

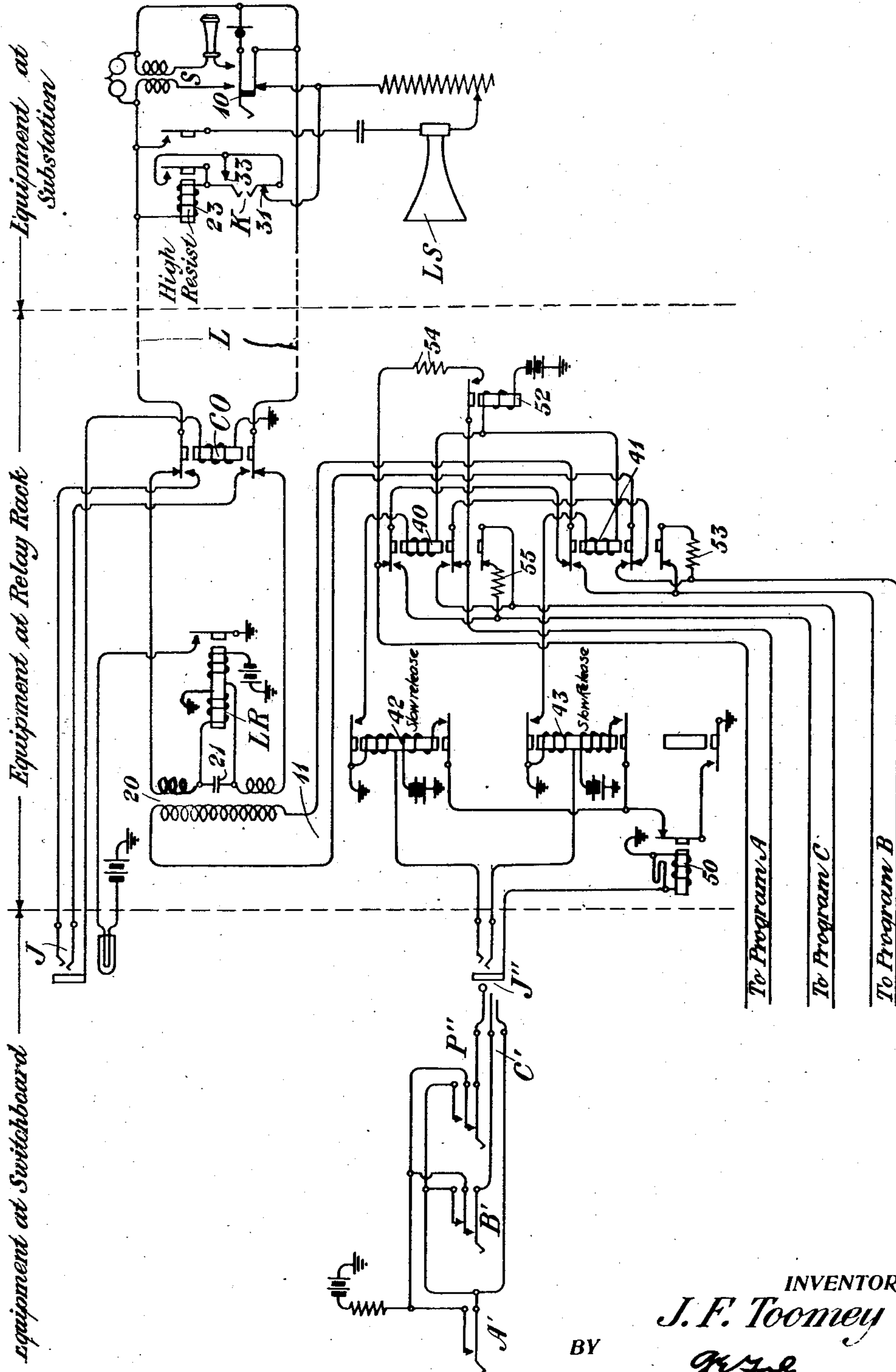
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PROGRAM SELECTING CIRCUITS

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PROGRAM-SELECTING CIRCUITS.

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This invention relates to transmission systems for sending programs over wires and more particularly to arrangements for the selection of programs for such systems.

5 Where wire lines, such as ordinary telephone lines, for example, are used for the transmission of entertainment programs, such as news, lectures, concerts and the like, it is desirable that some arrangement be
10 provided whereby the subscriber may automatically select the particular program which he desires to hear. In accordance with the present invention it is proposed to
15 accomplish this result by providing a selective switching arrangement at the central office for connecting the terminals of the subscriber's line to the terminals of any one of a number of trunks each leading to a different program. Controlling devices are
20 also provided at the central office whereby the operator, upon being informed by a subscriber as to the program desired, may control the switching arrangement to select the program.

25 By the use of a selective switching arrangements for selecting programs it becomes immaterial whether the program be transmitted at voice frequencies or carrier frequencies and it also becomes immaterial
30 whether several programs be transmitted at the same frequency or whether different carrier frequencies are used for different programs. The switching arrangement employed may be of any well known type, but
35 as herein disclosed it comprises a relay selecting device for making the desired connections.

The invention will now be more fully understood from the following description
40 when read in connection with the accompanying drawing, the figure of which illustrates a preferred embodiment of the invention.

Referring to the drawing, L designates an
45 ordinary telephone transmission line terminating in the usual subscriber's set S at one end and terminating at the central office in the switching jack J. Normally, the telephone line is connected over the contacts of
50 the cut-off relay CO to a transformer 20 whereby the line is associated with conductors 11 leading to a relay switching arrangement for connecting the line with the desired program. The line relay LR has its
55 windings connected on either side of a con-

denser 21, which is interposed between the two halves of the secondary winding of the transformer 20. The cut-off relay CO is so arranged that when it is operated the line L is disconnected from the transformer 20
60 and hence from the line relay LR, the line being then connected directly to the tip and ring terminals of the jack J.

In order that the line may be used for program transmission during such time as
65 it is not being used for ordinary telephone purposes, a program receiver, such as the loud speaker LS at the subscriber's station is provided, said receiving device being bridged across the line through the back
70 contact of the switchhook 10 and through the contact of a high resistance relay 23. The relay 23, which controls a circuit of the loud speaker LS, is so arranged that it will
75 be operated to connect the loud speaker upon the momentary actuation of the non-locking key K to close its contact 33. On the other hand, the relay 23 is so arranged that it will
80 be released to disconnect the loud speaker upon taking the receiver from the switchhook to make the call, or upon the operator inserting the plug into one of the multiple
jacks to call the subscriber. It may also be released by the subscriber when he no
85 longer desires to hear a program by means of a contact 31, controlled by the key K.

At the central office, a plurality of trunks leading to different programs, indicated on
90 the drawing as A, B and C, are provided. In order to connect any particular trunk to the line over the conductors 11, a relay selective arrangement is provided comprising
relays 40 and 41, controlled by selective relays 42 and 43. Normally, the trunk leading
95 to program A is connected to the line L over the contacts of the relays 40 and 41. Upon the operation of relay 40, however, program A will be disconnected from the line and program C will be connected instead. If relay 41 is actuated, program B
100 is connected to the line exclusively. In order to control these relays a jack J'' is arranged at the central office and the operator is provided with a controlling circuit comprising keys A', B' and C', which may
105 be associated with the jack J'' through the plug P''.

Further details of the apparatus will be clear from the description of the operation, which is as follows: When the line L is not
110

in use for telephonic purposes and the subscriber desires to receive a program such, for example, as the program B, the receiver will be moved from the switchhook 10 of the substation set in the usual manner in making a telephone call, thereby energizing the line relay LR to signal the operator. The operator then plugs into the jack J in the usual manner, thereby energizing the cut-off relay CO and connecting the line L to the tip and ring terminals of the jack J. Upon ascertaining that the subscriber wants program B, the operator withdraws the plug of the cord circuit from the jack J, thereby releasing the cut-off relay CO and again connecting the line L through the transformer 20 to the conductors 11. The operator at the same time inserts the plug P'' of the control circuit in the jack J'' and momentarily actuates the key B'. This closes a circuit from battery, over the middle and upper contacts of key B', over the sleeve conductors of the plug P'' and jack J'' and through the winding of the relay 50 to ground. Relay 50, upon being momentarily energized by the momentary operation of the key B', opens the locking circuit of relay 42 or relay 43, in case either of these relays has been operated in making a previous selection. This results in the deenergization of relay 40 or 41 in case either of these relays has been actuated, thereby restoring the normal connection of the conductors 11 to the program A.

The momentary depression of key B' also closes a circuit from battery, over the middle and lower contacts of said key, over the ring conductors of the plug P'' and jack J'' and through the upper winding of the relay 43 to ground. Relay 43 is energized and at its lower contact completes a circuit through its locking winding and over the back contact of relay 50 to ground, this circuit being completed as soon as the relay 50 releases upon the release of the key B'. The relay 43 is slightly slower in releasing its armature than the relay 50 and consequently its locking circuit is completed before the upper winding is deenergized. At its upper contact relay 43 closes a circuit through relay 41 in series with relay 52. Relay 41 disconnects conductors 11 from program A and connects said conductors directly to program B. The circuit of the resistance 53, bridged across the trunk leading to program B, is at the same time opened. Relay 52, on the other hand, bridges a resistance 54 across the trunk leading to program A so that the trunk will have the proper impedance.

The operator, of course, withdraws the plug P'' from the jack J'' as soon as the selection is made and the connection of the line L to the program B will remain in the condition just described, regardless of what may take place in connection with the line

L, unless the subscriber calls up the operator in the manner already described and orders up a new connection. If the subscriber, for example, should order the program C connected to his line the operator will insert the plug P'' into the jack J'' as before and operate the key C'. This closes a circuit from battery over the middle and upper contacts of said key and over the sleeve conductors of the plugs P'' and jack J'', through the winding of the relay 50 to ground. Relay 50 is momentarily energized as before and opens a locking circuit of the relay 43 so that said relay is released, thereby opening the circuit of relays 41 and 52 and restoring said relays to normal. The conductors 11 are now connected to the trunk leading to program A and the resistance 54 is no longer bridged across said trunk, while the resistance 53 is again bridged across the trunk leading to program B.

The actuation of the key C' at the same time closes a circuit from battery, over its middle and lower contacts, over the tip conductors of plug P'' and jack J'', through the upper winding of relay 42 to ground. Relay 42 is energized and locked up through its lower winding in series with the back contact of relay 50 as soon as the relay 50 is deenergized. The relay 42 is slightly slower in releasing its armature than relay 50, thereby causing the locking circuit of the relay 42 to be closed before the upper winding of said relay is deenergized. At its upper contact relay 42 closes a circuit of relays 40 and 52. Relay 40 connects conductors 11 over the back contacts of relay 41 and over the front contacts of relay 42 to the trunk leading to program C. The circuit of the resistance 55, which is normally bridged across said trunk, is at the same time opened. Relay 52 at the same time bridges resistance 54 across the trunk leading to program A so that the impedance of the trunk A will not be changed by disconnecting the line therefrom.

With the circuit in this condition the operator may select program A by actuating the key A' of her controlling circuit when the plug P'' is inserted in the jack J''. This closes a circuit from battery, over the contacts of said key and over the sleeve conductors of the plug P'' and jack J'' through the winding of the relay 50 to ground. Relay 50 unlocks the relay 42, which in turn releases relays 40 and 52. Relay 40 disconnects the conductors 11 from the program C and connects said conductors over its back contact to the trunk leading to program A, at the same time bridging the resistance 55 across the trunk leading to program C. Relay 52 in the meantime disconnects the bridge including the resistance 54 from the trunk leading to program A.

As soon as the subscriber has requested

the central operator to connect his line to a particular program, he immediately hangs up his receiver and momentarily actuates the key K to close its contact 33. This completes a circuit from battery, through the right-hand winding of the line relay LR, over the lower back contact of the cut-off relay CO, ring conductor of the line, over the back contact of the switchhook 10, over contact 31 of the key K and over contact 33 of said key, through the high resistance winding of relay 23, over the tip conductor of line L, upper back contact of relay CO and through the right-hand winding of the line relay LR to ground. The line relay is not energized in series with the high resistance of the relay 53 but relay 23 is energized and completes a locking circuit for its winding in parallel with the contact 33 of the key K so that the relay 23 remains energized after the key is restored. At its outer front contact relay 23 bridges the loud speaker LS across the line so that the subscriber is able to hear the program ordered as soon as the operator has made the connection in the manner previously described.

If, while the circuit is being used for receiving a program a telephone call should come in for the subscriber, the operator inserts the plug of her cord circuit into the jack J in the usual manner, thereby energizing the cut-off relay CO. The cut-off relay CO shifts its armatures from its back contacts to its front contacts, thereby connecting the line L to the tip and ring conductors of the jack J. This momentarily disconnects the battery supply to the relay 23 through the line relay LR and permits the relay 23 to be deenergized and unlocked before battery is again supplied to the line L through the cord circuit. The relay 23, upon being unlocked, disconnects the loud speaker LS from the line. The subscriber, upon being rung, then moves his receiver from the switchhook and the conversation takes place in the usual manner. At the end of the conversation the subscriber hangs up and the operator withdraws the plug from the jack, thereby releasing the cut-off relay CO. The subscriber may now connect his loud speaker to the line by momentarily actuating the key K to close the contact 33, as already described.

If the subscriber desires to make a call while the line is being used for receiving a program he moves his receiver from the switchhook in the usual manner. The circuit of the relay 23 is open at the back contact of the switchhook so that the relay 23 is unlocked and the loud speaker LS is disconnected. A low resistance circuit is completed through the subscriber's set for the line relay LR, thereby energizing said relay to call the attention of the operator. The operator then plugs in, operating the cut-off relay CO and connecting the line L to the jack J in the usual manner. The conversation proceeds as before and at the end of the conversation the subscriber hangs up his receiver and the operator withdraws the plug from the jack J. The subscriber may then again receive the program by momentarily closing the contact 33 or key K.

When the subscriber no longer desires to hear a program he merely actuates the key K to momentarily open the contact 31, thereby releasing and unlocking the relay 23, which disconnects the loud speaker LS from the line. The connection of the line to the program previously selected remains as before, however, until such time as the subscriber orders a new connection.

It will be obvious that the general principles herein disclosed may be embodied in many other organizations widely different from those illustrated without departing from the spirit of the invention as defined in the appended claim.

What is claimed is:

In a wired program system, a line extending from a central office to a program subscriber's station, a plurality of trunks at said central office upon which programs may be impressed, resistances to simulate the impedance of said line normally connected to said trunks, and selectively operated relay means for establishing connections between said line and any one of said trunks and to disconnect the resistance from the trunk to which connection is made.

In testimony whereof, I have signed my name to this specification this 7th day of December, 1923.

JOHN F. TOOMEY.