or more outlying circuits center in one exchange, a switchboard for said exchange, terminal connections on said switchboard for the incoming circuits, jacks for each of said connections, and a series of plugs each inductively connected to one incoming circuit and adapted to adhere through electromagnetic action to said jacks when placed in position thereon, said jacks consisting essentially of soft-iron cores, and means to change the electrical connection of the circuits to which said jacks are operatively related.

In testimony whereof I hereby sign my name, in the presence of two subscribing witnesses, this 31st day of July, A. D. 1902.

ISIDOR KITSEE.

Witnesses:
EDITH R. STILLEY,
CHAS. KRESSENBUCH.