

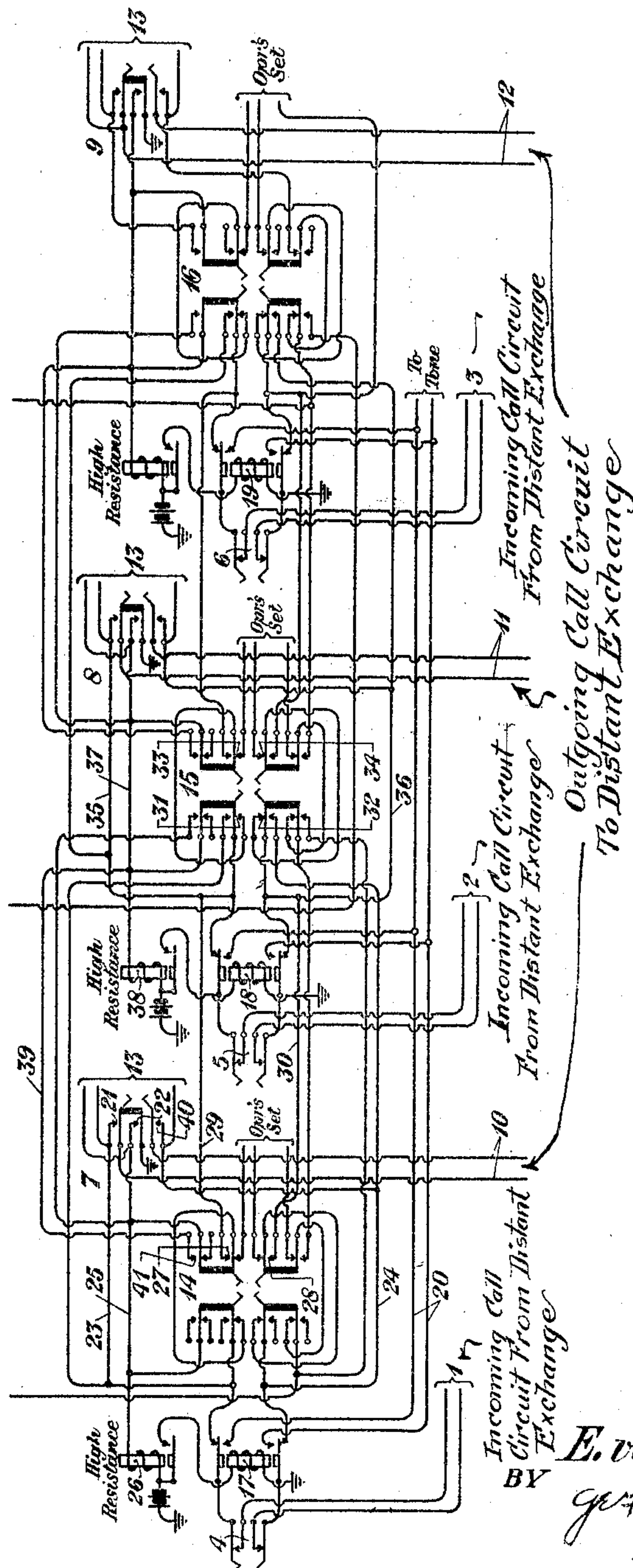
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E. VON NOSTITZ

TELEPHONE SYSTEM

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UNITED STATES PATENT OFFICE.

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TELEPHONE SYSTEM.

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To all whom it may concern:

Be it known that I, ERICH VON NOSTITZ, residing at Brooklyn, in the county of Kings and State of New York, have invented certain Improvements in Telephone Systems, of which the following is a specification.

This invention relates to telephone systems, and more particularly to call circuits for such systems over which trunk assignments may be made.

At night and other times, when the traffic conditions do not warrant the employment of a full staff of operators at all the positions at a telephone switchboard used as a tandem center, it is the practice to group several positions, so that incoming calls at these positions may be answered by one operator at a single position and completed to the terminating office by the same operator. In the case of grouped call circuit positions at a tandem switchboard, it has been necessary heretofore for the operator at a grouped position to walk back and forth from one position to another in response to incoming calls at the different positions of the group in order to obtain the number of an idle trunk to assign a calling operator and to obtain the number of an idle outgoing trunk from a called operator so as to complete the connection. It is an object of this invention to eliminate these time-consuming operations, and permit a tandem operator to answer an incoming call and communicate with the distant office where the call is completed in a simple and efficient manner. Another object of the invention consists in preventing connection of and applying a tone signal to all incoming call circuits during the interval of connection of the tandem operator and called operator, as an indication to a calling operator that the tandem operator is busy, so that confusion may be eliminated in the assignment of the trunks to the incoming operators. Other and further objects of the invention will appear more fully hereinafter.

The invention may now be more fully understood from the following description, when read in connection with the accompanying drawing, the figure of which shows a circuit diagram illustrating one embodiment of the invention.

Referring to the drawing, the numerals 1, 2 and 3 each represent an incoming call circuit

from other offices terminating in keys 4, 5 and 6, respectively, at different positions of a tandem switchboard. At 7, 8 and 9 are indicated keys connected to call circuits outgoing to distant offices, as shown by the conductors 10, 11 and 12, respectively. The numerals 13, associated with the keys 7, 8 and 9, designate conductors connected at each position to additional keys and call circuits leading to other distant offices. 14, 15 and 16 represent group keys which serve when actuated to connect their positions together, so that an operator at such connected position may answer an incoming call to any of the positions of the group. A relay is associated with each position, as is indicated at 17, 18 and 19, for connecting a tone over the conductors 20 to all incoming call circuits when the tandem operator is engaged in completing a connection.

In the normal operation of the improved circuit, it may be assumed for the purpose of illustration that an incoming call from a distant office is over conductors 1, the circuit continuing through the upper and lower contacts of key 4, normal contacts of relay 17, left and right-hand inner contacts, respectively, of key 14 to the tandem operator's telephone set. When this circuit is closed a talking connection is completed between the distant calling operator and the tandem operator and the former operator may announce the number and name of the exchange desired whereupon the tandem operator assigns a trunk over which the connection is to be established. The tandem operator now actuates a call circuit key connected to the talking conductors terminating at the called exchange. Assuming the exchange desired is that connected with conductors 10, key 7 is depressed and the tandem operator's set connected to said conductors through contacts 21 and 40 of said key, conductors 23 and 24, left and right-hand inner normal contacts of key 14 to the tip and ring conductors of said set. The actuation of key 7 also closes a circuit through its contact 22 from ground, over conductor 25, through winding of high resistance relay 26 to battery causing the operation of relay 26, which, in turn, closes a circuit through its make contact from battery, through the winding of relay 17 to ground causing the energization of the latter relay. Relay 17 upon operating connects tone through its

make contacts over conductors 20, so that during the interval key 7 is actuated, an operator on an incoming call circuit cannot obtain connection with the tandem operator, such an attempt causing tone to be impressed upon the call circuit as an indication that the tandem operator is busy. When talking connection between the tandem operator and the operator at the called exchange is established, a trunk is assigned to the tandem operator, who then releases key 7 and connects a tandem trunk with the trunk assigned and the connection between the calling and called exchanges is completed in a well understood manner.

In the operation of the improved circuit at periods when the force of operators is decreased due to the decrease in traffic, several of the positions are grouped so that one operator stationed at one position can attend to the calls incoming on all the grouped positions. For instance, it will be assumed that the grouped position is that indicated by the key 15, and that the positions indicated by the keys 14 and 16 are grouped thereat, these keys being actuated at such time. An incoming call at key 15 under this condition will be similar in operation to that just described in connection with key 14. An incoming call on one of the other positions, for example, an incoming call over conductors 1, is completed through the contacts of key 4, normal contacts of relay 17, left-hand inner normal contacts of key 14, make contacts 27 and 28 of said key, conductors 29 and 30, contacts 31, 32, and 33, 34, of key 15 to the operator's set. The operator connected with the incoming call circuit 1 can now transmit to the tandem operator connected with key 15, the name and number of the office and line desired. The tandem operator assigns a trunk to the calling operator over which a connection is to be made, and to complete the call to the wanted office depresses a key at the incoming called position associated with an outgoing trunk to that office. Assuming that this is key 7, the operator's telephone set is connected to the outgoing conductors 10 through the contacts 21 and 40, conductors 23 and 24, inner left-hand normal contacts and make contacts 27 and 28 of key 14, conductors 29 and 30, respectively, normal contacts 31, 32 and 33, 34 of key 15 to the operator's telephone set associated with key 15. The closing of this circuit establishes a talking connection between the tandem and distant operators so that the number of an idle trunk may be transmitted to the tandem operator, without the tandem operator being required to again change her position. The tandem operator connects one end of the tandem trunk, the opposite end of which is connected with the calling office, to the trunk assigned by the distant operator which ex-

tends to the distant or called office. The connection may be now completed in a well understood manner. During the operation of key 7, a circuit is closed through its grounded contact, over conductor 25 and winding of relay 26 to battery, thus causing the operation of relay 26. The energization of this relay through its make contact closes a circuit from battery and winding of relay 17 to ground, which causes the operation of the latter relay, and connects a tone to the armatures thereof. The operation of key 7 also causes the operation of high resistance relay 38 by a circuit extending from the grounded contact of said key, make contact 41 of key 14, conductor 39, winding of relay 38 to battery. The operation of relay 38 in turn causes the operation of relay 18 over a circuit from battery, make contact of relay 38, winding of relay 18 to ground. In a similar manner the high resistance relays are operated at all positions grouped to the one at which the tandem operator is located so that tone will be connected to a call circuit incoming at any position of the group and transmitted to any incoming operator desiring to communicate with the tandem operator during the interval the latter operator is connected to an outgoing call circuit. This serves as an indication that the tandem operator is busy and connection cannot be had at that time.

What is claimed is:

1. A plurality of outlying telephone exchanges, a tandem office having trunks extending to each outlying telephone exchange, means at the tandem office to interconnect the trunks to each outlying exchange, incoming call circuits extending from outlying exchanges to the tandem office, outgoing call circuits extending from the tandem office to other outlying exchanges, means whereby the operators at said first mentioned outlying exchanges may converse with the tandem operator over said first mentioned call circuits, means at the tandem office to complete a talking connection over said second mentioned call circuits to enable the tandem operator to converse with operators at the other outlying exchanges for the purpose of passing information with reference to the establishment of connections for said trunks, means associated with each position for transferring incoming call circuits to a grouped position, and means associated with each position of a group to prevent talking connection between the tandem office and all incoming call circuits and connect tone to said incoming call circuits during the interval the tandem office is connected with an outgoing call circuit.

2. A plurality of outlying telephone exchanges, a tandem office having trunks extending to each outlying exchange, means at the tandem office to interconnect trunks to

each outlying exchange, a plurality of operators' positions at said tandem office, call circuits incoming from certain of said outlying exchanges to one of said positions, call circuits incoming from other outlying exchanges to other of said positions, outgoing call circuits extending from each of said positions to outlying exchanges, means to group the connection of incoming call circuits at certain of said positions to a single transferred position, means at said transferred position to connect with outgoing call circuits to outlying exchanges for the purpose of passing information with reference to the establishment of connections for said trunks, and means associated with each position of the group at the transferred position to connect tone to incoming call circuits during the interval of connection between said single transferred position and an outgoing call circuit.

3. A telephone system comprising a plurality of telephone exchanges, a tandem office having a plurality of positions, incoming call circuits from the telephone exchanges to the tandem office positions, outgoing call circuits from the tandem office positions to a plurality of telephone exchanges, switching means associated with each position for transferring call circuits normally incoming

thereto to another position, means associated with each position for establishing connections over outgoing call circuits, and means responsive to the actuation of the last mentioned means for preventing talking connection of incoming call circuits with a tandem position during the interval of its connection with an outgoing call circuit.

4. A telephone system comprising a plurality of telephone exchanges, a tandem office having a plurality of positions, incoming call circuits from the telephone exchanges to the tandem office positions, outgoing call circuits from the tandem office positions to a plurality of outlying telephone exchanges, means at each position for answering an incoming call circuit, means at each position for establishing a connection with an outgoing call circuit, switching means at each position for transferring incoming calls to a grouped position, and means associated with each position for connecting tone to incoming call circuits seeking connection with any position included in the group during the interval said grouped position is connected to an outgoing call circuit.

In testimony whereof, I have signed my name to this specification this 13th day of December 1923.

ERICH VON NOSTITZ.