

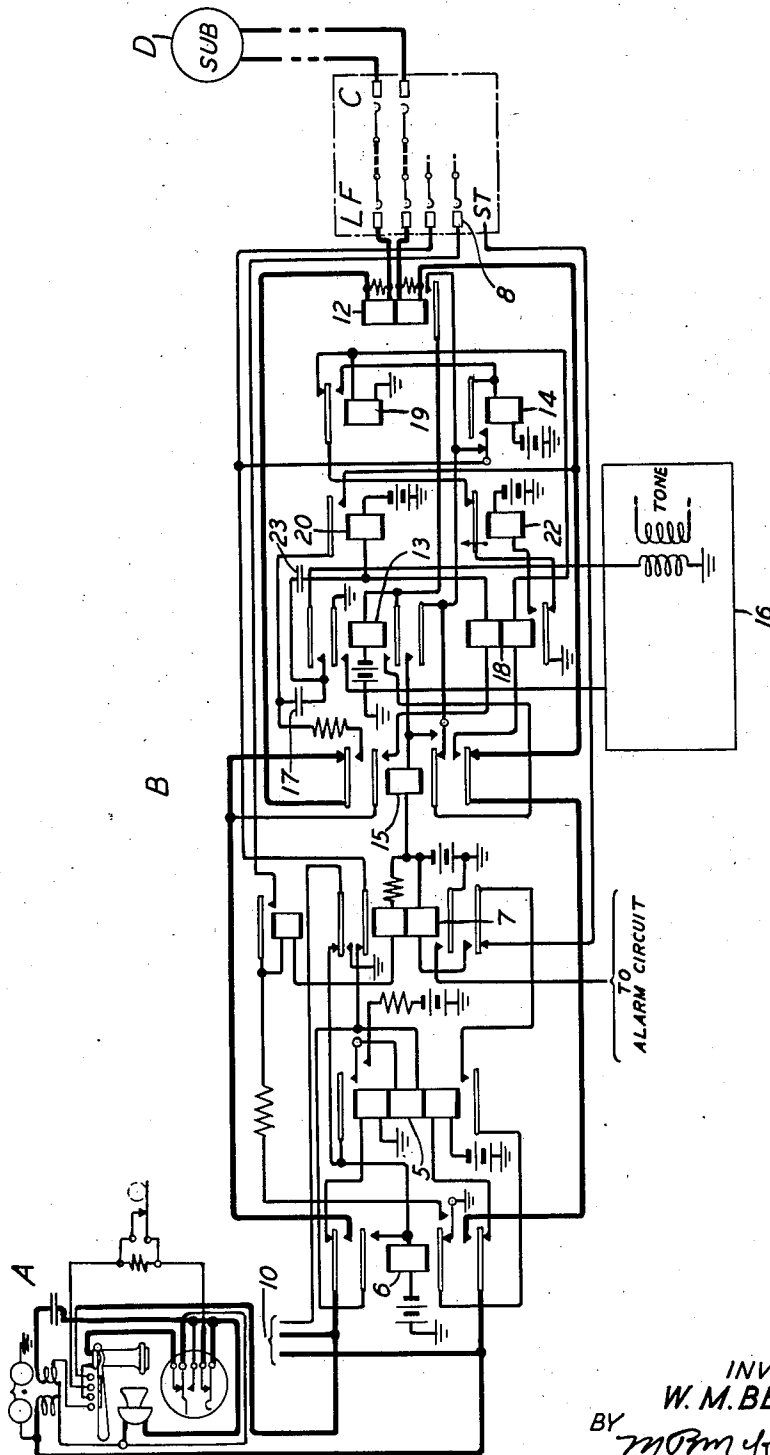
Nov. 13, 1934.

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1,980,175

TELEPHONE SYSTEM

Filed July 1, 1932



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1,980,175

TELEPHONE SYSTEM

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Application July 1, 1932, Serial No. 620,423

11 Claims. (Cl. 179—6.3)

This invention relates to telephone systems and particularly to improvements in automatic telephone systems in which the subscriber is required to deposit a coin to establish a connection.

5 An object of this invention is to simplify and insure the accuracy of operation in systems of this kind.

Heretofore systems have been designed in which after a calling subscriber has established an automatic connection to a called subscriber, the calling subscriber is prevented from talking to the called subscriber until a coin has been deposited. However, in such prior systems the calling subscriber may under certain circumstances by operating his switchhook or dial at a certain rate cause false operations to take place in the connection to permit the calling subscriber to talk to the called subscriber without depositing coins.

10 It is a feature of the present invention to positively prevent such a free call from being made by a calling subscriber in the case he attempts it by operating the dial or flashing the switchhook before the coin is deposited. In the present system the attempt to dial or flash the switchhook in any manner whatsoever merely causes certain operations to take place in the calling subscriber's line circuit to positively prevent the establishing of a talking connection.

15 Referring to the drawing the invention has been illustrated by means of a line circuit for a calling subscriber's line having coin box facilities. In the drawing the line circuit has been shown in detail and terminating in a line finder and a connector and a called subscriber's line shown in diagrammatic form.

A description will now be made of a call from the calling subscriber's station A through the calling subscriber's line circuit B, the line finder LF, the connector C to the called subscriber's station D, followed by a description of the operations of the line circuit B in case the calling subscriber dials or otherwise signals over the line to simulate the deposit of a coin in an attempt to secure a free call.

20 If the calling subscriber at A removes his receiver from the switchhook, a circuit is completed through relay 5 from battery through the lower winding of this relay, contacts of relay 6, the calling subscriber's loop, contacts of relay 6 and the upper winding of relay 5 to ground. The operation of relay 5 connects a ground to the start lead ST leading to the line finder LF to cause it to establish a connection for this line circuit to a connector C for the establishing of a connection

to a called subscriber at D by dial pulses operating the connector. The line finder and the connector have been shown in diagrammatic form as their construction and operation characteristics are well known in the art. The connection from ground for the start lead ST may be traced from relay 6, lower armature and front contact of relay 5, lower outer armature and back contact of relay 7 to the start lead ST in the line finder. The line finder will then stop on the terminals of this line due to the battery connection through upper armature and front contacts of relay 5, middle winding of this relay, upper armature and back contact of relay 7, to the sleeve contact of the line circuits terminating in the line finder LF. The usual ground connection in the line finder on the sleeve lead will now cause the operation of relay 6 from battery, winding of relay 6 through the connection traced for relay 5. Relay 5 will be held through the same circuit by the ground on the sleeve until relay 6 has been operated when the middle winding of relay 5 is short-circuited by contacts of relay 6 causing relay 5 to release. Relay 6 in operating also connects a ground to the sleeve lead of the multiple terminals leading to incoming connectors as indicated at 10, to keep these terminals busy. Relay 6 also opens the connection from ground to the start lead ST and closes the tip and ring connections from the calling subscriber's line through the line finder circuit to the connector for dialing. The line circuit B is now in condition for dialing. The dial pulses may pass through the tip and ring conductors of the line circuit B without this circuit performing any functions during the dialing.

When the connector has been operated and the called station D answers, a battery connection through the tip and ring conductors of this line circuit are reversed causing the operation of relay 12. Relay 12 in operating closes an operating circuit for relay 13 from battery through the armature and front contact of relay 12, lower inner armature and make-before-break contacts of relay 14 to ground on the sleeve circuit in the line finder. Relay 13 in operating closes a circuit for the operation of relay 15 through its lower outer armature and front contact to the ground on the sleeve. Relay 15 also closes a connection to ground at its upper inner armature and front contact for the starting of a tone ringing machine which has not been shown in detail but merely diagrammatically at 16. A tone is now transmitted from this machine

through the upper outer armature and front contacts of relay 13 and condenser 17. It is, however, not immediately transmitted to the calling and called stations as relay 15 has split the connection between the stations at its upper outer and lower outer armatures and back contacts. Relay 15 connects relays 18, 19 and 20 through to the calling line. This connection may be traced as follows: battery, winding of relay 20, upper winding of relay 18, upper inner armature and front contact of relay 15, the tip conductor through the calling subscriber's loop and back over the ring conductor, the lower outer armature and front contact of relay 15, lower winding of relay 18, winding of relay 19 and ground. This allows the relays 18 and 20 to operate. Relay 19 does not operate as it is short-circuited by the connection to ground at contacts of relays 22 and 18. Relay 20 closes a holding bridge for holding the connector switch operated. This bridge may be traced from the tip conductor, line finder LF, upper winding of relay 12, upper outer armature and front contact of relay 15, armature and front contact of relay 20 to the ring conductor and the line finder LF. Relay 18 in operating removes the short-circuit around the winding of relay 19 at its armature and back contact and causes the operation of relay 22 over an obvious circuit. Relay 19 now operates in the circuit traced through the tip and ring conductors. A circuit for the tone applied at 16 is now completed through the upper outer armature and front contact of relay 13, condenser 17, armature and front contact of relay 20 over the ring conductor to the called subscriber's station D and over condenser 23, the upper winding of relay 18, inner upper armature and front contact of relay 15, the tip conductor to the calling subscriber's station A.

The tone is an indication at the calling subscriber's station that the called subscriber has answered and that a coin should now be deposited in the calling station coin box associated with the calling subscriber's set. The coin box may be so arranged that when the coin is deposited, a resistance is momentarily shunted across the tip and ring circuits of the line. This resistance causes the relay 18 to release due to its marginal characteristics, and this relay in turn causes the release of relay 22. Relay 19, however, remains operated under these conditions, to cause relay 14 to operate over a circuit from battery through the winding of this relay, upper armature and front contact of relay 19, armature and back contact of relay 22, armature and back contact of relay to ground. Relay 14 in operating provides a locking circuit for itself, through its armature and front contact to the ground on the sleeve conductor. The operation of relay 14 causes the release of relays 15 and 13. Relay 13 opens the starting lead for the tone to discontinue it. Relay 15 opens the line from the calling subscriber through relays 18, 19 and 20. The bridge for holding the connection during this period is also opened and the line is closed through from the calling subscriber to the called subscriber at the outer upper and lower armatures and back contacts of relay 15.

When the calling subscriber at station A replaces his receiver on a switchhook, the connector is released causing the removal of the ground from the sleeve lead to the line finder which is also released. This causes the release of relays 12, 14 and 6.

In case a calling subscriber at A attempts to

secure a free call by operating the dial or otherwise signal by flashing of a switchhook to imitate the deposit of a coin, such attempts will be futile. If, for example, the circuit through the calling subscriber's line is opened by such manipulations, relays 18 and 19 will release simultaneously so that when relay 22 releases on the release of 18, the path from ground at the armatures and back contacts of relays 18 and 22 will not cause the operation of relay 14 due to the release of relay 19. As relay 14 can not be operated the cutting through of the tip and ring connections can not take place. Relay 22 is slow in releasing to permit relay 19 to release before the connection for operating relay 14 is closed.

Should the subscriber at the called station B replace his receiver before the calling station at A deposits a coin, battery from the connector will be reversed to its normal condition which will then cause the release of relay 12. This in turn causes the release of relay 13 which removes ground from the start lead for the tone and opens the tone circuit. The removal of the tone from the line of the calling subscriber provides an indication to this subscriber that the called subscriber has replaced his receiver on the hook.

Should the calling subscriber replace his receiver before a coin has been deposited, relays 18, 19, 20 and 22 will release. The release of relay 20 opens the holding circuit for the connector which allows the relay 12 to release and the connector is thereby restored to normal as well as the relays operated in the line circuit B due to the release of relay 12 as heretofore described.

What is claimed is:

1. In a telephone system, a calling coin box subscriber's line, a called subscriber's line, means for establishing by dialing a connection from the calling subscriber's line to the called subscriber's line, means including a relay operative when the called subscriber answers a call, means including a second relay operative in response to the operation of said first relay for splitting the connection, means including a group of relays operative in response to the operation of said second relay, a third relay, means responsive to the calling subscriber depositing a coin for controlling said group of relays to cause the operation of said third relay, and means controlled by the operation of said third relay for releasing the second relay to reestablish the connection.

2. In a telephone system, a calling coin box subscriber's line, a called subscriber's line, means for establishing by dialing a connection from the calling subscriber's line to the called subscriber's line, means including a relay operative when the called subscriber answers a call, means including a second relay operative in response to the operation of said first relay for splitting the connection, means including a group of relays operative in response to the operation of said second relay, a third relay, means responsive to the calling subscriber depositing a coin for controlling said group of relays to cause the operation of said third relay, means controlled by the operation of said third relay for releasing the second relay to reestablish the connection, and means responsive in case the calling subscriber dials or manipulates the switchhook for controlling said group of relays in a different manner to prevent the operation of said third relay.

3. In a telephone system, a calling coin box subscriber's line, a called subscriber's line, a line circuit for the calling subscriber's line, means for

establishing a connection by dialing from the calling subscriber's line to the called subscriber's line through said line circuit, a group of relays and circuit means therefor in said line circuit operative to split the connection through the line circuit and to apply a tone on the calling subscriber's line in response to the called subscriber answering the call, and means responsive to the deposit of a coin by the calling subscriber for controlling said group of relays and associated circuit means to reestablish the connection and to remove the tone from the calling subscriber's line.

4. In a telephone system, a calling coin box subscriber's line, a called subscriber's line, a line circuit for the calling subscriber's line, means for establishing a connection by dialing from the calling subscriber's line to the called subscriber's line through said line circuit, a group of relays and circuit means therefor in said line circuit operative to split the connection through the line circuit and to apply a tone on the calling subscriber's line in response to the called subscriber answering the call, means responsive to the deposit of a coin by the calling subscriber for controlling said group of relays and associated circuit means to reestablish the connection and remove the tone from the calling subscriber's line, and means responsive to the calling subscriber dialing or manipulating the switchhook for controlling said group of relays and the associated circuit means in a different manner to prevent the reestablishing of the connection and the removal of the tone.

5. In a telephone system, a central office, a calling coin box subscriber's station, a line connecting said calling subscriber's station with said central office, a called subscriber's station, a line connecting said called subscriber's station with said central office, means for establishing through said central office a connection from the calling subscriber's station to the called subscriber's station over said lines, means responsive to the called subscriber answering the call for splitting this connection at the central office, and means for reestablishing said connection at the central office only in response to the calling subscriber depositing a coin.

6. In a telephone system, an exchange, a calling coin box subscriber's line terminating in said exchange, a called subscriber's line, means for establishing a connection from the calling subscriber's line to the called subscriber's line, means at said exchange responsive to the called subscriber answering the call for opening the established connection, and means for reestablishing said connection only in response to the calling subscriber depositing a coin.

7. In a telephone system, an exchange, a calling coin box subscriber's line, a line circuit at said exchange for said calling line, switches, means for establishing a connection from the calling subscriber's line to the called subscriber's line through the calling subscriber's line circuit and said switches, means responsive to the called subscriber answering a call for severing said connection in the calling subscriber's line circuit, and means for reestablishing said connection only in

response to the calling subscriber depositing a coin.

8. In a telephone system, an exchange, a calling coin box subscriber's line terminating in said exchange, a called subscriber's line, means for establishing a connection from the calling subscriber's line to the called subscriber's line, means at said exchange responsive to the called subscriber answering the call for opening the established connection, means for reestablishing said connection only in response to the calling subscriber depositing a coin, and means for preventing the reestablishing of said connection if the calling subscriber does not deposit a coin and momentarily opens and closes said connection through his telephone set by dialing or manipulating of the switchhook.

9. In a telephone system, an exchange, a calling coin box subscriber's line terminating in said exchange, a called subscriber's line, means for establishing a connection from the calling subscriber's line to the called subscriber's line, means at said exchange responsive to the called subscriber answering the call for splitting the established connection, a relay at said exchange for reestablishing said connection between the calling subscriber and the called subscriber's line and means for operating said relay only by the depositing of a coin by the calling subscriber.

10. In a telephone system, an exchange, a calling coin box subscriber's line terminating in said exchange, a called subscriber's line, means for establishing a connection from the calling subscriber's line to the called subscriber's line, means at said exchange responsive to the called subscriber answering the call for splitting said connection, a relay for reestablishing said connection, a second relay, a third relay, circuit means for controlling the operation of the said first relay under control of said second and third relay, means for releasing said second and third relay in response to the calling subscriber dialing or manipulating the switchhook to prevent the operation of said first relay, and means responsive to the calling subscriber depositing a coin for maintaining said third relay operated and for releasing said second relay to cause the operation of said first relay to reestablish the connection.

11. In a telephone system, an exchange, a calling coin box subscriber's line terminating in said exchange, a called subscriber's line, a line circuit for said calling subscriber's line at said exchange, means for establishing a connection from the calling subscriber's line to the called subscriber's line through said line circuit, a plurality of relays in said line circuit, means for severing said connection in the line circuit when said called subscriber answers the call, means for operating said relays in a certain manner if the calling subscriber attempts to reestablish said connection without depositing a coin by dialing or manipulation of the switchhook to prevent the reestablishing of said connection, and means for operating said relays in another manner when said calling subscriber deposits a coin to cause the reestablishing of said connection.

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