

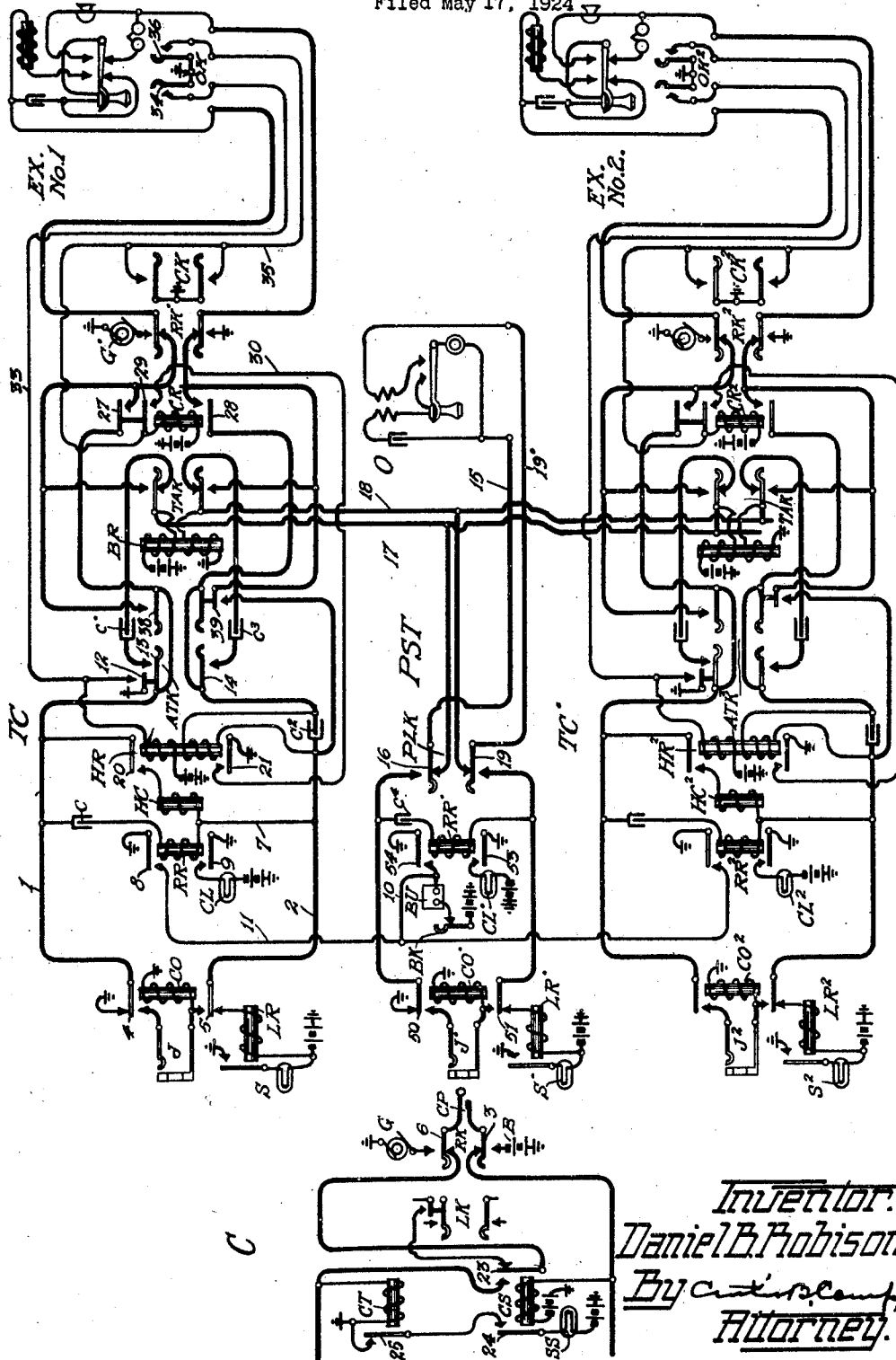
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TELEPHONE SYSTEM

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UNITED STATES PATENT OFFICE.

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TELEPHONE SYSTEM.

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My invention relates to telephone systems and has particularly to do with a private trunk or telephone line extending between a private or an executive's office and a distant or main exchange.

Prior to my invention it was the practice, where a number of parties in the same suite of offices or same building receive and extend calls over the same trunk lines, to provide a private branch exchange at the suite of offices or building in which said trunk circuits terminate, the private branch exchange being attended to by an operator who attends to the calls and sets up the desired connections. It sometimes occurs that an executive or very busy party does not wish to talk with a certain other party who is calling him and the private branch exchange operator is instructed to first find out the name of the calling party and to inform the called for party the name of the calling party before the called for party will consent to talk with the calling party and if he does not wish to converse with the calling party, a diplomatic excuse will be offered by the private branch exchange operator to the calling party. The attending of such calls by the private branch operator is found objectionable by some busy executives for various reasons, and they find it more satisfactory and obtain more privacy and secrecy if they are able to have their private secretary handle their calls personally instead of having their calls attended to by the private branch exchange operator. It is an object of my invention to provide a trunk circuit or private line extending from the main exchange to the executive's office over which the executive may converse directly with the calling party.

Another feature of my invention is the provision of a private trunk line extending from the main exchange to the executive's private secretary's desk, which is operatively associated with the executive's private trunk line, said trunk circuit being provided with means so that calls, extended from the main exchange over the executive's trunk line, may first be attended to by the private secretary to ascertain the name of the calling subscriber who will, after learning his name, effect operation of certain means in the executive's trunk line to signal and converse secretly with the executive or called for party to learn whether or not he will talk

with the calling party and if he so wishes, the private secretary will operate other means provided in the executive's trunk line to connect the executive or called for party in conversational circuit with the calling party.

Another feature of my invention is the provision of means in the executive's trunk circuit, which when operated, will permit calls to be received and extended directly over said trunk circuit independently of the private secretary.

A further feature of my invention is the provision of control means controlled by the executive or called for party for signaling for a disconnection at the main exchange, said means also operable to maintain the called for subscriber in circuit with the calling party during conversation.

Still another feature of my invention is the provision of means for enabling the private secretary to converse over his private trunk line with the main exchange independently of the executive's trunk line.

The above features as well as others will be more specifically pointed out in the ensuing specification, reference being had to the accompanying drawing which illustrates two trunk circuits or private lines of my invention terminating at one end in terminals at a main exchange and terminating at the other end in substations of any well known common battery type, and associated with these two trunk circuits or private lines is shown the private secretary's trunk circuit and telephone set operatively associated with the said two trunk circuits. The calling end of a well known operator's cord circuit is also shown which is adapted to be connected to any one of the trunk circuits appearing in the main exchange.

Referring now in general to my invention as illustrated in the drawing, C represents the calling end of a well known operator's cord circuit, and comprises a calling plug CP, a ringing key RK for connecting the ringing generator G and battery B to said plug, a sleeve relay CS, supervisory signal SS and a supervisory relay CT. A listening key LK is also provided for connecting the operator's telephone set (not shown on the drawing) to the tip and sleeve conductors of the cord circuit C.

Referring now to the trunk circuit or private line TC extending from the main

exchange, this trunk circuit TC terminates at the main exchange in a jack J and terminates at its other end in a common battery subscriber's substation Ex. No. 1. The trunk circuit TC comprises a cut off relay CO associated with the jack J which is adapted to control a line relay LR which in turn controls a supervisory lamp S. A relay RR is provided which is bridged across the talking conductors 1 and 2 of the trunk circuit TC and is adapted to be operated by generator current flowing over said conductors to cause a signal CL to light, and to also operate a buzzer mechanism BU in the private secretary's trunk circuit PST to signal the private secretary. The private secretary upon being signalled will operate a two-way combination answering and talking key ATK in the trunk circuit TC by moving the same to the left whereupon the holding relay HR will operate and bridge the holding coil HC across the conductors of the trunk circuit TC to hold the relay CT in the cord circuit C energized. The private secretary upon learning the name of the calling party and the party wanted, and assuming it is the party at substation Ex. No. 1, will operate the ringing key RK' to connect and supply ringing current from the generator G' to the trunk conductors extending to said substation, and will also operate the talking key TAK to enable her to converse secretly with the party at substation Ex. No. 1. The party upon responding will be informed by the private secretary the name of the party calling and will ascertain whether or not the called for party will talk to the calling party and if he so desires the operator will then operate the key CK to cause relay CR to operate to connect the calling and called for parties in conversational circuit and the private secretary will restore the talking key TAK and the key ATK. A key OK is provided at the substation Ex. No. 1 for permitting the executive or party at said substation to extend calls to the main exchange over the trunk circuit TC without the aid of the private secretary.

The private secretary's line PST comprises a jack J' which is located at the main exchange, together with a cut off relay CO', line relay LR' and supervisory signal S', while at the private secretary's desk is a buzzer BU, a key BK for controlling the circuit of the buzzer BU, a relay RR', a calling lamp signal CL', and a listening key PLK for connecting the private secretary's telephone set O to the trunk circuit PST or to the trunk circuits extending to the different executives' offices.

The trunk circuit or private line TC terminates at the main exchange and is provided with the same apparatus and has the same circuit arrangement as the trunk circuit or private line TC and operates in the

same identical manner, the same reference characters being used as those used in trunk circuit TC but having exponents affixed thereto.

For a clearer understanding of my invention a detail description will now be given of its operation by tracing a call from the main exchange to the executive's substation Ex. No. 1 over the trunk circuit TC, it being assumed that this is the wanted party.

The operator at the main exchange will answer the call initiated with the answering end of the cord circuit C (not shown in the drawing) in the usual and well known manner to ascertain the wants of the calling subscriber, and upon learning that the wanted party is the executive at substation Ex. No. 1, will insert the calling plug CP of the calling end of cord circuit C into the jack J of the trunk circuit or private line TC extending to the substation Ex. No. 1, whereupon the sleeve relay CS and the cut off relay CO will energize in series over a circuit traced from battery through the winding of the sleeve relay CS, normal contact 3 of ringing key RK, sleeve contacts of the plug CP and jack J, through the winding of the cut off relay CO to ground. The cut off relay CO energizing over this circuit closes its alternate contacts 4 and 5, thereby removing the line relay LR and supervisory signal S from the trunk circuit TR. The operator at the main exchange will, after inserting the calling plug CP into the jack J as just described, operate the ringing key RK to apply generator current to the trunk circuit TC from the generator G to cause the relay RR at the trunk circuit TC to operate. The circuit for the relay RR may be traced from ground through the generator G, alternate contact 6 of the ringing key RK, tip contacts of plug CP and jack J, alternate contact 4 of relay CO, conductor 1 through the condenser c, winding of relay RR, conductors 7 and 2, alternate contact 5 of relay CO, and through the winding of relay CO to ground. Relay CO will not de-energize upon the opening of normal contact 3 of the ringing key RK as the alternate contact 3 of said key RK will be closed thereby connecting battery to the sleeve contact of the plug CP so long as the ringing key RK is in its off normal or operated position. Relay RR of the trunk circuit TC will be operated by current flowing over the circuit just traced and will close its alternate contacts 8 and 9, and the closing of its alternate contact 8 establishes a circuit for the buzzer BU provided in the private secretary's trunk circuit PST, which circuit may be traced from battery through the normal contact of the buzzer control key BK, through the buzzer BU, conductors 10 and 11 and to ground through alternate contact 8 of relay RR. The buzzer BU will operate over this circuit

to indicate to the private secretary that a call has been initiated and that her services are required. The closure of alternate contact 9 of relay RR closes a circuit for the calling lamp CL which will light to indicate the trunk line or private line over which a call is coming from the main exchange and the private secretary, upon hearing the buzzer BU and observing the lighted calling signal CL, will operate the two-way combination answering and talking key ATK to the left to close alternate contacts 12, 13 and 14, and the closing of alternate contacts 13 and 14 connects the private secretary's telephone set O to the conductors 1 and 2 of the trunk circuit TC to enable her to communicate with the calling subscriber or party. The circuit by which the private secretary's telephone set O is connected to the talking conductors of the trunk circuit TC may be traced from one side of the telephone set O, conductor 15, normal contact 16 of the listening key PLK, conductor 17, upper normal contact of the talking key TAK, through the condenser c' and the alternate contact 13 of key ATK, to conductor 1 of the trunk circuit TC, and over the tip side of the cord circuit C, through the calling substation, back over the sleeve side of the cord circuit C at the main exchange, conductor 2 of trunk circuit TC, condenser c^2 , alternate contact 14 of key ATK, condenser c^3 , lower normal contact of key TAK, conductor 18, normal contact 19 of key PLK, conductor 19', to the other side of the telephone set O. The private secretary converses over this circuit and inquires the wants and the name of the calling party. When the key ATK is moved to the left and alternate contact 12 is closed as described above, a circuit is established for the holding relay HR traced from battery through the upper winding of said relay HR to ground through the alternate contact 12 and relay HR energizing over this circuit closes its alternate contacts 20 and 21. The closure of its alternate contact 20 bridges the holding coil HC across the conductors 1 and 2 of the trunk circuit TC thereby establishing a holding circuit for the supervisory relay CT of the cord circuit C to prevent the restoration of said relay CT thereby preventing the lighting of the supervisory signal SS of the cord circuit C to avoid a false disconnect signal. The circuit for relay CT may be traced from battery through the winding of relay CS, normal contact 3 of key RK, sleeve contacts of plug CP and jack J, alternate contact 5 of relay CO, conductors 2 and 7, through the winding of the holding coil HC, alternate contact 20 of the holding relay HR, conductor 1, alternate contact 4 of relay CO, tip contacts of the jack J and plug CP, normal contact 6 of key RK, alternate contact 23 of relay CS, through the winding of relay CT to ground. Relay CT energizing over this circuit maintains its armature attracted thereby opening the circuit of the supervisory signal SS. The private secretary upon learning the name and wants of the calling party will not restore the key ATK but will leave it in its operated left position and will then operate the ringing key RK' to signal the subscriber or executive at substation Ex. No. 1 which has been assumed to be the called for party, the circuit for the ringing current for signalling the party at the substation Ex. No. 1 being traced from ground through the generator G', upper alternate contact of the ringing key RK', tip conductor of trunk circuit TC, through the call bell at the said substation Ex. No. 1, to ground through the lower alternate contact of key RK'. The private secretary will also throw her listening key TAK associated with the trunk circuit TC thereby opening the normal contacts of said key TAK to place her telephone set O out of circuit with the calling party and will close the alternate contacts of said key to connect her telephone set in circuit with the substation Ex. No. 1, whereby the private secretary is enabled to secretly converse with the executive or party called for at substation Ex. No. 1 without being heard by the calling party, and the private secretary will now ascertain from the called for party whether or not he desires to talk with the calling party. Talking battery for the private secretary and called for party is provided from battery through the windings of the battery feed relay BR and through the alternate contacts of key TAK to the talking conductors of trunk circuit TC. Assuming now that the called for party wishes to converse with the calling party the private secretary will operate the key CK thereby establishing a circuit for the connecting through relay CR, traced from battery through the winding of said relay CR, to ground through alternate contacts of said key CK. Relay CR will energize over this circuit and close its alternate contacts 27 and 28, in the talking conductors of trunk circuit TC thereby connecting the called for subscriber at substation Ex. No. 1 in conversational circuit with the calling subscriber. Relay CR upon energizing also closes its alternate contact 29 thereby closing a locking circuit for itself which may be traced from battery through the winding of said relay CR, alternate contact 29, conductor 30, to ground through alternate contact 21 of the holding relay HR. The private secretary now restores the key ATK and the key TAK to normal whereupon the private secretary's telephone set O is operatively disassociated from the trunk circuit TC. Upon the restoration of the key ATK the circuit through the upper winding of the holding

relay HR is opened at alternate contact 12 of said key ATK but relay HR will not de-energize at this time, as a holding circuit is established for the same which may be traced from battery through the winding of relay CS of cord circuit C, normal contact 3 of key RK, sleeve contacts of the plug CP and jack J, alternate contact 5 of relay CO, conductor 2, through the lower winding of the holding relay HR, alternate contact 28 of relay CR, lower normal contact of key RK', through the now closed alternate switchhook contacts at the substation Ex. No. 1, upper normal contact of key RK', alternate contact 27 of relay CR, conductor 1, alternate contact 4 of relay CO, tip contacts of the jack J and plug CP, normal contact 6 of key RK, alternate contact 23 of relay CS, to ground through the winding of the relay CT of the cord circuit C. Relay HR remains energized over this circuit thereby maintaining its alternate contact 20 closed to retain the holding coil HC bridged across the conductors of the trunk TC, and also maintains its alternate contact 21 closed to maintain the locking circuit for relay CR. Thus, it will be readily apparent that the holding relay HR is controlled by the party at the substation Ex. No. 1 and it will also be seen that the relay CT at the cord circuit C is under the control of the called for party at said substation so that the supervisory disconnect signal SS is controlled by the said called for party.

Assuming now that the calling and called parties have terminated their conversation the calling party will replace his receiver upon its switchhook thereby operating well known means in the answering end of the cord circuit C to signal for disconnection in the well known manner, and the called for subscriber at the executive substation Ex. No. 1 will replace his receiver; and upon the replacement of his receiver upon its switchhook, the holding circuit for the holding relay HR will be opened whereupon said relay HR restores to normal and opens its alternate contacts 20 and 21, thereby opening the locking circuit for the relay CR which will now restore to normal, and the opening of alternate contact 20 of the relay HR opens the circuit for the relay CT of the cord circuit C whereupon the said relay CT restores to normal to close the circuit of the supervisory signal SS, which circuit may be traced from battery through the said signal SS, alternate contact 24 of relay CS, to ground through normal contact 25 of relay CT. The operator at the main exchange observing the lighted supervisory signal in the answering end of the cord circuit C and the lighted signal SS in the calling end of the cord circuit C will know that conversation has terminated and will withdraw the plugs of cord circuit C from their

respective jacks whereby the cord circuit C will restore to normal in the well known manner. The withdrawal of the plug CP from the jack J disconnects battery from the sleeve contact of the jack J thereby permitting the cut off relay CO to restore to normal to again place the line relay LR in circuit with the conductors 1 and 2 of the trunk circuit TC. The key CK is not a self locking key and therefore will restore immediately upon the private secretary removing her finger therefrom. The trunk circuit TC is now in its normal position and ready for other calls.

Assuming now that the party at the executive's substation Ex. No. 1 desires to initiate a call through the main exchange, the party will do so by first removing the receiver from its switchhook and will then operate his calling key OK which will close an energizing circuit for the holding relay HR traced from battery through the upper winding of said relay HR, conductor 33, to ground through the alternate contact 34 of said key OK; and will also close a circuit for connecting through relay CR traced from battery through the winding of said relay CR, conductor 35, to ground through alternate contact 36 of the key OK. The key OK is not a locking key and will restore upon the removal of pressure from it, whereby its alternate contacts 34 and 36 will open but relay CR will not deenergize when the contacts 36 of key OK are opened as a locking circuit is closed through its alternate contact 29, conductor 30, and the alternate contact 21 of relay HR to ground. Neither will relay HR de-energize when alternate contact 34 of key OK is opened, as a holding circuit is closed through its lower winding. The holding circuit for relay HR may be traced from battery through the winding of the line relay LR, normal contact 5 of the cut off relay CO, conductor 2, lower winding of relay HR, alternate contact 28 of relay CR, lower normal contact of the key RK', through the now closed alternate switchhook contacts of substation Ex. No. 1, upper normal contact of key RK', alternate contact 27 of relay CR, conductor 1, to ground through normal contact 4 of the cut-off relay CO. Relay LR will energize over this circuit and close its alternate contact thereby closing a circuit through the supervisory signal S to indicate to the operator at the main exchange that a call has been extended and that her services are required, whereupon she will take the answering plug of the cord circuit C (said answering end however not being shown on the drawing as its operation is well known) and insert the same into the jack J thereby closing a circuit through the cut off relay CO of the trunk circuit TC in the well known manner, and the cut-off relay CO energizing opens its

normal contacts 4 and 5 thereby opening the circuit of the line relay LR which will now restore, and also opens the circuit of the slow-acting holding relay HR but the relay HR will not de-energize as the circuit will now extend through the alternate contact 5 of relay CO and over the sleeve conductor of the cord circuit C to battery instead of through the winding of relay LR to battery.

The holding relay HR is made slow acting so that the same will not de-energize while the armature is moving from the normal contact 5 to the alternate contact 5 of the cut-off relay CO thereby preventing the restoration of the relay CR. The operator at the main exchange will now inquire the wants of the calling party at the substation Ex. No. 1 and will take care of his wants in the well known manner.

Upon termination of conversation the calling and called parties will replace their receivers, and the replacing of the receiver at the called for substation at the main exchange will bring about the lighting of the supervisory signal in the cord circuit C as will be well understood from the foregoing description, and upon the replacing of the receiver upon its switchhook at the calling substation Ex. No. 1 the holding circuit for the holding relay HR will be opened at the alternate switchhook contacts of the said substation Ex. No. 1 so that said relay HR will de-energize and open its alternate contacts 20 and 21 thereby causing the answering supervisory signal in the answering end of the cord circuit C to light, and also open the circuit of the relay CR of the trunk circuit TC which relay CR will restore to normal. The operator at the main exchange observing the lighted answering and calling supervisory signals will know that conversation has terminated and will take down the connection and upon the withdrawal of the answering plug from the jack J of the trunk circuit TC, cut off relay CO will de-energize and connect the line relay in circuit with the conductors of the trunk circuit TC. The trunk circuit TC is now restored to normal and ready for other calls.

Assuming now that the executive or party at the executive's substation Ex. No. 1 wishes to receive calls without having the same attended to by the private secretary, the private secretary will throw the two-way key ATK to the right which key will remain in this position until restored manually, said key when moved to the right closes alternate contacts 38 and 39 whereby the trunk talking conductors 1 and 2 are cut through from the jack J to the substation Ex. No. 1 exclusive of the relay CR. Now when a call is extended from the main exchange, upon the insertion of the plug CP into the jack J and when the ringing key RK of the cord circuit C is operated as described above, ringing current will be applied to the call bell of the substation Ex. No. 1 to signal the called for subscriber over a circuit traced from ground through the generator G, alternate contact 6 of key RK, tip contacts of the plug CP and jack J, alternate contact 4 of relay CO, tip conductor of trunk circuit TC alternate contact 38 of the key ATK (it being remembered that the key ATK has been moved to its right-handed position), upper normal contact of key RK' through the call bell at substation Ex. No. 1, lower normal contacts of key RK', alternate contact 39 of key ATK, sleeve conductor of trunk circuit TC, alternate contact 5 of relay CO, through the winding of said relay CO to ground. During the application of ringing current relay CO will remain energized due to the fact that battery will be connected through the alternate contact 3 of the ringing key RK as is set forth in the foregoing specification. Upon the response of the called for party at substation Ex. No. 1, a circuit is established for the relay CT of the cord circuit C which will operate to open its normal contact 25 thereby preventing the lighting of the supervisory signal SS, said circuit for relay CT being traced from battery through the winding of the relay CS, normal contact 3 key RK, sleeve contacts of the plug CP and jack J, sleeve conductor of trunk circuit TC, alternate contact 39 of key ATK, lower normal contact of key RK', through the now closed alternate switchhook contacts of the substation Ex. No. 1, upper normal contact of key RK', alternate contact 38 of key ATK, tip conductor of trunk circuit TC, alternate contact 4 of cut-off relay CO, tip contacts of the jack J and plug CP, normal contact 6 of key RK, alternate contact 23 of relay CS, to ground through the winding of relay CT. Relay CT energizing over this circuit opens its normal contact 25 thereby opening the circuit of the supervisory signal SS. Conversation is also carried on through the substation Ex. No. 1 over this same part of the trunk circuit TC as just traced. When conversation has terminated the calling party replacing his receiver upon its switchhook, operates the signal at the answering end of the cord circuit, and the party at the substation Ex. No. 1 upon replacing his receiver upon its switchhook opens the circuit of the relay CT of the cord circuit C, whereupon said relay CT restores to normal and closes its normal contact 25 thereby closing a circuit for the supervisory signal SS. The operator at the main exchange observing the lighted supervisory signals will know that the conversation has terminated and will withdraw the answering and calling plugs from their respective jacks, whereupon the cord circuit C restores to normal, and the removal of the plug CP

from the jack J will permit the cut-off relay CO to restore to normal, thus rendering the trunk circuit TC available for other calls. When the key ATK is thrown to its right handed position as just described above the private secretary will operate the busy control key BK to open the circuit of the buzzer BU so that the same will not operate.

When the key ATK is thrown to its right handed position as just described above, the party at the substation Ex. No. 1 may initiate a call without operating his calling key OK, as a circuit will be closed for the line relay LR upon the closure of the alternate switchhook contacts of the substation Ex. No. 1. This circuit being traced from battery through the winding of the line relay LR, normal contact 5 of relay CO, sleeve conductor of trunk circuit TC, alternate contact 39 of key ATK, lower normal contact of key RK', through the now alternate switchhook contacts of the substation Ex. No. 1, upper normal contact of key RK', alternate contact 38 of key ATK, tip conductor of trunk circuit TC, through the normal contact 4 of relay CO to ground. The line relay energizing over this circuit will close its alternate contact, thereby causing the signal S to light to notify the operator at the main exchange that a call is awaiting her attention whereupon she will take care of the call in the manner as described above.

The private secretary may converse with a party at the main exchange exclusive of the trunk circuit TC or TC' by operating her listening key PLK, whereby her telephone set O will be disconnected from the trunk circuits TC and TC'. Assuming that a party at the main exchange desires to talk with the private secretary, the operator at the main exchange will insert the calling plug CP into the jack J' thereby closing a circuit for the sleeve relay CS and cut-off relay CO' as follows: battery through the winding of relay CS, normal contact 3 of key RK, sleeve contacts of the plug CP and jack J', through the winding of relay CO' to ground. Relay CO' upon energizing will close its alternate contacts 50 and 51 thereby removing the line relay LR' from the control of the telephone set O. The operator at the main exchange upon inserting the plug CP into the jack J' will operate her ringing key RK to connect generator current to the trunk circuit PST over a circuit traced from ground through the generator G, alternate contact 6 of key RK, tip contacts of plug CP and jack J', through the alternate contact 50 of relay CO', condenser c' , through the winding of relay RR', alternate contact 51 of relay CO', and through the winding of said relay CO' to ground. Relay RR' will operate over this circuit and close its alternate contact 53 to cause the signal CL' to light, and relay RR' will also close its alternate contact 54 to close a circuit from ground through the buzzer BU and buzzer key BK to battery. The buzzer BU will operate to attract the attention of the private secretary or attendant, who, upon observing the lighted signal CL', will know that a call has been extended to her private trunk line PST and she will operate her listening key PLK to open normal contacts 16 and 19 and close alternate contacts 16 and 19 to connect her telephone set O to the talking conductors of the trunk circuit PST and will converse with the calling party. During the application of ringing current, cut-off relay CO' remains energized as battery will be connected in circuit with said relay CO' through the alternate contact 3 of the ringing key RK. Upon the removal of the receiver at the private secretary's telephone set O and the throwing of the listening key PLK to its alternate position, a circuit is closed for the relay CT of the cord circuit C, said circuit being traced from battery through the winding of the relay CS, normal contact 3 of ringing key RK, sleeve contacts of the plug CP and jack J', alternate contact 19 of key PLK, conductor 19', through the now closed alternate switchhook contacts of the telephone set O, conductor 15, alternate contact 16 of the key PLK, alternate contact 50 of the relay CO', tip contacts of the sleeve J' and plug CP, normal contact 6 of key RK, alternate contact 23 of relay CS, to ground through the winding of relay CT. Relay CT energizing over this circuit opens its normal contact 25 thereby effacing the supervisory signal SS. Upon termination of conversation, the private secretary will replace her receiver upon its switchhook thereby opening the circuit of the relay CT, said relay CT de-energizes and closes its normal contact 25 to cause the lighting of the supervisory relay SS to signal for a disconnection. The operator at the main exchange will upon observing the lighted supervisory signals in the cord circuit C withdraw the plug CP from the jack J' thereby opening the circuit for cut-off relay CO' which will now restore to normal and connect the line relay LR' in circuit with the talking conductors of the private secretary's trunk lines PST, and the relay CS of the cord circuit C will restore and open the circuit of the supervisory signal SS.

Assuming now that the private secretary wishes to extend a call to the main exchange, she will throw her listening key PLK to its alternate position thereby disconnecting her telephone set O from the trunk circuits TC and TC' and will connect the same to the talking conductors of the trunk circuit PST, to close a circuit for the line relay LR', traced from battery through the winding of said relay LR', normal contact 51 of relay CO', alternate contact 19 of the listening key

PLK, through the now closed alternate switchhook contacts of the telephone set O, alternate contact 16 of the listening key PLK, to ground through the normal contact 50 of the cut-off relay CO'. Relay LR' energizes over this circuit and closes its alternate contact thereby closing a circuit for the supervisory signal S', which signal S' will light to indicate to the operator at the main exchange that a call has been extended and that her services are required, whereupon she will insert the answering plug of a cord circuit into the jack J', thereby causing the energization of the cut off relay CO', and relay CO' energizing opens its normal contacts 50 and 51 thereby removing the line relay LR' from the trunk circuit PST. After the conversation has terminated the private secretary will restore her receiver upon its switchhook and will also restore her listening key PLK, thereby opening the circuit of the supervisory relay in the answering end of the cord circuit at the main exchange whereupon the supervisory relay will restore and cause the operation of a supervisory signal to signal for a disconnection in the well known manner. The operator at the main exchange will now withdraw the answering plug of the cord circuit C from the jack J', whereupon the cut off relay CO' will restore to normal and connect the line relay LR' to the trunk circuit PST. The trunk circuit PST is now in its normal position.

The trunk circuit TC' operates in the same manner as trunk circuit TC and the operator at the main exchange will insert a plug of a cord circuit into the jack J² and the call will be handled in the same manner to signal a party at the executive's substation Ex. No. 2 as described above in connection with the trunk circuit TC.

As many trunk lines, as are desired, may be attended to by the private secretary by associating the same with the private secretary's telephone set and trunk circuit PST in the same manner in which the trunk circuits TC and TC' are associated therewith.

Although I have illustrated and described a preferred circuit arrangement of my invention, it is to be understood that I do not wish to be limited to the exact circuit arrangement as shown and described, as changes and modifications will readily suggest themselves to those familiar with the art, but that I claim all that which may come within the spirit and scope of the appended claims.

What I claim as new and desire to secure by United States Letters Patent, is:

1. A telephone system including a trunk circuit terminating at one end in a jack terminal at a main exchange and at its other end in a subscriber's substation, an attendant's trunk circuit terminating in one end

at said main exchange and at its other end in a telephone set, signal means for said attendant's trunk circuit for signalling the attendant at said attendant's trunk circuit, means in said first trunk circuit controlled from the main exchange for controlling said signalling means, means for said first trunk circuit controlled by the attendant for connecting said subscriber's substation in conversational circuit with the main exchange, automatic means controlled by said subscriber for disassociating said substation and said main exchange and for signalling for a disconnection at the main exchange, and means for said trunk circuit for permitting calls to be extended from the main exchange to said substation exclusive of the attendant.

2. A telephone system including a trunk circuit terminating at one end in a main exchange and at its other end in a subscriber's substation, an attendant's circuit terminating in said exchange, a telephone set, signal means for said attendant's circuit for signalling the attendant, means for said trunk circuit controlled from the main exchange for controlling said signal means, means for said trunk circuit for connecting said telephone set to said trunk circuit to enable the attendant to talk to the main exchange, means for enabling the attendant to talk secretly over said trunk circuit with a party at said substation, automatic means for disassociating said substation and said main exchange and for signalling for a disconnection at the main exchange, said automatic means controlled by the party at said substation, and means for said trunk circuit for permitting calls to be extended from the main exchange to said substation exclusive of the attendant.

3. A telephone system including a trunk circuit terminating at one end in a main exchange and at its other end in a subscriber's substation, an attendant's circuit terminating in said exchange, a telephone set, signal means for said attendant's circuit for signalling the attendant, means for said trunk circuit controlled from the main exchange for controlling said signal means, means for said trunk circuit for connecting said telephone set to said trunk circuit to enable the attendant to talk to the main exchange, means for enabling the attendant to talk secretly over said trunk circuit with a party at said substation, means for connecting said substation through in conversational circuit with said main exchange, automatic means controlled by said substation for disassociating said substation and said main exchange and for signalling for a disconnection at the main exchange, and means for said trunk circuit for permitting calls to be extended from the main exchange to said substation exclusive of the attendant.

4. A telephone system including a main exchange, a distant subscriber's substation, a

connecting circuit for interconnecting said substation and said main exchange, automatic means controlled by the party at said substation for disassociating said substation and said main exchange and for signalling for a disconnection at the main exchange, an attendant's telephone set, a connecting circuit for interconnecting said telephone set and said main exchange, signalling means for said second connecting circuit for signalling the attendant thereat, said signalling means controlled via said first connecting circuit, and means for said connecting circuit for permitting calls to be extended from the main exchange to the substation exclusive of the attendant.

5. A telephone system including a main exchange, a distant subscriber's substation, a connecting circuit for interconnecting said substation and said main exchange, automatic means controlled by the party of said substation for disassociating said substation and said main exchange and for signalling for a disconnection at the main exchange, an attendant's telephone set, a connecting circuit for interconnecting said telephone set and said main exchange, signalling means for said second connecting circuit for signalling the attendant thereat, said signalling means controlled via said first connecting circuit, means for said first connecting circuit for permitting the attendant to talk secretly to either the main exchange or the subscriber at said substation, and means for said first connecting circuit for permitting calls to be extended from the main exchange to the subscriber's substation exclusive of the attendant.

6. A telephone system including a main exchange, a distant subscriber's substation, a connecting circuit for interconnecting said substation and said main exchange, an attendant's telephone set, a connecting circuit for interconnecting said telephone set and said main exchange, signalling means for said second connecting circuit for signalling the attendant thereat, said signalling means controlled via said first connecting circuit, means for said first connecting circuit for permitting the attendant to talk secretly to either the main exchange or the subscriber at said substation, means controlled by the attendant for connecting said subscriber's substation in conversational circuit with said main exchange, automatic means controlled by said subscriber for disassociating said substation and said main exchange and for signalling for a disconnection at the main exchange, and means for said connecting circuit for permitting calls to be extended from the main exchange to the subscriber's substation, exclusive of the attendant.

7. A telephone system including a main exchange, a subscriber's substation, a connecting circuit for interconnecting said sub-

station and said main exchange, a private secretary's telephone set, means for said connecting circuit for permitting the private secretary to converse with the main exchange, means for permitting the private secretary to secretly converse with the party at said substation, means for said connecting circuit for connecting said substation in conversational circuit with said main exchange, automatic means controlled by said subscriber for disassociating said substation and said main exchange and for signalling for a disconnection at the main exchange, and means for said connecting circuit for permitting calls to be extended from the main exchange to the substation exclusive of the private secretary.

8. A telephone system including a main exchange, a subscriber's substation, a connecting circuit for interconnecting said substation and said main exchange, a private secretary's telephone set, means for said connecting circuit for permitting the private secretary to converse with the main exchange, means for permitting the private secretary to secretly converse with the party at said substation, means for said connecting circuit for connecting said substation in conversational circuit with said main exchange, automatic means controlled by said substation for automatically disassociating said substation and said main exchange and for signalling for a disconnection at the main exchange, said means being operable to maintain said subscriber's substation in a conversational circuit with said main exchange, and means for said connecting circuit for permitting calls to be extended from the main exchange to the substation, exclusive of the attendant.

9. A telephone system including a main exchange and a subscriber's substation, a link circuit for interconnecting the same, an attendant's link circuit, signalling means for said second link circuit for signalling the attendant thereat, means for said first link circuit for controlling said means, means for said first link circuit for permitting the attendant to converse with the main exchange via said first link circuit, means for permitting the attendant to converse secretly with the subscriber at said substation, means for said first link circuit for operatively connecting said substation in conversational circuit with the main exchange, automatic means controlled by said subscriber for disassociating said substation and said main exchange and for signalling for a disconnection at the main exchange, and means for the said link circuit for extending calls from the main exchange to the substation exclusive of the attendant.

10. A telephone system including a main exchange and a subscriber's substation, a link circuit for interconnecting the same, an

attendant's link circuit, signalling means for said second link circuit for signalling the attendant thereat, means for said first link circuit for controlling said means, means for said first link circuit for permitting the attendant to converse with the main exchange via said first link circuit, means for said connecting circuit for permitting calls to be extended from the main exchange to the substation, exclusive of the attendant, means for permitting the attendant to converse secretly with the subscriber at said substation, means for said first link circuit for operatively connecting said substation in conversational circuit with the main exchange, and automatic means controlled by the subscriber at said substation for operatively disassociating said substation and said main exchange and for signalling for a disconnection at said main exchange.

11. A telephone system including a main exchange and a subscriber's substation, a link circuit for interconnecting the same, an attendant's telephone set, means for permitting the attendant to talk over said link circuit with the main exchange, means for permitting the attendant to talk with a party at said substation secretly exclusive of the main exchange, means for said link circuit for connecting said substation and said main exchange in conversational circuit, means for said connecting circuit for permitting calls to be extended from the main exchange to the substation, exclusive of the attendant, and means located at said main exchange controlled by said substation for disassociating said substation and said main exchange and to operate disconnect signalling means at the main exchange, said means being operable to maintain said subscriber's substation in a conversational circuit with said main exchange.

12. A telephone system including a main exchange and a subscriber's substation, a link circuit for interconnecting the same, an attendant's telephone set, means for said link circuit for permitting the attendant to converse secretly with a subscriber at the main exchange and to converse secretly with a party at said substation, means in said link circuit whereby the subscriber at the said substation can call the main exchange without the assistance of the attendant, and means for said link circuit controlled by the attendant for connecting said substation in conversational circuit with said main exchange, said means controlled by the subscriber at said substation for discontinuing the conversational circuit and for signaling for a disconnection at the main exchange.

13. A telephone system including a main exchange and a subscriber's substation, a connecting circuit for interconnecting the same, an attendant's telephone set operatively associated with said connecting circuit,

and means for said connecting circuit for permitting calls from the main exchange to be extended by the attendant to said substation, means for said connecting circuit for permitting calls to be extended from the main exchange to said substation exclusive of the attendant, and means for said link circuit controlled by said substation for operatively disassociating said substation from said main exchange and for signaling for a disconnecting at the main exchange.

14. A telephone system including a main exchange, a plurality of subscriber's substations, individual connecting circuits for interconnecting said substations and said main exchange, an attendant's link circuit terminating at said main exchange, signal means for said link circuit for signalling the attendant thereat, individual means for each of said connecting circuits for operating said signal means when connection is made with any one of said connecting circuits and generator current is applied thereto from said main exchange, means in said connecting circuits for permitting calls to be extended from the main exchange to any of the subscriber's substations exclusive of the attendant, and automatic means controlled by the party at said substation for disassociating said substation and said main exchange and for signalling for a disconnection at the main exchange, a supervisory signal for each of said connecting circuits for indicating the particular connecting circuit with which connection has been made at said main exchange.

15. A telephone system including a main exchange, a plurality of substations, a connecting circuit for each of said substations terminating in said main exchange, an attendant's connecting circuit terminating in said main exchange, means in said connecting circuits for permitting calls to be extended from the main exchange to any of the subscriber's substations exclusive of the attendant, signal means for said attendant's connecting circuit for signalling the attendant thereat upon a connection at said main exchange with any one of said connecting circuits, automatic means controlled by the party at said substation for disassociating said substation and said main exchange and for signalling for a disconnection at the main exchange, and an individual supervisory signal for each of said connecting circuits for notifying the attendant the particular connecting circuit connected to at the main exchange.

16. A telephone system including a main exchange and a plurality of subscriber's substations, trunk circuits for interconnecting said substations and said main exchange, an attendant's telephone set, a trunk circuit for interconnecting said telephone set and said main exchange, automatic means controlled

by the party at said substation for disassociating said substation and said main exchange and for signalling for a disconnection at the main exchange, signal means for
 5 said trunk circuit for signalling the attendant thereat, means in said first trunk circuits for permitting calls to be extended to the substations exclusive of the attendant, and means for operating said signal means from
 10 said main exchange via said trunk circuit or via any one of said trunk circuits.

17. A telephone system including a main exchange and a plurality of subscribers' substations, trunk circuits for interconnecting
 15 said substations and said main exchange, automatic means controlled by the party at said substation for disassociating said substation and said main exchange and for signalling for a disconnection at the main exchange, an attendant's telephone set, a trunk
 20 circuit for interconnecting said telephone set and said main exchange, signal means for said trunk circuit for signalling the attendant thereat, means in said first trunk circuits
 25 for permitting calls to be extended to any or all of the substations exclusive of the attendant, means for operating said signal means from said main exchange via said trunk circuit or via any one of said trunk
 30 circuits, and means controlled by the attendant for permitting her to talk to the main exchange over the trunk circuit over which said signal is operated.

18. A telephone system including a main exchange and a plurality of subscribers' substations, trunk circuits for interconnecting
 35 said substations and said main exchange, automatic means controlled by the party at said substation for disassociating said substation and said main exchange and for signalling for a disconnection at the main exchange, an attendant's telephone set, a trunk
 40 circuit for interconnecting said telephone set and said main exchange, signal means for said trunk circuit for signalling the attendant thereat, means in said first trunk circuits
 45 for permitting calls to be extended from the main exchange to any of the substations exclusive of the attendant, means for operat-

ing said signal means from said main exchange via said trunk circuit or via any one
 50 of said trunk circuits, means controlled by the attendant for permitting her to talk to the main exchange over the trunk circuit over which said signal is operated, and individual means for each of said trunk circuits
 55 for indicating the particular trunk circuit over which said signal means is operated.

19. A telephone system including a main exchange and an executive's substation, a trunk circuit for interconnecting said sub-
 60 station and said main exchange, a private secretary's telephone set associated with said trunk circuit, means for said trunk circuit for permitting the private secretary to attend to the calls extended from said main ex-
 65 change and to extend the same to said executive's substation, automatic means controlled by the party at said substation for disassociating said substation and said main exchange and for signalling for a disconnection
 70 at the main exchange, and means for said link circuit for permitting said substation to receive and to extend calls between said substation and said main exchange exclusive of the private secretary.
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20. A telephone system including a main exchange, and an executive's substation, a trunk circuit for interconnecting the same, a private secretary's telephone set associated with said trunk circuit, a trunk circuit
 80 for interconnecting said telephone set and said main exchange, signal means for said second trunk circuit for signalling the private secretary, said means controlled from the main exchange over said first trunk circuit or controlled directly over said second
 85 trunk circuit, means whereby the private secretary may receive calls over any of the trunk circuits, and means whereby she is prevented from extending calls to the main
 90 exchange over any trunk circuit other than her own.

Signed by me at Chicago, county of Cook and State of Illinois, this 15th day of May, 1924.

DANIEL B. ROBISON.