

May 23, 1933.

R. L. STOKELY

1,910,972

TELEPHONE SYSTEM

Filed July 1, 1932

3 Sheets-Sheet 1

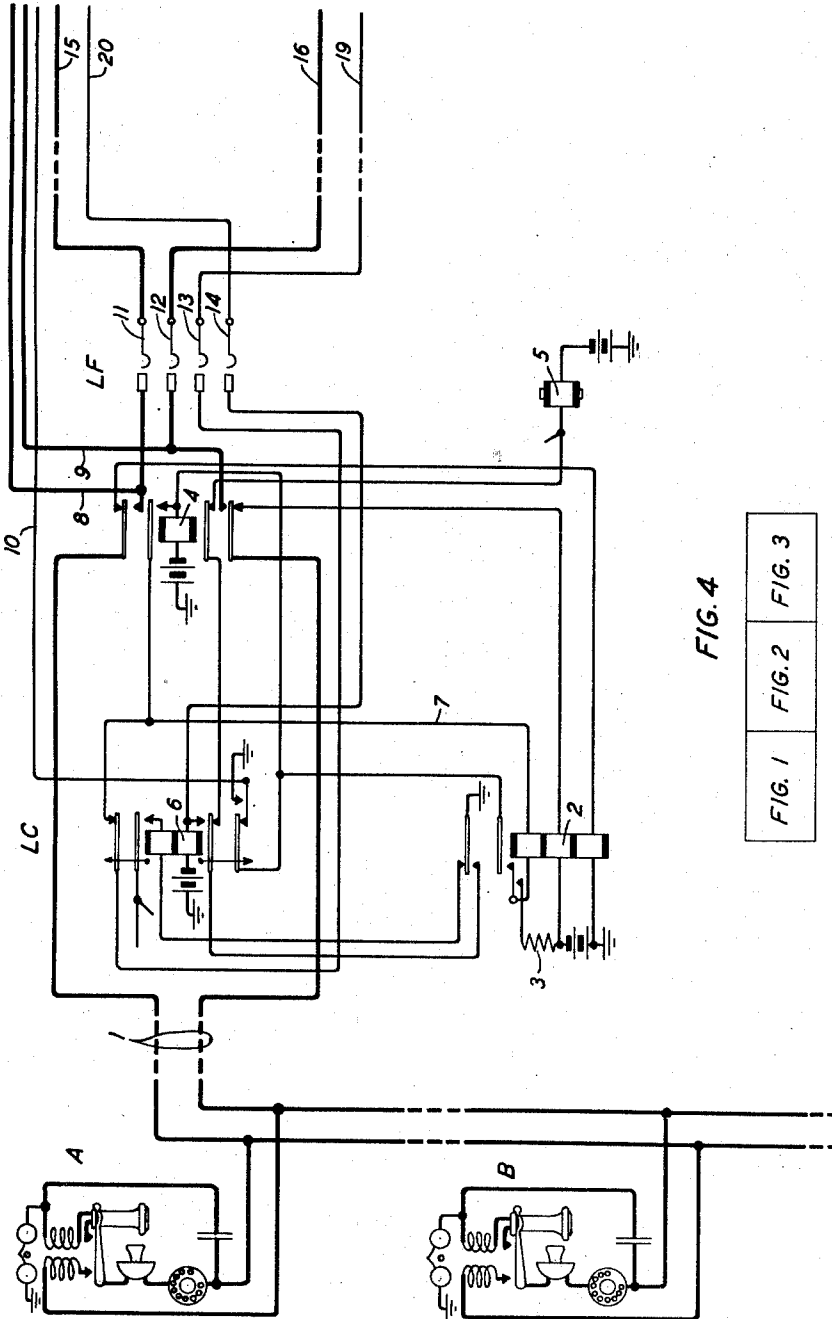


FIG. 1

FIG. 4

FIG. 1	FIG. 2	FIG. 3
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3 Sheets-Sheet 2

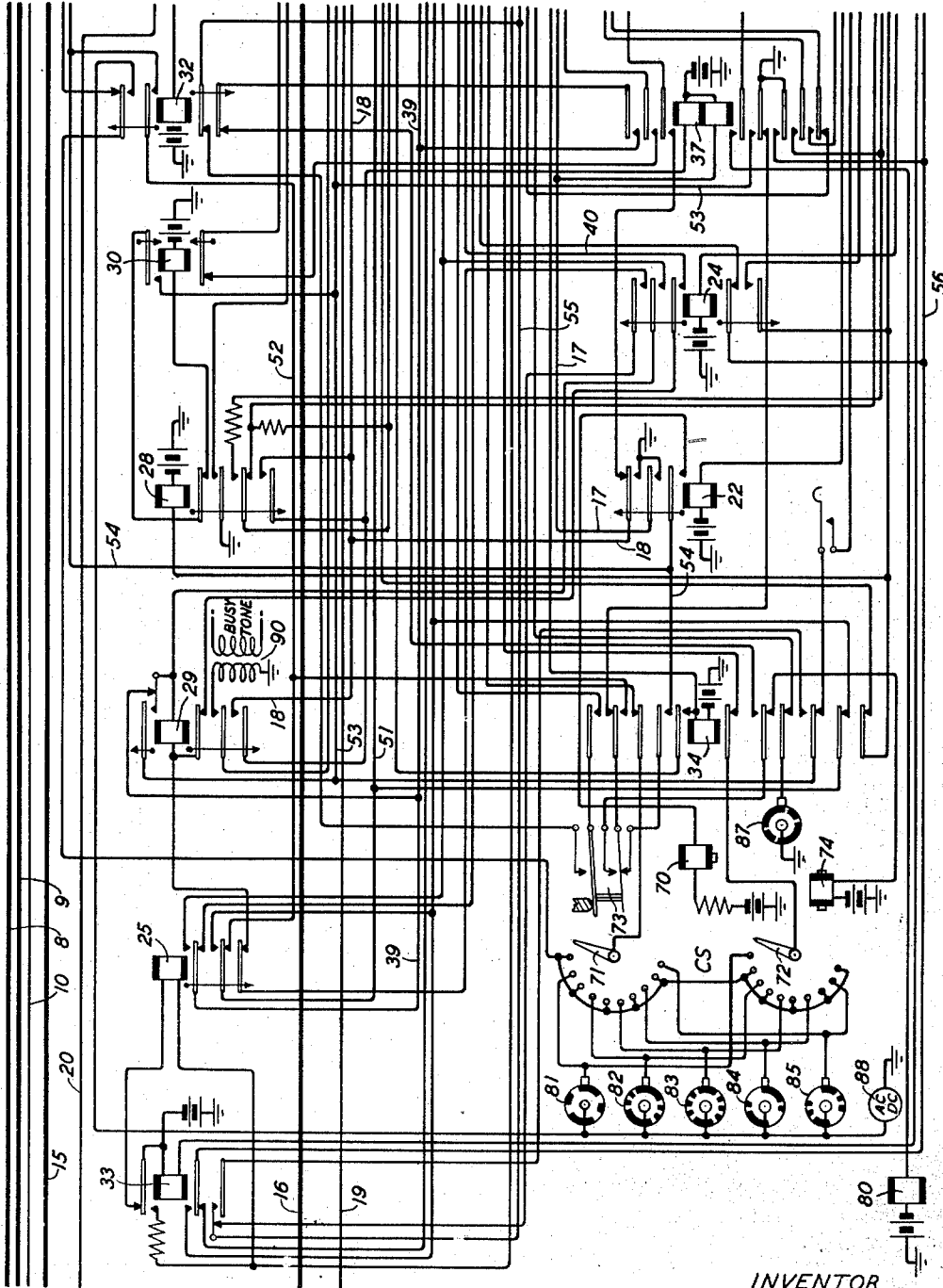


FIG. 2

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3 Sheets-Sheet 3

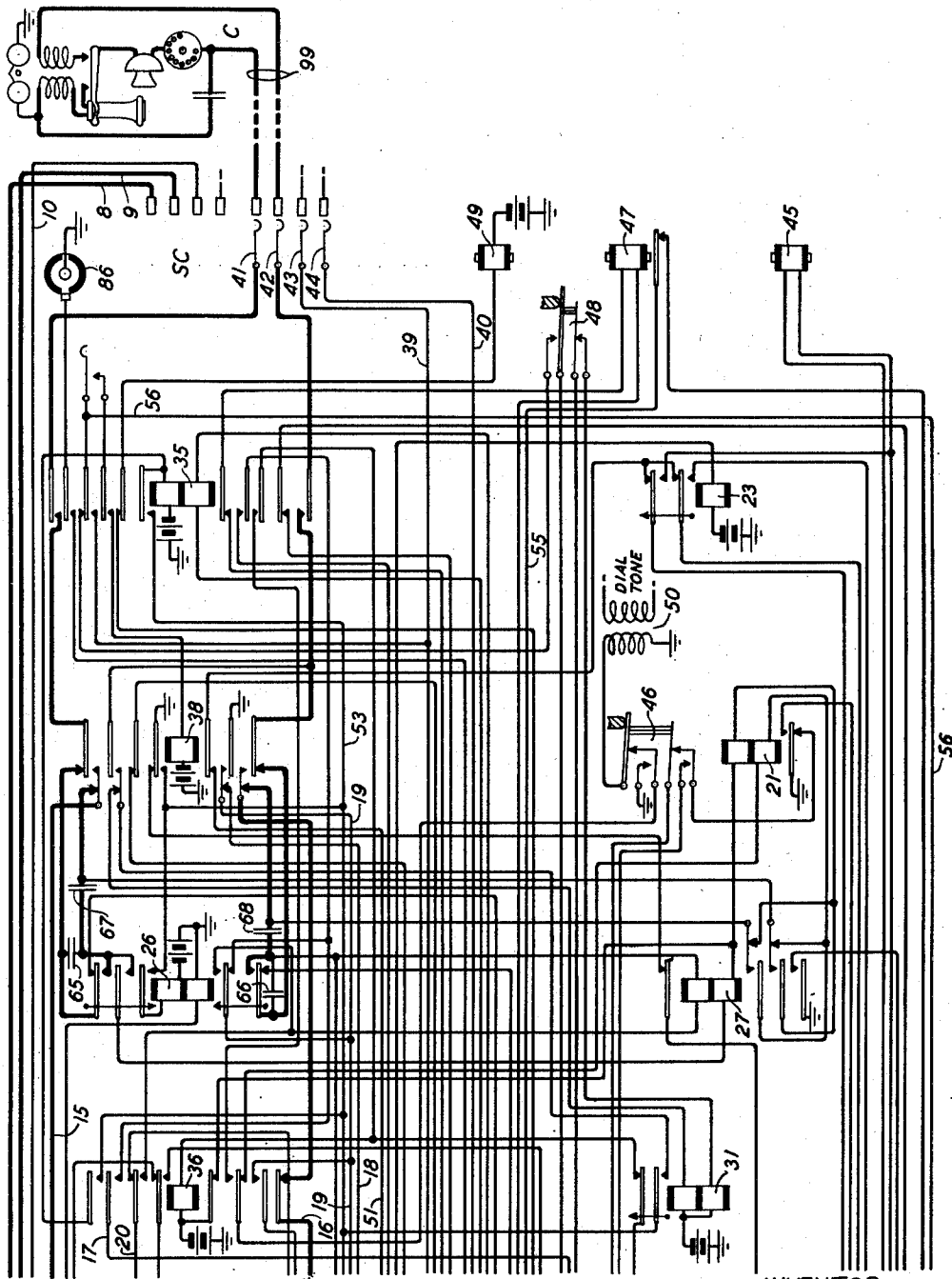


FIG. 3

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TELEPHONE SYSTEM

Application filed July 1, 1932. Serial No. 620,337.

This invention relates to telephone systems and more particularly to automatic telephone systems having multi-station lines.

The object of this invention is to simplify the equipment required in automatic telephone systems for providing party line service and to provide an arrangement for the more efficient and economical use of this equipment.

Heretofore, automatic telephone systems have been arranged so that a subscriber on a party line can call another station on the same line. In certain of these systems, the switches employed in completing connections between subscribers on different lines are also employed in completing connections between stations on the same line, in which case the final switch is arranged to make a reverting busy test to determine whether the called line is busy on account of being the same line as that which serves the calling station. In other systems, a special ring back switch is employed to signal the called and calling stations. In either case the ringing of the called station is initiated by replacing the receiver at the calling station, and talking battery is then furnished from the final switch or the special ring back switch; or, in some cases the talking battery is furnished from the first selector, all other switches involved in the connection being released.

In a system arranged according to this invention, all of the switches used in establishing a desired connection are released when the line of the called station is also the line of the calling station. To this end the subscriber's line circuit is arranged to supply talking battery to the calling and called stations upon receiving an indication from the final selector that these stations are on the same line. The final selector is arranged to seize the terminals of the line, to make the usual reverting busy test, to determine whether the call is a reverting call, to ring both the calling and called stations, to signal the line circuit that the call is a reverting call, and to cause the release of all of the switches involved in the completion of the call. The line circuit maintains the talking connection without causing further

operation of the central office switches until the receivers have been replaced at both of the calling and called stations; whereupon the line circuit is again rendered effective for the initiation of a call from any of the stations which it serves.

In a system arranged to complete reverting calls by extending the connection to a ring back switch instead of using a final selector to seize the line and signal the stations, the ring back switch can be arranged to signal the line circuit that the call is a reverting call and to thereupon cause the release of the switches involved.

A telephone system arranged in accordance with the features of this invention is shown diagrammatically in the drawings which consist of four figures.

Fig. 1 shows a party line with subscribers' stations A and B, the associated line circuit LC, and a line finder switch LF.

Figs. 2 and 3 show a connector switch SC with its associated control equipment, and a third subscriber's station C.

Fig. 4 shows how Figs. 1, 2 and 3 are to be arranged with respect to each other.

The line finder and connector switches illustrated in the drawings are similar in construction, both being of the Strowger type. For a complete description of the Strowger type connector switch, reference may be had to pages 53 to 56, inclusive, of the second edition of "Automatic Telephony" by Smith and Campbell. The invention is not limited, however, in its application to systems using this particular type of switch nor is it limited to the particular system shown in the drawings.

The line finder switch is represented schematically by the brushes 11, 12, 13 and 14; the driving magnets and other equipment associated with the switch are omitted since a clear and complete description of the invention may be made without including the detailed operation of the line finder switch. For a description of the operation of a Strowger type line finder, reference may be had to the patent to H. Hovland, 1,711,682, May 7, 1929; the brushes 11, 12 and 13 of the

drawings may be either one of the two sets of brushes shown in this patent.

The connector switch SC is designed for use in a small dial central office having ten party lines and is arranged for code ringing and for completing reverting calls. It is also arranged to function as a selector on certain levels and to function as a rotary hunting connector for completing calls to private branch exchanges on other levels. The operation of the switch as a selector or a rotary hunting connector will not be described in detail since the invention is concerned only with the establishing of reverting calls, that is, calls from one station on a line to another station on the same line.

The connector switch includes the brushes 41, 42, 43 and 44, the vertical stepping magnet 45, the vertical off-normal springs 46, the rotary stepping magnet 47 and the rotary off-normal springs 48. Other equipment associated with the connector switch includes relays designated 21 to 38, inclusive, the tone supply transformers 50 and 90, a start magnet 80 for starting operation of the ringing machine comprising interrupter drums 81 to 87, inclusive, and an auxiliary rotary switch CS comprising the stepping magnet 70, brushes and banks 71 and 72, off-normal springs 73 and release magnet 74.

Operation of the system shown in the drawings will be illustrated by assuming calls from station A to stations B and C. When the subscriber at station A removes the receiver to originate a call, the line relay 2 operates. The circuit for operating relay 2 is traced from battery through the middle winding of relay 2, outer lower contact of cut-off relay 4, over the lower conductor of line 1, through the subscriber's set at station A, back over the upper conductor of line 1, outer upper contact of relay 4, and through the lower winding of relay 2 to ground. Relay 2 connects a marking potential to the test terminals of line 1 in the banks of the line finders common to line 1. This connection may be traced from battery through the winding of relay 4 and from battery through the winding of resistance 3, through the inner front contacts and upper winding of relay 2, over conductor 7, through the upper back contact of relay 6, to the test terminal in the bank of switch LF. Relay 2 also closes a circuit from ground through its uppermost front contact, through the inner lower back contacts of relays 6 and 4, and through the winding of group relay 5, to battery. Relay 5, which is common to all lines in the same group with line 1, operates to cause an idle line finder switch to search for the calling line.

Assuming that the switch LF is the one used on the call in question, the brushes 11, 12, 13 and 14 are stepped up to the level

in which the terminals of line 1 are located and are then rotated until the test brush 13 engages the test terminal of line 1. During the rotation, the test brush 13 is connected to ground (not shown) thereby causing the operation of the cut-off relay 4 and the stopping of the line finder brushes in the usual manner. When relay 4 operates, the conductors of line 1 are disconnected from the windings of relay 2 and extended through brushes 11 and 12, thereby causing the operation of the line relay 21 of the connector switch C. The circuit for operating relay 21 is traced from battery through the inner lower back contact of relay 36, upper winding of relay 21, inner lower back contact of relay 27, next-to-the-outer lower back contact of relay 38, lowermost back contact of relay 36, conductor 16, through brush 12 of line finder LF, lower front contact of relay 4, over line 1 and through the subset at station A, uppermost front contact of relay 4, brush 11 of line finder LF, conductor 15, next-to-the-outer upper back contact of relay 38, outer lower back contact of relay 27, lower winding of relay 21, middle lower back contact of relay 36, upper back contact of the vertical off-normal springs 46, through the left winding of dial tone transformer 50, to ground. Relay 21 closes an obvious circuit for operating relay 22; and relay 22 connects a holding ground at its uppermost front contact through the next-to-the-inner lower back contact of relay 38, to the test conductor 19 of line finder LF to hold this switch until the entire connection is to be released. The holding ground is further extended from conductor 19 through test brush 13 to the test conductor of line circuit LC to hold the cut-off relay 4 operated. The line relay 2 releases when the cut-off relay 4 operates, relay 4 being locked through its inner upper front contact to the holding ground on conductor 19. The upper front contact of relay 4 is also effective to short-circuit the upper winding of relay 2, this winding having prevented the release of relay 2 until the cut-off relay 4 is locked to the holding ground. The release of relay 2 causes the release of relay 5. The aforementioned operation of relay 22 also closes a circuit through the lower winding of relay 37. Relay 37 operates, thereby closing a circuit from ground at the inner upper back contact of relay 38, through the upper back contact of relay 27, the inner lower front contact of relay 37, and through the winding of start magnet 80 to battery. The operation of magnet 70 starts the ringing interrupter in readiness for the signaling of a called station.

The dial tone transmitted over the line to the calling station from transformer 50 indicates that the calling subscriber may dial the called number. In response to the cur-

rent impulses created by the dialing of the first digit of the called number, relay 21 is alternately released and reoperated. The first release of relay 21 closes a circuit for operating the relay 23 and the vertical stepping magnet 45. This circuit is traced from battery, through the winding of relay 23, the lowermost back contact of relay 28, winding of magnet 45, next-to-the-outer lower front contact of relay 37, lower back contact of the vertical off-normal springs 46, to ground at the back contact of relay 21. In operating, magnet 45 steps the brushes 41, 42, 43 and 44 up to the first level of the terminal bank and the vertical off-normal springs 46 are actuated when the switch moves out of its normal position. With the springs 46 actuated and with relay 23 operated, the dialing circuit is traced from ground through the upper front contact of springs 46 instead of through the left winding of the dial tone transformer 50 and is traced through the lower front contact of springs 46, the outer lower front contact of relay 37 and the outer front contact of relay 23 instead of through the next-to-the-outer lower front contact of relay 37. When relay 21 reoperates after the first impulse, magnet 45 releases but relay 23 is slow in releasing and remains operated until all of the impulses in the series have been received. Relay 22 is also slow in releasing and remains operated during the receipt of dial impulses. Each succeeding release and reoperation of relay 21 causes the operation and release of magnet 45 thereby stepping the brushes of switch SC up to the level corresponding to the first digit of the called number. Relay 23, after all of the first series of impulses have been received, releases thereby rendering the rotary stepping magnet 47 responsive to the next series of dial impulses received from the calling station.

When the second digit of the called number is dialed, relay 21 is again alternately released and reoperated. The first release of relay 21 is effective to operate magnet 47 and relay 25 in a circuit which is traced from ground at the back contact of relay 21, through the lower front contact of springs 46, lowermost front contact of relay 37, outer back contact of relay 23, inner lower back contact of relay 38, conductor 51, next-to-the-lowermost back contact of relay 34, inner lower back contact of relay 35, winding of magnet 47, winding of relay 25, and through the upper back contact of relay 33 to battery. The operation of magnet 47 steps the brushes 41, 42, 43, 44 into contact with the first set of terminals in the selected level. The operation of relay 25 renders the circuit for magnet 47 independent of relay 34, the outer front contact of relay 25 being in parallel with the next-to-the-lowermost back contact of relay 34. Relay 25 also connects the winding of test relay 24 to the test brush 43. This connection is traced from battery through the winding of relay 24, lowermost back contact of relay 35, inner front contact of relay 25, conductor 39, to brush 43. As soon as the brushes are moved out of their normal rotary position, the rotary off-normal springs 48 are actuated, thereby closing a circuit from battery through the winding of relay 34, front contact of springs 48, uppermost back contact of relay 35, conductor 56, to ground at the middle lower front contact of relay 37. Relay 34 operates in this circuit and locks through its inner upper front contact and the next-to-the-inner upper back contact of relay 38, inner lower back contact of relay 33, over conductor 56 to the same ground at relay 37. When relay 21 reoperates, magnet 47 releases but relay 25 is slow in releasing and remains operated until all of the impulses created by the dialing of the second digit have been received. Each succeeding release and reoperation of relay 21 causes the operation and release of magnet 47 thereby stepping the brushes to the set of terminals which corresponds to the number dialed. If the called line is busy, a guarding ground potential is encountered on the test terminal of the called line and the test relay 24 operates before relay 25 releases. Relay 24 locks, through its middle upper front contact and the upper back contact of relay 29 to the busy ground on conductor 39. When relay 25 releases, a circuit is closed from battery through the winding of relay 33, contacts of magnet 47, conductor 55, back contact of the continuity springs of relay 33, uppermost front contact of relay 24, outer back contact of relay 25, winding and upper back contact of relay 29 to the ground on conductor 39. Relay 33 is marginal and does not operate but relay 29 operates in this circuit, the front contact of the continuity springs of relay 29 being effective to close a holding circuit for itself and for relay 24, over conductor 53 to ground at the next-to-the-inner lower front contact of relay 37. Relay 29 connects the left winding of busy-tone transformer 90 to one side of condenser 68, thereby transmitting a busy tone through this condenser and through back contacts of relays 38 and 36 over conductor 16 to the calling station.

Assuming that line 99 is the called line and that it is idle, relay 24 does not operate and the release of relay 25 closes a circuit from battery through the winding of the cut-off relay (not shown) and test terminal of line 99, through brush 43, conductor 39, inner back contact of relay 25, lower winding of relay 35, back contact of relay 24, over conductor 56, to ground at relay 37.

Relay 35 is sufficiently energized by the current in this circuit to close its inner upper front contacts and thus complete its operation by energizing its upper winding in a circuit through these contacts and over conductor 53 to ground at relay 37. When fully operated, relay 35 connects the ground on conductor 56 through its middle upper front contact over conductor 39 to brush 43 to prevent the seizure of line 99 by another connector.

When the calling subscriber dials the party designation of the called subscriber's station, relay 21 again alternately releases and reoperates. The first release of relay 21 closes a circuit from ground at its back contact, through the lower front contact of springs 46, the lowermost front contact of relay 37, the outer back contact of relay 23, the inner lower back contact of relay 38, conductor 51, the middle lower back contact of relay 25, next-to-the-uppermost front contact of relay 34, back contact of the off-normal springs 73 of the code switch CS, next-to-the-inner upper front contact of relay 34, conductor 54, inner front contact of relay 22, and through the winding of the stepping magnet 70 to battery. Relay 32 operates in parallel with the magnet 70, a connection being traced from the winding of relay 32 through the inner upper back contact of relay 36 to conductor 54. The operation of magnet 70 advances the brushes 71 and 72 to their first off-normal position and actuates the off-normal springs 73. The operation of relay 32 renders the circuit for itself and magnet 70 independent of the off-normal contacts 73; this circuit now being traced from conductor 54, through the inner upper front contact of relay 32, over conductor 52, and through the middle lower back contact of relay 25 to conductor 51 and thence to ground at the back contact of relay 21 as hereinbefore described. Relay 32 is slow in releasing and remains operated during the receipt of all of the impulses in the series but the magnet 70 is alternately operated and released by the alternate release and reoperation of relay 21 in response to the dial impulses. The brushes 71 and 72 are thus advanced to a position corresponding to the party designation of the called station.

When relay 32 releases after all the party designation impulses have been received, the winding of pick-up relay 33 is connected through the back contact of magnet 47, conductor 55, the inner lower back contact of relay 32, the upper front contact of springs 73, the uppermost front contact of relay 34, the next-to-the-outer upper front contact of relay 35, to the brush of the pick-up drum 86 of the ringing interrupter. When the brush of interrupter 86 is connected to ground at the beginning of the next ring-

ing cycle, relay 33 operates. Relay 33 locks, independent of the pick-up ground, by connecting conductor 55 through its lowermost front contact and the lowermost front contact of relay 34, over conductor 53, to ground at relay 37. Relay 34 now releases since its operating circuit was opened by relay 35 and its holding circuit is opened by relay 33. The release of relay 34 closes a circuit for operating relay 28. This circuit is traced from battery through the winding of relay 28, lowermost back contact of relay 34, inner lower front contact of relay 35, inner lower back contact of relay 26, to ground on conductor 19. Relay 28 closes a holding circuit through the upper winding of relay 37. The release of relay 34 is also effective to close the ringing circuit to signal the called station. Assuming the code switch to be set in position 2, the ringing circuit may be traced from the source of superimposed AC-DC ringing current 88 through the ringing interrupter 81, second terminal and brush 71, inner upper back contact of relay 34, uppermost back contacts of relays 26 and 38, uppermost front contact of relay 35, brush 41, upper conductor of line 99 through the condenser and ringer at station C to ground. The interrupter 81 controls the ringing circuit so that a 2-ring code is transmitted over the upper conductor of line 99 to operate all of the ringers connected to that conductor. Ringing tone is transmitted to the calling station through condensers 65 and 67. The two rings are repeated until the receiver is removed at the called station at which time the ringing current circuit is extended back over the lower conductor of line 99, through brush 42, lowermost front contact of relay 35, lowermost back contacts of relays 38 and 26, inner lower back contact of relay 34, brush 72 and second terminal, upper back contact of relay 32, and through the lower winding of relay 26 to ground. Relay 26 operates, locks through its upper winding and inner upper front contact over conductor 53 to ground at relay 37, opens the ringing circuit, disconnects ground from the start conductor to permit the release of start magnet 80, and completes the talking connection between stations A and C. Talking battery is supplied to the called station in a circuit which may be traced from battery at the inner lower back contact of relay 36, lower winding of supervisory relay 27, upper front contacts of relay 26, uppermost back contact of relay 38, uppermost front contact of relay 35, brush 41, line 99 and subset at station C, brush 42, lowermost front contact of relay 35, lowermost back contact of relay 38, lowermost front contact of relay 26, upper winding of relay 27, inner lower front contact of relay 26, to ground on conductor 19. Relay 28 is slow to release and before it can release due to the opening of

its operating circuit by relay 26, relay 27 closes a holding circuit for relay 28. Relay 27 also reverses the connection between conductors 15 and 16 with respect to the windings of relay 21, thereby reversing the direction of current over these conductors. The talking current is transmitted through condensers 67 and 68.

When the connection is released by replacing the receiver at station A, relays 21, 22 and 37 release in the order named. The release of relay 22 disconnects ground from conductors 17 and 18, thus removing the holding potential from test conductor 19. The cut-off relay 4 in line circuit LC is thus released so that another call may be initiated or completed over line 1. The line finder LF is also restored to normal in the usual manner when the holding potential is disconnected from conductor 19. The release of relay 37 disconnects ground from conductors 53 and 56, causing the release of relays 26 and 35. When the receiver is replaced at station C, relays 27 and 28 release in the order named. The release of relay 35 removes the busy potential from the sleeve terminal of line 99 and closes a circuit from battery through the winding of release magnet 49 of switch SC, inner upper back contact of relay 35, lowermost back contact of relay 37, lower front contact of vertical off-normal springs 46, to ground at back contact of relay 21. The operation of magnet 49 causes the shaft and brushes of switch SC to be returned to their normal position, the release magnet circuit being opened at springs 46. The release of relay 37 closes a circuit from battery through the release magnet 74 of code switch CS, next-to-the-inner lower back contact of relay 34, lower front contact of off-normal springs 73, uppermost back contact of relay 34, to ground at the inner lower back contact of relay 37. The operation of magnet 74 causes the brushes of switch CS to be restored to normal position, the release magnet circuit being opened at springs 73.

Assume now that station A is calling station B, both of these stations being connected to line 1. The connection is extended from line 1 through line finder LF to the connector SC which responds to the dialing of the number and party designation of the called station in the same manner as hereinbefore described. The brushes 41, 42, 43 and 44 are in this case advanced to engage the terminals in its bank which connect to conductors 8, 9 and 10 leading to line circuit LC. When the busy test relay 24 is connected through brush 43 to test the called line as hereinbefore described, relay 24 operates since conductor 10 is connected through the outer lower back contact of relay 6, the inner upper front contact of relay 4, the upper back contact of relay 6, and

through brush 13 of line finder LF to the ground on conductor 19. Relay 29 is operated, relay 24 is held operated, the calling subscriber receives a busy tone, and the code switch CS is positioned by the dialing of the party designation, all in the manner hereinbefore described. When the calling subscriber replaces the receiver on the receiver hook to permit the ringing of the called station B, relays 21 and 22 release in the order named. Relay 37 is held operated by a circuit from battery through its upper winding, outer lower front contact of relay 29, conductor 18, next-to-the-inner lower back contact of relay 38, conductor 19, line finder brush 13, the upper back contact of relay 6 in the line circuit LC, inner upper front contact of relay 4, lowermost back contact of relay 6, conductor 10, brush 43 of the connector SC, conductor 39, uppermost front contact of relay 37, lowermost back contact of relay 32, inner lower front contact of relay 34, lower front contact of springs 73, next-to-the-outer upper front contact of relay 34, middle back contact of relay 25, conductor 51, inner lower back contact of relay 38, outer back contact of relay 23, lowermost front contact of relay 37, lower front contact of springs 46 to ground at the back contact of relay 21. Thus relay 37, the cut-off relay 4 and the line finder LF are held in their operated position by the current in this circuit over conductor 10 to the ground supplied from the back contact of relay 21. The ground thus connected to conductor 19 is also extended through the next-to-the-inner lower back contact of relay 38, over conductor 18, and through the back contact of relay 22, the inner upper front contact of relay 37 and the back contact of relay 31, to the winding of relay 36. Relay 36 operates to open the connection over conductor 16 to the line finder and closes a circuit for operating relay 35; this circuit is traced from battery through the upper winding of relay 35, uppermost front contact of relay 36, over conductor 53 to ground at relay 37. Relay 35 closes the connection for operating relay 33 to ground at the pick-up interrupter 86 and connects the conductors 8 and 9 through to the contacts of the tripping relay 26. Relay 33 is operated and relay 34 released as hereinbefore described to start the ringing. Ringing current is connected to one side of line 1 to signal the called station with the proper ringing code and is also connected to the other side of the line to transmit two short impulses for each code cycle to operate the ringers connected to said other side. If the ringer of the calling station is not connected to the same side of the line as the called station, the termination of the short impulses informs the calling station that the called station is being signaled and

since these impulses cease when the called party answers, the calling subscriber knows when to again remove the receiver for the purpose of conversing with the called subscriber. Assuming the party designation of station B to be 3, the code switch CS is in position 3 and the circuit for signaling the called station is traced from the source of ringing current 88 through interrupter 82, terminal 3 and brush 72, inner lower back contact of relay 34, lowermost back contacts of relays 26 and 38, lowermost front contact of relay 35, brush 42 of switch SC, conductor 9, lower front contact of cut-off relay 4, lower conductor of line 1, through the condenser and ringer at station B to ground. The circuit for signaling the stations with ringers connected to the upper conductor of line 1 is controlled by relay 32, the circuit for intermittently operating this relay being traced from battery through its winding, the inner upper front contact of relay 36, conductor 54, the next-to-the-inner lower back contact of relay 34, to interrupter 87. Relay 32 is momentarily operated to ground at interrupter 87 twice per each code cycle, each operation of relay 32 being effective to close a circuit from ringing source 88 through the outer upper front contact of relay 32, terminal 3 and brush 71 of the code switch, inner upper back contact of relay 34, uppermost back contacts of relays 26 and 38, uppermost front contact of relay 35, brush 44, conductor 8, uppermost front contact of relay 4, over the upper conductor of line 1, through the ringer at station A to ground.

When the subscriber at the called station removes the receiver to answer the call, the ringing circuit is extended back over the upper conductor of line 1, over conductor 8, through brush 41, contacts of relays 35, 38 and 26 in the order named, inner upper back contact of relay 34, brush 71 and terminal 3, upper back contact of relay 32, through the lower winding of relay 26 to ground. Relay 26 operates thereby opening the ringing circuit. Since relay 36 is operated, the operation of relay 26 also connects the ground on conductor 19 through its inner lower front contact and the next-to-the-inner upper front contact of relay 36, over conductor 20, through brush 14 of line finder LF to the lower winding of relay 6 in the line circuit LC. Relay 6 operates thereby causing the release of the cut-off relay 4. With relay 4 released, the conductors of line 1 are disconnected from conductors 9 and 10 and from the line finder LF and are again connected to the windings of line relay 2. Relay 2 again operates thereby closing a circuit from ground at its outer front contact to lock relay 6 operated. Talking battery is now supplied to stations A and B through the windings of relay 2. The line 1 is held

busy during the conversation by ground connected to conductor 10 at the outer lower front contact of relay 6.

The aforementioned operation of relay 26 was also effective to cause the release of relay 28 and relay 28 disconnects ground from conductor 19. Relay 37 now releases thereby causing the release of relay 35. The operations of magnets 49 and 74 return the connector switch SC and the code switch CS to normal in the same manner as hereinbefore described. The line finder switch LF returns to normal when the ground is disconnected from conductor 19. All switching equipment is thus freed for use on another connection while the conversation between stations A and B is taking place. When the receivers are replaced at both stations, relay 2 releases thereby causing the release of relay 6. The line circuit LC is now normal, ready for use on another connection.

In case the subscriber at the called station fails to answer the call, the removal of the receiver at the calling station trips the ringing. The connector and line finder switches are then restored to normal as hereinbefore described and when the receiver is replaced at the calling station the line circuit LC is also restored to normal.

What is claimed is:

1. In a telephone system, party lines, automatic switches, means for establishing a connection from a calling subscriber on a line to a called subscriber on the same line through said switches, means responsive to the establishing of said connection for ringing said called subscriber, and means responsive to the called subscriber answering said ringing for releasing said switches.

2. In a telephone system, party lines, automatic switches, means for establishing a connection from a calling subscriber on a line to a called subscriber on the same line through said switches, means responsive to the establishing of said connection for ringing said called subscriber, and means responsive to the called subscriber answering said ringing for releasing said switches and for connecting a source of talking battery to said party line for said calling and called subscriber.

3. In a telephone system, party lines, automatic switches, means for establishing a connection from a calling subscriber on a line to a called subscriber on the same line through said switches, means responsive to the establishing of said connection for ringing said called subscriber, a relay, means responsive to the called subscriber answering said ringing for operating said relay, and means responsive to the operation of said relay for releasing said switches.

4. In a telephone system, party lines, automatic switches, means for establishing a connection from a calling subscriber on a

- line to a called subscriber on the same line through said switches, means responsive to the establishing of said connection for ringing said called subscriber, a relay associated with one of said switches, a relay associated with the party line of said calling and called subscribers, means responsive to the called subscriber answering said ringing for actuating said first mentioned relay, means responsive to the operation of said first mentioned relay for actuating said second mentioned relay, and means responsive to the operation of said second mentioned relay for releasing said switches.
5. In a telephone system, party lines, automatic switches, means for establishing a connection from a calling subscriber on a line to a called subscriber on the same line through said switches, means responsive to the establishing of said connection for ringing said called subscriber, a relay associated with one of said switches, a relay associated with the party line of said calling and called subscribers, means responsive to the called subscriber answering said ringing for actuating said first mentioned relay, means responsive to the operation of said first mentioned relay for actuating said second mentioned relay, and means responsive to the operation of said second mentioned relay for releasing said switches and for connecting a source of talking battery to said party lines for said calling and called subscribers.
6. In a telephone system, lines each serving a plurality of subscribers' stations, automatic switches for use in extending a connection from a calling to a called station, means responsive to the establishing of said connection for ringing the called station, a relay associated with the line of said calling station for operation if said calling and called stations are on the same line, means responsive to the removal of the receiver at one of the stations of said line for terminating the ringing and for operating said relay, and means responsive to the operation of said relay for releasing said switches and for establishing a busy condition for said line and for supplying talking battery to said calling and called stations.
7. In a telephone system, subscribers' lines each serving a plurality of stations, automatic equipment including means arranged to ring both the calling and called stations on calls between stations on the same line, means for extending a calling line to said equipment, means individual to said line for supplying talking battery to the stations on said line, and means effective in consequence of the removal of the receiver at one of the stations on said line for causing the release of said automatic equipment and for operating said individual means.
8. In a telephone system, subscribers' lines each serving a plurality of stations, equipment including an automatic switch for extending a connection to a called line, means associated with said switch and arranged to ring both the calling and called stations on calls between stations on the same line, means for extending a calling line to said switch, means individual to said line for supplying talking battery to the stations on said line, and means operative in consequence of the removal of the receiver at one of the stations on said line for causing the release of said automatic equipment and for rendering said individual means effective.
- In witness whereof, I hereunto subscribe my name this 28th day of June, 1932.
- RAY L. STOKELY.