

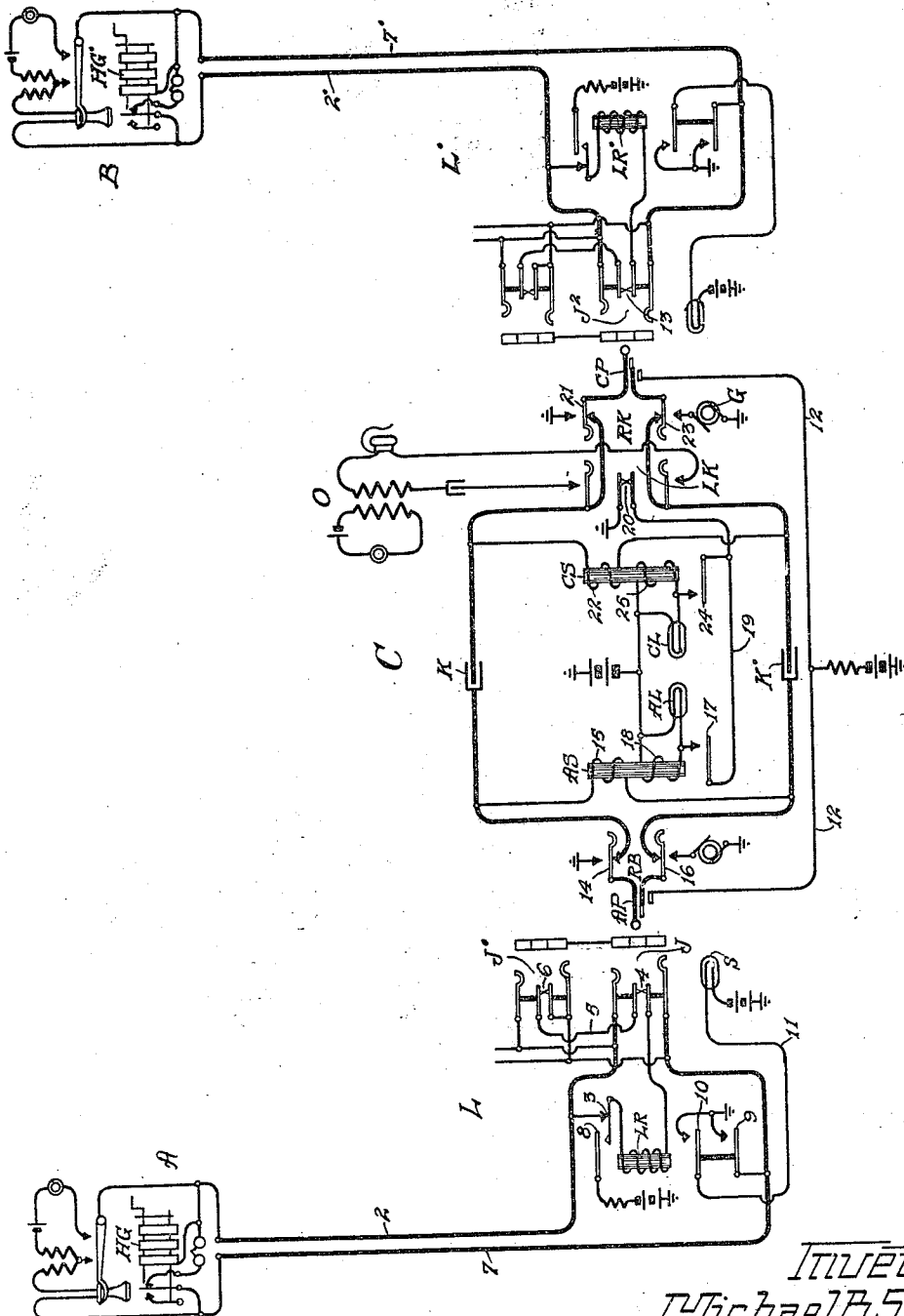
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TELEPHONE SYSTEM

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UNITED STATES PATENT OFFICE.

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TELEPHONE SYSTEM.

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To all whom it may concern:

Be it known that I, MICHAEL B. STAZAK, a citizen of the United States of America, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Telephone Systems, of which the following is a specification.

My invention relates to telephone systems in general and has to do more particularly with systems of the type known in the art as magneto or local battery systems, and an object of my invention is the provision of an improved circuit arrangement of the above character which will embody desirable features in a simple, efficient and economical manner.

The lines of a system of the above character terminate at the exchange in drop signals, which signals when actuated upon the initiation of a call attract the operator's attention so that the same may be answered. The cord circuits for interconnecting the lines are provided with clearing-out signals which operate to attract the operator's attention when disconnection is desired after the termination of conversation. The drop signals for the lines are located in the face of the board and when one operates it drops a shutter to attract the operator's attention, giving the operator both a visual and audible signal. When the operator is busy setting up and disconnecting other connections, she depends largely on the audibility of the dropping shutter, and as this audibility is not always marked, delays frequently happen. The clearing-out signals associated with the cord circuits are also in the form of drops and are also located in the face of the switchboard. When the clearing-out signals are actuated to notify the operator that disconnection is desired, it frequently happens that many of the cords are in use in establishing connections thus partly obscuring a clear view of the face of the board, and to withdraw the cords that were used in the call that now desires disconnection the operator must frequently trace at a considerable time loss the cords associated with the actuated clearing-out signals so that no mistake is made and the wrong connection taken down.

To overcome these objectionable features, I provide for each line a visual signal in the form of a line lamp in place of the drop

signal, which is lighted upon the initiation of a call, the said lamp being associated with an answering jack of its line. I thus provide answering jacks and signal lamps only for the lines at the exchanges and the usual multiples associated with answering jacks. I eliminate the clearing-out drop signals and in their place I provide supervisory signals in the form of lamps which are located in the keyboard of the switchboard and in alignment with the answering and calling plugs of their associated cord circuit, so that when conversation is terminated and the disconnect currents are transmitted to the exchange from the respective substations, the associated supervisory signals are lighted, giving the operator positive visual signals, and even though a plurality of cords are in the jacks of established connections. The disconnection is simple due to the fact that the two lighted supervisory disconnect signals are in alignment with their respective cords, and in full view of the operator, and the operator does not have to trace the cords to effect disconnection. The features as above outlined, as well as others, will be more fully hereinafter described in the ensuing specification.

Referring now more in general to my invention as illustrated in the accompanying drawing, I show a calling magneto substation A equipped with the usual local battery substation apparatus, which is connected at the exchange with a line circuit L which comprises a line relay LR, which is energized by generator current from the calling substation A. A line signal S associated with line circuit L is lighted upon the energization of the line relay to attract the operator's attention. The line circuit L is also equipped with the usual answering jack J, and I also show the multiples J' of the calling substation A. The cord circuit C for interconnecting subscribers' lines comprises an answering plug AP and a calling plug CP, the said plugs being connected by the heavily marked talking conductors, having the condensers K and K' interposed. The answering end of the cord circuit C comprises a ringback key RB, for the usual purposes, and is also provided with an answering supervisory relay AS, which relay is energized by disconnect current from the calling substation A. An answering supervisory lamp AL is associated with

the answering end of the cord circuit C and is lighted upon the actuation of the answering supervisory relay AS to give the operator at the exchange a visual disconnect signal. The calling end of the cord circuit C is provided with a calling supervisory relay CS, energized by disconnect current from the called substation, and a calling supervisory lamp CL is provided, which is lighted upon the actuation of the calling supervisory relay CS to give the operator at the exchange a visual disconnect signal. A listening key LK, when actuated, connects the operator's set O to the cord conductors, and a ringing key RK, when actuated, connects ringing generator G to the cord conductors to signal the called for substation.

To the right of the drawing I have shown a called substation B similar to the calling substation A, said substation B terminating at the exchange in a line circuit L' similar to the line circuit L.

Having described in general the apparatus embodying my invention, I will now describe in detail the operation in establishing a connection between a calling substation and a called substation.

Assuming now that the subscriber at the calling substation A initiates a call, he operates his hand generator HG and removes the receiver from the switchhook. The current from the hand generator operates the line relay LR of the line circuit L, said current being traced from the hand generator HG over the line conductor 2, normal contact 3 of the line relay LR, through the winding of the relay LR, normally closed contact 4 of the jack J, conductor 5, through the normally closed contact 6 of the multiple jack J', the line conductor 7, to the other pole of the hand generator HG. The line relay LR now energizes, and the closing of its make-before-break contact 8 establishes an energizing circuit, traced from battery, through the closed contact 8, through the winding of the line relay LR, normally closed contacts 4 and 6 of the jacks J and J' to ground through the alternate contact 9 of the line relay. The closing of alternate contact 10 of the line relay LR establishes an energizing circuit for the line signal S, traced from battery through the lamp S, conductor 11, to grounded alternate contact 10 of the line relay LR. The operator at the exchange noting the lighted line signal S, now inserts the answering plug AP into the jack J of the calling line, and the insertion of the said plug AP into the jack J opens the normally closed contacts 4 of the said jack J, interrupting the locking circuit of the line relay LR, which now restores, opening its alternate contact 10 to efface the line signal S. The operator now actuates her listening key LK to connect her

operator's set O to the cord conductors and inquires the wants of the calling subscriber. A busy potential is placed upon the sleeve of the line jacks when the answering plug AP is inserted therein, traced from battery over conductor 12, through the sleeve of the plug AP to the sleeve of the jack J, so that, should an operator test the multiple jack of the calling line, she would receive the customary busy signal.

Assuming that it is the subscriber at the substation B that is wanted, she now inserts the calling plug CP into the multiple jack J² of the called line, and the opening of normally closed contacts 13 of the jack J² removes the substation control of the line relay LR' of the line circuit L'. The operator now actuates her ringing key RK to connect the ringing generator G to ring the bell at the called substation B. The subscriber at the called substation B, in response to the call, removes the receiver from the switchhook. The calling subscriber at substation A and the called subscriber at the substation B are now in conversational circuit, said circuit being traced over the heavily marked conductors. The insertion of the calling plug CP into the jack J² of the called line also places a busy potential on the sleeve of the multiple jacks of the called line, from battery over the conductor 12, to the sleeve of the plug CP, to the sleeve of the multiple jacks J² of the called line.

Assuming that the subscribers have finished conversation, they replace their receivers upon their respective switchhooks and actuate their respective hand generators HG and HG' to give the operator at the exchange the disconnect signal.

The operation of the hand generator at the calling substation A sends current over the line conductor 2, through the tip contacts of the connected plug AP and jack J, normally closed contact 14 of the ringback key RB, through the upper winding 15 of the answering supervisory relay AS, back through normal contact 16 of the ringback key RB, the ring contacts of the connected plug AP and jack J, over the line conductors 7, back to the hand generator at the calling substation. The answering supervisory relay AS, energized by the generator current, now closes its alternate contact 17 establishing a locking circuit for itself traced from battery, through the lower winding 18 of the said relay AS, its alternate contact 17, conductor 19, to ground at the normally closed contacts 20 of the listening key LK. The closing of alternate contact 17 of the answering supervisory relay AS also establishes a circuit for the answering supervisory lamp AL, traced from battery, through the said lamp, alternate contact 17 of relay AS, conductor 19 to ground at normal contact 20 of the listening key LK.

The called subscriber at the substation B now actuating his hand generator HG' sends current from the hand generator HG', over line conductor 2', the tip contacts of the connected plug CP and jack J², normal contact 21 of the ringing key RK, through the upper winding 22 of the calling supervisory relay CS, back through normal contact 23 of the ringing key RK, ring contacts of the connected plug CP and jack J², over line conductors 7' to the hand generator at the substation B. The calling supervisory relay CS is energized by this generator current, and the closure of its alternate contact 24 establishes a locking circuit for itself, traced from battery, through the lower winding 25, its alternate contact 24, conductors 19 to ground, through the normally closed contacts 20 of the listening key LK. The closure of alternate contact 24 also establishes a circuit for the calling supervisory lamp CL, traced from battery, through the lamp CL, alternate contact 24 of the relay CS, to ground at the normal contact 20 of the listening key LK. The two supervisory lamps AL and CL are now lighted, giving the operator the disconnect signal and notifying her that the calling and called subscribers have finished their conversation, and she withdraws the answering plug AP and the calling plug CP from the respective jacks J, J² and actuates her listening key LK to open the normally closed contacts 20 of the ringing key LK. This interruption of the normally closed contact 20 opens the locking circuit through the lower windings 18 and 25 of the answering supervisory and calling supervisory relays AS and CS, the said relays restoring; and the opening of the normally closed contact 20 of the listening key LK also opens the circuit through the answering supervisory lamp AL and the calling supervisory lamp CL, which lamps are now effaced. The apparatus that was used in establishing the connection between the calling subscriber at the substation A and the called substation B, is now at normal and available for use in establishing other connections.

While I have described a specific form of invention, I do not wish to be limited to the same as changes and modifications will readily suggest themselves by those skilled in the art, and I therefore, aim to cover all such changes and modifications as come within the spirit and scope of the appended claims.

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

1. A lamp signal magneto telephone line circuit including a line relay, multiple jacks for said line, contacts for said jacks, said line relay initially energized by alternating current over the two line limbs and said con-

tacts of said jacks in series independent of any ground, and a locking circuit for said relay including a portion of one line limb only and said contacts.

2. A lamp signal magneto telephone line circuit including a relay initially actuated by alternating current over the two line limbs and contacts of a plurality of spring jacks, a locking circuit for said relay including a portion of one line limb only, and a jack contact in said locking circuit adapted to be opened when connection is made with the line.

3. A magneto multiple switchboard including a telephone line, a lamp signal therefor at the exchange, and a locking relay to light the signal and contacts of multiple jacks whereby the insertion of a plug in any jack of the line will operate contacts of said jack and will serve to put out the lamp signal.

4. A magneto multiple switchboard including a telephone line, a lamp signal therefor at the exchange, an alternating current relay at the exchange to control said signal, an initial energizing circuit for said relay including the two limbs of the line and contacts of a plurality of spring jacks, and a locking circuit for said relay local to the exchange including said contacts.

5. A switchboard including a telephone line provided with multiple jacks at the exchange, the two limbs of the line normally connected together by a circuit including contacts of a plurality of said jacks, a line relay for the line normally responsive to alternating current and connected in series with the line limbs, a pair of locking contacts for said relay, one serving on its energization to connect one side of its winding to one side of a central source of current, the other locking contact serving to connect the other side of the winding to the other side of said source, a lamp signal controlled by the relay, and a connecting plug adapted when inserted in any jack of said line to control said relay.

6. A switchboard including a telephone line with an alternating current relay at the exchange whose energizing circuit extends in series through normally closed contacts of the line's multiple jacks, a local locking circuit for said relay and a source of steady current connected thereto, said locking circuit also including said jack contacts.

7. A magneto multiple switchboard including telephone lines each with relay controlled lamp line signal and spring jacks multiply connected and provided with contacts, plugs serving on insertion in the spring jacks to open said contacts to efface the line signals, cord circuits for interconnecting the lines having each a calling su-

pervisory lamp and an answering supervisory lamp, and manually operated switch keys for said circuits for restoring the supervisory lamps to normal.

5 8. A magneto telephone system including a telephone line, an answering jack and a plurality of multiple jacks, a lamp signal for said line, a relay operative over the two
10 limbs of the line and spring contacts of said answering and said multiple jacks in series, a locking circuit for said relay controlled through the spring contacts of said answering and said multiple jacks, and con-
15 tacts controlled by said relay for causing the lighting of said signal, a cord circuit having a connection terminal at each end and adapted to engage any of said multiple jacks, said terminal operating said spring
20 contacts in the jack to which it is connected to cause the de-energization of said relay and the effacement of said lamp.

9. In a magneto telephone system including a relay, multiple jack contacts, a signal
25 lamp, said relay operative over the two sides of said telephone line and said multiple jack

contacts in series to light said signal lamp, a locking circuit for said relay including a make-before-break contact and said jack contacts, and means for operating said multiple jack contacts to permit the restoration
30 of said relay and the effacement of said lamp signal.

10. In a telephone system including a telephone line terminating in a plurality of multiple jacks having spring contacts, a
35 relay initially energized by an alternating current over the two sides of the line and spring contacts of said multiple jacks in series, a locking circuit for said relay including the spring contacts of said multiple
40 jacks; means for engaging any of said multiple jacks to operate said spring contacts in that jack to open the said locking circuit of said relay, and a signal lamp controlled by said relay.
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Signed by me at Chicago, in the county of Cook, and State of Illinois, this 13 day of July, 1920.

MICHAEL B. STAZAK.