

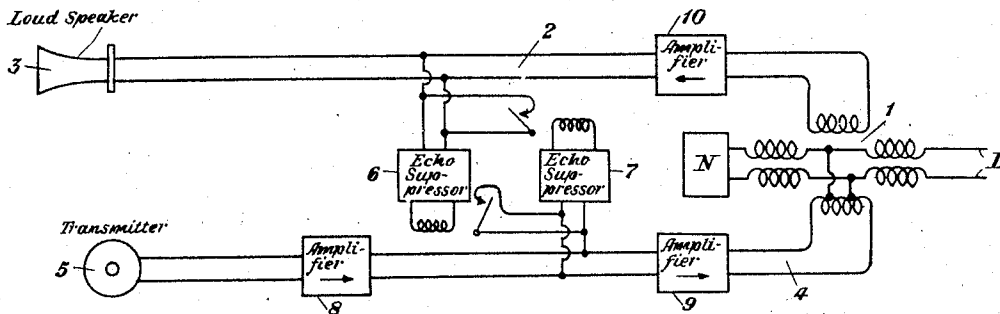
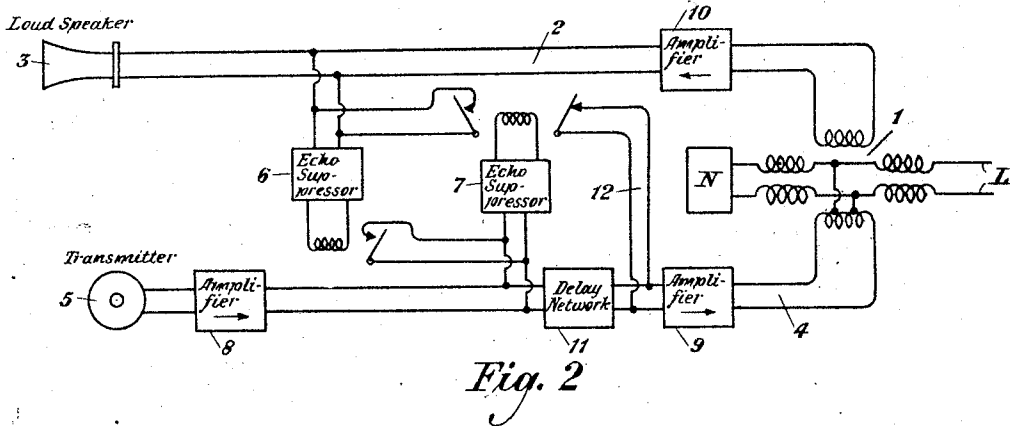
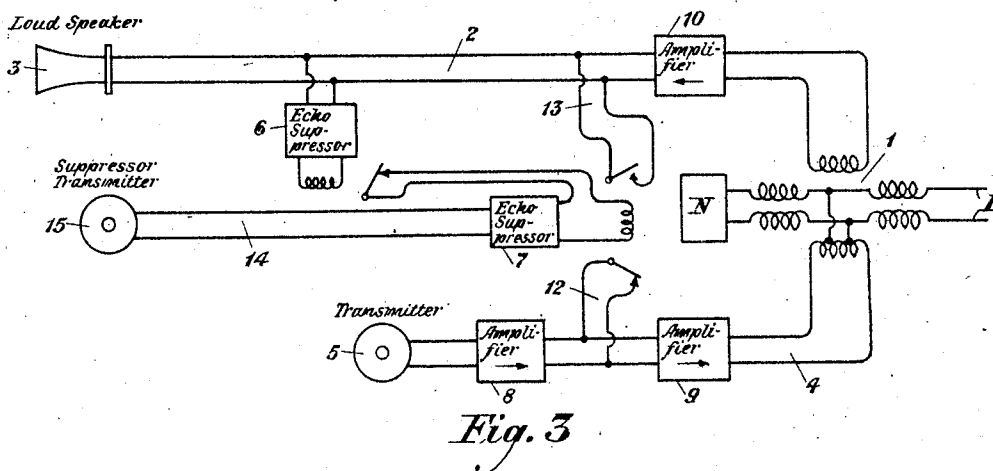
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TELEPHONE CONFERENCE ARRANGEMENT

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TELEPHONE CONFERENCE ARRANGEMENT

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This invention relates to improved arrangements for giving conference telephone service between two or more groups of people.

5 In the arrangements of the invention there will be provided at each station for a group a loud speaker by which the group may hear speech delivered before any other group. The group, however, will listen to its own
10 speakers directly. This will present certain advantages over an arrangement for simply interconnecting two public address systems as it will not be necessary to by-pass speech from the nearby transmitter into the loud
15 speaker and will eliminate the effects of talker echoes so that the minimum line transmission loss will be limited only by listener echoes. Each station for a group will also be provided with a transmitter so that its
20 speakers may be heard by the other group without requiring any speaker to talk close to the transmitter. Echoes due to acoustic coupling between the loud speaker and the transmitter will be eliminated by echo sup-
25 pressor circuits. Other features and advantages of the invention will appear more fully from the detailed description thereof hereinafter given.

The invention may be more fully understood from the following description together with the accompanying drawing in the
30 Figures 1, 2 and 3 of which the invention is illustrated. Fig. 1 is a circuit diagram illustrating a preferred embodiment of the invention. In Figs. 2 and 3 are circuit diagrams illustrating modified forms of the
35 invention. Similar reference characters have been utilized to denote like parts in all of the figures.

40 In the arrangements of Fig. 1 is shown a section of a transmission line L to which might be connected a number of stations for groups desiring conference telephone service. Each station would comprise a receiving circuit 2 including a loud speaker 3 and a trans-
45 mitter circuit 4 including a transmitter 5. The receiving circuit 2 and the transmitter circuit 4 would be connected to line L by means of the hybrid coil 1 and balancing net-
50 work N so that they will be approximately

in conjugate relationship. Included in the receiving circuit 2 would be an amplifier 10, and included in the transmitter circuit 4 would be the amplifiers 8 and 9. The loud
55 speaker 3 will be required to deliver a volume of sound to the conferees substantially equal to that due to their own speech. The transmitter 5 will be exposed to sound from the loud speaker 3, and hence it will be necessary to use echo suppressing devices to prevent
60 echoes and distortion due to acoustic coupling, even if this coupling is not close enough to cause singing. Accordingly, the echo suppressor devices 6 and 7 are provided. One of these will be connected to each local
65 circuit, and in response to voice currents transmitted thereover, will close a short circuit across the other local circuit to disable it. Where it is possible to so locate and ad-
70 just the transmitter and loud speaker that singing will not occur, the arrangements of Fig. 1 will suppress the echoes. The hybrid coil 1 is utilized to give the transmitting
75 echo suppressor 7 the greatest possible operating margin over the receiving echo suppressor 6 when speech begins to act on the transmitter. It is pointed out that if re-
peated circuits are used to connect the different conference groups, it is preferable
80 to arrange the echo suppressor contacts so that the short circuits (or opens) will not be applied directly to the terminals of the hybrid coil in order not to disturb the impedance presented toward the line L and so produce
85 echoes.

If the acoustic coupling between the loud speaker and the transmitter is such that singing is encountered, the arrangements illustrated in Figs. 2 and 3 might be utilized. The
90 arrangements of Fig. 2 are substantially similar to those of Fig. 1 except that an extra set of contacts are provided to normally close a short circuit 12 across the transmitter circuit 4. A delay network 11 is also provided in
95 circuit 4 between short circuit 12 and the input terminals of the echo suppressor 7. With these arrangements, the speech which actuates transmitter 5 will be held up by the delay network until the device 7 operates to open
100 short circuit 12 and to close a short circuit

across the receiver circuit 2. Obviously, singing could not occur because of the normally closed short circuit 12 across the talking circuit 4.

In the arrangements of Fig. 3, the relatively slow transmission of sound through the air is utilized to secure the delay provided for in Fig. 2 by the delay network 11. The echo suppressor 7 is connected by a separate circuit 14 to a suppression transmitter 15 which will be located closer to the conference group than the pick-up transmitter 5. Accordingly, when one of the conferees speaks, the echo suppressor 7 is operated by the suppressor transmitter 15, and the necessary circuit changes made by the time the sound reaches the pick-up transmitter 5.

It is pointed out that with the arrangements of the invention, the transmitter branch 4 is made normally inoperative by means of the sing suppressing contacts of the short circuit 12 closed across said circuit. The advantage in this will be seen from the fact that if the transmitter branches of all stations are normally operative, the room noises from all the stations involved are impressed upon the line at all times when speech is not being transmitted; hence, the resulting relative level of total noise in the line will be higher than the relative noise level in the noisiest conference room. Furthermore, by making the transmitter branch 4 normally inoperative, the receiving echo suppressor 6 is required to discriminate only against line noise as room noise will only be on during the time someone is talking, and will be only that due to one room. The receiving echo suppressor can then be made quite sensitive so that the transmitting echo suppressor will be protected against false operation by strong echoes due to acoustic coupling. A further advantage of the arrangements of the invention consists in the fact that due to the lack of talker echoes, the arrangements of the invention are suitable for operation over any two-way or multi-way transmission network which will give substantially equal transmission losses over the different paths and satisfactory quality for loud speaker operation.

While the arrangements of the invention have been disclosed as embodied in certain specific arrangements which are deemed desirable, it is pointed out that they are capable of embodiment in other forms without departing from the spirit of the invention as defined by the appended claims.

What is claimed is:

1. In association with a transmission line, an arrangement of telephone circuits and apparatus adapted for use as a unit in a conference system, comprising a receiving path, a loud speaking receiver therein, a normally disabled transmitting path, a transmitter therein exposed to sound from said receiver, said receiving path and said transmitting

path being connected substantially conjugately to the transmission line, means in the transmitting path for clearing said path in response to voice waves therein, and means associated with each of said paths for disabling the opposite path in response to voice waves.

2. In association with a transmission line, an arrangement of telephone circuits and apparatus adapted for use as a unit in a conference system, comprising a receiving path, a loud speaking receiver therein, a normally disabled transmitting path, a transmitter therein exposed to sound from said receiver, said receiving path and said transmitting path being connected substantially conjugately to the transmission line, means for disabling either of said paths in response to voice waves in the other path, means in the transmitting path for clearing said path in response to voice waves therein, and means for insuring the operation of said clearing means before the arrival of the actuating voice waves at the point at which the transmitting path is normally disabled.

In testimony whereof, I have signed my name to this specification this 29th day of February, 1928.

GEORGE CRISSON.