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ACOUSTICAL AID FOR DEAF PERSONS

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Fig. 1.

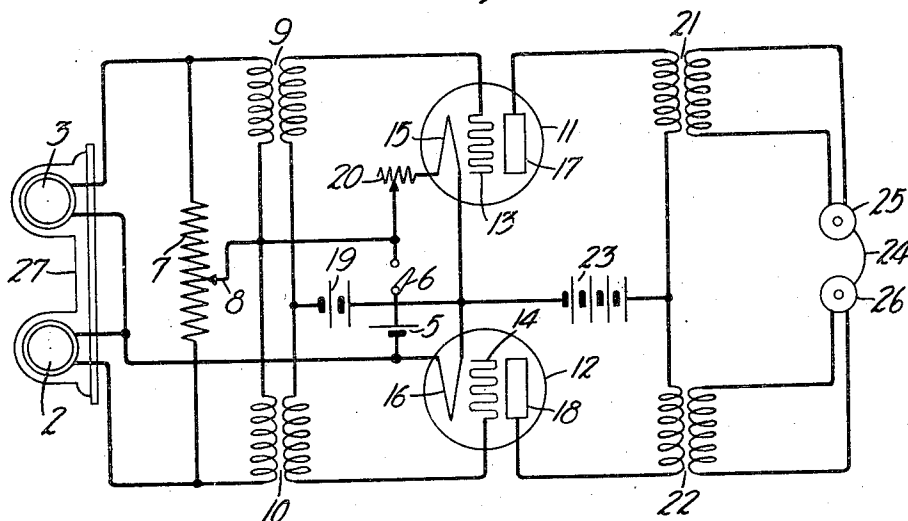
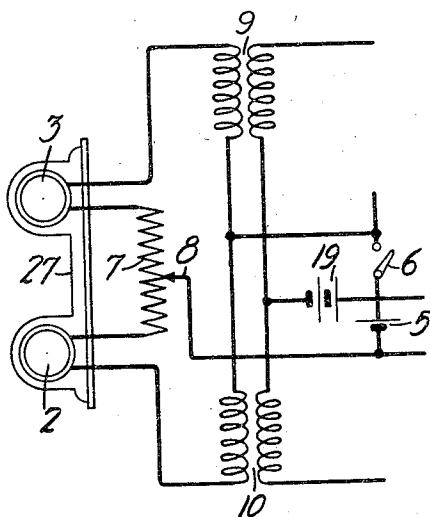


Fig. 2.



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UNITED STATES PATENT OFFICE.

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ACOUSTICAL AID FOR DEAF PERSONS.

Application filed December 21, 1921. Serial No. 523,845.

To all whom it may concern:

Be it known that I, ROY M. ALLEN, a citizen of the United States, residing at Bloomfield, in the county of Essex, State of New Jersey, have invented certain new and useful Improvements in Acoustical Aids for Deaf Persons, of which the following is a full, clear, concise, and exact description.

This invention relates to devices for improving the hearing of deaf or partially deaf persons.

An object of this invention is to provide, in a binaural system for aiding the deaf to hear, means whereby the user may control the relative intensities of the sounds in each receiver in order to compensate for any difference in the sensitivity of his ears and also for any difference in the electrical characteristics of the circuits and apparatus.

Another object is to provide a binaural amplifying system in which both transmitters and both amplifiers are provided with current from the same source.

Other objects will appear hereinafter.

In general the invention comprises a pair of transmitters connected to a pair of receivers by separate amplifying circuits and means for controlling the relative intensities of the sounds in each of the receivers.

In the drawings, Fig. 1 is a complete schematic view of a system embodying the invention; Fig. 2 represents a modification of the system shown in Fig. 1.

Referring to Fig. 1, the transmitters 2 and 3 are preferably of the high quality type described in I. B. Crandall Patent No. 1,456,538, issued May 29, 1923. They are mounted in fixed relation on a support 27 so as to receive the sounds in their natural acoustical relation. One terminal of each of the transmitters is connected in common to the negative pole of a battery 5. The other terminals are connected to one terminal of each of the primaries of transformers 9 and 10, respectively. The other terminals of the primaries of the transformers are connected in common through switch 6 to the positive pole of the battery 5. Bridged across the transmitters in series is a potentiometer 7, which is provided with an adjustable contact 8 connected through switch 6 to the positive pole of battery 5 for controlling the current supply to the transmitters and the potential across the pri-

maries of transformers 9 and 10. Vacuum tubes 11 and 12, having the usual cathodes 15 and 16, control electrodes 13 and 14, and anodes 17 and 18, are provided for amplifying the transmitter currents. The cathodes, or filaments, are connected in series and supplied with current from battery 5 through switch 6 and rheostat 20, the latter providing a means for controlling the temperature of both filaments and thereby simultaneously increasing or decreasing equally, the outputs of each amplifier. Control electrodes 13 and 14 are each connected through the secondaries of the transformers 9 and 10 to negative pole of battery 19, the positive pole of which is connected to the common terminal of the filaments and the negative pole of battery 23, to which is connected through the primaries of transformers 21 and 22, the anodes 17 and 18, respectively. Across the secondary of transformer 21 is a receiver 25 and across the secondary of transformer 22 is a receiver 26. These receivers are supported on the usual head band 24.

In order to regulate the relative intensity of the sounds in the receivers so that the user's natural acoustical relation, with respect to the source of sound, may be maintained, and also compensate for any difference in the sensitivity of his ears, it is only necessary to adjust the potentiometer by moving contact 8. If, for example, in Fig. 1, the intensity of receiver 25, as compared with that of receiver 26, is too great, then by moving the contact 8 upward, the potential across the primary of transformer 9 will be decreased, while that across the primary of transformer 10 will be increased, thus decreasing the input to amplifier 11 and increasing the input to amplifier 12, which results in a corresponding decrease in the intensity of the sound in receiver 25, and an increase in the intensity of sound in receiver 26. After adjusting the receivers 25 and 26 to have their desired relative intensities, if it should so happen the volume of sound is too great or too small, the desired intensity of sound may be obtained by adjusting the intensity of the filament currents by manipulating the rheostat 20. In this case the intensities of the sounds in the receivers 25 and 26 are increased or decreased by equal amounts in the same direction.

In the modification shown in Fig. 2 the resistance 7 of the potentiometer is in series with the transmitters. Therefore, to decrease the intensity in the receiver 25 and at the same time to increase it in receiver 26, the contact member 8 is moved downward instead of upward, as in the case illustrated in Fig. 1.

What is claimed is:

1. In a binaural system for enabling the deaf to hear, a pair of transmitters, a receiver for each transmitter, amplifying means connecting the transmitters to their respective receivers, and a single potentiometer for simultaneously adjusting the relative intensities of the sounds in each receiver.

2. In a binaural system for enabling the deaf to hear, a pair of transmitters, a receiver for each transmitter, amplifying means connecting the transmitters to their respective receivers, common means for simultaneously adjusting the relative intensities of the sounds in each receiver, and means for simultaneously increasing or decreasing the intensities of the sounds in the receivers.

3. In a binaural system for enabling the deaf to hear, a pair of amplifying circuits, a transmitter in the input of each circuit, single means for simultaneously adjusting the relative inputs to said amplifying circuits, a pair of receivers connected in each of the outputs of said circuits, and common means in said amplifying circuits to simultaneously increase or decrease the outputs of both receivers.

4. In a binaural system for enabling the deaf to hear, a pair of amplifying circuits, a transmitter in the input of each circuit, common means for simultaneously adjusting the relative inputs to said amplifying circuits, a receiver connected in the output of each circuit, means in said amplifying circuits to simultaneously increase or decrease the outputs of both receivers, and a

source of energy common to both transmitters and both amplifying circuits.

5. In a binaural system for enabling the deaf to hear, a pair of transmitters, a receiver for each transmitter, amplifiers connecting the transmitters to their respective receivers, single means for simultaneously adjusting the relative intensity of the sounds in each receiver, and a source of energy common to both transmitters and both amplifiers.

6. In a binaural system for enabling the deaf to hear, a pair of transmitters, a source of electrical energy common to both transmitters, a pair of receivers, and single means for simultaneously adjusting the relative intensity of the sounds in each receiver.

7. In a binaural system for enabling the deaf to hear, a pair of transmitters, a pair of amplifying circuits, a pair of transformers having primary and secondary windings for connecting said transmitters to the inputs of said amplifying circuits, a potentiometer bridged across the primaries of said transformers, means common to both circuits for increasing the potential across one of the primaries and at the same time decreasing it across the other primary, and a receiver connected to the output of each amplifying circuit.

8. In a system for enabling the deaf to hear, comprising two circuits each having a vacuum tube amplifier, a transmitter connected to the input of each tube, a receiver connected to the output of each tube, a source of energy common to the plates, a second source common to the grid, a third source common to the filaments and the transmitters, and single means for adjusting the relative current supply to each transmitter.

In witness whereof I hereunto subscribe my name this 16th day of December, A. D., 1921.

ROY M. ALLEN.