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(54) **METHOD FOR THE SECURING OF AN ELECTRO-ACOUSTIC DEVICE IN OR PARTLY IN THE HUMAN EAR**

VERFAHREN ZUR BEFESTIGUNG EINER ELEKTRO-AKUSTISCHEN VORRICHTUNG IM ODER TEILWEISE IM MENSCHLICHEN OHR

PROCEDE DE FIXATION D'UN DISPOSITIF ELECTRO-ACOUSTIQUE A L'INTERIEUR OU PARTIELLEMENT A L'INTERIEUR DE L'OREILLE

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(56) References cited:
WO-A-92/09181
US-A- 2 678 973
US-A- 4 130 741
US-A- 4 532 649

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Description

Background of the invention

[0001] The invention relates to a method as presented in the preamble of claim 1.

[0002] Electro-acoustic devices to be placed at or in the ear have been known for several decades. Such devices are usually secured by means of a securing member, for example a carrying device in a headset, or by the electro-acoustic device being designed so that it is individually adapted to the ear to be mounted either externally on the ear or internally in the auditory canal or in the outer ear, like for example an electronic hearing aid.

[0003] Today three main types of electro-acoustic devices in the form of hearing aids are produced: portable, behind-the-ear and in-the-ear hearing aids, the two last-mentioned being the most commonly used today. The two last-mentioned types are acoustically coupled to the ear via an ear-plug, in that the in-the-ear hearing aid itself constitutes an earplug. This coupling method is applied to reduce the acoustic feed back from the sound reproducer to the sound receiver. Because of this coupling method the tympanic membrane of the ear will not be able to receive sound waves not passing the hearing aid; the coupling is thus called "closed hearing". Such a hearing aid requires both mechanical and acoustic adaptation to the ear on or in which it is to be mounted. This adaptation is time consuming and involves periods of waiting for the user, so that often several weeks pass from the first hearing test until the hearing aid is delivered. The known hearing aids moreover require a certain period of "getting-used-to", both in respect of carrying a device being individually adapted to the ear and in respect of hearing in a new way. In-the-ear hearing aids are moreover secured by individual adaptation only, without particular securing members. The use of devices with ear-plugs or in-the-ear devices may also result in various side effects, such as increased cerumen production, due to the fact that the auditory canal is closed off for long periods of time.

[0004] A method of securing a hearing aid as presented in the preamble of claim 1 is disclosed in US A 4,532,649. This document concerns an in-the-ear hearing aid which is designed to be located in the auditory canal of the user. A body portion of the hearing aid is custom-shaped to fit in the auditory canal, leaving only a cover member of the hearing aid exposed. To avoid acoustical closing of the auditory canal from the surroundings, the hearing aid has a sound vent tube. The hearig aid is secured in the auditory canal by the interfitting relation between the custom-shaped body portion and the auditory canal.

[0005] A method of securing a part of a hearing system, e.g. a hearing aid, by the use of adhesion in the auditory canal of a user, is disclosed in WO A 92/09181. In this document it is described that a transducer which is a part of a hearing system can be located on the tympanic membrane by the use of surface adhesion. The remaining parts of the hearing system, e.g. a signal producing means, can be placed at different locations within the ear canal or external to the ear canal.

Advantages of the invention

[0006] By proceeding as presented and characterized in claim 1, the possibility is provided of securing the device in a completely new manner offering a number of advantages. The individual adaptation of the device - as it is known from in-the-ear hearing aids - in order to secure it in the auditory canal is avoided, and all the drawbacks caused by the adaptation process are avoided too. Thus, a hearing aid secured according to the invention does not need to be individually adapted to the ear, and the possibility is provided of achieving "open hearing", i.e. the user can hear sounds both from the surroundings and from the device, and thus a much more natural hearing perception is achieved in this manner compared to the known devices. Consequently, the time passing from the hearing test until the hearing aid is delivered can be drastically reduced. The consumption of time can actually be reduced to the time it takes to adjust the hearing aid to have it compensate for the hearing disability. Further, by securing the hearing aid as characterized in claim 1, a very inconspicuous hearing aid is achieved, which can be designed or ornamented as a piece of jewellery or the like, if so desired, in order hereby to disguise the presence of a hearing aid. The coupling system may be a glue or an adhesive of a type being compatible with human skin; an electrostatic or an electrodynamic device; a system based on a surface tension or a change of the surface tension, or another means or system being applicable for securing items to the skin. The coupling system may also be a combination of two or more securing methods.

[0007] By proceeding as presented and characterized in claim 3, the mounting of for example a hearing aid is simplified. Naturally there will be cases where it may be advantageous to apply the adhesive on the skin first, for example if a hearing aid is not mounted by the user but by an assistant. However, in the vast majority of cases it will be advantageous to proceed as described in the claim.

[0008] As adhesive may be used different known types of adhesive being acceptable to the skin. The adhesive may be fluent or pastelike; it may be double-faced tape; plaster cut out or punched out in advance, or plaster being cut out into suitable pieces, and similar adhesives. This is the reason why in some cases it may be advantageous to proceed as present-ed and characterized in claim 4. The application aid may be a means for applying the adhesive, or it may directly carry the adhesive.

[0009] By proceeding as presented and characterized in claim 5, the adhesion is improved and becomes more

uniform. The possibility exists of combining the adhesive with the application aid according to claim 4, or of using it in connection with the application aid.

The drawing

[0010] The invention will hereafter be explained with reference to the drawing showing a preferred embodiment of the invention.

Description of the preferred embodiment

[0011] The drawing shows a hearing aid 1 designed according to the invention and secured by means of an adhesive 2 to the tragus 3 of the ear 8.

[0012] The hearing aid is oblong and slightly curved so that it fills about half of the auditory canal 5. It is naturally placed in such a manner that the sound reproducer 6 is directed towards the tympanic membrane, and the sound receiver 4 is directed towards the surroundings. The hearing aid is moreover designed with rounded edges and has such a form and size that it can be placed in the human ear without any further mechanical adaptation to the auditory canal being required.

[0013] The fact that the hearing aid 1 fills about half of the auditory canal 5 is only an example, as the form and size of the auditory canal as it will be recalled is highly individual. The shown oblong hearing aid is slightly curved, for example bean-shaped, allowing it to fit into most persons' auditory canal.

[0014] The hearing aid consists of an outer thin shell of plastic, for example acrylic plastic, surrounding the necessary electronic components, i.e. an amplifying circuit with a battery, a sound receiver and a sound reproducer, and possibly further circuits, for example a telecoil or the like, and means for receiving signals from a master (remote control unit).

[0015] The hearing aid 1 is secured by applying an adhesive to the plastic shell in a selected place. The adhesive may be applied directly or using the application aid. The aid may be arranged to carry the adhesive and any means for cleaning the skin area to which the device is to adhere, for example the tragus. The cleaning means may be based on absorbtion or adsorbtion of skin secretion, for example cerumen.

[0016] The hearing aid shown in the drawing is only an example of how such a device can be designed and secured according to the invention. It will be obvious to a person skilled in the art that many other embodiments may be conceived also providing the possibility of securing the hearing aid in or at least partly in a person's auditory canal by means of a coupling system according to the invention, for example by adhesion as shown.

[0017] The fact that in the drawing and in the description it is stated that the hearing aid, or any other electroacoustic device, is secured to the tragus of the ear should only be regarded as an example of a place where the device according to the invention can be secured. The areas meatus acusticus externus and cavum conchae, or the area between these two areas, represent other applicable places 7 for the securing of the device. It will be obvious to a person skilled in the art that corresponding advantages will be achieved if the device is secured in other places in the ear.

Claims

1. Method for securing in position a hearing aid (1) in or at leat partly in a person's auditory canal (5), said hearing aid (1) comprising in an outer shell at least one sound receiver (4), at least one sound reproducer (6) and an electronic amplifying circuit **characterized in that** the outer shell of the hearing aid is not individually adapted to the person's auditory canal (5), **in that** the hearing aid (1) is secured in position using a coupling system (2) made of material being compatible with the skin, **in that** the coupling system (2) is arranged on the outer shell so that the hearing aid (1) is secured, in relation to its position in the auditory canal (5), to the tragus (3) of the ear or to the meatus acusticus externus or to the cavum conchae or to the area between the meatus acusticus externus and the cavum conchae, and **in that** the cross-sectional profile of the hearing aid (1) is designed such that the hearing aid (1) can be placed and secured in position by the coupling system (2) in such a manner that the auditory canal (5) is not closed acoustically from the surroundings.

2. Method according to claim 1, **characterized in that** the coupling system (2) is an adhesive.

3. Method according to claim 1 or 2, **characterized in that** the securing is effected by applying the coupling system (2) to the hearing aid (1) to create a securing area, after which the hearing aid (1) is positioned in such a manner that the securing area is placed or pressed against the skin in the place where the hearing aid (1) is to be secured in position.

4. Method according to claim 1, 2 or 3, **characterized in that** an application aid is used for applying the coupling system (2) to the hearing aid (1) or to the skin.

5. Method according to any one of claims 1-4, **characterized in that** the coupling system (2) comprises absorbing or adsorbing removable capacity towards skin secretion.

Patentansprüche

1. Verfahren zur Befestigung eines Hörgerätes (1) in

einer Position im oder teilweise im menschlichen Gehörgang (5) einer Person, bei dem das Hörgerät (1) in der Außenschale aus mindestens einem Ton-Empfänger (4), mindestens einem Ton-Wiedergabegerät (6) und einer Verstärkerschaltung besteht, **dadurch gekennzeichnet, dass** die Außenschale des Hörgerätes nicht individuell an den menschlichen Gehörgang (5) angepasst ist, dass unter Benutzung eines aus einem hautverträglichen Material hergestellten Kupplungssystems (2) das Hörgerät (1) befestigt wird, dass das Kupplungssystem an der Außenschale angeordnet ist, so dass das Hörgerät (1) bezüglich seiner Position im Gehörgang (5), zum Tragus (3) des Ohres oder zum Meatus acusticus externus oder zum Cavum conchae oder zum Gebiet zwischen dem Meatus acusticus externus und dem Cavum conchae befestigt ist und dass das Querschnittsprofil des Hörgerätes (1) derart ausgebildet ist, dass das Hörgerät (1) durch das Kupplungssystem (2) in der Weise angebracht und in seiner Position befestigt werden kann, dass der Gehörgang (5) akustisch von der Umgebung nicht abgeschlossen ist.

2. Verfahren gemäß Anspruch 1, **dadurch gekennzeichnet, dass** das Kupplungssystem (2) ein Klebemittel ist.

3. Verfahren gemäß Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Befestigung durch das Vorsehen des Kupplungssytems (2) am Hörgerät (1) bewirkt wird, um einen Befestigungsbereich zu schaffen, hinter welchem das Hörgerät (1) in einer solchen Weise positioniert wird, dass der Befestigungsbereich an der Stelle, wo das Hörgerät (1) sicher befestigt werden soll, auf der Haut platziert ist oder gegen sie gedrückt wird.

4. Verfahren gemäß Anspruch 1, 2 oder 3, **dadurch gekennzeichnet, dass** eine Anwendungshilfe zum Anbringen des Kupplungssystems (2) am Hörgerät (1) oder an der Haut benutzt wird.

5. Verfahren gemäß eines Anspruchs 1 - 4, **dadurch gekennzeichnet, dass** das Kupplungssystem (2) ein austauschbares Absorptions- oder Adsorptionsvermögen für Hautsekret besitzt.

Revendications

1. Procédé pour fixer en position une aide auditive (1) dans ou au moins en partie dans un canal auditif (5) d'une personne, la dite aide auditive (1) comprenant, dans une coquille extérieure, au moins un dispositif de réception de son (4), au moins un dispositif de reproduction de son (6) et un circuit d'amplification électronique, **caractérisé en ce que** la coquille extérieure de l'aide auditive n'est pas adaptée de façon, individuelle au canal auditif (5) de la personne, **en ce que** l'aide auditive (1) est fixée en position au moyen d'un système de couplage (2) en matière compatible avec la peau, **en ce que** le système de couplage (2) est agencé sur la coquille extérieue de sorte que l'aide auditive (1) est fixée, en ce qui concerne sa position dans le canal auditif (5), au tragus (3) de l'oreille ou au meatus acusticus externus ou au cavum conchae ou à la région comprise entre le meatus acusticus externus et le cavum conchae, et **en ce que** le profil de section transversale de l'aide auditive (1) est prévu de sorte que l'aide auditive (1) peut être placée et fixée en position par le système de couplage (2) d'une manière telle que le canal auditif (5) n'est pas isolé acoustiquement de l'environnement.

2. Procédé selon la revendication 1, **caractérisé en ce que** le système de couplage (2) est un adhésif.

3. Procédé selon la revendication 1 ou 2, **caractérisé en ce que** la fixation est effectuée par application du système de couplage (2) à l'aide auditive (1) pour créer une région de fixation, après quoi l'aide auditive (20) est positionnée d'une manière telle que la région de fixation est placée ou pressée contre la peau à l'endroit où on veut fixer l'aide auditive (1) en position.

4. Procédé selon la revendication 1, 2 ou 3, **caractérisé en ce qu'**on utilise un accessoire d'application pour appliquer le système de couplage (2) à l'aide auditive (1) ou à la peau.

5. Procédé selon une quelconque des revendications 1 à 4, **caractérisé en ce que** le système de couplage (2) comprend un moyen détachable d'absorption ou d'adsorption d'une sécrétion de la peau.

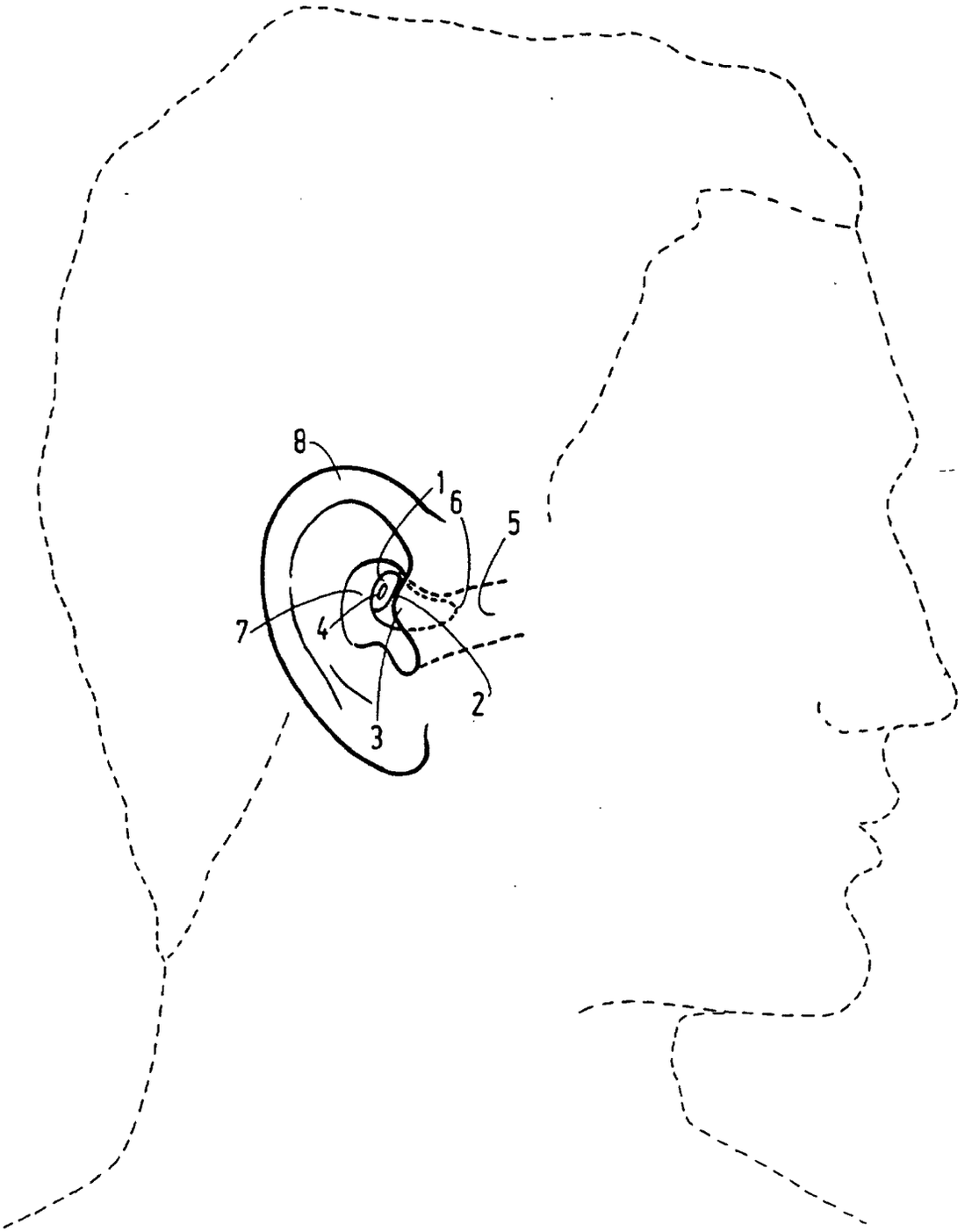

Fig. 1