CARRIER FOR EAR LEVEL HEARING AID

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The present invention relates to hearing aids, and, more particularly, to novel and improved carrier means for an ear level hearing aid and the method of producing such carrier means for the individual wearer.

In recent years, two types of hearing aids have been developed which are designed to be worn behind the ears. These types include instruments having outside receivers and instruments having built-in receivers. When the instrument makes use of an outside receiver, the receiver is worn in the usual manner in the ear and is usually snapped onto a conventional ear mold, the instrument being connected by a semi-flexible receiver cord with the receiver. In this type of hearing aid, the cord not only makes the electrical connection, but must provide the necessary stiffness to hold the instrument wedged in place behind the ear. The second type of instrument containing a built-in receiver is usually connected to the ear mold by means of a semi-flexible tubing which conducts the sound from the instrument into the ear canal and provides the necessary support for the instrument.

In practice it has been found that both variations have certain serious disadvantages. One of these disadvantages lies in the fact that the instrument is not sufficiently supported to keep it locked in place under all circumstances, for example, when the head is moved. This disadvantage results because the instrument cannot be perfectly wedged into the irregular shaped ear space between the ear and the mastoid bone. A further disadvantage lies in the use of a semi-rigid receiver cord which, due to its stiffness, aggravates the problem of acoustical feedback and seriously limits the usable acoustical gain of the instrument.

In accordance with the invention, the need for a semi-rigid connection in the form of a semi-flexible receiver cord and/or semi-flexible tubing between the instrument and the receiver or ear mold is eliminated. Further, means are provided for supporting the instrument in such a manner that it will be kept permanently wedged in place.

In particular, a hearing aid carrier is provided which is specially fabricated to conform to portions of the intended wearer’s head and to support the hearing aid device at all times in the most effective location with respect to the head of the wearer. This hearing aid carrier generally comprises a unitary structure including a hook-shaped extension intended to reach forwardly over the ear of the wearer and hook either into the uppermost fold of the outer ear or into the ear canal, and a main body generally positioned behind the ear and conforming to those portions of the outer ear and the head of the wearer with which it is contiguous, a portion of the main body conforming to the configuration of the hearing aid instrument and providing a place to which the hearing aid instrument may be attached.

For a more complete understanding of the invention, reference may be had to the following detailed description.

Figure 1 is a perspective view showing the assembled relation of a hearing aid instrument, and the hearing aid carrier about a human ear, in accordance with the invention;

Fig. 2 is a side elevation of the hearing aid carrier of Fig. 1;

Fig. 3 is a sectional view of the hearing aid carrier of Fig. 2 taken along the line A—A and looking in the direction of the arrows;

Fig. 4 is a side elevation of an alternate embodiment of a hearing aid carrier, in accordance with the invention; and

Fig. 5 is an additional embodiment of a hearing aid carrier, in accordance with the invention.

In Fig. 1, a conventional hearing aid instrument 11 is positioned in a recess 12 of the main body 13 of a carrier 14 shown more clearly in Fig. 2 positioned in assembled relation about the ear of the intended wearer. The carrier 14 has at its upper end a relatively thin extending portion 15 passing over the ear and locking into the uppermost fold of the outer ear.

In Figs. 2 and 3, the unitary hearing aid instrument carrier 14 including the main body 13 and the extending portion 15 is preferably formed of a suitable plastic material having sufficient rigidity to maintain itself and the hearing aid instrument 11 in close contiguity with the ear and head of the wearer.

As shown in Fig. 3, it is intended that the surfaces 16 and 17 of the carrier 14 with the exception of the surfaces 18 and 19 forming the walls of the recess 12 and the outer peripheral edge 20 of the carrier 14 be irregular in the manner hereinafter described with relation to the method for fabricating the carrier. On the other hand, the surfaces 18 and 19 of the recess 12 are substantially plane and conform to the configuration of the hearing aid instrument 11 that is to be attached to the carrier 14.

In some circumstances, it is preferable, as shown in Fig. 4, to fabricate the carrier extension 15 from a relatively rigid plastic material and the main body 13 of the carrier from some softer material, such as a suitable rubber-like substance or other similar plastic material, the carrier extension 15 being joined to the carrier body in any suitable manner, such as by conventional adhesives.

Under other circumstances, as shown in Fig. 5, it may be desirable to fabricate both the main body 13 and the extension 15 of the carrier 14 from a relatively soft plastic or rubber-like material and to incorporate a wire or other stiffening member 21 in at least the carrier extension 15. Such a stiffening member may also be used in the embodiment of Fig. 4, for example.

In fabricating a hearing aid instrument carrier, in accordance with the invention, it is intended that a mold first be taken of that portion of the intended wearer’s head adjacent to and contiguous with the outer ear in the area in which the hearing aid carrier is to be positioned. This mold may be made in a conventional manner with suitable elastic impression material.

In the preferred method, a dummy hearing aid instrument conforming to the configuration of the hearing aid instrument 11 ultimately to be incorporated with the hearing aid carrier 14 is appropriately positioned in the elastic impression material at the time of making the mold. After the mold is made, those portions of the mold, which are not intended to be contiguous with the head or ear of the wearer, are suitably trimmed to provide a predetermined regular outer peripheral configuration for the carrier, such as that shown by the line 20 in Figs. 2, 4 and 5 of the drawing.
After the mold has been trimmed and the instrument dummy removed therefrom, the final form of the hearing aid carrier may be fabricated in accordance with conventional mold techniques. For example, a negative mold may first be made from the original mold, and, after suitable trimming, the final hearing aid instrument carrier may be molded from a suitable plastic or other substance in the form of a positive impression. At the time of forming the positive impression, a suitable stiffening means, such as the wire 21 of Fig. 5, may be embedded in at least the extension portion of the carrier, in accordance with well known plastic molding techniques.

After fabrication of the hearing aid instrument carrier, the hearing aid instrument 11 may be attached to the carrier recess 12 by suitable conventional adhesives.

In each of the disclosed embodiments, a flexible cord or flexible tubing may be appropriately connected from the hearing aid instrument 11 to a position in or adjacent the ear canal for the transmission of acoustic vibrations or electrical signals to an acoustic reproducing device therein. Because of the flexible nature of the receiver cord or flexible tubing which may be used in conjunction with the hearing aid instrument and carrier of the invention, the problem of acoustical feedback is considerably reduced or limited enabling the utilization of a higher acoustical gain than would be otherwise permissible with hearing aid instruments connected to the ear by semi-rigid receiver cords or semi-rigid tubing having the necessary stiffness to hold the instrument in place.

Thus, in accordance with the invention, there has been provided a novel and improved hearing aid instrument carrier and a novel method for fabricating such a carrier for supporting a hearing aid instrument in continuous close conformity to the head and ear of the intended wearer notwithstanding movement of the head.

It will be understood by those skilled in the art that the above described embodiments are meant to be merely exemplary and that they are susceptible of modification and variation without departing from the spirit and scope of the invention. For example, in the case of the use of hearing aid instruments with removable batteries, an appropriate aperture may be made in the main body of the hearing aid instrument carrier through the walls of the recess to which the hearing aid instrument is attached to facilitate the replacement of a battery. There-

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