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— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

[Continued on next page]

(54) **Title**: RECEIVER IN CONCHA

(57) **Abstract**: A hearing instrument with separated hearing device (1) and receiver (5) is characterised in that the receiver comprising a sound outlet (7) provided such to introduce the sound direct into the ear channel (19) or into an earmold.

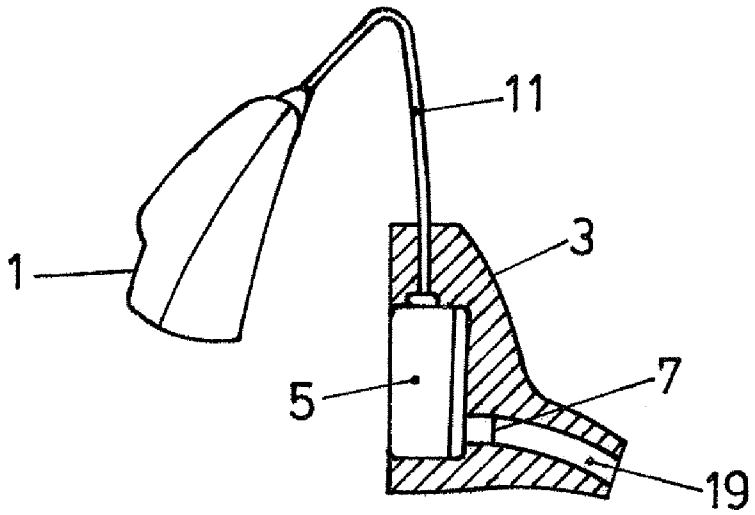

FIG.1

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— *upon request of the applicant, before the expiration of the time limit referred to in Article 21(2)(a)*

Receiver in Concha

The present invention refers to a hearing device according to the introduction of claim 1.

Severe to profound hearing losses can only be compensated with powerful and big receivers, size EF or bigger. These receivers do not fit into the ear canal and are usually built into behind-the-ear devices, which are difficult to place and hold on the ears of newborn and kids.

For newborn and kids, smaller receivers can be used due to smaller ear canals. Nevertheless, they are too big to be placed in the ear canal. In addition, the earmold of newborn and kids have to be renewed every four months on average and the cable length of the external receiver unit has to be changed too.

It is well known how to place external receivers in the ear canal and how to make them exchangeable. In that respect the EP 2 026 605 proposes to introduce a receiver into an earmold by means of a coupling element, which limits the size and the power output of the receiver.

The DE 10 2007 023 055 describes the detachable arrangement of a receiver within an earpiece that is wearable within the ear by means of a bayonet coupling. Again the size and power output of the receiver is very limited due to the dimensions of an ear canal.

Receivers used to compensate for severe to profound hearing losses are normally placed behind the ear. A recent solution is known, where a receiver is placed within the

auricle and which is hold by means of a soft secure fix piece. The receiver is connected to a receiver ear tip by means of a sound tube.

Big hearing instruments, such as receivers, are difficult to be hold within ears of kids and newborn. E.g. the proposed soft secure fix element, as describe above, is difficult to be placed and usually is painful within an ear of a child.

The aim of this invention is to provide an external receiver solution with powerful receivers to compensate for severe to profound hearing losses. It is further an object of the present invention to provide a receiver element, with in addition a higher power output, which can be securely hold within an ear without the need of complicated and painful fixing elements.

As a solution a hearing instrument is proposed according to the wording of claim 1 with separated hearing device and receiver, where the receiver comprising a sound outlet provided such to introduce the sound direct into the ear canal or into an earmold.

According to one embodiment, the receiver is integrated within an earmold. The mechanical design of external receiver unit allows for a replacement of the earmold without influence to the fitting of the hearing instrument and it further allows to adjust the connecting receiver tube cable length in a certain range.

It is proposed that the receiver outlet is placed in a position at the receiver that it directly points towards

the ear canal or the earmold at the entrance of the ear canal.

According to one embodiment the receiver outlet is integrally welded, glued, molded or attached in any other manner directly to the earmold.

The connecting cable or tube of the receiver to the hearing device is adjustable by flexible positioning of the connection and of the cable or tube at or within the receiver.

According to the further embodiment, the earmold entrance is shaped such horn like that the receiver outlet pointing towards the entrance of the earmold can be positioned in a flexible manner. The receiver can be arranged in a detachable connection manner to the earmold by means of e.g. an adhesive tape.

Further possible embodiments are characterised within the dependent claims or are described with reference to the attached figures.

Within the figures:

Figure 1 shows schematically the arrangement of receiver of a hearing instrument being part of an earmold,

Figure 2 shows the receiver of figure 1 in a perspective view,

Figure 3 shows schematically the arrangement of a receiver within an auricle,

Figure 4 shows schematically the connection of a connection receiver tube at a receiver in a flexible manner,

Figure 5 shows schematically the flexible connection of a connecting receiver tube at the receiver for left or right ear, and

Figure 6 shows schematically in a cross sectional view the arrangement of a receiver at the ear canal entrance of an earmold.

According to Figure 1 it is schematically shown, according to the present invention, how a receiver 5 can be part of an earmold 3 of a hearing instrument further comprising a hearing device 1. The hearing device 1 can be placed else where such as e.g. behind the ear or can be worn at any other place such as e.g. behind the head, within a wearing bag, etc. The hearing device 1 is connected via a connecting receiver tube 11 to the receiver 5, of which the respective outlet 7 is pointed towards the ear canal 19 of the earmold 3.

As can be seen in Figure 2 it is preferred that the receiver outlet 7 is placed in a position where it points toward the ear canal most likely on the biggest side of the receiver 5.

The receiver spout can be molded, welded, glued or attached in any other manner to the earmold. In other words, the receiver is directly mechanically connected to the earmold. The receiver outlet is defining a direct acoustic coupling to the ear via the earmold.

The earmold, a slim tip or a dome, can be attached to the receiver respectively to the receiver outlet tube without having influence to the fitting parameters. The receiver tube can be flexible and can be shaped as a horn. Furthermore it is possible to have the earmold made of at least two peaces, which can be easily replaced and cleaned.

According to figure 3 it is shown schematically, how a receiver can be placed within the auricle of a wearing person. The receiver 5 is placed such within the concha 23 of an auricle 21 that the receiver outlet or sound opening of the receiver is directly pointing towards the entrance of the ear canal.

To enable that the connection of the cable between the hearing device and the receiver can be adjusted in order to change the position of the receiver unit or the dimensions of the receiver unit, e.g. in case of a child, it is proposed, to have a flexible connection of the cable to the receiver as shown schematically e.g. in figure 4. The cable 11 with its end 17 can be moved according to the shown arrow within a compartment 14 of the receiver 5, in which the cable 11 is connected in a flexible manner via wires 15 to respective connections 13 within the receiver 5. This arrangement enables a flexible position of the receiver on the earmold.

A further possibility is schematically shown in figure 5, where the connecting cable 11 between the hearing device 1 to the receiver 5 can be turned or bended according the shown arrow for the arrangement within a left or a right ear of a wearing person.

A further possibility for a flexible arrangement is shown schematically and in cross sectional view in figure 6. The receiver 5 is arranged at a horn shaped tubing entrance 19 within the earmold 3. The horn shaped tubing and the arrangement of the receiver is such that the receiver outlet 7 can be moved along the shown arrow with no negative influence of the sound coupling of the receiver to the ear canal. It is further proposed that the receiver is arranged e.g. by means of an adhesive tape (18), the connection being detachable so that the receiver can be arranged at various positions at the earmold. Usually the receiver could be sticked to a plane on the earmold without a need of accurate placement.

The embodiments, as shown in figures 1 to 6, are only examples for the better understanding of the present invention. Of course the design of the receiver can be different and also the arrangement of the outlet opening can be placed either on the biggest side of the receiver, which is preferred as well as on a lateral surface. Furthermore, the design of the earmold can be different and instead of an earmold of course also an ear tip or dome can be placed directly on or at the receiver outlet.

Claims

1. Hearing instrument with separated hearing device and receiver, characterised in that the receiver comprising a sound outlet provided such to introduce the sound direct into the ear canal or into an earmold.

2. Hearing instrument according to claim 1, characterised in that the receiver is integrated within an earmold.

3. Hearing instrument according to claim 1 or 2, characterised in that the receiver outlet is placed in a position at the receiver that it directly points into the ear canal.

4. Hearing instrument according to one of the claims 1 to 3, characterised in that the receiver outlet is integrally welded, glued, molded or attached in any other manner directly to the earmold.

5. Hearing instrument according to one of the claims 1 to 4, characterised in that the receiver outlet is placed on the biggest side of the receiver.

6. Hearing instrument according to one of the claims 1 to 5, characterised in that the connection cable or tube of the receiver to the hearing device is adjustable by flexible positioning of the connection end of the cable or tube at or within the receiver casing.

7. Hearing instrument according to one of the claims 1 to 6, characterised in that the receiver is arranged to a plane on the earmold, the receiver outlet pointing to a horn shaped tubing within the earmold such that there is no need of accurate placement to ensure correct sound transmission from the receiver to the ear canal.

8. Hearing Instrument to one of the claims 1 to 7, characterised in that the connecting cable or tube between the hearing device and the receiver consists of only one bend, the hearing instrument an the receiver are placed in one plane, such that only one cable for left and right ear positioning is required.

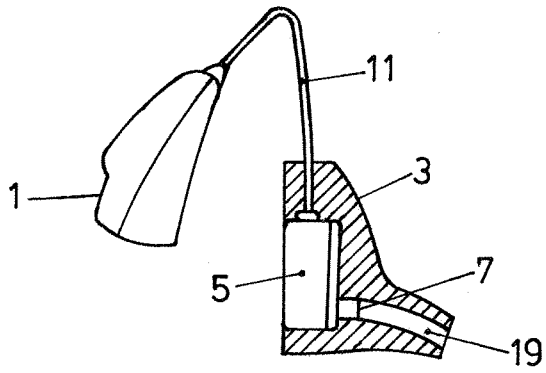

FIG.1

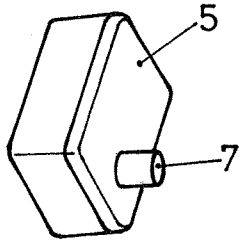

FIG.2

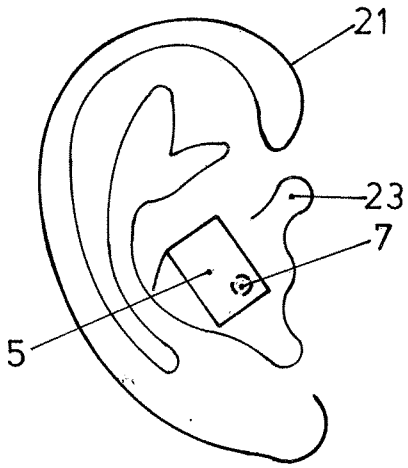

FIG.3

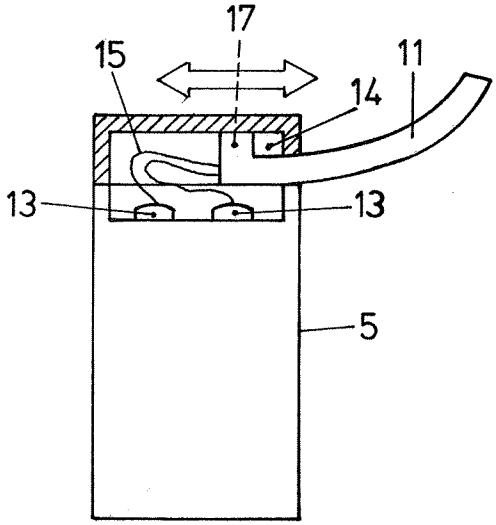

FIG.4

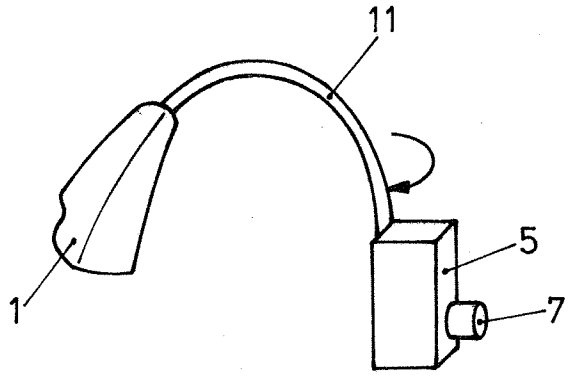

FIG.5

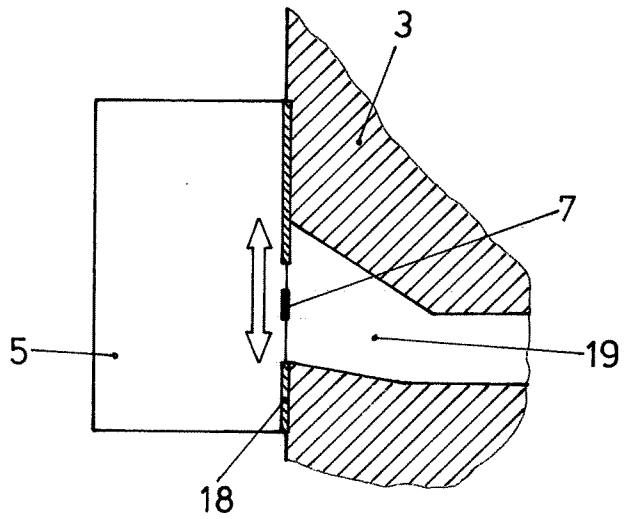

FIG.6

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2010/062327

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04R25/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2010/040351 A1 (WIDEX AS [DK]; LARSEN TINA AHLBERG [DK]; JENSEN LARS BAEKGAARD [DK]; N) 15 April 2010 (2010-04-15) page 1, line 6 - page 14, line 32; figures 1-8	1,5,7,8
X	WO 2010/066299 A1 (WIDEX AS [DK]; RUNG MARTIN [DK]; JENSEN PETER NORDLAND [DK]; OLSEN JOR) 17 June 2010 (2010-06-17) page 1, line 4 - page 12, line 7; figures 1-9	1,2,5,7
X	US 3 865 998 A (WEISS ERWIN M ET AL) 11 February 1975 (1975-02-11) column 1, line 6 - column 4, line 18; figures 1-6	1-7

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
1 October 2010	12/10/2010

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2010/062327

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2010040351 A1	15-04-2010	NONE	
WO 2010066299 A1	17-06-2010	NONE	
US 3865998 A	11-02-1975	NONE	