179. TELEPHONY,
Systems, Automatic,
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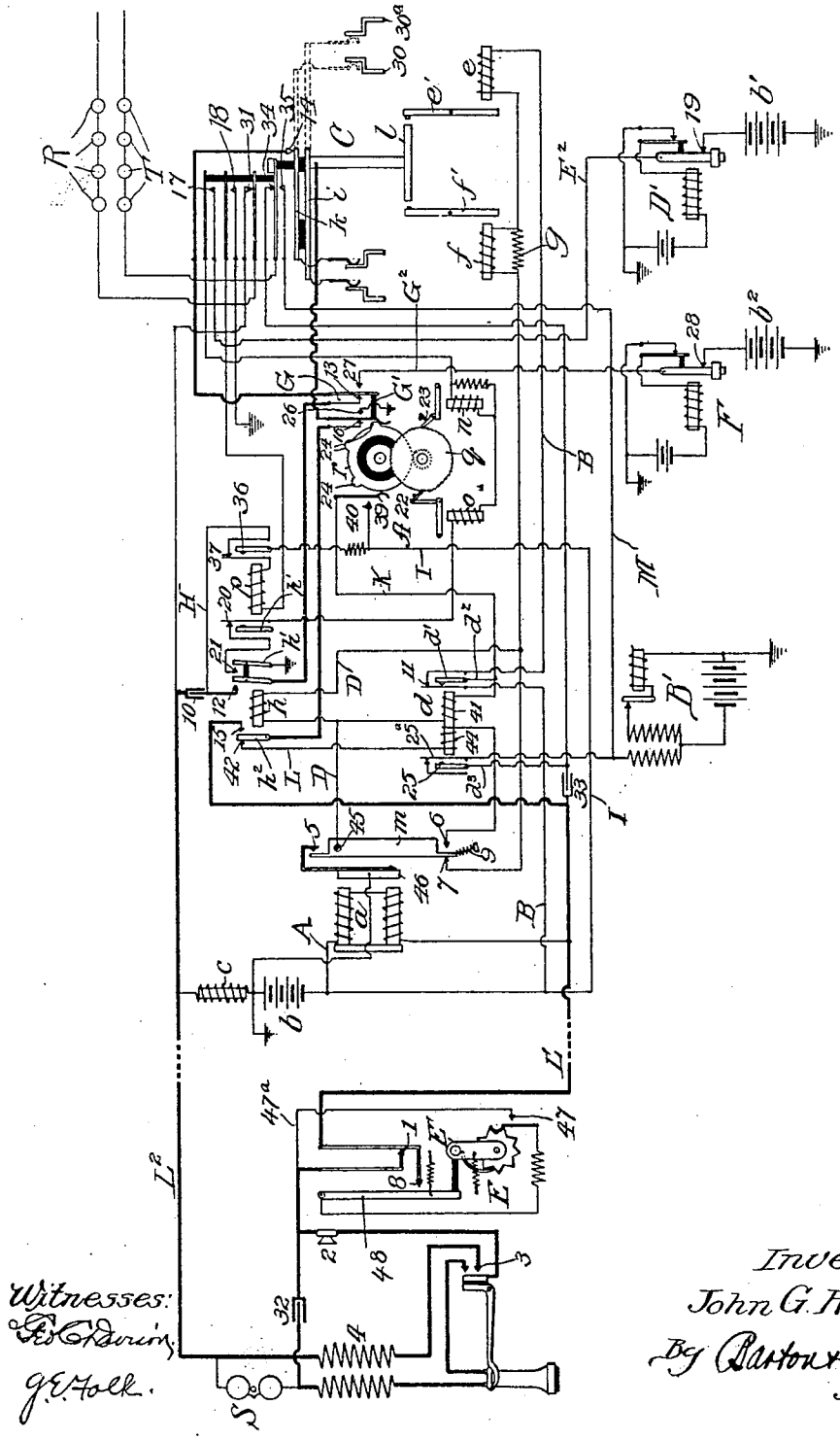
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J. G. ROBERTS.

AUTOMATIC TELEPHONE EXCHANGE.

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UNITED STATES PATENT OFFICE.

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AUTOMATIC TELEPHONE-EXCHANGE.

No. 852,523. Specification of Letters Patent. Patented May 7, 1907.

Application filed February 5, 1906. Serial No. 299,424.

To all whom it may concern:

Be it known that I, JOHN G. ROBERTS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Automatic Telephone-Exchanges, of which the following is a full, clear, concise, and exact description.

My invention relates to an automatic telephone exchange system of the central energy type, and has for its object to provide improved and efficient means for effecting the interconnection of any two subscribers in the exchange, while requiring the minimum amount of labor on the part of the calling subscriber.

A feature of my invention consists in the arrangement whereby when connection is made with an idle called line, ringing current is automatically applied thereto to signal the called party, said ringing current being automatically cut off when the called subscriber responds. In case the called subscriber does not respond after the ringing current has been applied a predetermined length of time, the ringing current is automatically cut off and a busy tone apparatus connected with the calling line.

Another feature of the invention consists in the manner of imposing interrupted current upon the line to operate the selector controlling mechanism without the use of a ground connection at the substation, so avoiding trouble due to high potential grounded circuits.

Other features of the invention consist in the detailed structural arrangement to be described hereinafter.

I will describe my invention more particularly by reference to the accompanying drawing, which is a diagrammatic representation of a substation single subscriber's line, and its substation and central office equipment.

The telephone line shown extends in two limbs L^1, L^2, from the substation to the central office, the battery *b* being included in a bridge A of the line at the central office. The line relay *a* is included in said bridge between the free pole of the battery and the limb L^1 of the line, while the impedance coil *c* is included in said bridge between the grounded pole of said battery and the limb L^2 of the line. At the substation is provided an interrupter E, said interrupter being provided with a ratchet wheel adapted to be operated by an arm E^1 to make and break contacts 47 which are included in a conductor 47^a extending from the limb L^1 of the line to a contact arm 48, which is adapted when the arm E of the interrupter is away from normal position, to engage a contact spring 8 and separate it from its anvil 1, said spring 8 being connected with line conductor L^1. Thus normally the contacts 1, 8, are included in conductor L^1, but when the contact arm is moved into position to operate the ratchet wheel, the contacts 1, 8, are separated, and conductor 47^a, including the contacts 47 operated by the ratchet wheel, is substituted, and said ratchet wheel in making and breaking said contacts 47 causes an interrupted or oscillating current to flow from battery *b* to relay *a* over limb L^1 of the line, through the substation and back over limb L^2 of the line to the battery, in a complete metallic circuit. The use of a ground connection at the substation is thus avoided.

The relay *a* is provided with an armature 46 and a heavy suspended arm or lever *m*. The armature 46 of said relay is so designed as to be responsive to interruptions of the current through the windings of the relay produced in the operation of selection, to be described hereinafter, and to act upon the arm *m* to close contacts 5, the arm *m* being so pivoted, and of such weight and inertia as to be immovable under a temporary impact of armature 46 as the latter engages it in closing said contacts, said arm, however, responding to a continuous pull of the armature resulting from a continuous flow of current through the relay *a*.

In order to render the arm *m* more sluggish, I may employ a spring 9 so applied as to exert its maximum force when the arm is in normal position, as shown, in which position an increased restoring force is more desirable, and to exert its minimum force when its arm is in its operative position, the reduction in the spring's action being due to the fact that in its compressed condition its pressure is more nearly in line with the pivot 45 of said arm *m*. The contacts 5 control a local circuit B extending from the free pole of battery *b* through contacts 11 of relay *d*,

stepping magnet *e* of the selector C, retaining magnet *f* of said selector, which is shunted by a non-inductive resistance *g*, contacts 7, normally closed by the inertia arm *m*, contacts 5 to ground.

The line conductors L^1, L^2, lead to contact arms or brushes *i*, *k*, respectively, of the selector C, said conductors being normally separated at contacts 15, 12, respectively, of the sluggish relay *h*, which is included in conductor D extending from conductor B between the relay *f* and contacts 7 therein, to the inertia arm *m*, said relay being normally short circuited by the portion of conductor B controlled at contacts 7, this short circuit, however, being opened when the arm responds to the continuous current in relay *a* to permit the relay *h* to operate. It will thus be seen that the relay *h* will not be operated to extend the line to the contact brushes *i*, *k*, until after the interrupted current has been passed through relay *a* to advance the selector arm to the desired terminals, this being desirable in order that there may be no disturbance or confusion as the contact arms *i*, *k*, which are of the wiping type, advance over the line terminals of the selector.

The selector, while away from normal position, opens contacts 31, 34, disconnecting the line from its multiple terminals R, T, on the different selectors in the exchange. A conductor M extends from the busy tone apparatus B^1 to a contact 35, which, when the contacts 34 are separated by the selector arm, engages the member of said contacts directly connected with the test terminals T of the calling subscriber's line. Said arm, while away from normal position, also closes contacts 17, 18. The contacts 17 control a circuit E^2 extending from a grounded battery b^1 through contacts 19 of a pulsator D^1, magnets *n*, *o*, contacts 20 of relay *p*, contacts 21 closed by armature *h'* of the connecting relay *h* when energized, to earth. The magnets *n*, *o*, control the automatic ringing mechanism comprising a ratchet wheel *q* provided with a stepping pawl 22 operated by magnet *o*, retaining pawl 23 operated by magnet *n*, said ratchet wheel when advanced rotating a contact wheel *r* carrying a number of cams 24 which are adapted successively to operate a ringing key G and separate contacts 16, 13, normally included in line conductors L^1, L^2, and connect the portions of said conductors leading directly to the brushes *i*, *k*, of the selector with contacts 26, 27, respectively, contact 26 being connected to earth by conductor G^1, while contact 27 is connected by a conductor G^2 with the contacts 28 of a pulsator F, said contacts being connected with the free pole of a grounded battery b^2.

A conductor H extends from line conductor L^2 between the condenser 10 and contacts 12 therein, through contacts 37 of relay *p*, winding of said relay *p*, contacts 18, to earth, relay *p*, in other words, being included in a grounded leg from the contact brush *k* of the selector. This relay would be adapted to respond to a potential at the terminal 30 of a called subscriber, created upon the removal of the called subscriber's receiver from its hook. Relay *p*, when energized, attracts its armature p^1, opening contacts 20, and breaking the circuit of the automatic ringing magnets *n*, *o*. The armature 36 of relay *p* is connected by conductor I with the free pole of battery *b*, said armature when attracted separating contacts 37, engaging the contact thereof directly connected through the winding of relay *p*, through contacts 18, to earth, so locking up relay *p* until the conversation is completed.

The first cam 24 on wheel *r*, if said wheel is allowed to continue its rotation, as when the called subscriber does not respond, is adapted eventually to close contacts 39, 40, contact 39 being connected by conductor K through the winding 41 of relay *d* to conductor D, which is connected to earth through contacts 5, while contact 40 is connected with conductor I, which leads to the free pole of battery *b*. The armature d^1 of magnet *d*, when attracted, is adapted to open contacts 11 included in the circuit of the selector magnets *e*, *f*, said armature being connected by a conductor d^2 with conductor K, and being adapted to engage the member of contacts 11 which is directly connected with the free pole of battery *b*. The armature 25 of relay *d* is connected by conductor d^3 with line conductor L^1, a condenser 33 being included in said line conductor between the junction of conductor d^3 with limb L^1 and the substation. The contact 25^a which the armature 25 engages when attracted, is connected with a busy tone apparatus B^1.

The armature h^2 of relay *h*, which, when attracted, completes the continuity of line conductor L^1, is directly connected with a portion thereof leading to contact brush *i*, said armature when retracted engaging the contact 42 connected with a conductor L which leads through the winding 44 of relay *d* to contact 6 closed when the heavy arm *m* is operated by continuous current in magnet *a*. Thus if the line is busy a potential will exist at the terminal 30^a of such line, producing a current to operate magnet *d* when the selector makes connection with the desired line before the sluggish magnet *h* has operated, and after the inertia arm *m* has operated, so applying busy test current to the circuit; or if the called party does not respond to the ringing current, relay *d*, when operated, also connects said busy tone apparatus with the calling subscriber's line.

Operation.

Calling an idle line.—In establishing a connection, the calling subscriber first re-

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moves his telephone from its hook, thereby completing the metallic line circuit from battery b through line relay a, limb L^1 of the line, springs 1, 8, of the interrupter, transmitter 2, contacts 3 closed by the switch hook, induction coil winding 4, limb L^2 of the line to the battery. The line circuit when thus completed effects the energization of relay a, which closes contacts 5 and 6 and opens contacts 7, thereby advancing the arms i, k, of the selector C through one step. This operation is, however, incidental, since the first contact of the selector has no electrical connection. The calling party now moves his interrupter arm E^1 to the number of the desired subscriber, which operation, in addition to opening the line circuit, prepares the same for the operation of the selector by introducing the interrupter contacts 47 in the line circuit; separating, as before described, contacts 1, 8. The interrupter arm, when released from its advanced position, interrupts at contacts 47 the metallic circuit through the line relay a, and causes the same to close its contacts 5, in response to each impulse, the contacts 7 remaining closed, due to the inertia of armature m. Each closure of contacts 5 completes the circuit D, including the stepping magnet e and retaining magnet f of the selector C, which magnets operate their respective pawls e^1, f^1, causing the same to engage the ratchet wheel l of the selector. The ratchet wheel l is thus caused to advance the contact brushes i, k, to the terminals of the desired line.

The interrupter arm having returned to its resting position after effecting the advance of the selector arm, the line relay a in response to the steady current now flowing therethrough, overcomes the inertia of the heavy arm m and the pressure of the spring 9, and opens contacts 7, closing contacts 6. The short circuit controlled at contacts 7 about relay h is now open, and said relay h is included in a circuit B—D, including battery b. Said sluggish relay h thereupon operates to extend the circuit of the line conductors L^1, L^2, to the contact brushes i, k, of the selector. The extension of limb L^1 leads through contact 15 and armature h^2 of relay h, through contacts 16, to selector brush i, while the extension of limb L^2 leads through condenser 10, contacts 12 of relay h, contacts 13, contacts 14 of the selector to the brush k thereof.

The selector arm, while away from normal position, as before described, opens contacts 31, 34, and disconnects the multiple terminals of the calling line therefrom. The selector arm, in opening contacts 34, connects the test terminals of the calling subscriber's line by way of conductor M, with the busy test apparatus B^1. The contacts 17 closed by the selector arm while away from normal position now co-operate with the armature h^1 and contact 21 of sluggish relay h to complete the circuit E^2 from pulsator D^1, through the retaining magnet n and stepping magnet o of the automatic ringing apparatus, through contacts 20 of relay p, to earth. The ratchet wheel q is stepped forward by the operation of the stepping pawl 22, and is retained by the locking pawl 23, advancing in its movement the contact wheel r. As the wheel r advances, the cams 24 are brought consecutively into engagement with the ringing key to open contacts 16 and 13 and close contacts 26 and 27, thereby providing a circuit for ringing current from generator F. Ringing current thereupon flows from battery b^2 through pulsating contacts 28, conductor G^2, contacts 27, contacts 14, selector arm k, terminal 30 of the called subscriber's line, through the called subscriber's line wire L^2, ringer S, condenser 32, interrupter contact 1, line wire L^1, condenser 33, terminal 30^a of the selector, and from thence through brush i, contacts 26 to ground, by way of conductor G^1. At definite intervals, therefore, dependent upon the rate at which the ringing key G is actuated, the bell at the called subscriber's station will be automatically rung. Obviously the opening of contacts 16 and 13 prevents any reaction of the ringing current upon the ear of the calling subscriber, who would at this time be listening.

If the called subscriber responds promptly relay p of the calling subscriber's line is energized, and operates instantly to open contacts 20 and sever the circuit E^2 for the magnets n, o, of the automatic ringer. As before described, the relay p, when contacts 13 of the ringer G are closed, is included in a grounded leg from contact brush k, by way of contacts 12 of relay h, conductor H, contacts 37 of relay p, winding of said relay p, contacts 18, to earth. When the called subscriber responds to the call by removing his telephone from its hook, he raises the terminal 30 of his line to a potential equal to the drop in potential through the impedance c, which potential produces a current flowing from said terminal 30, contacts 14, 13, 12, 37, winding of relay p, contacts 18, to ground, thereby operating relay p, which opens the contacts 20 of the ringing circuit and completes at its armature 36 and one of the members of contacts 37 a locking circuit I—H, through contacts 18 to ground.

The opening of contacts 20 by breaking the circuit E^2 releases the stepping and retaining pawls 22, 23, of ratchet q, allowing said wheel and its companion r to be restored to normal condition. It will readily be understood that although the cam wheel r will in its restoration, as in its advance, actuate the ringing key G, and thereby send impulses of ringing current over the called

subscriber's line; said restoration may be easily made to occur in so short a time that the ringing impulses will have ceased and the called circuit be in a quiescent state before the called party will have had time to place his receiver to his ear.

Upon the response of the called subscriber, by the removal of his receiver, the talking circuit between the two stations is completed, consisting of the two lines, supplied through their respective bridged impedances *a* and *c* with current from central battery *b*.

When the calling subscriber replaces his receiver on the hook at the completion of a conversation, the line relay *a* of his line is de-energized, and its armature opens contacts 5 and 6 and closes contacts 7. The closing of contact 7 re-establishes a short circuit about the sluggish connecting relay *h*, which releases its armatures, and disconnects the extensions of line wires L^1, L^2, from the selector arms *i*, *k*, so that during the return of the selector arm, brushes *i*, *k*, will be dead. Contacts 5, when opened, sever the circuit B of stepping and retaining magnets *e*, *f*, of selector C, allowing the selector brushes *i*, *k*, to be restored by the usual spring. The selector arm, when it resumes its normal position, breaks contacts 17 and 18 and 35, and closes contacts 31, 34, connecting the line with its multiple terminals. The opening of contacts 18 breaks the locking circuit I—H for relay *p*, which thereupon restores its contacts to normal position.

It will be observed that the said restoration of the apparatus is made dependent upon the action of the calling subscriber. This arrangement, however, does not prevent either party from disconnecting at any time and establishing other connections. In case the called subscriber, upon being signaled, fails to respond, the wheel *r* continues to advance until the first of its cams 24 engages spring 39 and forces the same into engagement with contact 40, thereby completing the circuit from the free pole of battery *b*, conductor I, contacts 39, 40, conductor K, winding 41 of relay *d*, contacts 5 of relay *a*, to earth. Relay *d* is thereupon energized and attracts its armatures, armature d^1 opening contacts 11 included in the circuit of the retaining and stepping magnets of the selector, and completing a locking circuit for said winding 41 of relay *d*, from the free pole of battery *b*, conductor B, one of the members of contacts 11, armature d^1, conductor d^2, conductor K, winding 41, contacts 5 of relay *a* to earth. The armature 25 of said relay *d* when attracted, engages contact 25^a and connects busy tone apparatus B^1 with limb L^1 of the line, by way of conductor d^3. The calling subscriber, upon hearing the busy signal and hanging up his telephone, would de-energize relay *a* and break the locking circuit of winding 41 of relay *d*.

Calling a busy line.—In case the called line were busy, the steps before described would be proceeded with up to the point when the selector reached the terminals of the desired line. If the called line were busy a potential would be present at the terminal 30^a of such line, and when the selector brush *i* reached said terminal, and before the sluggish relay *h* had been operated, current would flow from said terminal through brush *i*, extension of line conductor L^1, contacts 16, armature h^2 of connecting relay *h* and its back contact 42, through conductor L, winding 44 of relay *d*, contacts 6 closed by arm *m*, contacts 5 of relay *a*, to earth. Relay *d* would thereupon be energized, drawing up its armature d^1 to open the circuit of the stepping and retaining magnets of the selector and lock itself up until the calling subscriber hung up; armature 25 would operate to connect the busy tone apparatus with the limb L^1 of the calling subscriber's line.

I claim:

1. The combination with a telephone line, of a bridge of the line at the central office including a source of current, a magnet having a winding included in said bridge, an armature for said magnet, a lever engaged by said armature in its attracted position, said lever possessing considerable inertia, whereby it is unresponsive to a momentary impact of the armature but is responsive to a continuous engagement thereof, a circuit closed by the contacts of said armature and lever, a second circuit closed by said armature and lever when the lever is in its responsive position, and switching mechanism at the subscriber's station for either interruptedly or continuously closing the circuit of the line through said magnet.

2. In an automatic telephone exchange, the combination with a telephone line and a selector therefor, of a bridge of the line at the central office including a battery, a magnet having a winding included in said bridge, an armature for said magnet, a lever engaged by said armature in its attracted position, said lever possessing considerable inertia whereby it is unresponsive to a momentary impact of the armature but is responsive to a continuous engagement thereof, a local circuit having contacts controlled by said armature and lever, said circuit including electromagnetic means for operating the selector and a relay for connecting the subscriber's line to the terminals of said selector, a short circuit for said relay closed when the lever is in its normal position, and switching mechanism and an interrupter at the subscriber's station for closing the circuit and for producing an interrupted current through the magnet, respectively; whereby the selector is actuated to select the terminals of the called subscriber and the calling subscriber's line is extended to said terminals.

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3. In an automatic telephone exchange, the combination with a telephone line and a selector therefor, of a bridge of the line at the central office including a magnet and a source of current, switching mechanism at the subscriber's station for producing either continuous or intermittent currents in said magnet, means operated by an intermittent current in the magnet to actuate the selector to select the terminals of a called subscriber, a source of ringing current, and means operated by a continuous current in said magnet for connecting the ringing current to the called subscriber's line and for connecting the calling subscriber's line to the selected terminals.

4. In an automatic telephone exchange, the combination with a telephone line and a selector therefor, of a line relay, switching mechanism controlled by the line relay for selecting the line of a called subscriber and for connecting the line of the calling subscriber thereto, a source of ringing current, automatically operated means for connecting the same to the terminal of the called subscriber, and a relay energized upon the response of the called subscriber to open the circuit of the ringing current.

5. In an automatic telephone exchange, the combination with a telephone line and a selector therefor having terminals for the several subscribers' lines and an arm carrying brushes adapted to engage the terminals, of a relay *h* adapted to connect the circuit of the calling subscriber's line to the terminals of his selector, a line relay *a*, means at the substation for controlling said line relay, a local circuit, controlled by relay *a*, including the relay *h* and electromagnetic means for actuating the selector to select the terminals of the called subscriber, a short circuit of the relay *h* controlled by the line relay, a source of ringing current, and means automatically controlled by the relay *h* for connecting the same with the selector arm after it has reached the selected terminals.

6. In an automatic telephone exchange, the combination with a telephone line and a selector therefor having terminals for the several subscribers' lines and an arm carrying brushes adapted to engage the terminals, of a relay *h* adapted to connect the circuit of the calling subscriber's line to the terminals of his selector, a line relay *a*, means at the substation for controlling said line relay, a local circuit, controlled by relay *a*, including the relay *h* and electromagnetic means for actuating the selector to select the terminals of the called subscriber, a short circuit of the relay *h* controlled by the line relay, a source of ringing current, mechanism for connecting the same with the selector arm, and a local circuit including electromagnetic means for actuating said mechanism, said circuit being controlled by relay *h*.

7. In an automatic telephone exchange, the combination with a telephone line and a selector therefor, of a bridge of the line at the central office including a battery, a line relay *a* having a winding included in said bridge, switching mechanism and an interrupter at the substation for closing the circuit and producing an interrupted current through said relay, respectively, a local circuit controlled by said relay, including electromagnetic means for operating the selector to select the terminals of the called subscriber, and a shunt of said local circuit, including a relay *h*, controlled by the line relay, said relay *h* being adapted to connect the circuit of the line to the selected terminals.

8. In an automatic telephone exchange, the combination with a telephone line and a selector therefor, of a bridge of the line at the central office including a battery, a line relay *a* having a winding included in said bridge, switching mechanism and an interrupter at the substation for closing the circuit and producing an interrupted current through said relay, respectively, a local circuit, controlled by said relay, including electromagnetic means for operating the selector to select the terminals of the called subscriber, a shunt of said local circuit including a relay *h* controlled by the line relay, said relay *h* being adapted to connect the circuit of the line to the selected terminals, a source of ringing current and means controlled by the relay *h* for connecting the same to a selected terminal.

9. In an automatic telephone exchange, the combination with a telephone line and a selector therefor, of a bridge of the line at the central office including a battery, a line relay *a* having a winding included in said bridge, switching mechanism and an interrupter at the substation for closing the circuit and producing an interrupted current through said relay, respectively, a local circuit, controlled by said relay, including electromagnetic means for operating the selector to select the terminals of the called subscriber, a shunt of said local circuit including a relay *h* controlled by the line relay, said relay *h* being adapted to connect the circuit of the line to the selected terminals, a source of ringing current, mechanism for connecting the same to a selected terminal, and a local circuit including electromagnetic means for actuating said mechanism, said circuit being controlled by relay *h*.

10. In an automatic telephone exchange, the combination with a telephone line, of a bridge of the line at the central office including a battery, a line relay *a* having a winding included in said bridge, switching mechanism controlled by the line relay for selecting the line of the called subscriber, a relay *h* controlled by the line relay for connecting the circuit of the calling subscriber to the terminals of the called subscriber, a source of

ringing current, ringer mechanism for connecting the same to the selected terminal, a local circuit including electromagnetic means for actuating said ringer mechanism, said circuit being adapted to be closed by the relay h, and a relay p adapted to be energized to open said local circuit upon the response of the called subscriber.

11. In an automatic telephone exchange, the combination with a telephone line, of a bridge of the line at the central office including a battery one pole of which is grounded, a line relay a having a winding included in said bridge, switching mechanism controlled by the line relay for selecting the line of the called subscriber, a relay h controlled by the line relay for connecting the circuit of the calling subscriber to the terminals of the called subscriber, a source of ringing current, ringer mechanism for connecting the same to the selected terminal, a local circuit including electromagnetic means for actuating said ringer mechanism, said circuit being adapted to be closed by the relay h, a relay p adapted to be energized to open said local circuit upon the response of the called subscriber, a test relay d having a winding included in a normally open circuit, a contact device upon said ringer mechanism adapted to close the circuit of relay d after a predetermined time upon the failure of the called subscriber to respond, and a busy tone apparatus adapted to be connected to the calling subscriber's line by the test relay d.

12. In an automatic telephone exchange, a calling subscriber's line and a selector therefor, subscribers' lines having terminals in said selector, means controlled by the calling subscriber to select the line of a desired subscriber and to connect the line of the calling subscriber thereto, a source of ringing current, ringer mechanism at the central station adapted to automatically connect said source of ringing current to the selected line, a busy tone apparatus, and automatic mechanism, operated by said ringer mechanism after a predetermined time, upon the failure of the called subscriber to respond, for connecting said busy tone apparatus to the calling subscriber's line.

13. In an automatic telephone exchange, the combination with a calling subscriber's line and a selector therefor, of subscribers' lines having terminals in said selector, means controlled by the calling subscriber to actuate the selector to select the terminals of a desired subscriber, a busy tone apparatus, a test relay having two windings, one of which is included in a circuit automatically closed upon the failure of the selected subscriber to respond in a predetermined time, the other winding of the test relay being included in a circuit closed when the called line is engaged, and switching mechanism operated by said test relay for connecting the busy tone apparatus to the calling subscriber's line.

14. In an automatic telephone exchange, the combination with an electric circuit including a source of current, of a magnet having its windings included in said circuit, an armature for said magnet, a pivoted lever engaged by said armature in its attracted position, a spring engaging said lever and increasing its inertia when said lever is at its normal position, whereby the lever is unresponsive to a momentary impact of the armature but is responsive to a continuous engagement thereof, and switching mechanism for either interruptedly or continuously closing the circuit through said magnet.

15. In an automatic telephone exchange, the combination with an electric circuit including a source of current, of a magnet having its winding included in said circuit, an armature for said magnet, a lever engaged by said armature in its attracted position, said lever possessing considerable inertia whereby it is unresponsive to a momentary impact of the armature but is responsive to a continuous engagement thereof, and switching mechanism in said circuit for either interruptedly or continuously closing the circuit through said magnet.

16. In an automatic telephone exchange, the combination with a telephone line and a selector therefor, of a source of current and a magnet in the circuit of the line at the central office, switching mechanism at the substation, adapted to be set by the subscriber, for automatically producing intermittent currents in said magnet, to actuate said selector and select the desired line terminals, and thereafter for producing continuous current in said magnet, a source of ringing current, and mechanism automatically operated by said continuous current in said magnet for connecting the ringing current to the desired line terminals.

In witness whereof, I hereunto subscribe my name this 26th day of January A. D., 1906.

JOHN G. ROBERTS.

Witnesses:
ROY. T. ALLOWAY,
E. F. BEAUBIEN.