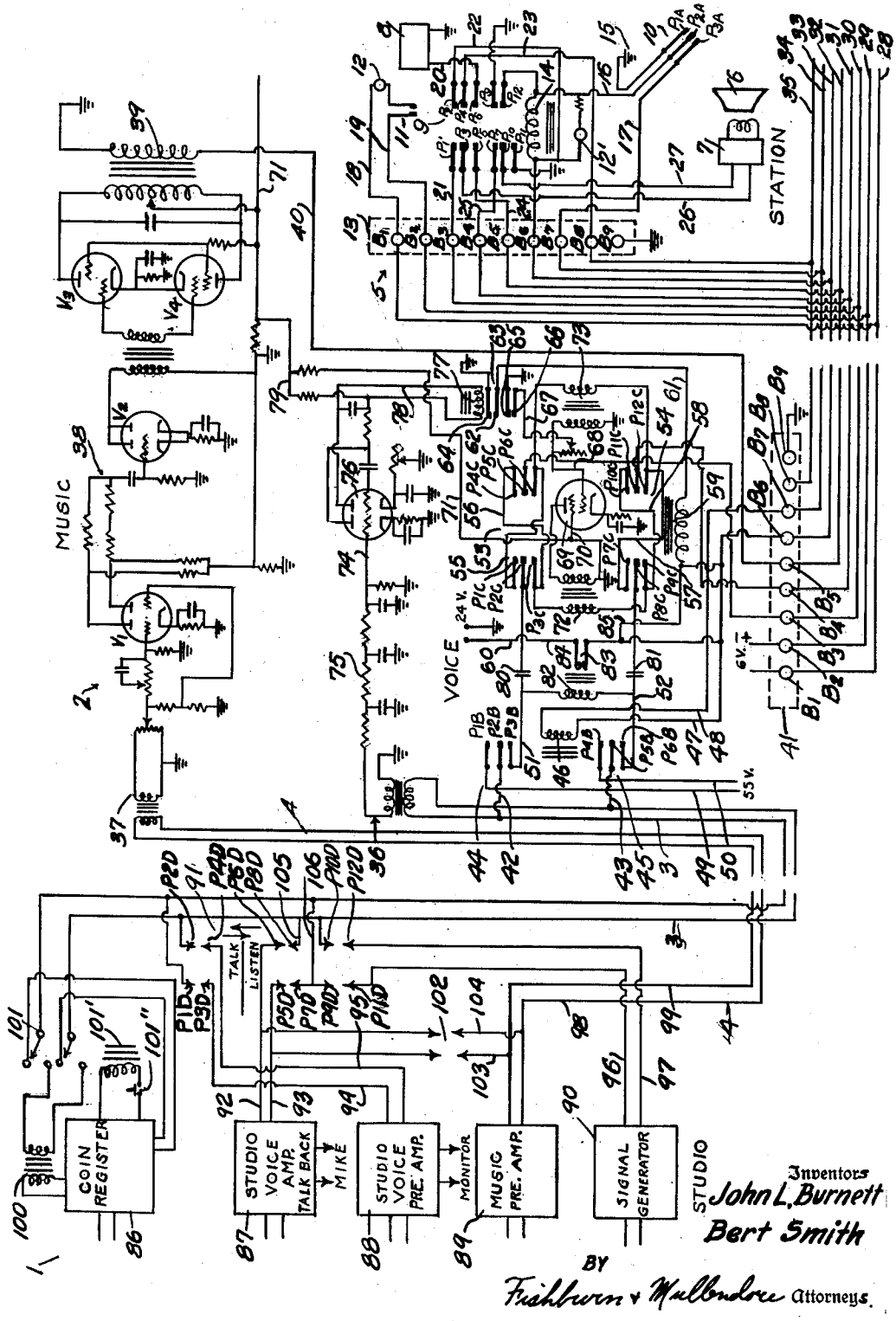
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APPARATUS FOR TRANSMISSION OF MUSIC FROM A CENTRAL STUDIO TO A PLURALITY OF SUBSCRIBERS

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APPARATUS FOR TRANSMISSION OF MUSIC FROM A CENTRAL STUDIO TO A PLURALITY OF SUBSCRIBERS

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This invention relates to apparatus for transmission of music from a central studio to a subscriber having a plurality of receiving stations equipped for receiving transcribed music and for carrying on a conversation with the studio operator.

The principal object of the invention is to provide for operation of any one of the subscriber stations to carry on a conversation with the central studio operator without interference with any of the other stations' reception of transmitted music.

Other objects of the invention are to provide separate transmission lines for music and conversation; to provide a single speaker at each station adapted to be connected with the transmission lines to serve as a microphone as well as a speaker; to provide for reversing voice input amplification; to provide each station with a coin operated relay for establishing connection through the conversation line with the central studio and which operate to open circuit of the other stations with the conversation transmission line without interference with music being received at the other stations; to provide coin operated relays so that when any one is operated the other relays function to open the conversation circuits of the other stations with respect to the conversation transmission line; and to provide means actuated by an operator at the central studio for re-establishing the coin operated relays to open a closed circuit and to re-establish the ability of the other coin operated relays to be operated by a patron at any one of the stations.

In accomplishing these and other objects of the invention we have provided improved electric circuits and controls thereof, the preferred forms of which are illustrated in the accompanying drawing wherein:

The single figure is a diagrammatic view of the electric circuits and associated apparatus embodying the features of the present invention.

Referring more in detail to the drawing:

1 designates the circuits at a central studio, 2 control circuits at a remotely located subscriber's place of business which are connected by separate conversation and music transmission lines 3 and 4 respectively and individual coin control station circuits 5 whereby a customer may insert a coin at any one of a subscriber's stations and effect automatic connection with the central studio through the conversation transmission line 3 without interference by any other patron's station and without interference of the music transmitted from the central studio through the music transmission line to the other patrons' stations.

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Connected in each station circuit 5 is a speaker 6, transformer 7, a coil holder relay 8, a master relay 9, switches 10—11, a line busy signal 12, and a binding post strip 13. The master relay includes contact points P1 to P12 inclusive which are operated by a magnet winding 14. The switch 10 is adapted to be operated upon insertion of a coin and includes contacts P1A, P2A and P3A. The binding post strip carries a plurality of binding posts B1 to B9 inclusive which are interconnected to corresponding binding posts of the other stations. The contact P1A of the switch 10 is grounded as at 15 and the contact P2A is connected through the magnet winding 14 of the master relay switch with the binding post B6 by means of a conductor 16. The other contact P3A of the coin control switch is directly connected with the binding post B7 by a conductor 17. The binding posts B1 and B2 are connected with the busy signal 12 by conductors 18 and 19 which are energized upon closing of the switch 11. The coin holding relay 8 has one side grounded and the other side connected by a conductor 20 with the contact P6 of the master relay switch. The contacts P1, P2, P4, P5 and P7 are connected with the binding post B3, B6, B8, B5 and B4 by conductors 21, 22, 23, 24 and 25 respectively. The contacts P3 and P10 of the master control relay are connected with the transformer 7 of the speaker by conductors 26 and 27.

In operation of the coin control circuits thus described, insertion of a coin closes the switch 10 to energize the master relay by current flowing between the binding post 6 through the conductor 16, contact P2A and P1A and ground 15. This actuation of the master relay closes contact P9 and P12. Simultaneously a circuit is closed to the studio circuits later described through a circuit comprising the ground connection P1A of the switch 10 and contact P3A, conductor 17 and binding post 7. The impulse through the master relay causes the master relay to stay in closed position as the contacts P9 and P12 maintain flow of current through the magnet winding 14 after the switch 10 is opened.

The coin stop or coin holding relay 8 of the other patrons' stations are energized through the contacts P2 and P4 of the relay which was energized by insertion of a coin. The switches 11 of the other stations are closed by the coin stop relays of said other stations to energize the signals thereof to indicate that one subscriber's station is being used for communication.

The binding posts of each patron station are interconnected by line conductors 28 to 35 so that all of the binding posts of the stations are connected in parallel.

The control station circuits include two telephone input circuits 36 and 37 that are inductively coupled with the transmission lines 3 and 4. The input 37 supplies the music circuit 38 which includes a suitable stage amplification as indicated by the tubes V1, V2, V3 and V4. Amplified music impulses are passed from the transformer 39 of the final stage of amplification through a conductor 40 which leads to binding post B5 of a binding post strip 41 having binding posts B1 to B9 from which the lines 28 to 35 extend to the patrons' stations 5.

The control circuits are also connected with the voice transmission line 3 through conductors 42 and 43 with switches 44 and 45 having contacts P1B, P2B and P3B, P4B, P5B and P6B, respectively. The switches are operated by a relay coil 46 and are connected with the binding posts 6 and 7 of the contact strips 41 by conductors 47 and 48. The contacts P1B and P4B are connected with a current supply of substantially 55 volts through conductors 49 and 50, the contacts P2B and P5B being connected with the conductors 42 and 43 previously described. The contacts P3B and P6B are connected by conductors 51 and 52 with a reversing switch having switch sections 53 and 54. The section 53 of the switch has contacts P1C, P2C, P3C, P4C, P5C and P6C. The section 54 of the switch has contacts P7C, P8C, P9C, P10C, P11C and P12C. The contacts P2C and P8C are connected by conductors 51 and 52 and the contact P1C is connected with the contact P6C by a conductor 55. The contact P3C is connected with the contact P4C by a conductor 56. The contacts P7C and P9C are similarly connected with the contacts P10C and P12C by conductors 57 and 58. The contacts P5C and P11C are connected with the binding posts B3 and B4 of the contact strip 41. The switches just described are operated by a relay coil 59 that is connected with a current supply of substantially 24 volts through a conductor 60. The other terminal of the coil is connected by a conductor 61 with the contact 62 of a switch 63. The switch 63 also includes contacts 64, 65 and 66, the contacts 64 and 65 being connected with grounds and the contact 66 with the conductor 67 leading to the grid circuit 68 of a vacuum tube 69. The other grid of the tube is connected by a conductor 70 that is connected with the B-voltage supply conductor 71 of the music circuit. The plate of the tube is connected with the primary of a transformer 72 and the secondary of the transformer is connected with the contacts P3C and P9C of the switches 53 and 54. The grid circuit of tube 69 is also connected to a similar transformer 73 having its primary connected with the contacts P6C and P12C of the switch sections 53 and 54. The switch 63 is operated from the studio through a signal circuit 74 that is connected with the input 36. The signal current is passed through a filtering circuit indicated at 75 and imposed on the grid of a vacuum tube 76. The plate terminals are connected with a relay winding 77 of the switch 63 by a conductor 78. The opposite side of the winding is supplied with a B-voltage through a conductor 79 that is connected with the B supply conductor 71 of the music circuit.

Connected in the conductors 51 and 52 on the line side of condensers 80 and 81 that are connected therein is a relay winding 82 for operating a switch 83, one contact of which is connected with a five ampere twenty-four volt current supply through a conductor 84 and the other contact is connected by a conductor 85 with the conductor 47.

The studio apparatus includes a coin registering mechanism 86, a studio voice amplifier 87, a studio amplifier for the subscriber's voice 88, a music preamplifier 89, and a relay signal generator 90. The mechanisms 87 and 88 are connected with a switch 91 through conductors 92–93 and 94–95. The switch 91 includes contacts P1D, P2D and P3D, P4D, P5D, P6D, P7D, P8D, P9D, P10D, P11D and P12D. The conductors of the voice transmission line 3 are connected with the contacts P1D, P2D, P7D, P8D, P9D and P10D. The signal generator 90 is connected with the contacts P11D and P12D by conductors 96 and 97.

The music preamplifier 89 is connected with the conductors of the music transmission line by conductors 98 and 99. The coin register mechanism 86 is connected with a transformer 100 through a switch 101 operated by an electromagnet 101' energized by a push button switch 101''. The wires 94 and 95 of the studio voice preamplifier are connected with the contacts P3D and P4D. The conductors 92 and 93 from the studio voice amplifier 87 are also connected with the music line through a switch 102 by conductors 103 and 104. Conductor 106 connects the contacts P7D and P9 with one side of the voice line 3 and a conductor 105 connects P8D and P10D with the other side of the voice line.

Normally the switches 44 and 45 have the contacts P2B–P3B and P5B–P6B closed. The normal position of the reversing switch sections 53 and 54 are such that the P2C–P3C, P5C–P6C, P8C–P9C, and P11C–P12C are closed while the other contacts are open so that these switches are normally in condition to pass voice currents from any one of the patron's stations to the studio. The contacts of the switch 83 are normally closed and the contacts of the switch 63 are normally open. The normal position of the switches 9 at the patron's stations are such that the contacts P3 and P5, P4 and P6, and P10 and P11 are closed so that the customer's stations are all ready to receive music currents transmitted from the studio. The coin operated switches 10 and signal switches 11 are also normally open.

If desired a "thank you" signal 12' is connected across the relay windings 14 of the respective patrons' stations to indicate that contact is made with the studio.

Assuming that the circuits and associated apparatus are connected as described and that all of the switches are in their normal position, a patron at one of the stations in the customer's place of business may insert a coin to close contacts P1A, P2A and P3A so that there is a 24-volt current through conductor 84, switch 83, conductor 85, conductor 47, relay winding 46, conductor 48, binding post 7 of the strips 41 and 13, conductor 17, contacts P3A and P1A to ground 15. This flow of current energizes the relay winding 46 to open the contacts P2B and P3B and P5B and P6B and momentarily close the contacts P1B, P2B and P4B, P5B sending an impulse of current over the line wires 3 to the studio to energize the coin register mechanism 86 so that the studio operator is advised that a patron desires to carry on a conversation. Closure of the contacts P1A, P2A, P3A also causes a flow in the conductor 47,

binding post 7 of the strip 41, relay winding 14, conductor 16 and ground 15, which impulse of current operates the relay switch 9 to close the contacts P9 and P12 to ground thereby establishing a holding circuit for the relay 9. Upon operation of the relay switch 9 a current flows in conductor 23, contacts P2 and P4, conductor 22 to the other customers' stations so that a current flows through the closed contacts P4 and P6 of the relay switches of the other stations to energize the coin holder windings 8 at those stations for closing the contact switches 11. Closing of the contact switches 11 at the other stations causes flow of current to signals of the other stations. Energization of the signals indicates that one of the stations is in communication with the central studio. Operation of the winding 8 also rejects any coins that may be inserted at those stations so that they will not be effective in actuating the switches 10 until the normal conditions of the circuits have been re-established by the operator of the studio as later described.

After the impulse of current has occurred in the relay 46, the switches 42 and 43 return to their normal operating condition so that contacts P2B and P3B are closed and contacts P5B and P6B are closed. The relay winding 14 remains energized to hold contact of P1 in engagement with P3, P2 with P4, P7 with P10 and P9 with P12. Upon closing of the contacts P1, P3 and P7, P10 of switch 9, the speaker 6 may be used as a microphone so that the customer may talk to the operator of the studio, the circuit being completed through the conductors 26 and 27, contacts P7–P10 and contacts P1–P3 of switch 9, conductors 25 and 21, binding posts 3 and 4 of strips 13 and 41, normally closed contacts of the reversing switch sections 53 and 54 and conductors 42 and 43 which connect with line wires 3.

The studio operator answers by actuating the reversing switch sections 53 and 54 so that voice currents from the studio will be passed in the proper direction through the amplifying tube 69. This is effected by the operator sending a low frequency current (60 cycles) over the voice line wires to the input 36 through the filters 75 to the amplifying tube 76 from where the amplified current passes through the relay 77 to close the contacts 66, 65, 62 and 64. A twenty-four volt current then passes through normally closed switch 83, conductor 60, winding 59, contacts 62 and 64 to ground, thereby energizing the winding 59 to change the position of the reversing switch sections 53 and 54. The contact P1C will then engage the contact P2C, P4C the contact P5C, contact P10C the contact P11C, and contact P7C the contact P8C. The voice currents from the studio then pass to the input side of the tube 69 and the output side is connected with the speaker transformer winding 7.

The operator of the studio may then talk to the customer at the subscriber's station. After the conversation has been completed between the studio operator and customer, the operator at the studio proceeds to re-establish the normal position of the switch 9. This is effected by pushing the button 101'' which sends a current impulse over the voice line wires of proper voltage to energize the relay 82 and momentarily open the switch 83 which interrupts the twenty-four volt current supply to the relay winding 14, thereby re-establishing the normal position of the contacts for switch 9. Return of the contacts of the switch 9 to their normal position re-establishes the coin holding mechanism and signals at the other stations and the voice line is again open to the studio.

The operator then transmits the desired musical composition record and connects the music amplifier in circuit with the line wires 4 and the music current will be received at the amplifying mechanism 38 of the control station and the amplified current will be carried by the conductor 40 to the binding posts 5 of all of the stations.

During playing of the composition, a customer at any one of the stations may carry on a conversation with the studio operator without interfering with the music reception at the other stations since the relay switch for that station automatically opens connection with the music circuits and establishes voice connection with the studio through separate line wires.

What we claim and desire to secure by Letters Patent is:

1. In a voice transmitting and receiving system including a studio, a control station situated remotely from the studio and a plurality of patron stations at the control station, a single pair of line conductors composing a single telephone circuit connecting the studio with the control station for transmitting voice currents between the studio and any one of the patron's stations, a current operated speaker at each patron's station adapted to serve as a microphone, means at the control station for amplifying the voice currents over said line conductors in either direction, actuating means at each of the patron stations for sending a current impulse over said line conductors to the studio, holding means at the patrons' stations adapted to be energized by said actuating means at any one of the patron stations to prevent the other stations from communicating with the studio, a switch mechanism at each patron station actuated by the current impulse for actuating the holding means at the other patron stations and to connect the speaker in circuit with the voice current amplifying means at the control station, current conducting means connecting the amplifying means with said line conductors, and means for sending current impulses from the studio over said single pair of line conductors for rendering the amplifying means effective so that voice currents from the studio are adapted to be amplified by the amplifying means at the control station for reception at a patron's station sending the current impulses to the studio.

2. In a voice transmitting and receiving system including a studio, a control station situated remotely from the studio and a plurality of patron stations at the control station, a pair of line conductors connecting the studio with the control station for transmitting voice currents between the studio and any one of the patron's stations, a current operated speaker at each patron's station adapted to serve as a microphone, means at the control station for amplifying the voice currents over said pair of line conductors, actuating means at each of the patron stations for sending a current impulse over said pair of line conductors to the studio, holding means at the patrons' stations adapted to be energized by said actuating means at any one of the patron stations to prevent the other stations from communicating with the studio, a switch mechanism at each patron station actuated by the current impulse for actuating the holding means at the other patron stations and to connect the speaker

in circuit with the voice current amplifying means at the control station, current conducting means connecting the amplifying means with said pair of line conductors including reversing switches for reversing flow of current through the amplifying means, a relay means for actuating the reversing switch, and means at the studio for sending current impulses over said pair of line conductors for energizing the relay means actuating said reversing switches so that voice currents from the studio are adapted to be amplified by the amplifying means at the control station for reception at a patron's station sending the current impulses to the studio.

3. In a voice transmitting and receiving system including a studio, a control station situated remotely from the studio and a plurality of patron stations at the control station, a pair of line conductors connecting the studio with the control station for transmitting voice currents between the studio and any one of the patron's stations, a current operated speaker at each patron's station adapted to serve as a microphone, means at the control station for amplifying the voice currents, means at the studio for sending and receiving voice currents over said pair of line conductors, actuating means at each of the patron stations for sending a current impulse over said pair of line conductors to the studio, holding means at the patrons' stations adapted to be energized by said impulse actuating means at any one of the patron stations to prevent the other stations from communicating with the studio, a switch mechanism at each patron station actuated by the current impulse for actuating the holding means at the other patron stations and to connect the speaker in circuit with the voice current amplifying means at the control station, current conducting means connecting the amplifying means with said pair of line conductors including reversing switches for reversing flow of current through the amplifying means, a relay means for actuating the reversing switch, means at the studio for sending current impulses over said pair of line conductors for energizing the relay means actuating said reversing switches so that voice currents from the studio are adapted to be amplified by the amplifying means at the control station for reception by the speaker at a patron's station sending the current impulses to the studio, and means energized at the studio for re-establishing said mechanisms to normal position after completion of conversation between the studio and patron's station.

4. In a voice transmitting and receiving system including a studio, a control station situated remotely from the studio and a plurality of patron stations at the control station, line conductors connecting the studio with the control station for transmitting voice currents between the studio and any one of the patron stations, means connected with the line conductors for amplifying said voice currents, music current sending means at the studio, separate line wires connecting the music current sending means with the patron stations, and current direction changing means for rendering the amplifying means effective in either direction of voice current flow.

5. In a voice transmitting and receiving system including a studio, a control station situated remotely from the studio and a patron's station at the control station, a speaker at the patron's station, amplifying means at the control station, line conductors connecting the studio with the control station for transmitting voice currents through the amplifying means to and from the speaker, music current sending means at the studio, separate line wires connecting the music current sending means with the patron's station, and current direction changing means for rendering the amplifying means effective for amplifying the voice currents in either direction.

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