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(71) Applicant: **Oticon A/S**
2765 Smørum (DK)

(72) Inventor: **KVIST, Preben**
DK-2765 Smørum (DK)

(74) Representative: **Mikkelsen, Jacob**
Demant A/S
Kongebakken 9
2765 Smørum (DK)

(54) **HEARING AID INCLUDING A DOME**

(57) The present disclosure relates to a hearing device comprising an in-the-ear housing having a longitudinal axis, wherein the in-the-ear housing comprises an interface part to releasably connect to a dome, the dome comprising a core part having an attachment part configured to connect to the interface part of the in-the-ear housing, the dome comprising a flexible part configured to engage an ear canal wall of a user, the flexible part defining a tip and a bottom part, where a diameter of the flexible part increases from the tip to the bottom part a plurality of grooves and/or ribs being formed in the flexible part, the plurality of grooves and/or ribs extending parallel along a longitudinal direction of the flexible part.

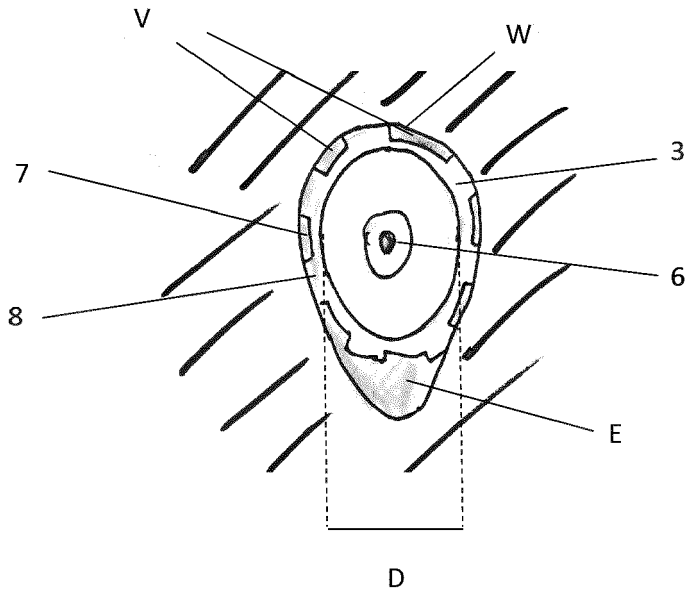

Fig. 2

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Description

[0001] The present disclosure relates to hearing aids including domes or tips. More particularly, the disclosure relates to a dome or tip comprising one or more grooves or ribs.

[0002] Hearing aids, and other hearing devices, which utilize a dome for ensuring that a housing of the hearing aid or hearing device is secured in the ear canal of a user are often formed rotationally symmetrical. However, the human ear canal is not cylindrically shaped. This results in a risk that the dome does not fit the user, which possibly results in sound leakage.

[0003] Therefore, there is a need to provide a solution that addresses at least some of the above-mentioned problems. The present disclosure provides at least an alternative to the prior art.

SUMMARY

[0004] The present disclosure provides a hearing device comprising: an in-the-ear housing having a longitudinal axis, wherein the in-the-ear housing comprises an interface part to releasably connect to a dome, the dome comprising a core part having an attachment part configured to connect to the interface part of the in-the-ear housing, the dome comprising a flexible part configured to engage an ear canal wall of a user, the flexible part defining a tip and a bottom part, where a diameter of the flexible part increases from the tip to the bottom part, a plurality of grooves and/or ribs being formed in the flexible part, the plurality of grooves and/or ribs extending parallel along a longitudinal direction of the flexible part. An advantage of having grooves and/or ribs in the dome is that the performance of the hearing aid can be improved. Another advantage of having a dome comprising a plurality of grooves and/or ribs is that a consistent, controlled, leak occurs between the grooves and/or ribs and the ear canal. Another advantage is that it provides a better fit for ear canals that are not perfectly cylindrical in shape. Another advantage of having ribs is that they might stiffen the dome and thus minimize folding problems that can otherwise occur when an ear canal is slightly smaller than a dome.

[0005] The present disclosure further provides a hearing device wherein at least one of the plurality of grooves and/or ribs defines a jagged tooth-like pattern in a line along the longitudinal direction of the flexible part. An advantage of having a jagged tooth-like pattern is that it might improve retention and allows easy insertion.

[0006] The present disclosure further provides a hearing device wherein the plurality of grooves and/or ribs have a varying diameter along the longitudinal direction.

[0007] The present disclosure further provides a hearing device wherein the dome is configured so that when attached to the in-the-ear housing and being positioned in an ear canal, the flexible part at least partly conform to the ear canal and at least a multitude of the plurality of grooves and/or ribs each establish a vent canal with the ear canal.

[0008] The present disclosure further provides a hearing device wherein the flexible part is at least partly spherical. An advantage of this is that it allows for a better fit in the ear canal.

[0009] The present disclosure further provides a hearing device wherein at least the flexible part is formed from 2 different materials.

[0010] The present disclosure further provides a hearing device wherein the interface includes a snap fitting. An advantage of this is that a secure fitting is ensured while also allowing for easy removal when exchanging the dome or removing it for cleaning.

[0011] The present disclosure further provides a hearing device wherein the dome includes one or more sensor elements configured to provide a sensor signal to a processor of the hearing aid. An advantage of this is that various physiological parameters can be measured.

[0012] The present disclosure further provides a hearing device wherein the dome further comprises a filter unit at an outlet and/or inlet. An advantage of this is that debris such as sweat or wax can be easily removed, thus decreasing the risk for clogging. Another advantage is that the performance of the hearing aid is less affected by sweat or wax.

[0013] The present disclosure further provides a hearing device wherein the filter is fixed.

[0014] The present disclosure further provides a hearing device wherein the dome further comprises a wax trap arranged at the tip of the dome. An advantage of this is that the performance of the hearing aid is less affected by wax.

[0015] The present disclosure further provides a hearing device wherein the dome does not comprise a vent channel formed at the core part.

[0016] The present disclosure further provides a hearing device wherein ribs of the plurality of grooves and/or ribs are arranged staggered in neighboring rows of ribs.

BRIEF DESCRIPTION OF DRAWINGS

[0017] The aspects of the disclosure may be best understood from the following detailed description taken in conjunction with the accompanying figures. The figures are schematic and simplified for clarity, and they just show details to improve the understanding of the claims, while other details are left out. Throughout, the same reference numerals are used for identical or corresponding parts. The individual features of each aspect may each be combined with any or all features of the other aspects. These and other aspects, features and/or technical effect will be apparent from and elucidated with reference to the illustrations described hereinafter in which:

FIG. 1 schematically illustrates a dome in an ear canal,

FIG. 2 schematically illustrates a cross section of a

dome according to the present disclosure,

FIG. 3A schematically illustrates a dome according to the present disclosure.

FIG 3B schematically illustrates a dome according to the present disclosure,

FIG 3C schematically illustrates a dome according to the present disclosure,

FIG 4A schematically illustrates a dome according to the present disclosure, and

FIG 4B schematically illustrates a dome according to the present disclosure.

DETAILED DESCRIPTION

[0018] The detailed description set forth below in connection with the appended drawings is intended as a description of various configurations. The detailed description includes specific details for the purpose of providing a thorough understanding of various concepts. However, it will be apparent to those skilled in the art that these concepts may be practiced without these specific details. Several aspects of the apparatus and methods are described by various blocks, functional units, modules, components, circuits, steps, processes, algorithms, etc. (collectively referred to as "elements"). Depending upon particular application, design constraints or other reasons, these elements may be implemented using electronic hardware, computer program, or any combination thereof.

[0019] The electronic hardware may include micro-electronic-mechanical systems (MEMS), integrated circuits (e.g. application specific), microprocessors, microcontrollers, digital signal processors (DSPs), field programmable gate arrays (FPGAs), programmable logic devices (PLDs), gated logic, discrete hardware circuits, printed circuit boards (PCB) (e.g. flexible PCBs), and other suitable hardware configured to perform the various functionality described throughout this disclosure, e.g. sensors, e.g. for sensing and/or registering physical properties of the environment, the device, the user, etc. Computer program shall be construed broadly to mean instructions, instruction sets, code, code segments, program code, programs, subprograms, software modules, applications, software applications, software packages, routines, subroutines, objects, executables, threads of execution, procedures, functions, etc., whether referred to as software, firmware, middleware, microcode, hardware description language, or otherwise.

[0020] A hearing device (or hearing instrument, hearing assistance device) may be or include a hearing aid that is adapted to improve or augment the hearing capability of a user by receiving an acoustic signal from a user's surroundings, generating a corresponding audio signal, possibly modifying the audio signal and providing the possibly modified audio signal as an audible signal to at least one of the user's ears. 'Improving or augmenting the hearing capability of a user' may include compensating for an individual user's specific hearing loss. The "hearing device" may further refer to a device such as a hearable, an earphone or a headset adapted to receive an audio signal electronically, possibly modifying the audio signal and providing the possibly modified audio signals as an audible signal to at least one of the user's ears. Such audible signals may be provided in the form of an acoustic signal radiated into the user's outer ear, or an acoustic signal transferred as mechanical vibrations to the user's inner ears through bone structure of the user's head and/or through parts of the middle ear of the user or electric signals transferred directly or indirectly to the cochlear nerve and/or to the auditory cortex of the user.

[0021] The hearing device is adapted to be worn in any known way. This may include i) arranging a unit of the hearing device behind the ear with a tube leading airborne acoustic signals into the ear canal or with a receiver/ loudspeaker arranged close to or in the ear canal and connected by conductive wires (or wirelessly) to the unit behind the ear, such as in a Behind-the-Ear type hearing aid, and/ or ii) arranging the hearing device entirely or partly in the pinna and/ or in the ear canal of the user such as in an In-the-Ear type hearing aid or In-the-Canal/ Completely-in-Canal type hearing aid, or iii) arranging a unit of the hearing device attached to a fixture implanted into the skull bone such as in a Bone Anchored Hearing Aid or a Cochlear Implant, or iv) arranging a unit of the hearing device as an entirely or partly implanted unit such as in a Bone Anchored Hearing Aid or a Cochlear Implant. The hearing device may be implemented in one single unit (housing) or in a number of units individually connected to each other.

[0022] A "hearing system" refers to a system comprising one or two hearing devices, and a "binaural hearing system" refers to a system comprising two hearing devices where the devices are adapted to cooperatively provide audible signals to both of the user's ears. The hearing system or binaural hearing system may further include one or more auxiliary device(s) that communicates with at least one hearing device, the auxiliary device affecting the operation of the hearing devices and/or benefitting from the functioning of the hearing devices. A wired or wireless communication link between the at least one hearing device and the auxiliary device is established that allows for exchanging information (e.g. control and status signals, possibly audio signals) between the at least one hearing device and the auxiliary device. Such auxiliary devices may include at least one of a remote control, a remote microphone, an audio gateway device, a wireless communication device, e.g. a mobile phone (such as a smartphone) or a tablet or another device, e.g. comprising a graphical interface, a public-address system, a car audio system or a music player, or a combination thereof. The audio gateway may be adapted to receive a multitude of audio signals such as from an entertainment device like a TV or a music player, a telephone apparatus like a mobile telephone or a computer, e.g. a PC. The auxiliary device may further be

adapted to (e.g. allow a user to) select and/or combine an appropriate one of the received audio signals (or combination of signals) for transmission to the at least one hearing device. The remote control is adapted to control functionality and/or operation of the at least one hearing device. The function of the remote control may be implemented in a smartphone or other (e.g. portable) electronic device, the smartphone / electronic device possibly running an application (APP) that controls functionality of the at least one hearing device.

[0023] In general, a hearing device includes i) an input unit such as a microphone for receiving an acoustic signal from a user's surroundings and providing a corresponding input audio signal, and/or ii) a receiving unit for electronically receiving an input audio signal. The hearing device further includes a signal processing unit for processing the input audio signal and an output unit for providing an audible signal to the user in dependence on the processed audio signal.

[0024] The input unit may include multiple input microphones, e.g. for providing direction-dependent audio signal processing. Such directional microphone system is adapted to (relatively) enhance a target acoustic source among a multitude of acoustic sources in the user's environment and/or to attenuate other sources (e.g. noise). In one aspect, the directional system is adapted to detect (such as adaptively detect) from which direction a particular part of the microphone signal originates. This may be achieved by using conventionally known methods. The signal processing unit may include an amplifier that is adapted to apply a frequency dependent gain to the input audio signal. The signal processing unit may further be adapted to provide other relevant functionality such as compression, noise reduction, etc. The output unit may include an output transducer such as a loudspeaker/ receiver for providing an air-borne acoustic signal transcutaneously or percutaneously to the skull bone or a vibrator for providing a structure-borne or liquid-borne acoustic signal. In some hearing devices, the output unit may include one or more output electrodes for providing the electric signals such as in a Cochlear Implant.

[0025] Now referring to FIG. 1, which schematically illustrates a dome 3 in an ear canal E of a user. The dome 3 in figure 1 is releasably connected to the in-the-ear housing 1 part of a hearing aid. The in-the-ear-housing 1 has a longitudinal axis LA, and an interface part 2 which releasably connects to the dome 3. The dome 3 has a core part having an attachment part (described further herein with reference to figure 2) configured to connect to the interface part 2. The interface part 2 could for example include a snap fitting. Other ways of connecting the dome 3 to the interface 2 are equally plausible. The dome 3 further comprises a flexible part configured to engage the ear canal wall of the user. The flexible part has a tip 4 and a bottom 5 part. The dome 3 in figure 1 preferably has grooves and/or ribs in the flexible part, as further illustrated in figure 2.

[0026] Figure 2 illustrates a cross section of the dome 3 when inserted into the ear canal E of a user. The core part 6 has an attachment part for connecting to the interface 2 of the in-the-ear housing 1. In figure 2, it is clearly shown how the flexible part of the dome 3 engages the wall W of the ear canal E. The diameter D of the flexible part increases from the tip 4 to the bottom 5 part of the dome 3. The dome 3 in figure 2 has grooves 7 and ribs 8 formed in the flexible part and extending parallel along the longitudinal axis LA of the flexible part. As can be seen in figure 2, the dome 3 is not perfectly sealed in the ear canal E, instead, voids are created between the ribs 8 and the wall W. These spaces create leakage which affect the performance of the hearing aid. One advantage of having these ribs 8 and grooves 7 is that the leakage that occurs between ribs are consistent and controlled, as opposed to the uncontrolled leakage that occurs in regularly shaped domes. A dome without ribs and/or grooves has a minimal bending radius, and thus when trying to fit into an ear canal that is slightly smaller than the dome, unintentional dome folds or leaks are created as the dome does not seal properly. These folds create an uncontrolled leak that is further impacted by jaw or head movements (such as when eating) which also work the dome outwards in the ear canal. Thus, such uncontrolled and non-consistent leaks are hard to compensate for. By having ribs 8 and/or grooves 7, the leak is consistent and controlled and thus, the gain in the hearing aid can be compensated accordingly. As can be seen from figure 2, the ribs 8 and/or grooves 7 create vent canals V with the ear canal E when the dome is positioned in the ear canal E.

[0027] The ribs 8 and grooves 7 allow for a more adjustable dome 3 that is more easily inserted, compared to standard plain domes that have a hard time adjusting to curved ear canals or ear canals with varying cross-sectional areas due to their minimal bending radius.

[0028] Figure 3A and 3B illustrate two different examples of a dome 3 with ribs 8 on the flexible part. The ribs 8 are extending parallel along the longitudinal axis LA of the in-the-ear housing 1. It is also possible that some or all ribs 8 have a slight curve or are not straight from tip 4 to bottom 5. I figure 3A, the ribs 8 extend from tip 4 to bottom5, and in fig. 3B the ribs 8 extend from the tip 4 to slightly before the bottom 5. Adding ribs 8 on the outside of the dome 3 like this is very similar to current domes manufacturing, which is an advantage in production. Although the ribs 8 in both 3A and 3B are shown as being equidistantly distributed across the dome 3, it is also possible that the distance between ribs 8 vary across the dome. It is also plausible that the width of the ribs varies across the dome. A width of one rib 8 could be for example 0.5 mm, 0.2mm, 1 mm or 1.5mm. Preferably the width is no more than 1mm and no less than 0.2mm. The ribs 8 in fig. 3A and B all have the same width, it is however plausible that some ribs 8 have different widths than some other ribs 8. The ribs 8 might be from a different material than the dome 3, or the material of both the dome 3 and the ribs 8 could be the same. Some examples of

plausible materials are silicone and thermoplastic polyurethane.

[0029] Figure 3C is similar to figs. 3A and 3B but have grooves 7 instead of ribs 8.

[0030] Figure 4A and 4B illustrate two examples of a dome 3 with grooves 8 that form a jagged tooth-like pattern. As can be seen, the pattern is directed parallel to the longitudinal axis LA. The pattern can be evenly distributed across the flexible part, as in figs. 4A and 4B, or it can be randomly scattered across the dome 3. The pattern in fig 4A slightly differs from the pattern in fig. 4B. It is plausible that the ribs 8 are arranged staggered in neighboring rows of ribs. The domes 3 in figures 4A and 4B both have only jagged tooth-patterned ribs 8, but it is plausible that a dome 3 has a combination of both jagged ribs and ribs and/or grooves as shown in figures 3A, 3B and 3C. It is also plausible that the dome 3 has only one single rib, jagged rib or groove 8. The jagged ribs 8 as in figures 4A and 4B possibly improves retention of the dome 3 in the ear canal due to its form. It may also allow for easier insertion into the ear canal. When a user chews, speaks or otherwise move the jaw, the shape of the jagged ribs 8 may also move the dome 3 forward in the ear, thus ensuring that the hearing aid stays in place.

[0031] As can be seen in figures 1-4, the dome 3 has a shape that at least partially is spherical. Preferably the diameter D of the dome 3 increases from the tip 4 to the bottom part 5. It is further possible that the dome 3 comprises two flexible parts, forming a "Christmas tree"-like structure, not shown. The two parts of such a structure, the top and bottom part, might both have ribs and/or grooves. It is also possible that only the top or bottom part of the tree has ribs and/or grooves.

[0032] The dome 3 might further comprise one or more sensors for measuring parameters, such as temperature, blood pressure etc. The sensor could also for example be an accelerometer, or a PPG. The dome 3 could also comprise a filter unit at an inlet or outlet. Such filter could be fixed. It is also possible that the dome 3 comprises a wax trap in the tip 4 of the dome.

[0033] It is intended that the structural features of the devices described above, either in the detailed description and/or in the claims, may be combined with steps of the method, when appropriately substituted by a corresponding process.

[0034] As used, the singular forms "a," "an," and "the" are intended to include the plural forms as well (i.e. to have the meaning "at least one"), unless expressly stated otherwise. It will be further understood that the terms "includes," "comprises," "including," and/or "comprising," when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof. It will also be understood that when an element is referred to as being "connected" or "coupled" to another element, it can be directly connected or coupled to the other element, but an intervening element may also be present, unless expressly stated otherwise. Furthermore, "connected" or "coupled" as used herein may include wirelessly connected or coupled. As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items. The steps of any disclosed method are not limited to the exact order stated herein, unless expressly stated otherwise.

[0035] It should be appreciated that reference throughout this specification to "one embodiment" or "an embodiment" or "an aspect" or features included as "may" means that a particular feature, structure or characteristic described in connection with the embodiment is included in at least one embodiment of the disclosure. Furthermore, the particular features, structures or characteristics may be combined as suitable in one or more embodiments of the disclosure. The previous description is provided to enable any person skilled in the art to practice the various aspects described herein. Various modifications to these aspects will be readily apparent to those skilled in the art, and the generic principles defined herein may be applied to other aspects. Reference to an element in the singular is not intended to mean "one and only one" unless specifically so stated, but rather "one or more." Unless specifically stated otherwise, the term "some" refers to one or more.

[0036] Accordingly, the scope should be judged in terms of the claims that follow.

[0037] Feature list:

1 In-the-ear-housing
2 interface part
3 dome
4 tip
5 bottom
6 core part
7 grooves
8 ribs

W wall
E Ear canal
LA longitudinal axis
V vent canal

Claims

1. A hearing device comprising:

an in-the-ear housing having a longitudinal axis, wherein the in-the-ear housing comprises an interface part to releasably connect to a dome,
the dome comprising a core part having an attachment part configured to connect to the interface part of the in-the-ear housing, the dome comprising a flexible part configured to engage an ear canal wall of a user, the flexible part defining a tip and a bottom part, where a diameter

of the flexible part increases from the tip to the bottom part,
a plurality of grooves and/or ribs being formed in the flexible part, the plurality of grooves and/or ribs extending parallel along a longitudinal direction of the flexible part.

2. The hearing device according to claim 1, wherein at least one of the plurality of grooves and/or ribs defines a jagged tooth-like pattern in a line along the longitudinal direction of the flexible part.

3. The hearing device according to claim 1 or 2, wherein the plurality of grooves and/or ribs have a varying diameter along the longitudinal direction.

4. The hearing device according to any one of claims 1-3, wherein the dome is configured so that when attached to the in-the-ear housing and being positioned in an ear canal, the flexible part at least partly conform to the ear canal and at least a multitude of the plurality of grooves and/or ribs each establish a vent canal with the ear canal.

5. The hearing device according to any one of claims 1-4, wherein the flexible part is at least partly spherical.

6. The hearing device according to any one of claims 1-5, wherein at least the flexible part is formed from 2 different materials.

7. The hearing device according to any one of claims 1-6, wherein the interface includes a snap fitting.

8. The hearing device according to any one of claims 1-7, wherein the dome includes one or more sensor elements configured to provide a sensor signal to a processor of the hearing aid.

9. The hearing device according to any one of claims 1-8, wherein the dome further comprises a filter unit at an outlet and/or inlet.

10. The hearing device according to claim 9, wherein the filter is fixed.

11. The hearing device according to any one of claims 1-10, wherein the dome further comprises a wax trap arranged at the tip of the dome.

12. The hearing device according to any one of claims 1-11, wherein the dome does not comprise a vent channel formed at the core part.

13. The hearing device according to any one of claims 1-12, wherein ribs of the plurality of grooves and/or ribs are arranged staggered in neighboring rows of ribs.

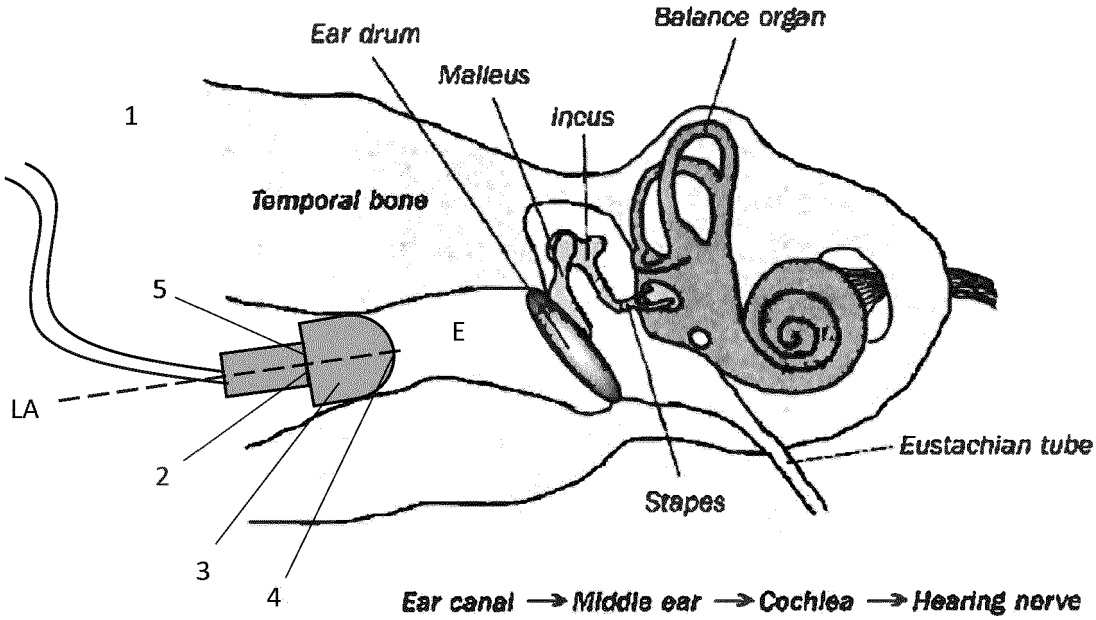

Illustration from "Fading sounds", Claus Elberling & Kirsten Worsoe, Bording A/S 2006

Fig. 1

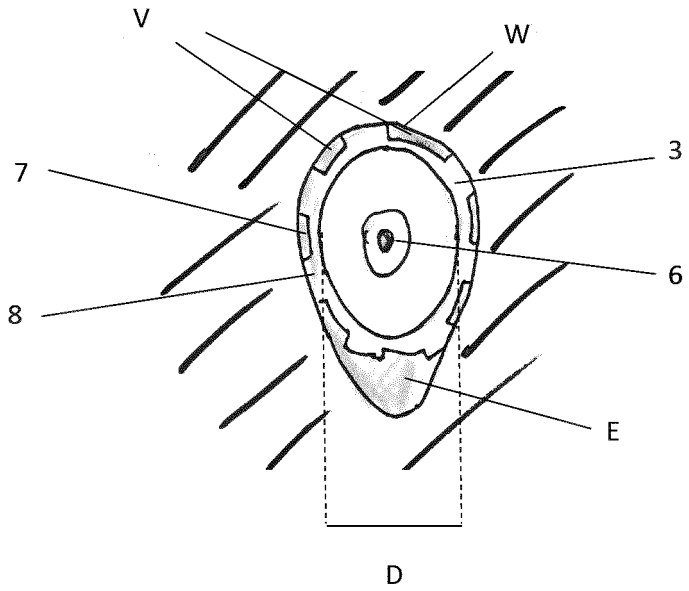

Fig. 2

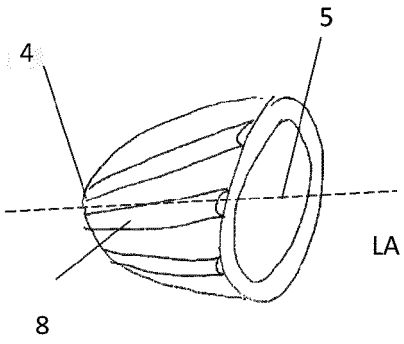

Fig. 3A

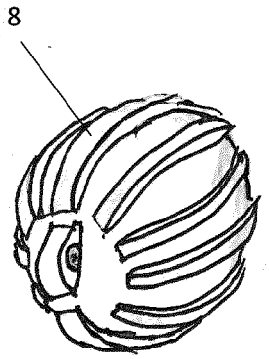

Fig. 3B

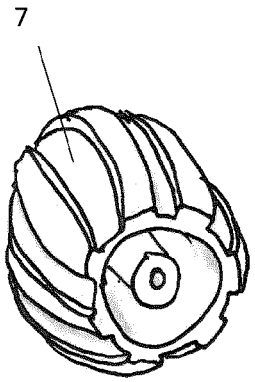

Fig. 3C

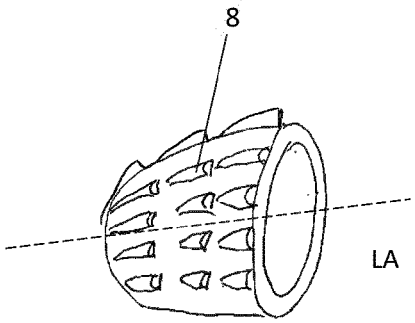

Fig. 4A

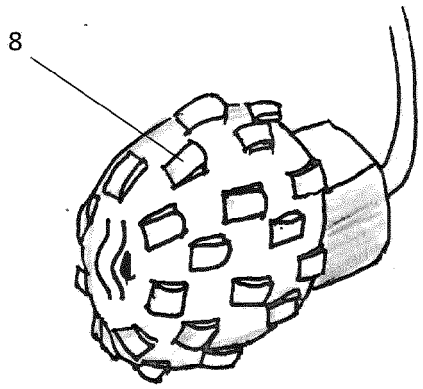

Fig. 4B

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EUROPEAN SEARCH REPORT

Application Number
EP 21 15 2735

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2015/222978 A1 (MUROZAKI KATSUNORI [JP]) 6 August 2015 (2015-08-06) * paragraphs [0049] - [0129]; figures 1-21 * -----	1-13	INV. H04R25/00
X	US 2016/066110 A1 (SHENNIB ADNAN [US] ET AL) 3 March 2016 (2016-03-03) * paragraphs [0026] - [0045]; figures 1-11 * -----	1,3-6, 8-12	
X	JP S53 38323 U (PANASONIC CORPORATION) 4 April 1978 (1978-04-04) * the whole document * -----	1,4-12	
A	US 2020/374641 A1 (HUSUNG KUNIBERT [DE]) 26 November 2020 (2020-11-26) * paragraph [0024] * -----	6,8	
A	US 2012/082336 A1 (WUBKER JOHN JAMES [US] ET AL) 5 April 2012 (2012-04-05) * paragraphs [0035], [0040]; figure 7A * -----	9-11	

TECHNICAL FIELDS SEARCHED (IPC)

H04R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	9 June 2021	Fobel, Oliver

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 21 15 2735

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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09-06-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2015222978 A1	06-08-2015	JP 6060915 B2	18-01-2017
		JP 2015149586 A	20-08-2015
		US 2015222978 A1	06-08-2015
US 2016066110 A1	03-03-2016	NONE	
JP S5338323 U	04-04-1978	NONE	
US 2020374641 A1	26-11-2020	CN 111956181 A	20-11-2020
		DE 102019207373 A1	26-11-2020
		EP 3742758 A1	25-11-2020
		US 2020374641 A1	26-11-2020
US 2012082336 A1	05-04-2012	US 2012082336 A1	05-04-2012
		WO 2010151492 A1	29-12-2010

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