

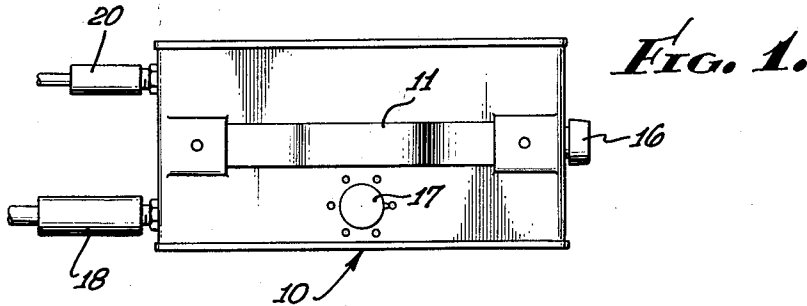
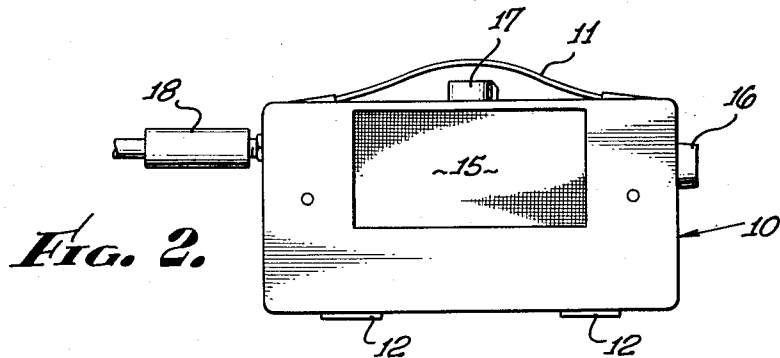
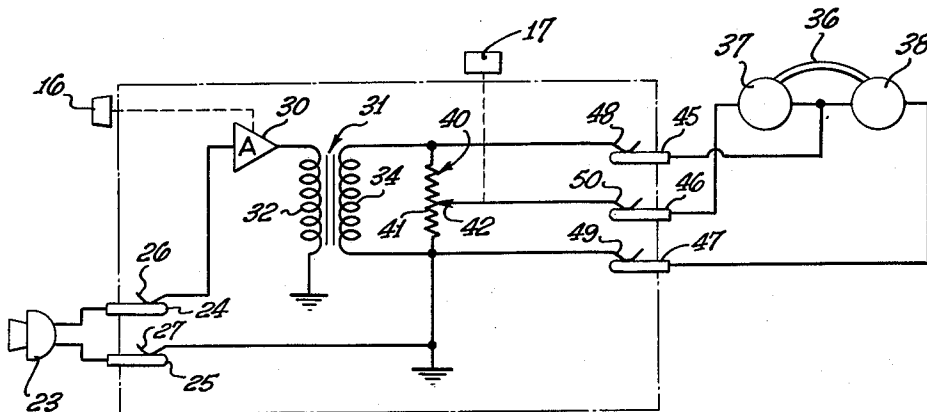
Jan. 5, 1960

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2,920,139

BALANCED BINAURAL AUDIO TRAINER

Filed Jan. 27, 1958



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2,920,139

BALANCED BINAURAL AUDIO TRAINER

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Application January 27, 1958, Serial No. 711,255

4 Claims. (Cl. 179-1)

This invention relates to a sound signal, that is, voice transmission system particularly adapted to the training of deaf persons, especially children and/or individuals having speech or hearing deficiencies, or both. The system is one comprising a microphone and amplifier connected to a pair of earphones with a single control for relatively adjusting the signals in the two earphones so that the individual wearing the earphones hears an equal or balanced signal or output in the two earphones. In many individuals having hearing deficiencies, the deficiencies in the two ears are unequal, i.e., one ear is stronger or weaker than the other. It is necessary, therefore, to adjust the signals to the two earphones so that to the listener they appear to be equal.

It has been known in the prior art to have a system having two separate controls, one for each earphone to produce signals appearing to the listener to be equal. Such system requires that the control for each earphone be adjusted selectively in attempting to achieve signals in the two earphones appearing to the listener to be equal.

The present invention utilizes a potentiometer having a tap or adjustable contact which is connected across the amplifier output. One earphone is connected directly across the full potentiometer voltage while the other earphone is connected across the variable output or voltage of the potentiometer. The full potentiometer voltage is impressed on the earphone for the weaker ear. By then adjusting the single control which adjusts the potentiometer tap or sliding contact, the signal to the stronger ear can be very readily and effectively adjusted to bring the signals into balance wherein the listener appears to hear equal signals. The system includes the usual amplifier gain or output control whereby the signals to the two earphones can then be simultaneously adjusted to produce balanced outputs in the two earphones suited to the listener's preference.

The invention has utility in having improved adaptability for balancing the output to the earphones appropriate to the inequality in the deficiencies in the listener's ears. The single control reduces the amplifier loading and accordingly the fidelity of response of the amplifier is improved. The system is otherwise considerably simpler, more economical and less bulky, and has reduced weight.

The primary object of the invention is to improve the relative selectivity of attenuation of the signals to a pair of earphones used in the training of individuals having hearing deficiencies, or individuals having defects in speech.

Another object of the invention is to provide an improved means for relatively controlling signals to each of a pair of earphones by means of a single control wherein the signal to one earphone is controlled relatively to the other.

Another object is to provide an improved means for relatively controlling the magnitude of signals to a pair of earphones comprising a potentiometer having a sliding

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contact for feeding signals the earphones wherein one earphone is connected across the full potentiometer voltage whereas the other earphone is connected to the variable potentiometer voltage; that is, the voltage between the sliding contact and one end of the potentiometer slide wire.

Another object of the invention is to provide an improved control as in the foregoing, wherein the amplifier with its gain or output control and the individual control for selectively controlling the signals to the earphones relatively, are embodied in a single unit.

Further objects and numerous additional advantages of the invention will become apparent from the following detailed description and annexed drawings wherein:

Figure 1 is a plan view of a portable housing unit containing the improved amplifier circuit and control means of the invention.

Figure 2 is a side elevational view of the unit of Figure 1.

Figure 3 is a schematic circuit diagram of a microphone and amplifier circuit having the improvements of the invention embodied therein.

Referring now more particularly to Figure 1 of the drawings, numeral 10 represents a housing or casing having contained therein the amplifier circuit means with the selective balancing control of the invention, as well as the usual amplifier gain or output control. The casing 10 has a carrying handle 11 for portability and may have feet 12 as shown at the bottom. A microphone is embodied in the unit, being represented in part by the fabric panel 15. The amplifier gain control button or knob is shown at 16. Numeral 17 designates a knob which is the selective balancing control of this invention. Numeral 18 designates an earphone plug jack which plugs into the unit and which will be referred to more in detail presently. Numeral 20 designates another plug jack whereby, if desired, an extension microphone or other accessory may be employed.

Figure 3 of the drawings is a schematic circuit diagram wherein the microphone is shown at 23, its output being connected to contactors 24 and 25, forming part of its plug jack, which engage with contactors 26 and 27 within the unit 10. Numeral 30 designates schematically an amplifier, or amplifier circuit, which may be of conventional type and may be of a multi-stage type. Contactors 26 and 27 are connected respectively to the input of the amplifier 30 and to ground, as shown. The amplifier gain control button 16 adjusts the amplifier output in the usual manner. Numeral 31 designates an output transformer having a primary 32 connected across the output of the amplifier 30. The transformer 31 has a secondary 34, the output of which, as will be described, is connected to a pair of earphones 36 having ear pieces of phones 37 and 38.

The improvement of the invention lies principally in potentiometer 40 having a slide wire 41, connected across the transformer secondary 34 and having a sliding tap or contact 42 movable adjacent the slide wire 41. The points of the components which are at ground potential are as shown in Figure 3. The earphone plug jack is one having three contactors, 45, 46 and 47. Contactors 45 and 47 connect as shown directly across earphone 38 and they engage with contactors 48 and 49, connecting across the slide wire 41. The contactor 46 connects to earphone 37 and it engages with contactor 50, connecting to sliding contactor 42. Thus, as can be seen, earphone 37 is connected across the controllable or variable voltage of the potentiometer, that is, the voltage between sliding contact 40 and the upper end of slide wire 41. The button or knob 17 adjusts the position of sliding contactor 42.

The technique of selectively adjusting and balancing the binaural output of the earphones or headset is that

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the earphone 38 is for the weaker ear of the listener. The output signal to the stronger ear, i.e., to earphone 37, is then selectively attenuated so that the selectively balanced outputs appear to the listener to be equal. If both ears are equally weak or equally strong the knob 17 can, of course, be adjusted to full binaural, i.e., to deliver or impress the full output signal; that is, the full potentiometer voltage on both of the earphones. That is, the sliding contactor 42 would be adjusted to the lower end of the slide wire 41.

After the signals to the earphones have been selectively adjusted to appear to the listener to be equal, the listener may then adjust the amplifier gain control knob 16 to adjust the amplifier output, that is, signal to both earphones to a magnitude or volume to suit his preference.

The unit of the invention is preferably embodied in a relatively small compact casing or housing, as described, which is portable and is adapted to be placed on the desk of the deaf person or other person receiving training or instruction. The principle of the invention may, however, be applied to wearable hearing aids.

Where the unit is to be used by only one person it may be preferable to control the slider 42 by a screw setting rather than the knob 17, thereby minimizing the danger of inadvertent changing of the output ratio between the phones 37 and 38. In similar vein, the setting of the slider 42 may be completely inside the housing 10 and/or may be potted at a given setting after carefully adjusting to suit the taste of the user.

From the foregoing, those skilled in the art will observe that I have provided a novel and highly effective improved selective balancing control for relatively adjusting the signals fed to a pair of earphones, whereby a listener, by means of a single control, can relatively adjust the signals to the two earphones to compensate for inequality in weakness or strength as between the two ears.

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While the instant invention has been shown and described herein in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention which is therefore not to be limited to the details disclosed herein but is to be accorded the full scope of the claims.

What I claim as new and desire to secure by Letters Patent is:

1. In an amplifier system of the type embodying a microphone and amplifier, and a pair of earphones connected to the output of the amplifier, the improvement comprising a potentiometer having a slider and connected to have an output of the amplifier impressed thereacross, means connecting one earphone across the entire potentiometer voltage and means connecting the other earphone to the adjustable potentiometer voltage between the slider and one end of the potentiometer, and a single control knob for adjusting the slider for relatively adjusting the outputs in the two earphones.

2. The combination of claim 1, wherein the earphone connected across the full potentiometer voltage is adapted for use by the weaker ear of a listener, and means for adjusting the amplifier output applied to the potentiometer and independent of the relative adjustment between the two earphones.

3. The combination of claim 1 including a transformer having a primary connected to the amplifier output and having a secondary across which the potentiometer is connected.

4. The combination of claim 1 including an earphone jack having three contactors, two of which are connected respectively to earphone terminals and one of which is connected to a terminal which is common to earphone terminals.

No references cited.