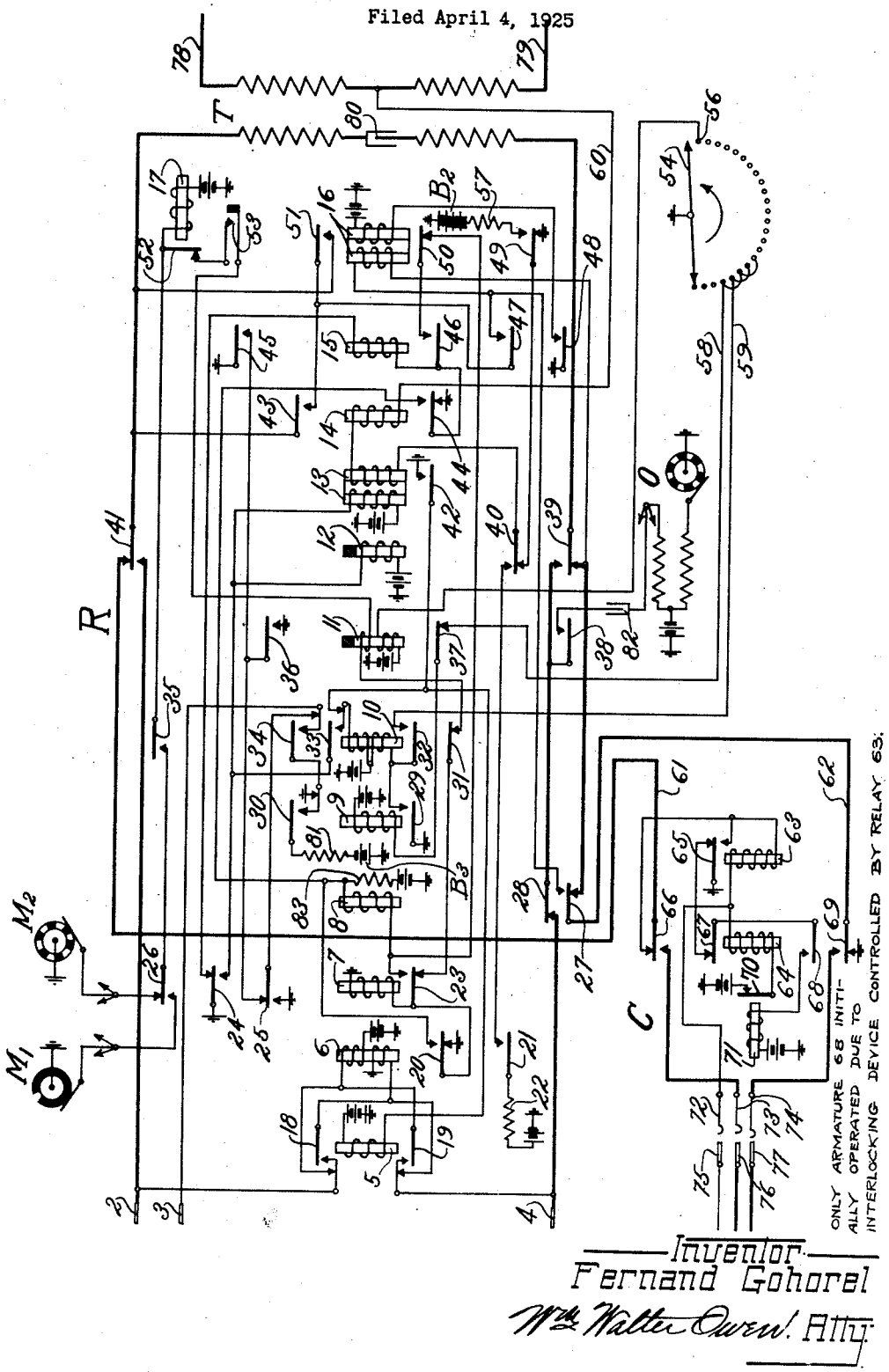
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AUTOMATIC TELEPHONE SYSTEM

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AUTOMATIC TELEPHONE SYSTEM.

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The present invention relates in general to automatic telephone systems but is concerned more particularly with such systems in which the toll or long distance connections are established automatically. One of the objects of my invention may be said to consist of the production of new and improved toll repeater circuits whereby a subscriber can operate automatic switches in a distant exchange to extend a connection to a desired called line.

In such systems toll charges may be assessed against the calling subscriber by operating his message register a number of times to assess a line charge when the called party answers and thereafter reoperating the register at stated intervals to assess an elapsed time charge proportional to the length of the conversation. Accordingly, a further object of my invention lies in improved circuits for the control of the message register to assess toll charges.

Toll lines, to be efficiently used, must handle traffic in both directions. Therefore each end of the toll line must be equipped with incoming switches. In the usual practice, a selector is associated with the incoming repeater to handle incoming calls, in which case the number of selectors must correspond with the number of toll lines. A considerable saving in the number of selectors required can be effected by the use of a line switch associated with the incoming repeater for the above purpose. This line switch may have access to a small number of incoming selectors or may have access to the regular local selectors. For such use a preselecting line switch is preferable. Accordingly, a further object of my invention may be said to consist of an improved preselecting rotary line switch adapted to work in connection with the repeater hereinbefore set forth, to complete incoming calls from a distant exchange.

Other objects of this invention will be apparent from the detailed description and claims which follow.

The accompanying drawing shows diagrammatically at R a repeater, which can be used for incoming and outgoing calls, together with its arrangement for multiple metering the duration of a call; it also shows at C a preselecting secondary line switch. This switch comprises a group of two relays 63 and 64, a rotary magnet 71, wipers 72—74, and bank contacts 75—77. The relay 64 is provided with a locking device, which prevents all its contacts except the contact 68 from operating. When the relay 63 is energized, the locking device of the relay 64 is released thus enabling all the contacts of the relay 64 to operate.

At the incoming end the toll line represented by the conductors 78 and 79 terminates in a repeater similar to the repeater R, and the description of its operation at the exchange where the line comes in is made with reference to the apparatus shown at R and C.

An outline will now be given of the operation of the system.

When the calling subscriber has been connected to a repeater such as the repeater R, which serves a toll line, he takes into use an incoming selecting device at the distant exchange over a repeater, such as R, and a secondary line switch such as C. In response to the operation of the calling subscriber's number dial, the repeater R at the outgoing exchange transmits current impulses over both the line leads in parallel. The repeater R at the incoming exchange transforms these impulses into other impulses suitable for operating the selecting devices at the incoming exchange.

When the wanted subscriber answers, the current in the toll line is reversed and sets in operation the metering device. The operation of the calling subscriber's meter is retarded sufficiently long to enable him to ascertain that he has obtained a connection with the wanted number. If the conversation exceeds a predetermined length of time, the calling subscriber's meter is operated a second time, but a few seconds before this second operation is effected, the subscriber is warned by a special tone put on his line.

When the calling subscriber's instrument has been connected over a selector to the repeater R, the relay 6 is energized in the circuit: battery, upper winding of the relay 6, back contact 18, bank contact 2 of the selector, the calling subscriber's line and instrument (not shown), selector bank contact 4, back contact 19, lower winding of relay 6 and ground. Upon energizing, the relay 6 closes a circuit at the impulse contact 21. The relay 7 is energized in the circuit: ground,

winding of relay 7, front contact 20, resistance 83 and battery; at the front contact of 25 it puts ground on the test contact 3 of the selector bank, thus marking the line engaged and holding the selector in its operated position.

At the front contact 23, the relay 7 prepares the circuit of the relay 8; at the front contact of 26, it prepares the circuit of the interrupter M^1 over the electromagnet 17, and at the front of 24 it closes the circuit of relay 12 and of the left hand winding of relay 13. As the relay 13 is polarized, it is not operated in this circuit. Upon energizing, the relay 12 at the back contacts 39 and 41 disconnects the repeating coil T from the secondary line switch, and at the front contacts it connects the coil to the calling line. At the contact 40 the ground on the lead 60 in series with the relay 14 and the right hand winding of the relay 13 is disconnected and is replaced by the battery in series with the resistance 22 and the contact 21.

This battery being connected to the two conductors of the toll line, causes the energization of a relay corresponding to the relay 14 at the repeater at the distant exchange over the following circuit: battery, resistance 22, front contact 21, front contact of 40, right hand winding of the relay 13, winding of the relay 14, the two windings of the repeater T in parallel, the two leads 78 and 79 of the toll line, the two windings of a repeater similar to the repeater coil T at the repeater in the incoming exchange such as R, the relay 14, the right hand winding of relay 13, the back contact of 40, back contact 49 and earth.

At the repeater at the incoming exchange, the relay 14, on energizing, closes the front contact of 44, thus establishing the circuit of relay 15, and at the front contact of 43 it prepares a loop across the line of the secondary line switch C. The relay 15 is energized in the following circuit: ground, back contact of 24, winding of relay 15, front contact of 44, resistance 83 and battery. At the front contact of 45 relay 15 puts ground on the test contact 3 in the selector bank over the back contacts 25 and 34, thus marking the line engaged at the selector in the incoming exchange; at the contact 48 it closes a circuit over one winding of the relay 16; at contact 46 it prepares the circuit of the relay 8; and finally, at contact 47 it completes the loop across the line of the secondary line switch in series with the left hand winding of the relay 16. The direction of the current in the relay 16 is such that the relay does not operate its contacts.

The secondary preselecting line switch C, located at the incoming exchange, the operation of which will be hereinafter explained, is always set on the line of an idle selector, and, upon the energization of the relays 14 and 15, the circuit of the relays 63 and 64 is closed over: battery, contact 70, windings of the relays 64 and 63, back contact of 66, lead 61, back contact of 41, front contacts of 43 and 47, winding (left hand) of the relay 16, back contact of 27, lead 62, back contact of 69 and ground.

Upon energizing, the relay 63 operates a locking device, thus enabling relay 64 to actuate all its contacts; at the back contact of 65 it disconnects ground from the circuit of the magnet 71, and at the front contact of 65 it establishes a locking circuit in series with the relay 64. The relay 64, on energizing, connects the line to the selecting device at 66 and 69, and opens the circuit of the rotary magnet at 67.

When the line is connected to the selecting device (not shown), its calling relay is energized in series with the line loop and closes the circuit of the releasing relay, which puts ground on the test lead and test contact 75. By means of the wiper 72, this ground is connected to the end of the winding of relay 64, and the relay 63, being short circuited, releases, while the relay 64 remains energized.

The toll line has now been connected across the repeater R over the selecting device in the incoming exchange.

At the outgoing exchange, the relay 14 of the repeater is also energized in the circuit above described, but this has no effect because the circuit of relay 15 is open at the back contact of 24.

When the subscriber operates his number dial for the remaining figures of the wanted subscriber's number, each interruption of the line by the number dial causes the relay 6 to open the contact 21 and at back contact 20 it closes the circuit of relay 8. The latter, on energizing, opens the circuit of the left hand winding of the repeater T and suppresses the effect of the condenser 80 on the relay 6 during the impulses.

The short circuiting of the relay 7 having rendered it slow acting, it remains operated during the impulses and the relay 8, after having been energized, likewise does not release until after the train of impulses.

At the incoming exchange, the relay 14 releases each time its circuit is opened at the contact 21 of the relay 6 in the repeater at the outgoing exchange, and at its contact 43 it repeats these interruptions in the line of the selecting device for the purpose of positioning the wipers of the latter onto the line of the wanted subscriber. At the back contact of 44, the circuit of the relay 8 is closed and the relay on energizing prepares at the front contact of 27 a new circuit for the impulses, which does not pass over the winding of the relay 16. The short circuiting of the relays 15 and 8 having rendered them

slow acting, they remain in their operated position during the train of impulses, and then the relay 8, on releasing, connects the repeater to the line of the selecting device and closes the loop over the winding of the relay 16.

When the wanted subscriber responds to the call, the current is reversed in the line of the selecting device and hence in the left hand winding of the relay 16, and this reversal energizes the relay 16. Thereupon the relay 16 opens the circuit of the relay 8 at contact 50; it short circuits the contact 43 of the relay 14 at contact 51, and at the contact 49 it replaces the ground connection by the special battery B^2 in series with the resistance 57. The voltage of this special battery B^2 is greater than the central battery of the exchange, hence the direction of the current in the toll line is reversed.

This battery reversal on the toll line causes the relay 13 to be energized at the repeater in the outgoing exchange. The relay 13, on energizing, at 42 closes the circuit of the relays 5 and 10. On energizing, the relay 5 reverses the battery on the line of the calling subscriber. Thus supervision is obtained. The relay 10, on energizing, closes the circuit at 33 for maintaining its upper winding energized; at contact 34 it connects the test lead to the contacts of the metering relay 9; at contact 32 it prepares a locking circuit for its lower winding; at 31 it opens the release circuit for the magnet 17; and at 35 it closes the circuit of this magnet over the interrupter M^1, which operates slowly.

It will be assumed that the wanted subscriber belongs to an exchange for which a three minutes conversation costs three times as much as a local call. In that case the bank contacts of the apparatus, which has 25 contacts, are connected in multiple as shown in the figure, and the interrupter M^1 closes its contact every 7.2 seconds. As the metering relay 9 is connected to the fourth, sixth and eight bank contact, the first operation of the subscriber's meter is delayed for about 20 seconds, thus giving the calling subscriber time to release the connection before metering if for any reason he finds he is not connected to the wanted party.

When the wiper 54 reaches the fourth bank contact, the relay 9 is energized in the following circuit: ground, wiper 54, fourth bank contact, lead 58, back contact of 37, winding of the relay 9 and battery. On energizing, the relay 9 at its contact 30 replaces the ground on the test lead by the special battery B^3, for operating the calling subscriber's meter, and at contact 29 it closes the circuit for the lower winding of the relay 10.

At the moment this latter circuit is without effect, as the relay 10 is energized by its upper winding. When the wiper 54 passes onto the fifth bank contact, the relay 9 releases, which causes the meter of the calling subscriber to fall back likewise after having registered one unit. At the sixth and eighth bank contact the meter is again operated, so that when the wiper 54 reaches the ninth bank contact, the calling subscriber's meter will have registered three units.

By the action of the magnet 17, the wiper 54 continues its rotation and, on reaching its last bank contact, it closes the circuit of the relay 11 over: ground, wiper 54, 25th bank contact, lead 56, lower winding of the relay 11 and battery.

On energizing, the relay 11 at its contact 38 puts a tone on the calling subscriber's line to notify him that his meter is going to be again operated.

If the calling subscriber replaces his receiver before the wiper 54 for the second time reaches the fourth bank contact, the line relay 6, in falling back, opens the circuit of the relay 7, which on releasing opens at 24 the circuits of the relays 10, 12 and 13, and at the back contact of 23 prepares the releasing circuit for the magnet 17. The relay 10, on releasing, removes at 34 ground from the test lead, thereby releasing the selecting devices; at contact 35 it opens the circuit of the magnet 17 extending over the contact 26, and at contact 31 it closes the circuit for automatically operating the magnet 17.

If the wiper 54 is out of its normal position, the contact 53 is closed and the circuit of the magnet 17 is closed from battery, the winding of the magnet 17, the contact 52, the contact 53, the upper winding of the relay 11, the back contacts of 31, 23, 20 and to ground. The magnet 17, operating intermittently, advances the wiper 54 to its normal position, in which the contact 53 is opened and the wiper comes to rest.

The relay 11 is energized in series with the magnet 17 and puts ground on the test lead of the repeater over the contacts 36, 25 and 34, thus preventing the repeater being taken into use before the wiper 54 reaches its normal position.

The relay 12, on releasing, connects the toll line to the secondary line switch, and at contact 40 it again puts ground on the lead 60 in series with the relay 14. At the incoming exchange the relay 14 releases when the relay 6 at the outgoing exchange has released, whereupon the relay 15 likewise releases; the loop across the line of the selecting device is opened and this is released. At the same time the ground is removed from the test lead and the relay 64 of the secondary line switch releases. At the repeater, the relay 16 releases when the circuit of its left hand winding is opened at 43, and

when it has fallen back ground is again put on the lead 60 in series with the relay 14.

If the calling subscriber hangs up his receiver while metering is taking place, the release of the switches at the incoming exchange takes place in the manner above described, but at the outgoing exchange relay 10 remains locked until the metering has been completed. Thereby its lower winding is connected to the fifth and seventh bank contacts over the front contact of 32, and from the fifth to the eighth contact the circuit of its lower winding is closed either at contact 29 or by the wiper 54.

When the calling subscriber has hung up his receiver the relays 5, 6, 7, 12, and 13 fall back as in the case described above, but the preceding selecting devices are not released, because ground or special battery B^3 is connected to the test lead at the contacts 30 and 34. When the relay 7 falls back, the circuit of the rotary magnet 17 is connected to the interrupter M^2 at the back contact of 26. This interrupter operates quicker than the interrupter M^1. Accordingly the magnet 17 operates at such rate that the wiper 54 moves too fast for the meter to operate when the wiper passes over the metering contacts. The circuit of the lower winding of relay 10 is opened when the bank contact 9 is reached, and upon falling back, the relay causes the wiper 54 to stop, as described in the preceding case, in its normal position.

If the calling subscriber should hang up his receiver before metering has commenced, the magnet 17, in operating automatically, returns the wiper 54 to its normal position, and the relay 11, on energizing in series with the magnet, opens at 37 the circuit of the metering relay 9 in order to prevent its operation when the wiper 54 passes over the metering contacts.

The function of the secondary switch C is to connect the toll line, to which it belongs, with the line of an idle selecting device; hence when the line, on which the wipers 72, 73 and 74 are standing, is taken into use, ground is placed on the test lead and test contact, such as the contact 75, and the test wiper 72 connects this ground to the winding of the relay 64. On energizing, the relay 64 only operates the contact 68 owing to the locking device, and the circuit of the magnet 71 is closed as follows: earth, back contact of 65, back contact of 67, front contact of 68, winding of the magnet 71 and battery. The magnet 71, on energizing, opens at 70 the circuit of relay 64, which on releasing opens at 68 the circuit of the magnet. The magnet, on returning to normal advances its wipers onto the contacts of the next line. This rotary movement continues until the wipers find a free line. If during this movement the switch is taken into use by a toll line, the relay 63 is not energized because it is short circuited by ground on the test wiper; hence the relay cannot be energized unless the wipers are standing on an idle line.

If the wipers are standing on an idle line when the switch is taken into use by a toll line, the relays 63 and 64 are energized in series by the loop over the two leads of the line 61 and 62, and in that case the relay 64, being unlocked by the relay 63, operates all its contacts, and the switch operates in the manner already described.

What is claimed is:

1. In an automatic telephone exchange, a calling line, a message register associated with said calling line, a toll line terminating in a repeater, means operable through said toll repeater for extending a connection to a called line in a distant exchange, an auxiliary switch associated with said repeater operable to periodically control said message register, a polarized relay in said repeater, a circuit for said relay including the two toll line conductors in parallel, and means operable when the called party answers to reverse the current flow in said circuit, said polarized relay responding to said reversed current to start said auxiliary switch

2. In an automatic telephone exchange, a calling line, a message register associated with said calling line, a toll line terminating in a repeater, means operable through said toll repeater for extending a connection to a called line in a distant exchange, an auxiliary switch associated with said repeater operable to periodically control said message register, a polarized relay in said repeater, a circuit for said relay including the two toll line conductors in parallel, and means operable when the called party answers to apply booster battery to said circuit in the oposite direction to reverse the current flow therein, said relay responding to said reversed current to start said auxiliary switch.

3. In an automatic telephone exchange, a calling line, a message register associated with said calling line, a toll line terminating in a repeater, means operable through said toll repeater for extending a connection to a called line in a distant exchange, an auxiliary switch associated with said repeater operable to periodically control said message register, a polarized relay in said repeater, a circuit for said relay including the two toll line conductors in parallel, and a relay operable when the called party answers to apply booster battery to said circuit in the opposite direction to reverse the current flow therein, said polarized relay responding to said reversed current to start said auxiliary switch.

4. In an automatic telephone system, a calling line, a message register associated with said calling line, a toll line, a repeater at each end of said toll line, means operable

from the calling line through the repeater on the near end for operating the repeater on the far end to set up a connection to a called line, an auxiliary switch associated with the repeater at the near end operable to periodically control said message register, a polarized relay in said near end repeater, a circuit for said relay including the two sides of said toll line in parallel, and means in said repeater on the far end operable when the called party answers to reverse the current flow in said circuit, said polarized relay responding to reversed current to start said auxiliary switch.

5. In an automatic telephone system, a calling line, a message register associated with said calling line, a toll line, a repeater at each end of said toll line, means operable from the calling line through the repeater on the near end for operating the repeater on the far end to set up a connection to a called line, an auxiliary switch associated with the repeater at the near end operable to periodically control said message register, a polarized relay in said near end repeater, a circuit for said relay including the two sides of said toll line in parallel, and means in said repeater on the far end operable when the called party answers to apply booster battery to said circuit in the opposite direction to reverse the current flow therein, said relay responding to said reversed current to start said auxiliary switch.

6. In an automatic telephone system, a calling line, a message register associated with said calling line, a toll line, a repeater at each end of said toll line, means operable from the calling line through the repeater on the near end for operating the repeater on the far end to set up a connection to a called line, an auxiliary switch associated with the repeater at the near end operable to periodically control said message register, a polarized relay in said near end repeater, a circuit for said relay including the two sides of said toll line in parallel, a polarized relay in the repeater at the far end, a circuit for said relay including the two sides of a part of the connection to the called line, in series, and means operable when the called party answers for reversing the current flow in said connection, said second polar relay responding to said reversed current to apply booster battery in the opposite direction to the circuit of said first polar relay to reverse the current flow therein, said first polar relay responding to said reversed current to start said auxiliary switch.

7. In a telephone exchange, a toll line terminating in a repeater, a calling line having access to said repeater, a step by step metering switch associated with said repeater, means for operating said metering switch to periodically assess a charge against said calling line, and means in said repeater controlled by said metering switch for signalling the calling line prior to assessing a charge without interrupting the connection.

8. In a telephone exchange, a toll line terminating in a repeater, a calling line having access to said repeater, a step by step metering switch associated with said repeater, means for operating said metering switch to periodically assess a charge against said calling line, means in said repeater controlled by said metering switch for signalling the calling line prior to assessing a charge and without interrupting the connection, and means in said repeater controlled by said metering switch for preventing the release of said calling line while charge is being assessed.

9. In a telephone exchange, a toll line terminating in a repeater, a calling line having access to said repeater, a step by step metering switch associated with said repeater, said switch moving in one direction only from its normal position, means for operating said switch to periodically assess a charge against the calling line, and means responsive to the calling party hanging up for returning said metering switch to normal before the connection is released and without assessing a charge.

10. In a telephone system, a calling line, a meter therefor, means for extending a connection therefrom to a called subscriber, a device controlled by the response of the called subscriber for operating the meter a plurality of times to assess charges, means for releasing the extended connection without operating the meter if the calling subscriber replaces his receiver within a certain time interval after the called subscriber answers, and means for preventing release of the connection until the meter is operated a sufficient number of times to assess the charge if the calling subscriber replaces his receiver after said time interval has expired.

11. In an automatic telephone system, a toll line provided at each end with a repeater and with automatic switching means for maintaining said repeaters connected at each end to an idle one of a plurality of trunks when said toll line is not in use, and for periodically assessing charges against a calling substation using said toll line in the extension of a call, said charges being assessed in accordance with the duration of said extension.

12. In an automatic telephone system, a toll line provided at each end with a repeater and with automatic switching means for maintaining said repeaters connected at each end to an idle one of a plurality of trunks when said toll line is not in use, and for periodically assessing charges against a calling substation using said toll line in the extension of a call, said charges being assessed in accordance with the duration of said extension, and means in said repeaters for signal-

ling the calling substation prior to assessing a charge.

13. In an automatic telephone system, a toll line provided at each end with a repeater and with automatic switching means for maintaining said repeaters connected at each end to an idle one of a plurality of trunks when said toll line is not in use, and for periodically assessing charges against a calling substation using said toll line in the extension of a call, said charges being assessed in accordance with the duration of said extension, and means in said repeaters for signalling the calling substation prior to assessing a charge without interrupting the continuity of said connection.

14. In an automatic telephone system, a toll line provided at each end with a repeater and with automatic switching means for maintaining said repeaters connected at each end to an idle one of a plurality of trunks when said toll line is not in use, and for periodically assessing charges against a calling substation using said toll line in the extension of a call, said charges being assessed in accordance with the duration of said extension, means in said repeaters for signalling the calling substation prior to assessing a charge, and means for preventing the release of said calling line while charge is being assessed.

15. In an automatic telephone system, a toll line provided at each end with a repeater and with automatic switching means for maintaining said repeaters connected at each end to an idle one of a plurality of trunks when said toll line is not in use, and for periodically assessing charges against a calling substation using said toll line in the extension of a call, said charges being assessed in accordance with the duration of said extension, and means for releasing the extended connection without operating the charge assessing means if the calling subscriber replaces his receiver within a certain time interval after the connection has been completed.

16. In an automatic telephone system, a toll line provided at each end with a repeater and with automatic switching means for maintaining said repeaters connected at each end to an idle one of a plurality of trunks when said toll line is not in use, and for periodically assessing charges against a calling substation using said toll line in the extension of a call, said charges being assessed in accordance with the duration of said extension, means for releasing the extended connection without operating the charge assessing means if the calling subscriber replaces his receiver within a certain time interval after the connection has been completed, and means for preventing release of the connection until said charge assessing means is operated a sufficient number of times to assess the charge if the calling subscriber replaces his receiver after said time interval has expired.

17. In an automatic telephone system, a toll line provided at each end with a repeater and with automatic switching means for maintaining said repeaters connected at each end to an idle one of a plurality of trunks when said toll line is not in use, and for periodically assessing charges against a calling substation using said toll line in the extension of a call, said charges being assessed in accordance with the duration of said extension, means for signalling the calling substation prior to assessing a charge, means for releasing the extended connection without operating the charge assessing means if the calling subscriber replaces his receiver within a certain time interval after the connection has been completed, and means for preventing release of the connection until said charge assessing means is operated a sufficient number of times to assess the charge if the calling subscriber replaces his receiver after said time interval has expired.

18. In an automatic telephone system, a toll line provided at each end with a repeater, a first automatic step by step switch associated with each of said repeaters for maintaining said repeaters connected at each end to an idle one of a plurality of trunks, a second automatic step by step switch associated with each of said repeaters for periodically assessing charges against a calling substation using said toll line in the extension of a call, said charges being assessed in accordance with the duration of the extension, and means in said repeaters controlled by the called subscriber for starting said second automatic switch.

19. In an automatic telephone system, a toll line provided at each end with a repeater, a first automatic step by step switch associated with each of said repeaters for maintaining said repeaters connected at each end to an idle one of a plurality of trunks, a second automatic step by step switch associated with each of said repeaters for periodically assessing charges against a calling substation using said toll line in the extension of a call, said charges being assessed in accordance with the duration of the extension, and means in said repeaters operable upon the completion of said extension for starting said second automatic switch.

20. In an automatic telephone system, a toll line provided at each end with a repeater, a first automatic step by step switch associated with each of said repeaters for maintaining said repeaters connected at each end to an idle one of a plurality of trunks, a second automatic step by step switch associated with each of said repeaters for periodically assessing charges against a call-

ing substation using said toll line in the extension of a call, said charges being assessed in accordance with the duration of the extension, and differential relays in said repeaters operable upon the completion of said extension for starting said second automatic switch.

21. In an automatic telephone system, a toll line provided at each end with a repeater, a first automatic step by step switch associated with each of said repeaters for maintaining said repeaters connected at each end to an idle one of a plurality of trunks, a second automatic step by step switch associated with each of said repeaters for periodically assessing charges against a calling substation using said toll line in the extension of a call, said charges being assessed in accordance with the duration of the extension, and differential relays in said repeaters, one controlled by a reversal of current through its winding upon the completion of said extension, and the other controlled by booster battery applied by said first relay over the two conductors of said toll line in parallel for starting said second automatic switch.

22. In an automatic telephone system, switching means for extending a connection from a calling station to a called station by way of a toll line associated with a repeater, an automatic switch individual to said repeater, a first and a second current source, means controlled from the called station for operating said switch from said first source to periodically assess charges against said calling station in accordance with the duration of the connection and means controlled from the calling station for operating said switch from said second source to prevent the assessment of charges.

23. In an automatic telephone system, switching means for extending a connection from a calling station to a called station by way of a toll line associated with a repeater, an automatic switch individual to said repeater, a first and a second current source, means operable automatically upon the completion of said connection for operating said switch at a certain rate from said first current source to periodically register the call in accordance with its duration, and means controlled from the calling station for operating said switch at a different rate from said second current source to prevent registration of the call.

24. In a telephone system, switching means for extending a connection from a calling station to a called station, a switching device associated with said switching means, a first and a second current source, means operable automatically upon the completion of a connection to operate said switching device from said first current source to register the connection in accordance with its duration, and means controlled from the calling station for operating said switching device from said second current source to prevent registration.

In witness whereof, I hereunto subscribe my name this 7th day of March, A. D. 1925.

FERNAND GOHOREL.