

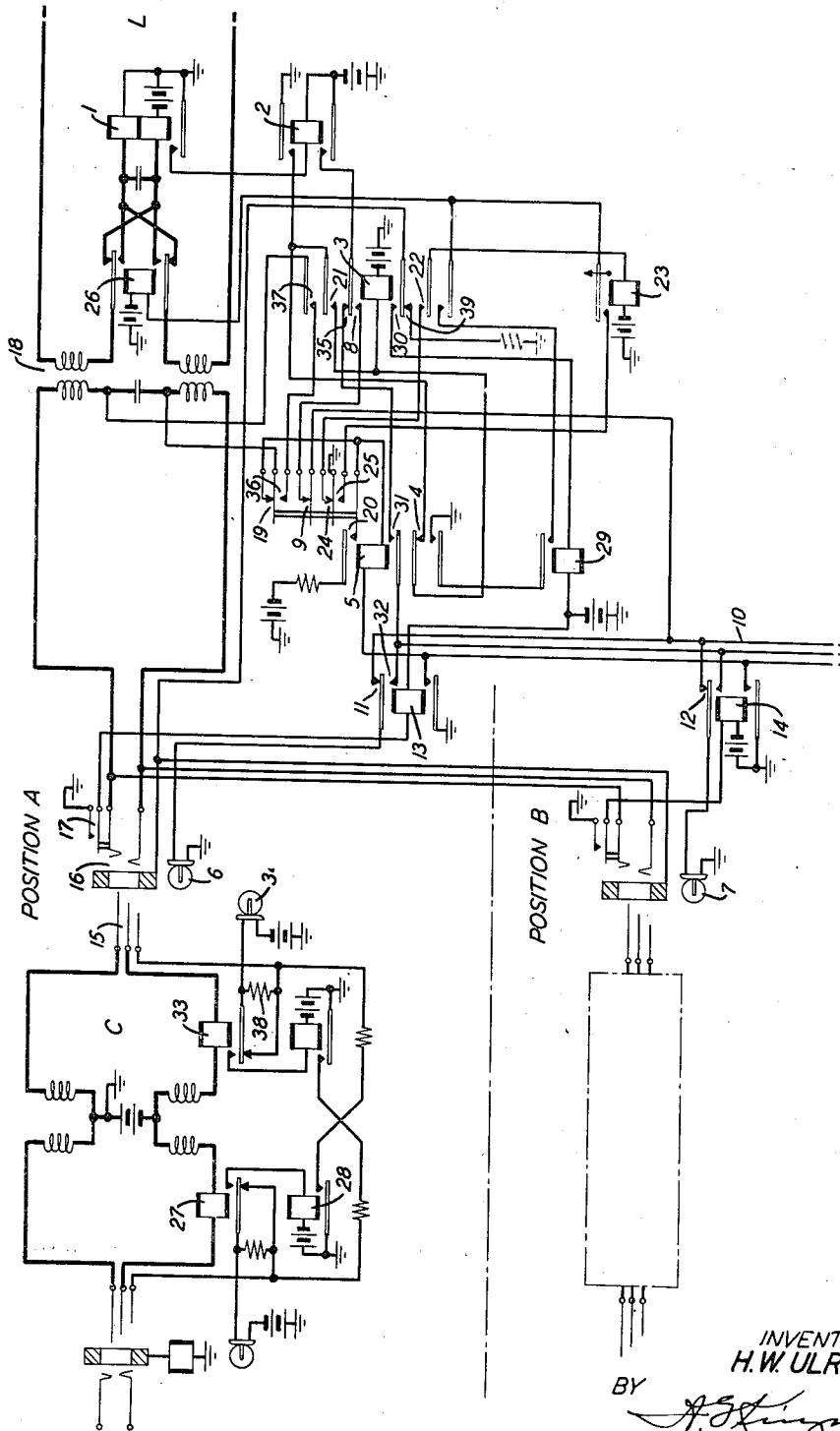
June 1, 1943.

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2,320,957

TELEPHONE SIGNALING SYSTEM

Filed Dec. 10, 1941



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TELEPHONE SIGNALING SYSTEM

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Application December 10, 1941, Serial No. 422,305

3 Claims. (Cl. 179—57)

This invention relates to manual telephone systems and more particularly to multiple switchboard systems employing multiple line lamps, i. e., systems in which lines appear at a plurality of operators' positions in jacks and line lamps, all of which lamps, associated with a particular line, are lighted when the line calls and are all extinguished when the call is answered at one of the jack appearances of the line.

An object of the invention is to permit the lamp at the position at which the call is answered to relight in case the calling line is released at the originating end and recalls before the line is disconnected at the switchboard but to prevent the other multiple lamp associated with the line from relighting.

A feature of the invention resides in means associated with a calling line, responsive to establishing a connection therewith at a switchboard to extinguish all associated line lamps, to disable all but the lamp at the position where the call is answered, as long as the connection with the line is maintained, and to condition the answering position lamp for relighting in response to release and reseizure of the line at the distant end.

The invention will be understood from the following description when read in conjunction with the accompanying drawing which shows an incoming trunk line from a distant central office appearing in multiple jacks at two switchboard positions, A and B, each of which jacks having associated therewith a multiple line lamp. An operator's cord circuit is shown at each position for answering and extending said trunk line.

Referring to the drawing, it will be assumed that a call is initiated over the trunk line L thereby causing the operation of line relay 1 in a well-known manner which relay in operating operates relay 2 which latter relay causes operation of relay 3 the circuit for which can be traced from ground, the upper contacts of relay 2, contacts 4 of relay 5 and winding of relay 3 to battery. Relay 2 in operating also partially closes at its lower contacts a circuit to light the multiple line lamps 6 and 7 at positions A and B which circuit is completed when relay 3 operates and can be traced from battery, lower contacts of relay 3, contacts 8 of relay 3, contacts 9 of relay 5, conductor 10 and thence to ground through line lamps 6 and 7 in multiple over the normal contacts 11 and 12 of relays 13 and 14, respectively, which relays are individual to positions A and B, which line lamps are lighted to indicate the call at their res-

spective positions. As well understood, the operator at either position can answer the call and we will assume that the operator at position A is free and immediately inserts plug 15 of her cord circuit C in the multiple jack 16 of the calling line, thereby causing closure of local contacts 17 of jack 16 and the consequent operation of position relay 13 which opens its contacts 11 thereby extinguishing lamp 6.

When the plug 15 is fully seated in jack 16, battery over the ring conductor of the trunk, causes partial operation of relay 5, the circuit for which can be traced from battery, lower right-hand winding of the cord circuit repeating coil relay 33, ring contacts of plug 15 and jack 16, lower left winding of trunk repeating coil 18 contacts 19 and winding of relay 5 and lower contacts of relay 13, now operated, to ground. Relay 5 is energized in this circuit sufficiently to close its contacts 20 thereby reducing the resistance of the previously traced circuit and further energizing relay 5 whereby contacts 9 are opened, thus opening the previously traced lamp circuits at this point to extinguish lamp 7 and all other multiple lamps associated with the line (not shown).

When relay 3 operated in response to a call, it locked, at its contacts 21, to relay 2 and at its contacts 22 caused operation of slow-to-release relay 23 from ground at contacts 24 of relay 5 and when the operator answered and relay 5 fully operated, the energizing circuit for relay 23 was opened at contacts 24. Relay 5 in opening the circuit for relay 23 closed its contacts 25 before relay 23 released, thereby momentarily operating relay 26 to send a reverse battery impulse over the trunk to the originating end, where, in case the equipment at the originating end is arranged for so-called "call announcer" operation, it acts as a signal to such equipment that the operator has answered and the called number can be transmitted. When relay 23 finally releases, relay 26 releases and restores the trunk battery to its normal polarity across the trunk.

The call is extended by the operator in the usual manner and when the called subscriber answers, calling supervisory relay 27 of the cord circuit operates, thereby operating relay 28 which connects ground to the sleeve of the trunk to operate relay 29 which circuit includes contacts 30 of relay 3 which is still held operated from relay 2. Relay 29 in operating completes a circuit to reoperate relay 26 to again reverse

the trunk battery as a signal that the called subscriber has answered.

When the called subscriber disconnects, cord supervisory relay 27 releases thereby causing ground to be removed from the trunk sleeve thereby releasing relay 29 which in turn releases reversing relay 26 in the trunk to restore the battery supply to its normal polarity to indicate to the calling end that the called subscriber has "hung up" whereupon the trunk is released at the originating end thereby releasing relays 1, 2 and 3.

Now in case the trunk is immediately re seized at the distant end for another call, relays 1 and 2 reoperate in an obvious manner, but if the operator had not had time, or for any other reason, to remove plug 15 from jack 16, the original operating circuit of relay 3 is open at contacts 4 of relay 5, which relay is still operated under control of relay 13 and consequently relay 3 remains released. With relays 2, 5 and 13 operated and relay 3 released, a circuit is completed for line lamp 6 at position A, at which position the plug is still connected to the trunk, which lamp circuit can be traced from battery, lower contact of relay 2, contact 35 of relay 3, contact 31 of relay 5, and contact 32 of relay 13 to ground in series with lamp 6. Lamp 7 (and the other multiple lamp) does not light due to the fact that its circuit is opened at contacts 9 of relay 5.

It will be noted that when the operator answered the original call and relay 5 operated, a circuit was completed to operate the answering cord supervisory relay 33 which was completed at contacts 36 of relay 5 and contacts 37 of relay 3, thereby introducing resistance 38 in series with the supervisory lamp 34 which prevents this lamp from lighting when the called subscriber answers and relay 28 operates.

When the trunk was released at its originating end thereby deenergizing relay 3, the circuit of supervisory relay was opened at contact 37 of relay 3 and supervisory lamp 34 was connected directly to the sleeve circuit, and due to the closure of contacts 39 of relay 3, a circuit was closed to light lamp 34 from ground, contacts 39 of relay 3, sleeve contacts of the jack and plug, normal contacts of relay 33 and lamp 34 to battery. This circuit remains closed until the plug 15 is removed from the jack due to the fact, before mentioned, that once relay 3 is released, it cannot reoperate until relay 5 is released by the removal of the plug, and consequently lamp 34 remains lighted until the operator disconnects. Although lamp 34 is lighted, as a signal to disconnect, if line lamp 6 is relighted before such disconnection the operator understands that a second call has been initiated and she momentarily removes plug 15 from the jack and immediately reinserts it thereby allowing relays 13 and 5 to momentarily release after which they reoperate. When relay 5 releases the original

energizing circuit for relay 3 is reclosed which relay immediately reoperates and locks thereby establishing the same condition, after relays 13 and 5 reoperate, as when the first call was answered.

While the foregoing describes the invention as applied to a call announcer trunk, it will be understood that the method of controlling multiple line lamps when a calling line disconnects and recalls before the operator disconnects from the first call, is applicable to other types of circuit which will be obvious to those skilled in the art.

What is claimed is:

1. In a telephone system, a switchboard having a plurality of operators' positions, a line, an appearance of said line at more than one of said positions, a multiple line signal associated with each line appearance, cord circuits for connecting to said line at any appearance thereof, means responsive to seizure of said line at the distant end for energizing all of the associated line signals, means responsive to the connection of a cord with said line at any appearance for deenergizing all of said line signals, and means thereafter effective in response to a disconnection and reseizure of said line at the distant end prior to disconnection of said cord circuit therefrom to reenergize the line signal associated with the connected jack appearance but to prevent energization of the remaining multiple signals of the line.

2. In a telephone system, a switchboard, a line terminating thereat in a plurality of terminals, a signal associated with each terminal, all of said signals being adapted to be displayed in response to seizure of the distant end of said line, a cord circuit adapted to be connected to said line by way of any one of said terminals, and means associated with said line responsive to connection of said cord for retiring all of said signals and for disabling all but the signal associated with the terminal connected to, until the cord is disconnected therefrom, and means responsive to release and reseizure of said line at the distant end before disconnection of said cord circuit to redisplay the signal associated with the connected terminal.

3. In a telephone system, a calling line, multiple terminals and associated calling signals therefor, switching means for connecting to any of said terminals, means responsive to connection of said switching means to any terminal to retire all displayed signals, and to disable all but the signal associated with the connected terminal, until said switching means is disconnected, and means responsive to discontinuance of said calling condition and a subsequent recall before disconnection of said switching means to redisplay the calling signal associated with the connected terminal.

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