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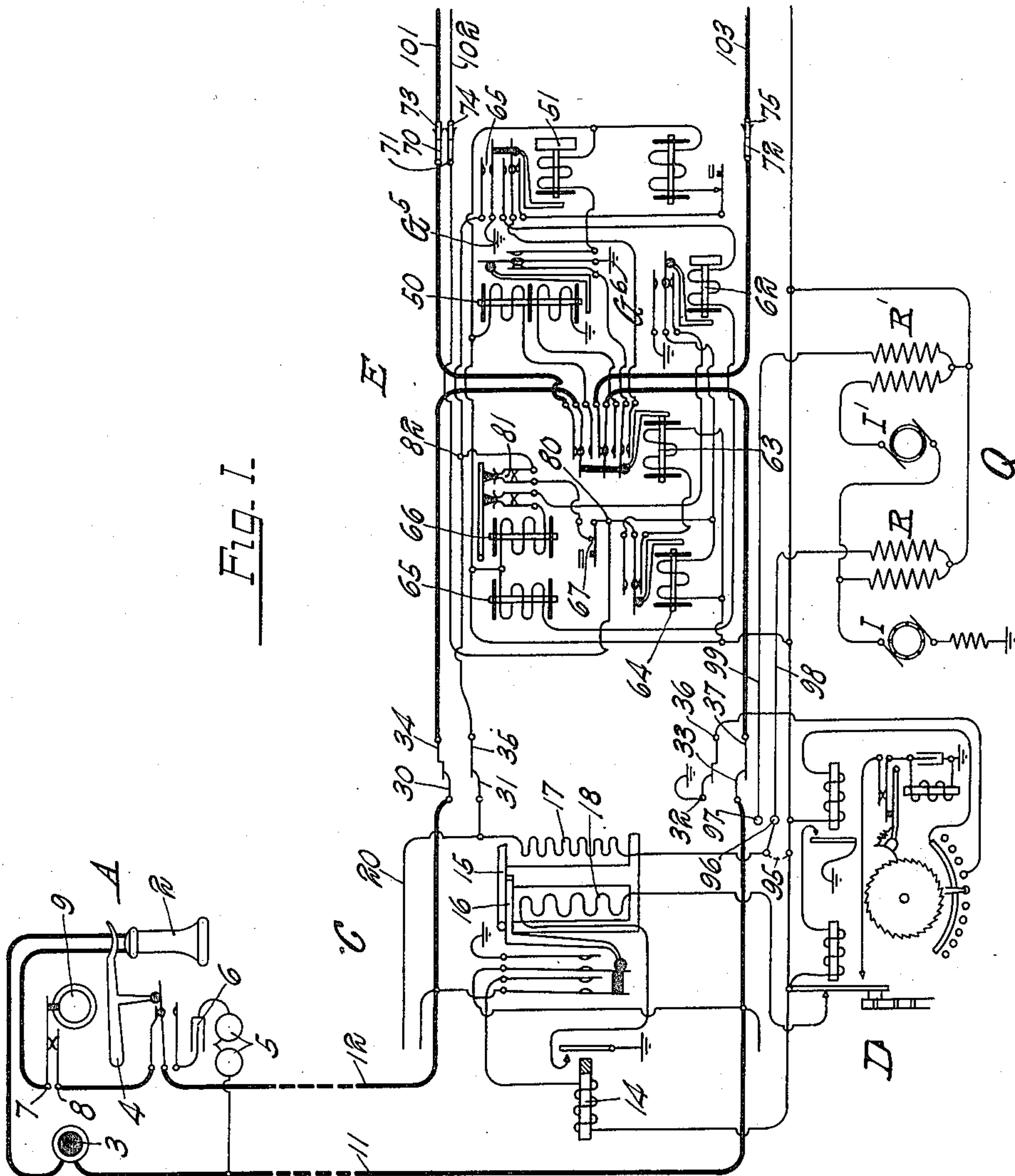
SPECIAL SERVICE TRUNK FOR AUTOMATIC TELEPHONE SYSTEMS.

APPLICATION FILED OCT. 27, 1916.

1,281,112.

Patented Oct. 8, 1918.

2 SHEETS—SHEET 1.



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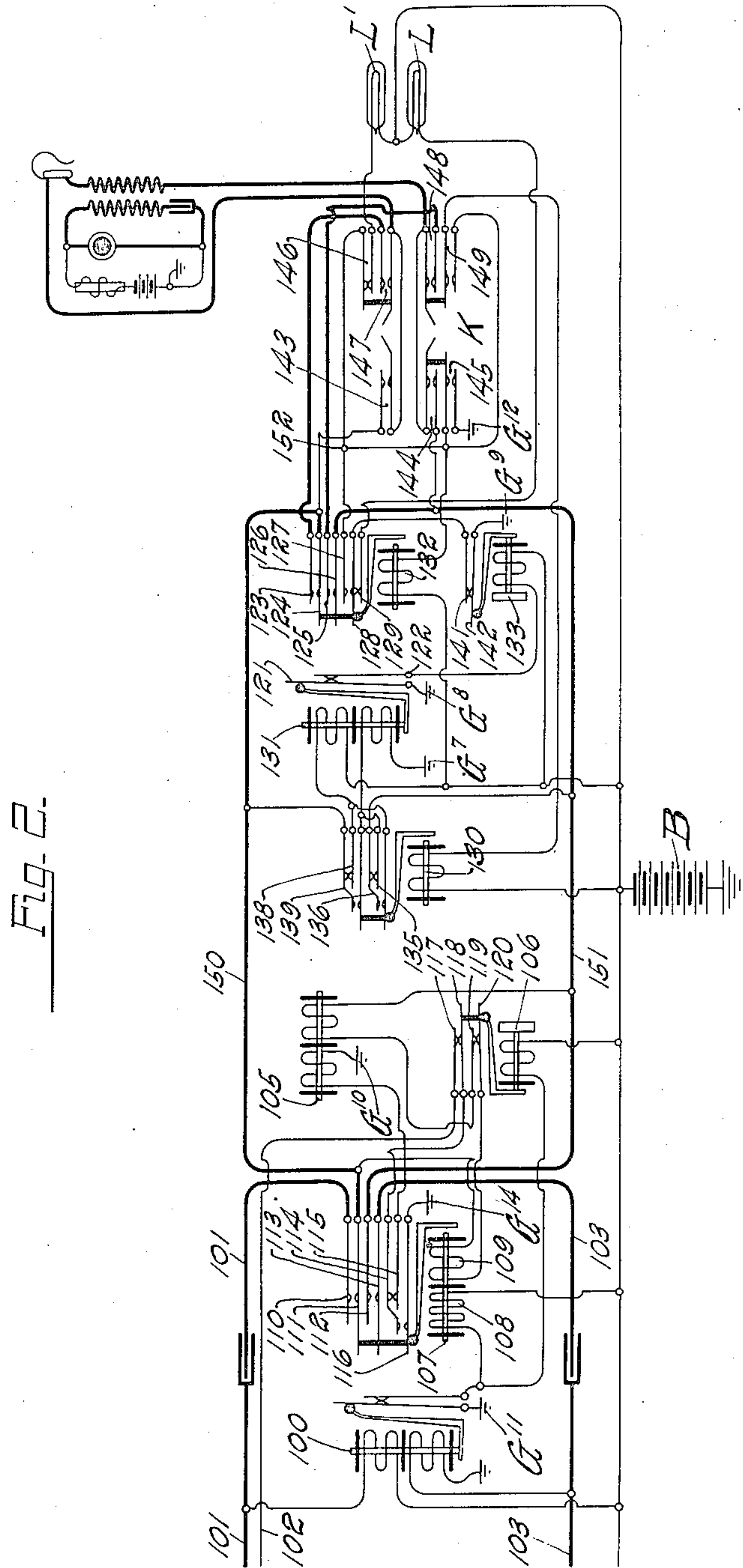
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UNITED STATES PATENT OFFICE.

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SPECIAL-SERVICE TRUNK FOR AUTOMATIC TELEPHONE SYSTEMS.

1,281,112.

Specification of Letters Patent.

Patented Oct. 8, 1918.

Application filed October 27, 1916. Serial No. 128,061.

To all whom it may concern:

Be it known that I, BERNARD D. WILLIS, a citizen of the United States of America, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Special-Service Trunks for Automatic Telephone Systems, of which the following is a specification.

My invention relates in general to special service trunks for automatic telephone systems but is particularly applicable to so-called toll recording trunks over which local subscribers call the recording operators for the purpose of initiating long distance calls.

It becomes necessary in a system of the above character to provide means for automatically advising a recording toll operator of the character of the calling line; or, more specifically, on the receipt of a call, the operator should be informed at once by means independent of the subscriber, whether the calling subscriber is one entitled to have long distance calls charged to his account, whether toll service is to be denied him by reason of his poor credit, or whether he is provided with a coin box whereby collection may be made in advance.

One of the objects of my invention, therefore, is the provision of an improved discriminating test system whereby a recording toll operator may be immediately apprised of any limitation imposed on the long distance service of a calling line.

A further object is the provision of means in a toll recording trunk whereby the operator is required to listen for the test tone before answering the call. In other words, my invention makes it impossible for the operator, through carelessness or indifference, to answer any call without first listening for a distinctive tone indicating the character of service to which the calling subscriber is entitled.

To accomplish the foregoing and other useful ends my invention comprises means which will be fully described in the specification which is to follow, reference being had to the accompanying drawings, in which Figures 1 and 2 show diagrammatically the apparatus and circuits involved in a complete connection between a calling subscriber at substation A (Fig. 1) and a trunk line extending to a toll recording operator's position (Fig. 2).

Referring now to Fig. 1, the substation A

may be of any approved automatic type, such, for example, as the substation shown in British patent to Martin, No. 1419 of 1910. As represented herein, it comprises essentially the receiver 2, transmitter 3, switch hook 4, finger 5, and condenser 6. Being an automatic substation, there is also provided a pair of impulse springs 7 and 8 controlled by an impulse wheel 9 through the medium of a finger hole dial (not shown).

The line conductors 11 and 12 of the substation A are connected at the exchange to the individual line switch C which is of the general type of line switch disclosed in the British patent to James, No. 26,301 of 1906; being, however, of the particular type shown in U. S. Letters Patent No. 1,078,690, granted Jan. 17, 1912, to Frank Newforth. Since line switches of the above description are well known and form no part of my invention they will not be described in detail. It will suffice to say here that through the medium of line switch C the line of substation A when calling is given access to a plurality of trunk lines extending to selector switches.

The line switch C and a plurality of similar line switches are controlled in their trunk selecting operations by means of a master switch D. The master switch D is of the general type of master switch disclosed in the above mentioned British patent to James, No. 26,301 of 1906; being, however, more nearly of the particular type disclosed in the British patent to Martin, No. 1419 of 1910, also previously referred to. As is well known, the function of the master switch is to maintain the plungers of all idle line switches which it controls in position before the terminals of an idle trunk line.

One of the trunk lines to which the line switch C has access is shown in Fig. 1 extending to the selector switch E. The selector E may be of the general type of selector switch disclosed in U. S. Letters Patent No. 815,321, granted March 31, 1906, to Keith, Erickson, and Erickson; being, however, of the particular type disclosed in the British patent to the Automatic Telephone Mfg. Co., No. 2543 of 1914. A selector switch of the foregoing description may be operated in response to the first digit in a called number to select one of the main groups into which the subscribers' lines in the system are

divided. For this purpose the selector E, in common with other selectors may be given access to a number of groups of trunk lines (not shown), each of which groups extends to a group of second selector switches.

It is customary to use only nine of the first selector levels for trunking to second selectors, as outlined above, one of the levels, usually the tenth, being reserved for the trunk extending to the toll recording operators. One of these latter trunk lines, indicated in the drawings by the reference characters 101, 102, and 103, extends from the bank contacts 73, 74, and 75 in Fig. 1 to the trunk apparatus associated therewith at the operator's position (Fig. 2). This apparatus, comprising a plurality of relays, a double throw key K and signal lamps L and L', will be fully described hereinafter.

For supplying operating and talking current I have shown a battery B having its positive pole grounded. The distinctive tones by which the operator is to distinguish between the different kinds of lines are supplied from the signaling machine Q, which as shown herein comprises induction coils R and R', a high speed interrupter I and a low speed interrupter I'. The signaling machine Q is preferably common to the exchange and is in continuous operation whereby a steady high frequency tone is maintained on common conductor 98 and an interrupted high frequency tone on conductor 99. These common conductors are provided with multiple terminals in each line switch group in order that connections thereto from the individual line switches may be made as occasion may require.

Having given a brief description of the apparatus, I will now proceed to explain more in detail the operation of the same. For this purpose it will be assumed that the subscriber at substation A, which subscriber it will be further assumed is to be denied toll service by reason of his poor credit or for other reasons, desires to call a recording toll operator in order to place a long distance call.

When the calling subscriber at substation A removes his receiver to initiate the call, an energizing circuit is completed over the line conductors 11 and 12 for the line relay 14 of the line switch C. Upon attracting its armature, the line relay 14 closes a circuit for the pull-in winding 18. Upon energizing, the pull-in winding operates both the plunger arm 15 and the cut-off armature 16; the former through the medium of its plunger (not shown) forcing the bank springs 30—33, inclusive, into engagement, respectively, with contacts 34—37, inclusive; and the latter disconnecting the line conductors 11 and 12, respectively, from ground and from the line relay. By the engagement of bank springs

30 and 33 with contacts 34 and 37, respectively, the line conductors 12 and 11 are extended through normally closed contacts of the switching relay 63 to the double-wound line relay 50 of the selector E.

The line relay 50 is accordingly energized over the loop circuit including substation A and, upon attracting its armature, closes a circuit for the slow-acting release relay 51. Upon energizing, the release relay closes a holding circuit for the line switch C which may be traced from ground G⁵ by way of contact springs 65, contact 35, bank spring 31, the holding winding 17, terminal 96, common conductor 98, and the secondary winding of induction coil R to battery B. Since the line relay 14 is slow-acting, it retains its armature to maintain the pull-in winding 18 energized until after the above holding circuit has been established. A branch of the holding circuit extends by way of conductor 20 to multiple test contacts in the banks of connector switches having access to the line of substation A where by a ground potential on these test contacts the said line is made busy. By the engagement of bank spring 32 with contact 36 a circuit is closed whereby the master switch D is operated in the well known manner to advance the plungers of all the remaining idle line switches into position before the terminals of the next idle trunk line.

The foregoing operations whereby the line conductors 11 and 12 have been extended through to the line relay 50 of the selector E have taken place in response to the removal of the receiver at substation A. Since the recording trunks are terminated in the tenth selector level, as previously mentioned, the calling subscriber will now manipulate his dial in accordance with the digit 0, thereby separating momentarily the impulse springs 7 and 8 ten times and interrupting each time the circuit of line relay 50 of selector E. As a result of these interruptions of its circuit the line relay 50 is deenergized a corresponding number of times, sending an impulse at each deenergization from ground at G⁶ to the slow-acting relay 62 and the vertical magnet 65 in series. The vertical magnet in response to these impulses, steps up the switch shaft until the wipers 70, 71, and 72 stand opposite the horizontal level in which are located contacts which are terminals of the group of recording trunks. The relay 62, being slow-acting, retains its armature during the series of impulses and closes a circuit for the test relay 64, which latter relay prepares a circuit for the rotary magnet 66 and locks itself to ground at G⁵. At the end of the series of impulses the relay 62 deenergizes, thereby completing the aforementioned circuit of the rotary magnet 66, whereupon the wipers 70, 71, and 72 start rotating in search of an idle trunk line. As

is well known, the rotary magnet interrupts its own circuit and also the locking circuit of the test relay at every energization, the contacts in the latter circuit, however, being short-circuited by the test or private wiper 71 while passing over grounded busy contacts. As soon, therefore, as the test wiper 71 arrives at an ungrounded test contact the test relay 64 deenergizes and opens the rotary magnet circuit, thereby bringing the wipers to rest upon the terminals of an idle trunk line, assumed to be in this case the contacts 73, 74, and 75. As a further result of the deenergization of the test relay 64, a circuit is completed for the line switching relay 63 which relay, upon energizing, disconnects the extended line conductors 12 and 11 from the windings of the line relay 50 and further extends them by way of wipers 70 and 72, bank contacts 73 and 75, and trunk line conductors 101 and 103 to the double-wound line relay 100 in bridge of the recording trunk.

The line relay 100 thereupon energizes over the line circuit extending back through substation A and completes an energizing circuit for the slow acting relay 106. Relay 106, upon attracting its armature, completes a new holding circuit as follows: Ground at G^{10} , left hand winding of induction coil 105, contact springs 115 and 114, contact springs 118 and 117, conductor 102, bank contact 74, and wiper 71 to wire junction 80, where the circuit divides, one branch extending by way of a back contact of relay 64 through the winding of line switching relay 63 to battery B, and the other branch extending by way of off-normal contact 67 and interrupter contact 81 to wire junction 82 where it joins the previously described holding circuit extending back to the line switch C. It is understood that the above circuit is completed before the deenergization of the slow-acting release relay 51.

Having briefly described the manner in which the calling subscriber extends his line into connection with an idle recording trunk, I will now proceed to describe the remaining operations with more attention to details. Referring to Fig. 2, a branch of the energizing circuit of the slow-acting relay 106 includes the winding 108 of the electro-polarized relay 107. The winding 108 is of high resistance and few turns, being preferably of German silver wire, and relay 107 is therefore not operated by current flow therein. When the slow-acting relay 106 was energized, as previously mentioned, a circuit was completed for the double-wound relay 131 which may be traced as follows: Ground at G^7 , lower winding of relay 131, contact springs 135 and 136, conductor 151, right hand winding of the induction coil 105, contact springs 119 and 120, winding 109 of the electro-polarized relay 107, conductor

150, contact springs 139 and 138 and the upper winding of relay 131 to battery B. Upon energizing, relay 131 completes a circuit for the slow-acting relay 133 as follows: Ground at G^8 , contact springs 121 and 122, and winding of relay 133 to battery B. Relay 133, upon energizing in turn, completes the following circuit for the call signal lamp L. Ground at G^9 , contact springs 142 and 141, contact springs 128 and 129, and the lamp L to battery B. By the lighting of the lamp L the operator is informed that a call has been received.

Before proceeding further, it should be mentioned that the electro-polarized relay 107, whose right hand winding 109 is included in the circuit of the double-wound relay 131, remains inoperative for the present; for the direction of current flow in the winding 109 is such that its magnetizing effect is in opposition to the magnetizing effect of the polarizing winding 108.

Upon perceiving the signal, the operator will respond by throwing the key K in such direction that the left hand sets of contact springs are actuated. Assuming that the ordinary type of double throw key is used, the key will be thrown backward. By the closure of the key contacts 143 and 144, the operator's head set will be bridged across the trunk conductors 150 and 151, and by the closure of contact 145 a circuit is completed for relay 132 as follows: ground at G^{12} , contact 145, and the winding of relay 132 to battery B. Upon energizing, relay 132 extends by means of its contact springs 123—126, inclusive, the trunk conductors 150 and 151 to contact springs controlled in the forward movement of the key K; extinguishes the lamp L by separating contact springs 128 and 129; and establishes a locking circuit for itself by closing its contact springs 127 and 128. A branch of the latter circuit may be traced from the junction point 152 by way of key contact 146 and the red busy lamp L' to battery B.

Although the operator now has her head set bridged across the trunk conductors, she cannot talk to the calling subscriber, for the connection is open at the contact springs of the polarized relay 107. Instead the operator is given a distinctive tone indicative of the character of service to which the calling subscriber is entitled, in the following manner: It will be remembered that the holding circuit for maintaining the line switch C in operative condition includes the left hand winding of induction coil 105 (Fig. 2) and the secondary of the induction coil R (Fig. 1). Also it will be seen that the right hand winding of the induction coil 105 is connected in bridge of the conductors 150 and 151. It follows from the foregoing considerations that a steady high frequency tone will be transmitted to the operator,

who is thereby informed that the calling subscriber is not entitled to have long distance calls charged to his account.

Having recognized the characteristic signal, the operator will now throw her key forward, thereby extinguishing the lamp L' by opening the key contact 146; and retaining her head set in bridge of the trunk conductors by the closure of key contacts 147 and 148, the relay 132 being in operated position. As a further result of the forward operation of the key K, a circuit is closed for the reversing relay 130 which may be traced as follows: Ground at G⁹, contact springs 142 and 141, contact springs 128 and 127, contact 149 of key K, and the winding of relay 130 to battery B. Upon energizing, relay 130 in an obvious manner reverses the trunk conductors 150 and 151 as regards their connections to the windings of the double-wound relay 131, thereby reversing the direction of current flow in the winding 109 of the electro-polarized relay 107. The windings 108 and 109 now coöperate, whereby the relay 107 is enabled to attract its armature with the following results: By the engagement of contact springs 114 and 116 and the separation of contact springs 114 and 115, the holding circuit extending back to line switch C is connected direct to ground at G¹⁴, and the left hand winding of the induction coil 105 is eliminated, thereby disconnecting the tone from across the trunk; and by the engagement of contact springs 111 and 113, respectively, with contact springs 110 and 112, the conductors 101 and 103 are connected, respectively, with the conductors 150 and 151. The operator is now able to converse with the calling subscriber. The instructions given a subscriber whose credit is no good when he attempts to secure a long distance connection will vary with different telephone companies, but he will usually be asked to come to the central office to talk.

In some instances, owing to objections made by the subscribers, it may become necessary for the operator to verify her test before finally refusing service. In this case she will tell the subscriber to wait, will restore her key K to normal, and will then call some official of the telephone company who is competent to decide the matter. The utility of the red busy lamp L' now becomes apparent. As long as the calling subscriber is waiting on the line and the key K is normal the lamp will glow to insure that the operator will not forget the call.

Whatever may be the character of the conversation, the calling subscriber will finally terminate it and will replace his receiver, bringing about the disconnection of the apparatus in the usual manner. Briefly, upon the deenergization of the line relay 100

and the slow-acting relay 106, the holding circuit by which the line switch C and the selector switch E were maintained in operated position is broken whereby these switches are restored to normal position. As a further result of the deenergization of relay 106 the circuit of the double-wound relay 131 will be broken, and the said relay 131, relay 133, and relay 132 will deenergize in order, whereupon all the apparatus will have been restored to normal.

Particular attention is directed to the fact that at no time is the calling subscriber able to hear the tone associated with his line. This is true because the electro-polarized relay 107 which connects the two sections of the trunk line also at the same time (or an instant before, depending on the adjustment of its springs) disconnects the tone. Another important feature is the arrangement whereby the operator is compelled to listen for the tone before she can talk to the calling subscriber. If, on receiving a call, the operator should first throw her key K forward, such operation would be of no effect, for the locking relay 132 is not yet energized. Since the relay 132 can only be energized by the backward operation of the key, it will be apparent that in order to answer the call the operator will have to proceed as hereinbefore described.

The condition described in the foregoing, where the subscriber is denied long distance service, will be the exception rather than the rule. The great majority of the subscribers, who are entitled to toll connections whenever they so desire, will have their individual line switches wired as indicated by the short dotted conductor 95 in Fig. 1. In other words, the holding windings, such as the winding 17, will be connected direct to the battery B. When such a subscriber calls the recording operator for the purpose of placing a long distance call she will hear no tone and will therefore accept the call without objection.

Pay station subscribers, who are required to pay for their connections in advance, will have the holding windings of their individual line switches connected to the common conductor 99: Thus, if the substation A were equipped with a coin box, the holding winding 17 would be connected to terminal 97. Then when the subscriber endeavored to obtain a toll connection the recording operator would be given an interrupted tone; by which she would be informed that the call was from a pay-station subscriber. She would then accept the call, of course, but would make a notation on the ticket to apprise the toll operator of the fact that collection must be made in advance.

While in the foregoing explanation it has

been assumed that all the apparatus was located in one exchange, such need not be the case; in fact, the circuit is designed with a view to its suitability for large multi-office systems. In a large system of this kind the toll and recording operators would all be at the office in which the toll lines were terminated, and the latter operators would be accessible to subscribers in all the other offices. Under these circumstances the operators' equipment and the relays 130, 131, 132, and 133 would be at the toll office, while the remaining relays would be located at a local office. It will be noted that only two conductors are required in the trunk connecting the two offices.

Having described my invention, what I consider to be new and desire to have protected by Letters Patent will be pointed out in the appended claims.

What I claim as my invention is:

1. An automatic telephone exchange system, subscribers' lines divided into three or more classes in accordance with the kind of service to which they are entitled, means for extending one of said lines to an operator's position, means whereby said operator may connect with said line, and automatic means responsive when a subscriber calls for connecting a distinctive tone to the operator before the operator can connect with said line to indicate to what class he belongs.

2. An automatic telephone exchange system in which the subscribers are divided into three or more classes in accordance with the kind of service to which they are entitled, automatic switching equipment for enabling any subscriber to extend connection to an operator's position, means whereby said operator may connect with said line, and automatic means for informing the operator of the class to which the calling subscriber belongs before the operator can connect with said line.

3. In a telephone system, a plurality of lines divided into three classes in accordance with the kind of toll service to which the subscribers are entitled, the subscribers of one class being entitled to have calls charged, the subscribers of another class being not entitled to have calls charged, and the subscribers of the third class being provided with means whereby calls may be collected for in advance, means for extending any line when calling to an operator's position, and automatic means for informing the operator of the class to which the calling subscriber belongs before the operator can connect with said line.

4. In an automatic telephone system, a plurality of subscribers' lines, certain of said lines having restricted service, means for extending any line to an operator's position, and means for giving the operator a distinctive tone without the knowledge of the

calling subscriber when the calling line is a restricted service line.

5. In an automatic telephone system, a plurality of subscribers' lines, certain of said lines having restricted service, automatic switching equipment for enabling the subscriber on any line to extend connection to an operator's position, means for giving the operator a distinctive tone when the calling line is a restricted service line, and means for preventing the calling subscriber from hearing said tone.

6. In an automatic telephone system, a plurality of subscribers' lines, certain of said lines having restricted service, a trunk line in two normally disconnected sections the second of which terminates in an operator's position, subscriber controlled means for extending connection from any line to the first section of said trunk line, and automatic means for placing a distinctive tone on the talking conductors of said second section when the calling line is a restricted service line.

7. In an automatic telephone system, a plurality of subscribers' lines, certain of said lines having restricted service, a trunk line in two normally disconnected sections the second of which terminates in an operator's position, subscriber controlled means for extending connection from any line to the first section of said trunk line, automatic means for placing a distinctive tone on the talking conductors of said second section when the calling line is a restricted service line, and means for bridging the operator's telephone set across the second section while the two sections are disconnected.

8. In an automatic telephone system, a plurality of subscribers' lines, certain of said lines having restricted service, a trunk line in two normally disconnected sections the second of which terminates in an operator's position, subscriber controlled means for extending connection from any line to the first section of said trunk line, automatic means for placing a distinctive tone on the talking conductors of said second section when the calling line is a restricted service line, means for bridging the operator's telephone set across the second section while the two sections are disconnected, and means for thereafter connecting the two sections and for disconnecting said distinctive tone.

9. In a telephone system, a plurality of subscribers' lines of different character, automatic switching equipment for enabling the subscriber on any line to extend a connection to an operator's position, automatic means for giving the operator a distinctive tone indicative of the character of the calling line, and means for preventing the calling subscriber from hearing said tone.

10. In a telephone system, a plurality of

subscribers' lines of different character, automatic switching equipment for enabling the subscriber on any line to extend a connection to an operator's position, means for giving
5 the operator a characteristic signal only when the calling line is of a particular character, and means for preventing the calling subscriber from hearing said signal.

11. In a telephone system, a plurality of
10 subscribers' lines of different character, means for extending any line when calling to an operator's position, automatic means for giving the operator a distinctive tone indicative of the character of the calling
15 line, and means for preventing the calling subscriber from hearing said tone.

12. In an automatic telephone system, a plurality of subscribers' lines, certain of said lines having restricted service, automatic switching equipment for enabling the
20 subscriber on any line to extend connection to an operator's position, means for giving the operator a distinctive tone when the calling line is a restrictive service line, and
25 means whereby the operator is obliged to listen for said tone before she can answer the call.

13. In a telephone system, a plurality of subscribers' lines of different character, automatic switching equipment for enabling the
30 subscriber on any line to extend a connection to an operator's position, automatic means for giving the operator a distinctive tone indicative of the character of the calling
35 line, and means whereby the operator is obliged to listen for said tone before she can converse with the calling subscriber.

14. In a telephone system, a plurality of subscribers' lines of different character, automatic switching equipment for enabling the
40 subscriber on any line to extend a connection on an operator's position, means for giving the operator a characteristic signal only when the calling line is of a particular
45 character, and means for compelling the operator to listen for said signal before she can converse with the calling subscriber.

15. In a telephone system, a plurality of subscribers' lines of different character,
50 means for extending any line when calling to an operator's position, automatic means for giving the operator a distinctive tone indicative of the character of the calling line, and means for compelling the operator
55 to listen for said tone before she can converse with the calling subscriber.

16. In a telephone system, a trunk line terminating in an operator's position, means
60 for connecting a calling subscriber's line with said trunk line, and means for requiring the operator to perform a plurality of operations in a definite order before she can answer the call.

17. In a telephone system, a trunk line
65 comprising two normally disconnected sec-

tions, the second section terminating in an operator's position, means for connecting a calling line with the first section, a call signal at the operator's board responsive to such connection, and means for connecting said
70 sections actuated only in response to a plurality of manual operations performed in a definite order.

18. The combination, with two conductors, of a key movable in two directions from
75 a normal position, and means for connecting said conductors when said key is moved in one direction effective only if said key has first been moved in the other direction.

19. The combination, with two conductors, of a key movable in two directions from
80 a normal position, and means for connecting said conductors effective only upon the movement of said key in both directions in a definite order.
85

20. The combination, with two conductors, of a key movable in two directions from
a normal position, circuit connections whereby said conductors may be connected by the
90 movement of said key in either direction, and means for preventing such connection if the initial movement of said key is in a certain direction.

21. In an automatic telephone system, a plurality of subscribers' lines, certain of said
95 lines having restricted service, means for extending any line to an operator's position, means for giving the operator a distinctive tone without the knowledge of the calling
100 subscriber when the calling line is a restricted service line, and means whereby the operator is obliged to listen for said tone before she can answer the call.

22. In an automatic telephone system, a plurality of subscribers' lines, certain of said
105 lines having restricted service, automatic switching equipment for enabling the subscriber on any line to extend connection to an operator's position, means for giving the
110 operator a distinctive tone when the calling line is a restricted service line, means for preventing the calling subscriber from hearing said tone, and means whereby the operator is obliged to listen for said tone before
115 she can answer the call.

23. In a telephone system, a plurality of subscribers' lines of different character, automatic switching equipment for enabling the
120 subscriber on any line to extend a connection to an operator's position, automatic means for giving the operator a distinctive tone indicative of the character of the calling line, means for preventing the calling subscriber from hearing said tone, and means whereby
125 the operator is obliged to listen for said tone signal before she can converse with the calling subscriber.

24. In a telephone system, a plurality of subscribers' lines of different character, automatic switching equipment for enabling
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the subscriber on any line to extend a connection to an operator's position, means for giving the operator a characteristic signal only when the calling line is of a particular character, means for preventing the calling subscriber from hearing said signal, and means whereby the operator is obliged to listen for said signal before she can converse with the calling subscriber.

- 10 25. In a telephone system, lines of different character, a recording operator's position, means for extending one of said lines to said operator's position, a key for determining the character of the calling line, a
15 signal for indicating an unanswered call, means controlled by said key for retiring said signal, another signal for indicating a waiting call, means controlled by said key for displaying said second signal, and means

controlled by said calling subscriber for 20 maintaining said second signal.

26. In a telephone system, lines of different character, a recording operator's position, means for extending one of said lines to said operator's position, a key for determining the character of the calling line, a 25 signal for indicating an unanswered call, means controlled by said key for retiring said signal, another signal for indicating a waiting call, means controlled by said key 30 for displaying said second signal, and means independent of said key for maintaining said second signal.

Signed by me at Chicago, Cook county, State of Illinois, this 19th day of October, 35 1916.

BERNARD D. WILLIS.