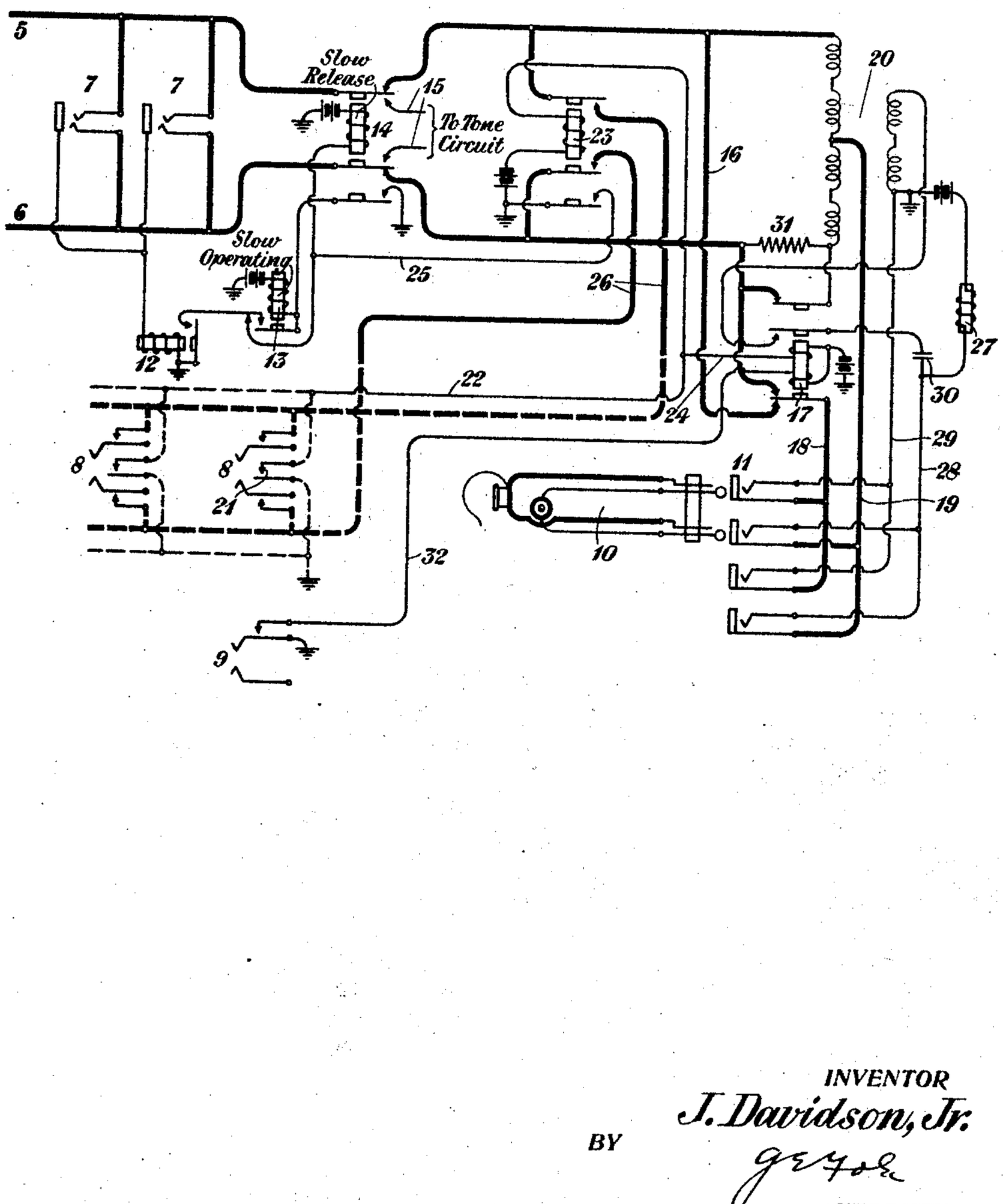
Oct. 27, 1925.

1,558,534

J. DAVIDSON, JR

TELEPHONE CIRCUITS

Filed Oct. 1, 1924



INVENTOR

J. Davidson, Jr.

BY

ATTORNEY

Patented Oct. 27, 1925. 1,558,534

UNITED STATES PATENT OFFICE.

JOHN DAVIDSON, JR., OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO AMERICAN TELEPHONE AND TELEGRAPH COMPANY, A CORPORATION OF NEW YORK.

TELEPHONE CIRCUITS.

Application filed October 1, 1924. Serial No. 741,043.

To all whom it may concern:

Be it known that I, JOHN DAVIDSON, Jr., residing at Montclair, in the county of Essex and State of New Jersey, have invented certain Improvements in Telephone Circuits, of which the following is a specification.

This invention relates to telephone circuits, and more particularly to operators' telephone set circuits.

One of the objects of this invention consists in providing means for eliminating outside noises from operators' telephone set circuits during the period of connection with incoming lines.

Another object consists in providing an improved circuit whereby, when the operator's set is associated with a local call circuit, the receiving circuit is changed to an anti-side tone connection.

These and other objects of the invention will be apparent from the following description, when considered in connection with the accompanying drawing, in which one embodiment thereof is diagrammatically illustrated.

Referring to the drawing, the numerals 5 and 6 represent talking conductors of the operator's telephone set which terminate at an operator's position in jacks 7. The numerals 8, 8 represent call circuit keys, which are connected to a call wire extending to a distant station. At 9 is indicated a talking key, the operation of which connects the transmitter of an operator's set with the operator's telephone set circuit. 10 represents an operator's set comprising a transmitter, receiver and a plug which may be connected to the jacks 11 in the customary manner.

In the operation of the system, the line which terminates in a cord and plug is inserted in the jack 7, thereby closing a circuit from battery associated with the sleeve contact of the cord circuit, sleeve contacts of jack 7, and winding or delay 12 to ground. The closing of this circuit operates relay 12, which, in turn, closes a circuit through its make contact, normal contact of relay 13, and winding of relay 14 to battery. The closing of this circuit causes the operation of relay 14, which, through its make contacts, connects a tone through jack 7 to the line from a source connected with conductors 15. The operation of relay 14 closes a circuit through its lower make contact from ground through the winding of relay 13 to battery, causing this latter relay to operate and close a locking circuit through its winding and make contact from battery through the make contact of relay 12 to ground. The closure of this circuit opens the circuit whereby relay 14 was operated and causes it to release and disconnect the tone from the line. The connection of tone indicates to the calling operator that the line is in condition to be used.

The calling operator may now proceed to pass the number of the station desired to the incoming operator, whose set 10 is associated with the jacks 11, over the following talking circuit: over tip conductor 5, upper normal contact of relay 14, conductor 16, lower back contact of relay 17, conductor 18, through the ring conductors and receiver of operator's set 10, and return over conductor 19, lower left-hand winding of transformer 20, upper back contact of relay 17, over conductor 6 including the lower normal contact of relay 14. It will be noted that the transmitter of the operator's set 10 is disconnected from the circuit at this time. This eliminates exterior noises that might be introduced in the circuit through this medium, and results in a considerable gain in transmission.

The inward operator, upon receiving the number of the station desired from the distant operator, depresses a call circuit key extending to the exchange through which the desired subscriber is reached, for instance one of the keys 8, thereby closing the following circuits: from ground, conductor 21 of key 8, conductor 22, winding of relay 23 to battery, and also from ground, contact 21, conductors 22 and 24, and upper winding of relay 17 to battery. The closure of the first mentioned circuit causes the operation of relay 23, which establishes a path for current through its lower make contact from ground, conductor 25, winding of relay 14 to battery. The closing of this circuit causes the operation of relay 14, which connects tone to the talking conductors 5 and 6, as formerly outlined. The connection of tone to the line conductors at this time serves as an indication to the originating operator that the inward operator is not connected with the

line. The operation of relay 23 through its make contacts also connects the talking conductors 26 of the call circuit with the operator's telephone set circuit. The closure of the second mentioned circuit causes the operation of relay 17, which, through its front contacts, connects the transmitter of the operator's set 10 in the operator's telephone set circuit. A talking circuit for the transmitter of the operator's set 10 is now established by a circuit extending from grounded battery, coil 27, conductor 28, through the transmitter by way of the lower and upper tip contacts of jack 11, conductor 29 to ground. A variation of the current in this circuit by the transmitter causes a corresponding variation in the circuit from lead 28, condenser 30, middle make contact of relay 17, right-hand windings of transformer 20 to ground. The receiving circuit under this condition is changed to an anti-side tone connection which may be traced from the midpoint of the left-hand windings of transformer 20, conductor 19, through the receiver of operator's set 10, by way of the ring contacts of jack 11, conductor 18, lower front contact of relay 17 and resistance element 31. The inward operator, upon being connected with the distant operator over the call circuit as above described, transmits the number of the desired station to the latter operator, and receives a trunk assignment so that a connection may be established in the usual manner. The inward operator, after receiving the assignment, releases the call circuit key, thereby removing the line cord from the listening jack 7, and connects it to the assigned switching trunk.

When the inward operator desires to talk directly with the originating operator, key 9 is depressed and a circuit is closed from the grounded contact of this key, conductor 32, lower winding of relay 17 to battery, causing this relay to operate. The operation of relay 17 connects the transmitter of the operator's set 10 to the operator's telephone set circuit in the same manner as previously outlined, and the receiving circuit is, in the same way as before, connected in anti-side tone relation therewith.

What is claimed is:

1. A trunk circuit, a call circuit, an operator's set normally connected to the trunk circuit, said set comprising a transmitter, a receiver and a balancing element, means to disconnect said operator's set from said trunk circuit and connect it to said call circuit, said means operating also to render said transmitter operative, connect said balancing element in circuit and connect said receiver in an anti-side tone connection between the balancing element and the transmission circuit.

2. A trunk circuit, a call circuit, an anti-side tone operator's set comprising a transmitter, a receiver, a transformer and a balancing element, said receiver being normally associated with said transformer with the balancing element disconnected and the transmitter rendered inoperative, means to connect the operator's set with the trunk circuit under certain conditions, and to the call circuit under other conditions, and means responsive to such connections to associate the elements of said set in an anti-side tone arrangement so that said receiver will be conjugate with respect to said transmitter.

3. A trunk circuit, a call circuit, an operator's set normally connected to the trunk circuit, said set comprising a transmitter, a receiver, and a balancing element, means to disconnect said operator's set from said trunk circuit and connect it to said call circuit, and means to disconnect said operator's set from said call circuit and connect it with said trunk circuit, said two mentioned means operating also to render said transmitter operative, connect said balancing element in circuit, and connect said receiver in an anti-side tone connection between the balancing element and the transmission circuit.

In testimony whereof, I have signed my name to this specification this 30th day of September, 1924.

JOHN DAVIDSON, JR.