Jan. 24, 1933. H. M. BASCOM 1,895,020

TELEPHONE SYSTEM

Filed Jan. 15, 1931 2 Sheets-Sheet 1

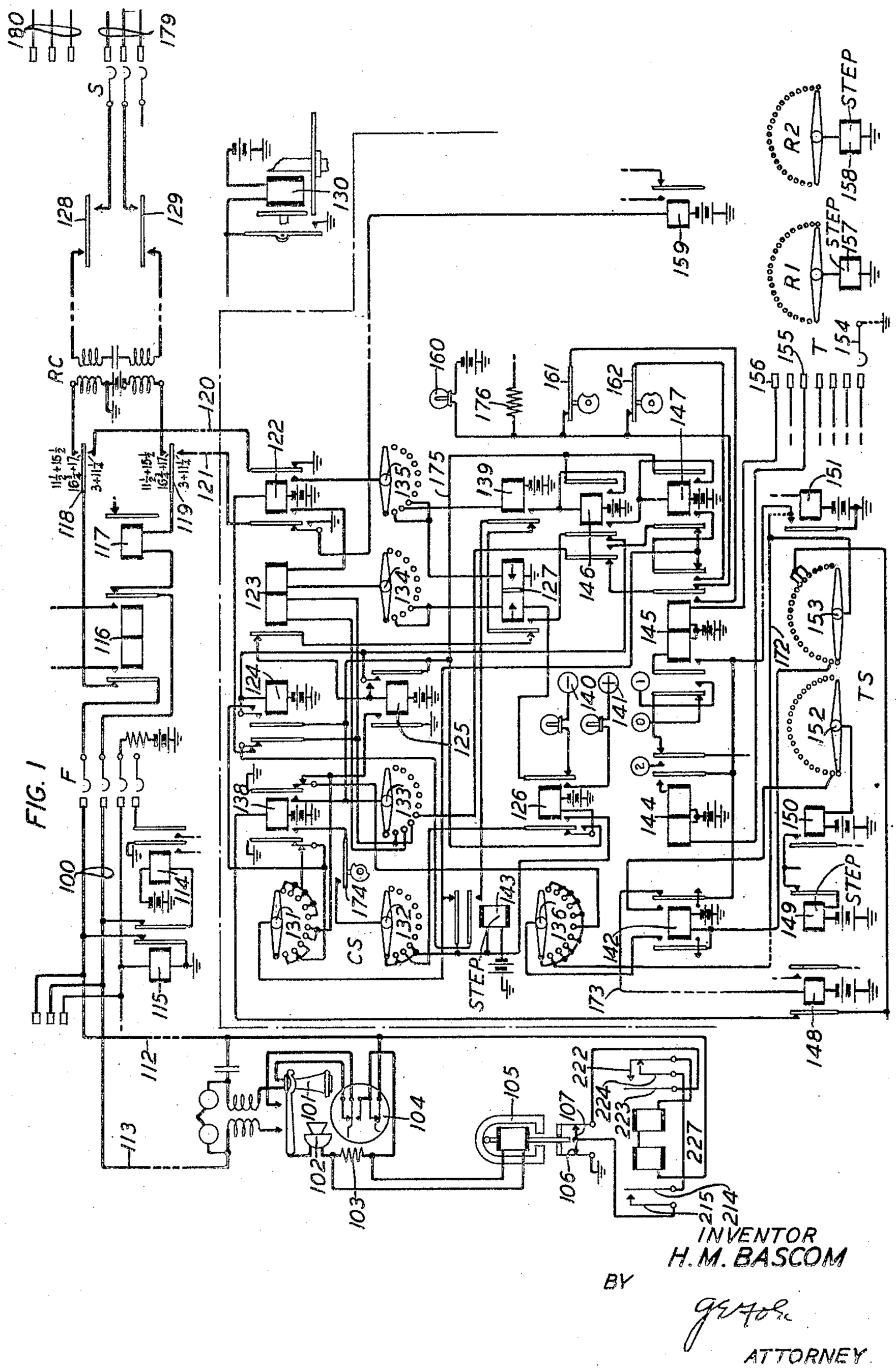

FIG. 1

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FIG. 2

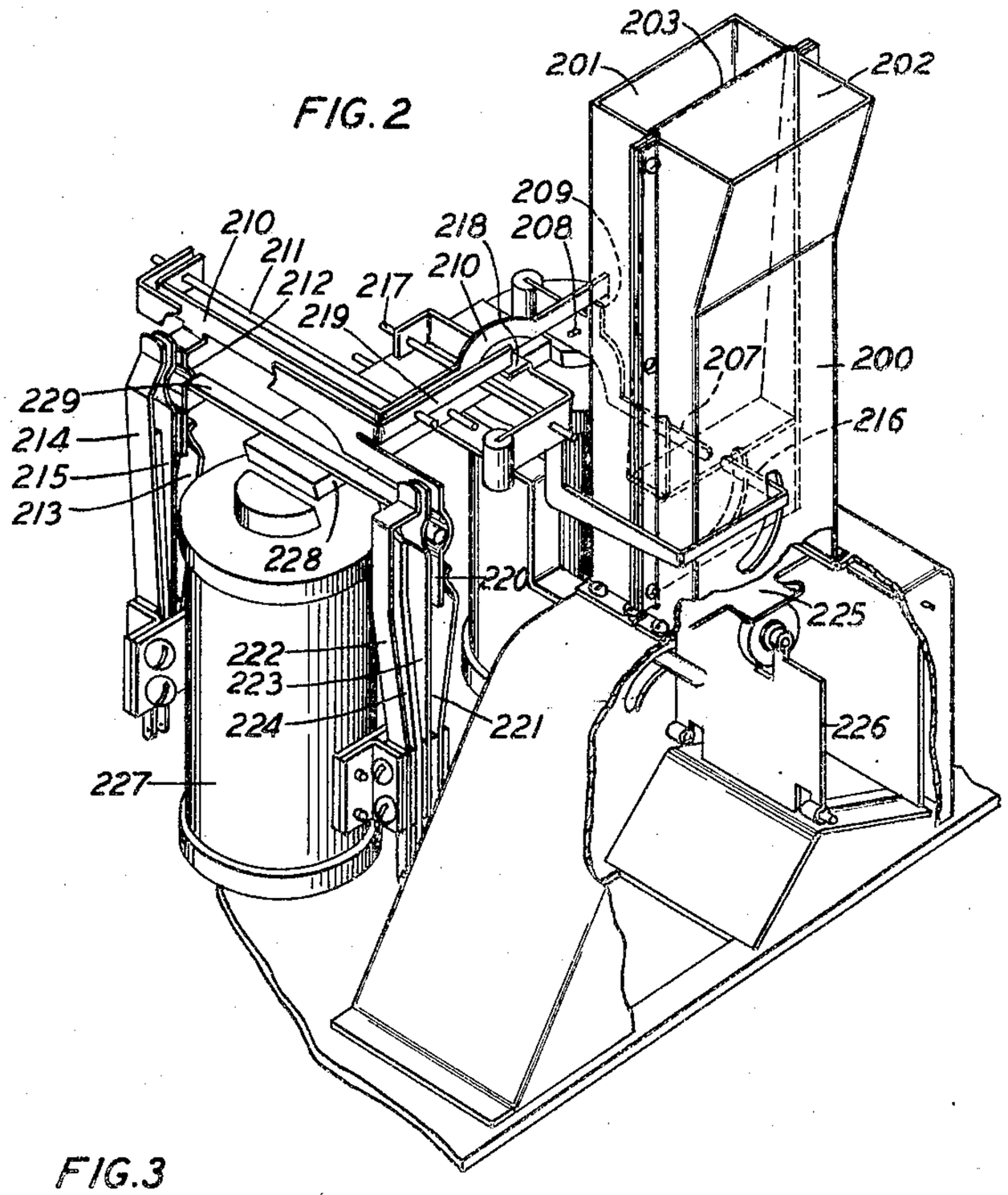


FIG. 3

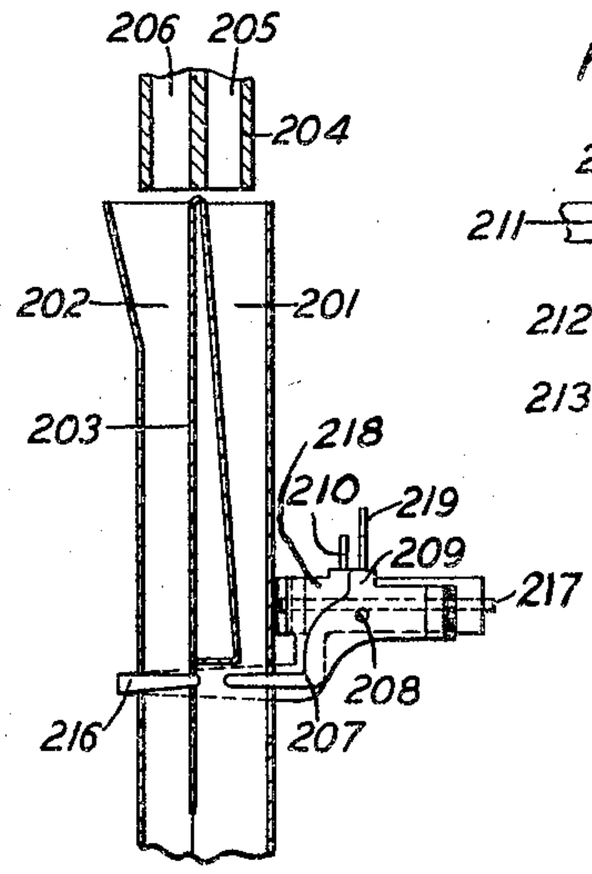


FIG. 4

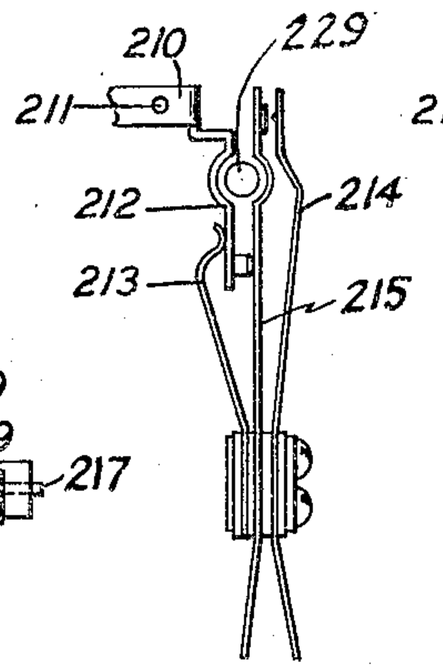
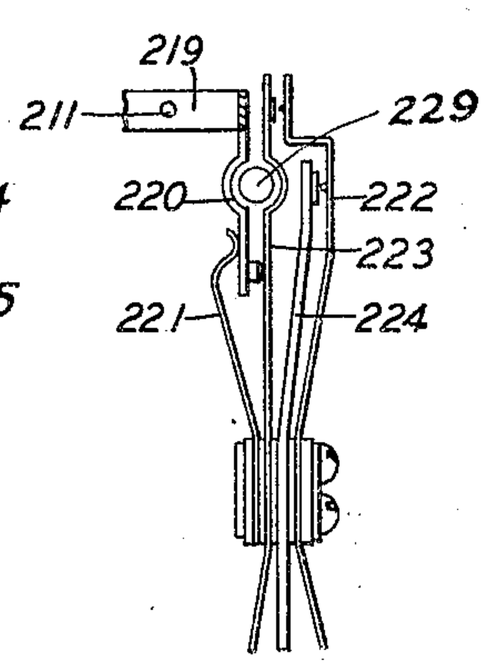


FIG. 5



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Patented Jan. 24, 1933 1,895,020

UNITED STATES PATENT OFFICE

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TELEPHONE SYSTEM

Application filed January 15, 1931. Serial No. 508,980.

This invention relates to telephone systems and particularly to automatic systems involving coin controlled lines.

The objects are to extend and enlarge the range of coin-line service in dial areas, to secure a reliable test of the calling line to distinguish coins of different values, and to otherwise improve systems of this character.

According to the present practice, a calling party at a coin-box station can establish calls on a purely automatic basis only within a certain local area such as those for which the rate is a five-cent coin. If he wishes to make a call to a distant zone requiring a higher toll, he must secure the assistance of an operator whose duty it is to advise him as to the required amount and to verify, usually by audible signals, the sum deposited in the coin box.

This invention overcomes these limitations by means of an arrangement in which a calling party at a coin station in an automatic system may extend calls, without the assistance of an operator, into zones requiring different toll charges. The central office equipment is arranged to test the coin line when a call is attempted, to determine first, whether a coin has been deposited, and second, whether the value of the coin deposited is sufficient to entitle the calling party to obtain the particular connection for which he has dialed. If so, the connection will proceed automatically to completion, but, if the test is unsatisfactory, the equipment will refuse to set up the connection, and an operator will be signaled.

This distinguishing test is accomplished by applying to the line sources of current of opposite polarity to control a polarized relay at the substation. The polarized relay in response to current of one polarity disconnects ground potential from each of two coin contacts, one contact representing five-cent coins and the other ten-cent coins. This enables a test to determine whether the line is encumbered by a false ground potential. Next a test relay is connected to the line to determine whether either of the two coin contacts is closed. Finally current of opposite polarity is connected to the line to operate the polarized relay in such a way that ground potential is removed from the ten-cent coin contact, enabling a test to determine whether a five-cent piece has been deposited.

In the drawings accompanying this specification, Figure 1 discloses a portion of an automatic telephone system embodying the features of the invention;

Fig. 2 is a perspective view showing the structure of the coin mechanism employed at the substation;

And Figs. 3, 4, and 5 are details of this structure.

Referring particularly to Fig. 1, the coin controlled telephone line 100 is equipped at the substation with the usual receiver 101, talking transmitter 102, and impulse dial 104 for controlling the selector switches at the central office. The substation is also provided with a coin box including the operating magnet 227 and coin operated contacts 214, 215, 222, 223 and 224. Also, there is provided a polarized relay 105, which responds to test current for the purpose of controlling the application of ground potential to the coin operated contacts. The structure of the coin mechanism will be described in detail hereinafter.

The line 100 extends to the central office and terminates in the bank of a line finder switch F, only a portion of which is shown in the drawings. Finder switch F serves to extend the calling line to a first or district selector switch S, also shown only in part.

The central office is also equipped with register senders, which receive impulses representing the wanted designations, including both office and numerical codes, to control the selective operation of the switches in accordance with the registered designations and to perform the necessary tests of the calling line to determine whether the proper coin has been deposited, entitling the calling party to the call for which he has dialed and also to signal a monitoring operator in case the coin test proves unsatisfactory. One of these senders is partly illustrated in the drawings including a disclosure of only what is necessary to a clear understanding of the invention. These senders are associated with the

link circuit extending between the finder F and selector S by means of a selecting switch (not shown) usually called the sender selector. The equipment comprising the register sender is shown in the drawings within the area bounded by the broken lines. It includes a timing switch TS, a series of office and numerical registers, two of which, R1 and R2, are illustrated, a control switch CS for controlling the testing of the calling line to determine the nature of the coin deposited, and a translator switch T, together with numerous relays and other devices. The switches TS, R1, R2 and CS may be of the single motion step-by-step type, well known in the art. Translator T may also be of this type, or it may, if desirable, be a switch of the power-driven type, also well known in the art.

The link circuit between finder F and the selector S is controlled by a sequence switch 130 having numerous contact springs which are closed in various positions of the switch as it moves from one position to another. The link circuit also includes a repeating coil RC which may, if desirable, be arranged to vary the ratio between the primary and secondary windings in accordance with the transmission requirements of the line over which the connection is being extended.

The line finder selector unit may employ panel switches and a circuit arrangement similar to that disclosed in the Henry Patent 1,575,336 of March 2, 1926, and in the Kopp Patent 1,589,402 of June 22, 1926. Reference is also made to the patent to Stearn et al., No. 1,395,997 of November 1, 1921.

The construction and operation of the coin mechanism employed at the substation is in general the same as the devices shown and described in the patents to Forsberg, No. 1,043,219 of November 5, 1912, and No. 1,117,485 of November 17, 1914.

Before proceeding with the detailed operation of the circuits, a description will be given of the structure and operation of the coin mechanism shown in Figs. 2, 3, 4 and 5. This mechanism comprises a hopper or coin receptacle 200 having two compartments 201 and 202 formed by a partition 203. These compartments receive coins of different denominations which have been directed to the entrance of the receptacle by the coin chute 204 having the runways 205 and 206. For example, coins of one denomination, such as five-cent pieces, traverse the chute 205 and enter the compartment 201, whereas coins of another denomination, such as ten-cent pieces, descend the chute 206 and enter the other compartment 202.

Within the compartment 201 is a trip finger 207 pivoted at 208. This trip finger carries a shoulder 209 which, in its normal position, supports a lever 210 pivoted on the rod 211, thus holding the contact actuating arm 212 against the pressure of spring 213, permitting the coin contacts 214 and 215 to remain open. When, however, a coin descends the compartment 201, it strikes the finger 207 causing it to rotate about its pivot 208 and permitting the shoulder 209 to move out of engagement with the lever 210. With the lever 210 free, the spring 213 immediately causes it to rotate about the rod 211 closing the contact 215 against the contact 214. The purpose of these contacts will be explained in connection with the circuit description.

Within the other compartment 202 is a second trip finger 216 pivoted about the rod 217 on the frame of the device. The trip finger 216 also carries a shoulder 218 which, in the normal position, supports the lever 219, pivoted to the rod 211, and holds the contact actuating arm 220 against the pressure of spring 221, permitting coin contacts 222 and 223 to remain open and contacts 222 and 224 to remain closed. When, however, a ten-cent piece decends the compartment 202, it strikes the trip finger 216 and rotates it about its pivot, causing the shoulder 218 to escape from beneath the lever 219. Thereupon the lever 219 is rotated by the spring 221 to close contacts 222 and 223 and to open contacts 222 and 224.

After the coins have operated their respective trip fingers, they land on the usual trap 225 where they await final disposal either into the coin till or into the return chute. The coins are disposed of by means of the usual operating magnets 227, which attract the armature 228 to rotate the deflecting vane 226 either in one direction or the other according to which way the armature 228 is tilted. The armature 228 also carries a restoring bar 229 which acts on the contact arms 212 and 220 to restore the levers and trip fingers to their normal latched positions.

A detailed description will now be given of the operation of the circuits shown in Fig. 1. For this purpose, it will first be assumed that the calling party wishes to make a call into a zone for which the charge is five cents and that he deposits a five-cent piece in the coin box. When the receiver 101 is removed from the switchhook, a circuit is completed from battery through the winding of line relay 114, a contact of cut-off relay 115, ring conductor 113 through the left winding of the substation induction coil, switchhook contacts, transmitter 102, winding of the polarized relay 105, normally closed contacts of the dial 104, tip conductor 112, through a contact of relay 115 to ground. The line relay 114 operates and initiates in the well-known manner the operation of the line finder F and a sender selector switch. The finder F finds the calling line 100, the sender selector chooses an idle sender, and the controlling sequence switch 130 advances into

some position where contacts 118 and 119 are closed to extend the tip and ring conductors of the calling line over conductors 120 and 121 to the impulse relay 159 of the register sender.

The subscriber proceeds to manipulate his dial 104 to transmit impulses representing the designation of the wanted line, causing the setting of registers R1 and R2 and other similar registers. As soon as the first two digits, representing the office code, are dialed, the translator T assumes its position depending upon the value of these digits. Since the calling party has dialed for a zone for which the charge is five cents, it will be assumed that the translator T positions its brush 154 on some terminal other than the terminals 155 and 156. Accordingly, neither relay 144 nor relay 145 operates.

Following the seizure of the sender, the time measure switch TS is caused to move from its normal position to its first off-normal position where a circuit is completed from battery through the winding of relay 142, brush 153 of the time measure switch, conductor 172 and thence to ground over an operated relay 151. The relay 142 operates and locks in a circuit from battery through its winding and left contact, brush 136 of control switch CS and thence over conductor 172 to ground. With relay 142 operated, a circuit is completed from battery through the winding of relay 150, brush 152 of the time measure switch, right front contact of relay 142 and thence to ground through the contact of relay 151. Relay 150 causes the stepping magnet 149 to advance the time measure switch TS. Relay 142, at its back contact, disconnects the grounded conductor 172 from conductor 173 to prevent the sender from completing the talking connection to the called line until relay 142 has released subsequent to a satisfactory coin test.

Following the completion of the dialing operation, the time measure switch TS advances into position 15 where a circuit is closed from battery through the winding of relay 138, back contact of relay 148, brush 153 to the grounded conductor 172. Relay 138, in conjunction with the interrupter 174, advances the control switch CS through a number of positions to perform the test of the calling line to determine whether the proper coin has been deposited by the calling party. As soon following the energization of relay 138 as interrupter 174 closes its contacts, a circuit is completed from battery through the stepping magnet 143 of the switch CS, brush 132 in the normal position of the switch, contacts of interrupter 174 to ground at the left front contact of relay 138. Magnet 143 energizes preparatory to advancing the brushes 131 to 136, inclusive, to the first off-normal position. When interrupter 174 again opens its contacts, magnet 143 releases and moves the brushes to their first off-normal position.

In position 1 of the control switch, relay 122 operates in a circuit from battery through its winding, left normal contacts of relay 124, brush 133 in its first position, to ground at the right front contact of relay 138. Relay 122 connects the tip and ring conductors through to the control switch CS and relay 159 is now held over a circuit leading to ground at the left front contact of relay 122.

A test circuit is now completed for performing the first test of the subscriber's line. This circuit may be traced from the source of negative potential 140, through the right back contact of relay 126, left winding of differential relay 127, brush 134, right winding of relay 123, left front contact of relay 122, conductor 121, sequence switch spring 119, relay 117, contact of relay 116 and thence over the ring conductor through the substation loop as above traced, including the winding of polarized relay 105, and returning over the tip conductor 112 to conductor 120 and thence through the right front contact of relay 122, brush 135, right winding of differential relay 127 to ground. The polarized relay 105 responds to current in this direction and moves its armature to the left, thus disconnecting ground potential from both contacts 106 and 107. In this manner, ground potential is removed from the tip conductor 112 whether a coin has been deposited in either the five-cent chute or the ten-cent chute of the coin box. Assuming that no false ground potential exists on either side of the line, current flows equally through both windings of relay 127 and this relay fails to attract its armature. Relay 123 also operates in series with relay 105 in a circuit above traced.

When the interrupter 174 again closes and opens its contacts, magnet 143 operates and releases to advance the control switch into position 2. Relay 123 is maintained operated during the advance of the control switch in a circuit from battery through the winding of relay 122, contacts of relay 124, left winding of relay 123, brush 133 to ground at the right contacts of relay 138. Relay 122 also remains operated in this circuit. The advance of brush 134 out of position 1 opens the test circuit above traced and polarized relay 105 releases.

The second test is now performed in a circuit traceable from battery through the winding of relay 139, brush 135, right front contact of relay 122 and thence over the tip conductor 112 of the subscriber's line through the winding of magnet 227, closed contacts 222 and 224, contacts 214 and 215, closed by the deposit of a five-cent piece, contact 106 to ground. Relay 105 is in its neutral position since no energizing current is flowing therethrough and ground potential is connected to both contacts 106 and 107. The test

relay 139 at the central office operates in this circuit. On the next closure of interrupter 174, relay 126 operates in a circuit from battery through its winding and contact, brush 132, interrupter 174 to ground. Relay 126 locks through its left make-before-break contact to the grounded conductor 175. The purpose of relay 126 is to transfer the test circuit from the source of negative potential 140 to the source of positive potential 141 for the performance of the third test of the subscriber's line. Relay 126 operated also extends the interrupter ground to magnet 143 which energizes, and a circuit is closed from battery to the winding of register relay 146, front contact of relay 139, inner front contact of magnet 143, left contacts of relay 124, left winding of relay 123, brush 133 to ground at the contact of relay 138. Relay 146 operates and locks through its winding and right contact, conductor 175 and thence to ground at the right front contact of relay 138. When the interrupter 174 again opens its contacts, magnet 143 releases and advances the brushes into position 3. At the time relay 146 operates in parallel with relay 122, relay 123 may release. This is without effect, however, since the circuit from the armature of relay 123 is opened at the back contact of relay 139.

The third test is now performed in a circuit from the source of positive potential 141, right front contact of relay 126, left winding of relay 127, brush 134 in position 3 and thence as previously traced over the subscriber's loop and returning through brush 135 and the right winding of differential relay 127 to ground. Relay 105 operates in this circuit and moves its armature to the right, thus opening the spring which normally engages contact 107, to remove ground potential from the ten-cent contact 223. This leaves ground potential connected to the five-cent contacts with the result that this ground is extended through the normal contacts 222 and 224 and the winding of magnet 227 to the tip conductor 112. This shunts the right winding of the differential relay 127, permitting this relay to operate. The next time interrupter 174 closes its contacts, magnet 143 energizes and a circuit is completed from battery through the winding of register relay 147, left front contact of relay 146, left front contact of relay 127, back contact of relay 139, which releases when the switch passes out of position 2, inner front contact of magnet 143, normal contacts of relay 124, brush 133 to ground. Relay 147 locks through its right contact to the grounded conductor 175. When the interrupter again opens its contacts, magnet 143 releases and advances the switch into position 4 where the test circuit is opened, permitting the release of relay 127.

In position 4 of the control switch, a circuit is completed from battery through the winding of magnet 143, upper back contact of said magnet, outer right back contact of relay 145, left front contact of relay 147, outer left front contact of relay 146, brush 133 to ground at the contact of relay 138. Magnet 143 interrupts its own circuit and advances the control switch out of position 4 and into position 5.

When the control switch leaves position 3, it opens the energizing circuit of relay 122 and this relay releases. Relay 122 at its back contacts, restores the circuit of the pulse relay 159 under control of the subscriber's line.

With the control switch in position 5, the holding circuit of relay 142 is opened, and this relay releases, closing a circuit from battery through the winding of relay 148, conductor 173, back contact of relay 142 to the grounded conductor 172. Relay 148 acts as a signal to the sender that it may proceed to complete the partially established connection to the called subscriber's line. Relay 148, at its left contact opens the holding circuit of relay 138, and this latter relay releases and applies ground potential to the remaining contacts engaged by brush 131 of the control switch. In an obvious interrupting circuit the stepping magnet 143 now advances the brushes back to their normal position.

In the manner fully disclosed in the above mentioned patents to Henry, Kopp and Stearn et al., the controlling sequence switch 130 advances into some position for completing the talking connection between the calling and called subscribers. Since the call is one for a five-cent zone, it may be considered that the district selector switch S has positioned its brushes on the terminals of the trunk 179 leading in the direction of that zone. During conversation, the winding of the polarized relay 105 does not interfere with voice currents since it is shunted by the non-inductive resistance 103. Furthermore polarized relay 105 is operated during conversation in a direction to move its armature to the left thus removing the ground at contact 106 during conversation.

Assume next that the calling party dials a designation corresponding to a ten-cent zone and deposits therfore a ten-cent piece. In this case, the translator T advances its brush 154 to terminal 156, following the setting of the registers R1 and R2, and a circuit is closed through the right winding of relay 145. Relay 145 operates and locks through its left winding and contact to the grounded conductor 172. The sender controls the district selector S to seize the trunk 180 leading to a ten-cent zone, the time measure switch TS is operated in the manner hereinbefore described, and the control switch CS is driven

through positions 1, 2 and 3 to perform the coin test.

Since a ten-cent piece is now deposited in the coin box, contacts 222 and 223 are closed, and contacts 222 and 224 are opened, and the five-cent contacts 214 and 215 are also open. The first two tests will take place in the manner already described, following which the control switch passes into position 3. In this position, positive potential from source 141 is applied over the circuit above traced, and relay 105 moves its armature to the right, disconnecting ground potential from the spring 223. Although the contact spring 223 is closed against contact 222, no ground potential now appears on the tip conductor 112, and consequently the differential relay 127 does not operate. With relay 127 de-energized, the registering relay 147 fails to operate in the manner hereinbefore described.

The magnet 143 advances the control switch CS into position 4, and a circuit is completed from battery, through the winding and back contact of said magnet, left back contact of relay 147, outer left front contact of relay 146, brush 133 to ground. Magnet 143 interrupts its own circuit and advances the control switch into position 5. From this point on, the operation takes place in the manner already described hereinbefore.

Assume next that a five-cent call is made for which a ten-cent piece is deposited. In this case, the operation will be same as it was when a ten-cent piece was deposited for a ten-cent call, except that the relay 145 will not operate inasmuch as the translator T positions its brush 154 on some terminal other than terminals 155 or 156. Therefore relay 145 is in its normal position, and register relay 146 is operated. When the control switch reaches position 4, it is immediately driven into position 5 in a circuit from battery through the winding of magnet 143, back contact of said magnet, left back contact of relay 147, outer left front contact of relay 146, thence to ground, as above traced. In position 5, relay 142 is released as explained, and the sender controls the completion of the connection to the called line.

Assume next that a five-cent call is attempted without the deposit of any coin. In this case, none of the relays 145, 146 and 147 is operated, and, when the control switch reaches position 4, it comes to rest, there being no circuit closed for driving it into position 5. The stopping of the control switch in position 4 withholds the completion of the connection, and a circuit is closed for the lamp 160 traceable from battery through said lamp, inner right back contact of relay 145, outer left back contact of relay 146, brush 133 in position 4 to ground at the contact of relay 138. The lamp 160 burns steadily and the monitoring operator, observing this lamp, knows that the subscriber has attempted a five-cent call but has failed to deposit a coin. She listens in on the connection and instructs him to deposit the necessary coin.

Assume next that a ten-cent call is attempted without the deposit of any coin. In this case, relay 145 is operated from the translator, but relays 146 and 147 remain inert. In a similar manner the control switch CS stops in position 4, and a circuit is closed from battery, through the lamp 160, interrupter 161, inner right front contact of relay 145, outer left back contact of relay 146 and thence to ground as above traced. The lamp 160 flashes at the operator's position.

Should the subscriber deposit only five cents and dial for a ten-cent call, relays 145, 146 and 147 would all be in an operated condition when the control switch reaches position 4. By inspecting the circuit, it will be found that the magnet 143 cannot advance the control switch out of position 4 when these relays are all operated. Consequently, a circuit is completed from battery through lamp 160, interrupter 162, outer right front contact of relay 145, left front contact of relay 147, outer left front contact of relay 146 and thence to ground. The lamp 160 flickers as a signal to the monitoring operator.

Assume next that a false ground condition occurs on the line, either accidentally or due to an attempt to obtain a call without depositing a coin. In this case the differential relay 127 is unbalanced during the first test, namely when the control switch is in position 1. Relay 127 therefore operates, and, when the magnet 143 attracts its armature, a circuit is completed from battery to the winding of relay 124, inner left back contact of relay 146, left front contact of relay 127, back contact of relay 139, front contact of magnet 143, left contact of relay 124, brush 133 to ground. Relay 124 operates and locks through its make-before-break contacts, the circuit being traceable from battery through the winding of said relay through its contacts to ground at the right contact of relay 138. Relay 124 causes the release of relay 122 and also places ground potential on the first, second and third position terminals associated with brush 131. Relay 122 restores the control of the line relay 159 to the subscriber's line, and the control switch CS advances into position 4 under the control of the interrupting circuit of the stepping magnet 143. In position 4, the control switch comes to rest, and lamp 160 is lighted as above explained.

The purpose of relay 123 is to cancel the test should the subscriber replace his receiver during the testing period. The replacement of the receiver permits the release of relay 123, and, when the magnet 143 again operates

with the control switch in either position 1 or position 3, a circuit is completed from battery through the winding of relay 125, normal contacts of relay 123, back contacts of relays 127 and 139, front contact of magnet 143, normal left contacts of relay 124 and thence through brush 133 in either position 1 or position 3 to ground. Relay 125 operates and locks to the grounded conductor 175 and closes an operating circuit for relay 124, traceable from battery, through the winding of relay 124, right contacts of relay 125 to the grounded conductor 175. Relay 124 connects ground to the No. 1, No. 2 and No. 3 terminals associated with brush 131, and relay 125 at its left contact places a ground potential on No. 4 and No. 5 terminals associated with said brush. Thus the control switch CS is driven into position 6. Should the receiver remain on the hook for a sufficient interval, the pulse relay 159 is released, and the apparatus is restored to normal in the usual manner. If, however, the interruption in the loop which caused the release of relay 123 is not of sufficient duration to release the pulse relay and associated relays, the equipment does not restore to normal. In this case, when the time measure switch TS reaches position 17, it stops. In this position a circuit is completed from battery through the lamp 160, hence through resistance 176 and eventually to ground. Lamp 160 burns in this circuit as a signal to the operator.

What is claimed is:

1. In combination, a telephone line having a substation thereon, coin mechanism at said substation for receiving coins of different denominations, and means for making a test of the line to determine the denomination of a coin deposited in said mechanism.

2. In combination, a telephone line having a substation thereon, coin mechanism at said substation for receiving the deposit of any one of a plurality of different sums, and means for testing said line to determine the sum of a deposit made in said mechanism.

3. The combination in a telephone system, of a line having a substation thereon, a coin device at said substation for receiving any one of a plurality of sums of money, automatic switches for extending said line, means for testing the line to determine which one of said sums has been deposited, and means responsive to said testing means for controlling the operation of said automatic switches.

4. The combination in a telephone system of a line having a substation thereon, a coin device at the substation for receiving any one of a plurality of coins of different denominations, automatic switches for extending said line, means at the substation for sending impulses representing the designation of the wanted line, means for testing said line to determine the denomination of the coin deposited, means for comparing the results of said test with the designation sent by the calling party, and means for operating said automatic switches to extend the wanted connection provided said comparison is favorable.

5. The combination in a telephone system of a telephone line having a coin device at the substation thereof, automatic switches for extending said line, a designation register and means at the substation for sending wanted designations to said register, means for testing the line to determine the value of any one of a plurality of coins deposited at said substation, means effective provided the value of the coin deposited corresponds to the designation registered for selectively operating said automatic switches to extend the connection, and means effective provided the value of the coin deposited does not correspond to the registered designation for withholding the extension of the connection.

6. In a telephone system, a line having a substation and a coin device at said substation, automatic switches for extending said line, a register sender for controlling said switches and for storing designations, means at the substation for transmitting designations to said sender, means for making a test to determine which one of a plurality of coins of different denominations has been deposited at the substation, means effective to operate said switches to extend a desired connection provided the deposited coin compares favorably with the designation sent by the calling party, an operator's position, and means effective to withhold the desired connection and to inform said operator provided the deposited coin does not compare favorably with the designation sent by the subscriber.

7. The combination in a telephone system of a line having a substation, a coin mechanism at the substation including a plurality of contacts, these contacts representing respectively coins of different denominations, and means for making a test of said contacts to determine the denomination of the coin deposited by a calling party.

8. The combination in a telephone system of a line having a substation, a coin mechanism at said substation including a plurality of coin control, contacts, means for making a test over the line to determine whether any one of said contacts has been operated by a coin, and means for making further test to determine which particular contact has been operated.

9. The combination in a telephone system of a line having a coin mechanism at the substation, said mechanism including a plurality of contacts representing respectively coins of different denominations, a polarized relay normally connecting a given potential to each of said contacts, means for operating said relay in one manner to remove said potential from all of said contacts, means for operating

said relay in another manner to remove said potential from a particular one of said contacts, and means for making tests during the operation of said relay to determine which of said contacts has been operated by the deposit of the coin.

10. The combination in a telephone system of a line having a substation and a coin device at said substation, automatic switches for extending said line, means at said substation for sending designations over said line for the purpose of controlling said switches, means for making a test of said line to determine which one of a plurality of coins of different denominations has been deposited in said coin device, means effective to operate said switches provided said test is satisfactory, an operator's position having a signal thereat, and means to withhold the operation of said switches and to operate said signal provided said test is unsatisfactory.

11. The combination in a telephone system of a line having a substation and a coin device at said substation, automatic switches for extending said line, means at said substation for sending designations over said line for the purpose of controlling said switches, means for making a test of said line to determine which one of a plurality of coins of different denominations has been deposited in said coin device, means effective to operate said switches provided said test is satisfactory, an operator's position having a signal lamp thereat, and means to withhold the operation of said switches if said test is unsatisfactory and to operate the signal lamp in a distinctive manner depending upon the results of said test.

In testimony whereof, I have signed my name to this specification this 13th day of January, 1931.

HENRY M. BASCOM.