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COMMON BATTERY CORD CIRCUIT

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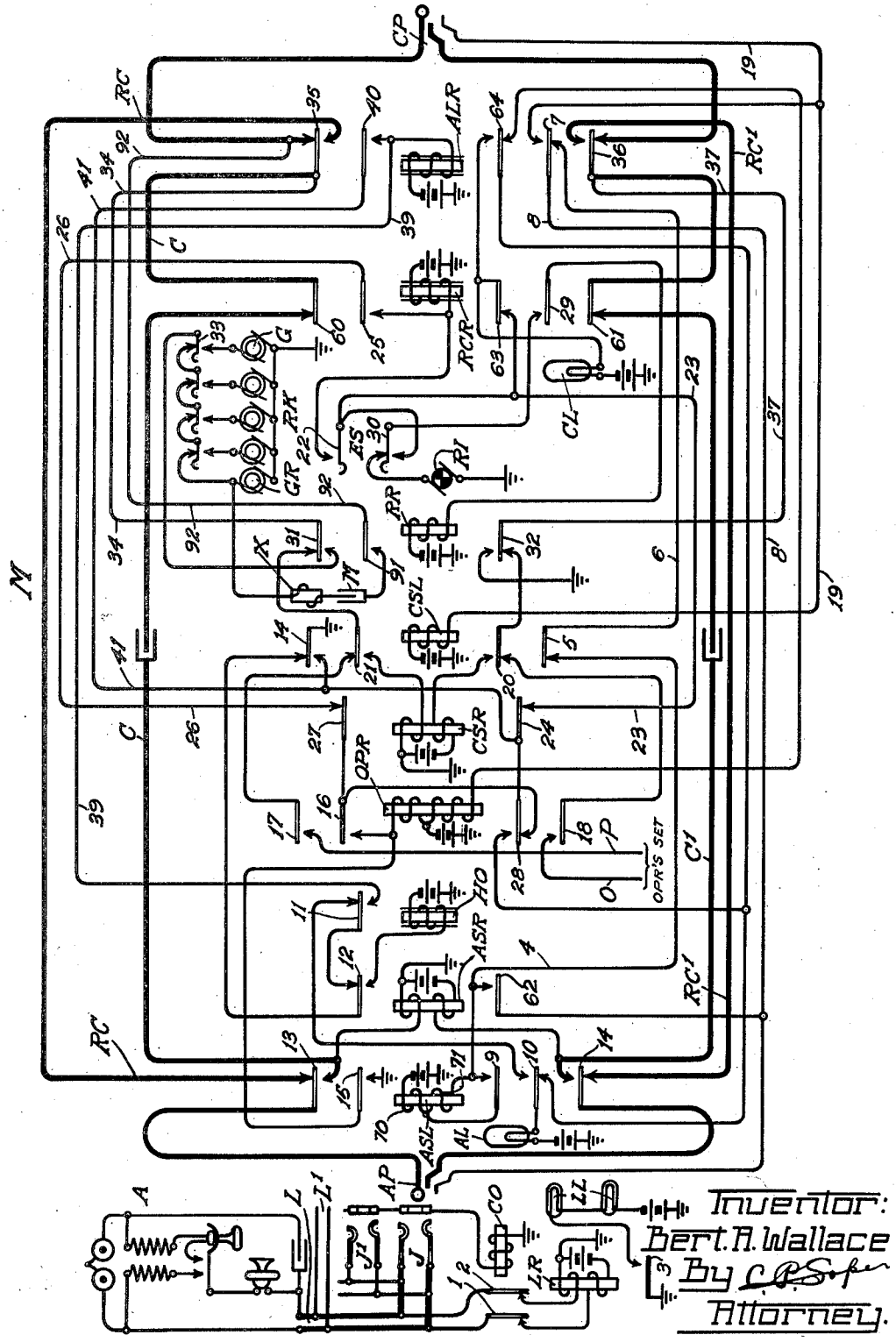

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COMMON BATTERY CORD CIRCUIT

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My invention relates to telephone systems and more particularly to the manual type of system in which an operator establishes the desired connections between subscribers by means of a cord or link circuit.

Such cord circuits are usually provided with an answering plug and a calling plug which are inserted into the jacks connected to the lines leading to the subscribers' stations. The answering plug is inserted into the jack of the subscriber desiring to be connected to another substation. This other substation may be associated with another line or, as in a party line system, with the same line as is the calling subscriber. In party line systems it is necessary to provide means for signaling the subscriber at any one of the plurality of substations on the line and one method of doing this is by the use of harmonic ringers. The ringer at each station responds to current of a certain frequency which frequency is different for each ringer on the line. The ringing current originates at the exchange and it has been usual in the past to provide a plurality of generators which produce current of different frequencies. These currents are connected to the called line by means of a party ringing key which previously has generally been associated with the calling plug of the link circuit.

Such a system was satisfactory when the calling substation and the called substation were located on different lines but when the two parties were associated with the same line its operation was not so satisfactory. Under such circumstances, the operator would answer the incoming call by inserting the answering plug of the cord circuit into the jack of the calling line and receive the number of the desired party from the calling subscriber, then withdraw the answering plug from the jack and insert the calling plug into the same jack and then operate the proper plunger of the party ringing key to connect current of the proper frequency to the line to operate the ringer at the desired substation. In a multiple system the busy test was removed from the line during the time interval between the removal of the answering plug from the jack and the insertion of the calling plug into the jack and it was possible for another operator to seize the line and place another call.

My invention overcomes the above difficulty and reduces the time necessary to complete a call between two subscribers on the same line and also reduces the wear and tear upon the apparatus by providing means which make it unnecessary to remove the answering plug from the jack to establish a connection between two substations on the same line.

A feature of my invention is the inclusion, in a cord or link circuit used for interconnecting telephone lines, of means which permit the establishing of a connection between two substations on the same telephone line through the answering plug of the link circuit.

Another feature of my invention is the provision in a telephone cord circuit of means for sending the ringing current through the calling plug of the cord circuit when the substations, to be connected, are located on different lines and for sending the ringing current through the answering plug of the link circuit when the substations to be interconnected are located on the same line.

Still another feature of my invention is the provision of a manual cord circuit, capable of handling revertive calls, of means for maintaining the busy condition of the line throughout the process of establishing the call.

An additional feature of my invention is the inclusion in a cord circuit, for a manual telephone system, of means for disconnecting the calling line from the cord circuit when the calling subscriber replaces his receiver upon its switch hook upon the termination of a conversation between substations located on different telephone lines and for associating the answering plug of the cord circuit with the ringing device on the first replacement of the receiver on revertive calls. Another feature of my invention is the provision in a manual cord circuit of means preventing the operator, setting up the connection, from connecting her telephone set to the cord circuit to listen in on a conversation between two subscribers, even though the calling plug of the cord circuit is not in a jack.

A further feature of my invention is the provision in a telephone system in which a revertive call is completed solely through the answering plug of a cord circuit of means which prevent a second operator from connecting her set to an existing connection by plugging into a multiple jack of one of the engaged lines.

For a more complete and better understanding of my invention, reference may be had to the accompanying drawing which shows a schematic arrangement of a cord circuit of my invention.

General Description

The drawing discloses a common battery subscriber's station A which comprises the usual ap-

paratus and is connected to the main exchange M by line conductors L. The line conductors L1 lead to another subscriber's substation not shown on the drawing but similar in detail to station A. The line conductors L terminate at the exchange in multiple jacks J and J1 which appear before different operators at the switchboard. A line lamp LL is associated with each of the jacks J and J1 and glow (in response to the removal of a receiver from the switch hook at a substation on the associated line) to inform the operators that a party desires a connection.

An operator noticing the glowing of a line lamp LL will insert an answering plug AP into the associated jack J or J1 which will cause the cut-off relay CO to operate and extinguish the lamps LL. The answering sleeve relay ASL will also energize. This relay prevents another operator from listening in on a conversation and also controls the disconnection of the line from the cord circuit. The answering supervisory relay ASR is controlled by the switch hook contacts at the subscriber's station through the alternate contacts of relay ASL and provides a locking circuit for relay ASL. An operator's relay OPR is energized subsequent to the operation of relay ASL and connects an operator's set, not shown, but connected to leads O and P, to the talking conductors of the cord circuit so that the calling subscriber can supply the operator with the number of the desired party.

If the substation of the desired party is located on a different line, than is the substation of the calling party, the operator will test the busy condition of the wanted line in the usual manner and if it is idle, will insert the calling plug CP of the cord circuit into the jack of the line associated with the called party. The connections of the jack and line circuit of the called party are the same as that shown in the drawing for the calling line and substation A. The insertion of the plug CP into a jack establishes an energizing circuit for the cut-off relay of the called line and the called sleeve relay CSL which operates to disconnect the operator's set from the cord circuit to provide for secret communication between the subscribers. The calling signal CL is lighted at this time and indicates to the operator that a call is awaiting completion.

When the plug AP was inserted into the jack J and battery current from relay ASL was connected to the sleeve of the jack J a busy condition of all the multiple jacks J1 of the calling line was established. Likewise, the insertion of plug CP into a jack of the called line provides a test potential upon the sleeve contacts of the jacks connected in multiple with the selected jack to cause the called line to test busy.

The operator next presses the proper button of the party ringing key to cause the sending of ringing current of the proper frequency out over the line under the control of the ringing control relay RCR and ringing relay RR. A revertive ringing tone is sent over the calling line and the calling subscriber hearing this tone knows that the called party is being signalled. When the called subscriber answers by removing the receiver from its switch hook, the called supervisory relay CSR is energized, when the ringing circuit is interrupted, to stop the application of ringing current to the line by deenergizing relay RCR which restores its contacts and completes the connection between the calling and called subscribers' substations.

Revertive call—General

In establishing a revertive call, that is, one in which both subscribers have substations located on the same line, the operation of the circuit is the same up to the point at which the calling subscriber informs the operator of the number of the desired station. The operator realizing that the desired station is located on the same line as the calling station instructs the calling subscriber to replace the receiver upon its switch hook. When the receiver is replaced upon the switch hook, the answering supervisory relay ASR restores to normal and opens the energizing circuit of the hold-over relay HO, but before relay HO can restore its contact 11 to its normal position, an energizing circuit for the relay ALR is established. Relay ASL releases and relay CSL operates and lamp CL lights as above explained. The operator next presses the proper ringing button and ringing current is sent through the alternate contacts of relay ALR over the heavily marked ringing conductors RC and RC1 back through the answering plug AP and out over the subscribers' line. The removal of a receiver at either the calling or called station on the line causes the energization of the supervisory relay CSR which stops the application of ringing current to the line, the subsequent removal of the receiver at the second station places the subscribers in a conversational circuit with battery current being supplied through the windings of the called supervisory relay CSR. The replacing of both receivers at the respective stations upon the termination of the conversation causes the deenergization of the relay CSR to signal for a disconnection by illuminating the answering lamp and the calling lamp.

Through call

A detailed description of the operation of my system in the establishment of a connection between two subscribers on different lines will now be given.

The subscriber at A will remove the receiver from its switch hook to close the switch hook contacts which will establish an energizing circuit for the line relay LR which will be energized by current flowing from grounded battery through the lower winding of relay LR, normal contact 1, out over the line conductor L, through the closed switch hook contacts of station A, conductor L, normal contact 2 and the upper winding of relay LR to the other side of the battery. Relay LR closes its contact 3 to establish an obvious energizing circuit for the line lamps LL. The operator, noticing the lamps LL glowing, will select an answering plug of an idle cord circuit an insert it into a jack such as J. This insertion establishes an energizing circuit for the answering sleeve relay ASL which is energized by current flowing from grounded battery, through both windings of relay ASL, conductor 4, normal contact 5 of relay CSL, conductor 6, normal contact 7 of relay ALR, conductor 8, sleeve contacts of connected plug AP and jack J, and the winding of relay CO to ground. The presence of current on the sleeve contacts of the multiple jacks provides a test potential so that any other operator attempting to seize the calling line as a called line will be warned that the line is busy. The relay CO is also energized by current flowing over this circuit and causes contacts 1 and 2 to assume their alternate positions to open the energizing circuit of line relay LR which is deenergized and restores its contact

3 to open the energizing circuit of the line lamps LL and cause their extinguishment. The relay ASL closes its contact 9 to establish a locking circuit for itself and for the relay CO, through the low resistance winding 70 of relay ASL. The high resistance winding 71 of relay ASL is shunted by the above path, this arrangement provides for non-interfering answering, as well as secret service. If a second operator should insert an answering plug of a second cord circuit into a multiple jack, such as J1, the second cord circuit would not be operatively connected to the line as the answering sleeve relay ASL of a second cord circuit will not operate in series with the cut-off relay CO for the reason that the low resistance winding 70 of relay ASL of the first cord renders the relay ASL of the second cord inoperative. The relay ASL of the second cord failing to operate the second operator's set will not be connected to the line, and the operator will withdraw the second plug AP from the jack J1 when no response is made to her "Number, please". Contacts 14 and 13 of relay ASL assume their alternate positions and establish an energizing circuit for answering supervisory relay ASR. This relay is operated by current flowing from grounded battery through the lower winding of relay ASR, alternate contact 14 of relay ASL, through the plug AP and jack J, the closed switch hook contacts at station A, the tip contacts of jack J and plug AP, alternate contact 13 of relay ASL and the upper winding of relay ASR to ground. A substitute locking circuit for relay ASL is completed through alternate contact 62 of ASR and an energizing circuit for the hold-over relay HO is established through alternate contact 12 of relay ASR and normal contact 14 of relay CSL to ground. The energizing of relay HO has no effect on the circuit at this time.

In the meantime, operator's relay OPR has been energized by current flowing from grounded battery through the upper winding of relay OPR to ground at alternate contact 15 of relay ASL. Relay OPR closes contacts 17 and 18 to establish a talking circuit between an operator's set, not shown, but connected to conductors O and P, and the calling station A. This talking circuit can be traced from conductor P, contact 17, normal contact 21, normal contact 31, conductor 34, heavily marked conductor C, normal contact 60 of RCR, alternate contact 13 of relay ASL, tip contacts of AP and J, out over the line, back through the ring contacts of the jack J and plug AP, alternate contact 14 of relay ASL, talking conductor C1, normal contact 61 of relay RCR, conductor 37, normal contact 32 of relay RR, normal contact 20 of relay CSL, alternate contact 18 of relay OPR and conductor O back to the operator's set. Talking battery for this circuit is supplied through the windings of answering supervisory relay ASR. The calling subscriber supplies the operator with the number of the desired station, and the operator inserts the calling plug CP into the jack of the called line which will establish an operating circuit for the called sleeve relay CSL. This circuit can be traced from grounded battery, the winding of relay CSL, conductor 19, sleeve contacts of the plug CP and connected jack, the winding of the cut-off relay associated with the called line, to ground. Relay CSL energizes and opens normal contacts 20 and 21 to disconnect the operator's set from the talking conductors of the cord circuit and thereby provide secret service for the subscribers as an operator's set cannot be connected to the talking conductors of the cord circuit so long as both plugs AP and CP are in their associated jacks. The presence of current on the sleeve contacts of the multiple jacks will cause the usual click in the operator's head set to indicate the busy condition of the line when it is tested by an operator.

The operator will next press the proper button of the party ringing key RK to supply ringing current of the proper frequency to the called line to operate the ringer at the station of the desired party. Let us assume that the generator G supplies ringing current of the proper frequency. The actuation of the button closes the contact 33 and momentarily closes the end springs ES associated with the ringing key RK. The closure of contact 22 of the end springs establishes an energizing circuit for the ringing control relay RCR which is energized by current flowing from grounded battery through the winding of relay RCR, alternate contact 22 of end springs ES, conductor 23, normal contact 24 of relay CSR to ground at alternate contact 14 of relay CSL. Ringing control relay RCR opens its contacts 60 and 61 to disconnect the answering end of the cord from the calling end to prevent the flow of ringing current back through the cord and over the calling line. The closure of contact 25 of relay RCR establishes a locking circuit for the relay RCR which can be traced from grounded battery through the winding of relay RCR, closed contact 25, conductor 26, normal contact 27 of relay CSR, alternate contact 16 of relay OPR to ground at closed contact 15 of relay ASL. The closing of contact 29 of relay RCR establishes an energizing circuit for the ringing relay RR. This relay is energized by current flowing from grounded battery through the winding of RR, closed contact 29 of relay RCR, normal contact 30 of the end springs ES which were only momentarily opened, through the constantly rotating ringing interrupter RI to ground. The ringing relay RR is alternately energized and deenergized by current flowing over this circuit due to the interruptions of the circuit by the interrupter RI. Each time the ringing relay RR is energized, ringing current is connected to the called line and a revertive ringing tone is sent over the calling line. The circuit for the revertive tone can be traced from ground, generator GR, coil X and condenser M, closed contact 91, conductor 92, normal contact 35 of ALR, over the heavily marked conductors to the tip contact of plug AP, over the line and through the receiver at station A, back through the ring contact of plug AP, heavily marked conductors and conductor 37, closed contact 32 of RR to ground. The subscriber at A hearing this tone knows that the called subscriber is being signalled. The circuit for the ringing current can be traced from ground through the generator G, alternate contact 33, alternate contact 31 of ringing relay RR, conductor 34, normal contact 35 of relay ALR, the tip contact of the plug CP out over the called line and through the harmonic ringer at the called station, back through the ring contact of the plug CP, normal contact 36 of relay ALR, conductor 37, alternate contact 32 of relay RR to ground. The subscriber at the desired station will remove the receiver from its switch hook in response to the signal and will thereby complete an energizing circuit for the called supervisory relay CSR when the relay RR returns to normal. Relay CSR will be energized only during a silent period by current flowing from grounded battery

through the lower winding of relay CSR, alternate contact 20 of CSL, normal contact 32 of relay RR, conductor 37, normal contact 36, through the plug CP and the closed switch hook contacts of the called station, the tip contact of plug CP, normal contact 35, conductor 34, normal contact 31 of relay RR, alternate contact 21 of CSL and the winding of relay CSR to ground. Relay CSR energizes and opens contact 27 to interrupt the locking circuit of relay RCR which restores its contact 29 to prevent the further operation of the ringing relay RR and the application of the ringing current to the called line. The closing of contacts 60 and 61 of relay RCR complete the talking circuit for the subscribers which is shown by means of heavy lines. Battery current for this circuit is supplied through the windings of relays ASR and CSR.

Upon the termination of the conversation, the replacement of the receiver at the called station causes the deenergization of the called supervisory relay CSR which relay restores its contacts 24 and 27 to normal. The replacement of the receiver at the calling station A interrupts the energizing circuit of the answering supervisory relay ASR which opens its contact 62 to interrupt the locking circuit of the answering sleeve relay ASL and the cut-off relay CO. The removal of battery current from the sleeve contacts of the multiple jacks J and J1 will cause the line to test idle even though the plug AP is still in the jack J. Therefore, the line can be seized as a called line by another operator before the plug AP has been removed from the jack J. Relay CO closes contacts 1 and 2 to again place the line relay LR under the control of the subscribers' stations associated with the line. Relay ASL opens its alternate contacts 13 and 14 to operatively disconnect the plug AP from the cord circuit. Closing of normal contact 10 establishes an energizing circuit for the answering lamp AL which circuit can be traced from grounded battery, lamp AL, normal contact 10, alternate contact 28 of relay OPR, alternate contact 14 of relay CSL to ground. An energizing circuit for the calling lamp CL was established when the relay CSR restored its contact 24 to normal. This circuit can be traced from grounded battery through the lamp CL, normal contact 63 of relay RCR, conductor 23, normal contact 24 of relay CSR and alternate contact 14 of relay CSL to ground. The operator noticing that both lamps AL and CL are burning will realize that the conversation has terminated and will withdraw the plugs AP and CP from their respective jacks and restore the relays to normal and in condition for the establishment of another call.

Revertive call

In the case of a revertive call, the operation of the system is the same up to the point where the calling subscriber supplies the operator with the number of the desired station. The operator realizing that the station of the called party is located on the same line as is the calling station will instruct the calling subscriber to replace the receiver upon its switch hook for a short interval. The replacing of the receiver will open the energizing circuit of the answering supervisory relay ASR which will restore to normal. The restoration of relay ASR opens the energizing circuit of the hold-over relay HO which relay, however, is slow to restore its contact 11 because of its slow-to-release construction and the contact 11 remains in its alternate position long enough to cause the energization of the relay ALR by current flowing from grounded battery through the winding of ALR, conductor 39, alternate contact 11 of relay HO, normal contact 12 of ASR and normal contact 14 of relay CSL to ground. Relay ALR closes its alternate contact 40 to establish a locking circuit for itself and remains locked due to current flowing from grounded battery, through the winding of relay ALR, closed contact 40 and conductor 41 to ground at alternate contact 14 of relay CSL, an energizing circuit for the relay CSL having been established when contact 7 of relay ALR assumed its alternate position. Relay ALR is preferably of slow-to-release construction so that it will not release before the locking circuit is completed. This energizing circuit can be traced from grounded battery through the winding of relay CSL, conductor 19, alternate contact 7 of relay ALR, conductor 8, sleeve contacts of plug AP and jack J, winding of relay CO to ground. The cut-off relay CO is also maintained energized by current flowing over this circuit. The circuit is so designed that battery is supplied to the sleeve contacts of the jacks J and J1 from the battery associated with relay CSL just as soon as the battery associated with relay ASL is removed due to the opening of contact 62 of relay ASR. The presence of continuous battery potential on the sleeve contacts will cause the line to test busy if another operator tests the line. The test circuit can be traced from operator's conductor P of the second cord circuit, alternate contact 17, contacts 21 and 31, tip contact CP of the second cord, sleeve contact of jack J1, the multiple connection to the sleeve of jack J, to battery and ground at relay CSL. Current flows from the battery at the first cord, over conductor P at the second cord and through the receiver of the second operator's set and causes a distinctive click which informs the second operator that the tested line is busy. The opening of contact 62 of relay ASR opened one path of the locking circuit for the relay ASL and the opening of normal contact 7 of relay ALR opened the other path of the locking circuit for the relay ASL and caused the deenergization of relay ASL. The deenergization of relay ASL restored relay OPR and thereby disconnected the operator's set from the talking conductors of the cord circuit and the reconnection of the operator's set to the line is prevented so long as the plug AP is in the jack J.

The operator next selects the button of the party key associated with the generator which provides proper ringing current to operate the ringer at the station of the called party. The actuation of that button causes the momentary operation of the end springs ES to operate the ringing control relay RCR. Relay RCR is energized by current flowing from grounded battery through the winding of relay RCR, alternate contact 22 of end springs ES, conductor 23, normal contact 24 of CSR, alternate contact 14 of CSL to ground. Relay RCR is locked up by current flowing from grounded battery through the winding of relay RCR, contact 25, conductor 26, closed contact 27 of CSR, closed contact 28 of OPR, and alternate contact 14 of CSL. Relay RCR opens contacts 60 and 61 and opens its contact 63 to extinguish the calling lamp CL. The relay RR is again energized as above described and the ringing current is connected to the line over the following path, from the ground through

the proper generator and operated key, alternate contact 31 of ringing relay RR, conductor 34, alternate contact 35 of relay ALR, ringing conductor RC, normal contact 13 of relay ASL, through the plug AP, out over the line, back through the ring contacts of the plug AP, normal contact 14 of relay ASL, ringing conductor RC1, alternate contact 36 of relay ALR, conductor 37, alternate contact 32 of relay RR to ground. Ringing current is intermittently applied to the line until one of the subscribers removes the receiver from its switch hook at which time an energizing circuit for the supervisory relay CSR is established, provided relay RR is deenergized. Relay CSR is operated by current flowing from grounded battery, through the winding of CSR, alternate contact 20 of relay CSL, normal contact 32, conductor 37, alternate contact 36 of relay ALR, ringing conductor RC1, normal contact 14 of relay ASL, ring contacts of plug AP and jack J, through the switch hook contacts at the station at which the receiver was removed, tip contacts of jack J and plug AP, normal contact 13 of relay ASL, conductor RC, alternate contact 35 of relay ALR, conductor 34, normal contact 31 of relay RR, alternate contact 21 of the relay CSL, the upper winding of relay CSR to ground. The relay CSR energizes and opens its contacts 27 and 24. The opening of 27 interrupts the locking circuit of relay RCR which relay restores its contacts to normal to open the energizing circuit of relay RR and prevent the further application of ringing current to the line. When the other subscriber on the line removes the receiver, the two parties will be able to converse with each other over the line; battery current being supplied through the winding of the called supervisory relay CSR.

Upon the termination of the conversation, it will be necessary for both subscribers to place their receivers upon their respective switch hooks to signal for a disconnection at the main exchange. The opening of the line will open the energizing circuit for the called supervisory relay CSR which will close its normal contacts 24 and 27. The battery associated with relay CSL is maintained connected to the sleeve contacts of the jacks J and J1 so that the line will test busy until the plug AP is removed from the jack J. This busy condition of the line has been maintained during the entire time the plug AP remained in the jack J so that no other operator could interfere with the establishment of the desired connection at any time. The closing of normal contact 24 establishes an energizing circuit for the call lamp CL over a previously traced circuit. The lamp AL is illuminated by current flowing from battery through the lamp AL, normal contact 10 or relay ASL, alternate contact 64 of relay ALR, normal contact 63 of relay RCR, conductor 23, normal contact 24 of CSR, alternate contact 14 of relay CSL to ground. The operator noting that both lamps are glowing will know that the conversation has terminated and will withdraw the plug AP from the jack J to restore all the apparatus to normal as above described.

Having described my invention what I claim is new and desire to secure by United States Letters Patent is:

1. A telephone system including a plurality of telephone lines, a plurality of stations on each of said lines, a link circuit for interconnecting any two of said stations, a calling end and an answering end for said link circuit, means in said link circuit for establishing a connection between two stations on the same line, entirely through the answering end, a plurality of disconnect signals, operating circuits for said signals and means controlled over said line and through said answering end for controlling said operating circuits.

2. A telephone system including a plurality of telephone lines, a plurality of stations on each of said lines, a signal responsive to ringing current at each of said stations, a link circuit having an answering plug and a calling plug, signaling means in said link circuit including a source of ringing current for operating the signal at the called station, means for normally connecting the ringing current to the line of the called station through the calling plug and other means rendered effective over the calling line on a revertive call to connect said current to the line of the called station through the answering plug.

3. A telephone system including a plurality of telephone lines, a plurality of stations on each of said lines, a signal at each of said stations, a link circuit for interconnecting any two of said stations, an answering plug and a calling plug for said link circuit, signaling means in said link circuit for causing the operation of the signal at the called station, said means being normally operative through said calling plug and other means rendered effective over the calling line on a revertive call for rendering said ringing means operative through the answering plug.

4. A telephone system including telephone lines, a plurality of stations on each of said lines, a link circuit for interconnecting any two of said stations, an operator's telephone set normally disconnected from said link circuit, relay means operable upon the connection of said answering plug to one of said lines to connect said operator's set to said link circuit, electromagnetic means for disconnecting said operator's set from said link circuit, said means being responsive to the connection of said calling plug to a called line on a through call and responsive to the replacement of the receiver at the calling station in the establishment of a revertive call.

5. A telephone system including a telephone line, a plurality of stations on said line, a link circuit, an operator's telephone set normally disconnected from said link circuit, relay means associated with the answering plug of said link circuit operable when said answering plug is connected to one of said lines to connect said operator's set to said link circuit, electromagnetic means for disconnecting said operator's set from said link circuit responsive to the calling subscriber replacing his receiver on its switch hook in the establishment of a revertive call.

6. A telephone system including telephone lines, a plurality of stations on each of said lines, a link circuit for interconnecting any two of said stations, an operator's telephone set normally disconnected from said link circuit, relay means associated with the answering plug of said link circuit operable when said answering plug is connected to one of said lines to connect said operator's set to said link circuit, electromagnetic means for disconnecting said operator's set from said link circuit responsive to the calling subscriber replacing his receiver on its switch hook in the establishment of a revertive call.

7. A telephone system comprising a plurality of telephone lines, a plurality of stations on each of said lines, a link circuit having a calling plug

and an answering plug for interconnecting any two stations, ringing means in said link circuit for signaling a called subscriber, said means being normally associated with said calling plug, subscriber controlled means for disassociating said means when the called station is located on the same line as the calling station.

8. A telephone system comprising a plurality of telephone lines, a plurality of stations on each of said lines, a link circuit having a calling plug and an answering plug for interconnecting any two of said stations, ringing means in said link circuit for signaling a called subscriber, said means being normally associated with said calling plug, subscriber controlled means permitting the connection of said ringing means to said answering plug.

9. A telephone system comprising a plurality of telephone lines, a plurality of stations on each of said lines, a link circuit having a calling plug and an answering plug for intereconnecting any two of said stations, ringing means in said link circuit for signaling a called subscriber, said means being normally associated with said calling plug, subscriber controlled means for disassociating said means and said calling plug when the called station is located on the same line as the caling station and other means for connecting said ringing means to said answering plug under the control of said subscriber controlled means.

10. A telephone system comprising a plurality of telephone lines, a plurality of stations on each of said lines, a link circuit having a calling plug and an answering plug for interconnecting any two of said stations, ringing means in said link circuit for signaling a called subscriber, said means being normally associated with said calling plug, subscriber controlled means effective on revertive calls for permitting the connection of said ringing means to said answering plug.

11. A telephone system including a plurality of telephone lines, a plurality of stations on each of said lines, a telephone switchboard comprising a plurality of operator's positions, said telephone lines each terminating in a plurality of said positions, link circuits at each of said positions for interconnecting any two of said stations, a telephone set for each position normally disconnected from said link circuits, means in said link circuit for automatically connecting a telephone set to an associated link circuit when the said link is connected to a calling line, means for preventing more than one operator's telephone set being connected to the same line at the same time and other means for disconnecting said operator's set from said line, said last means being responsive to the replacement of the receiver at the calling station in the establishment of a revertive call.

12. A telephone system including a plurality of telephone lines, a plurality of stations on each of said lines, a telephone switchboard comprising a plurality of operator's positions, said telephone lines terminating in a plurality of said positions, link circuits at each of said positions for interconnecting any two of said stations, means in said link circuit for rendering a calling line busy and means for constantly maintaining said busy condition during the completion of a revertive call.

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