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(54) **Ear strap for a probe tube**

Ohrgurt für ein Sondenrohr

Sangle d'oreille pour tube de sonde

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Description

Field of invention

[0001] The present invention generally relates to an ear strap for assisting arrangement of a probe tube in the ear canal. The present invention more particularly relates an ear strap that can be used to fix a probe tube in the ear canal, adjust its position in the ear canal and be attached to and be detached from the probe tube in a fast and simple way.

Prior art

[0002] A variety of hearing aids have been developed to correct the hearing of users having different degrees of hearing impairments. In many situations an individual adjusting of the hearing aid is required in order to make the hearing aid work optimal.

[0003] Such adjusting is in particular important for children and people with a high degree of hearing impairment. However, these types of adjustments are also carried out in other types of users, depending on the individual sales or delivery office tradition. The adjusting is based on a so-called "real-ear measurement", where the sound pressure inside the ear canal in front of the eardrum is measured while the patient is wearing the hearing aid.

[0004] Usually the "real-ear measurement" is carried out by the dispenser while the patient has a so-called "plug" in the ear canal. The plug is normally moulded to fit the outermost portion of the ear canal. The receiver is either provided in the plug, or placed in the hearing aid. In the latter the receiver is connected to the area in front of the eardrum by means of a tube extending through a channel in the plug.

[0005] The measurement is carried out by providing a small tube adjacent to the earplug and hereby providing an acoustic connection between the space between the plug and the eardrum and a microphone connected to the opposite end of the tube. When the receiver generates a given sound, it is possible to measure the sound pressure generated in front of the eardrum.

[0006] It is known to apply different types of strips in order to maintain e.g. an ear piece or an ear plug in the right and desired position within the ear canal.

[0007] EP 1448014 B1 discloses a behind-the-ear (BTE) hearing aid that comprises an ear piece provided with a so-called "sports lock" keeping the ear piece in place. The "sports lock" is shaped as a flexible fibre attached directly to the ear piece or via the sound tube to the ear piece. The fibre is adapted to attribute the outer ear e.g. at the lower part of the concha.

[0008] US 7720244 B2 discloses an ear piece for a hearing aid that comprises a plug connected to a housing via a tube. The earpiece comprises a contact element for resting against an inside of the user's tragus and/or the ear canal and a fixture having means for adjusting

the spacing between the plug and the contact element.

[0009] US 2007 183615 A1 discloses an ear canal device and a retaining strip. The ear canal device has a part configured to be inserted into the ear canal. The retaining strip is fastened to the ear canal device at its first end. The retaining strip is configured to be arranged to lie resiliently against the inside of the concha.

[0010] US 2009 092269 A1 discloses a hearing aid having a flexible elongated member with a first end attached to a shell and a second free end. The flexible elongated member has a shape for stabilizing the shell relative to a user's ear.

[0011] WO 2004 73349 A2 discloses a hearing aid system comprising a receiver configured to be inserted into the ear canal of a user. The hearing aid system comprises a connection portion extending between a sound processing component connection and the receiver. The system comprises a retaining wire configured to be positioned within a portion of the concha of the ear.

[0012] US 2002/0172386 relates to an otoplasty for BTE hearing aids where a sound tube coming from the BTE device can be positioned in the auditory canal. The otoplasty is individually adapted to the anatomy of the patient. Its fixing part is essentially in the form of a hook which follows the outer edge of the cavum conchae in an arch, at least in some areas. A limb which follows the edge of the cavum conchae becomes a bent transversal section above the antitragus, traversing the cavum conchae, extending in the direction of the porus acusticus externus and expanding at its end section which comes to rest in the upper area of the auditory canal, in order to receive the signal conductor.

[0013] WO 2006/026988 relates to an earpiece for a hearing aid comprising a plug for contacting the meatus of the users ear canal, a contact element for resting against an inside of the users tragus and or the ear canal, and a fixture for holding the plug and the contact element together, the fixture having means for adjusting the spacing between the plug and the contact element.

[0014] During a "real-ear measurement" it is important that the probe tube is placed and maintained at the right position. The probe tube has to be arranged so deep in the ear canal that interference from the reflected sound from the eardrum can be avoided. On the other hand the probe tube may not be placed too near to the eardrum since this can potentially damage the eardrum. When the probe tube has been placed correctly at the optimal position by the dispenser, the dispenser has to hold the probe tube fixed in this position until the ear mould or hearing aid is in place. This is a major drawback and none of the prior art systems provides a solution to this challenge.

[0015] Thus, there is a need for an improved ear strap for a probe tube, which ear strap can be used to provide and maintain a probe tube in the right position within the ear canal.

[0016] It is an object of the present invention to provide an ear strap that can be used to provide and maintain a probe tube in the right position within the ear canal.

[0017] Moreover, is an object of the present invention to provide an ear strap that can be attached to the concha of the ear and ensure that the probe tube maintains its correct position in the ear canal.

Summary of the invention

[0018] The object of the present invention can be achieved by an ear strap as defined in claim 1. Preferred embodiments are defined in the dependent sub claims and explained in the following description and illustrated in the accompanying drawings.

[0019] The ear strap according to the invention is an ear strap comprising attachment means for being attached to a tube, where the ear strap has a flexible member configured to be placed within the concha of the ear and to be held in place by the concha of the ear, where the flexible member is configured to take a form that fits the shape of the concha of the ear. The ear strap comprises means for adjusting the position of the tube relative to the attachment means.

[0020] Here it is achieved that the ear strap can be used to provide and maintain a probe tube in the right position within the ear canal when a "real-ear measurement" has to be carried out. The ear strap can be attached to the concha of the ear and hereby it can be ensured that the probe tube maintains its correct position in the ear canal.

[0021] By the term "being attached to a tube" means that the attachment means is configured to be attached to a tube in a manner in which the attachment means and the tube are maintained fixed relative to each other.

[0022] The flexible member is configured to be placed within the concha of the ear and to be held in place by the concha of the ear. This means that the flexible member can be maintained in a position in which the flexible member is fixed to the concha of the ear. Bending of the flexible member provides a tension large enough to keep the flexible member fixed to the concha of the ear. Accordingly, the flexible member both takes a form that fits the shape of the concha of the ear and provides a mechanical attachment to the concha of the ear.

[0023] It may be an advantage that the attachment means comprises an opening for receiving a tube and that the means for adjusting the position of the tube relative to the attachment means are configured to increase the size of the opening and hereby allow for attachment of the attachment means to the tube and for detachment of the attachment means from the tube.

[0024] Hereby the attachment means makes it possible to attach the attachment means to a tube and to detach the attachment means from a tube in a fast and easy manner.

[0025] It may be an advantage that the means for adjusting the position of the tube relative to the attachment means is a pull out string being attached to the attachment means, where the pull out string is configured to transfer a force applied to the pull out string to the tube

and hereby change the position of the tube relative to the attachment means.

[0026] Hereby it is achieved that the position of the tube relative to the attachment means can be changed and adjusted in an easy and secure way. This is advantageous when the ear strap is used to provide and maintain a probe tube in the right position within the ear canal when a "real-ear measurement" has to be carried out. Even when the ear strap has been attached to the concha of the ear, the position of the probe tube in the ear canal can be adjusted if desired.

[0027] It may be an advantage that the pull out string is rod shaped and configured to be handled by just one or two fingers.

[0028] It may be beneficial that the attachment means is configured to be attached to a tube in such a way that the position of the tube relative to the attachment means can be changed when a force exceeding a predefined level is applied to the pull out string and that the tube is moved without changing the position of the tube relative to the attachment means when a smaller force is applied to the pull out string. In this way it is possible to use the pull out string to move the probe tube (when a small force is applied) e.g. in order to maintain the right position of the probe tube within the ear. When a larger force is applied, the position of the tube relative to the attachment means is changed (it may require that the tube is maintained in a fixed position e.g. by a hand).

[0029] In praxis the position of the tube relative to the attachment means can be changed when the applied force exceeds the retention force that is defined by the coefficient of static friction between the contact surface of the attachment means and the tube. As long as the applied force is smaller than the retention force, the attachment means will be maintained attached to the tube in the same position of attachment.

[0030] It may be beneficial that the pull out string protrudes from the attachment means and that the pull out string is rod shaped. Hereby it becomes easier to get hold of and handle the pull out string.

[0031] It may be an advantage that a knob member is provided at the distal end of the pull out string. Hereby the use of the pull out string is eased. Moreover it becomes easier to get hold of and handle the pull out string.

[0032] The knob member may be spherical or have any other suitable geometrical shape.

[0033] It may be beneficial that that an aperture is provided in the attachment means.

[0034] Hereby the flexibility of the attachment means is increased so that attachment of a tube (e.g. a tube having a bend) is eased. The aperture may also make it easier to detach the tube from the attachment means. It may be advantageous that the attachment means comprises at least one pair of corresponding protruding locking members that are configured to maintain a tube attached to the attachment means once the tube has been attached to the attachment means.

[0035] Hereby a secure and reliable way of maintaining

a tube attached to the attachment means can be provided. The locking members are preferably configured to allow an easy detachment of the tube from the attachment means by moving the locking members away from each other. Hereby a simple mechanical locking mechanism can be provided.

[0036] It may be beneficial that the attachment means comprises a semi cylindrical section configured to receive and bear against a tube and that the attachment means comprises a number of abutting plane sections extending basically perpendicular to the longitudinal axis of the semi cylindrical section or the attachment means.

[0037] Hereby the attachment means can be attached to a tube without damaging the tube. The tube may bear against the semi cylindrical section and at the same time be protected from damage by the structure of the semi cylindrical section. The semi cylindrical section may be provided with a surface structure or a surface layer in order to achieve any desired coefficients of friction between the tube and the contact surface of the semi cylindrical section.

[0038] It may be an advantage that the opening is defined by the plane sections and the locking members. It may be beneficial that the opening has its smallest width at the region between the locking members so that the space between the locking members determines if a tube may be attached to the attachment means. It may be preferred that the locking members are configured in such a manner that the tube increases the space between the locking members the moment they pass the locking members while being inserted into the semi cylindrical section.

It may be beneficial that the attachment means comprises a body that is arranged symmetrically about the longitudinal axis of the attachment means. Hereby it is achieved that a probe tube may be attached to the attachment means regardless to the orientation of the attachment means.

[0039] It may be beneficial that the flexible member is conical so that the distal end of the flexible member has a smaller width than the proximal end of the flexible member.

[0040] Hereby the required flexibility (great flexibility of the distal end of the flexible member) and strength (great strength in the proximal end of the flexible member) of the flexible member can be provided.

[0041] It may be advantageous that the longitudinal axis of the attachment means extends basically perpendicular to the longitudinal axis of the flexible member.

[0042] It may be beneficial that the attachment means and the pull out string are arranged in such a way that the angle between the longitudinal axis of the attachment means and the longitudinal axis of the pull out string is smaller than 45 degrees, preferably smaller than 30 degrees.

[0043] It may be advantageous that the attachment means in one end is attached at the proximal end of the flexible member and that an arm member is attached to

the opposite end of the attachment means and that a pull out string is attached to the arm member. Hereby a reliable and simple ear strap can be provided.

[0044] It is preferred that the attachment means is configured to be attached to a probe tube for performing a "real-ear measurement", where the sound pressure inside the ear canal in front of the eardrum is measured while a patient is wearing a hearing aid such as a BTE hearing aid device or a receiver-in-the-ear (RITE) hearing aid device.

[0045] It may be useful to have a kit comprising an ear strap according to one of the claims and a probe tube for performing a "real-ear measurement". Such a kit may be used to carry out reliable and safe "real-ear measurement".

Description of the Drawings

[0046] The invention will become more fully understood from the detailed description given herein below. The accompanying drawings are given by way of illustration only, and thus, they are not limitative of the present invention. In the accompanying drawings:

- Fig. 1 a) shows an ear strap according to the invention attached to a probe tube that is arranged in the ear canal of a client;
- Fig. 1 b) shows the ear strap shown in Fig. 1 a) attached to maintain a probe tube extending adjacent to an earplug in a desired position in the ear canal;
- Fig. 2 shows three different perspective views of an ear strap according to the invention;
- Fig. 3 shows two different perspective close-up views of the attachment member of the ear strap illustrated in Fig. 2;
- Fig. 4 shows another close-up view of the attachment member of the ear strap illustrated in Fig. 2 and 3 and
- Fig. 5 shows another perspective close-up view of the attachment member of the ear strap illustrated in Fig. 2-4.

Detailed description of the invention

[0047] Referring now in detail to the drawings for the purpose of illustrating preferred embodiments of the present invention, different views of an ear strap 2 according to the invention is illustrated in Fig. 1.

[0048] Fig. 1a) illustrates an ear strap 2 according to the invention attached to a probe tube 4 that has been inserted into the ear canal 20 of a client. The ear 16 is seen from the side and the ear canal 20 is illustrated as an open canal for illustration purposes.

[0049] A microphone 14 is attached to the end of the probe tube 4. The ear strap 2 is attached to the probe tube 4 by means of an attachment member 6 (see Fig. 3-5 for a close-up view). The ear strap 2 comprises a

flexible strap member 3 that is attached to the concha 18. The flexible strap member 3 (also just called a flexible member 3) is configured to take a form that fits the shape of the concha 18. The ear strap 2 moreover comprises a pull out string 8 configured to be used to adjust the position of the probe tube 4 in the ear canal 20 and to pull out the probe tube 4 from the ear canal 20. A spherical knob 10 is provided at the distal end of the pull out string 8. This knob 10 makes it easier to get hold of and use the pull out string 8.

[0050] Fig. 1 b) also illustrates the ear strap 2 shown in Fig. 1 a). The ear strap 2 is attached to maintain a probe tube 4 that extends adjacent to an earplug 24 (that has been inserted into the ear canal 20) in a desired position in the ear canal 20. The probe tube 4 is connected to a hearing aid device 22. The hearing aid device 22 is a BTE hearing aid device 22 that has been attached behind the ear 16 and is connected to the earplug 24 by means of a connection tube 26.

[0051] The ear strap 2 comprises a flexible strap member 3 that extends along the outside surface of the earplug 24 and is attached to the concha 18. Due to its flexibility the flexible strap member 3 has taken a form that fits the shape of the concha 18.

[0052] The ear strap 2 is provided with a pull out string 8 that is intended to be used to adjust the position of the probe tube 4 and be used to pull out the probe tube 4 from the ear canal 20. Like in Fig. 1 a) a spherical knob 10 is provided at the distal end of the pull out string 8.

[0053] When the BTE hearing aid device 22 has to be adjusted a "real-ear measurement" can be carried out by detecting the sound pressure inside the ear canal 20 in front of the eardrum (not shown) while the patient is wearing the hearing aid device 22 like illustrated in Fig. 1 b).

[0054] The dispenser can carry out the "real-ear measurement" while the patient has the earplug 24 inserted in the ear canal 20 like shown in Fig. 1 b). The earplug 24 is moulded to fit the outermost portion of the ear canal 20.

[0055] The "real-ear measurement" is carried out by providing small probe tube 4 adjacent to the earplug 24 and hereby providing an acoustic connection between the space between the earplug 24 and the eardrum (not shown) and a microphone connected to the opposite end of the probe tube 4.

[0056] Fig. 2 a), 2 b) and 2 c) illustrates three perspective views of an ear strap 2 according to the invention. The ear strap 2 comprises an elongated strap member 3 having a distal end 38 and a proximal end 36. An attachment member 6 is provided at the proximal end 36 of the strap member 3. The attachment member 6 is configured to be attached to a probe tube (see Fig. 1 a) and Fig. 1 b)) in order to control the position of the probe tube.

[0057] The probe tube is intended to be attached to the attachment member 6 of the ear strap 2 by insertion of the probe tube through the opening 40. An aperture 28 is provided in the attachment member 6 for giving the required flexibility. Moreover the aperture 28 may be

used when the probe tube has to be detached from the attachment member 6 of the ear strap 2.

[0058] The ear strap 2 is provided with a pull out string 8 that is intended to be used to adjust the position of a probe tube 4 and to be used to pull out the probe tube 4 from the ear canal like illustrated in Fig. 1. The pull out string 8 is attached to an arm member 12 that is attached to the attachment member 6. A spherical knob 10 is provided at the distal end of the pull out string 8.

[0059] The strap member 3 is conical and is having its greatest width at the proximal end 36 of the strap member 3 and its smallest width at the distal end 38 of the strap member 3. Hereby the required flexibility and strength of the strap member 3 can be provided.

[0060] The strap member 3 extends along its longitudinal axis X and the longitudinal axis Y of the attachment member 6 extends basically perpendicular to the longitudinal axis X of the strap member 3. The pull out string 8 is formed as a thin rod having a longitudinal axis Z. The angle θ between the longitudinal axis Y of the attachment member 6 and the longitudinal axis Z of the pull out string 8 is about 20 degrees. It is possible to provide an ear strap 2 in which the pull out string 8 is arranged differently in order to achieve a smaller angle θ between the longitudinal axis Y of the attachment member 6 and the longitudinal axis Z of the pull out string 8, e.g. an angle θ of 0, 5, 10 or 15 degrees. The angle θ between the longitudinal axis Y of the attachment member 6 and the longitudinal axis Z of the pull out string 8 may also be larger than shown in Fig. 2 b), e.g. 25, 30, 35 or 40 degrees by way of example.

[0061] Fig. 3 illustrates two perspective close-up views of the attachment member 6 of the ear strap 2 illustrated in Fig. 1 and Fig. 2. It can be seen that the attachment member 6 is attached at the proximal end 36 of the strap member 3 of the ear strap 2.

[0062] The attachment member 6 has a body comprising a semi cylindrical section 32 and plane sections 34. An opening 40 extends along the longitudinal axis Y of the attachment member 6.

[0063] An arm member 12 is provided at the distal end of the attachment member 6 and a pull out string 8 having a spherical knob 10 attached to its free end is attached to the arm member 12.

[0064] An aperture 28 is provided in the central portion of the semi cylindrical section 32.

[0065] Two locking members 30 are provided at the midsection of the attachment member 6. The locking members 30 are basically wedge shaped and extend basically perpendicular to the longitudinal axis Y of the attachment member 6. The locking members 30 are configured to secure a probe tube (see Fig. 1) within the attachment member 6 when the probe tube has been attached to the attachment member 6.

[0066] Together with the semi cylindrical section 32 the inside surface of the locking members 30 constitutes a cylindrical portion configured to receive and bear against a probe tube. The attachment member 6 may be

manufactured in a plastic, silicone or rubber material allowing the locking members 30 to be moved apart from each other in order to make it possible to insert a probe tube into the cylindrical portion through the opening 40.

[0067] Fig. 4 illustrates another close-up view of the attachment member 6 of the ear strap 2 shown in Fig. 1-3. The attachment member 6 is symmetrical about both the longitudinal axis X of the strap member 3 and about the longitudinal axis Y of the attachment member 6. The arm member 12, however, is not completely symmetric about the longitudinal axis X of the strap member 3.

[0068] It can be seen that the angles α , α' , β , β' between the plane sections 34 of the attachment member 6 and the longitudinal axis Y of the attachment member 6 is about 20 degrees. The angle θ between the longitudinal axis Y of the attachment member 6 and the longitudinal axis Z of the pull out string 8 is also approximately 20 degrees.

[0069] Fig. 5 illustrates a close-up view of the attachment member 6 shown in Fig. 2-4. It can be seen that the locking members 30 are protruding from the plane sections 34 of the attachment member 6. Both the semi cylindrical sections 32 and the abutting plane sections 34 are smooth surfaces, however, it is possible to provide these surfaces with a structure in order to increase the friction between these surfaces and the probe tube (see Fig. 1) the attachment member 6 is configured to be attached to.

[0070] It can be seen that the pull out string 8 is integrated within the body of the attachment member 6. Hereby the pull out string 8 may be used to detach a probe tube from the attachment member 6 simply by forcing the pull out string 8 in a direction away from the strap member 3 of the ear strap 2.

List of reference numerals

[0071]

2	- Ear strap
3	- Strap member
4	- Probe tube
6	- Attachment member
8	- Pull out string
10	- Knob
12	- Arm member
14	- Microphone
16	- Ear
18	- Concha
20	- Ear canal
22	- Hearing aid device
24	- Plug
26	- Connection
28	- Aperture
30	- Locking member
32	- Semi cylindrical member
34	- Plane section
36	- Proximal end

38	- Distal end
40	- Opening
X	- Axis
Y	- Axis
5 Z	- Axis
α , α' , β , β' , θ	- Angle

Claims

1. An ear strap (2) for arranging a probe tube (4) within an ear canal, the ear strap (2) comprising attachment means (6, 30) for being attached to the tube (4), where the ear strap (2) has a flexible member (3) configured to be placed within the concha (18) of the ear (16) and to be held in place by the concha (18) of the ear (16), where the flexible member (3) is configured to take a form that fits the shape of the concha (18) of the ear (16), the ear strap (2) comprising means (8, 10, 12) for adjusting the position of the tube (4) relative to the attachment means (6, 30) **characterized in that** the attachment means (6, 30) comprises an opening (40) for receiving the tube (4) and that the means (8, 10, 12) for adjusting the position of the tube (4) relative to the attachment means (6, 30) are configured to increase the size of the opening (40) and hereby allow for attachment of the attachment means (6, 30) to the tube (4) and for detachment of the attachment means (6, 30) from the tube (4).
2. An ear strap (2) according to claim 1 **characterised in that** the means (8, 10, 12) for adjusting the position of the tube (4) relative to the attachment means (6, 30) is a pull out string (8) being attached to the attachment means (6, 30), where the pull out string (8) is configured to transfer a force applied to the pull out string (8) to the tube (4) and hereby change the position of the tube (4) relative to the attachment means (6, 30) when the applied force exceeds the retention force as defined by the coefficient of the static friction between the contact surface of the attachment means and the tube.
3. An ear strap (2) according to claim 2 **characterised in that** the attachment means (6, 30) is configured to be attached to a tube (4) in such a way that the position of the tube (4) relative to the attachment means (6, 30) can be changed when a force exceeding a predefined level is applied to the pull out string (8) and that the tube (4) is moved without changing the position of the tube (4) relative to the attachment means (6, 30) when a smaller force is applied to the pull out string (8).
4. An ear strap (2) according to one of the preceding claims **characterised in that** the pull out string (8) protrudes from the attachment means (6, 30) and

that the pull out string (8) is rod shaped.

5. An ear strap (2) according to one of the preceding claims **characterised in that** a knob member (10) is provided at the distal end of the pull out string (8). 5
6. An ear strap (2) according to one of the preceding claims **characterised in that** an aperture (28) is provided in the attachment means (6, 30). 10
7. An ear strap (2) according to one of the preceding claims **characterised in that** the attachment means (6) comprises at least one pair of corresponding protruding locking members (30) that are configured to maintain a tube (4) attached to the attachment means (6) once the tube (4) has been attached to the attachment means (6). 15
8. An ear strap (2) according to one of the preceding claims **characterised in that** the attachment means (6) comprises a semi cylindrical section (32) configured to receive and bear against a tube (4) and that the attachment means (6) comprises a number of abutting plane sections (34) extending basically perpendicular to the longitudinal axis (Y) of the semi cylindrical section (32) or the attachment means (6). 20
9. An ear strap (2) according to one of the preceding claims **characterised in that** the flexible member (3) is conical so that the distal end (38) of the flexible member (3) has a smaller width than the proximal end (36) of the flexible member (3). 25
10. An ear strap (2) according to one of the preceding claims **characterised in that** the attachment means (6) comprises a semi cylindrical member (32) comprising a longitudinal axis (Y) that extends basically perpendicular to the longitudinal axis (X) of the flexible member (3). 30
11. An ear strap (2) according to one of the preceding claims 3-11 **characterised in that** the attachment means (6) and the pull out string (8) are arranged in such a way that the angle between the longitudinal axis (Y) of the attachment means (6) and the longitudinal axis (Z) of the pull out string (8) is smaller than 45 degrees, preferably smaller than 30 degrees. 35
12. An ear strap (2) according to one of the preceding claims 3-12 **characterised in that** the attachment means (6) in one end is attached at the proximal end (36) of the flexible member (3) and that an arm member (12) is attached to the opposite end of the attachment means (6) and that a pull out string (8) is attached to the arm member (12). 40
13. An ear strap (2) according to one of the preceding claims **characterised in that** the attachment means 45

(6) is configured to be attached to a probe tube (4) for performing a "real-ear measurement", where the sound pressure inside the ear canal (20) in front of the eardrum is measured while a patient is wearing a hearing aid (22) such as a behind-the-ear (BTE) hearing aid device or a receiver-in-the-ear (RITE) hearing aid device.

14. A kit comprising an ear strap (2) according to one of the preceding claims and a probe tube (4) for performing a "real-ear measurement", where the sound pressure inside the ear canal (20) in front of the eardrum is measured while a patient is wearing a hearing aid (22) such as a behind-the-ear (BTE) hearing aid device or a receiver-in-the-ear (RITE) hearing aid device. 50

Patentansprüche

1. Ohrgurt (2) zum Anordnen eines Sondenrohrs (4) in einem Gehörgang, wobei der Ohrgurt (2) ein Befestigungsmittel (6, 30) aufweist, um an dem Rohr (4) befestigt zu werden, wobei der Ohrgurt (2) einen flexiblen Abschnitt (3) hat, der ausgebildet ist, in der Ohrmuschel (18) des Ohres (16) angeordnet zu sein und durch die Ohrmuschel (18) des Ohres (16) festgehalten zu sein, wobei der flexible Abschnitt (3) ausgebildet ist, eine Form anzunehmen, die zu der Form der Ohrmuschel (18) des Ohres (16) passt, wobei der Ohrgurt (2) Mittel (8, 10, 12) zum Einstellen der Position des Rohres (4) relativ zu dem Befestigungsmittel (6, 30) aufweist, **dadurch gekennzeichnet, dass** das Befestigungsmittel (6, 30) eine Öffnung (40) zum Aufnehmen des Rohres (4) aufweist, und das die Mittel (8, 10, 12) zum Einstellen der Position des Rohres (4) relativ zu dem Befestigungsmittel (6, 30) ausgebildet sind, die Größe der Öffnung (40) zu vergrößern und hierdurch ein Befestigen des Befestigungsmittels (6, 30) an dem Rohr (4) und ein Abtrennen des Befestigungsmittels (6, 30) von dem Rohr (4) zu erlauben. 45
2. Ohrgurt (2) gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Mittel (8, 10, 12) zum Einstellen der Position des Rohres (4) relativ zu dem Befestigungsmittel (6, 30) von einem Entnahmestrang (8), der an dem Befestigungsmittel (6, 30) befestigt ist, gebildet werden, wobei der Entnahmestrang (8) ausgebildet ist, eine an dem Entnahmestrang (8) anliegende Kraft auf das Rohr (4) zu übertragen und hierdurch die Position des Rohres (4) relativ zu dem Befestigungsmittel (6, 30) zu verändern, falls die anliegende Kraft eine durch den Koeffizienten der statischen Reibung, zwischen der Kontaktfläche des Befestigungsmittels und dem Rohr, vorgegebene Rückhaltekraft überschreitet. 50

3. Ohrgurt (2) gemäß Anspruch 2, **dadurch gekennzeichnet, dass** das Befestigungsmittel (6, 30) ausgebildet ist, an einem Rohr (4) derart befestigt zu sein, dass die Position des Rohres (4) relativ zu dem Befestigungsmittel (6, 30) verändert werden kann, falls eine ein vordefiniertes Niveau überschreitende Kraft an dem Entnahmestrang (8) anliegt, und dass das Rohr (4) ohne eine Veränderung der Position des Rohres (4) relativ zu dem Befestigungsmittel (6, 30) bewegt wird, falls eine kleinere Kraft an dem Entnahmestrang (8) anliegt. 5
4. Ohrgurt (2) gemäß einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** der Entnahmestrang (8) aus dem Befestigungsmittel (6, 30) herausragt und dass der Entnahmestrang (8) stabförmig ist. 10
5. Ohrgurt (2) gemäß einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** ein Knopf-Abschnitt (10) an dem distalen Ende des Entnahmestrangs (8) bereitgestellt ist. 15
6. Ohrgurt (2) gemäß einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** eine Öffnung (28) in dem Befestigungsmittel (6, 30) bereitgestellt ist. 20
7. Ohrgurt (2) gemäß einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** das Befestigungsmittel (6) mindestens ein Paar von aufeinander abgestimmten hervorstehenden Verschlussabschnitten (30) aufweist, die ausgebildet sind, ein Rohr (4) an dem Befestigungsmittel (6) befestigt zu halten, sobald das Rohr (4) an dem Befestigungsmittel (6) befestigt ist. 25
8. Ohrgurt (2) gemäß einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** das Befestigungsmittel (6) einen halbzylindrischen Abschnitt (32) aufweist, der ausgebildet ist, ein Rohr (4) aufzunehmen und zu halten, und dass das Befestigungsmittel (6) eine Anzahl von angrenzenden flachen Abschnitten (34) aufweist, die sich im Wesentlichen senkrecht zu der Längsachse (Y) des halbzylindrischen Abschnitts (32) oder des Befestigungsmittels (6) erstrecken. 30
9. Ohrgurt (2) gemäß einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** der flexible Abschnitt (3) konisch ist, so dass das distale Ende (38) des flexiblen Abschnitts (3) eine geringere Breite als das proximale Ende (36) des flexiblen Abschnitts (3) hat. 35
10. Ohrgurt (2) gemäß einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** das Befestigungsmittel (6) einen halbzylindrischen Abschnitt (32) aufweist, der eine Längsachse (Y) aufweist, die sich im 40

Wesentlichen senkrecht zu der Längsachse (X) des flexiblen Abschnitts (3) erstreckt.

11. Ohrgurt (2) gemäß einem der vorherigen Ansprüche 3 bis 11, **dadurch gekennzeichnet, dass** das Befestigungsmittel (6) und der Entnahmestrang (8) derart angeordnet sind, dass der Winkel zwischen der Längsachse (Y) des Befestigungsmittels (6) und der Längsachse (Z) des Entnahmestrangs (8) kleiner als 45 Grad, bevorzugt kleiner als 30 Grad ist. 45
12. Ohrgurt (2) gemäß einem der vorherigen Ansprüche 3 bis 12, **dadurch gekennzeichnet, dass** das Befestigungsmittel (6) an einem Ende an dem proximalen Ende (36) des flexiblen Abschnitts (3) befestigt ist, und dass ein Arm-Abschnitt (12) an dem entgegengesetzten Ende des Befestigungsmittels (6) befestigt ist, und dass ein Entnahmestrang (8) an dem Arm-Abschnitt (12) befestigt ist. 50
13. Ohrgurt (2) gemäß einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** das Befestigungsmittel (6) ausgebildet ist, an einem Sondenrohr (4) zum Ausführen einer "Echt-Ohr-Messung" befestigt zu sein, wobei der Schalldruck innerhalb des Gehörgangs (20) vor dem Trommelfell gemessen wird, während ein Patient ein Hörgerät (22) trägt, wie etwa ein Hinter-dem-Ohr (BTE) Hörgerät oder ein Hörer-im-Ohr (RITE) Hörgerät. 55
14. Ausrüstung, die einen Ohrgurt (2), gemäß einem der vorherigen Ansprüche, und ein Sondenrohr (4) zum Ausführen einer "Echt-Ohr-Messung" aufweist, wobei der Schalldruck innerhalb des Gehörgangs (20) vor dem Trommelfell gemessen wird, während ein Patient ein Hörgerät (22) trägt, wie etwa ein Hinter-dem-Ohr (BTE) Hörgerät oder ein Hörer-im-Ohr (RITE) Hörgerät. 60

Revendications

1. Attache auriculaire (2) pour agencer un tube sonde (4) à l'intérieur d'un canal auditif, l'attache auriculaire (2) comprenant un moyen d'attache (6, 30) destiné à être attaché au tube (4), dans lequel l'attache auriculaire (2) a un élément flexible (3) configuré pour être placé dans la conque (18) de l'oreille (16) et à être maintenu en place par la conque (18) de l'oreille (16), dans lequel l'élément flexible (3) est configuré pour prendre une forme qui correspond à la forme de la conque (18) de l'oreille (16), l'attache auriculaire (2) comprenant des moyens (8, 10, 12) pour ajuster la position du tube (4) par rapport au moyen d'attache (6, 30) **caractérisé en ce que** le moyen d'attache (6, 30) comprend une ouverture (40) destinée à recevoir le tube (4) et **en ce que** les moyens (8, 10, 12) pour ajuster la position du tube (4) par 65

rapport au moyen d'attache (6, 30) sont configurés pour augmenter la taille de l'ouverture (40) et ainsi permettre l'attache du moyen d'attache (6, 30) au tube (4) et le détachement du moyen d'attache (6, 30) du tube (4).

2. Attache auriculaire (2) selon la revendication 1 **caractérisé en ce que** les moyens (8, 10, 12) pour ajuster la position du tube (4) par rapport au moyen d'attache (6, 30) est un cordon de traction (8) qui est attaché au moyen d'attache (6, 30), dans lequel le cordon de traction (8) est configuré pour transférer une force appliquée au cordon de traction (8) sur le tube (4) et ainsi changer la position du tube (4) par rapport au moyen d'attache (6, 30) lorsque la force appliquée excède la force de retenue telle que définie par le coefficient de frottement statique entre la surface de contact du moyen d'attache et le tube.
3. Attache auriculaire (2) selon la revendication 2 **caractérisé en ce que** le moyen d'attache (6, 30) est configuré pour être attaché à un tube (4) de telle sorte que la position du tube (4) par rapport au moyen d'attache (6, 30) peut être changée lorsqu'une force excédant un niveau prédéterminé est appliquée au cordon de traction (8) et que le tube (4) est déplacé sans modifier la position du tube (4) par rapport au moyen d'attache (6, 30) quand une force plus petite est appliquée au cordon de traction (8).
4. Attache auriculaire (2) selon l'une quelconque des revendications précédentes **caractérisé en ce que** le cordon de traction (8) fait saillie à partir du moyen d'attache (6, 30) et **en ce que** le cordon de traction (8) est en forme de tige.
5. Attache auriculaire (2) selon l'une quelconque des revendications précédentes **caractérisé en ce qu'un** élément formant bouton (10) est prévu à l'extrémité distale du cordon de traction (8).
6. Attache auriculaire (2) selon l'une quelconque des revendications précédentes **caractérisé en ce qu'une** ouverture (28) est prévue dans le moyen d'attache (6, 30).
7. Attache auriculaire (2) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le moyen d'attache (6) comprend au moins une paire d'éléments de verrouillage (30) correspondants et faisant saillie qui sont configurés pour maintenir un tube (4) attaché au moyen d'attache (6) une fois que le tube (4) a été attaché au moyen d'attache (6).
8. Attache auriculaire (2) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le moyen d'attache (6) comprend une section semi-cylindrique (32) configurée pour recevoir et prendre

appui contre un tube (4) et **en ce que** le moyen d'attache (6) comprend un certain nombre de sections planes contiguës (34) se prolongeant essentiellement perpendiculairement à l'axe longitudinal (Y) de la section semi-cylindrique (32) ou du moyen d'attache (6).

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9. Attache auriculaire (2) selon l'une quelconque des revendications précédentes **caractérisé en ce que** l'élément flexible (3) est conique de telle sorte que l'extrémité distale (38) de l'élément flexible (3) présente une largeur inférieure à l'extrémité proximale (36) de l'élément flexible (3).

10. Attache auriculaire (2) selon l'une quelconque des revendications précédentes **caractérisé en ce que** le moyen d'attache (6) comprend un élément semi-cylindrique (32) comprenant un axe longitudinal (Y) qui se prolonge essentiellement perpendiculairement à l'axe longitudinal (X) de l'élément flexible (3).

11. Attache auriculaire (2) selon l'une des revendications 2 à 10 **caractérisé en ce que** le moyen d'attache (6) et le cordon de traction (8) sont disposés de telle sorte que l'angle entre l'axe longitudinal (Y) du moyen d'attache (6) et l'axe longitudinal (Z) du cordon de traction (8) est inférieur à 45 degrés, préférentiellement inférieur à 30 degrés.

12. Attache auriculaire (2) selon l'une des revendications 2 à 11 **caractérisé en ce que** le moyen d'attache (6) à une extrémité est attaché à l'extrémité proximale (36) de l'élément flexible (3) et **en ce qu'un** élément formant bras (12) est attaché à l'extrémité opposée du moyen d'attache (6) et **en ce qu'un** cordon de traction (8) est fixé à l'élément formant bras (12).

13. Attache auriculaire (2) selon l'une quelconque des revendications précédentes **caractérisé en ce que** le moyen d'attache (6) est configuré pour être attaché à un tube sonde (4) pour effectuer une « mesure oreille réelle », dans laquelle la pression acoustique à l'intérieur du conduit auditif (20) en face du tympan est mesurée alors que le patient porte une aide auditive (22) comme un dispositif d'aide auditive derrière l'oreille (BTE) ou un récepteur dans l'oreille (RITE) d'un dispositif d'aide auditive.

14. Kit comprenant une attache auriculaire (2) selon l'une quelconque des revendications précédentes et un tube sonde (4) pour effectuer une « mesure oreille réelle », où la pression acoustique à l'intérieur du conduit auditif (20) en face du tympan est mesurée alors que le patient porte une aide auditive (22) comme un dispositif d'aide auditive derrière l'oreille (BTE) ou un récepteur dans l'oreille (RITE) d'un dispositif d'aide auditive.

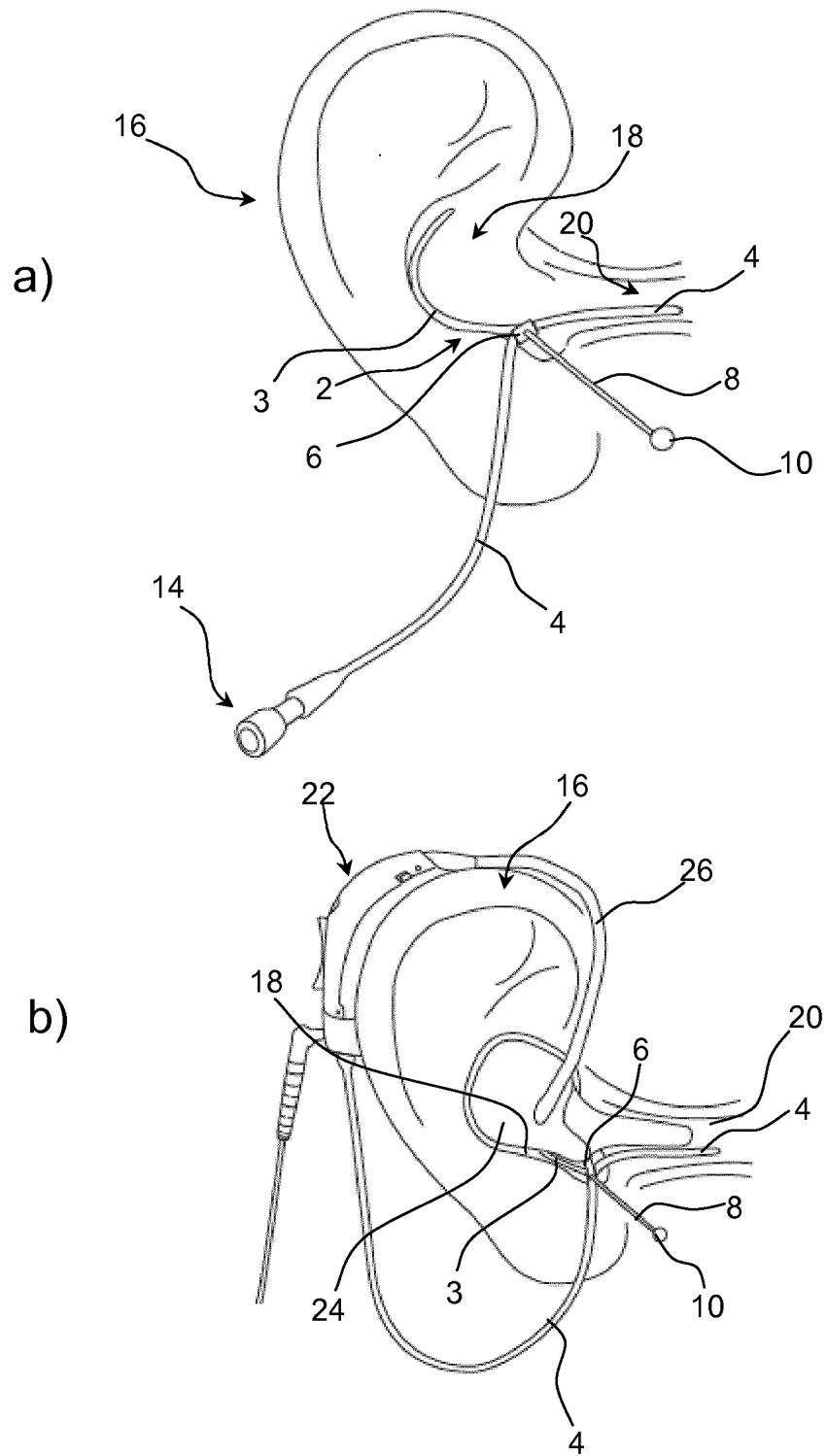
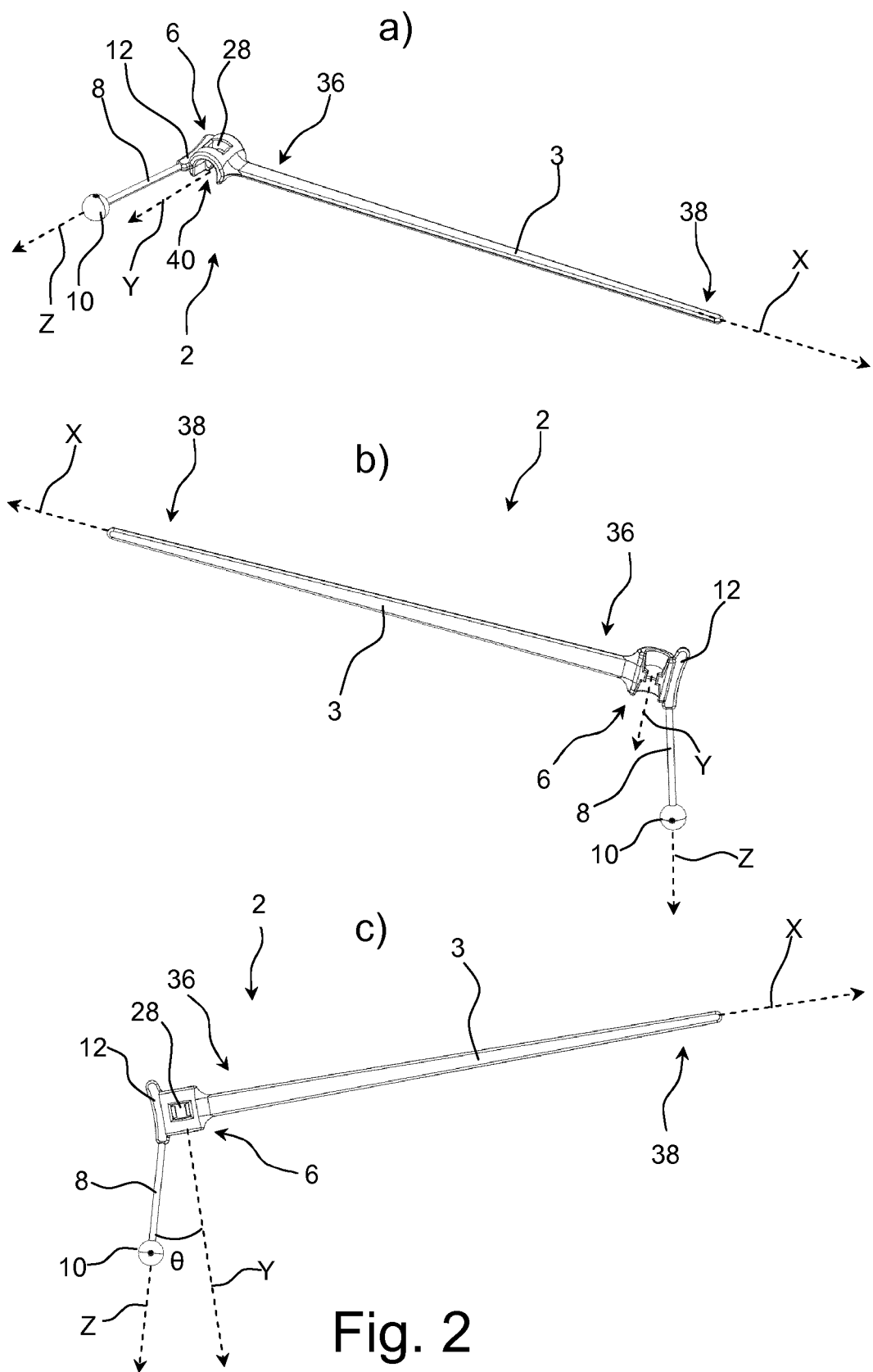
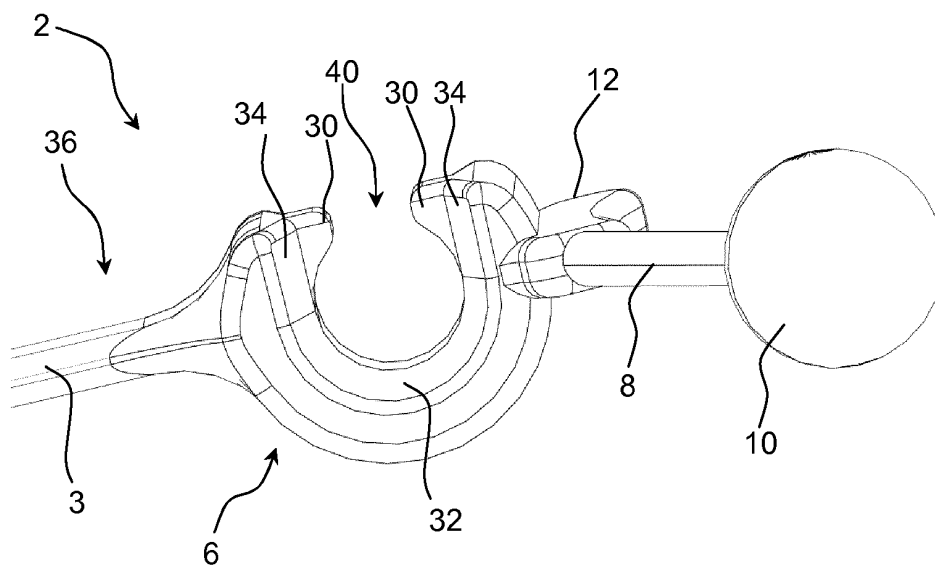
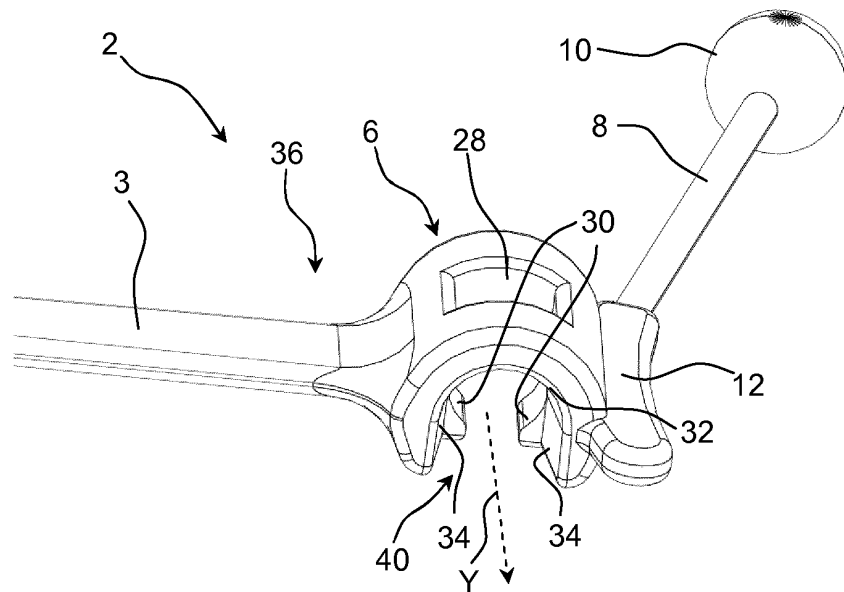


Fig. 1



a)



b)

Fig. 3

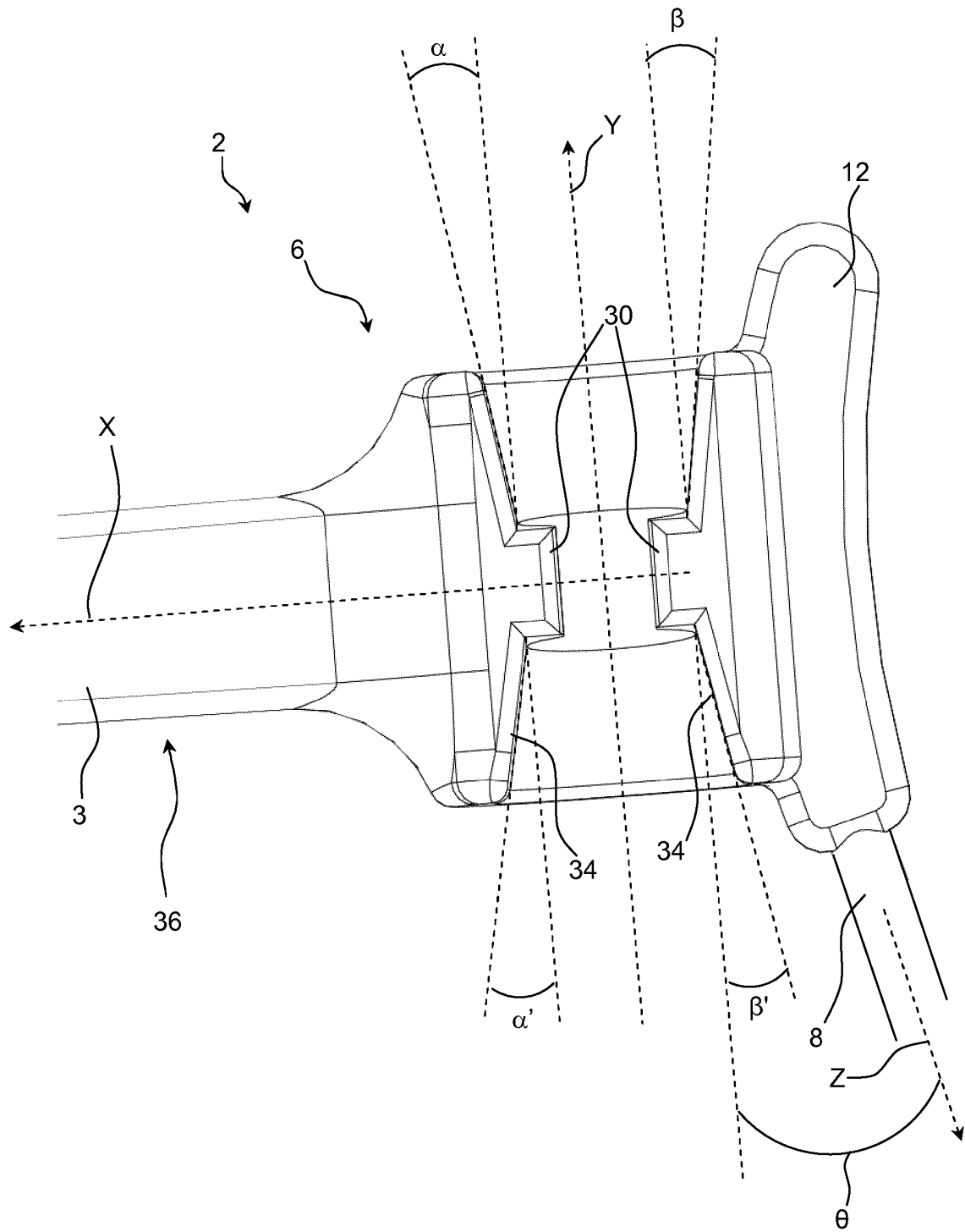


Fig. 4

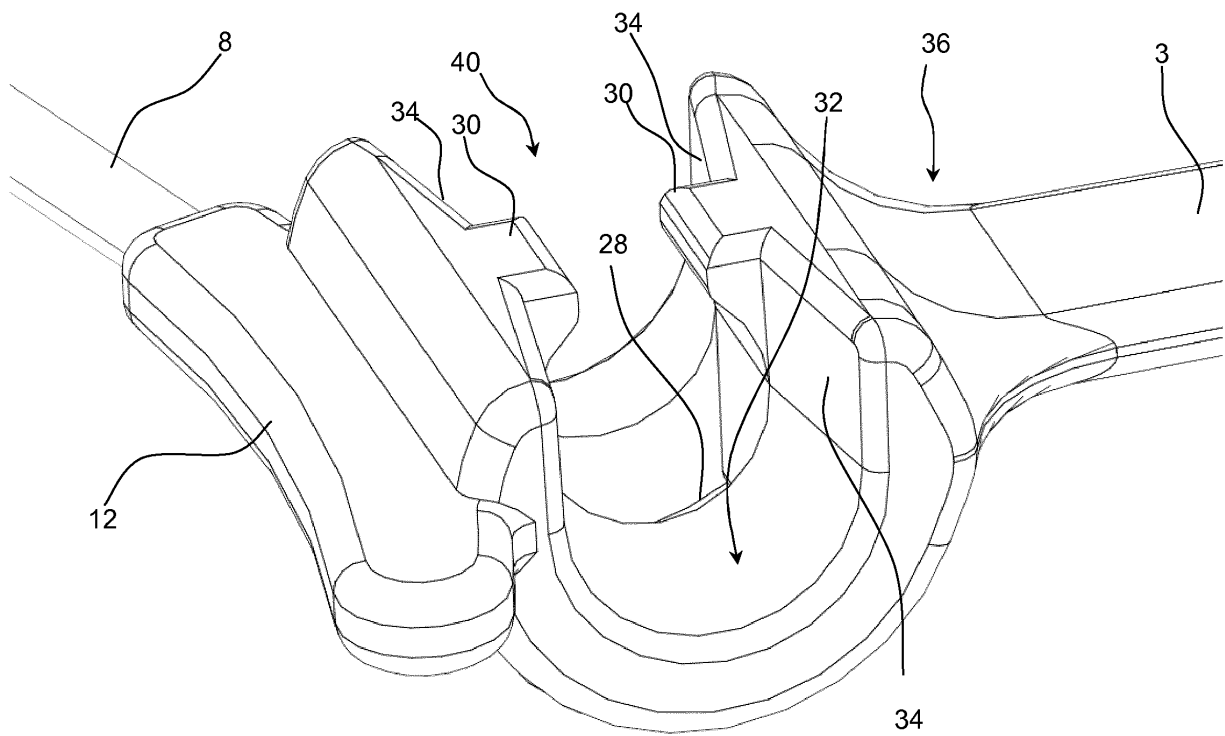


Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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专利名称(译)	用于探管的耳带		
公开(公告)号	EP2816822B1	公开(公告)日	2016-05-04
申请号	EP2013172994	申请日	2013-06-20
[标]申请(专利权)人(译)	奥迪康有限公司		
申请(专利权)人(译)	OTICON A / S		
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IPC分类号	H04R25/00 A61B5/00		
CPC分类号	A61B5/121 A61B5/6816 H04R25/652 H04R2460/17 H04R25/65		
其他公开文献	EP2816822A1		
外部链接	Espacenet		

摘要(译)

公开了一种耳带(2)。耳带(2)包括附接装置(6,30)，附接装置(6,30)构造成附接到管(4)。耳带(2)具有柔性构件(3)，该柔性构件(3)被配置成放置在耳朵(16)的耳甲(18)内并且由耳朵(16)的耳甲(18)保持就位。柔性构件(3)构造成采用适合耳朵(16)的耳甲(18)的形状的形式。耳带(2)包括用于调节管(4)相对于连接装置(6,30)的位置的装置(8,10,12)。

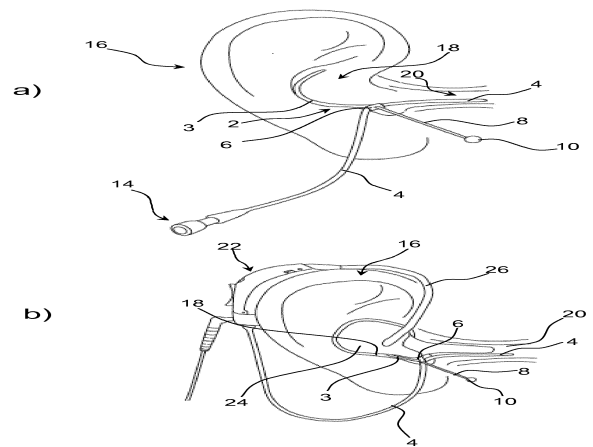


Fig. 1