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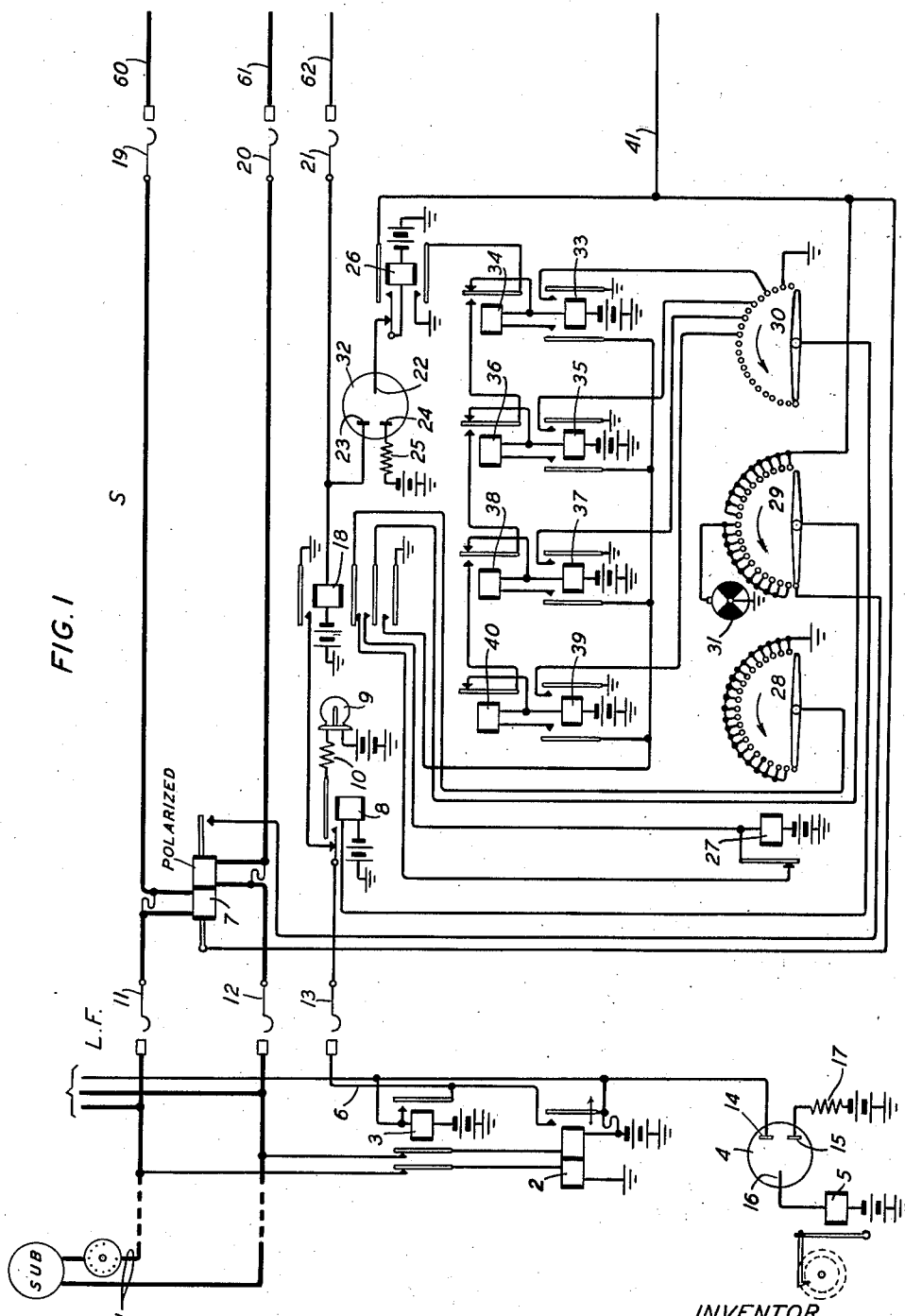
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2,060,261

TELEPHONE SYSTEM

Filed March 21, 1934

2 Sheets-Sheet 1



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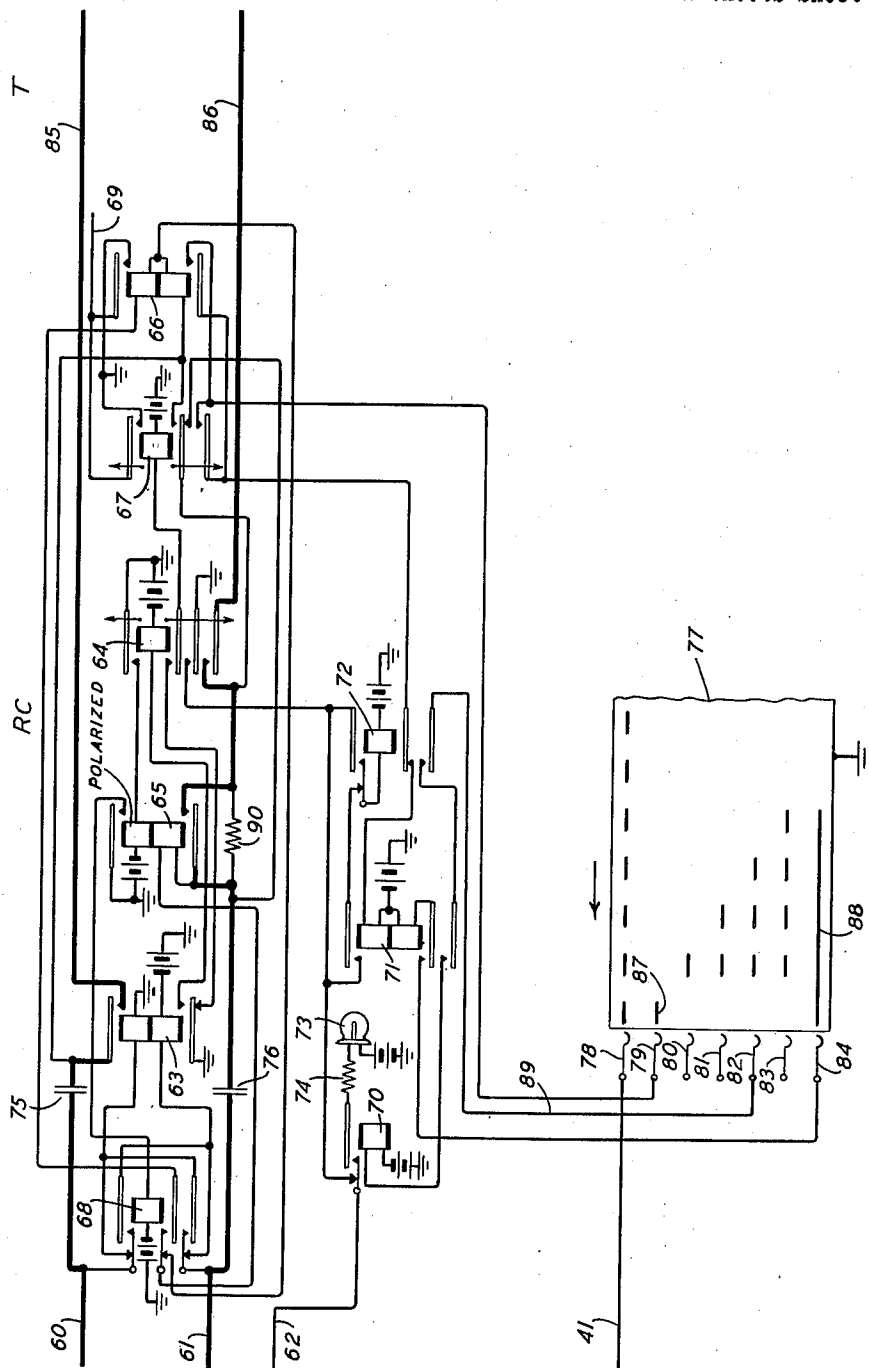
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2 Sheets-Sheet 2

FIG. 2



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2,060,261

TELEPHONE SYSTEM

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Application March 21, 1934, Serial No. 716,571

9 Claims. (Cl. 179—7.1)

This invention relates to telephone systems and particularly to circuit arrangements for assessing the subscribers in accordance with the service rendered.

5 The objects of the invention are to enable a more positive and reliable performance of the subscriber's message register where it is desirable to operate such register a number of times during a conversational period, to insure the repeated operation of the register without interfering with the operative condition of other apparatus associated with the same circuits, to secure improvements in the detection and recording of information as to the zone into which the calls are made, and otherwise to improve systems of this character.

10 In designing systems heretofore for repeatedly operating a calling subscriber's message register in accordance with the zone into which the call is made, some difficulty has been experienced in obtaining such operating conditions for the register as to insure that it will not respond to the current that holds the cut-off relay energized, although connected to the same conductor with said relay, and yet will respond reliably to the successive impulses of metering current.

15 A feature of the present invention is to overcome these difficulties by means of a circuit arrangement in which a space-discharge device, such as a vacuum or gas-filled tube, is connected in series with the message register to the sleeve conductor of the subscriber's line. By this arrangement the current flowing over the sleeve conductor to hold the cut-off relay operated is insufficient to cause the flow of current through the discharge device to operate the register. However, when a metering impulse is applied to the sleeve conductor, the potential on the discharge device is so altered that current flows from one element to another, and the register is operated. And the metering impulse thus applied is of such a nature as to insure the continued operation of the cut-off relay. Moreover, due to the characteristics of the discharge device, when the metering impulse ceases, the flow of current through the device is definitely quenched, and the register releases preparatory for the next operation on the arrival of the succeeding metering impulse.

20 Another feature of the invention is a zone metering system in which the information as to the zone in which the call is being made is transferred back over the sleeve conductor to the charging trunk in the form of impulses, and in which these impulses are received and recorded by means of a space-discharge device connected to the sleeve conductor in the charging trunk. By this means the holding and control relay connected to the sleeve conductor is maintained energized, and at the same time the zone recording mechanism is

reliably operated to record accurately the information as to the called zone.

25 These and other features of the invention will be more fully understood from the following detailed description, which should be considered in connection with the accompanying drawings, and also from the appended claims.

Referring to the drawings, Fig. 1 shows a calling subscriber's station, a line finder LF and a selector S arranged to receive information as to the zone called and to operate the subscriber's register a plurality of times in accordance with this information and the duration of the call.

Fig. 2 shows a repeater circuit RC and an outgoing trunk T arranged to send back information to selector S as to the zone in which trunk T terminates.

30 The line finder switch LF, which may be of the well-known Strowger type, is represented schematically by the brushes 11, 12 and 13 and the terminals with which they are associated. The selector switch S may also be of the well-known Strowger type and is shown schematically by brushes 19, 20, and 21 and their associated terminals. In each case only those parts of the circuits which are necessary for a complete understanding of the invention have been shown. For a complete description of the operation of these switches reference may be had to pages 53 to 67 inclusive of the second edition of "Automatic Telephony" by Smith and Campbell.

35 The selector circuit S contains the usual polarized supervisory relay whose windings are in series with the talking conductors of the trunk, zone relays for registering the destination of the call, and a charging switch for measuring the unit periods of conversation and for operating the subscriber's register a plurality of times depending upon the setting of the zone relays.

40 In both the subscriber's lines circuit and the selector circuit S a space-discharge device is shown which ionizes when a booster battery impulse is applied and is quenched when the pulse terminates.

45 The repeater circuit RC is arranged to repeat dial impulses over the outgoing trunk in the usual manner. Upon seizure the repeater transmits a series of booster battery impulses over the sleeve conductor to the selector circuits, the number of pulses depending upon the zone in which the trunk circuit T outgoing from repeater RC terminates. Upon receipt of the booster battery impulses by selector S the corresponding zone relays are operated to register the zone in which the called station is located. When the polarized supervisory relay operates due to the reversal of current in the line conductors when the called subscriber answers, the charging switch is set in motion and applies booster battery impulses to the sleeve conductor of the subscriber's line, one, 60

two, three, four or five times as controlled by the zone relays, as a charge for the initial unit period of conversation. After this the charging switch proceeds to count the initial unit time period by advancing under control of a timed interrupter. If the conversation continues beyond this measured unit period, the switch is again set in motion and applies booster battery impulses to the sleeve conductor of the subscriber's line a second time in accordance with the setting of the zone relays, operating the subscriber's register a number of times corresponding to the number of booster battery impulses.

For the sake of simplicity the drawings show an arrangement for charging the subscriber for additional periods of conversation time at the same rate as for the initial period, but it will be evident to anyone skilled in the art that a different charge could be applied for periods of time subsequent to the first and that subsequent periods of time could be also different from the first.

The operation of the system will now be described in detail. Assume a call to have been originated at the subscriber's station shown in Fig. 1, that the line finder LF has extended the line 1 of the calling station through brushes 11, 12, and 13 over the talking conductors of the selector S to brushes 19, 20, and 21 which in response to the dialing of the first digit of the called station's number have been selectively operated to extend the call to conductors 60, 61, and 62 of the repeater circuit RC. As soon as brushes 19 and 20 make contact with conductors 60 and 61, relay 63 is energized. The circuit for operating relay 63 is traced from battery through its lower winding, lowermost back contact of relay 68, conductor 61, brush 20, right hand winding of relay 7, brush 12, through line wires 1 and the subscriber's station to brush 11, left hand winding of relay 7, brush 19, conductor 60, upper back contact of relay 68, to ground through the upper winding of relay 63. The operation of relay 63 operates relay 64 in an obvious circuit involving the lower front contact of relay 63. The operation of relay 64 closes a circuit from ground through its upper front contacts to battery through the upper winding of relay 65. The current in this circuit is not sufficient to operate relay 65 however, and relay 65 remains in a non-operated condition at this time. Relay 64 also closes the circuit between line wires 85 and 86 to prepare the succeeding selectors for subsequent operations of the subscriber's dial. This circuit is traced from battery from the distant office (not shown) over conductor 86, lowermost front contact of relay 64, lower inner back contact of relay 67, lower winding of relay 65, lower inner back contact of relay 68, lower winding of relay 66, upper front contact of relay 63, to ground at the distant office over conductor 85. Relay 66 operates in the circuit just described, but relay 65 does not operate since the direction of current in its lower winding is opposite to that in its upper winding. The operation of relay 64 also connects ground through its lower middle front contact through the back contact of relay 70 to sleeve conductor 62, and brush 21 to battery through the winding of relay 18. Relay 18 operates and connects ground in the usual manner to hold the sleeve relay 3 of the subscriber's line operated, relay 3 having previously been operated by the action of the line finder. This circuit is traced from ground through the upper front contacts of relay 18, back contact of relay 8, brush

13, sleeve conductor 6 to battery through the winding and front contact of relay 3.

Relay 66 when it operated closed a circuit from ground on the upper front contacts of relay 66 over conductor 69 to the "all trunks busy circuit" (not shown) and also set in motion the apparatus, to be described later, by means of which information is sent back over sleeve conductor 62 to selector circuit S as to the zone in which trunk T, which was selected as a result of the dialing of the first digit, terminates.

The repeater circuit RC is now in a position to receive the pulses produced by subsequent operations of the subscriber's dial and to repeat them over trunk T to effect the further setting up of the connection. At the first dial pulse relay 63 releases and at its upper front contact opens the circuit between line wires 85 and 86 thereby repeating the pulse to the succeeding selector. The release of relay 63 on the first dial pulse also operates relay 67 in a circuit traced from battery through the winding of relay 67, lower innermost front contact of relay 64 to ground through the lower back contact of relay 63. The operation of relay 67 modifies the circuit between conductors 86 and 85 to improve the pulsing circuit by short circuiting the lower windings of relays 66 and 65. The modified circuit is traced from conductor 86, lowermost front contact of relay 64, lower inner front contact of relay 67, upper front contact of relay 63 to conductor 85. Relay 64 is deenergized whenever relay 63 breaks its lower front contact but being slow in releasing does not release during the momentary open periods of the dialing pulses. Relay 67 is also slow in releasing and stays operated until relay 63 operates at the conclusion of each train of pulses. Relay 65 releases due to the operation of relay 67 but its two functions, that of holding ground on the all-trunks-busy lead 69 and that of transmitting back to selector S information as to the zone called, are carried by relay 67 during pulsing.

The method of transmitting the information to the preceding selector as to the zone in which the call terminates will now be described. When relay 66 operated and closed its lower front contact, relay 71 was connected to pick-up interrupter brush 79 which is associated with interrupter segment 87. Interrupter 77 which contains pick-up segment 87 is shown in plan view and moves under brushes 78, 79, 80, 81, 82, 83, and 84 in the direction shown by the arrow. After the conclusion of one cycle as shown another exactly similar cycle follows. When the pick-up segment 87 makes contact with brush 79 ground is extended through the lower front contact of relay 66, the lower inner back contact of relay 72 to battery through the upper winding of relay 71. Relay 71 operates in this circuit and locks through its lower winding and lower inner front contact to ground through brush 84 and holding segment 88. The operation of relay 71 operates relay 72 in a circuit from ground through the lower middle front contact of relay 64, upper front contact of relay 71 to battery through the upper back contact and winding of relay 72. Relay 72 locks through its upper make contact to ground from the lower middle front contact of relay 64.

For purposes of illustration it will be assumed that the repeater circuit RC and the trunk T which have been selected by the operation of the dial terminate in an office in the fourth zone for which it is desired to charge the subscriber by

operating his message register four times for each five minute period or fraction of conversation time. To accomplish this conductor 89 of repeater circuit RC is permanently connected to brush 82 which is associated with the interrupter which makes three closures per revolution. If the repeater circuit and trunk circuit RC had terminated in an office in some other zone, conductor 89 would have been permanently connected to brush 80, 81 or 83 depending upon the number of times it was desired to operate the subscriber's register for each conversation period.

Since it has been assumed that conductor 89 is connected to brush 82, conductor 89 will be grounded three times as the segments of interrupter 77 pass underneath brush 82. This will cause relay 70 to be operated and released three times, in a circuit traced from battery through the winding of relay 70, lower outer front contact of relay 71, lower outer front contact of relay 72, brush 82, to ground through the segments of interrupter 77. The operation and release of relay 70 causes the application and removal of positive booster battery potential to sleeve wire 62 and the recording in the selector circuit of the information that the call has been extended to zone 4, in the manner now to be described.

In addition to sleeve relay 18 electrode 23 of space-discharge device 32 is attached to sleeve conductor 62. Electrode 24 of the space-discharge device 32 is connected through resistance 25 to negative central office battery and electrode 22 is connected to negative central office battery through the winding and upper back contacts of relay 26. With ground through the lower middle front contacts of relay 64 connected to sleeve conductor 62 the potential between electrodes 23 and 24 and between electrodes 23 and 22 is insufficient to cause current to flow in either circuit. However, when relay 70 operates under control of interrupter 77, ground from the lower middle front contact of relay 64 is removed from sleeve wire 62 and positive booster battery through current limiting lamp 73 and resistance 74 is substituted. The positive booster battery is connected in such a direction that the potential across electrodes 23 and 24 is raised to a value sufficiently high to cause space-discharge device 32 to ionize and a current to flow between electrodes 23 and 24 and through resistance 25 to central office battery. Since the potential across relay 18 is not changed in direction but is merely increased by the operation of relay 70, relay 18 remains operated.

The ionizing of space-discharge device 32 also causes current to flow between electrodes 23 and 22 and to operate relay 26. This circuit is traced from positive booster battery through lamp 73 and resistance 74, front contact of relay 70, sleeve wire 62, brush 21, electrodes 23 and 22 of space discharge device 32, to central office battery through the upper back contact and winding of relay 26. Relay 26 operated locks through conductor 41 to interrupter brush 78 which is grounded by the segments of interrupter 77 in synchronism with the metering pulses. This locking feature is provided to insure the positive operation of relay 26 once only for each metering pulse, since without it relay 26 might operate more than once if the contacts of relay 70 were dirty. The operation of relay 26 causes the operation of relay 33 in a circuit traced from ground through the lower front contact of relay 26, back contact of relay 34 to battery through the winding of relay 33. Relay 33, operated con-

nects ground from the lowermost front contact of relay 18, left hand front contact of relay 33 to one side of the winding of relay 34. Relay 34 does not operate at this time, however, since the ground which operated relay 33 is also connected to the other side of the winding of relay 34 and the latter relay therefore has ground connected to both of its winding terminals.

When relay 70 releases due to the breaking of the contact between the segment of interrupter 77 and brush 83 at the termination of the first metering pulse, the positive booster battery is removed from sleeve wire 62 and the holding ground from the lower middle contact of relay 64 is restored. This lowers the potential across electrodes 23 and 22 and across 23 and 24 to that of the central office battery which is insufficient to continue the current flow between these electrodes. Relay 26 therefore releases, the locking circuit through its upper make contact to conductor 41 being opened simultaneously with the release of relay 70 by the termination of the closure between the segment of interrupter 77 and brush 78. Upon the release of relay 26, ground from its lower front contact is removed from the right hand winding terminal of relay 34 and relay 34 operates in series with relay 33 in a circuit traced from ground through the lowermost front contact of relay 18, left hand front contact of relay 33 to battery through the windings of relays 34 and 33 in series. The operation of relay 34 transfers the operating path from the first set of counting relays, 34 and 33, to the second set, 36 and 35. When the segment of interrupter 77 makes contact with brush 82 for the second interrupter pulse, relay 70 again operates and applies positive booster battery potential to sleeve conductor 62. Space-discharge tube 32 again ionizes the current again operates relay 26. When relay 26 operates due to the second interrupter pulse relay 35 is operated in a manner similar to that described for the operation of relay 33. At the termination of the second pulse of positive booster battery, space discharge tube 32 is quenched and relay 26 is released. The release of relay 26 causes the operation of relay 36 in a manner similar to that described for the operation of relay 34. Relay 36, operated, transfers the operating path from the second set of counting relays, 36 and 35, to the third set, 38 and 37. The third and last closure of the segment of interrupter 77 and brush 82 causes the operation of the third set of counting relays 38 and 37. At the completion of the interrupter cycle brush 83 breaks contact with segment 88 and relay 71 is released.

In this manner the information that the subscriber has called another subscriber whose line appears in an office in zone 4 has been transmitted over the sleeve conductor to the first selector without in any way affecting the normal holding functions of the sleeve conductor. In the selector S the information has been recorded on sets of counting relays which by the number of pairs operated indicate the zone of the called subscriber's number.

When the called subscriber answers, the polarity of the battery connected to line conductors 65 and 66 is reversed at the distant office in the usual manner. This causes the reversal of current in the lower winding of relay 65. Since the two windings of relay 65 now produce magnetic flux in the same direction relay 65 operates. The operation of relay 65 causes the operation of relay 68 in an obvious circuit. Relay 75

68, operated, reverses the direction of current from the windings of relay 63 to the subscriber's station over conductors 60 and 61. This circuit is now traced from ground through the upper winding of relay 63, lowermost front contact of relay 66, conductor 61, brush 28, right hand winding of relay 7, brush 12 through the subscriber's telephone set over line conductors 1, brush 11, left hand winding of relay 7, brush 19, conductor 60, upper front contact of relay 63, to battery through the lower winding of relay 63. The operation of relay 38 and relay 65 also modify the holding bridge across conductors 85 and 86 so that both windings of relay 66 are in circuit across line wires 85 and 86, and resistance 90 which is used as a buffer resistance to absorb the surges caused by the connection and disconnection of the lower winding of relay 66 during dialing is short circuited. This circuit is traced from battery from the distant office over conductor 85, upper front contact of relay 63, lower and upper windings of relay 66 in series, lower inner front contact of relay 68, lower winding of relay 65, lower front contact of relay 65, lowermost front contact of relay 64 to ground at the distant office over conductor 86.

The reversal of the direction of current flow through the windings of polarized relay 7 now causes the operation of that relay which sets in motion the apparatus for operating the subscriber's message register 5 one or more times depending upon the zone called. Since zone 4 has been selected for purposes of illustration the detailed operation of the circuit for this zone will be described.

Selector S contains a selector switch and magnet labeled 27, 28, 29, 30, which is of a type well-known in the telephone art and characterized by the advance of brushes 28, 29, and 30, one terminal on their respective terminal banks each time stepping magnet 27 is operated and released. When relay 7 operates due to the reversal of current over conductors 60 and 61, a circuit is closed from ground on the segment of interrupter 77, when it makes contact with brush 78, conductor 41, contacts of relay 7, the normal terminal of arc 29, on which the wiper brush of arc 29 is standing, lower middle front contact of relay 18 to battery through the winding of stepping magnet 27. Magnet 27 operates and when the segment of interrupter 77 breaks circuit with brush 78 it releases and advances the wiper brushes associated with arcs 28, 29, and 30 to the first terminals on the banks. The first terminal of arc 30 is vacant and the switch advances to the second terminal when the next segment of interrupter 77 makes and breaks contact with brush 78. In this case however the circuit to operate stepping magnet 27 does not include the contacts of relay 7, it being traced from ground on the segment of interrupter 77, brush 78, conductor 41, strapped terminals 1 to 10 of arc 29, wiper brush associated with arc 29, lower middle front contact of relay 18 to battery through the winding of stepping magnet 27. On the second terminal of arc 30, a path is closed from ground, wiper brush of arc 30 to battery through the winding of relay 8. Relay 8 operates and connects positive booster battery through current limiting lamp 9 and resistance 10, front contact of relay 8, brush 13 to sleeve wire 6. This booster battery holds sleeve relay 3 operated and is connected to electrode 14 of space-discharge device 4, through the right hand front contact of relay 3. With the application of booster battery voltage to electrode 14, of space-

discharge device 4 the potential across electrodes 14 and 15 is raised to such an extent that tube 4 ionizes and current passes between electrodes 14 and 16 to battery through message register 5, operating the message register. When the next segment of interrupter 77 makes the breaks contact with brush 78, stepping magnet 27 is again operated, and released advancing the wiper brushes of switch 28, 29 and 30 to the third set of terminals on the banks. With the wiper brush associated with bank 30 standing on to terminal No. 3, the circuit to relay 8 is broken and relay 8 releases and removes booster battery potential from sleeve conductor 6 and substitutes ground from the upper front contact of relay 18. Under this condition the voltage between electrodes 14 and 15 and 14 and 16 of space-discharge device 4 is insufficient to maintain the current flow and message register 5 releases.

In a similar manner the brushes associated with arcs 28, 29 and 30 are advanced under control of interrupter 77, to their 11th terminal. In passing terminals 4, 6, 8, and 10, of arc 30 the winding of relay 3 is connected to the front contacts of relays 33, 35, 37, and 39, respectively and if one or more of these relays are operated, ground is connected to the winding of relay 8 while the switch is standing on the terminals associated with them. As it has been assumed that relays 33, 35, and 37 are operated, ground will be connected to terminals 4, 6 and 8 of arc 30 and relay 8 will be operated, will connect booster battery to conductor 6 and space-discharge device 4 will ionize and operate message register 5, as the switch passes these positions.

When the switch has advanced to terminal 11, a circuit is closed from ground through 30, second interrupter 31, strapped terminals 11 to 21 of arc 29, brush associated with arc 29, lower middle front contact of relay 18 to battery through the winding of stepping magnet 27. Interrupter 31 closes a circuit to ground every 30 seconds and in the circuit just traced, operates and releases stepping magnet 27 and advances the switch one position every 30 seconds. If the conversation continues until the 21st terminal is reached, or ten 30 second intervals have been counted, switch 28, 29, and 30 is again advanced over terminals 1 to 11 under control of interrupter 77 and message register 5 is again operated a number of times in accordance with the operated condition of relays 33, 35, and 37. In this way, the message register records the number of unit charges according to the zone called and the number of five minute periods or fraction of conversation time.

When the originating subscriber replaces the receiver on the switchhook, relay 63 releases. The release of relay 63 opens the circuit between line wires 85 and 86, opening the operating circuit and releasing relay 66 and allowing the apparatus at the distant office to release. The release of relay 63 also opens the operating path and causes the release of relay 64. The release of relay 64 opens the operating circuit of the upper winding of relay 65 permitting relay 65 to release, opens the operating circuit to relay 67, allowing relay 67 to release if operated, removes ground from sleeve conductor 62, allowing relay 18 to release and remove ground from sleeve conductor 6, which in turn permits relay 3 to release. The removal of ground from sleeve conductor 62 also opens the circuit to the winding of relay 72, allowing it to release. The release of relay 65 opens the operating circuit and allows relay 68 to release.

The release of relay 66 removes the ground from conductor 69 to the all-paths-busy circuit.

The release of relay 18 restores selector S to its normal condition in the usual manner (restoring apparatus not shown) and also releases register relays 33, 34, 35, 36, 37, 38, 39, and 40, if operated, by opening their holding circuits and restores the wiper brushes associated with terminal banks 28, 29 and 30 to their normal position, if off normal, in the following manner: When relay 18 releases, a circuit is closed from ground on the strapped terminals of arc 28 through the wiper brush associated with it, through the lower inner back contact of relay 18 to battery through the back contact and winding of stepping magnet 27. Stepping magnet 27 operates but in operating, breaks the circuit to its own winding and immediately releases, advancing the wiper brushes to the next terminal. Since ground is connected to every terminal except the normal terminal of arc 28 the circuit to operate and release stepping magnet 27 just described will be closed each time the switch comes to rest on a terminal until the normal terminal is reached. In this manner both selector S and repeater circuit RC are returned to their normal condition of readiness to receive a new call.

What is claimed is:

1. In combination, a line having two talking conductors and a control conductor, a register for said line, a space-discharge device having one of its electrodes connected to said register and another of its electrodes connected to the control conductor of said line, a source of potential, and means for repeatedly applying said source to said conductor, said discharge device responsive to each such application to cause a flow of current through the register to operate the same.

2. The combination in a telephone system of a line having a control conductor, a message register for said line, a relay connected to said control conductor, a space-discharge tube having one of its electrodes connected to said control conductor and another of its electrodes connected to said message register, means for operating said relay without causing said tube to discharge, and means for causing said tube to discharge to in turn cause the operation of said register.

3. The combination in a telephone system of a subscriber's line having a control conductor, a message register for said line, a cut-off relay connected to said control conductor, a discharge tube having one electrode connected to said conductor and another of its electrodes in circuit with said message register, a source of potential, means for connecting said source to said conductor to operate said cut-off relay, said source being insufficient to cause the discharge of said tube, a second source of potential, and means for substituting said second source for said first source to cause the discharge of said tube to in turn cause the operation of said register, said second source serving to hold said cut-off relay to operated condition.

4. In a telephone system, a subscriber's line having a sleeve conductor, a message register for said line, a cut-off relay connected to said sleeve conductor, a gas-filled tube connected between said sleeve conductor and said message register, a source of potential for causing the operation of said cut-off relay but insufficient to cause the discharge of said tube, a second source of potential, and means for repeatedly connecting said second source to and disconnecting it from said

sleeve conductor to cause the repeated discharge of said tube and the consequent repeated operation of said register.

5. The combination in a telephone system of a subscriber's line, automatic means for extending said line to different destinations, a message register for said line, a space-discharge device connected between said register and one of the conductors of said line, a source of potential, and means depending upon the destination of a call for applying said source to said conductor to cause the repeated discharge of said device and the consequent repeated operation of said register.

6. In a telephone system, a line, trunk circuits extending to different destinations, a selector switch for extending said line to any one of said trunks, means responsive to the extension of a connection to one of said trunks for transmitting to one of the conductors of said switch current signals identifying the seized trunk, a space-discharge device connected to said conductor and responsive to said signals, and registering means controlled by said device.

7. In a telephone system, a subscriber's line, trunk circuits extending to different destinations, a selector switch for extending said line to any one of said trunks, a control conductor associated with said switch and a relay connected thereto, a space-discharge tube connected to said conductor, means for operating said relay without causing the discharge of said tube, means depending upon the trunk seized by said selector switch for sending over said control conductor impulses of current identifying the destination of the call, said discharge tube responding to each of said impulses of current, and means in circuit with said tube for recording the destination of the call.

8. In a telephone system, a subscriber's line, a charging trunk, a selector switch, means for extending said line over said charging trunk to said selector, outgoing trunks extending to different zones, means for operating said selector to seize a desired one of said trunks, a message register for said line, a control conductor for said charging trunk, a control relay connected to said conductor, a gas-filled discharge tube connected to said control conductor, a source of potential, means for connecting said source to said conductor to cause the operation of said relay without discharging said tube, a source of higher potential, means dependent upon the zone selected for sending impulses of current from said source of high potential over said control conductor to cause the repeated discharge of said tube, zone recording mechanism responsive to the discharge of said tube to record the zone to which the call is being extended, and means controlled by said zone recording mechanism for repeatedly operating the subscriber's message register.

9. The combination in a telephone system of a subscriber's line, means including trunk circuits for extending said line in different directions, a message register for said line, a space-discharge device connected between said register and said line, a source of potential, and means under the control of said trunk circuits and depending upon the direction in which the connection is extended for applying said source of potential to said line to cause the repeated discharge of said device and the consequent repeated operation of said register.