June 13, 1939. R. H. CAMPBELL 2,162,371

COMMUNICATION SYSTEM

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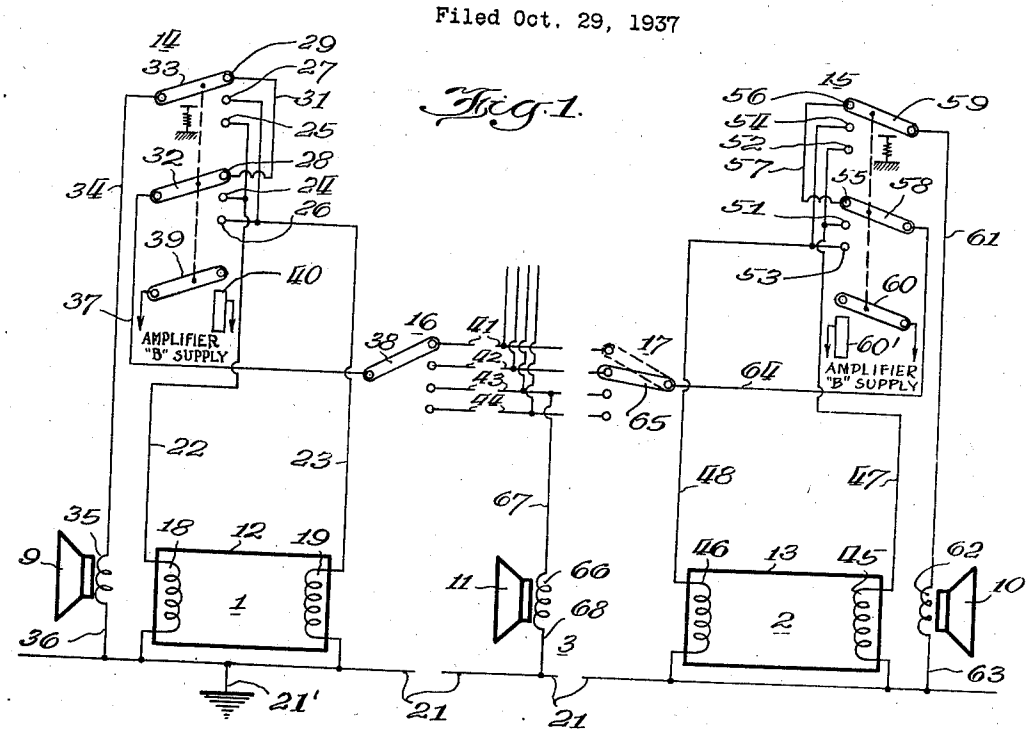


Fig. 1.

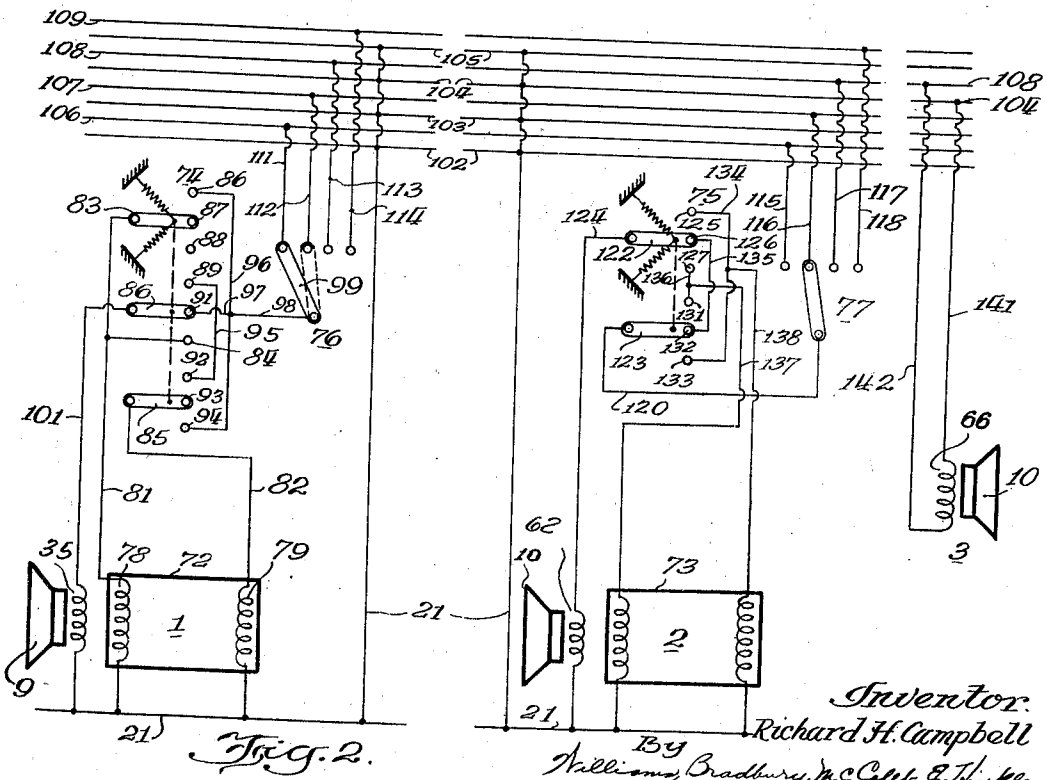


Fig. 2.

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COMMUNICATION SYSTEM

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23 Claims. (Cl. 179—1)

This invention relates to communication systems and particularly to telephonic communication systems in which suitable voice receiving and transmitting means, such as dynamic loud speakers of the type comprising a permanent magnet, are employed for the dual function of receiving and transmitting, the fluctuations in electrical current created in the transmitter being amplified by suitable amplifying means.

According to the present invention there are provided a plurality of stations located remote from each other. Each station is provided with a loud speaker unit and several of the stations are provided with amplifiers and selector switches operable to connect the station with which they are associated to any one of the remaining stations. These stations are also provided with selectively operable plural position master switches for connecting the speaker unit at the station to the input or output of the associated amplifier, or through one of the aforementioned selector switches to the other stations.

Each station has associated therewith an interstation conductor with which the selector switch is normally in engagement and to which the loud speakers that do not have amplifiers control switches associated therewith are permanently connected.

The master switches are so constructed and arranged in circuit with the loud speakers, amplifiers and interstation conductors that communication can be maintained between any stations provided with like apparatus or a loud speaker alone by simple manipulations of master switches. The latter normally, i. e., when the system is not in use and the amplifier is inoperative, occupy a first position in which the speaker unit associated with any particular master switch is connected to an interstation conductor through the selector switch so that any one of the several stations provided with an amplifier may communicate therewith even though the amplifier at the station being called is deenergized. The master switches are operable into second position in which the speaker unit is connected to the output of its own amplifier and the interstation conductor is connected to the input of the amplifier. In this position of the master switches any of the other stations may communicate with the station even though these other stations are not provided with amplifiers. The master switches are also operable into a third position permitting the operator at that station to communicate with any of the remaining stations. In this position the speaker unit at the associated station is connected to the input and the interstation conductor is connected to the output of the amplifier.

A primary object of the present invention is to provide an intercommunicating system in which a number of different types of apparatus may be joined together and operated with a minimum of effort and likelihood of confusion.

A further object is so to construct the communication controlling master switches that they are biased to return to a predetermined position from one or more of the other positions to simplify operation of the system and prevent the operator at any station from leaving the apparatus at his station in such condition that the station cannot be called.

A further object of the invention is to provide a master switch adapted to control not only the communication circuits but also the supply of power to the amplifier.

A further object is to provide an intercommunicating system comprising apparatus of the type described in which a minimum of interstation conductors are used and according to which independent conversations can be carried on between two stations or several stations can be connected together for conference purposes.

Other advantages and objects of the present invention will become apparent from the ensuing description in the course of which reference is had to the accompanying drawing, in which,

Figure 1 is a schematic diagram of one embodiment of the present invention; and

Figure 2 is a schematic circuit diagram of a modified form of the invention.

Referring first to Figure 1, the reference numeral 9 designates voice receiving and transmitting means such as a dynamic loud speaker of the type employing a permanent magnet and a voice coil suspended in the field thereof, located at a station indicated by the reference numeral 1. Similar loud speaker units 10 and 11 are provided at stations 2 and 3 located remote from station 1 and from each other.

Stations 1 and 2 are provided with identical apparatus including amplifiers 12 and 13, respectively, so that operators thereat may initiate communication with other stations, be they provided with similar apparatus or simply a loud speaker unit, as station 3. The apparatus at stations 1 and 2 includes three position master switches 14 and 15, respectively, for enabling the operators thereat to control the energization of the amplifiers, the direction of communication and to condition the stations for the reception of speech from any station provided with an ampli-

fier of its own. Stations 1 and 2 are provided also with selector switches 16 and 17 for selectively connecting the stations to other stations included in the system.

While the apparatus in each of stations 1 and 2 is identical, it is believed that the indication of the various parts thereof by separate reference numerals will add to the clarity of the description. For this reason, the apparatus at station 1 is described in detail first and the apparatus in station 2 described briefly thereafter.

The amplifier 12 at station 1 is provided with the usual input and output transformer coils 18 and 19, each of which has one terminal thereof connected to a common conductor 21 which is grounded as indicated at 21'. The other terminals of the input and output coils are connected by conductors 22 and 23 to interconnected contacts 24 and 25 and inter-connected contacts 26 and 27, respectively, of the master switch. The remaining contacts 28 and 29 of the master switch are connected together by a conductor 31.

The master switch 14 is provided with a pair of communication circuit controlling switch blades 32 and 33 mechanically inter-connected for simultaneous operation by the operator at station 1, and is spring biased from its lowermost or third to its middle or second position. Blade 33 is connected by a conductor 34 to one terminal of the voice coil 35 associated with speaker unit 9, the other terminal of which is connected by a conductor 36 to the common conductor 21. Blade 32 is connected to the selector switch 16 by a conductor 37 connected to the switch blade 38 comprising a part of the selector switch.

The master switch 14 also comprises a switch blade 39 controlling the energization of the amplifier and mechanically inter-connected to blades 32 and 33. The blade is adapted to engage an elongated contact 40 in certain hereinafter described positions of the master switch to supply the amplifier with a suitable "B" potential and thereby render it operative. The amplifier filaments (not shown) are continuously supplied with power from a suitable source (also not shown) so that as soon as the "B" supply is connected to the amplifier the latter is immediately ready to perform its usual function.

The selector switch blade 38 is adapted to establish a circuit from the conductor 37 to any one of a plurality of inter-station conductors 41, 42, 43, and 44. These inter-station conductors extend to all of the stations forming the communication system.

The apparatus at station 2 is, as stated previously, identical with that at station 1. Thus the ungrounded ends of input and output coils 45 and 46 of the amplifier 13 are connected by conductors 47 and 48 to the master switch 15. Conductor 47 is connected to the inter-connected contacts 51 and 52 of the master switch and conductor 48 is connected to the interconnected contacts 53 and 54. Contacts 55 and 56 of the master switch are interconnected by a conductor 57. The switch blades 58, 59 and 60 are mechanically interconnected for simultaneous operation and are spring biased from their lowermost to middle positions. Switch blade 59 is connected by a conductor 61 to the voice coil 62 associated with speaker unit 10, the other terminal of which is connected by a conductor 63 to the common conductor 21, which extends to station 2 as well as to the remaining stations. Switch blade 58 is connected by a conductor 64 to the selector switch blade 65. Switch blade 60 controls the "B" supply for the amplifier and has associated therewith a contact 60' engaged thereby when the switch is actuated to predetermined positions. Switch blade 65 corresponds to switch blade 38 and like the latter may be selectively actuated to establish a circuit from conductor 64 to any one of the interstation conductors 41 to 44, inclusive.

In addition to the similar stations 1 and 2 described above, the system may comprise one or more secondary stations having no amplifier or control means and, therefore, with no means for initiating or controlling the direction of communication. Station 3 is of the latter type and the voice coil 66 associated with the speaker unit 11 thereat is connected by a conductor 67 to interstation conductor 43. The other terminal of voice coil 66 is connected by a conductor 68 to the common conductor 21 which extends also to station 3.

In the preferred mode of operation it is contemplated that the selector switch associated with any particular station is connected to the interstation conductor corresponding to that station. In the present instance station 1 has associated therewith the interstation conductor 41 and station 2 has associated therewith the interstation conductor 42. Therefore, switch blade 38 normally establishes a circuit from conductor 37 to conductor 41 and switch blade 65 establishes a circuit from conductor 64 to conductor 42.

According to this arrangement the system is so arranged that any station may be called from any other station, provided, of course, that the station from which it is desired to initiate conversation is provided with amplifier. For instance, station 2 may be placed in communication with station 1 simply by actuation of the selector switch 65 into engagement with conductor 41, as illustrated by the dotted lines in Figure 1, and thereby placing the direction of communication under control of the master switches.

The master switches 14 and 15 at each station are usually left in the positions indicated so that the interstation conductor associated with that station is connected directly to the voice coil of the speaker unit at that station and the amplifier "B" supply cut off. The interstation conductor 41 thus is connected to voice coil 35 of speaker unit 9 through a circuit that is as follows: Switch blade 38 in engagement with conductor 41, conductor 37, switch blade 32 in engagement with contact 28, conductor 31, switch blade 33 in engagement with contact 29 and conductor 34. The return circuit from the voice coil extends through conductor 36 and the common conductor 21. Thus, when switch blade 65 is actuated into the position indicated by the dotted lines, either the input or output of amplifier 13 may be connected to speaker unit 9 through operation of the master switch 15. When the master switch is actuated into its lowermost position, switch blade 58 engages contact 53 and the switch blade 59 engages contact 52, thereby connecting voice coil 62 to the input coil of amplifier 13 through conductor 61, switch blade 59 in engagement with contact 52, and conductor 47. The circuit to the input coil is completed in obvious fashion through conductor 63 and the common conductor 21.

The output coil 46 of amplifier 13 is simultaneously connected to the interstation conductor 41 through a circuit including conductor 48, switch blade 58 in engagement with contact 53, and conductor 64 leading to the interstation conductor 41 through the switch blade 65 in its dotted

line position. Thus, the operator at station 2 may communicate with the operator at station 1.

At this time the system may be operated in either one of two modes because the direction of communication may be controlled from either station. If the operator at station 1 responds to a call from station 2 without manipulating master switch 14, the operator at station 2 releases master switch 15 which returns to its intermediate position to establish a circuit from contacts 51 and 54 to the switch blades 58 and 59, thereby connecting the speaker unit 9 to the input of the amplifier 13 and the speaker unit 10 across the output of amplifier 13. The voice coil of speaker unit 9 is connected to the input through the interstation conductor 41, switch 65 in engagement therewith, conductor 64, switch blade 58 in engagement with contact 51, and conductor 47 leading to the input coil. The return circuit to the voice coil is completed through the common conductor 21 and conducor 36. Speaker unit 10 is connected across the output coil 46 through a circuit including conductor 48, switch blade 59 in engagement with contact 54, and conductor 61 leading to voice coil 62, the return circuit being completed through conductor 63 and the common conductor 21. Under this mode of operation station 2 is a master station and only the master switch 15 is actuated to reverse the direction of communication. This mode of operation may be carried on by the operator at station 1 who can manipulate master switch 14 in a similar manner.

However, if the operator at the station 2 did not desire to use amplifier 13 during reception, and actuated the master switch 15, to its uppermost position, the operator at station 1 is able to communicate with the operator at station 2 simply by operating the master switch 14 at station 1 to its lowermost position. This operation results in the connection of speaker unit 9 to the input of amplifier 12 through conductor 34, switch blade 33 in engagement with contact 25, and conductor 22. The output of amplifier 12 is simultaneously connected to the interstation conductor 41 through a circuit including conductor 23, switch blade 32 in engagement with contact 26, and conductor 37. Since the speaker unit 10 is connected to the interstation conductor when the master switch 15 is in its uppermost position, the output of amplifier 12 is connected thereto. To reverse the direction of communication, it is necessary to reverse the positions of the master switches.

After completion of a conversation, the operators at both stations usually return the master switches to their uppermost positions, thereby cutting off the "B" supply to the amplifier and connecting the speaker unit to the interstation conductor to condition the station for receiving calls. In case an operator fails to do this, operators at the remaining stations can call because in all events the master switch is returned to its intermediate position in which the station is conditioned to receive messages through its own amplifier.

In the event an operator at station 1 or 2, or any similar station, desires to communicate with the secondary station 3, he may do so by manipulating the selector switch into engagement with the interstation conductor connected with station 3. Thus, if the operator at station 1 desires to communicate with the operator at station 3, he simply manipulates switch blade 38 to establish a circuit from conductor 37 to interstation conductor 43. Then, upon operation of the master switch 14 into the talk position, in which switch blade 32 is in engagement with contact 26 and switch blade 33 is in engagement with contact 25, the output of amplifier 12 is impressed across the voice coil 66 of speaker unit 11. When the operator at station 1 desires to listen to the operator at station 3 he operates the master switch 14 into its intermediate position, thereby connecting voice coil 66 across the input of the amplifier and voice coil 35 of the speaker unit 9 across the output.

The last described mode of operation is similar to the first of the two alternative modes of operation when communication is had between stations 1 and 2, according to which station 2 was operated as a master station. It is seen, therefore, that the system as a whole can be operated in a uniform and simple manner with little likelihood of confusion even though different types of apparatus be installed at the several stations. Furthermore, continuity of operation is assured even though some of the amplifiers may become inoperative for any reason, such as defective tubes or the like.

The system described above possesses the advantage that it can be used for conferences and the like between a plurality of stations. Whenever it is desired to hold a conference between operators at three or more stations all operators actuate their selector switches into engagement with a particular interstation conductor. Whenever a particular operator wishes to speak, he simply actuates his master switch into its lowermost or talk position, the remaining operators allowing their master switches to remain in the upper position. At such time the amplifier unit at the station from which the operator is talking is the one utilized, as described above.

Furthermore, a plurality of independent conversations can be carried on over the system without interference. For example, communication can be established between stations 1 and 3 simply by operation of selector switch blade 38 at station 1 to close a circuit to interstation conductor 43. Simulaneously, communicatoin can be established between station 2 and a station associated with interstation conductor 44 (not shown, but which may correspond to stations 1 and 2 or 3) by operation of selector switch blade 65 at station 2 to close a circuit to conductor 43.

In the modification of the invention illustrated in Figure 2 the construction of the master switch has been modified in such manner that its normal position is the intermediate one in which the loud speaker unit associated therewith is connected to the interstation conductor and from which it is actuated into the upper position to listen through its own amplifier and into its lower position for transmitting through its own amplifier. The embodiment of Figure 2 also utilizes a different type of interstation conductor, each interstation conductor comprising a pair of conductors, one conductor of each pair being connected to similar conductors of every other pair to form the common conductor 21 of the previously described modification.

As in the previously described modification, a plurality of stations 1, 2, and 3 are illustrated. Loud speaker units 9, 10, and 11 are located at these three stations, respectively, and station 1 has associated therewith a continuously energized amplifier 72, and station 2 has associated therewith a similar amplifier 73. These two stations are also provided with master switches 74

and 75 and selector switches 76 and 77, respectively. Master switches 74 and 75 have been shown as comprising three and two communication circuit controlling blades respectively to illustrate somewhat different switch constructions.

Amplifier 72 has its input and output coils 78 and 79 connected by conductors 81 and 82 to switch blade 83 and stationary contact 84, and to switch blade 85, respectively, of the master switch 74. The latter comprises three switch blades including a third one 86, which along with blades 83 and 85 are all operable into three positions. The switch blades are normally biased into the intermediate position illustrated by suitable spring means. Switch blade 83 has associated therewith three stationary contacts 86, 87, and 88, of which contacts 87 and 88 are not included in any circuit; switch blade 86 has associated therewith three stationary contacts 89, 91, and the previously mentioned contact 84; and switch blade 85 has associated therewith three contacts 92, 93, and 94. As illustrated in Figure 2, switch blades 83, 85, and 86 are normally in engagement with contacts 87, 93, and 91, respectively. Contacts 89 and 92 are inter-connected by a conductor 95 and the three contacts 86, 91 and 94 are joined by conductors 96 and 97. The three last mentioned contacts are also connected by a conductor 98 to the selector switch 99. Switch blade 86 is connected by a conductor 101 to the voice coil 35 of speaker unit 9, the opposite terminal of which and one terminal of input and output coils 78 and 79 are all connected to a common conductor 21. The latter has an extension to conductors 102, 103, 104, and 105, each forming a single conductor of a group of twisted pairs provided for the purpose of decreasing hum and other objectionable noise originating in the interstation conductors. The other conductors of each pair, including conductors 106, 107, 108, and 109, are provided with branch conductors 111 to 114, inclusive, leading to the selector switch 76 at station 1.

Before proceeding with the description of master switch 75, it may be noted that interstation conductors 106 to 109 are connected by branch conductors 115 to 118, respectively, to the selector switch 77. The latter is connected by conductor 121 to the master switch.

The master switch 75 differs from switch 74 only in construction. It consists of two blades 122 and 123 connected by conductors 124 and 121 to voice coil 62 and selector switch 77. Each blade is operable into three positions and is biased into its intermediate position. Contacts 125 to 127 associated with blade 122 are connected to contacts 131 to 133 by conductors 134 to 136. Contacts 127 and 131, which are interconnected by conductor 136, are connected to the input of the amplifier by conductor 137 and contacts 125 and 133, which are interconnected by conductor 134, are connected to the output by conductor 138. The switch blades 122 and 123 are mechanically interconnected and biased into engagement with contacts 126 and 132, thereby normally connecting loud speaker unit 11 to selector switch 77.

The embodiment of Figure 2 may also be provided with a number of stations 3 comprising simply a loud speaker unit. In the present instant the loud speaker 3 has its associated voice coil 66 connected by conductors 141 and 142 across conductors 104 and 108.

Under normal conditions the selector switches 76 and 77 are in positions connecting voice coils 35 and 62 to interstation conductors 106 and 107, which are, therefore, the interstation conductors for stations 1 and 2, respectively. This connection extends through master switches 74 and 75 in their normal intermediate positions.

In the normal positions of the master switches one station can communicate with another simply by operation of its associated selector switch into engagement with the interstation conductor associated with the latter and operation of the master switch thereat to its lowermost, or talk, position.

When the operator at station 1 desires to communicate with the operator at station 2, he actuates selector switch blade 99 to establish a circuit from conductor 98 to conductor 112, thereby connecting conductor 98 to the interstation conductor 107 associated with station 2. Inasmuch as the selector switch 77 is in engagement with conductor 116, the result is the connection of the speaker unit 10 to conductor 98. The operator at station 1 thereafter depresses switch 74 into its lowermost position thereby connecting conductor 98 to the output coil 79 of amplifier 72 and the speaker unit 9 across the input coil 78 of the amplifier. The circuit to the input coil 78 extends from voice coil 35 through conductor 101, switch blade 86 in engagement with contact 84, and conductor 81. The connection of output coil 79 to the speaker unit 10 extends through conductor 82, switch blade 85 in engagement with conductor 94, conductors 96 and 98, switch blade 99 in engagement with conductor 112, interstation conductor 107, and conductor 116, selector switch 77, and switch blades 122 and 123.

After the operator at station 1 calls the operator at station 2, the described system may be operated according to two methods. The first corresponds to the first of the two methods previously described according to which the master switch 74 at station 1 alone is used to control the direction of communication. For transmitting, it is actuated to its lowermost position as above indicated and for receiving, it is actuated to its uppermost position in which the interstation conductor (and speaker unit 10) are connected to the input of amplifier 72 and the speaker unit 9 is connected to the output of the amplifier. It may be seen, therefore, that the apparatus at the calling station alone is used, although it should be noted that the called station can be given control over the direction of communication.

According to the second method, both amplifiers are used, the amplifier used at any particular time being the one associated with the transmitting station. When operating according to this method, the master switches are depressed from their normal middle positions to their lowermost positions when transmitting and released to condition the station for reception.

Whenever any one of the operators desires to communicate with the operator at station 3, he may do so just as in the previously described modification. Likewise, a conference between the the operators at two or more stations or a plurality if independent communication circuits can be established by manipulation of the selector switches just as in the first modification.

While only a limited number of stations have been utilized in the description of the present invention, it should be apparent to those skilled in the art that any number of stations may be added.

For instance, there may be as many stations as there are interstation conductors or several stations may be connected to a single conductor. The addition of other stations entails merely an increase in number of interstation conductors and a corresponding change in the selector switch so that the latter may close a circuit to all conductors.

What I claim as new and wish to secure by United States Letters Patent is:

1. In an intercommunication system, the combination including a plurality of stations remote from each other, voice receiving and transmitting means and an amplifier having input and output connections at each station, interstation conductors between stations, and means at each station for controlling the connections of said voice receiving and transmitting means and interstation conductors to said amplifier and to each other, said means being operable into a first position in which the interstation conductor is connected to said voice receiving and transmitting means, to a second position in which the interstation conductor and voice receiving and transmitting means are connected to the input and output, respectively, of the amplifier, and to a third position in which the connections of the voice receiving and transmitting means and interstation conductor to the amplifier are reversed.

2. In an intercommunication system, the combination including a plurality of stations remote from each other, voice receiving and transmitting means and an amplifier having input and output connections at each station, interstation conductors between stations, means at each station for controlling the connections of said voice receiving and transmitting means and interstation conductors to said amplifier and to each other, said means being operable into a first position in which the interstation conductor is connected to said voice receiving and transmitting means, to a second position in which the interstation conductor and voice receiving and transmitting means are connected to the input and output, respectively, of the amplifier, and to a third position in which the connections of the voice receiving and transmitting means and interstation conductor to the amplifier are reversed, and biasing means for returning said control means from said third mentioned position to said second mentioned position.

3. In an intercommunication system, the combination including a plurality of stations remote from each other, voice receiving and transmitting means and an amplifier having input and output connections at each station, interstation conductors between stations, means at each station for controlling the connections of said voice receiving and transmitting means and interstation conductors to said amplifier and to each other, said means being operable into a first position in which the interstation conductor is connected to said voice receiving and transmitting means, to a second position in which the interstation conductor and voice receiving and transmitting means are connected to the input and output, respectively, of the amplifier, and to a third position in which the connetcions of the voice receiving and transmitting means and interstation conductor to the amplifier are reversed, and biasing means for returning said control means from said second and third mentioned positions to said first mentioned position.

4. An intercommunication system, including in combination, a plurality of stations remote from each other, voice receiving and transmitting means and an amplifier having input and output connections at each station, interstation conductors between stations, and means including a plural position switch and a selector switch at each station for normally connecting the voice receiving and transmitting means thereat to an interstation conductor, said plural position switch being operable into two displaced positions, in the first of which the interstation conductor and receiving and transmitting means are connected to the input and output of said amplifier, respectively, and in the second of which the interstation conductor and the receiving and transmitting means are connected to the output and input of said amplifier.

5. In an intercommunication system, the combination including a plurality of stations remote from each other, voice receiving and transmitting means and an amplifier having input and output connections at each station, a source of power supply for said amplifier, interstation conductors between stations, and a plural position switch for controlling the connections of said voice receiving and transmitting means and interstation conductors to said amplifier and to each other, said switch being operable into a first position in which the interstation conductor is connected to said voice receiving and transmitting means, to a second position in which the interstation conductor and voice receiving and transmitting means are connected to the input and output, respectively, of the amplifier, and to a third position in which the connections of the voice receiving and transmitting means and interstation conductor to the amplifier are reversed, said switch including also means for cutting off the supply of power to the amplifier when operated into said first-mentioned position.

6. An intercommunication system, including, in combination, a plurality of stations remote from each other, receiving and transmitting means and an amplifier having input and output connections at each station, interstation conductors between stations, and means including a three position master switch and a selector switch for controlling the connection of the receiving and transmitting means and the interstation conductors to the amplifier, said selector switch being operable to condition the receiving means and amplifier for connection to any interstation conductor, and said master switch being biased to a position to complete the connection of the receiving and transmitting means directly to the interstation conductor and operable between two other positions to reverse the connections of the receiving and transmitting means and the interstation conductor to the input and output of the amplifier.

7. An intercommunication system, including in combination, a pair of stations remote from each other joined by an interstation conductor, voice receiving and transmitting means at each station, an amplifier at each station, a plural position switch at each station normally biased to a position in which the voice receiving and transmitting means at each station is connected to the interstation conductor, and circuits adapted selectively to be completed by said switch in its other positions for connecting the voice receiving and transmitting means to the input or output of the amplifier and simultaneously connecting the interstation conductor to the output or input of the amplifier.

8. An intercommunication system including, in

combination, a plurality of stations remote from each other, an interstation conductor associated with each station, a loud speaker unit, an amplifier having input and output connections, a two-pole three-position switch, a connection from the loud speaker unit to one blade of said switch, a connection from the other blade to an interstation conductor, said blades being operable into engagement with a first pair of interconnected contacts whereby the interstation conductor is connected to the unit for reception of communication from another station provided with an amplifier, a connection from the output of the amplifier to a second pair of interconnected contacts, one of which is adapted to be engaged by the first switch blade in its second position, and the other by the second switch blade in its third position whereby the interstation conductor is connected to the input and the loud speaker unit to the output of the amplifier for the reception of signals from a station without an amplifier, a connection from the input of the amplifier to a third pair of interconnected contacts, one of which is adapted to be engaged by the first switch blade in its third position, and the second switch blade in its second position whereby a speaker unit is connected to the input and the interstation conductor to the output of the amplifier, for the transmission of signals to other stations, and said switch being provided with resilient means for returning the blades from said third-mentioned position to said second-mentioned position, and being so constructed that the blades remain in said first-mentioned position when operated thereinto.

9. An intercommunication system, including, in combination, a plurality of stations remote from each other, an interstation conductor associated with each station, a loud speaker unit and amplifier having input and output connections, a two-pole three-position switch, a connection from the loud speaker unit to one blade of said switch, a connection from the other blade to an interstation conductor, said blades being normally biased into engagement with a first pair of interconnected stationary contacts whereby the interstation conductor is connected to the speaker unit for reception of signals from another station provided with an amplifier, a connection from the output of the amplifier to a second pair of interconnected contacts, one of which is adapted to be engaged by the first switch blade in its second position and the other by the second switch blade in its third position whereby the interstation conductor is connected to the input and the loud speaker unit to the output of the amplifier for the reception of signals from a station without an amplifier, and a connection from the input of the amplifier to a third pair of interconnected contacts, one of which is adapted to be engaged by the first switch blade in its third position and the second switch blade in its second position, whereby the speaker unit is connected to the input and the interstation conductor to the output of the amplifier for the transmission of signals to other stations.

10. An intercommunication system, including, in combination, a plurality of stations remote from each other, an interstation conductor associated with each station and a conductor common to all stations, a loud speaker unit and amplifier having input and output connections at each station, a connection from the loud speaker unit and amplifier input and output to the common conductor, a three-pole, three-position switch, a connection from the input of the amplifier to one switch blade, a connection from the loud speaker to the second blade, a connection from the output of the amplifier to the third blade, said switch being biased into an intermediate position in which the second blade engages a contact connected to an interstation conductor and the other blades are in open circuit position, whereby the station is conditioned for reception of speech from any station provided with an amplifier, said switch being operable to a first displaced position in which the first blade engages a contact connected to the interstation conductor and the remaining blades engage a pair of interconnected contacts, whereby the station is conditioned for reception of speech from other stations, and said switch being operable to a third position in which the first blade is in open circuit position, the second blade engages a contact connected to the input of the amplifier, and the third blade engages a contact connected to the interstation conductor, whereby the station is conditioned for the transmission of signals to other stations.

11. An intercommunication system, including in combination, a plurality of stations, an equal number of individual interstation conductors and a common conductor, voice receiving and transmitting means and an amplifier at each station, a selector switch at each station for establishing a circuit therefrom to any of said interstation conductors, and means including a plural position master switch at each station for reversing the connection of the voice receiving and transmitting means thereat and interstation conductor to the input and output of the amplifier.

12. An intercommunication system, including in combination, a plurality of stations, an equal number of individual interstation conductors and a common conductor, voice receiving and transmitting means and an amplifier at each station, a selector switch at each station, and means including a plural position master switch at each station for connecting the voice receiving and transmitting means thereat to an associated interstation conductor through said selector switch, said master switch being operable to two other positions, in one of which the interstation conductor is connected to the input of the amplifier and the voice receiving and transmitting means to the output and in the other of which these connections are reversed, and said selector switch being operable to establish a circuit to any of said interstation conductors, whereby communication can be established between two or more stations by operation of the selector switches thereat to establish a circuit to a predetermined interstation conductor.

13. An intercommunication system, including in combination, a plurality of stations, an equal number of individual interstation conductors and a common conductor, voice receiving and transmitting means and an amplifier at each station, a selector switch at each station, and means including a plural position master switch at each station for connecting the voice receiving and transmitting means thereat to an associated interstation conductor through said selector switch, said master switch being operable to two other positions, in one of which the interstation conductor is connected to the input of the amplifier and the voice receiving and transmitting means to the output, and in the other of which these connections are reversed, and said selec-

tor switch being operable to establish a circuit to any of said interstation conductors, whereby a plurality of independent communication circuits can be established between groups of two or more stations by operation of selector switches in each group to establish circuits to predetermined interstation conductors.

14. An intercommunication system, including in combination, a plurality of stations, voice receiving and transmitting means and an amplifier at each station, communication circuits between stations, and means at each station for controlling the connection of the communication circuit to that station and the voice receiving and transmitting means thereat to the amplifier, said control means normally occupying a position in which the communication circuit is established through the voice receiving and transmitting means and operable to two displaced positions in a first of which the voice receiving and transmitting means is connected to the input of the amplifier and the communication circuit to the output, and in the second of which the connections of the voice receiving and transmitting means and communication circuit to the amplifier are reversed.

15. In an intercommunicating system, the combination including an amplifier, having input and output connections, a source of power for said amplifier, voice receiving and transmitting means, and a plural position switch for controlling the connections of said voice receiving and transmitting means and said amplifier, said switch being operable into a first position to connect said voice receiving and transmitting means to the input of said amplifier, to a second position to connect the voice receiving and transmitting means to the output of said amplifier, and to a third position to disconnect said voice receiving and transmitting means from said amplifier and simultaneously cut off the supply of power to the amplifier.

16. In an intercommunicating system, the combination including an amplifier, having input and output connections, a source of power for said amplifier, voice receiving and transmitting means associated therewith, and single switch means for simultaneously controlling the supply of power to said amplifier and the connections of the voice receiving and transmitting means to the input and output of the amplifier.

17. In an intercommunicating system, the combination including a plurality of stations, certain of said stations being provided with voice receiving and transmitting means and amplifiers, and others of said stations being provided with voice receiving and transmitting means only, interstation conductors leading to all stations, and communication control switches so constructed and arranged in circuit with the voice receiving and transmitting means, amplifiers, and interstation conductors that stations provided with switches may be placed in communicating relationship with other similar stations through either the amplifier at that station or said similar station, and with the remaining stations through the amplifier at that station.

18. In an intercommunicating system, the combination including a plurality of stations, certain of said stations being provided with voice receiving and transmitting means and amplifiers, and others of said stations being provided with voice receiving and transmitting means only, interstation conductors leading to all stations, and communication control switches so constructed and arranged in circuit with the voice receiving and transmitting means, amplifiers, and interstation conductors that communication may be maintained between other similar stations according to two modes of manipulation of said switches, and with the remaining stations, according to one of said modes of manipulation.

19. A unit adapted to be connected in an intercommunicating system of the loudspeaking type, including in combination, voice receiving and transmitting means adapted to function as a microphone and loudspeaker, an amplifier having input and output connections, a conductor adapted to be connected to other units in the system, and means associated with said voice receiving and transmitting means, amplifier and conductor for controlling the connections thereof, said means being operable into a first position to connect said voice receiving and transmitting means to said conductor and to a second position to connect said conductor to the input and said voice receiving and transmitting means to the output of said amplifier.

20. A unit adapted to be connected in an intercommunicating system of the loudspeaking type, including in combination, voice receiving and transmitting means adapted to function as a microphone and loudspeaker, an amplifier having input and output connections, a conductor adapted to be connected to other units in the system, and means associated with said voice receiving and transmitting means, amplifier and conductor for controlling the connections thereof, said means being operable into a first position to connect said voice receiving and transmitting means to said conductor, to a second position to connect said conductor to the input and said voice receiving and transmitting means to the output of said amplifier, and to a third position in which the connections of the voice receiving and transmitting means and the conductor to the amplifier are reversed.

21. A unit adapted to be connected in an intercommunicating system of the loudspeaking type, including in combination, voice receiving and transmitting means adapted to function as a microphone and loudspeaker, an amplifier having input and output connections, a conductor adapted to be connected to other units in the system, and means associated with said voice receiving and transmitting means, amplifier and conductor for controlling the connections thereof, said means being operable into a first position to connect said voice receiving and transmitting means to said conductor, to a second position to connect said conductor to the input and said voice receiving and transmitting means to the output of said amplifier, and to a third position in which the connections of the voice receiving and transmitting means and the conductor to the amplifier are reversed, said last-mentioned means being adapted also to de-energize said amplifier when in said first mentioned position.

22. A unit for use at a station in an intercommunicating system of the loudspeaker type, including in combination, an amplifier, a source of "B" potential for said amplifier, voice receiving and transmitting means of the type adapted to function as a microphone and loudspeaker, a conductor adapted to be connected to other stations in the system, and switch means adapted to control the connections of said amplifier, conductor, and voice receiving and transmitting means whereby communication can be carried on between said station and other stations, said switch

means being so constructed and arranged that it can be operated simultaneously to condition the voice receiving and transmitting means for reception from other stations of the system and to disconnect the amplifier from the source of "B" potential.

23. A unit for use at a station in an intercommunicating system of the loudspeaker type, including in combination, an amplifier, a source of power for said amplifier, a voice reproducer, an interstation conductor, and single switch means for simultaneously connecting said reproducer to said interstation conductor and disconnecting said amplifier from said source of power.

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