

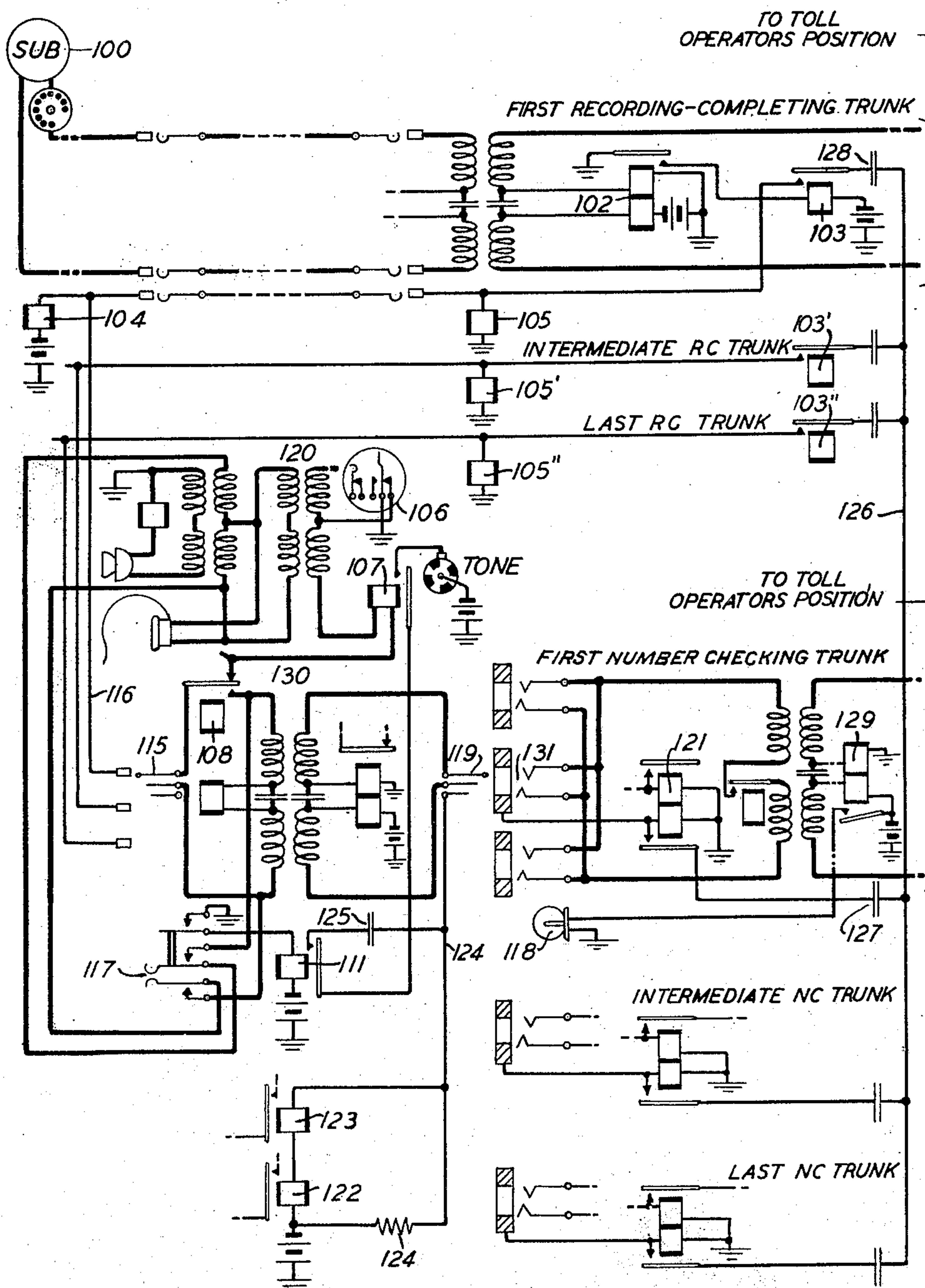
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TELEPHONE SYSTEM

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TELEPHONE SYSTEM

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This invention relates to telephone systems and particularly to systems wherein special character service is provided.

The object of the invention is to provide means whereby a toll operator, upon answering the call of a subscriber whose line has been automatically extended to her position over a recording-completing trunk, may be the more expeditiously informed of the identity of such a calling line.

One of the more prevalent and widely used means heretofore employed for accomplishing this object has been to have the toll operator call a special service operator at the DSA switchboard over a so-called number-checking trunk and set up a condition in her cord and position wherein a tone is placed on the sleeve conductor of the recording-completing trunk to the associated test pin of the subscriber's line at the DSA switchboard. The A operator then checks for the tone by touching the tip of the cord to the test pin; this condition being maintained until the A operator has completed the check and signaled the results of the check to the toll operator over the number-checking trunk after which the tone is removed by the toll operator from the recording completing trunk.

It has been found, however, that the tone on the sleeve conductor is very likely to be induced on other sleeve conductors in the same cable owing to the fact that since it is a single conductor, it cannot be transposed with another as is the case in a two-conductor circuit.

It has also been found that, to a limited extent, the various tones on the sleeve conductors find their way to the talking circuits thereby giving rise to undesirable noise during conversation.

It has also been found undesirable to leave the connection of the tone to the trunk under the control of the toll operator as, in some cases, it may not be removed immediately after receiving the result of the check from the A operator, in which event the presence of tone on the trunk test pin prolongs the period of induction to other sleeve conductors as well as exposes the A operators to subsequent incorrect checks.

Accordingly, it is an object of the present invention to provide new and improved arrangements whereby the connection of tone to the sleeve conductor is placed under the immediate control of the A operator and made effective only when the said operator is actually testing the test pin of the subscriber's line with the tip of the cord, and disconnect the tone when the pin and cord tip are not in contact. In accordance with the invention, therefore, one specific embodiment of which is disclosed herein by way of illustration, this is accomplished in the following improved manner:

A network circuit is provided which interconnects all of the recording completing trunks with the number-checking trunks and the checking tone is applied to this network only at times when some A operator is connected to a number-checking trunk and is actually testing a required trunk associated with a subscriber's line terminal. Under these conditions a relay is provided at the operator's position circuit which operates only when the tip of the cord is touching the test pin and thereby connects a tone to the sleeve circuit of the answering end of the cord which is then being used. Since the answering portion of said cord is connected to the number-checking trunk, the tone is connected to the network mentioned above. If the toll operator has the proper conditions set up, the network is, in turn, extended to the sleeve connection of the recording completing trunk which extended the calling line to the toll position, to the corresponding test pin of said subscriber's line at the A board. Touching the tip of the calling end of the cord to the test pin completes the circuit of the position relay and through its contacts is closed a tone circuit to the test pin so that the A operator hears the tone if the test pin tested is the one associated with the line of the calling subscriber whose number has been given to her by the toll operator. As soon as the tip of the cord plug is removed from the test pin, the circuit of the position relay is opened and the tone is removed from the sleeve connection even though the toll operator may continue to

maintain the conditions necessary at her position for obtaining a check. This arrangement, therefore, applies the checking tone only momentarily to the recording completing trunk and thereby reduces to a minimum the period during which there may be induction into adjacent circuits or during which false checks may be made.

A clearer conception of the scope and purpose of the invention will be obtained from a consideration of the following description and claims taken in connection with the attached drawing which shows such parts of a subscriber's line extension over a toll recording trunk together with such parts of a number-checking trunk interconnected therewith, the necessary cord for number checking and operator's telephone circuit as is necessary for a complete understanding of the invention. One embodiment of the network interconnecting a plurality of recording completing trunks and a plurality of number-checking trunks is also shown.

Subscriber 100, after removing his receiver from the switchhook, dials a toll operator impulse code which causes responsive automatic switches to extend his line to a toll operator's position in the known manner. The toll recording trunk extending from the last switching stage to the operator's position terminates in a jack in that position with a supervisory lamp associated therewith so that the seizure of the trunk by the prior switching stage causes the lighting of the lamp to indicate the presence of a call. The operator takes up the call with a regular holding or toll cord in the known manner and ascertains from the calling subscriber the fact that the line is to be further extended into an area for which a toll ticket and a verification of the calling line number is necessary. Under such circumstances, and to obtain this check, the operator first obtains the number of the calling line from the subscriber and then depresses a positional key which, in cooperation with the toll cord talking key, causes circuits to be closed for the operating relay 102. Relay 102 closes an obvious circuit for relay 103 which also operates.

The operator further takes into use one of a group of number-checking trunks NC which are available at her position and which connect said position with the special or "A" operator's position where the number-checking is to take place. Relay 129 is operated from the toll position in the known manner and this relay causes circuits to be closed which light lamp 118 at the "A" position to indicate to the checking operator thereat that service is required on the trunk associated with said lamp. The "A" operator, in response to the lighting of the lamp, inserts the answering plug 119 of a cord, such as 130, into the answering jack 131. Thereafter

the "A" operator depresses talking key 117, causes thereby the operation of relay 111 over an obvious circuit and further causes her telephone circuit 120 to be connected through the cord and across the talking conductors of the number-checking trunk whereupon she learns from the toll operator the number which is to be checked. The insertion of plug 119 into the jack 131 of the number-checking trunk closes a circuit from battery through the winding of relays 122 and 123 in series and resistance 124 in parallel therewith, conductor 124, sleeves of plug 119 and jack 131, lower winding of relay 121, to ground. Relay 121 operates and performs functions which are described hereinafter. The "A" operator is now ready to verify the number and, to accomplish this, touches the tip 115 of the calling plug of the cord to the test pin of that subscriber's line whose number was given by the toll operator. As is well known, this test pin is an extension of the sleeve conductor of the subscriber's line to the "A" position. The connection of the tip 115 to the sleeve pin of any line causes a circuit to be closed from battery through the cutoff relay 104, conductor 116 and test pin, tip 115, top back contacts of relay 108, winding of relay 107, right bottom winding of induction coil 120 of the operator's telephone circuit, off-normal contacts of dial 106, to ground. Relay 107 operates and connects a source of tone to the contacts of relay 107. With relays 111 and 121 operated, the source of tone is further extended from the contacts of relay 107 to the contacts of relay 111, through condenser 125, conductor 124, sleeves of plug 119 and jack 131 of the number-checking trunk, bottom contacts of relay 121, condenser 127, common conductor 126 which connects in parallel all the completing trunks through the contacts of their respective relays 103, condenser 128, contact of relay 103, to ground through the winding of coil 105. If, now, the number given by toll operator to the "A" operator corresponds to the number of the line from which the call is being made and to whose test pin the "A" operator has connected the tip 115 of the checking cord, the tone circuit above described is further extended over the established sleeve connection of said line, conductor 116, over a previously described circuit to ground on the contacts of dial 106. The tone is then further induced in the well known manner through the circuits of the "A" operator's telephone set and causes her to hear the tone which constitutes the check to be made and verifies the fact that the number as given to her by the toll operator checks with the number of the line from which the call is being made. Should the number given by the subscriber be other than that of the line from which he is calling, the operator will have connected the tip of the plug to the test pin of the wrong line and

consequently, under such circumstances, the tone circuit will not be extended over the sleeves of the established connection to ground on the contacts of dial 106, but will be completed only to coil 105 without any extension beyond that point, in which case the operator will not hear the tone, indicating thereby that the number as given is incorrect.

When the operator removes tip 115 from the test pin, relay 107 releases and the tone circuit is disconnected from the sleeve connection. The tone, therefore, is connected to the sleeve wire only during the momentary interval when tip 115 is connected to the pin of the subscriber's line and not at any other time. In this way the possibility of inducing the tone in other conductors carried in the same cable is substantially reduced.

After the operator is satisfied that she has heard the tone, an OK signal is transmitted by the "A" operator to the toll operator over the number-checking trunk in the well-known manner after which the special "A" operator withdraws plug 119 from the number-checking trunk, while the toll operator proceeds to extend the subscriber's line in the desired direction.

What is claimed is:

1. In a telephone system, a calling line having an identifying conductor, an operator's position, a first trunk line for extending said calling line to said operator's position, said trunk line having manually controlled means, a second trunk line capable of operative interconnection with said first trunk line through said manually controlled means, a source of tone, and means responsive to connections with said identifying conductor and with said second trunk line for applying said source of tone to said identifying conductor through said manually controlled means of said first trunk line.

2. In a telephone system, a calling line having an identifying conductor, an operator's position, a first group of trunk lines, each of said trunk lines having manually controlled means, means for extending said calling line to said operator's position over one of said trunk lines, a second group of trunk lines, each of said trunk lines of said second group being capable of operative interconnection with each trunk line of said first group through their respective manually controlled means, a source of tone, and means responsive to connections with the identifying conductor of said calling line and with a trunk line of said second group of applying said source of tone to said identifying conductor through said manually controlled means of said trunk line of said first group which extended said calling line to said operator's position.

3. In a telephone system, a calling line having an identifying conductor, an operator's position, a first trunk line for extending said

line to said operator's position, said trunk line having manually controlled means, a second trunk line capable of operative interconnection with said first trunk line through said manually controlled means, a source of tone, a connecting cord, and means responsive to the operative connection between said first and said second trunk lines and to a connection of said cord with said second trunk line and with said identifying conductor for connecting said source of tone to said identifying conductor through said cord, said first trunk line and said second trunk line.

4. In a telephone system, a calling line having an identifying conductor, an operator's position, a first trunk line for extending said calling line to said operator's position, manually controlled means in said first trunk line, a second trunk line capable of operative interconnection with said first trunk line through said manually controlled means, a source of tone, a connecting cord, an operator's telephone circuit operatively connected to said cord, and means responsive to an operative interconnection of said second trunk line with said first trunk line through said manually controlled means and to a further connection of said cord with said second trunk line and with said identifying conductor for connecting said source of tone to said operator's telephone circuit through said cord said first and second trunk lines, and said identifying conductor.

5. In a telephone system, a calling line having an identifying conductor, an operator's position, a trunk line for extending said calling line to said operator's position, manually controlled means in said first trunk line, a second trunk line capable of operative interconnection with said first trunk line through said manually controlled means, a source of tone, a cord for connection with said second trunk line and with said identifying conductor, a relay and an operator's telephone circuit operatively associated with said cord, means responsive to the connection of said cord with said identifying conductor for operating said relay, and means responsive to the operation of said relay for connecting said source of tone to said operator's telephone circuit through said cord, said second trunk line, said first trunk line, and said identifying conductor.

6. In a telephone system, a first group of trunk lines for extending subscriber connections, a second group of trunk lines, a source of tone, a network of transmission circuits extending between each of the trunk lines of said first group and each of the trunk lines of said second group, and manually controlled means responsive after the extension of a subscriber connection over a trunk line of said first group and to a further connection between a trunk line of said second group and

said trunk line of said first group for establishing a tone circuit from said source of tone to said trunk line in said first group over said trunk line in said second group and
5 through said network of transmission circuits.

7. In a telephone system, a subscriber's line having an identifying conductor, an operator's cord having a telephone circuit, a first
10 group of trunk lines for extending subscriber connection, a second group of trunk lines, a source of tone, a network of transmission circuits extending between each of the trunk lines of said first group and each of the trunk
15 lines of said second group, means responsive to a connection of said operator's cord with said identifying conductor and with a trunk line of said second group for connecting said source of tone to said trunk line of said second group, and means responsive after the extension of said subscriber's line over a trunk line of said first group for extending a connection from said source of tone over said trunk line of said second group to said operator's telephone circuit over said trunk line of
25 said first group, said network of transmission circuits and said identifying conductor.

8. In a telephone system, a calling line having an identifying conductor, a first operator's
30 position, a group of trunk lines for extending subscriber connections to said first position, manually controlled means in each of said trunk lines, a second operator's position, a second group of trunk lines connecting said first position with said second position, a relay in each of said trunk lines of said second group, a network of transmission circuits extending between contacts of each of said relays in said trunk lines of said second group and each of said manually controlled means
40 in said trunk lines of said first group, means for extending said calling line to said first position over a trunk line of said first group, a source of tone, a connecting cord at said second operator's position, an operator's telephone circuit operatively associated with said cord, a relay in said operator's telephone circuit, means responsive to a connection of said cord with a trunk line of said second group
50 for operating said relay in said trunk line, means responsive to a connection of said cord with said identifying conductor for operating said relay in said operator's telephone circuit, and means responsive to the operation of said manually controlled means in said trunk line of said first group over which said calling line was extended to said second operator's position for completing a tone circuit to said operator's telephone circuit from said
60 source of tone, said relay in said operator's telephone circuit, contacts of said relay in said trunk line of said second group, said network of transmission circuits, said manually controlled means in said trunk line of

said first group and said identifying conductor.

9. In a telephone system, a calling line having an identifying conductor, an operator's position, a first trunk line for extending
70 said calling line to said operator's position, said trunk line having manually controlled means, a second trunk line, a transmission circuit network extending between said first and said second trunk lines, a source of tone, and means responsive to connections with said identifying conductor and with said second trunk line for applying said source of tone to said identifying conductor through said transmission network and said manually controlled means of said first trunk line, and further responsive to a disconnection between said identifying conductor and said second trunk line for the removal of said source of tone from said transmission network and said
85 identifying conductor.

10. In a telephone system, a calling line having an identifying conductor, an operator's position, a first group of trunk lines, each of said trunk lines having manually controlled means, means for extending said calling line to said operator's position over one of said trunk lines, a second group of trunk lines, a network of transmission circuits extending between each of the trunk lines of said first group and each of the trunk lines of said second group, a source of tone, and means responsive to connections with the identifying conductor of said calling line and with a trunk line of said second group for applying
100 said source of tone to said identifying conductor through said network of transmission circuits and said manually controlled means of said trunk line of said first group, and further responsive to a disconnection between said identifying conductor and said second trunk for the removal of said source of tone from said identifying conductor and said network of transmission circuits.

In testimony whereof, I have signed my
110 name to this specification this 5th day of January 1932.

HENRY E. PHELPS.

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