

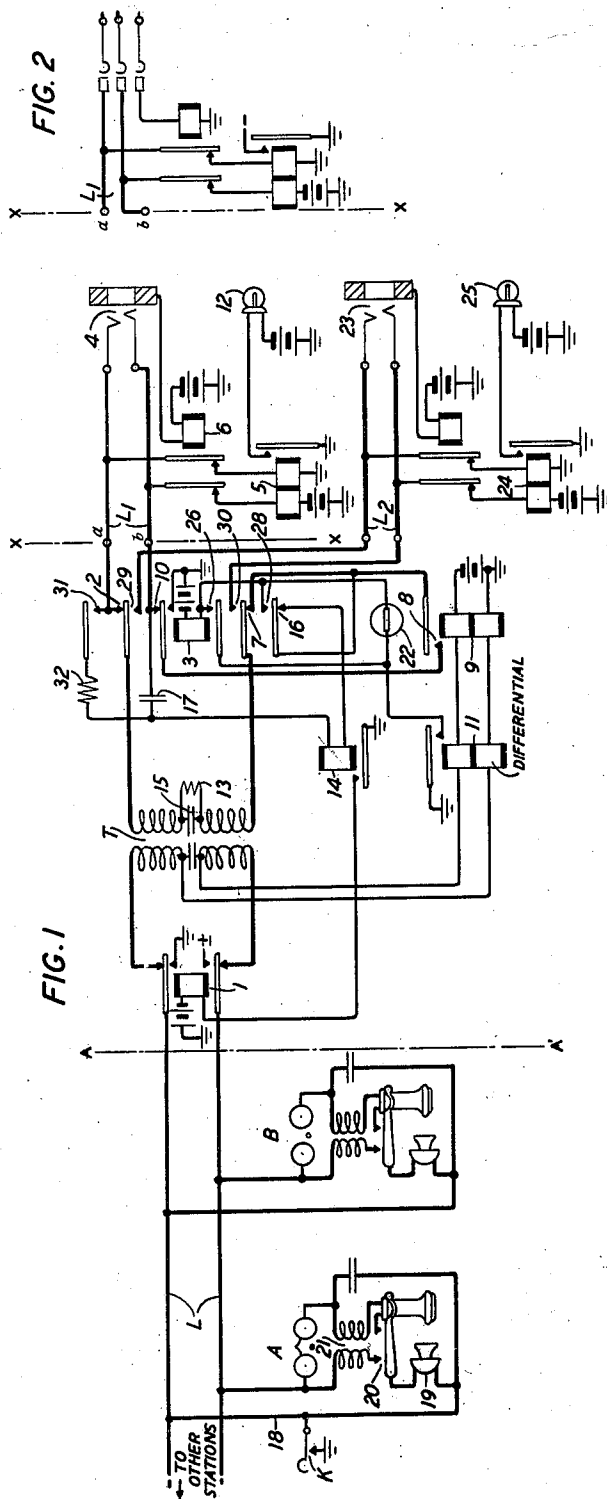
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G. SANDALLS, JR

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TELEPHONE SYSTEM

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INVENTOR
BY G. SANDALLS, JR.
H. S. Krigman
ATTORNEY

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TELEPHONE SYSTEM

George Sandalls, Jr., North Tarrytown, N. Y., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York

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This invention relates to telephone exchange systems and more particularly to subscribers' lines arranged in such a manner that a subscriber may cause his line to be transferred from its normal termination in an exchange to an auxiliary or emergency appearance before an operator in the same or another exchange.

A feature of the invention resides in an auxiliary circuit arrangement associated with the line, intermediate the line and the exchange, and controlled over the line by switching means at a subscriber's station whereby the subscriber can disconnect the line from its normal exchange termination and transfer it to a different (emergency) termination before an operator.

The invention will be understood from the following description when read in connection with the accompanying drawing,

Fig. 1 of which shows a line having normal and auxiliary appearances at an operator's switchboard, which line and one station thereof are arranged in accordance with the present invention; and

Fig. 2 shows the normal termination of the same line at an automatic central office.

Referring to Fig. 1 of the drawing, two stations A and B are shown, connected to a line L which extends to the exchange X, to the right of the broken vertical line AA', where it is shown as being normally connected to the left-hand windings of transformer T over the back contacts of ringing relay 1.

The upper right-hand windings of transformer T are shown as connected over contacts 2 of relay 3 to the tip spring of switchboard jack 4 and to ground through the right-hand winding of line relay 5, in series with the inner normal contacts of cut-off relay 6. The lower right-hand winding of transformer T is shown connected over contact 7 of relay 3 to the normally open contact 8 of relay 9 which contact, when closed, extends the circuit over contacts 10 of relay 3 to the ring spring of jack 4 and to battery in series with the left-hand winding of line relay 5 and the outer normal contacts of cut-off relay 6.

The invention will be understood from the following description of the operation of the system.

In the normal use of line L, any of the stations, either A or B, can call the operator in the usual manner by removing the receiver from the switchhook thereby closing a circuit to operate relay 9 which can be traced from ground, the lower winding of relay 9, lower winding of relay 11, upper left-hand winding of transformer T, upper back contacts of ringing relay 1, tip conductor of line L, through the transmitter, switchhook contacts and left-hand winding of the station induction coil, ring conductor of the line, lower back contact of relay 1, lower left winding

of transformer T and upper winding of relays 11 and 9 to battery. Relay 9 operates in this circuit, but relay 11, being differentially connected, does not operate.

Operation of relay 9 closes its contacts 8 thereby completing connection of the right-hand windings of transformer T to battery and ground in series with the line relay 5, which relay operates to light line lamp 12 due to the fact that the condenser, connected between the right-hand windings of the transformer T, is bridged by a resistance 13, of the order of 500 ohms. Jack 4 and line lamp 12 constitute the normal switchboard appearance line L and the call is answered by an operator in the usual manner, who extends the calling line, as desired.

If the operator desires to call any station on the line L she inserts one end of her cord circuit in jack 4 and connects ringing current over the tip and ring spring to operate relay 14 which can be traced from the tip and ring of jack 4, contacts 2 of relay 3, upper half of the right-hand winding of transformer T, condenser 15 and resistance 13 in parallel, lower right winding of the transformer, contacts 7 and 16 of relay 3, winding of relay 14 and condenser 17 to the ring spring of jack 4. Operation of relay 14 causes relay 1 to operate thereby connecting ringing current to the line L.

Emergency call

Now, let us assume, for example, that station B is engaged in a conversation on a connection involving jack 4 and subscriber A, due to an emergency, desires to obtain control of the line for the purpose of making an emergency call.

It will be noted that the subscriber's station equipment at A is identical with the other stations on the line except for the addition of a key K which, when operated, causes ground to be connected to wire 18 at the station thereby grounding the tip conductor of the line and, when the subscriber's receiver is removed from the hook, also connecting ground to the ring conductor in series with the station transmitter, contacts 20 of the switchhook, and winding 21 of the induction coil.

When the subscriber at station A, removes his receiver from the hook and actuates key K, the windings of differential relay 11 are unbalanced, due to the ground at the calling station, and this relay operates thereby completing an obvious circuit to operate relay 3, which circuit serially includes device 22, which has a high initial resistance to delay operation of relay 3 for a short interval of time thereby obviating false operations of relay 11 due to line surges, thereby operating relay 3 and causing a false transfer. Device 22, however, rapidly decreases in resistance due to the passage of current therethrough and relay 3

operates thereby opening its contacts 2 and 7 and disconnecting the line circuit from jack 4 and closing its contacts 29 and 30, thus causing the line to be transferred to the emergency line circuit L2, appearing in jack 23, which may be before the same or another operator, whereupon line relay 24 operates and causes line lamp 25 to light, which lamp may be of some characteristic color, such as red. When relay 3 operates, it closes its contact 26 thereby shunting device 22 and allowing it to restore to its normal high resistance condition.

Operation of relay 3 also closes its contacts 27 and 28 thereby completing a holding circuit for itself under control of contacts 8 of relay 9, which relay is operated as long as a receiver remains off the hook at any of the stations, including station A.

When an operator answers by inserting a plug in jack 23, the calling subscriber requests the desired extension of the line.

It will be understood that although the line L has been shown as terminating in a manual exchange, it may terminate in the line circuit of an automatic exchange, as shown in Fig. 2, in which case the stations on the line L will be equipped with pulse transmission devices, such as dials, and relay 9 will repeat the pulses to the pulse relay in the automatic equipment.

Operation of relay 3 also closes its contacts 31 thereby connecting a bridge, comprising resistance 32 and condenser 17, across the conductors of the normal line circuit L1 to provide a termination for a continuity test, in case the line normally terminates in a cross-bar office, in order to avoid a false trouble indication in case a call is extended to the line circuit L1 while the line L is transferred to the emergency line circuit L2.

While line L has been shown as having a plurality of stations, i. e., A and B, and the invention described as a means of obtaining control of the line by station A in case the line is busy, it will be understood that the line may have only a single station, A, which is equipped with an emergency key K in order that emergency calls from that station may be extended to a different operator from the one normally answering the line lamp 12. For example, the emergency lamp signal 25 and jack 23 may be located before a toll operator whereas lamp 12 and jack 4 appear before a local operator.

What is claimed is:

1. In a telephone system, an exchange, a subscriber's station, a line between said station and said exchange having a normal and also an emergency termination at said exchange, means associated with said line responsive to normal closure of the line at the station to cause said line to be extended to its normal termination, switching means at the station adapted when operated to connect ground to one side of the line, and means responsive to the joint operation of said switching means and closure of said line at the station to disconnect said line from its normal termination and transfer the line to its emergency termination.

2. In a telephone system, an exchange, a subscriber's station, an emergency switch thereat, a line between said station and said exchange having a normal and an emergency termination at

said exchange, means associated with said line responsive to normal closure of the line at the station to cause said line to be extended to its normal termination, and means responsive to joint operation of said emergency switch and a line closure at the station to transfer said line from its normal to its emergency termination.

3. In a party line telephone system, an exchange, a plurality of stations, a line interconnecting said stations extending to said exchange and having normal and emergency terminations thereat, emergency switching means at one of said stations, means associated with said line responsive to normal closure of said line at any of said stations to extend said line to its normal termination, and other means responsive to joint operation of said emergency switching means and a line closure at any of said stations to transfer said line from said normal termination to said emergency termination.

4. In a party line telephone system, an exchange, a plurality of stations, a line interconnecting said stations extending to said exchange, a first means associated with said line responsive to normal closure of said line in any one of said stations to extend the line to its normal termination, another means responsive to operation of said emergency switching means to transfer said line from said normal termination to its emergency termination, said first means being thereafter effective during said normal closure of said line at any station to maintain said line transfer to the emergency termination independent of said other means.

5. In a telephone system, a subscriber's station, an exchange, a line therebetween having normal and emergency terminations at said exchange, means associated with said line responsive to the normal operation of the subscriber's station equipment in signaling the exchange to extend said line to its normal termination, and means responsive to the connection of ground to both sides of said line to disconnect said line from its normal termination and transfer it to the emergency termination.

6. In a telephone system, a subscriber's station, an exchange, a line therebetween, said line being adapted to be terminated in said exchange in either of two line circuits, means associated with said line responsive to a normal closure of said line at said station for terminating the line to one of said line circuits, and other means associated with said line controlled thereover from said station for transferring said line to the other line circuit.

7. In a common battery telephone system, a subscriber's station, an exchange, a line interconnecting said station and exchange, a normal appearance for said line at said exchange, an operator's position, and an emergency jack and line signal appearance for said line thereat, means associated with said line responsive to a line closure at said station for extending said line to said normal appearance, emergency switching means at said station, and other means associated with said line responsive to operation of said emergency switching means to transfer said line from said normal appearance to said emergency jack and line signal appearance.

GEORGE SANDALLS, JR.