

Oct. 2, 1956

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2,765,373

HEARING AID, CONSTRUCTION AND SUPPORT THEREFOR

Filed Feb. 20, 1951

3 Sheets-Sheet 1

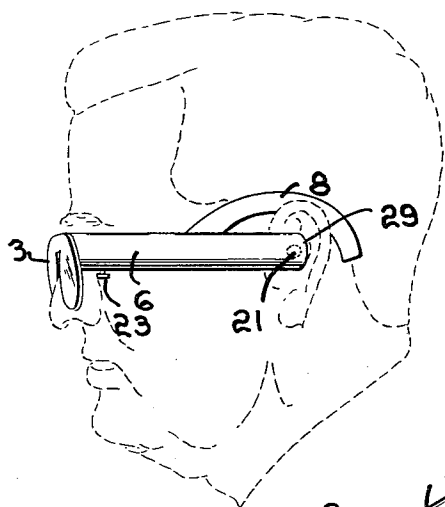


Fig. 1

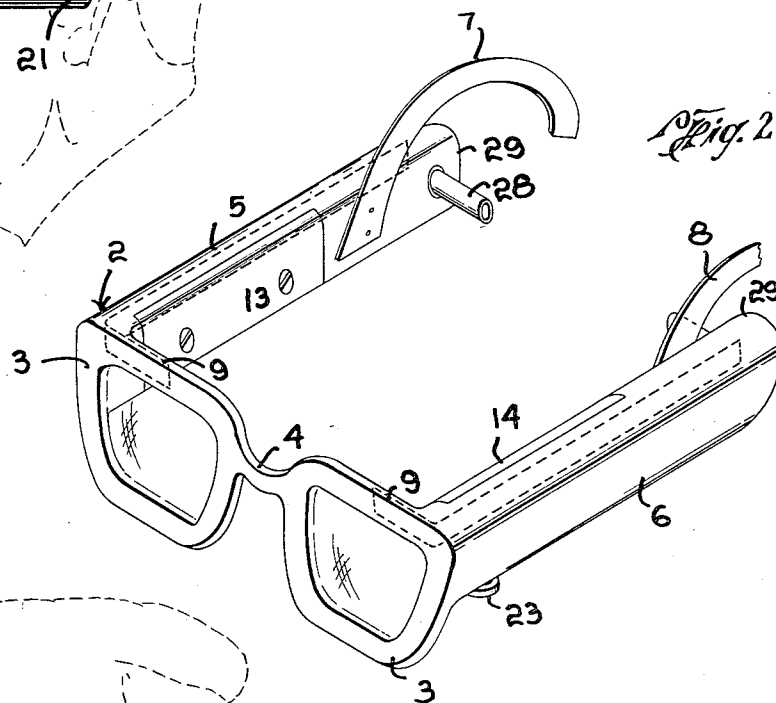


Fig. 2

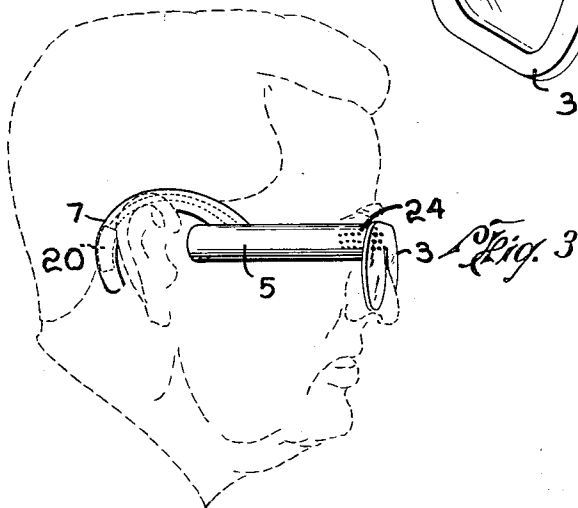


Fig. 3

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3 Sheets-Sheet 2

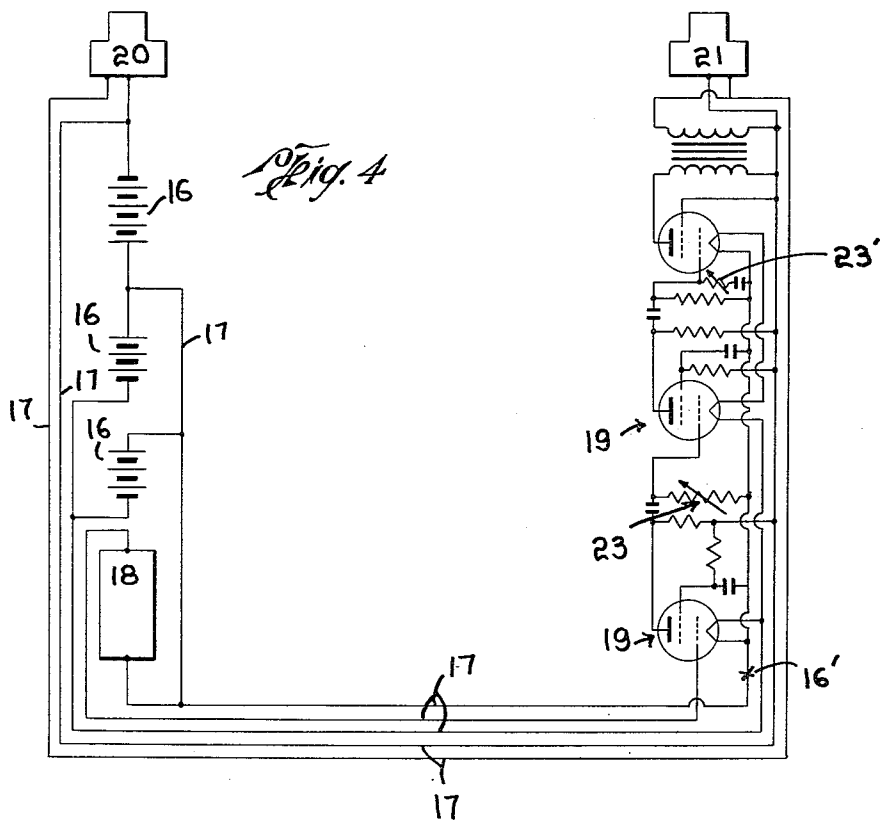


Fig. 5

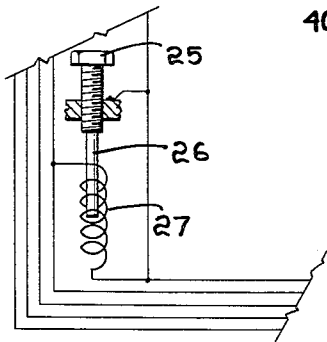
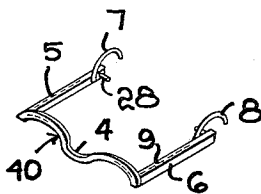


Fig. 12

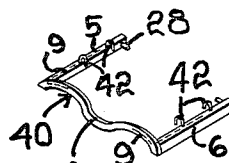


Fig. 13

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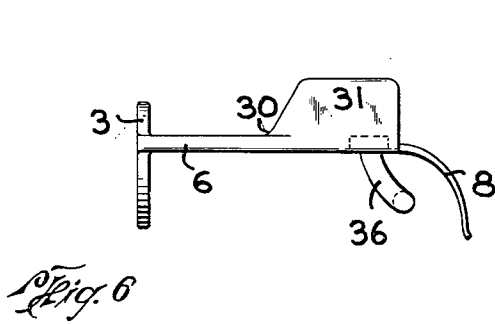
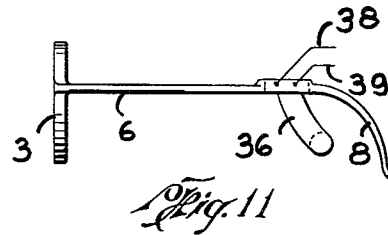
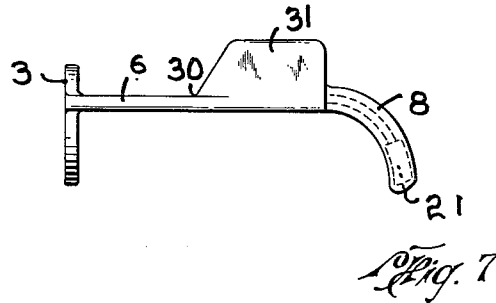
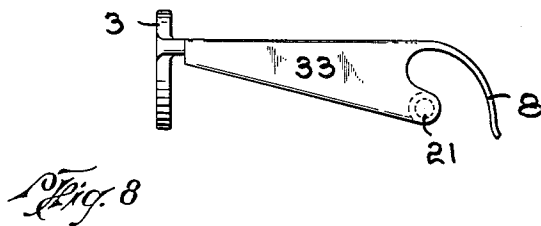
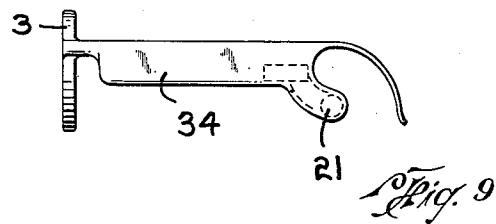
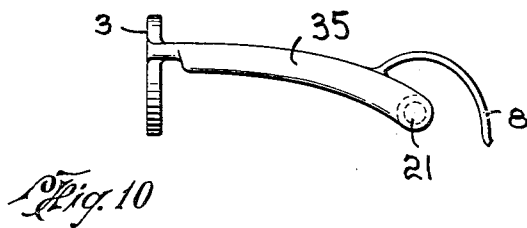
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3 Sheets-Sheet 3



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HEARING AID, CONSTRUCTION AND SUPPORT THEREFOR

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Application February 20, 1951, Serial No. 211,848

6 Claims. (Cl. 179—107)

The present invention relates to a hearing aid device and support therefor and more particularly to a hearing aid and support which can be worn on the head of the user and which eliminates telltale outside cords.

The present day aid is made up of a number of units, comprising the aid, which are suspended or hung from various parts of the body; such as a button, receiver, tube, etc., placed in the ear. A wire or tube extends from the ear to the amplifier, batteries, and sometimes a microphone mounted in the clothes of the user. Conducting wires usually extend from all these parts, which make the aid very unhandy in use or in dressing. The present invention combines all these various parts into one unit which may be worn outside the clothing; eliminating the scattering of parts or wiring over the body.

Most present day hearing aid devices are in a plurality of units, one of the major disadvantages of such hearing devices, both those which use the air conduction and bone conduction principle, is that a telltale cord or button which connects the parts together is always visible to the public.

Not only is this visible cord or tube objectionable to the user of the hearing aid, but generally in all instances the user of the hearing aid dresses with the aid concealed in his clothing which is undesirable.

One of the most objectionable features of the hearing aid is the static and noise set up by movement of the user's clothes transmitted to the user, thereby making it impossible to eliminate background or outside noise from the hearing aid.

In attaching or removing a hearing aid of the present day construction, it is necessary for the user to partly undress in order to arrange the tube or cord from beneath the clothing. The present invention has therefore as one of its objects the provision of a hearing aid and support therefor which eliminates the use of visible tubes and wires and buttons and consists of a unitary device which may be placed in or out of use with no more effort or inconvenience than putting on or taking off one's glasses.

Still another object of the invention is to provide a support for a hearing aid device, which support is in the form of a frame of the general type of spectacles or eye glasses and comprising a front frame portion to rest on the bridge of the nose and side bow portions connected to front frame portion and extending adjacent the side of the head and to the ears.

Still another object of the invention is to provide a unitized hearing aid in one unit to eliminate external wires, receivers, buttons, microphones, batteries, etc.

Another object of the invention is to provide a support for a hearing aid device, which support resembles or is in the form of spectacles or eye glasses frame comprising a front portion to rest on the front of the face and side bow portion connected to front frame portion and extending adjacent the side of the head and over the ears, there being spring means mounted in the support to resiliently urge said side bow portions inwardly against the side of the head.

Still another object of the invention is to provide in

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combination eye glasses and a complete hearing aid device including the lens, a microphone, amplifier, receiver, electrical energy power source, and electrical connections connecting each the microphone, amplifier, receiver, and power source.

Still another object of the invention is to provide a hearing aid support which can be carried only on the head of the user of the hearing aid.

A further object of the invention is to provide a device wearable on the head of the user to receive wave impulses including means to intercept such impulses, means to amplify said impulses, means to receive such amplified impulses, and an electric power source, electric conductors connecting said power source with said intercepting means, amplifying means, and said receiver means, and a support for said device to fit on the head of the user.

A further object of the invention is to provide a device wearable on the head of the user to receive wave impulses including means to intercept such impulses, means to amplify said impulses, means to receive such amplified impulses, and electric power source, electric conductors connecting said power source with said intercepting means, amplifying means, and said receiver means, and a support for said device to fit on the head of the user, said support comprising a front frame to engage the front of the head, and side bow portion connected to said front frame and extending along the side of the head and over the ear.

Still another object of the invention is to provide a radio receiving set wearable on the head of the user and a support therefor comprising a radio frequency tuning inductance to receive a signal, means to amplify such signal, receiver means for converting such signal into sound waves, an electrical power source to supply energy to said amplifier, conductors connecting said amplifying means, tuning inductance and receiving means, and a support for said set including a front frame to engage the front of the head, and side bow portions extending along the side of the head and over the ears.

Another object of the invention is to provide in combination with an air conduction hearing device for wearing on the head of a user, a support for such hearing aid device including a frame to rest on the front of the head of the user, side bow portions connected to said frame and extending along the side of the head of the user and over the ear, and spring means in said support for resiliently urging said side bows against the head of the user.

Still another object of the invention is to provide in combination with a bone conduction hearing aid device for wearing on the head of the user, a support for such device comprising a frame to rest on the front of the head, side bow portions connected thereto and extending adjacent the head of the user and over the ears.

Another object of the invention is to provide a support for a unitary hearing aid for wearing on the head of a user.

Still another object is to provide a hearing aid and support therefor for attaching to a pair of eye glasses.

Other objects and advantages of the invention will become readily apparent from a consideration of the following description and drawings wherein:

Fig. 1 is a side elevation of the invention illustrating it in position on the head of a user;

Fig. 2 is a perspective view showing an air conduction hearing aid device and its support;

Fig. 3 is a side elevation illustrating an embodiment of a bone conduction hearing aid device positioned on the head of a user;

Fig. 4 is a circuit diagram illustrating schematically the arrangement of the component parts in the hearing aid device and on the support;

Fig. 5 is a modification of the circuit diagram illustrated in Fig. 4 in that a variable tuning inductance is

inserted in the circuit in place of the microphone illustrated at the lower left hand corner of Fig. 4;

Fig. 6 is an alternate embodiment of the construction showing the support for an air conduction hearing aid device;

Fig. 7 is an alternate embodiment of the invention illustrating the support and a bone conduction hearing aid device;

Figs. 8, 9, and 10 illustrate various modifications of the support and hearing aid device;

Fig. 11 illustrates a head support with an attached ear button with leads to the hearing device to be worn on the body of the user;

Fig. 12 is a modification of the invention showing a support and hearing aid for wearing on the head of a user; and,

Fig. 13 illustrates another modification of the support and hearing aid for use with a pair of eye glasses or spectacles.

Attention is directed to Fig. 2 of the drawing wherein the support is denominated generally by the numeral 2 and is shown as resembling or being constructed in the form of spectacles or eye glasses including the frame 3 adapted to rest on the front of the head of a user by means of the nose rest 4. Rigidly secured to such frame and extending rearwardly therefrom are the side bow portions 5 and 6. These bow portions extend adjacent the side of the head of the user and are provided with the customary curved portions 7 and 8 at the rear end thereof to fit over the ears of the user. The present invention may be built with eye glasses or may be built as a separate unit fitting like glasses such as illustrated in Figs. 12 and 13.

As illustrated in the drawing, spring means 9 of any suitable type may be positioned in or on the support which spring means tends to move the bow members inwardly against the side of the head of the user. This insures intimate relationship between the hearing aid receiver and the ear drum if the air conduction hearing device is used or intimate contact with the bone of the user's head when the bone conduction device is used.

The bows 5 and 6 are of a suitable size and configuration to receive the necessary hearing aid equipment illustrated schematically in the circuit diagram of Fig. 4. Such bows are provided with removable portions 13 and 14 whereby access may be had to the interior of the hearing aid.

The schematic diagram of the circuit shown in Fig. 4 includes a suitable source of electrical energy such as batteries 16. Electrical conductors 17 are connected to such power source and the microphone 18 which is adapted to receive audio waves or air impulses. The microphone converts such waves or impulses into corresponding electrical impulses. Also connected in the circuit by means of the conductors are the amplifiers denoted generally by the numeral 19 which are adapted to receive the impulses from the microphone 18 and in turn amplify such impulses. The amplified electrical impulse is in turn discharged to the receivers 20 connected into the circuit by means of the conductors 17. It is not believed that a detailed discussion of the circuit is necessary, since such circuits per se are common to hearing aid devices.

As shown in the drawing, two receivers are connected into the circuit, one for each ear, or one for the bone on each side of head depending upon whether air conduction or bone conduction is being used.

If it is desired to remove the receiver 20 or 21 from the circuit it would only be necessary to remove the proper electrical connection from the circuit whereby either or both of such receivers can be used. A suitable volume control, as illustrated at 23 can be provided in the circuit to increase or decrease the volume of the impulses to the receivers 20 and 21.

It should be noted that the circuit diagram illustrated

in Fig. 4 represents one relative position the component parts may assume on the bows 5 and 6. For example, the batteries 15, switch and microphone 18 could be mounted in the bow 5 with suitable perforations as at 24 whereby wave impulses, or sound waves are transmitted to such microphone and picked up and then converted to electrical impulses. A switch 16' is provided in the circuit to turn the device off when it is not in use. Similarly, the amplifier 19, tone control 23' and volume control 23 connected therewith could be mounted in the bow 6 with the electrical conduits 17 connecting the parts mounted in each bow together through the front frame 4 of the support.

Alternate forms of the invention are illustrated in Figs. 12 and 13. In each of these modifications the frame 3 is of somewhat different configuration in that only the upper portion 40 of the frames is used to connect the side bow portions 5 and 6 together and to provide a support for the electrical conductors connecting the parts of the hearing aid in the bow portions together.

As illustrated in Figs. 12 and 13, an air conduction hearing aid is mounted in the supports, but the same type supports could be used for bone conduction hearing.

In Fig. 13 the curved ends 7 and 8 of the bow portions are eliminated, since such form is adapted to be secured to an ordinary pair of spectacles or eye glasses. To this any suitable means such as hooks 42 are provided to engage the side bow portions of an ordinary pair of eye glasses. If the user of the hearing aid wears glasses and desires that the hearing aid be separate from the glasses so that it can be removed while reading or otherwise not needed while the glasses are kept on, the modification of the invention illustrated in Fig. 13 could be used.

If the user of the hearing aid does not wear glasses, then a support as illustrated in Fig. 12 may be used.

By substituting a variable tuning inductance, as illustrated in Fig. 5, for the microphone 18, the invention can be used to pick up wave impulses of a radio frequency to obtain a signal which in turn is passed to the amplifier 19 and thence to the receivers 20 and 21 which reconvert it to audio waves. As shown in Fig. 5, the variable tuning device consists of a screw 25 with the iron core extension 26 thereon. Such extension is adapted to pass inside the inductance coil 27, the position of such extension within the inductance coil determining the frequency to which the radio is tuned and primarily serving to pick up or detect radio frequency waves.

As previously mentioned, two types of hearing aid devices are in use at the present time. One of such devices is what is termed an "air conduction" principle of hearing, while the other type hearing aid device is termed a "bone conduction" device. Both of such devices use a circuit and the apparatus illustrated in Fig. 4 and described herein; however, in the air conduction device a tube 28, or similar device is injected into the ear whereby its sound waves from the receiver may be passed inwardly to the ear drum. As illustrated in Fig. 1, the bows extend to a point covering the ear opening when the air conduction device is used with the present support. In this manner the tube 28 or button positioned on the end 29 of the bows can be positioned in the ear and will not be visible to the public.

On the other hand, if the bone conduction method is used the receiver is generally placed immediately behind the ear so that the vibratory contact surface of the receiver will engage hearing inducing bone structure. A form of this type hearing aid is illustrated in Fig. 3 wherein the receivers are mounted in the hooked portions 7 and 8 of the bows adjacent the head and resting on the hearing inducing bone structure. The spring 9 in the support tends to urge each of the bows inwardly against the side of the head thereby maintaining firm contact between such receiver and the side of the head

whereby a good contact is had to transmit the vibratory waves or impulses.

Several modifications of the support construction are shown in each Figs. 6, 8, 9, and 10, and as shown in Fig. 6, the bows are substantially of normal width to a point 30 thereon and are then enlarged as at 31 to receive the necessary hearing aid equipment. In each Figs. 8, 9, and 10 various modifications of the side bow portions is illustrated at 33, 34 and 35 respectively.

In Fig. 7 an alternate construction of the bone conduction type hearing aid is illustrated and is quite similar to that shown in Fig. 6 with the exception that the projection 36 for the button or tube to fit into the ear of the user is eliminated and the receiver is mounted in the rear portion 29 of the bow.

Figs. 6 and 7 illustrate designs of the invention whereby ladies may wear a streamlined hearing aid which appears as glasses with housing 31 hidden under the hair dress. With such a design the lady may wear a low cut evening dress without telltale wires and apparatus showing on her neck or shoulders to the public.

In Fig. 11, the projection 36 is shown as mounted on the bow of a spectacle with electrical leads 38 and 39 being provided for connection to the ordinary type hearing aid device.

From the foregoing description, it becomes readily apparent that the present invention provides a support structure for a hearing aid device, which hearing aid can be worn on the head of a user and eliminates visible wires and tubes.

No wires or tubes hang down the neck and since the support is in a form which may resemble spectacles or eye glasses the user looks like any ordinary person wearing glasses. The unit can be removed off and on as a pair of glasses.

The present invention permits a user to hear out of both ears which gives balanced hearing and makes it easier for the user to understand conversation and any musical sounds, as well as louder balanced reception.

The volume of the unit can be regulated by easy adjustment without going inside the user's clothing. Also, since the hearing aid is mounted immediately adjacent the head of the user, almost all background and outside noise due to rubbing or friction of clothing, and so forth, is eliminated.

Since the device is all in one unit, most objections to present day hearing aid devices are eliminated. The support is such that the hearing aid parts are supported on each side of the head with a connecting frame on the front of the head which makes the unit compact while presenting a good appearance.

Broadly, the invention relates to a device for wearing on the head of a user and for receiving wave impulses and transmitting them to the ears of such user and a support comprising spectacle frames and bows therefor to receive and support such device.

What is claimed is:

1. A self-contained hearing-aid structure for mounting to an eyeglasses frame, comprising side templar members adapted to be attached to the eyeglasses frame, at least one of said members having a hollow portion serving as a housing, a complete hearing-aid assembly including a microphone and an air-conduction receiver within said housing, means for mounting said side templar members to the eyeglasses frame to support the weight of the hearing-aid assembly on the said eyeglasses frame, and means on one of said side templar members extending into the ear of the user for conveying sound from the air-conduction receiver to the ear drum of the user.

2. The structure set forth in claim 1, wherein the mounting means includes releasable attaching members

on the side templar members adapted to engage the eyeglasses frame.

3. The combination with an eyeglasses-lens frame, of a wearable self-contained hearing aid structure for mounting to the eyeglasses frame, comprising a pair of side templar members adapted to be attached to the eyeglasses frame, at least one of said side templar members having a hollow portion serving as a housing, a complete hearing-aid assembly including a microphone and an air-conduction receiver within said housing, means for mounting the side templar members to the eyeglasses frame to distribute the weight of the hearing-aid assembly to the said eyeglasses frame, and means on one of said side templar members extending into the ear of the user for conveying sound from the air-conduction receiver to the ear drum of the user.

4. A self-contained hearing aid structure for mounting to an eyeglass frame as set forth in claim 1, wherein the last-named means on one of said side templar members includes an extension which extends into a plane below that portion of the templar member which rests upon the ear when the eyeglasses frame and templar members are in position on the wearer's head, said extension being of such contour and shape that the extremity thereof is located in substantial alignment with the ear cavity when the eyeglasses frame and templar members are in position on the wearer's head.

5. A self-contained hearing-aid structure for mounting to an eyeglasses frame comprising, a pair of side templar members adapted to be attached to the eyeglasses frame, each of said members having a hollow portion forming a housing within the members, a complete hearing-aid assembly including a microphone and air-conduction receiver mounted within the housings of the side templar members, portions of said hearing-aid assembly being disposed in one of said templar members with remaining portions of said assembly being mounted in the other templar members, means interconnecting said portions of the hearing-aid assembly which are located in said members, means on one of said templar members extending into the ear of the user for conveying sound from the air-conduction receiver to the ear drum of the user, and means for attaching the side templar members to the eyeglasses frame, whereby the complete hearing-aid assembly and the eyeglasses frame are combined into a unitary structure.

6. A self-contained hearing-aid structure for mounting to an eyeglasses frame comprising, side templar members adapted to be attached to the eyeglasses frame, a complete hearing aid assembly including a microphone and an air-conduction receiver, means for supporting said complete hearing aid assembly in at least one of the side templar members, means for attaching said side templar members to the eyeglasses frame to support the weight of the hearing-aid assembly on the said eyeglasses frame, and means on one of said side templar members extending into the ear of the user for conveying sound from the air-conduction receiver to the ear drum of the user.

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