Feb. 19, 1946. J. R. CUBERT 2,395,318

HEARING AID

Filed April 2, 1942

FIG. 2.

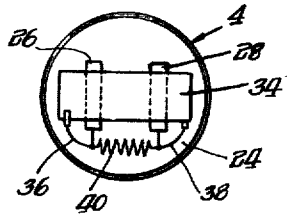


FIG. 3

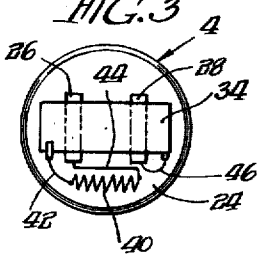


FIG. 4.

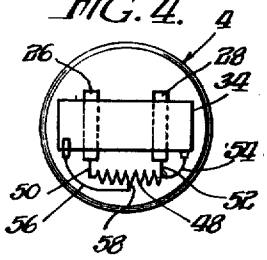


FIG. 5.

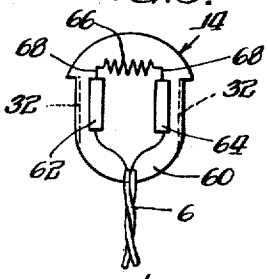


FIG. 6.

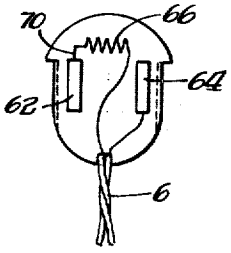


FIG. 7.

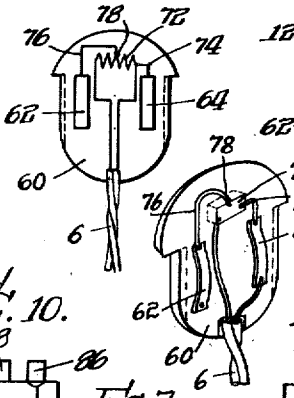


FIG. 8.

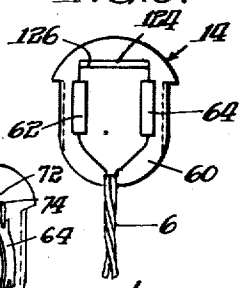


FIG. 9.

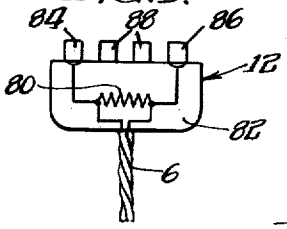


FIG. 10.

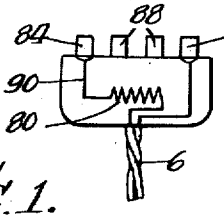


FIG. 7a.

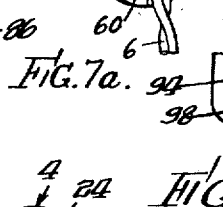


FIG. 11.

FIG. 1.

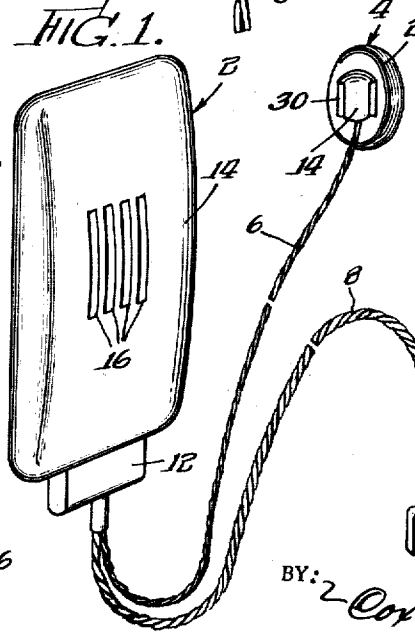


FIG. 15.

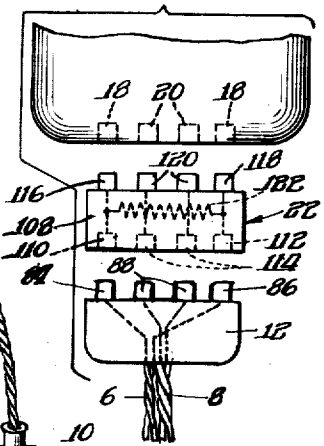


FIG. 12.

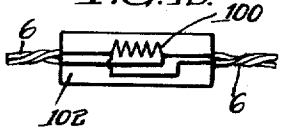


FIG. 13

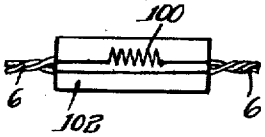
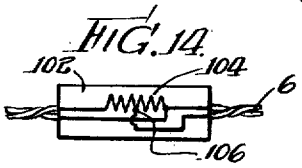


FIG. 14.



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BY: Cox Moore & Olson
attys.

Patented Feb. 19, 1946

2,395,318

UNITED STATES PATENT OFFICE

2,395,318

HEARING AID

Joseph R. Cubert, Chicago, Ill., assignor to Aurex Corporation, Chicago, Ill., a corporation of Illinois

Application April 2, 1942, Serial No. 437,382

5 Claims. (Cl. 179—107)

This invention relates to a hearing aid.

An appreciable number of hard of hearing persons have only a small percentage of hearing loss, and consequently the ordinary hearing aid instrument having high amplification is not satisfactory for those persons. Hearing aid manufacturers produce a so-called "low level" instrument for this class of persons. However, these so-called "low level" instruments are of special design, necessitating the manufacture and stocking of an additional instrument model.

An object of the invention is to provide a "low level" hearing aid which enables a manufacturer, distributor or service man to use a standard amplifier in conjunction with a special phone or instrument phone connector to provide a "low level" hearing aid.

It is a further object of the invention to provide a "low level" hearing aid, as above stated, by incorporating a shunt, series or potentiometer resistance in an element of the instrument-to-phone connector or in the phone itself so as to bring the acoustic output of the ear phone to a low level.

Other and further objects and advantages of the invention will be apparent from the following description when taken in connection with the accompanying drawing, wherein—

Figure 1 is a view in perspective of a hearing aid embodying the invention;

Figures 2, 3 and 4 are views in elevation of the phone with its cover removed;

Figures 5, 6 and 7 are views in elevation of the phone connector plug;

Figure 7*a* is a view showing the connector plug of Figure 7 in perspective;

Figure 8 is a view in elevation showing another phone connector plug;

Figures 9, 10 and 11 are views in elevation of the instrument connector plug;

Figures 12, 13 and 14 are fragmentary views of the instrument-to-phone connector cord; and

Figure 15 is a fragmentary view in elevation illustrating the construction and use of an adapter between the instrument and instrument connector plug.

The hearing aid device, as shown in Figure 1, comprises an instrument 2, a phone 4, a phone-to-instrument connecting cord 6, a battery-to-instrument connecting cord 8, a battery connector plug 10, an instrument connector plug 12, and a phone connector plug 14.

The instrument 2 comprises a casing 14 in which is housed a standard microphone (not shown) positioned behind the openings 16 of a standard high gain or level amplifier (not shown), the amplifier including a suitable socket having a pair of terminals 18 and a pair of terminals 20, as shown in Figure 15, for receiving the terminal prongs of an adapter plug 22 or the instrument connector plug 12. The casing 14 is provided with an opening (not shown) in its lower edge to permit the insertion of the prongs of the plug 12 or the adapter 22 into the terminals of that socket.

A resistive element may be incorporated in the phone (Figures 2 to 4), the phone connector plug (Figures 5 to 8), the instrument connector plug (Figures 9 to 11), the instrument-to-phone connecting cord (Figures 12 to 14) or the adapter 22 (Figure 15). As shown in Figures 1 and 2, the phone 4 comprises a casing 24 having an opening in its rear wall exposing a pair of terminals 26 and 28 mounted in the casing. The rear wall of the casing 24 on opposite sides of that opening is provided with outwardly extending channel-shaped guide pieces 30 receiving edge flange parts 32 (Figure 5) of the phone connector plug 14. The front of the casing 24 is closed by a suitable cover (not shown) having the usual opening or openings therein, through which the air passes as the phone diaphragm is vibrated. The usual phone crystal 34 is mounted in the casing 24 and connected electrically by wires or other connecting means 36 and 38 to the terminals 26 and 28.

The resistive element 40 in Figure 2 may be mounted in any suitable manner in the casing 24 and connected to the terminals 26 and 28 in shunt to the phone crystal 34.

As shown in Figure 3, the resistive element 40 mounted in the casing 24 of the phone is connected at one end as by wire 42 or other connecting means to one terminal of the phone crystal 34, and at its opposite end as by wire 44 or other connecting means to the terminal 26. The terminal 28 is connected as by wire 46 to the other terminal of the phone crystal. Thus, in this form the resistive element 40 is connected in series with the phone crystal.

As shown in Figure 4, the resistive element is in the form of a potentiometer 48 having one end connected by wire 50 to terminal 26, and the opposite end connected by wires 52 and 54 to the other terminal 28 and one terminal of the phone crystal 34. The other terminal of the phone crystal is connected by wire 56 at an intermediate point or tap 58 of the potentiometer resistor 48.

The phone connector plug 14 comprises a casing 60 which is provided with flanges 32 for slidably interlocking with the guides 30 of the phone

4, and in this casing are mounted resilient terminal strips 62 and 64 positioned so as to engage the terminals 26 and 28 of the phone 4, and, in resiliently engaging the phone terminals, resiliently retain the plug in position in the guides 30 of the phone.

A resistive element 66 may be mounted in any suitable manner in the casing 60 and connected at its opposite ends as by wires or other connecting means 68 to the terminals 62 and 64, so that when the phone connector plug is in position, as shown in Figure 1, the resistive element 66 is connected in shunt to the phone crystal 34. As shown in Figure 6, the resistive element 66 may be connected at one end directly to one wire of the connecting cord 6, and at its opposite end as by wire 70 to terminal 62, the other terminal 64 being directly connected to the other wire of the cord 6. In this form the resistive element 66 is, therefore, connected when the plug is positioned as shown in Figure 1, in series with the phone crystal.

As shown in Figure 7, a potentiometer resistor 72 is suitably mounted in the casing 60 and directly connected at its opposite ends to the wires of the connecting cord 6. One end of the potentiometer is also connected by wire 74 to terminal 64, while the terminal 62 is connected as by wire 76 to an intermediate tap 78 of the potentiometer resistor 72.

The resistive element may be incorporated in the instrument or amplifier connector plug 12, as shown in Figures 9, 10 and 11. As illustrated in Figure 9, the resistive element 80 may be mounted in the casing 82 of the instrument connector plug 12 and connected at its opposite ends to the wires of the connecting cord 6 and the terminal prongs 84 and 86 which are mounted in the casing and project therefrom for insertion in the terminals 18 of the amplifier socket. The other terminal prongs 88 which are mounted in the casing 82 and project therefrom for reception in the terminals 20 of the amplifier socket are directly connected to the pair of wires of the battery connecting cord 8. In Figure 10 the resistive element 80 is connected at one end directly to one wire of the phone connecting cord 6, and at its opposite end as by wire 90 to the plug terminal prong 84, while the companion terminal prong 86 is directly connected to the other wire of the phone connecting cord.

As shown in Figure 11, the potentiometer resistor 92 is connected at one end to one wire of the phone connecting cord 6, and by wire 94 to the terminal prong 84 while the opposite end of the potentiometer resistor is connected as by wire 96 to terminal prong 86. The other wire of the connecting cord is connected to a tap 98 of the potentiometer resistor. Thus, as shown in Figure 9, the resistor element 80 is effectively connected in shunt to the phone crystal, while resistive element 80 in Figure 10 is effectively connected in series with the phone crystal, and in Figure 11 the resistor 92 is connected as a potentiometer across the phone crystal.

The resistive element may be incorporated directly in the connecting cord, as illustrated in Figures 12 to 14, Figure 12 showing the resistive element 100 connected across the wires of the connecting cord 6 and mounted in a housing or casing 102 through which the cord extends. In Figure 13 the resistor element 100 is interposed in series in one wire of the connecting cord 6, while, as shown in Figure 14, the potentiometer resistor 104 has its opposite ends connected to both wires of the incoming section of the connecting cord and the outgoing section of the connecting cord is connected to one end of the potentiometer resistor, while the other wire is connected to a tap 106 of this potentiometer.

Alternatively, the resistive element may be incorporated in the adapter 22 (Figure 15), which adapter may comprise a casing 108 having a socket part and a plug part, the socket part comprising terminals 110 and 112 for receiving the prongs 84 and 86 of the connector plug 12 and terminals 114 receiving the prongs 88 of this plug 12. The plug part of the adapter may comprise prongs 116 and 118 connected to the terminals 110 and 112 and receivable in the terminals 18 of the amplifier socket. The plug part of the adapter may also comprise terminal prongs 120 connected to the terminals 114 and receivable in the terminals 20 of the amplifier socket.

The resistive element 122 may be mounted in the adapter casing 108 and connected, as shown in Figure 15, at its opposite ends between the wires connecting the outer terminals 110, 116 and 112—118, so that it is, in effect, connected across the phone crystal. Alternatively, the resistive element 122 may be connected between one of the pairs of prongs 110, 116 and 112—118 so as to be effectively in series with the phone crystal; or it may be connected as a potentiometer across a pair of terminals 110—112 or 116—118, while one end is connected to the other pair of such terminals, and the other one of said pair of terminals is connected at an intermediate point on the resistor.

The resistive element shown in Figures 2 to 15 can be any form of standard resistance material and mounted in its casing in any convenient manner. Preferably, however, the casing, as for example the casing 60 of the phone connector plug 14, is provided with a groove 124 filled with a resistive material 126, such as "Aquadag" and connections therefrom made to the appropriate terminals to connect the resistive material 126 in series or shunt or as a potentiometer in the phone circuit.

It will be obvious that changes may be made in the form, construction and arrangement of the parts without departing from the spirit of the invention or sacrificing any of its advantages, and the right is hereby reserved to make all such changes as fairly fall within the scope of the following claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A low level hearing aid comprising a high level hearing aid amplifier, a phone element, and a cord element with plug elements connecting the amplifier to the phone element, each of said elements having a casing, and a signal leveling fixed resistance strip on the inner surface of the casing of one of said elements.

2. A low level hearing aid comprising a high level hearing aid amplifier, a phone element, each of said elements having a casing, and a cord element with plug elements connecting the amplifier to the phone element, and a signal leveling fixed resistance strip on the inner surface of the casing of one of said elements and connected in shunt to the amplifier to provide a potentiometer across a portion of which the phone element is connected.

3. A low level hearing aid comprising a high level hearing aid amplifier, a phone element, and means including plug elements for connecting the amplifier to the phone element, each of said

elements comprising a casing and terminals mounted in said casing, and a signal leveling resistance strip coated on the inside of one of said casings and connected to the terminals thereof.

4. A low level hearing aid including a phone having input terminals, and a detachable plug having a casing, a pair of terminals mounted in said casing to establish electric connection to the input terminals of the phone, input signal leads extending into said casing, and a fixed signal leveling resistance strip coated on the inside of said casing and connected to said terminals and leads to reduce the power of the signals supplied to the phone.

5. A low level hearing aid comprising a high level hearing aid amplifier, a phone element, and elements connecting the amplifier to the phone element, one of said elements comprising a casing having terminals therein and signal leveling fixed resistance strip coated on the inside of said casing and connected to said terminals to reduce the power of the signals supplied by the amplifier to the phone element.

JOSEPH R. CUBERT.

Certificate of Correction

Patent No. 2,395,318. February 19, 1946.

JOSEPH R. CUBERT

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, lines 63 and 64, claim 2, strike out the words and comma "each of said elements having a casing," and insert the same after "element," in line 66, same claim; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 31st day of December, A. D. 1946.

[SEAL]

LESLIE FRAZER
First Assistant Commissioner of Patents.

elements comprising a casing and terminals mounted in said casing, and a signal leveling resistance strip coated on the inside of one of said casings and connected to the terminals thereof.

4. A low level hearing aid including a phone having input terminals, and a detachable plug having a casing, a pair of terminals mounted in said casing to establish electric connection to the input terminals of the phone, input signal leads extending into said casing, and a fixed signal leveling resistance strip coated on the inside of said casing and connected to said terminals and leads to reduce the power of the signals supplied to the phone.

5. A low level hearing aid comprising a high level hearing aid amplifier, a phone element, and elements connecting the amplifier to the phone element, one of said elements comprising a casing having terminals therein and signal leveling fixed resistance strip coated on the inside of said casing and connected to said terminals to reduce the power of the signals supplied by the amplifier to the phone element.

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