

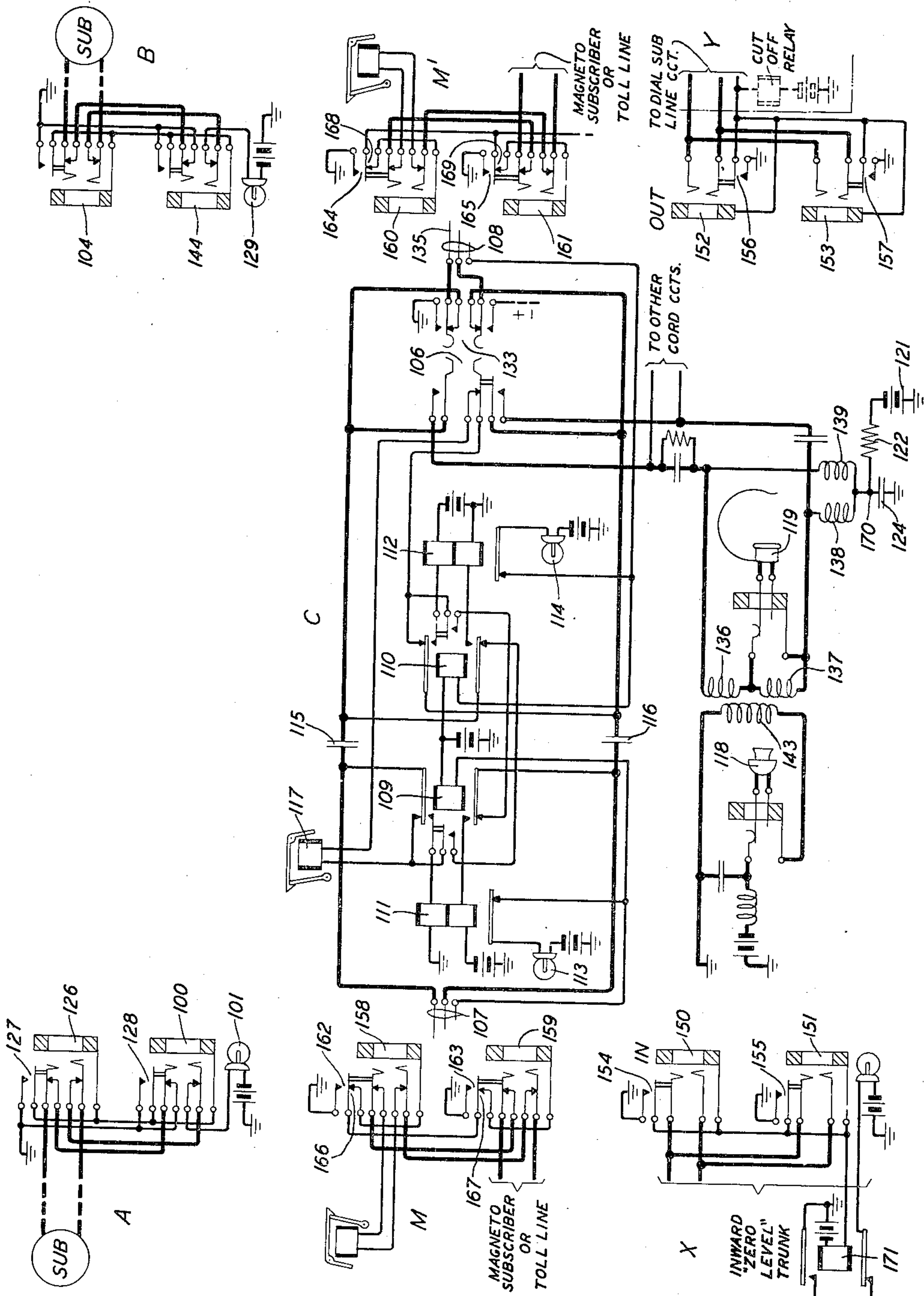
Nov. 28, 1939.

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2,181,668

TELEPHONE SWITCHBOARD

Filed June 16, 1938



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2,181,668

TELEPHONE SWITCHBOARD

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Application June 16, 1938, Serial No. 214,078

4 Claims. (Cl. 179—52)

This invention relates to telephone systems and more particularly to manually operated multiple switchboard systems for interconnecting lines of like or unlike character.

United States Patent 1,903,998 to R. W. Harper, discloses a universal cord circuit for indiscriminately interconnecting common battery and magneto (local battery) lines in which the multiple jacks of the common battery lines are so arranged that when one of them is plugged into all of the jack sleeves of that line are grounded. The magneto line jacks, however, are not so arranged, the sleeves merely being connected together, thus when one end of the cord is connected to a magneto line jack, all the jack sleeves of that line are at battery potential.

The principal feature of the Harper patent is a test circuit associated with the cord and operator's telephone circuit whereby a click is heard in the operator's telephone if the tip of a testing plug is brought into contact with the sleeve of a busy line, either common battery or magneto, in other words the test circuit being so arranged that regardless of whether the tip of the testing plug is brought into contact with battery or ground a click will be heard by the operator as an indication that the line is busy. In some cases it may be desirable to make the subscriber lines of an associated dial exchange available to the switchboard operator by bridging each dial line with a connection which terminates in multiple jacks at the switchboard, along with the before-mentioned magneto lines, toll lines, etc., thus providing facilities for enabling quick interconnection between rural and toll lines and dial subscriber in the same exchange area. Due to the fact that the sleeve circuits of dial subscribers' lines are normally at battery potential, the sleeves of such lines when multiplied at the switchboard, present a battery condition and in order to enable such lines to function properly with cord circuits of the type shown in the Harper patent, it is necessary to modify the cord circuit so that no busy indication will be given if the tip of a testing cord is brought into contact with the sleeve of an idle line. When this is done, however, a busy rural line multiple as indicated by jacks 105 and 145 of the above patent will test idle, although busy, due to the fact that the cord circuit, as now modified, does not recognize battery potential as a busy condition and some means must be devised to cause the rural line multiple to present the same busy condition as the other lines appearing at the switchboard.

An object of the invention is to operatively in-

terconnect dial and manual common battery or rural subscribers' lines by means of universal manual switchboard cord circuits.

A feature of the invention whereby the above object is attained resides in so arranging the multiple jacks of rural and toll lines that when a cord circuit plug is inserted in one of the jacks, ground will be connected to all the sleeves of the other multiple jacks of the line, but not to the sleeve of the jack in which the plug is inserted.

The invention will be understood from the following description when read in connection with the accompanying drawing, in which C is a switchboard universal cord circuit identical with the cord circuit disclosed in United States Patent 1,903,998 to R. W. Harper except for the omission of means (relay 120) for connecting ground to a point intermediate retardation coils 138 and 139, resistance 122 and condenser 124.

A and B are common battery subscriber's lines identical with the lines of stations A and B shown in the Harper Patent 1,903,998, M and M' are magneto or local battery subscribers' lines whose multiple jacks are arranged in accordance with the present invention, X is the inward end of a dial office "zero level" trunk for incoming calls from dial subscribers, and Y is a line circuit connected in multiple with a dial subscriber's line for outgoing calls.

As described in the Harper Patent 1,903,998 the jacks 100 and 126 are arranged with auxiliary contacts 127 and 128, and jacks 104 and 144 with similar unnumbered contacts, so that when a plug is inserted in any jack of any one of these lines all the jacks' sleeves of that line, including the sleeve of the jack plugged into, are grounded. This arrangement makes all the vacant jacks of the line test-busy and operates the sleeve relay 109 in the cord circuit to supply talking battery to the line.

With respect to the incoming line X from the dial office it is necessary that the sleeve circuit be connected either to battery or ground as a relay therein, 171, must be operated, in a well-known manner, when the operator inserts a plug in one of the jacks, in order to extinguish the line lamp, release the line relay, and hold the connection.

As this is a common battery line which functions in the same manner with respect to the cord circuit as the common battery subscribers' lines A and B, the jacks 150 and 151 are arranged with auxiliary contacts 154 and 155 in the same manner as jacks 100, 126, 104 and 144, and the sleeve cut-off relay 171 is connected to battery

whereby the insertion of a plug (107) in either jack will ground the sleeve circuit of both the line and cord thereby operating both sleeve relays 171 and 109.

5 Since the outgoing line Y, terminating in multiple jacks 152 and 153, is connected in multiple with a dial subscriber's line circuit, the sleeve conductor of which is connected to battery through the usual cut-off relay, and the sleeve
10 of the operator's cord circuit is also at battery potential, through the usual cord sleeve relay, it is obviously necessary that the sleeve of the jack be grounded when the cord circuit is connected to it in order to operate the cut-off relay
15 in the subscriber's line circuit at the dial office and also to operate the sleeve relay in the cord, and further, as the sleeves of both jacks are at battery potential when idle, the busy-test circuit of the cord, as described in the Harper patent, must be modified in order that it will not
20 give a busy indication if the tip of the plug encounters battery potential on one of the jack sleeves which is accomplished in a manner heretofore described, i. e., by omitting a ground connection, when the operator's transmitter 118 is
25 in the jack, at the point 170 intermediate the retard coils 138, 139, condenser 124 and resistance 122, originally shown and described in Patent 1,903,998, and consequently, in order to make
30 the vacant multiple jacks of a busy line test-busy they must also be grounded when a plug is connected to the line. This is accomplished in the same manner as in the case of jacks 126, 100,
35 104 and 144, i. e., by providing auxiliary contacts 156 and 157, one on each jack, which are closed when a plug is inserted, thereby connecting ground to both the sleeve of the jack plugged into and also the sleeves of all the other multiple jacks associated with this line.

40 By arranging the jacks of lines A, B, X and Y in the manner described, proper operation of the cord and line circuits will follow when the cord is connected to any one of the respective jacks.

It will be noted that a grounded jack sleeve
45 is a busy indication to which the operator's busy test circuit of the cord responds as fully described in the Harper patent heretofore mentioned.

It is also assumed that there is still another
50 type of line terminating at the switchboard, i. e., magneto or local battery lines M and M'. These lines, due to the fact that the stations furnish their own talking battery, require a different cord circuit condition than the lines A, B, X and Y
55 which receive their talking battery from the cord circuit and whereas, when the cord is connected to any of the lines A, B, X or Y, the cord sleeve is grounded by the jack sleeves to operate the respective cord sleeve relays 109 and 110 to supply talking battery to the line, when the cord
60 is connected to one of the lines M or M' no talking battery is required and consequently the sleeves of the line must be freed of ground in order not to operate the cord sleeve relay. However, when the cord is connected to a magneto
65 line jack the other multiple jacks of the line must test busy, i. e., must be grounded, which is the condition before determined by the lines A, B, X and Y. Hence, the insertion of a cord circuit plug 107 or 108 in a jack 158, 159, 160 or
70 161 of either line M or M' must cause all the jack sleeves of that line, except the sleeve of the

jack plugged into, to be grounded. This is accomplished in accordance with the present invention by arranging the jacks with auxiliary make contacts 162, 163, 164 and 165 and break contacts 166, 167, 168 and 169 so that the insertion
5 of a plug in any jack, for example 160, will open the normally closed contact 168 thereby isolating the sleeve of that jack from the other jack sleeves of that line (M') and will close contact
10 14 thereby connecting ground to the sleeve of jack 161 by way of the contacts 169 of that jack, which contacts remain closed.

From the foregoing it will be understood how a uniform busy condition can be applied to magneto rural or toll lines, manual common battery
15 lines, multiples of dial subscribers' lines, and "zero level" trunks from dial equipment which terminate at a switchboard for indiscriminate interconnection by a universal cord circuit of the type disclosed in Patent 1,903,998.

What is claimed is:

1. In a busy test system, a telephone switchboard, lines terminating in multiple jacks at the switchboard, a cord circuit arranged for testing
25 the busy condition of and for interconnecting said lines, a source of busy potential, and means responsive to the connection of said cord circuit to a jack of one of said lines to connect said source to the sleeves of all the jacks of that line except the sleeve of the jack to which the cord
30 is connected.

2. In a multiple switchboard busy test system, a cord circuit terminating in a plug, a plurality of multiple connected jacks each having a sleeve
35 element, a source of test potential, and means associated with each jack responsive to insertion of said plug therein to connect said source of test potential to all the multiple sleeve elements except the sleeve element of the jack in which the plug is inserted.

3. In a multiple switchboard system, a plug and a plurality of multiple connected jacks each having a sleeve element, and means associated
45 with each jack responsive to insertion of the plug therein to connect ground to all the multiple sleeve elements except the sleeve element of the jack in which the plug is inserted.

4. In a busy test system a telephone switchboard, common battery subscribers' lines terminating in multiple jacks at the switchboard, local
50 battery lines also terminating in multiple jacks at the same switchboard, a universal cord circuit thereat for connecting to any of said lines and normally conditioned for operation with local battery lines, an operator's receiver adapted to be associated with said cord, means for energizing said receiver when the tip conductor of an associated cord is connected to ground, means responsive to the connection of said cord to a common
55 battery line jack to connect ground to all the multiple sleeves of that line, including the sleeve of the jack with which the cord is connected, means controlled over the sleeve of said cord responsive to ground on the jack sleeve to condition the cord for common battery operation, and means responsive to connection of said cord to a local battery line jack to ground
60 all the multiple jack sleeves of that line except the sleeve of the jack with which the cord is connected.

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