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PREVENTION OF OVERHEARING IN PROGRAM CIRCUITS

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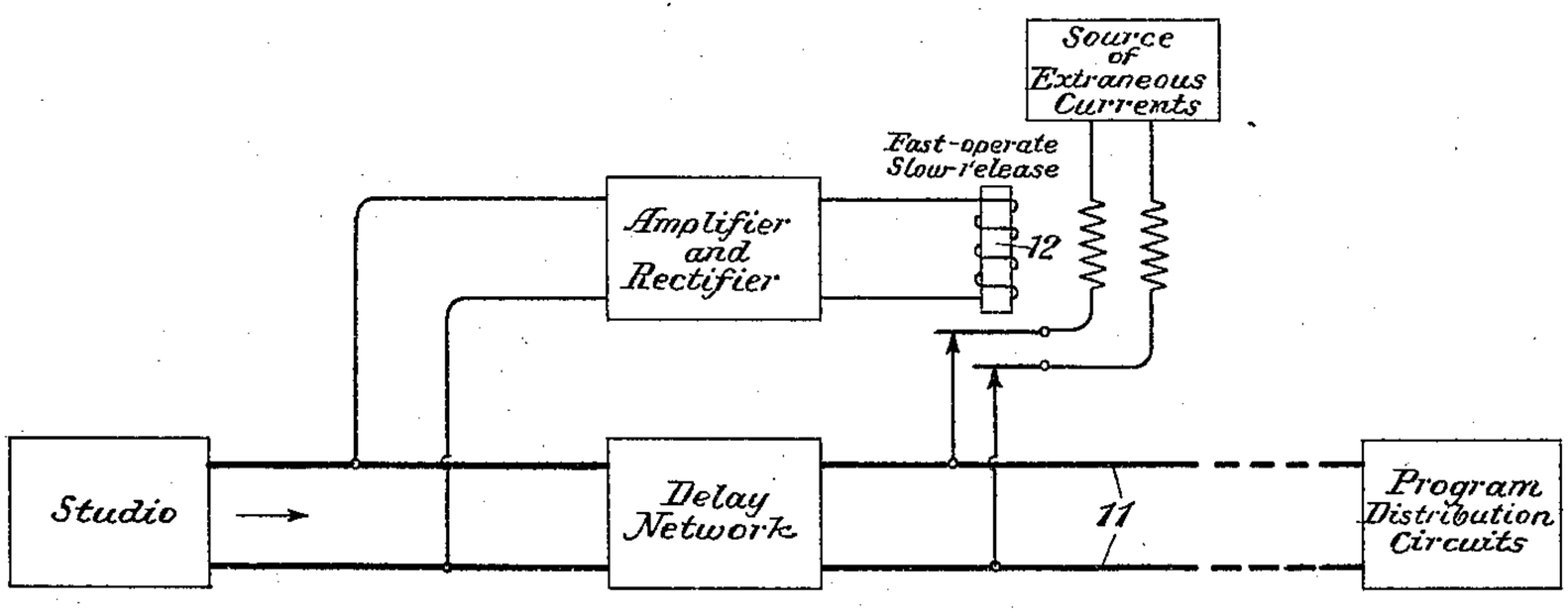

Fig. 1

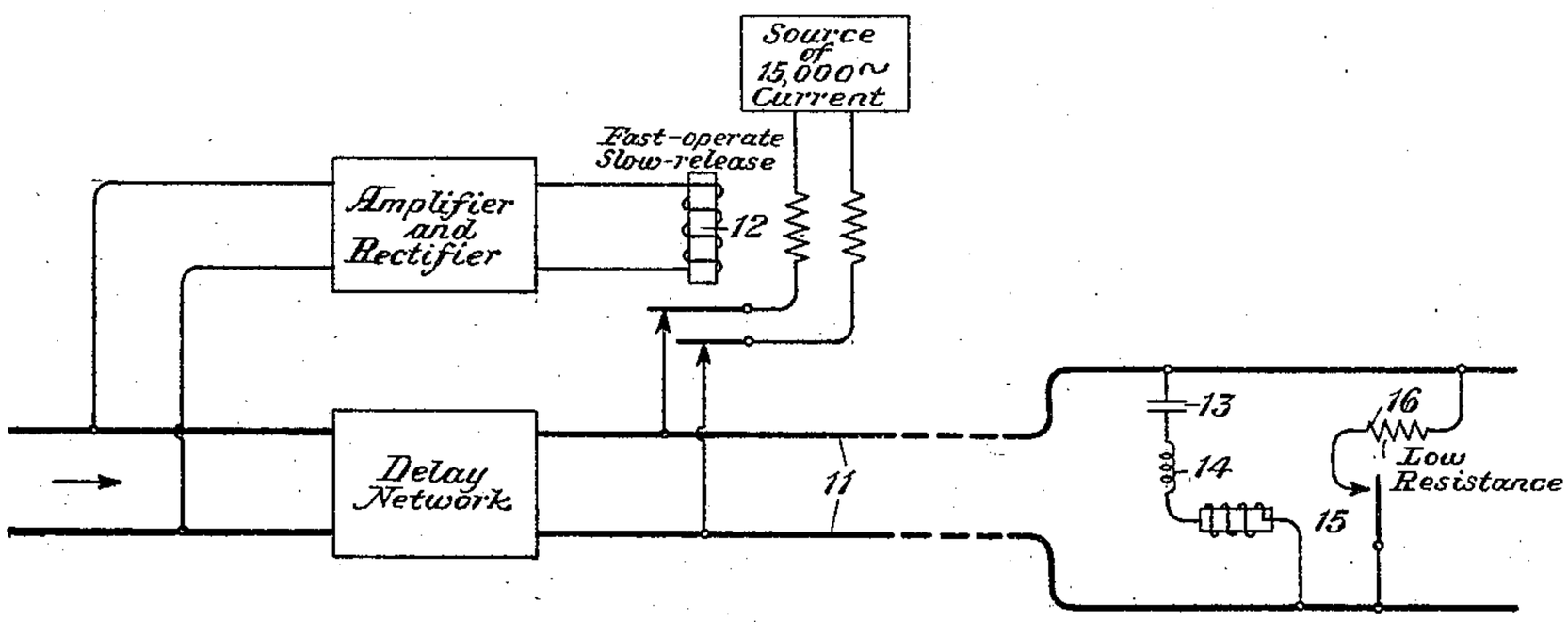

Fig. 2

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UNITED STATES PATENT OFFICE

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PREVENTION OF OVERHEARING IN PROGRAM CIRCUITS

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This invention relates to the prevention of interference between neighboring transmission circuits, and more particularly to the prevention of effective cross-talk from telephone message circuits to neighboring telephone circuits used for the transmission of programs.

In the designing of circuits for program transmission, it is of course highly desirable that the energy levels in the program circuits and in the neighboring message circuits be adjusted to the end that cross-talk between the circuits may be prevented. It is especially desirable to remove all possibility that conversations in a message circuit may be intelligibly overheard in a program circuit. Since the gain associated with the reception of a program is under the control of the listener, there has always been heretofore the possibility that the listener may overhear message circuit conversations during the absence from the program circuit of the program currents, especially if the program circuit is exceptionally little affected by noise. If the energy level of the program circuit is raised to such a degree that there is no effective cross-talk into even an exceptionally quiet circuit, expensive shielding must be resorted to in order to prevent interference with the message circuit from the high energy level program circuit.

It has been suggested that, in order to eliminate any possibility of overhearing on program circuits which are in proper operating condition, an amount of noise not greater than that which is deemed fairly tolerable be placed on each circuit used for the transmission of programs. Following up this suggestion, the applicants have devised methods and means whereby there is accomplished, in addition to the elimination of the possibility of overhearing on the program circuit, the reduction to the minimum of noise on the program circuit while the program currents are being transmitted. These and other objects of the invention will appear more clearly from the following description.

In general, the applicants accomplish the objects of the invention by sending over the program circuit, during the absence of the program currents, currents extraneous to the program currents. These extraneous currents prevent overhearing by the program listener of message circuit conversations, either directly by forming noise or indirectly by causing at the receiving end of the program circuit a large transmission loss.

The invention will be clearly understood when the following detailed description is read with reference to the accompanying drawing, in which

Figure 1 shows diagrammatically, and in part schematically, an arrangement for introducing extraneous audible currents, and

Fig. 2 shows in like manner an arrangement for introducing extraneous currents which may be inaudible and which cause the introduction of a large loss at the receiving end during the absence of the program currents.

Like reference characters in the two figures of the drawing designate corresponding elements of the circuits.

With reference to the details of the drawing, and first with particular reference to Fig. 1 thereof, let it be assumed that the line 11 is a telephone line employed to transmit program currents from a studio indicated schematically at the left over a considerable distance to certain circuits schematically indicated at the right, which circuits may be those suitable for the distribution of the program currents, as is well understood in the art. The applicants connect across the line 11 an amplifier and rectifier device (well understood in the art), and connect to the output of this device a relay 12. A source of extraneous currents is schematically indicated, and with the relay 12 unoperated, the circuit connection shown feeds the output of this source of extraneous currents into the transmission line 11. These extraneous currents may take the form of noise due to thermal agitation for instance, this type of noise being perhaps least annoying. Again, it is feasible to have this source produce music, dance music, for instance, from a phonograph record. It will be understood that with the arrangement shown these extraneous currents are transmitted over the line 11 when the pro-

gram currents from the studio are absent, that is, when there is a considerable break in the transmisison of the program. If the extraneous currents are noise currents they will serve to eliminate intelligible effects of cross-talk from neighboring message circuits. If these extraneous currents take the form of music currents, it will be understood that the level must normally be quite low, and if the program listener wishes to receive this dance music, for instance, during the periods of absence of the regular program, he will be in a position to increase the volume.

When the program currents come on the line 11, the amplifier and rectifier arrangement is operated, and the relay 12 with its two armatures as shown, breaks the supply circuit from the source of extraneous currents. There is, of course, no fair possibility of intelligible cross-talk in the line 11 while the program is being transmitted, and with the removal of the noise or other extraneous currents from the circuit the desired condition of transmisison is maintained. The relay 12 should be fast-operating and slow-releasing in order to prevent the application to the line 11 of the extraneous currents during the brief pauses which will occur in the program transmission.

It is, of course, desirable to place the applicants' device for introducing the extraneous currents at the sending or studio end of the program circuit since this arrangement results in economy of apparatus for the purpose. It is, of course, conceivable, however, that the noise or other extraneous currents might be introduced at any suitable point on the program circuit.

The delay network schematically shown in the line 11 between the branch path to the amplifier-rectifier and the point of application of the extraneous currents is obviously for the purpose of permitting the breaking of the supply circuit from the source without interference with the transmission of the program currents. The structure of this delay network is well understood in the art.

While the arrangement shown diagrammatically and in part schematically in Fig. 2 of the drawing is based upon the same principle as the arrangement of Fig. 1, the extraneous currents supplied in the arrangement of Fig. 2 are specifically indicated as high frequency currents of, for instance, 15,000 cycles. This current is inaudible, and accordingly there is provided an arrangement for producing an indirect elimination of intelligible cross-talk as distinguished from the direct elimination of Fig. 1 in which audible noise currents are introduced. At the right of Fig. 2, which represents what may be termed the receiving end of the program circuit, there are bridged across the line 11 a condenser 13, an inductance coil 14 and the winding of a relay 15. The elements 13 and 14 may be tuned to the frequency of the extraneous current produced at the studio end of the line, and accordingly, when this current is supplied to the line during the periods of absence of the program currents, the relay 15 will operate to close a circuit across the line including a low resistance 16. The effect, of course, is the introduction of a low impedance shunt across the line 11 and the resultant introduction of a very large loss. This arrangement serves, of course, to bypass any currents representing intelligible cross-talk from a neighboring message circuit.

While the invention has been disclosed specifically for the purpose of illustration, it is to be understood that its true scope is determined by the appended claims.

What is claimed is:

1. In a circuit for the transmission of programs, said circuit being continuously operative, the method of preventing intelligible cross-talk in the program circuit from neighboring message circuits which consists in producing independently of energy in the program circuit currents extraneous to the program currents and supplying the extraneous currents to the circuit only when no program currents are being transmitted.

2. In a circuit for the transmission of programs, said circuit being continuously operative, the method of preventing intelligible cross-talk in the program circuit from neighboring message circuits which consists in producing independently of energy in the program circuit currents extraneous to the program currents, supplying the extraneous currents to the circuit when no program currents are being transmitted, and interrupting the supplying of the extraneous currents in response to the transmission of program currents.

3. The method of transmitting programs over a continuously operative telephone circuit and rending said circuit free from intelligible cross-talk from neighboring message circuits which consists in supplying the program currents to the circuit, producing independently of energy in the program circuit currents extraneous to the program currents, and supplying said extraneous current to the circuit only when the program currents are absent therefrom.

4. The method of transmitting programs over a continuously operative telephone circuit and rendering said circuit free from intelligible cross-talk from neighboring message circuits which consists in supplying the program currents to the circuit, producing independently of energy in the program circuit, currents extraneous to the program currents, supplying said extraneous currents to the circuit, and causing the transmission of the program currents to interrupt the supplying of the extraneous currents.

5. In a circuit for the transmission of pro-

gram currents from the station of origin to a distant point on said circuit, said circuit being continuously operative, the method of preventing intelligible cross-talk from neighboring message circuits which consists in producing independently of energy in the program circuit currents extraneous to the program currents, applying the extraneous currents to the circuit only when the program currents are absent therefrom, and causing the extraneous currents received at the distant point on the circuit to introduce a large transmission loss therein.

6. In association with a circuit for the transmission of programs, said circuit being continuously operative, means independent of energy in the program circuit for producing currents extraneous to the program currents, a supply circuit for applying said extraneous currents to the program circuit, and means responsive to the program currents in the program circuit for breaking said supply circuit.

7. In association with a circuit for the transmission of programs, said circuit being continuously operative, means independent of energy in the program circuit for supplying to the program circuit currents extraneous to the program currents, and means responsive to program currents in said circuit for disabling said means for supplying extraneous currents.

8. A circuit for transmitting programs from the station of origin to a distant point thereon, said circuit being continuously operative, means independent of energy in the program circuit for producing currents extraneous to the program currents, means for supplying said extraneous currents to the transmission circuit only when the program currents are absent therefrom, and means at the distant point on said circuit for introducing a large loss therein in response to said extraneous currents.

In testimony whereof, we have signed our names to this specification this 26th day of August, 1930.

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