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(54) **Housing for a hearing aid**

(57) A housing for a hearing aid, comprising an outer surface adapted to face away from the ear of a user and a shell together defining an elongated cavity for receiving one or more hearing aid components, the shell defining an elongated outer periphery having first and second ends defining the longitudinal extend of the shell, and a circumferential portion of the outer periphery surrounding a longitudinal center line; the shell comprising: a shell section and a lid section, the shell section comprising

first and second circumferential end parts of the circumferential portion of the outer periphery, each circumferential end part defining one of the first and second ends and completely surrounding the center line; the shell section further comprising a central part only partially surrounding the center line so as to define a lateral aperture of the shell section for inserting the one or more components into the cavity, the aperture being delimited in the longitudinal direction by the first and second circumferential end parts.

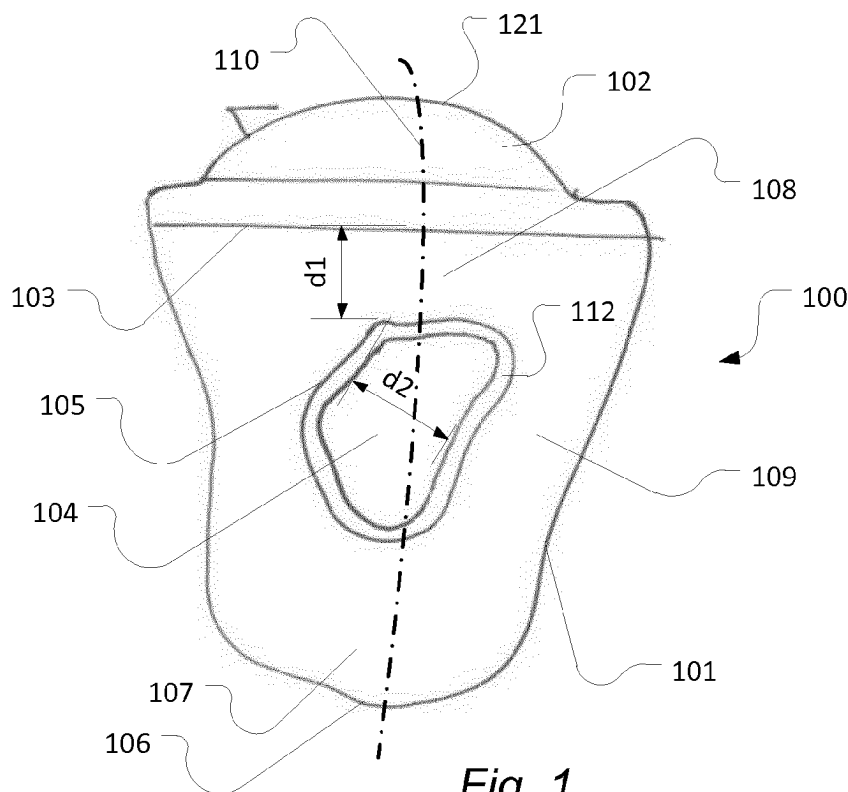


Fig. 1

Description

TECHNICAL FIELD

[0001] The invention relates to a hearing aid, and in particular a hearing aid for at least partial insertion into an ear canal, such as a so-called In-The-Ear (ITE) hearing aid, Invisible-In-Canal (IIC) hearing aid, a Completely-In-Canal (CIC) hearing aid, or similar types of hearing aids. The invention further relates to a housing for such a hearing aid.

BACKGROUND

[0002] Hearing aids of the above mentioned types comprise a number of components enclosed in a housing. The components typically comprise a battery and a signal path comprising a signal processor and at least two electroacoustic transducers such as a microphone and a receiver.

[0003] The housing for hearing aids of the above types typically comprises a surface part adapted to face away from the ear of a user, such as a faceplate and a shell attachable to the faceplate. The faceplate may be a flat or contoured sheet of plastic that forms a portion of the outer periphery of the hearing aid, alternatively the shell is adapted to form a part of the surface facing away from the ear of the user, and an electronics module is provided which fits into an opening in this surface. The battery and/or other components may be connected to the faceplate/module. The shell is typically a hollow body having an open end connectable to the faceplate, and it may be custom-made to fit in the user's ear.

[0004] In hearing aids of the above mentioned type, it is of the outmost importance, that the housing of the finished hearing aid has the smallest possible size, as hearing aid users prefer small hearing aids. These size constraints further complicate the manufacturing process which involves placement and securing of small, sensitive components within the housing. Some of the components may be arranged at the faceplate in a module connectable to the surface adapted to face away from the users ear, such as the battery, the microphone and contact elements for providing electrical contact with the components of the hearing aid.

[0005] EP 1 427 251 discloses a modular shell for an In-The-Ear hearing aid which comprises multiple parts that can be assembled with each other so as to allow disassembly of the parts from each other such that the hearing aid components can be removed or exchanged.

[0006] However, it remains desirable to provide a housing that allows for a more efficient manufacturing process, where the individual components may be securely positioned relative to each other and relative to the assembled housing.

[0007] Other requirements imposed on a hearing aid may include one or more of the following: Robustness and stability of the hearing aid, the possibility of accessing

the hearing aid components for maintenance or replacement, low electromagnetic interference caused by the components of the hearing aid.

SUMMARY

[0008] Disclosed herein are embodiments of a housing for a hearing aid, the housing comprising a faceplate/surface adapted to face away from the ear of a user wearing the hearing aid and a shell.

[0009] According to one aspect, in embodiments of such a housing the faceplate /surface facing away from the ear, and the shell together define an elongated cavity for receiving one or more components of a hearing aid, the shell defining an elongated outer periphery having first and second ends defining the longitudinal extent of the shell, and a circumferential portion of the outer periphery surrounding a longitudinal center line extending between the longitudinal first and second ends.

[0010] Embodiments of the shell comprise a shell section comprising first and second circumferential end parts of the circumferential portion of the outer periphery, each circumferential end part defining a respective one of the first and second ends, and each circumferential end part completely surrounding the center line; the shell section further comprising a central part connecting the first and second circumferential end parts, wherein the central part only partially surrounds the center line so as to define a lateral aperture of the shell section for inserting the one or more components into the cavity, the aperture being delimited in the longitudinal direction by the first and second circumferential end parts.

[0011] Embodiments of the shell further comprise a lid section sized and shaped to cover the aperture and defining a part of the outer periphery of the shell.

[0012] For example, during manufacturing of a custom ear shell, e.g. by a 3D printing process or another suitable process for producing customized 3D shapes, the shell may be manufactured as two sections that together form the ear shell: a lid section of the ear shell may be left out during manufacturing of a main shell section, thus resulting in a shell section forming a partial ear shell having an aperture. The aperture may be closed by the lid section such that the shell section and the lid section together form the complete shell. The lid section may be manufactured separately from or together with the shell section, e.g. as a separate or separable component such that the lid section can be glued or otherwise secured into the aperture of the ear shell when components have been placed in the hearing aid and the hearing aid has been assembled.

[0013] Consequently, as the shell has an aperture arranged in its central portion, both longitudinal ends of the cavity are structurally intact even without the lid section covering the aperture. This allows easy positioning and securing of the hearing aid components inside the cavity while the aperture allows easy access to the entire cavity. Embodiments of the housing disclosed herein further al-

low a better visual evaluation of the resulting placement of the components. For example, embodiments of the housing disclosed herein may allow for an improved fastening of hearing aid components such as an amplifier and/or an improved shock protection of components, such as the hearing aid receiver. Also, by the possibility of maneuvering components from outside by reaching into the cavity with instruments, reduced lengths of wires between the components may be obtained. These wires interconnect the different electrical components, and during normal operation, they tend to pick up electromagnetic noise which may become audible to the user, however this effect is diminished by shortening the lengths of wires between components.

[0014] In some embodiments the shell section defines a first part of the outer periphery of the hearing aid; wherein the lid section defines a second part of the outer periphery; and wherein the largest angle defined by any two surface normals of the second part of the outer surface is smaller than 170° , such as smaller than 160° , e.g. smaller than 120° . Consequently the shell section surrounds at least more than half of the circumference of the shell, even in the central part where the aperture is located, thus defining a major part of the cavity formed by the shell even when the lid section is not yet put into place. Some ear canals, after which the shells have been made, may be so irregular, that the angular restriction is not reasonable, but for most ear canals and corresponding hearing aid shells it is a valid restriction defining the relative size of the second part with respect to the first part.

[0015] In some embodiments, the aperture is delimited by a first rim defined by the shell section, the shell section comprises at least one sound exit opening or vent hole proximal to the first end, and the second end is an open end attachable to the faceplate or adapted to accommodate an electronics module, the open end being delimited by a second rim defined by the shell section; and wherein a shortest distance between the first rim and any one of the sound exit opening or vent hole is larger than 2 x average shell thickness and a shortest distance between the first rim and the second rim is larger than 2 x average shell thickness. Consequently the shell section forms a robust structure that defines a major part of the cavity formed by the shell even when the lid section is not yet put in place. Also the sturdiness of the rim sections is ensured by the defined shortest distances. The smallest width of the aperture will at any circumstances also allow an operator to reach into the shell with an implement or tool in order to maneuver the hearing aid parts.

[0016] In some embodiments the shortest distance between the aperture rim and any rim or the hearing aid shell or any other opening in the shell is larger than 1 mm and the smallest width of the aperture is larger than 3 mm.

[0017] For the purpose of the present description, the term 'smallest width of the aperture' is intended to be defined as the smallest distance that can be formed between two opposite parallel lines tangent to the rim of the

aperture.

[0018] In some embodiments, the shell section and the lid section are formed as a single component wherein a periphery of the lid section is connected to a first rim of the aperture by one or more bridge elements so as to allow disassembly of the lid section from the shell section. Consequently, the shell may be manufactured in a single production process while ensuring an accurate fit of the lid section into the aperture. Furthermore, this embodiment ensures safe handling of the shell up to the assembly process. The bridge elements may have a wall thickness smaller than a wall thickness of the lid section and/or the shell section.

[0019] In some embodiments, a first rim of the aperture comprises one or more indexing features. The lid section may comprise one or more indexing features configured to mate with respective ones of the one or more indexing features of the first rim. Hence, correct insertion and securing of the lid section into the aperture is further facilitated.

[0020] Furthermore, in a hearing aid, the different active components are typically electrically interconnected by a litze wires. Long wires may function as antennas and result in undesired electromagnetic noise either being picked up by or transmitted from such wires. Furthermore, during component placement, there is a risk of frayed wires and short circuiting of the wires. Due to easier component placement, embodiments of the housing described herein reduce the risk for damaging the wires during assembly and allow the wires to be shortened, thus resulting in an improved electromagnetic compatibility. For example, some or all of the components of the hearing aid may be inserted into the cavity as a kit of components where the components are electrically interconnected by litze wires. In particular, the components may be efficiently positioned within the cavity, even when the wires are kept short so as to reduce the risk of electromagnetic interference.

[0021] While not limited to such applications, embodiments of the housing disclosed herein are particular beneficial for small instruments such as ITE, IIC and CIC hearing aids, as component placing is more complicated in these types of hearing aids.

[0022] The aperture in a lateral side of the shell provides access to large well-defined parts of the cavity surrounded by walls of the shell section, thus allowing components such as the amplifier or the receiver to be attached to the inside of the ear shell, e.g. with double sided tape and/or by means of mounting elements on the inside periphery of the cavity. This increases the reliability of the hearing aid, as the amplifier is prevented from being displaced inside the instrument during impacts. Furthermore, in embodiments of the housing disclosed herein, the receiver may be shock protected, e.g. with different kinds of foam rubber or similar materials. If a balanced receiver is used such insulation may be achieved without significant rise in structural feedback.

[0023] In some embodiments, the shell section may

comprise one or more mounting elements on its interior surface allowing easy attachment of one or more components to the interior wall of the cavity. The active components may thus safely be secured inside the housing and protected against displacement during subsequent use. For example, such mounting elements may have the form of protrusions, such as a tubular protrusion into which a corresponding pin of a component may be inserted, or a protrusion that is insertable into a tubular connector of the component. Embodiments of the housing disclosed herein allows accurate attachment of the component to such mounting features, e.g. by gluing, frictional fitting or the like.

[0024] The present invention relates to different aspects including the housing described above and in the following, other aspects of a housing, a hearing aid comprising such a housing, and further methods and product means, each yielding one or more of the benefits and advantages described in connection with at least one of the above-mentioned aspects, and each having one or more preferred embodiments corresponding to the preferred embodiments described in connection with at least one of the above-mentioned aspects and/or defined in the claims.

[0025] According to another aspect, disclosed herein are embodiments of a hearing aid comprising a housing as described herein.

[0026] Embodiments of a hearing aid may comprise a battery, a processing unit, at least two transducers, and a housing, the housing comprising a faceplate or a surface adapted to face away from the ear of the user and a shell, the faceplate/surface and the shell defining an outer periphery of the hearing aid and defining an elongated cavity for receiving at least the battery, the processing unit and the at least two transducers; the cavity having a largest diameter; the hearing aid further comprising wires electrically connecting the processing unit with respective ones of the battery and the at least two transducers; the shell comprising a shell section and a lid section, the shell section comprising an aperture for receiving an assembled kit comprising the processing unit, the at least two transducers, and the wires; the lid section being configured to be assembled with the shell section so as to close the aperture; wherein each of the wires has a length smaller than the largest diameter of the cavity.

[0027] For the purpose of the present description the term 'largest diameter of the cavity' is intended to be defined as the largest distance that can be formed between two opposite parallel planes tangent to the boundary of the cavity.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] Aspects of the housing for a hearing aid disclosed herein will be described in more detail in the following description of preferred embodiments and with reference to the drawings.

Fig. 1 illustrates an example of a housing for a hearing aid.

Fig. 2 illustrates another example of a housing for a hearing aid.

Fig. 3 shows a cross-sectional view of an example of a lid section of a hearing aid shell.

Fig. 4 shows a cross sectional view of an example of a hearing aid

Fig. 5 shows a cross sectional view of another example of a hearing aid

Fig. 6 illustrates components of an example of a hearing aid

Figs. 7a-b illustrate an example of a hearing aid shell.

Fig. 8 illustrates another example of a shell section and a corresponding lid section of a housing for a hearing aid.

[0029] Throughout the drawings like reference numerals are used to refer to the same or like components, features or elements.

DETAILED DESCRIPTION

[0030] Fig. 1 illustrates an example of a housing for a hearing aid such as an ITE (In The Ear) hearing aid, an IIC (Invisible In the Canal) hearing aid, or a CIC (Completely In the Canal) hearing aid. The housing, generally designated 100 comprises a faceplate 102 and a shell. The shell comprises a shell section 101 and a lid section 104. The shell section 101 is a hollow body that may be custom designed with an exterior periphery shaped so as to match the shape of a user's ear canal. The shell section has an elongated shape having a first, closed end 106 and a second, open end defined by a rim 103. The rim 103 defines an interface with the faceplate 102 that may comprise a flat plastic plate configured to be attached to the rim 103 so as to close the open end of the shell. The housing thus defines a cavity configured to accommodate active components of the hearing aid, such as a battery, a signal processing unit, a microphone, and a receiver. The battery may be attached to the interior of the faceplate 102.

[0031] The shell section 101 defines a center line 110 extending from the closed end 106 to the center of the open end defined by the rim 103. The portions 107 and 108 of the shell section proximal to the closed end 106 and to the rim 103, respectively, extend around the entire circumference surrounding the center line 110 so as to provide two generally cylindrical, conical or dome-shaped portions of material. The central portion 109 of the shell section only partially surrounds the center line so as to leave a lateral aperture defined by a rim 105. Even though not explicitly shown in fig. 1, the shell housing may further comprise a vent hole and/or a sound exit opening situated at the closed end 106.

[0032] The housing 100 further comprises a lid section 104 shaped and sized so as to cover the aperture defined by rim 105. The aperture defined by rim 105 has a width

d2 larger than 3mm.

[0033] The shortest distance d1 between the rim 105 and the rim 103 is preferably larger than at least 2 times the average shell thickness or 1mm, so as to provide a stable shell and so as to allow the cavity defined by the shell section 101 alone to be sufficiently large and well-defined to allow placement and securing of components of the hearing aid inside the cavity without the lid section 104 being in place. During this operation of assembling the components of the hearing aid inside the cavity defined by the shell section 101, the aperture allows easy access to the components in the cavity and thus easy manipulation of the components inside the cavity. The assembly of the components may be performed before and/or after the faceplate 102 has been mounted on the shell.

[0034] The shell section 101 and the lid section 104 may be manufactured by a 3D printing process or another suitable manufacturing process well known in the art as such. To this end, the shell section 101 and the lid section 104 may be manufactured as two separate components or as a single component where the lid section is detachable from the shell section. An example of the latter embodiment is illustrated in fig. 2.

[0035] After assembly of the components inside the cavity, the lid section 104 may be placed and secured in the aperture defined by rim 105, e.g. by gluing or curing a curable material, e.g. a UV-curable photopolymer resin. Gluing provides a faster manufacturing process but may result in a visible glue line 112.

[0036] When components of the hearing aid have to be replaced or otherwise serviced, the ear shell may be disposed, and a replacement shell may be produced. Alternatively, when the boundary line of the lid section is visible, e.g. as a visible glue line 112, the ear shell may be opened along the boundary line, and the shell section may be reused. The lid section may also be reused or replaced by a replacement lid section.

[0037] Fig. 2 illustrates another example of a housing for a hearing aid. The housing of fig. 2 is similar to the housing of fig. 1 and comprises a faceplate 102, a shell section 101 and a lid section 104, all as described in connection with fig. 1. However, in this example, the lid section 104 is initially connected to the shell section 101. To this end the rim 105 comprises a number of narrow bridge elements 211 connecting the shell section 101 with the lid section 104. The bridge elements 211 extend from rim of the lid section to the rim 105 of the aperture defined by the shell section 101. The bridge elements 211 are formed so as to allow easy removal of the lid section 104, e.g. by breaking or cutting the bridge portions. Consequently, the shell may be manufactured in a single production process while ensuring an accurate fit of the lid section into the aperture defined by rim 105. Furthermore, this embodiment ensures safe handling of the shell up to the assembly process; in particular, the risk of a mix up of lid sections and shell sections is reduced. Prior to assembling the components of the hear-

ing aid into the cavity, the lid section 104 may be disconnected from the shell section. After completed assembly of the components inside the cavity, the lid section may be replaced into the aperture defined by rim 105 and secured as described in connection with fig. 1.

[0038] Fig. 3 shows a cross-sectional view of an example of a lid section of a hearing aid shell. The lid section 104 comprises a relatively flat or contoured lid part 313 having an exterior surface 315 and an interior surface 316. The lid part 313 may have a convex shape where the angle α defined by any two surface normal 317, 318 of the exterior surface 315 is smaller than 170°, preferably smaller than 160°, e.g. smaller than 120°.

[0039] The lid section 104 may further comprise a handle 314 outwardly protruding from the exterior surface 315, so as to allow easier handling of the lid section, in particular when the lid section is placed and secured in the aperture of the shell section.

[0040] Fig. 4 shows a cross-sectional view of an example of a hearing aid. The hearing aid comprises a housing 100 and a number of hearing aid components 420-423 accommodated within the housing. The housing of fig. 4 is similar to the housing of fig. 1 and comprises a faceplate 102, a shell section 101 and a lid section 104, all as described in connection with fig. 1.

[0041] The lid section 104 is shaped and sized so as to cover a lateral aperture 425 defined by a rim 105 of the shell section 101. The aperture defined by rim 105 and the lid section each have a width d2 larger than 3 mm. In fig. 4, the lid section 104 is shown removed from the hearing aid, i.e. prior to placing the lid section 104 so as to cover the aperture 425 in the shell section 101. Also, in fig. 4, the faceplate 102 is shown prior to cutting it to size, i.e. in fig. 2 the faceplate 102 extends laterally beyond the dimensions of the shell section 101 as defined by the rim 103.

[0042] The shortest distance d1 between the rim 105 and the rim 103 is preferably larger than 1mm or larger than 2 times the average shell thickness, also as described in connection with fig. 1. The shell section further comprises a vent hole and/or a sound exit opening 424 at or proximal to the closed end 106 of the shell section 101. The shortest distance d3 between the rim 105 and the vent hole 424 is preferably larger than 1mm, or larger than 2 times the average shell thickness so as to provide a stable shell and so as to allow the cavity defined by the shell section 101 alone to be sufficiently large and well-defined to allow placement and securing of components of the hearing aid inside the cavity without the lid section 104 being in place.

[0043] The hearing aid further comprises a battery 420, a signal processing unit 421, a receiver 422, and a microphone 423. The battery 420 is mounted to the faceplate and the other components are arranged at respective positions within the cavity formed by the shell section 101. The position of some of the components may be governed by operational requirements of the hearing aid and/or by space limitations of the cavity. For example,

the microphone 423 may be positioned at or proximal to the faceplate so as to allow an efficient recording of ambient sound, while the receiver 422 may be positioned at or proximal to the sound exit and/or vent hole 424 at or proximal to the closed end 106.

[0044] As is illustrated by fig. 4, the aperture 425 in the central portion of the shell section allows easy access to the different parts of the cavity, in particular to both the cavity portion formed by the part 107 of the shell section proximal to the closed end and to the cavity portion formed by the part 108 of the shell section proximal to the rim 103. Consequently, the aperture 425 allows easy manipulation of all components to be arranged in the cavity, even after the shell section 101 has been mounted on the faceplate 102.

[0045] Fig. 5 shows a cross sectional view of another example of a hearing aid. The hearing aid of fig. 5 is similar to the hearing aid of fig. 4, but with the aperture 425 located at a slightly different location than in the example of fig. 4, closer to the faceplate 102. However, as in the example of fig. 4, the shortest distance d_1 between the rim 105 and the rim 103 is preferably larger than 1mm, or larger than 2 times the average shell thickness, and the shortest distance d_3 between the rim 105 and the vent hole/sound exit hole 424 is preferably larger than 1mm or larger than 2 times the average shell thickness, while the smallest width d_2 of the aperture is preferably larger than 3mm. The aperture 425 may have a nice rounded shape as shown, or may be elongate making both d_1 and d_3 close to their minimum size.

[0046] Fig. 6 illustrates components of an example of a hearing aid, in particular the active components accommodated by the housing (not explicitly shown in fig. 6) disclosed herein. The hearing aid comprises a battery 420 that may be attached to the faceplate 102 as described above, a microphone 423, a signal processing unit 421, and a receiver 422. The battery 420, the microphone 423, and the receiver 422 are each electrically connected to the signal processing unit 421 by respective wires 628, 626, and 627, where wire 628 is connected to an electrical connector 629 located on the interior surface of the faceplate 102. Embodiments of the housing disclosed herein allow the microphone 423, the signal processing unit 421, the receiver 422, and the interconnecting wires 626-628 to be inserted into the housing as an assembled kit, and the individual components may be manipulated inside the cavity so as to properly position and secure them at their respective positions. The position and size of the aperture provided in the shell section described herein allows the kit of components to be inserted and manipulated even when the wires are kept short. It will be appreciated that the length of the wires may depend on the type of hearing aid. For example, for a CIC or ITE hearing aid, each of wires 626-628 may be between 5 and 15mm, e.g. 10 mm long. For an Invisible-In-the ear Canal (IIC) hearing aid the wires may be between 3mm and 8 mm long. For example wire 628 may be 7mm long and wires 626-627 may be 5mm long.

[0047] Figs. 7a-b illustrates an example of a hearing aid shell. Fig. 7a shows a part of the shell section 101 of the housing described in connection with fig. 2. In particular, fig. 7a shows the rim 105 defining an aperture of the shell section, and the lid section 104 covering the aperture. Fig. 7a illustrates the shell after manufacturing of the shell, e.g. by a 3D printing process or another suitable manufacturing process for producing customized 3D shapes. The shell is manufactured as a single component comprising both the shell section 101 and the lid section 104 where the lid section 104 is attached to the rim 105 by one or more material bridges 211. In order to facilitate removal of the lid section 104 prior to assembly of the hearing aid components inside the cavity formed by the shell section, the bridges may be formed sufficiently small so as to allow an easy breaking or cutting of the bridges. This is illustrated in fig. 7b showing a part of the wall 701 forming the shell section, a part of the wall 704 forming the lid section, and a bridge 711 connecting the walls 701 and 704 with each other.

[0048] For example, the bridges may be produced with a reduced wall thickness d_4 minus d_6 compared to the wall thickness d_4 of the shell section. For example, the bridges may have a wall thickness between 10% and 30% of the wall thickness of the shell section. The length d_5 of the bridges may be smaller than the wall thickness of the shell section, e.g. between 50% and less than 100% of the wall thickness. In one example, the wall thickness d_4 of the walls 701 and 704 may be 0.8 mm, while the wall thickness d_4 - d_6 of the bridge 711 may be 0.15 mm. The gap formed between walls 701 and 704, i.e. the length d_5 of the bridge may e.g. be 0.65 mm. However, it will be appreciated that other dimensions may be suitable, e.g. depending on the material used for the walls, the manufacturing process, etc.

[0049] Fig. 8 illustrates another example of a shell section 101 and a corresponding lid section 104 of a housing for a hearing aid. The shell section and the lid section are similar to the shell and lid sections described in connection with fig. 4. The shell section 101 comprises an open end defined by a rim 103 forming an interface to a faceplate. The shell section further comprises a closed end 106 and a sound exit hole and/or vent hole 424 at the closed end.

[0050] The shell section 101 is elongated in the direction from the open end to the closed end. The portions 107 and 108 of the shell section proximal to the closed end 106 and to the rim 103, respectively, extend around the entire circumference surrounding a longitudinal center line of the shell section so as to provide two generally cylindrical, conical or dome-shaped portions of material. The central portion 109 of the shell section only partially surrounds the center line so as to leave a lateral aperture defined by a rim 105.

[0051] The rim 105 comprises indexing features 831 that are configured to mate with corresponding indexing features 832 of the lid section, thus facilitating an accurate placement of the lid section to cover the aperture of

the shell section. The lid section 104 further comprises an outwardly protruding handle element 314 facilitating handling of the lid, in particular when inserting the lid into the aperture of the shell section.

[0052] It will be understood that the skilled person may devise variations to the embodiments explicitly described herein. The mere fact that certain measures are recited in mutually different dependent claims or described in different embodiments does not indicate that a combination of these measures cannot be used to advantage.

[0053] It should also be emphasized that the term "comprises/comprising" when used in this specification is taken to specify the presence of stated features, elements, steps or components but does not preclude the presence or addition of one or more other features, elements, steps, components or groups thereof.

Claims

1. A housing for a hearing aid, the housing comprising an outer surface adapted to face away from an ear opening of a user and a shell, the outer surface and the shell defining an elongated cavity for receiving one or more components of a hearing aid and adapted to be seated in the ear of a user, the shell defining an elongated outer periphery having first and second ends defining the longitudinal extent of the shell, and a circumferential portion of the outer periphery surrounding a longitudinal center line extending between the longitudinal first and second ends; the shell comprising

- a shell section comprising first and second circumferential end parts of the circumferential portion of the outer periphery, each circumferential end part defining a respective one of the first and second ends, and each circumferential end part completely surrounding the center line; the shell section further comprising a central part connecting the first and second circumferential end parts, wherein the central part only partially surrounds the center line so as to define a lateral aperture of the shell section for arranging the one or more components inside the cavity, the aperture being delimited in the longitudinal direction by the first and second circumferential end parts; and

- a lid section sized and shaped to cover the aperture and defining a part of the outer periphery of the shell.

2. A housing according to claim 1, wherein the largest angle defined by any two surface normals of the part of the outer periphery defined by the lid section is smaller than 170°.
3. A housing according to claim 1 or 2, wherein the

aperture is delimited by a first rim defined by the shell section, wherein the shell section comprises at least one vent hole and/or sound exit hole proximal to the first end, and wherein the second end is an open end attachable to the faceplate or module, the open end being delimited by a second rim defined by the shell section; and wherein a shortest distance between the first rim and any one of the one or more vent hole/sound exit hole is larger than 2 times average shell thickness and the shortest distance between the first rim and the second rim is larger than 2 times average shell thickness; and wherein a smallest width of the aperture is larger than 3 times average shell thickness.

4. A housing for a hearing aid, the housing comprising an outer surface adapted to face away from an ear opening of a user and a shell, the outer surface and the shell defining an outer periphery of the hearing aid, the shell comprising a shell section defining a cavity for receiving one or more components of a hearing aid and comprising an aperture for arranging the one or more components in the cavity, the shell section defining a first part of the outer surface; and a lid section configured to be assembled with the shell section so as to close the aperture and to define a second part of the outer surface; wherein the largest angle defined by any two surface normals of the second part of the outer surface is smaller than 170°.

5. A housing for a hearing aid, the housing comprising an outer surface adapted to face away from an ear opening of a user and a shell, the outer surface and the shell defining an outer periphery of the hearing aid, the shell comprising a shell section defining a cavity for receiving one or more components of a hearing aid and comprising an aperture for inserting or arranging the one or more components into the cavity, the aperture being delimited by a first rim defined by the shell section, the shell section further comprising at least one vent hole and an open end, the open end being delimited by a second rim defined by the shell section; and a lid section configured to be assembled with the shell section so as to close the aperture; wherein a shortest distance between the first rim and any one of the vent hole and/or a sound exit opening is larger than 1 mm and the shortest distance between the first rim and the second rim is larger than 1mm; and wherein a smallest width of the aperture is larger than 3mm.

6. A housing according to any one of claims 1-5; herein the shell section and the lid section are formed as a single component wherein a periphery of the lid section is connected to a first rim of the aperture by one

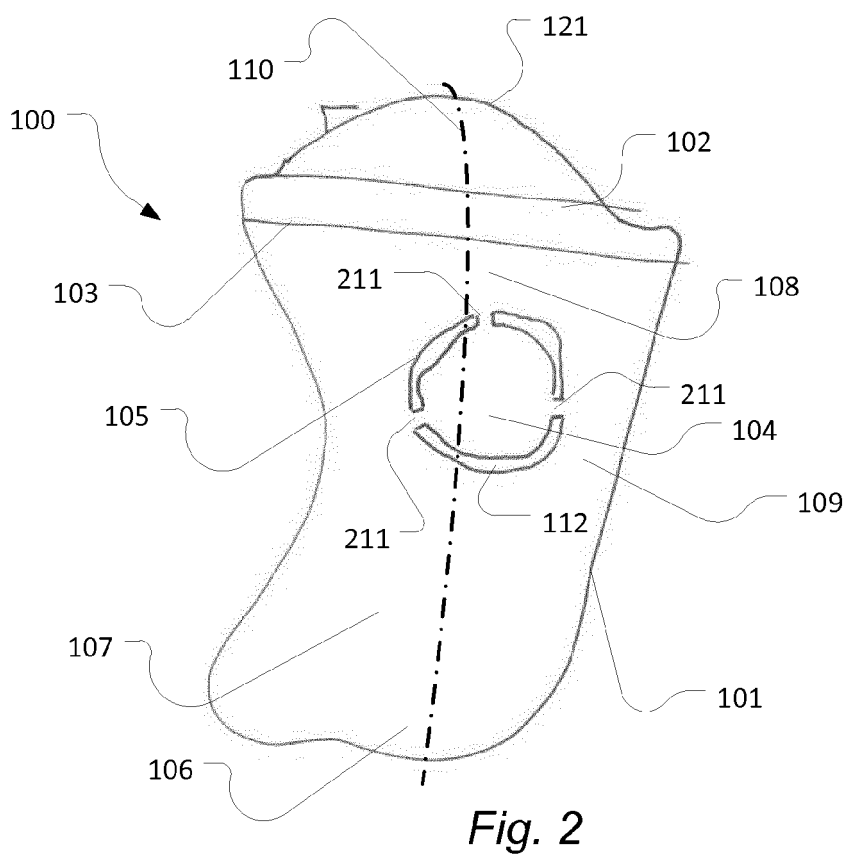
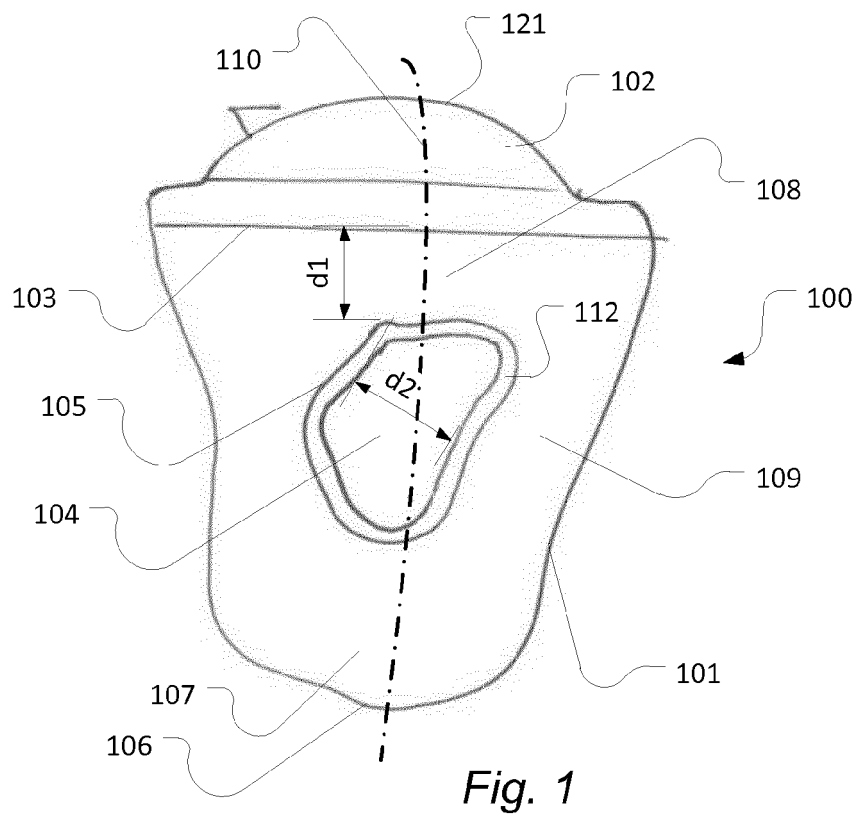
or more bridge elements so as to allow disassembly of the lid section from the shell section.

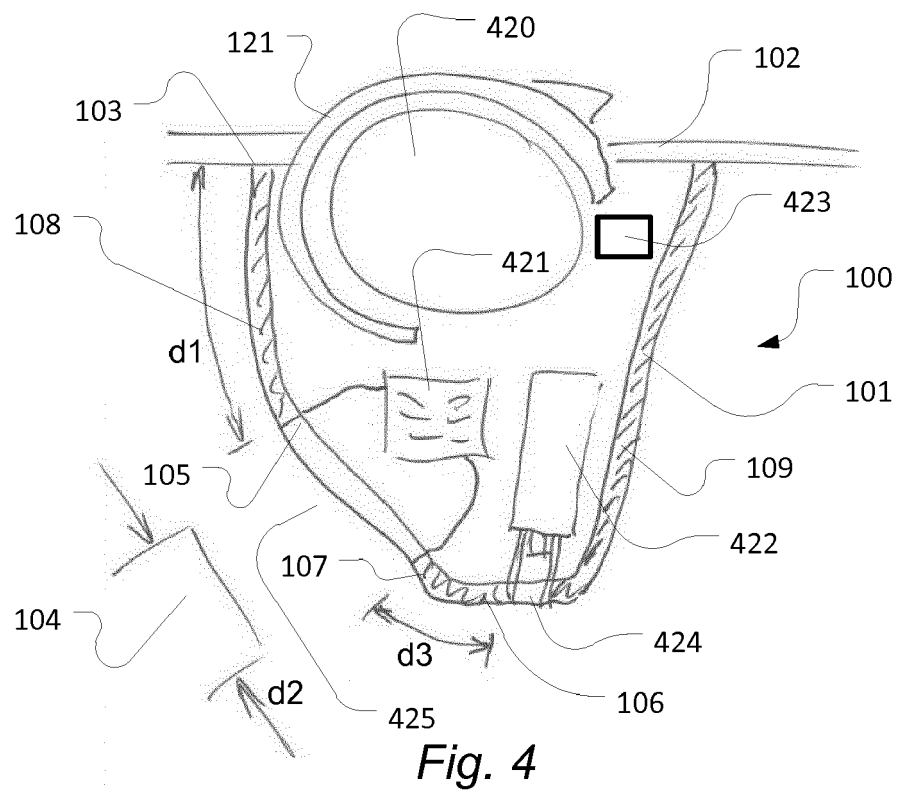
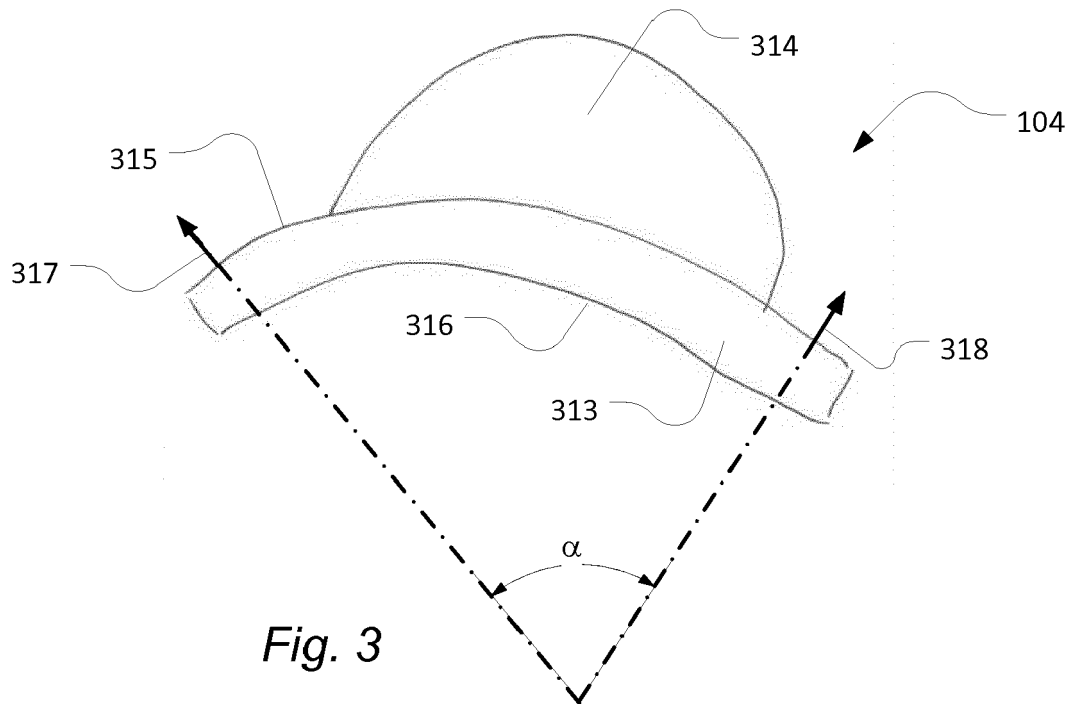
7. A housing according to any one of claims 1-6, wherein the shell section comprises one or more mounting elements located on an interior surface of the shell section. 5

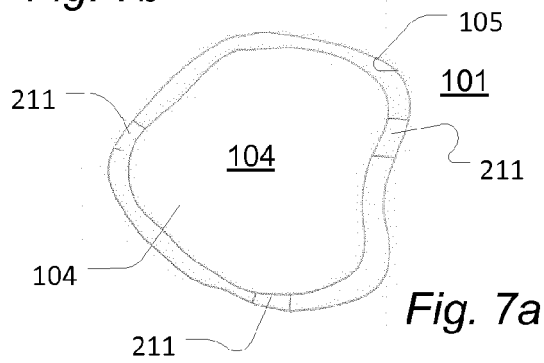
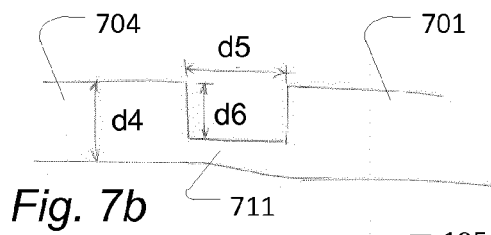
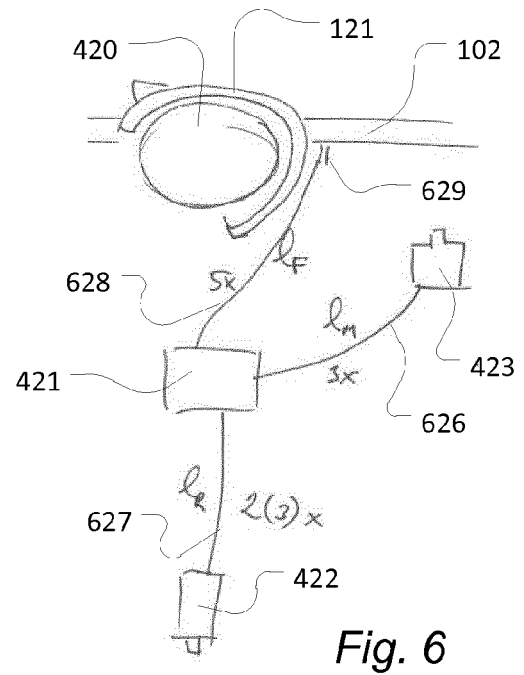
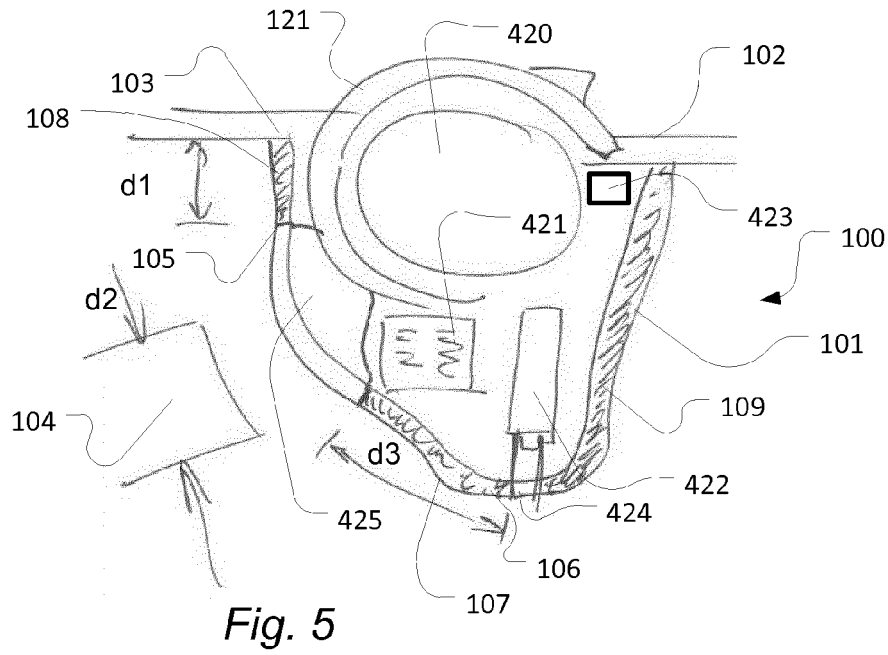
8. A housing according to any one of claims 1-7, wherein a first rim of the aperture comprises one or more indexing features, and wherein the lid section comprises one or more indexing features configured to mate with respective ones of the one or more indexing features of the first rim. 10
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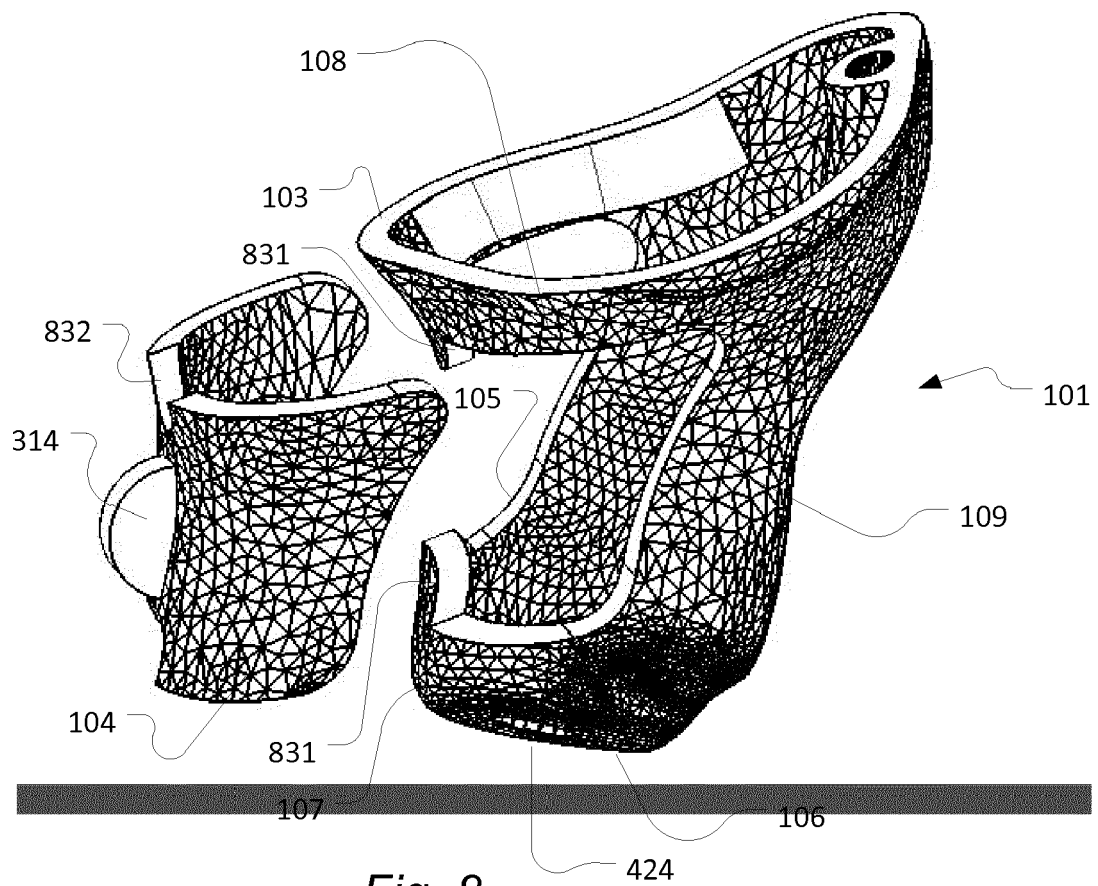
9. hearing aid comprising a housing as defined in any one of claims 1 through 8

10. A hearing aid comprising a battery, a processing unit, at least two transducers, and a housing, the housing comprising an outer surface adapted to face away from an ear opening of a user and a shell, the faceplate or outer surface and the shell defining an outer periphery of the hearing aid and defining an elongated cavity for receiving at least the battery, the processing unit and the at least two transducers; the cavity having a largest diameter; the hearing aid further comprising wires electrically connecting the processing unit with respective ones of the battery and the at least two transducers; the shell comprising a shell section and a lid section, the shell section comprising an aperture for receiving an assembled kit comprising the processing unit, the at least two transducers, and the wires; the lid section being configured to be assembled with the shell section so as to close the aperture; 20
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wherein each of the wires has a length no longer than 10mm. 40
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EUROPEAN SEARCH REPORT

Application Number
EP 12 17 1922

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Y	----- EP 2 037 702 A2 (SIEMENS HEARING INSTR INC [US]) 18 March 2009 (2009-03-18) * paragraph [0007] - paragraph [0011]; figures 2-5 *	6,8	
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Place of search Munich		Date of completion of the search 29 October 2012	Examiner Borowski, Michael
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