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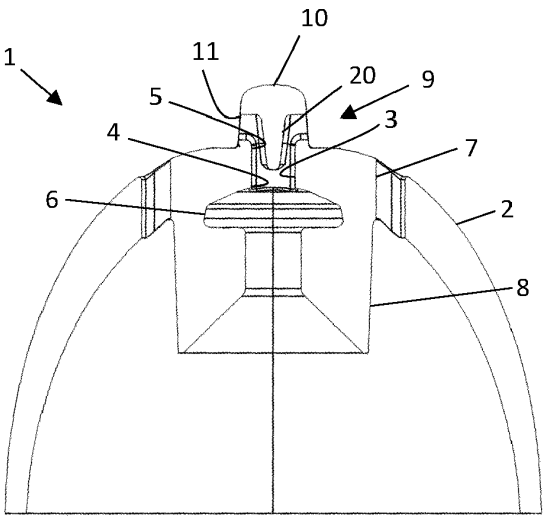
(54) CAP WITH WAX FILTER FOR A HEARING DEVICE

(57) A cap for a hearing device being configured to be inserted in the ear canal of a user is disclosed. The cap includes a dome-shaped part comprising a channel for receiving an acoustic signal from an output unit at a sound inlet and an opening connected to said channel, a first wax filtering element comprising a sound outlet, the first wax filtering element protruding from the dome-shaped part and being arranged to bridge the opening of the dome-shaped part, and a second wax filtering element. The second wax filtering element at least partially protrudes from the dome-shaped part and/or from the first wax filtering element into a space between the first wax filtering element and the dome-shaped part, wherein the first wax filtering element and the second wax filtering element define a sound path from the channel to the sound outlet.

Fig. 1B



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Description

FIELD

[0001] The present disclosure relates to caps, also termed dome, flexible insert mount, ear tip or acoustic coupler, for hearing devices configured to be inserted in a user's ear canal. More particularly, the disclosure relates to an improved wax filter for the caps.

BACKGROUND

[0002] The ear canal produces wax (earwax), also known as cerumen, which serves as a natural lubricant for the ear canal. During use, hearing devices are in close contact with the user's ear, and thereby, hearing devices are exposed to the wax.

[0003] It is conventionally known that during use, the wax enters through an opening such as a sound outlet of the hearing device and advances through an interior channel in the cap. For example, when inserting the cap of the hearing device into the user's ear canal, wax may be pressed into the cap until it reaches a wax filter right in front of an output unit of the hearing device. At this point, the wax is trapped inside the hearing device. Over time, the wax accumulates inside the cap and clogs the channel and/or the wax filter in front of the output unit. Consequently, this leads to a deterioration of the sound output such as a reduced volume or a muffled tone. In some cases, users may consider hearing devices as malfunctioning due to the deterioration of sound or even return them for repair. In many cases, where the hearing devices are considered to be malfunctioning, the caps are clogged by wax and the function can be re-established by replacing the wax filter in front of the output unit.

[0004] Therefore, there is a need to provide a solution that allows for preventing clogged hearing devices, which could lead to customer complaints, and which will enhance the ease of use of the hearing device.

SUMMARY

[0005] According to an aspect, a cap for a hearing device is provided, wherein the cap is configured to be inserted in the ear canal of a user. The cap includes a dome-shaped part comprising a channel for receiving an acoustic signal from an output unit at a sound inlet and an opening connected to said channel, a first wax filtering element comprising a sound outlet, and a second wax filtering element. The first wax filtering element protrudes from the dome-shaped part and is arranged to bridge the opening of the dome-shaped part. The second wax filtering element at least partially protrudes from the dome-shaped part and/or from the first wax filtering element into a space between the first wax filtering element and the dome-shaped part. The first wax filtering element and the second wax filtering element define a sound path from the channel to the sound outlet.

[0006] The first wax filtering element has an arched shape and protrudes from the dome-shaped part such as to form a bridge over the opening of the dome-shaped part. Thereby, the first wax filtering element protects the opening of the dome-shaped part and prevents wax from easily entering into the channel.

[0007] The second wax filtering element protrudes from the dome-shaped part and/or from the first wax filtering element into a space between the first wax filtering element and the dome shaped part. Thereby, the second wax filtering element provides a barrier between the opening and the sound outlet and prevents particles of wax that might fit below the arched shape of the first wax filtering element from entering into the channel. Additionally, the second wax filtering element increases the surface area and, thereby, supports retaining wax by providing additional surface area for adhesion of the wax. The second wax filtering element may be formed in any shape, and can have, for example, a bar shape, a plate shape, or a three-dimensional shape. Moreover, the second wax filtering element may be implemented as a brush comprising fibers or filaments protruding from the dome-shaped part and/or from the first wax filtering element. The second wax filtering element may be arranged so as to protrude through the opening of the dome-shaped part into the channel. In addition, the cap may be provided with another second wax filtering element or a plurality of second wax filtering elements.

[0008] The first wax filtering element and the second wax filtering element together define a sound path from the channel to the sound outlet. Thereby, sound is guided from the channel along the second wax filtering element, and subsequently along the first wax filtering element to the sound outlet. Wax, which enters at the sound outlet, advances through the cap in the opposite direction of the sound.

[0009] The second wax filtering element may be arranged so as to divide a space between the first wax filtering element and the dome-shaped part into at least two sub-spaces. By dividing the space under the arch of the first wax filtering element into several sub-spaces, the sub-spaces are disconnected from each other and thereby wax, which has entered into one sub-space, cannot advance from this sub-space to another sub-space directly. This prevents other sub-spaces from becoming clogged by wax, which has already entered into one sub-space, and thereby improves the robustness of the cap against clogging.

[0010] At least a part of the sound path defined by the second wax filtering element may be arranged in a direction different from that of the sound path defined by the first wax filtering element. By defining different sound path directions by the first wax filtering element and the second wax filtering element, a labyrinth structure is created. This labyrinth structure is easily passed through by sound, but is much harder to be passed through by wax. The sound path defined by the first wax filtering element and the second wax filtering element may also include

several bends and changes in direction to further enhance the wax retention properties.

[0011] At least a part of the sound path defined by the second wax filtering element may be arranged in more than one direction so that one sub-space defines a first sound path direction and another sub-space defines a second sound path direction, which is different from the first sound path direction. By arranging the second wax filtering element in this way, the sound transmitting properties of the cap are improved. In a case, in which wax has entered into one sub-space from one direction and one sound path is clogged, there is still the second sound path, whose direction is different from the first sound path. This prevents the second sound path from getting clogged subsequently and, thereby, the second sound path is maintained open and sound can be transmitted through the cap into the ear canal of the user.

[0012] The first wax filtering element may at least partially cover the second wax filtering element. Accordingly, in a top view, the first wax filtering element is arranged above the second wax filtering element so that the second wax filtering element is at least partially covered and protected by the first wax filtering element. However, a part of the second wax filtering element may not be covered and may protrude through the sound outlet to the outside of the cap.

[0013] The second wax filtering element may comprise a portion that connects the first wax filtering element and the dome-shaped part across the sound outlet. This allows for reducing the opening cross-section of the sound outlet and, thereby, prevents particles of wax that might fit below the arched shape of the first wax filtering element from entering into the space between the first wax filtering element and the dome-shaped part. Despite the reduced opening cross-section, sound can easily pass through, whereas particles of wax are prevented from getting stuck in the cap.

[0014] The second wax filtering element may comprise a plurality of through holes so that the second wax filtering element has a grid structure. The grid structure provides a reduced cross-section and allows only particles of wax, which are smaller than the through holes, to pass through. Thereby, the wax filtering capability is further improved.

[0015] The plurality of through holes may each have a polygonal shape. The polygonal shape may be a triangular shape, a rectangular shape, or any other polygonal form. The polygonal shape allows an arrangement of the plurality of through holes such that a portion of the second wax filtering element between two adjacent through holes has a simple structure such as a bar shape.

[0016] The first wax filtering element and the second wax filtering element may be integrally formed. Accordingly, both wax filtering elements may be manufactured in one step and an additional step of integrating the second wax filtering is not necessary.

[0017] The cap may comprise a plurality of holes arranged on the outer peripheral surface of the dome-shaped part. This allows ambient air to circulate into the inner side of the ear canal through the plurality of holes and prevents the cap from completely sealing the inner ear canal.

[0018] The cap may be made of at least two flexible materials, wherein an inner core part is made of a harder material than an outer part of the cap. The outer part of the cap is made of a relatively soft and flexible material. Thereby, the outer part of the cap easily allows elastic deformation and ensures adaptability to the individual shape of the user's ear canal. Accordingly, a high comfort during use is achieved. The inner core part enables a connection of the cap to the output unit, and by being made of a flexible material, the inner core part can elastically deform when being attached to the output unit. Accordingly, a simple connection between the cap and the output unit is achieved. However, using a relatively hard but flexible material for the inner core part ensures a tight fit and prevents the cap from easily coming off the output unit, especially during use.

[0019] The cap may further comprise a third wax filtering element. The third wax filtering element provides additional protection against wax entering through the cap and possibly damaging the output unit. The third wax filtering element is provided in a cavity of the dome-shaped part and is connected to the sound inlet. Thereby, the third wax filtering element is arranged so that wax entering through the sound outlet first must pass the first wax filtering element and the second wax filtering element until it can reach the third wax filtering element. Moreover, by arranging the third wax filtering element in the cavity of the dome-shaped part, the third wax filtering element is reliably accommodated inside the dome-shaped part, so that accidental coming off of the third wax filtering element is prevented, especially during use.

[0020] The third wax filtering element may be replaceable. Accordingly, the third wax filtering element can be removed and exchanged with a new one, in case it is clogged with wax. By replacing only the third wax filtering element, the cap itself may be reused several times. This allows for a reduction of the waste amount occurring during use of the hearing device.

[0021] The third wax filtering element may be adapted to be at least partly permeable for sound transmission and to be at least partly impermeable for material. Thereby, wax from the user's ear canal is prevented from passing through the third wax filtering element, whereas sound can pass through the third wax filtering element so that sound from the output unit can reach into the ear canal of the user.

[0022] In another aspect, a hearing device comprising the cap is provided, which is adapted for being positioned in the user's ear canal. By using the cap described above, all effects described above also apply to the hearing device in the same manner. The hearing aid may e.g. be a behind-the-ear type, an in-the-ear type or a receiver-in-the-ear type.

BRIEF DESCRIPTION OF DRAWINGS

[0023] 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:

Figure 1A is a perspective view of a cap for a hearing device;
Figure 1B is a cross-sectional view of the cap for a hearing device;
Figure 2A is an enlarged view of a tip end of a cap for a hearing device without the second wax filtering element;
Figure 2B is an enlarged view of a tip end of the cap for a hearing device;
Figure 2C is an enlarged view of a tip end of the cap for a hearing device;
Figure 2D is an enlarged view of a tip end of the cap for a hearing device; and
Figure 2E is an enlarged view of a tip end of the cap for a hearing device.

DETAILED DESCRIPTION

[0024] 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.

[0025] The electronic hardware may include microprocessors, microcontrollers, digital signal processors (DSPs), field programmable gate arrays (FPGAs), programmable logic devices (PLDs), gated logic, discrete hardware circuits, and other suitable hardware configured to perform the various functionality described throughout this disclosure. 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.

[0026] A hearing device may 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. The "hearing device" may further refer to a device such as 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 middle ear of the user or electric signals transferred directly or indirectly to cochlear nerve and/or to auditory cortex of the user.

[0027] 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 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 a 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 Bone Anchored Hearing Aid or Cochlear Implant, or iv) arranging a unit of the hearing device as an entirely or partly implanted unit such as in Bone Anchored Hearing Aid or Cochlear Implant.

[0028] 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 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 remote controls, remote microphones, audio gateway devices, mobile phones, public-address systems, car audio systems or music players or a combination thereof. The audio

gateway is 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, a PC. The audio gateway is further adapted 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 operation of the at least one hearing devices. The function of the remote control may be implemented in a SmartPhone or other electronic device, the SmartPhone/ electronic device possibly running an application that controls functionality of the at least one hearing device.

[0029] 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.

[0030] The input unit may include multiple input microphones, e.g. for providing direction-dependent audio signal processing. Such directional microphone system is adapted to enhance a target acoustic source among a multitude of acoustic sources in the user's environment. 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 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.

[0031] Figure 1A illustrates, in a perspective view, a cap 1 for a hearing device according to an aspect of the disclosure. The cap 1 has a dome-shaped part 2, which has a curved outer peripheral surface. The curvature is convex so that the dome-shaped part 2 has a substantially hemispherical shape. Thereby, the apex of the dome-shaped part 2 is located at a tip end 9 of the dome-shaped part 2. When inserted into the ear canal of a user, the dome-shaped part 2 is inserted with the tip end 9 directing to the inner end of the ear canal. At the tip end 9 of the dome-shaped part 2, an opening 5 is formed. The opening 5 has a circular shape and the center of the opening 5 coincides with a center axis of the dome-shaped part 2.

[0032] At the tip end 9 of the dome-shaped part 2, a first wax filtering element 10 is provided. In a top view, wherein the dome-shaped part 2 is viewed from an insertion direction into the ear canal, the first wax filtering element 10 extends linearly across the opening 5 so as to at least partly cover the opening 5. In a side view, the first wax filtering element 10 has the shape of a rounded arch, and is arranged so as to extend from one side of the opening 5 to an opposite side of the opening 5 across the opening 5. Thereby, a space with a substantially semicircular cross-section is formed between the rounded arch of the first wax filtering element 10 and the dome-shaped part 2. The space between the first wax filtering element 10 and the dome-shaped part 2 is connected to the opening 5 of the dome-shaped part 2.

[0033] Figure 1B is a cross-sectional view of the cap 1 for a hearing device. The cross-sectional view illustrates the structure of the dome-shaped part 2, wherein the dome-shaped part 2 is mainly constituted by a wall, which has an outer peripheral surface that forms the dome shape and an inner peripheral surface that also substantially has a dome shape. A channel 3 is formed through the wall of the dome-shaped part 2 such that the channel 3 linearly extends along the center axis of the dome-shaped part 2. A sound inlet 4 is located at a position, where the channel 3 intersects the inner peripheral wall of the dome-shaped part 2.

[0034] The opening 5 is located at a position, where the channel 3 intersects the outer peripheral surface of the dome-shaped part 2.

[0035] An inner core part 8 protrudes from the inner peripheral surface of the dome-shaped part 2. The inner core part 8 has a substantially annular cross-section. The inner core part 8 extends from the inner peripheral surface of the dome-shaped part 2 in vicinity of the sound inlet 4 along the center axis of the dome-shaped part 2. Thereby, the inner core part 8 forms a passage that is arranged concentric with the channel 3 along the center axis of the dome-shaped part 2 and is connected thereto. On an inner peripheral surface of the inner core part 8, a cavity 6 is provided at a position, where the inner core part 8 is connected to the inner peripheral surface of the dome-shaped part 2. The cavity 6 is formed as an annular recess and is configured to accommodate a third wax filtering element (not shown) and an output unit (not shown) therein. The output unit comprises a loudspeaker from which sound is emitted into a direction of the channel 3. The third wax filtering element is arranged between the output unit and the channel 3, such that it is capable of preventing wax, which may have entered the channel 3, from reaching to the output unit. The third wax filtering element comprises a diaphragm through which sound can pass, but material such as wax is blocked.

[0036] The inner core part 8 is made of a flexible material such that it can be elastically deformed. This allows insertion of the third wax filtering element and the output unit through the passage into the cavity 6. When the third wax filtering element and the output unit are inserted into the cavity 6, the inner core part 8 elastically returns to its

initial shape and thus tightly fixes the third wax filtering element and the output unit therein.

[0037] Furthermore, a taper-shaped recess is formed at the inner peripheral surface of the inner core part 8 at an end portion opposite to an end portion where the inner core part 8 is connected to the inner peripheral surface of the dome-shaped part 2. This taper shape allows easy insertion of the third wax filtering element and the output unit into the passage.

[0038] Additionally, a plurality of holes 7 are provided in the dome-shaped part 2 such as to penetrate from the inner peripheral surface of the dome-shaped part 2 to the outer peripheral surface of the dome-shaped part 2. Here, six holes 7 are provided equidistantly around the opening 5. Thereby, adequate ventilation of the inner ear canal is ensured.

[0039] Fig. 1B shows the first wax filtering element 10 in a cross-sectional view. Accordingly, there is a sound outlet 11 located between the first wax filtering element 10 and the outer peripheral surface of the dome-shaped part 2 at both sides of the first wax filtering element 10.

[0040] A second wax filtering element 20 protrudes from the first wax filtering element 10 into a space between the first wax filtering element 10 and the dome-shaped part 2. Here, the second wax filtering element 20 extends along the center axis of the dome-shaped part 2 through the opening 5 into the channel 3. The second wax filtering element 20 has a wedge shape such that its thickness is reduced from an attachment portion at the first wax filtering element 10 toward a tip end opposite to the attachment portion.

[0041] A sound path is formed in the cap 1, where sound from the output unit passes through the third wax filtering element and subsequently enters through the sound inlet 4 into the channel 3. From the channel 3, sound passes through the opening 5. From the opening 5 onwards, the sound path is defined by the second wax filtering element 20 and subsequently the first wax filtering element 10. From the first wax filtering element 10, the sound exits through the sound outlet 11 into the inner ear canal.

[0042] Wax moves through the cap 1 in a direction opposite to the sound path.

[0043] Figure 2A is an enlarged side view of the tip end 9 of a cap 1 for a hearing device according to an explanatory example, which does not comprise the second wax filtering element 20. Between the arch-shaped first wax filtering element 10 and the dome-shaped part 2, a semicircular sound outlet 11 is formed, through which sound exits the cap 1 and enters into the inner ear canal. Wax, on the other hand, can enter from the inner ear canal through the sound outlet 11 into the cap 1.

[0044] Thereafter, several other caps are described. These caps are based on the caps described previously, and thus all features described above apply to the following caps, if not stated otherwise.

[0045] Figure 2B is an enlarged side view of a tip end 9 of the cap 1. Herein, the second wax filtering element 20 has a plurality of through holes 22, wherein some of the through holes 22 are shaped as arc segments and a through hole 22 in the center is shaped in a semicircular manner. In between of adjacent through holes 22, a portion 21 of the second wax filtering element 20 is arranged so as to connect the first wax filtering element 10 and the dome-shaped part 2.

[0046] Figure 2C is an enlarged side view of a tip end 9 of the cap 1. Here, the second wax filtering element 20 has a bar shape that extends linearly from the first wax filtering element 10 to the dome-shaped part 2 across the sound outlet 11. Thereby, the second wax filtering element 20 extends substantially parallel to the center axis of the dome-shaped part 2. Another second wax filtering element 20 is provided on a second sound outlet 11 on the other side of the first wax filtering element 10.

[0047] In figure 2D the second wax filtering element 20 has a grid structure. A plurality of triangular through holes 22 are provided in the second wax filtering element 20. The through holes 22 extend through the second wax filtering element 20 in a direction from one sound outlet 11 to the other sound outlet 11. Some triangular through holes 22 are arranged upside down with respect to adjacent through holes 22, such that the portion 21 of the second wax filtering element 20 between two adjacent wax filtering elements 20 has a bar shape.

[0048] Figure 2E shows a tip end 9 of the cap 1. Therein, the second wax filtering element 20 has a bar shape which extends tangentially along the outer peripheral surface of the dome-shaped part 2 across the opening 5 and connects the dome-shaped part 2 with the first wax filtering element 10. Thereby, the second wax filtering element 20 forms a barrier such that the cross-sectional area of the sound outlet 11 is reduced.

[0049] 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.

[0050] 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 elements 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 is not limited to the exact order stated herein, unless expressly stated otherwise.

[0051] It should be appreciated that 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.

[0052] The claims are not intended to be limited to the aspects shown herein, but is to be accorded the full scope consistent with the language of the claims, wherein 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.

[0053] Accordingly, the scope should be judged in terms of the claims that follow.

Claims

1. A cap (1) for a hearing device, the cap (1) being configured to be inserted in the ear canal of a user, the cap (1) comprising:

   a dome-shaped part (2) comprising a channel (3) for receiving an acoustic signal from an output unit at a sound inlet (4) and an opening (5) connected to said channel (3),
   a first wax filtering element (10) comprising a sound outlet (11), the first wax filtering element (10) protruding from the dome-shaped part (2) and being arranged to bridge the opening (5) of the dome-shaped part (2), and
   a second wax filtering element (20) at least partially protruding from the dome-shaped part (2) and/or from the first wax filtering element (10) into a space between the first wax filtering element (10) and the dome-shaped part (2), wherein
   the first wax filtering element (10) and the second wax filtering element (20) define a sound path from the channel (3) to the sound outlet (11).

2. The cap (1) according to claim 1, wherein the second wax filtering element (20) is arranged so as to divide a space between the first wax filtering element (10) and the dome-shaped part (2) into at least two subspaces.

3. The cap (1) according to claim 1 or 2, wherein at least a part of the sound path defined by the second wax filtering element (20) is arranged in a direction different from that of the sound path defined by the first wax filtering element (10).

4. The cap (1) according to any one of claims 1 to 3, wherein at least a part of the sound path defined by the second wax filtering element (20) is arranged in more than one direction so that one sub-space defines a first sound path direction and another subspace defines a second sound path direction different from the first sound path direction.

5. The cap (1) according to any one of claims 1 to 4, wherein the first wax filtering element (10) at least partially covers the second wax filtering element (20).

6. The cap (1) according to any one of claims 1 to 5, wherein the second wax filtering element (20) comprises a portion (21) that connects the first wax filtering element (10) and the dome-shaped part (2) across the sound outlet (11).

7. The cap (1) according to any one of claims 1 to 6, wherein the second wax filtering element (20) comprises a plurality of through holes (22) so that the second wax filtering element (20) has a grid structure.

8. The cap (1) according to claim 7, wherein the plurality of through holes (22) each have a polygonal shape.

9. The cap (1) according to any one of claims 1 to 8, wherein the first wax filtering element (10) and the second wax filtering element (20) are integrally formed.

10. The cap (1) according to any one of claims 1 to 9, wherein the cap (1) comprises a plurality of holes (7) arranged on the outer peripheral surface of the dome-shaped part (2).

11. The cap (1) according to any one of claims 1 to 10, wherein the cap (1) is made of at least two flexible materials, wherein an inner core part (8) is made of a harder material than an outer part of the cap (1).

12. The cap (1) according to any one of claims 1 to 11, further comprising a third wax filtering element arranged in a cavity (6) connected to the sound inlet (4).

13. The cap (1) according to claim 12, wherein the third wax filtering element is replaceable.

14. The cap (1) according to claim 12 or 13, wherein the third wax filtering element is adapted to be at least partly permeable for sound transmission and to be at least partly impermeable for material.

15. A hearing device comprising a cap (1) according to

any one of claims 1 to 14, which is adapted for being positioned in the ear canal of a user.

Fig. 1A

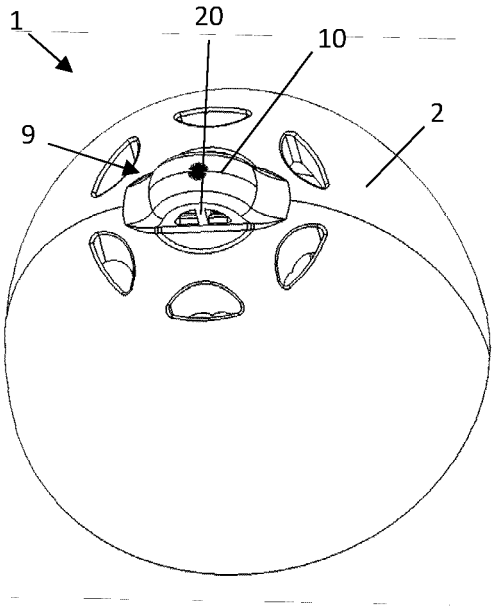


Fig. 1B

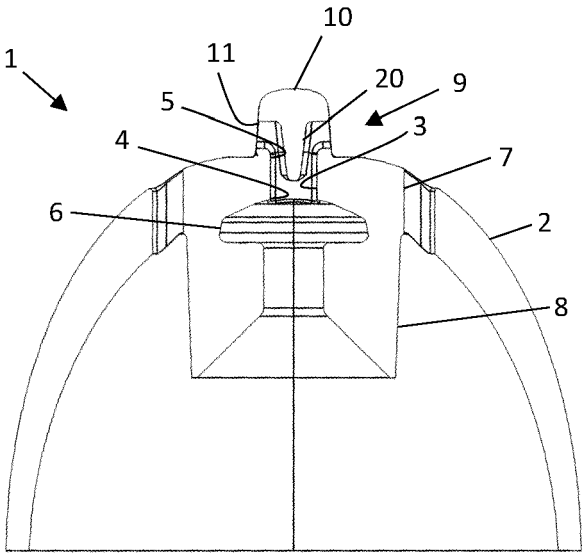


Fig. 2A

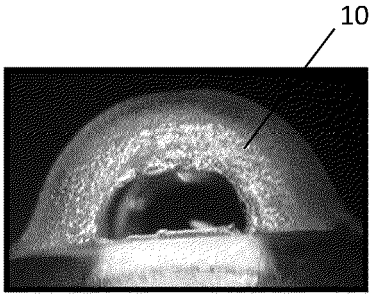


Fig. 2B

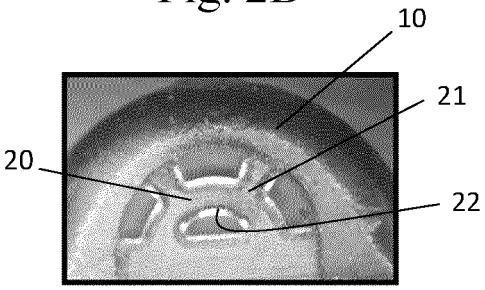


Fig. 2C

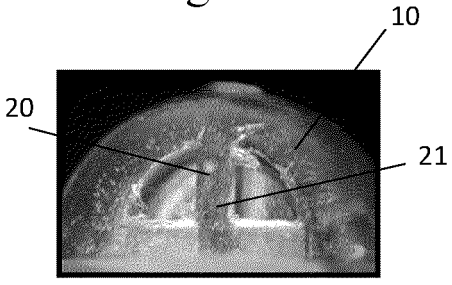


Fig. 2D

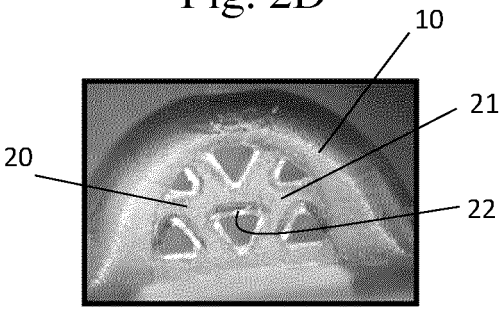
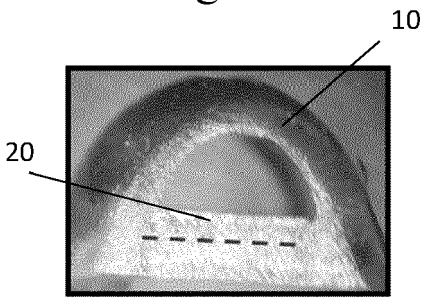


Fig. 2E



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Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	25 August 2020	Borowski, Michael

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