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(54) **Connector system for a receiver of a hearing device**

Verbindungseinrichtung für einen Hörer eines Hörhilfegerätes

Dispositif de connection pour un écouteur pour un appareil auditif

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- **PATENT ABSTRACTS OF JAPAN vol. 2000, no. 13, 5 February 2001 (2001-02-05) & JP 2000 300599 A (MIMII DENSHI KK), 31 October 2000 (2000-10-31)**

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Description

[0001] This invention relates generally to hearing devices, hearing instruments or hearing aids and particularly to hearing devices with at least a first component to be arranged outside the ear or the ear canal respectively and a second component to be arranged in the ear or ear canal respectively, this second component comprising an output transducer to be connected to sound modules arranged within the first component.

State of the art hearing devices are commonly either behind-the-ear (BTE) hearing devices, in-the-ear (ITE) hearing devices, in-the-canal (ITC) hearing devices or completely-in-the-canal (CIC) hearing devices. BTE hearing devices comprises sound conduction tubes to transmit the amplified sound from the BTE hearing device arranged behind the ear into the user's ear canal. The other hearing devices, ITE, ITC and CIC, are already arranged at or in the ear canal and thus have only short sound conduction tubes or no tubes at all.

Although the ITC and especially CIC hearing devices are preferred by many users due to their low visibility from outside, their drawbacks of limited maximum amplification, limited battery lifetime, limited receiver quality and not suitable space within the ear canal, also BTE hearing devices are still demanded and will still be used in the future.

[0002] In order to combine the advantages of BTE hearing devices and ITE, ITC and CIC hearing devices, combined hearing devices have already been proposed, comprising essentially two separate parts. The first part comprises most of the electronic modules, such as micro processors, tuners, power source, regularly in form of replaceable or re-chargeable batteries, and microphones, and is adapted to be worn externally by the user, either behind the ear or to be clipped to the clothing of the user. This part will be called the BTE part. The second part comprises an output transducer, regularly a speaker, and a shell, which is adapted or shaped to be worn partially or completely within the ear canal. This part will be called ITC or CIC part respectively. Those two parts are usually connected to each other by permanently wired connections.

In the field of hearing aids, the electric-to-acoustic transducer, regularly a speaker, is called receiver, as it will be done further on in this description.

Conventionally, the receiver is completely incorporated within the shell of said second ITC or CIC part and firmly connected to the electrical connectors. In case of failure or defect of the receiver, the whole ITC or CIC part has to be replaced, e.g. the shell and regularly also the connectors together with the defective receiver.

If the shell of this second part is custom shaped, a replacement of the receiver is therefore always coupled with a new manufacturing of a new custom shaped shell. That is a time consuming and costly process that may often only be performed by specialized fitting laboratories or the manufacturer of the hearing device. Time consuming means that the user will have to wait several days or even weeks until receiving a replacement part.

A modular connector system for auditory devices of the type of combined BTE/CIC is known from WO2004/025990. The BTE-component of this earpiece auditory device is connected via a connector to the CIC-component comprising the receiver.

The connector consists of a hollow tube with electric wires within this tube. The connector is either hard wire coupled or detachably coupled to the receiver and thus to the CIC-component. The receiver is coupled to the shell of the CIC-component either by mean of a fastener or directly plugged into an opening of the shell. The shell may include an ear mold to be inserted into the ear canal of the user.

The fastener is either fixed to the shell by resilient snap-in tongues or by means of screws. The use of the resilient snap-in tongues allows an easy assembling of the fastener, but is only suitable if the shell of the CIC-component includes a soft ear mold, that may be squeezed to loosen the tongues for a non-destructive disassembling of the fastener and therefore of the connector. Such a fastening means is not suitable in case of rigid shells, as the fasteners may not be disassembled without breaking at least a part of the shell or the fastening means. In any case, this can only be done by specialists skilled in the art.

The use of detachable connecting means such as screws on the other hand requires a well-skilled and time-consuming assembling technique and further disturbs the regularly smooth shape of the outer surface of the housing of the CIC-component. Furthermore, the screws require a certain amount of space in its axial direction which is opponent to the requirement of miniaturization and reduces the freedom of design of the shape of the housing of the CIC-component. Thus, only a limited miniaturization is possible, as well as not all possible ear canal geometries may be covered by such a construction.

All those connecting means further suffer from being prone to contamination with wear debris, dust or humidity. Especially an electrical plug-in connection will thus decrease in its transmitting quality, if it is not securely sealed against such contamination.

[0003] It is an object of the present invention to provide an improved detachable connection between the two components of such a hearing device as defined in claim 1. By providing a detachable fastener at each end of the tube acting as connecting means between the first and second component of the hearing device, the connecting means may be easily detached from both the first and second component of the hearing device. As the first fastener, to be connected to the second component, contains the receiver, this receiver may be replaced without the need of replacing either the whole hearing device or at least the second component of the hearing device as well as the receiver itself.

In a further embodiment, the housing or compartment of said first fastener contains at least the part of said receiver comprising the electric connectors of said receiver.

Thus, the receiver is inserted into a compartment of the first fastener with its part containing the electrical connectors. Therefore, this part is fully covered and thus not prone to any external contamination. The electrical connectors may be electrically conducting surfaces apt to be soldered with electric wires or plugs or sockets.

In a further embodiment, said tube is a hollow tube with at least one end-to-end opened canal arranged within said tube. This canal may be used to guide the electric wires for the receiver or for the transmission of sound from an external source to the second component of the hearing aid. It is clear, that not only one canal may be arranged within said canal, but two or more canals may be arranged within said canal.

In a further embodiment, a solid wire is provided within said tube, said solid wire being firmly attached to both fasteners. Such a solid wire may act as a pull-out safety device preventing the tube from being bunked away from its fastener.

In a further embodiment, said tube is attached laterally parallel or under an acute angle with respect to the longitudinal axis of said receiver to a side of said first fastener. This reduces the axial force conferred to the connection of the tube to the fastener by pulling on the tube. Furthermore, the course of the tube protruding from the second component may be configured in any desired manner.

In a further embodiment, the end of said tube is arranged within a bore or opening provided within said housing of said first fastener. The end of the tube may thus be hold in a separate cavity of the first fastener, thereby reducing the risk of conferring any force from the tube directly to the receiver or to the connecting electrical wires.

In a further embodiment, said bore or opening is a dead-end with only one entry opening or is end-to-end opened. An advantage of an end-to-end opening is that an end-to-end open connection between the inside of the second component through the tube to the first component may be realized. This may be useful for the purpose of acoustical transmission or for ventilation purposes.

[0004] In a further embodiment, an elastic gasket is provided to seal the gap between a receiving opening of said first fastener and said receiver in the inserted position of receiver within first fastener. This elastic gasket may act as fastening mean for the receiver and/or as a sealing mean of the receiving cavity of said first fastener.

In a further embodiment, the length of said first fastener is about half the length of said receiver or less. That means that only half of the length of the receiver or even less is inserted into the receiving cavity of said first fastener. Thus, the overall length of said first fastener is relatively short and a high degree of miniaturization is therefore achieved.

In an alternative embodiment, said second component is an ITE-device having a faceplate and a shell connected to said faceplate.

In a further embodiment, an opening is provided in said faceplate for entering said first fastener into said shell of said ITE-device. The shape of this opening corresponds to the cross section of the fastener.

In a further embodiment, a cavity is provided at said faceplate arranged at the inside of said shell, either made as a part of said faceplate or as a separate part attached to said faceplate. The opening of the faceplate thus leads directly into said cavity. The cavity may be made by directly forming the inside of the faceplate respectively. Preferably, the shape of the cavity corresponds to the outer shape of the completed combination of the first fastener with inserted and connected receiver. Thus, the fully inserted first fastener and receiver will be firmly embedded by the walls of said cavity. Alternatively, it is possible to build said cavity by providing a separate shell, for instance made out of another material than the faceplate. Preferably, the material of the housing of said cavity is a soft and adaptable plastic material to elastically embedding said first fastener and receiver in its inserted state. This cavity has at its bottom end an opening or an open canal, acting as sound transmitting canal from the front end of the receiver to the inside of the ear opposite to the eardrum.

In a further embodiment, said first fastener comprises a multipart housing, comprising at least two half-shells attached to each other. The first fastener may be composed out of two half-shells that may be attached to each other to form the final housing of the first fastener.

In a further embodiment, said second component further comprises a detachable locking element for locking said first fastener in said second component. To prevent the first fastener to be pulled out of said second component, a fastener is provided to securely lock said first fastener within said second component. As this locking element is able to be detached, the first fastener may at any time be detached or replaced from said second component.

In a further embodiment, said locking element is a thin locking plate, to be arranged transversally to the insertion direction of the first fastener into said second component. A great advantage of having such a locking element is the fact, that due to its small thickness, the additional space needed in the insertion direction is only marginal and does practically not affect the overall length of said first fastener with receiver.

In a further embodiment, the locking plate has a rhombic shape, for instance with rounded edges at least at the smaller diameter of said plate, and has a rectangular opening arranged in its center. The opening may also be triangular, square, hexagonal or of any other shape suitable for turning said locking plate with a correspondingly shaped tool.

A first advantage of this shape of the locking plate is its easy but defined insertion position into the opening for the first fastener in the second component. As this opening will regularly have a rectangular shape, the locking plate may only be inserted in its unlocking alignment. The rounded edges will then allow a smooth turning of the locking element about around 45° in its locking position. The turning of the locking element may be performed by

inserting the end of a screw driver into said rectangular slot. Thus, the locking and unlocking of the locking element may be quick and easily done without the need of having skilled knowledge.

[0005] In an alternative embodiment, the locking element is a pin, with truncated conically shaped ends. It has been found that the use of a pin, preferably with a small diameter, is as well usable for locking the first fastener within the second component of the hearing device. Furthermore, the pin in its locking position, lying crosswise within the opening of the second component, may be used as holding bar for any device or element to be attached to this bar. Thus, an element with ears formed by two resiliently arranged grippers, may be detachably clamped to the bar by sliding the ears over the bar.

In a further embodiment, a recess is provided at the back end of said first fastener to receive said locking element, having a shape that allows the locking element to be turned or swiveled around an axis perpendicular in relation to the surface of the back end of said first fastener. The locking element thus will on one hand be defined as it is positioned at the back end of said first fastener and on the other hand be defined during its rotation from the unlocked into the locked position.

In a further embodiment, a recess is arranged at a part of an inner wall arranged opposite to said locking element to receive end parts of the locking element in its locking position. The recess or recesses will receive the respective ends of the locking element, when the locking element is turned into its locking position. Therefore, the recesses are arranged at the inner wall within the turning plane of the locking element. Preferably, the width of those recesses is slightly lower than the thickness of the end parts of the locking element to be inserted into those recesses. The locking element will thereby be resiliently jammed in its locking position. A unintentional loosening of the locking element will thus be prevented.

In a further embodiment, the hearing device further comprises a covering plate covering the back end of said first fastener in its inserted state within said second component. The covering plate will close the opening provided for the first fastener and thereby providing a smooth and regular outer surface of the second component of the hearing device. This covering plate further prevents the inside of said opening of being contaminated by wear and dust.

In a further embodiment, said hearing device has tongues arranged at the inner side of the covering plate to resiliently be plugged into respective receiving bores arranged at the back end of said first fastener. To hold the covering plate in its covering position, the tongues are plugged into the bores by pressing onto the outside surface of the covering plate.

[0006] For purpose of facilitating and understanding the invention, some exemplary embodiments thereof are illustrated in the accompanying drawings to be considered in connection with the following description. Thus the invention may be readily understood and appreciated, but not limited to these embodiments.

Fig. 1 is a view of an embodiment of an assembled hearing device according to the present invention;

Fig. 2 is an exploded isometric view of the hearing device of figure 1;

Fig. 3 is a front view onto the right-side of a fastener with inserted receiver of the embodiment of figure 1;

Fig. 4 is another front view onto the left-side of the fastener of figure 3;

Fig. 5 is a front view onto a fastener to be connected to the BTE-part of figure 1;

Fig. 6 is a partial exploded isometric view onto another embodiment of an ITE-part of a hearing device according to the present invention;

Fig. 7 is an exploded isometric view onto a further embodiment of an ITE-part of a hearing device according to the present invention;

Fig. 8 is a partial view onto the backside of one embodiment of the ITE-part of a hearing device according to the present invention with a locking plate in its open position;

Fig. 9 is the same view as in figure 8 with the locking plate in its locked position;

Fig. 10 is a partial view onto the backside of another embodiment of the ITE-part of a hearing device according to the present invention with a locking pin in its open position;

Fig. 11 is the same view as in figure 10 with the locking pin in its locked position.

[0007] Referring to figure 1, a first embodiment of a hearing device according to the present invention is shown in its assembled state. The hearing device comprises a BTE-device 10 (behind-the-ear) as a first component, an ITE-device 20 (in-the-ear) as a second component and a tube 30 as connecting means between the BTE-device and the ITE-device.

The BTE-device 10 has a housing 11 adapted to be worn behind the ear by the user and containing common electronic modules, such as a sound processing circuitry, microphone and battery.

The ITE-device 20 has a housing 21 adapted to be inserted into the outer part of the ear canal. The shape of housing 21 in this example is individually shaped to fit exactly into the ear shell and/or ear canal of an individual person. This is done by applying an individual fitting process by a specialized fitter. A faceplate 22 is arranged at

the back end of housing 21, to receive the active components of ITE-device 20 and as well tube 30.

Figure 2 depicts an exploded isometric view of the hearing device of figure 1. Tube 30 has a first fastener 31 arranged at its left end and a second fastener 32 arranged at its right end. The second fastener 32 is adapted in its shape and functionality to be plugged onto the upper front 11' of housing 11 of BTE-device 10. The second fastener 32 will be secured to the housing 11 by a pin 33 which may be inserted through bores arranged transversally to the connecting direction in both the second fastener 32 and the connecting part 12 of housing 11.

The first fastener 31 is put over the back end of a receiver 23 of the ITE-device 20. The first fastener 31 together with the receiver 23 may be inserted into the inside of housing 21 of the ITE-device 20 through an opening 24 arranged in faceplate 22. A locking plate 5 is further provided to firmly hold first fastener 31 in its inserted position within ITE-device 20 or faceplate 22 respectively. The function of locking plate 5 will be more precisely described later in this description.

To cover and seal opening 24 of faceplate 22, a covering plate 25 is provided to be inserted over opening 24, having an aperture 26 for the lead through tube 30.

The configuration of the first fastener 31 is more precisely depicted in the views of figures 3 and 4. The first fastener 31 has for example a box-shaped housing with a front-opening 34 to receive receiver 23. Receiver 23 has for example a rectangular cuboid shape and may thus be pushed easily into said front-opening 34 of the first fastener 31. The depth of front-opening 34 is preferably equal or less than half of the length of receiver 23.

The edge of front-opening 34 may be equipped with an elastic gasket 35. This gasket 35 may on one side seal the gap between the surfaces of receiver 23 and first fastener 31 and on the other hand elastically clamp receiver 23 in its inserted state within fastener 31.

A bulge 36 is provided at the upper sidewall of the housing of first fastener 31 with a bore or opening 37 to receive the respective end 30' of tube 30.

By arranging this bore or opening 37 parallel to the longitudinal axis of opening 34 or receiver 23 respectively, the end 30' of tube 30 lies as well parallel to this longitudinal axis. This bore or opening 37 may be a dead-hole, only opened from the back side of first fastener 31, or opened on both sides.

For a communicative connection between the BTE-device 10 and the ITE-device 20, two electric wires 38 are arranged within tube 30 for establishing an electrical connection between receiver 23 and electronic components of the BTE-device 10. The ends of the electric wires 38 are bent around the end 30' of tube 30 and led to the interior back side of first fastener 31 to electric contacts arranged at the backside of receiver 23. The electric wires 38 may be soldered to those electric contacts or electrically connected in any other known manner.

The position of the end 30' of tube 30 may be secured by pressing, gluing or any other suitable connecting means within the bore or opening 37 of the housing of the first fastener 31. The end of an additional, solid wire 39, acting as a pull-out safety device, is additionally secured to the housing of first fastener 31, preferably within or close to the bore or opening 37.

This solid wire 39 runs for example together with the wires 38 within tube 30 from the first fastener 31 to the second fastener 32. Both types of wire 38 and 39 are preferably arranged within the hollow space of tube 30, but may be as well arranged within the wall of tube 30. Tube 30 may have a single open canal or multiple open canals arranged.

The other end 39" of solid wire 39 is firmly attached to the housing of second fastener 32, to provide a reliable pull-out safety device for the whole tube 30, as shown in figure 5. For this purpose, the end 39" may be bent in form of a circle and be molded directly into the housing of second fastener 32.

An electric plug 40 is provided for the electric connection of the electric wires 38 (not shown in Figure 5) with the electronic components of BTE-device 10. This plug 40 is plugged into a front bore arranged at the connecting side of second fastener 32.

Figure 6 depicts the view of a non assembled state of another embodiment of a first fastener 31 and ITE-device 20 according to the present invention. The ITE-device 20 comprises a faceplate 22 and a custom shaped housing 21 attached to faceplate 22. A (non-visible) opening 24 of faceplate 22 leads into a cavity 27 that protrudes into the inside of housing 21. Cavity 27 is designed to receive the first fastener 31 together with receiver 23 and has at its lower end a short tube 28 leading to a respective opening in the housing 21 to form an acoustic channel from receiver 23 into the user's ear canal.

The first fastener 31 may be inserted into said cavity 27 and the opening 24 of faceplate 22 will be closed by a covering plate 25, thereby holding and fixing fastener 31 and receiver 23 in its positions within faceplate 22. A pin 29 may be inserted through a bore 29' into faceplate 22 to fix covering plate 25 in its closed position in opening 24. Laterally protruding eyes 25' are provided at covering plate 25 for receiving said pin 29. A solid and stable detachable connection of the first fastener 31 to the faceplate 22 may thus be realized, wherein the fastening or locking means 29 is practically not visible from outside of the ITE-device 20.

As an alternative to the solution shown in figures 2 to 4, the end 30' of tube 30 is not arranged parallel to the longitudinal axis of the first fastener 31, but enters the first fastener 31 under an acute angle.

In figure 7, the view of a further embodiment of a first fastener 31 and ITE-device 20 according to the present invention is shown. Alternatively to figure 6, cavity 27 is made as a hollow part separate from faceplate 22 and not as a one piece part. This part may for example be made out of plastic, for instance as a rigid or elastic mold. Furthermore, the fixing of the first fastener 31 is realized by using a thin locking plate 5 that may be rotated within

opening 24 of faceplate 22 to interlock into recesses arranged at the sidewalls in the region of the border area of opening 24. Covering plate 25 will thus only be used to cover opening 24 and locking plate 5 and provides a smooth and continuous shape of the outside surface of the first fastener 31 at the place of the entry of tube 30.
As already described, a gasket 35 may be provided to seal the gap between receiver 23 and first fastener 31.
As can be seen out of Figure 7, the length of first fastener 31 is about half of the length of receiver 23. By way of arranging the end 30' of tube 30 parallel to the longitudinal axis of first fastener 31 on one side of the housing of first fastener 31, a considerable amount of space may be saved compared to common solutions of straight entering the end 30' of the connecting tube 30 at the back end of receiver 23.
It will also be clear for the men skilled in the art that a defect receiver 23 may easily be removed and replaced by disassembling the few parts, without the need of replacing at the same time the shell of ITE-device 20. Thus, a considerable amount of time may be saved if such a replacement has to be performed.
Figure 8 depicts the front view into the opening 24 of faceplate 22 of an ITE-device 20 with the first fastener 31 already inserted. The back end of the first fastener 31 is positioned slightly below the outside edging of opening 24, with tube 30 protruding to the outside of faceplate 22. Locking plate 5 is applied into a recess 31' provided at the back end of first fastener 31.
The locking plate 5 has a rhombic shape with rounded edges 6 at least at the smaller diameter and has a rectangular opening 7 arranged in its center. Locking plate 5 may now be turned for example by using a screw-driver inserted into the rectangular opening 7 about 45°, thereby shifting its smaller edges 8 into grooves or recesses 24' arranged within the upper part of the sidewall of opening 24. The first fastener 31 is now detachably hold and fixed by locking plate 5 in its inserted state within faceplate 22, as shown in figure 9.
The recess 31' has a shape provided to guide locking plate 5 during the turning of locking plate 5 from the open to the locked position by guiding the rounded edges 6. Thus, no vertical guide or pin is necessary for holding locking plate 5 in its working position. Thus, the locking mechanism only needs space in its insertion direction in the amount of the thickness of locking plate 5.
Covering plate 25 may now be inserted above locking plate 5 to close opening 24 of faceplate 22. A rectangular shaped nose may be provided at the inner side of covering plate 25, adapted to be clamped into said rectangular opening 7 of locking plate 5. By using this configuration, neither the backside of first fastener 31 nor locking plate 5 is visible from the outside of ITE-device 20.
Furthermore, the use of a flat locking plate 5 reduces the amount of space needed for attaching the first fastener 31 within the ITE-device 20 particularly with respect to the longitudinal dimension of ITE-device 20. It is thus possible to provide an ITE-device 20 with minimal longitudinal dimension that may fit even for extremely convoluted shaped ear canals. It is clear that any other suitable attaching means may be provided at covering plate 25 to attach covering plate 25 with faceplate 22.
Another embodiment of a locking device for locking the first fastener 31 within ITE-device 20 is shown in figures 10 and 11. A locking pin 9 is used instead of a flat locking plate 5. This locking pin 9 has a generally cylindrical shape with truncated conical shaped ends 9'. It may be inserted in a crosswise position in relation to opening 24 into a circular shaped recess 31' arranged at the backside of first fastener 31. By twisting locking pin 9 for instance clockwise around the longitudinal axis of ITE-device 20, its ends 9' may engage into accordingly arranged grooves or recesses 24' arranged within the sidewall of opening 24. The first fastener 31 will thus be locked in its inserted position within ITE-device 20 and the opening 24 may be covered again by a covering plate 25 as already described.

[0008] It will be clear to one skilled in the art that other applications may be substituted for those set forth herein without departing from the scope of the present invention.

Claims

1. A hearing device comprising:

a first component (10) with a housing (11) comprising at least one electronic module, said housing being adapted to be carried outside of or at the human body;
a second component (20) to be inserted either partially or fully into an ear canal of a human body, said second component (20) comprising a shell (21);
a connecting means connecting both mechanically and electrically said first (10) and said second (20) component, comprising a tube (30) with electric wire (38) arranged within the tube (30) and two fasteners (31,32) being arranged at each end of said tube (30);
said first fastener (31), being adapted to detachably connect said second component (20) with said connecting means, comprising a receiving housing or compartment, adapted to contain at least a part of a receiver (23) to be placed within said second component (20);
wherein an elastic rim (35) is provided to seal the gap between a receiving opening (34) of said first fastener (31) and said receiver (23) in the inserted position of receiver (23) within first fastener (31).

2. Hearing device according to claim 1 wherein the housing or compartment of said first fastener (31) contains at least the part of said receiver (23) comprising the electric connectors of said receiver (23).

3. Hearing device according to claim 1 or 2 wherein said tube (30) is a hollow tube with at least one end-to-end opened canal arranged within said tube (30).

4. Hearing device according to one of claims 1 to 3 wherein a solid wire (30) is provided within said tube (30), said solid wire (39) being firmly attached to both fasteners (31,32).

5. Hearing device according to one of claims 1 to 4 wherein said tube (30) is attached laterally parallel or under an acute angle with respect to the longitudinal axis of said receiver (23) to a side of said first fastener (31).

6. Hearing device according to claim 5 wherein the end (30') of said tube (30) is arranged within a bore or opening (37) provided within said housing of said first fastener (31).

7. Hearing device according to claim 6 wherein said bore or opening (37) is a dead-end with only one entry opening or is end-to-end opened.

8. Hearing device according to one of claims 1 to 7 wherein the length of said first fastener (31) is about half the length of said receiver (23) or less.

9. Hearing device according to one of claims 1 to 8 wherein said second component (20) is an ITE-device having a faceplate (22) and a shell (21) connected to said faceplate (22).

10. Hearing device according to claim 9 wherein an opening (24) is provided in said faceplate (22) for entering said first fastener (31) into said shell (21) of said ITE-device.

11. Hearing device according to claim 9 or 10 wherein a cavity (27) is provided at said faceplate (22) arranged at the inside of said shell (21), either made as a part of said faceplate (22) or as a separate part attached to said faceplate (22).

12. Hearing device according to one of claims 1 to 11 wherein said first fastener (31) comprises a multipart housing, comprising at least two half-shells attached to each other.

13. Hearing device according to one of claims 1 to 12 wherein said second component (20) further comprises a detachable locking element (5;9) for locking said first fastener (31) in said second component (20).

14. Hearing device according to claim 13 wherein the locking element is a thin locking plate (5), to be arranged transversally to the insertion direction of the first fastener (31) into said second component (20).

15. Hearing device according to claim 14 wherein said locking plate (5) has a rhombic shape, preferably with rounded edges (6) at least at the smaller diameter of said plate (5), and has an opening (7) arranged in its center.

16. Hearing device according to claim 13 wherein the locking element is a pin (9), with truncated conical shaped ends (9').

17. Hearing device according to one of claims 13 to 16 wherein a recess (31') is provided at the back end of said first fastener (31) to receive said locking element (5;9), having a shape that allows the locking element (5;9) to be turned or swiveled around an axis perpendicular in relation to the surface of the back end of said first fastener (31).

18. Hearing device according to one of claims 13 to 17 wherein at least one recess (24') is arranged at a part of an inner wall (24) arranged opposite to said locking element (5;9) to receive end parts of the locking element in its locking position.

19. Hearing device according to one of claims 1 to 18 further comprising a covering plate (25) covering the back end of said first fastener (31) in its inserted state within said second component (20).

20. Hearing device according to claim 19 with tongues arranged at the inner side of covering plate (25) to resiliently be plugged into respective receiving bores arranged at the back end of said first fastener (31).

Patentansprüche

1. Ein Hörgerät umfassend:

eine erste Komponente (10) mit einem Gehäuse (11) umfassend mindestens eine elektronische Baugruppe, wobei das Gehäuse dazu ausgelegt ist, ausserhalb oder am menschlichen Körper getragen zu werden;
eine zweite Komponente (20), welche entweder ganz oder teilweise in einen Ohrkanal eines menschlichen Körpers eingeführt werden kann, wobei die zweite Komponente (20) ein Schale (21) umfasst;
ein Verbindungsmittel, welches die erste (10) und die zweite (20) Komponente mechanisch und elektrisch verbindet, umfassend einen Schlauch (30) mit elektrischem Draht (38), welcher innerhalb des Schlauchs (30) angeordnet ist, und zwei Befestigungselemente (31, 32), welche an jedem Ende des Schlauchs (30) an-

geordnet sind;
wobei das erste Befestigungselement (31) ausgelegt ist, um lösbar mit der zweiten Komponente (20) verbindbar zu sein mittels des Verbindungsmittels, umfassend ein Aufnahmegehäuse oder Abteil, welches ausgelegt ist, um mindestens einen Teil eines Hörers (23) zu enthalten, welcher vorgesehen ist, um innerhalb der zweiten Komponente (20) angeordnet zu sein;
wobei ein elastischer Rand (35) vorgesehen ist, um den Spalt zwischen einer Aufnahmeöffnung (34) des ersten Befestigungselements (31) und dem Hörer (23) in der eingeführten Position des Hörers (23) innerhalb des ersten Befestigungselements (31) abzudichten.

2. Hörgerät nach Anspruch 1, wobei das Gehäuse oder das Abteil des ersten Befestigungselements (31) mindestens den Teil des Hörers (23) enthält, welcher die elektrischen Anschlüsse des Hörers (23) umfasst.

3. Hörgerät nach Anspruch 1 oder 2, wobei der Schlauch (30) ein hohler Schlauch ist mit mindestens einem von einem Ende zum anderen Ende verlaufenden offenen Kanal, welcher innerhalb des Schlauchs (30) angeordnet ist.

4. Hörgerät nach einem der Ansprüche 1 bis 3, wobei ein fester Draht (39) innerhalb des Schlauchs (30) vorgesehen ist, wobei der feste Draht (39) mit beiden Befestigungselementen (31, 32) fest verbunden ist.

5. Hörgerät nach einem der Ansprüche 1 bis 4, wobei der Schlauch (30) seitlich parallel oder unter einem spitzen Winkel bezüglich der Längsachse des Hörers (23) an einer Seite des ersten Befestigungselements (31) befestigt ist.

6. Hörgerät nach Anspruch 5, wobei das Ende (30') des Schlauchs (30) in einer Bohrung oder Öffnung (37) innerhalb des Gehäuses des ersten Befestigungselements (31) angeordnet ist.

7. Hörgerät nach Anspruch 6, wobei die Bohrung oder Öffnung (37) eine Sackgasse mit nur einer Eintrittsöffnung oder von einem Ende zum anderen Ende offen ist.

8. Hörgerät nach einem der Ansprüche 1 bis 7, wobei die Länge des ersten Befestigungselements (31) ungefähr die Hälfte der Länge des Hörers (23) oder weniger ist.

9. Hörgerät nach einem der Ansprüche 1 bis 8, wobei die zweite Komponente (20) ein IdO-Gerät ist mit einer Frontplatte (22) und einer Schale (21), welche mit der Frontplatte (22) verbunden ist.

10. Hörgerät nach Anspruch 9, wobei eine Öffnung (24) in der Frontplatte (22) zum Einführen des ersten Befestigungselements (31) in die Schale (21) des IdO-Geräts vorgesehen ist.

11. Hörgerät nach Anspruch 9 oder 10, wobei ein Hohlraum (27) an der Frontplatte (22) vorgesehen ist, welcher an der Innenseite der Schale (21) angeordneten ist, entweder als Teil der Frontplatte (22) oder als separates Teil, welches an der Frontplatte (22) befestigt ist.

12. Hörgerät nach einem der Ansprüche 1 bis 11, wobei das erste Befestigungselement (31) ein mehrteiliges Gehäuse umfasst, umfassend mindestens zwei Halbschalen, welche miteinander verbunden sind.

13. Hörgerät nach einem der Ansprüche 1 bis 12, wobei die zweite Komponente (20) ferner ein lösbares Verriegelungselement (5; 9) zum Verriegeln des ersten Befestigungselements (31) in der zweiten Komponente (20) umfasst.

14. Hörgerät nach Anspruch 13, wobei das Verriegelungselement eine dünne Verriegelungsplatte (5) ist, welche vorgesehen ist quer zur Einschubrichtung des ersten Befestigungselements (31) in die zweite Komponente (20) angeordnet zu sein.

15. Hörgerät nach Anspruch 14, wobei die Verriegelungsplatte (5) eine rhombische Form vorzugsweise mit abgerundeten Kanten (6) mindestens an dem kleineren Durchmesser der Platte (5) und eine Öffnung (7) aufweist, welche in ihrem Zentrum angeordnet ist.

16. Hörgerät nach Anspruch 15, wobei das Verriegelungselement ein Stift (9) mit stumpfkegelförmigen Enden (9') ist.

17. Hörgerät nach einem der Ansprüche 13 bis 16, wobei eine Vertiefung (31') am hinteren Ende des ersten Befestigungselements (31) zur Aufnahme des Verriegelungselements (5; 9) vorgesehen ist mit einer Form, welche es erlaubt, das Verriegelungselement (5; 9) um eine senkrechte Achse in Bezug auf die Oberfläche des hinteren Endes des ersten Befestigungselements (31) zu drehen oder zu schwenken.

18. Hörgerät nach einem der Ansprüche 13 bis 17, wobei mindestens eine Vertiefung (24') an einem Teil einer Innenwand (24) angeordnet ist, welche gegenüber dem Verriegelungselement (5; 9) angeordnet ist, um Endteile des Verriegelungselements in seiner Verriegelungsposition aufzunehmen.

19. Hörgerät nach einem der Ansprüche 1 bis 18, ferner umfassend eine Deckplatte (25), welche das hintere

Ende des ersten Befestigungselements (31) im eingeschobenen Zustand innerhalb der zweiten Komponente (20) abdeckt.

20. Das Hörgerät nach Anspruch 19 mit Zungen, welche an der Innenseite der Deckplatte (25) angeordnet sind, um elastisch in entsprechende Aufnahmebohrungen, welche am hinteren Ende des ersten Befestigungselements (31) angeordneten sind, gesteckt zu werden.

Revendications

1. Appareil auditif comprenant

- un premier component (10) avec une caisse (11) comprenant au moins une module électronique, ledit logement étant adapté pour être porté sur ou auprès d'un corps humain;
- un second component (20) adapté pour être insérable soit partiellement soit entièrement dans un canal d'oreille d'un corps humain, ledit second component (20) comprenant une coquille (21);
- un connecteur pour connecter de manière mécanique et électrique ledit première (10) et ledit second (20) component, comprenant un tuyau (30) avec des câbles électriques (38) arrangés dans le tuyau (30) et deux éléments de fixation (31, 32) arrangés au chaque but dudit tuyau (20);
- ledit premier élément de fixation (31) étant adapté pour connecter de manière soluble ledit second component (20) avec ledit connecteur, comprenant une caisse ou compartiment de réception, étant adapté pour recevoir au moins une partie d'un receveur (23) étant adapté pour être positionner dans ledit second component (20);
- où un bord élastique (35) est prévu pour étancher la fissure entre une ouverture de réception (34) du ledit premier élément de fixation (31) et ledit receveur (23) dans la position inséré du receveur (23) dans le premier élément de fixation (31).

2. Appareil auditif selon la revendication 1 où la caisse ou le compartiment du ledit premier élément de fixation (31) contient ou moins la partie dudit receveur (23) comprenant les connecteurs électriques dudit receveur (23).

3. Appareil auditif selon la revendication 1 ou 2 où ledit tuyau (30) est un tuyau creux avec au moins un canal ouvert d'un bout à l'autre arrangé dans ledit tuyau (30).

4. Appareil auditif selon l'une des revendications 1 à 3 où un fil solide (39) est prévu dans ledit tuyau (30), ledit fil solide (39) étant attaché immobile avec tous les deux éléments de fixation (31, 32).

5. Appareil auditif selon l'une des revendications 1 à 4 où ledit tuyau (30) est attaché latéral parallèle ou avec un angle pointu relatif à l'axe longitudinal dudit receveur (23) à une côté dudit premier élément de fixation (31).

6. Appareil auditif selon la revendication 5 où le bout (30') dudit tuyau (30) est arrangé dans un perçage ou orifice (37) prévu dans ladite caisse dudit premier élément de fixation (31).

7. Appareil auditif selon la revendication 6 où ledit perçage ou orifice (37) est une voie sans issue avec seulement une ouverture d'entré ou est ouvert d'un bout à l'autre.

8. Appareil auditif selon l'une des revendications 1 à 7 où la longueur dudit premier élément de fixation (31) est presque la moitié de la langueur dudit receveur (23) ou moins.

9. Appareil auditif selon l'une des revendications 1 à 8 où ledit deuxième component (20) est un dispositif ITC avec un panneau avant (22) et une coquille (21) étant relié avec ledit panneau avant (22).

10. Appareil auditif selon la revendication 9 où un orifice (24) est prévu dans ledit panneau avant (22) pour introduire ledit premier élément de fixation (31) dans ledit coquille (21) dudit dispositif ITC.

11. Appareil auditif selon la revendication 9 ou 10 où une cavité (27) est prévu au panneau avant (22) arrangé à l'intérieure dudit coquille (21), soit fabriqué comme partie dudit panneau avant (22) soit attaché par ledit panneau avant (22) comme partie particulier.

12. Appareil auditif selon l'une des revendications 1 à 11 où ledit premier élément de fixation (31) comprenant une caisse multiple, comprenant au moins deux demi-coquille attaché l'un à l'autre.

13. Appareil auditif selon l'une des revendications 1 à 12 où ledit deuxième élément de fixation (20) comprenant en outre un élément de fermeture détachable (5; 9) pour barrer ledit premier élément de fixation (31) dans ledit deuxième component (20).

14. Appareil auditif selon la revendication 13 où l'élément de fermeture est une plaque de fermeture mince (5), pour être arrangé de travers par la direction d'entrée dudit premier élément de fixation (31) dans ledit deuxième component (20).

15. Appareil auditif selon la revendication 14 où ladite plaque de fermeture (5) comprenant une forme rhombique, de préférence avec des coins arrondis (6) au moins en diamètre inférieur de ladite plaque de fermeture (5), et comprenant une ouverture (7) arrangée au centre.

16. Appareil auditif selon la revendication 13 où l'élément de fermeture étant une goupille (9), avec des bouts en forme tronconique (9').

17. Appareil auditif selon l'une des revendications 13 à 16 où une cavité (31') est prévue au bout arrière dudit premier élément de fixation (31) pour recevoir ledit élément de fermeture (5;9), comprenant une forme qui permet l'élément de fermeture étant tourné ou pivoté autour un axe perpendiculaire par rapport à la surface du bout arrière dudit premier élément de fixation (31).

18. Appareil auditif selon l'une des revendications 13 à 17 où au moins une cavité (21') étant arrangée par un part de la paroi intérieure (20) arrangé vis-à-vis par ledit élément de fermeture (5;9) pour recevoir les partis de bout d'élément de fixation dans sa position fermée.

19. Appareil auditif selon l'une des revendications 1 à 18 comprenant en outre une plaque de protection (25) couvrant le bout arrière dudit premier élément de fixation (31) en position importé dans ledit deuxième component (20).

20. Appareil auditif selon la revendication 19 avec des languettes arrangées par la coté inférieure de ladite plaque de protection (25) pour être endurer dans des respective perçages d'accueil arrangés au bout arrière dudit premier élément de fixation (31).

Fig. 1

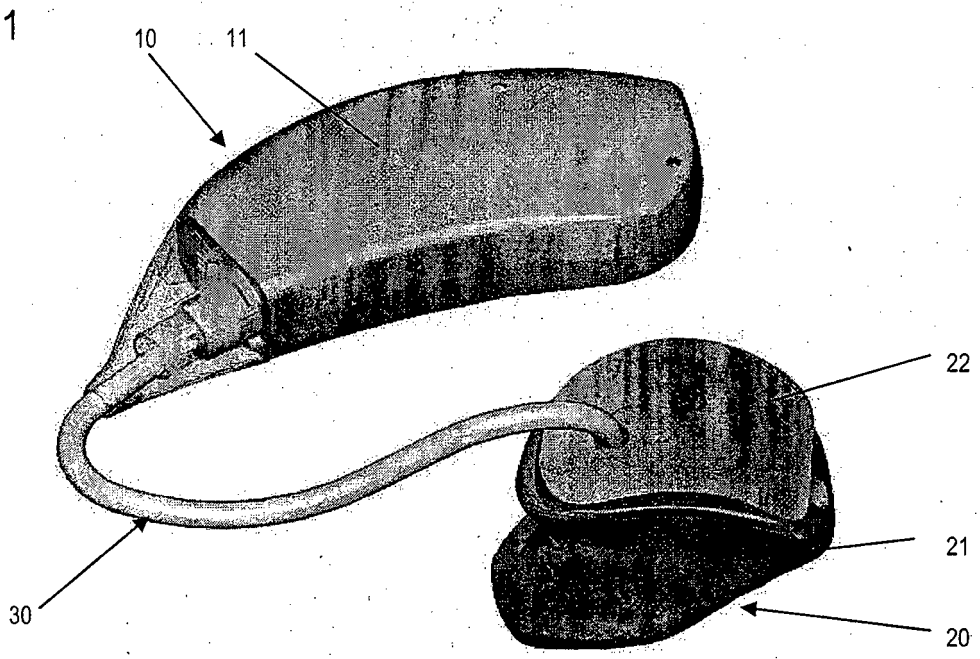


Fig. 2

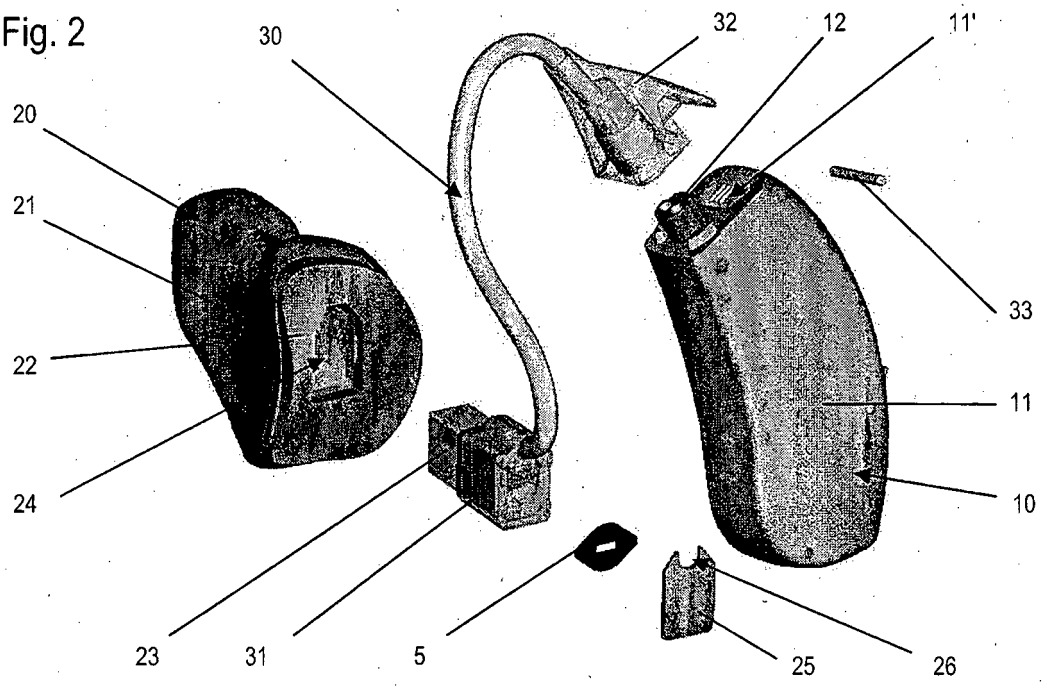


Fig. 3

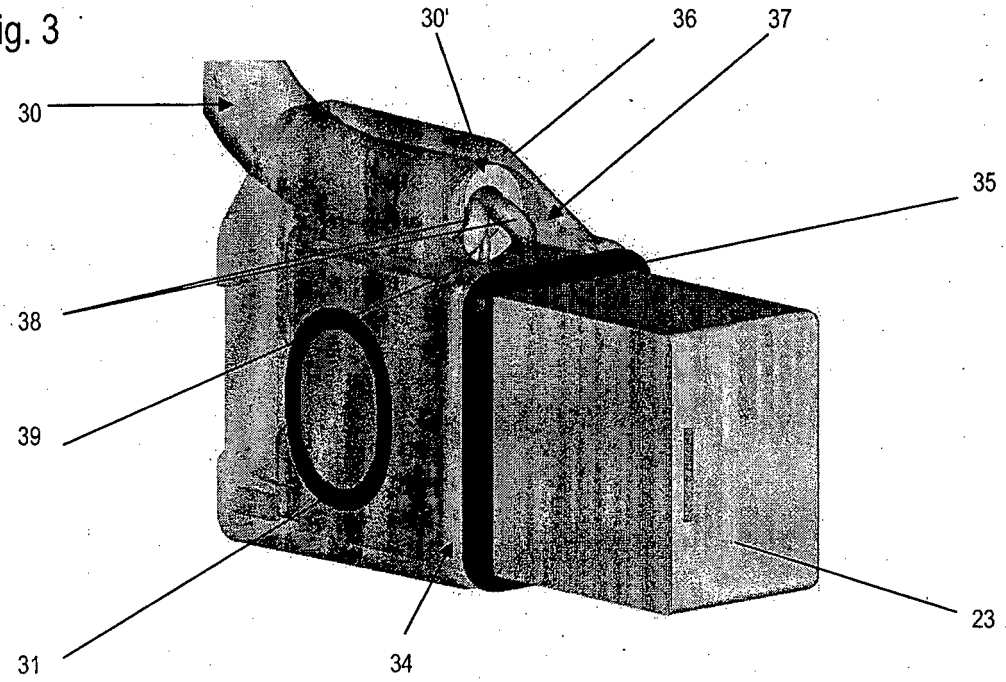


Fig. 4

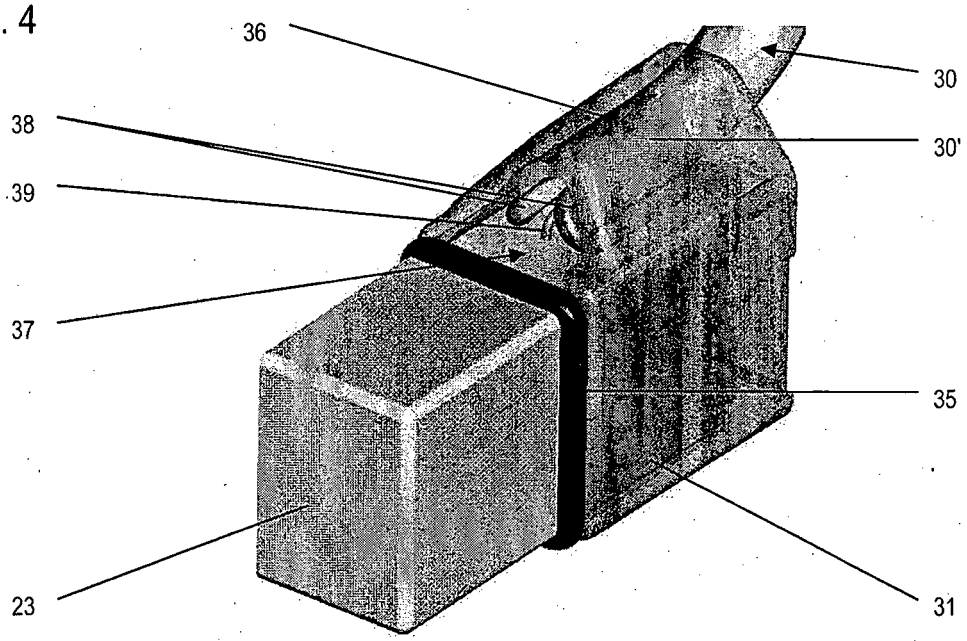


Fig. 5

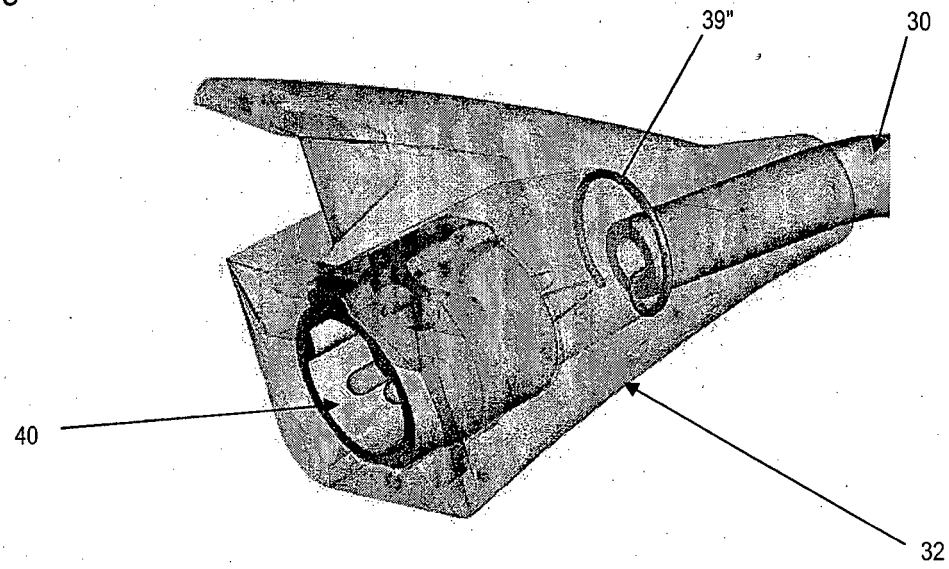


Fig. 6

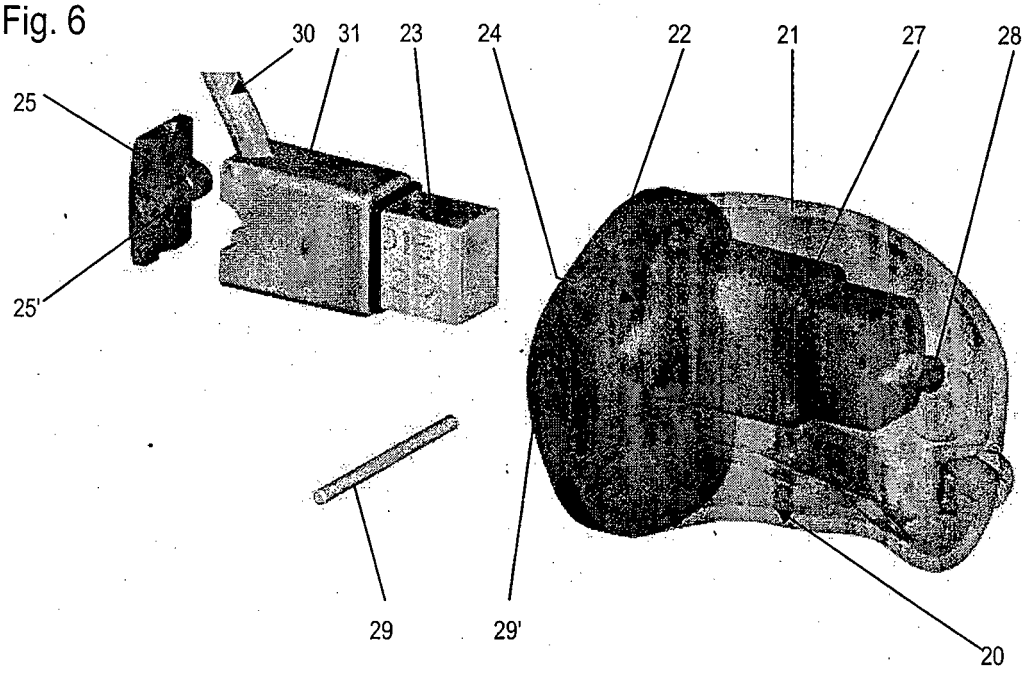


Fig. 7

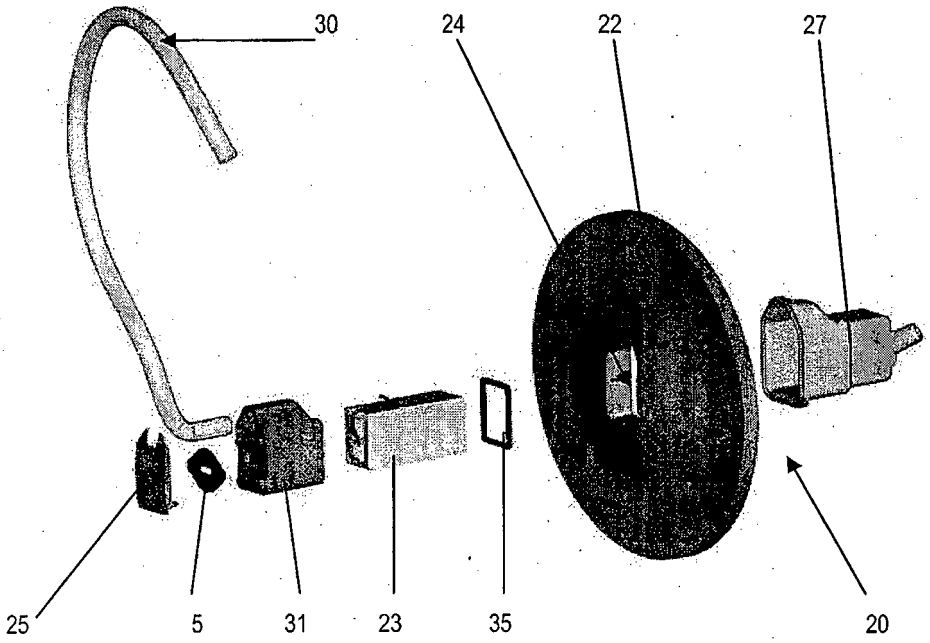


Fig. 8

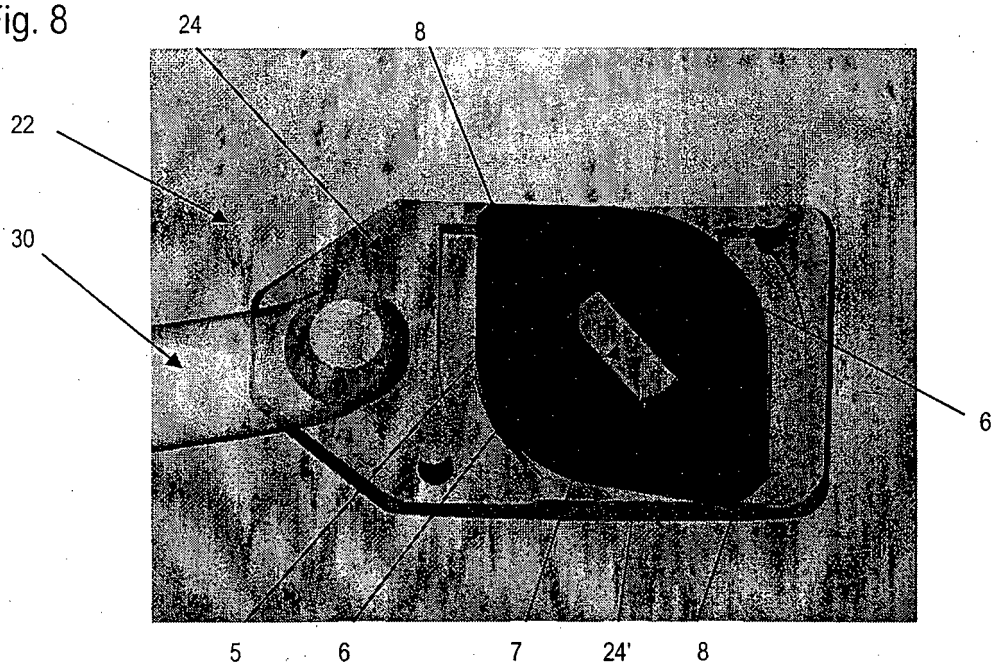


Fig. 9

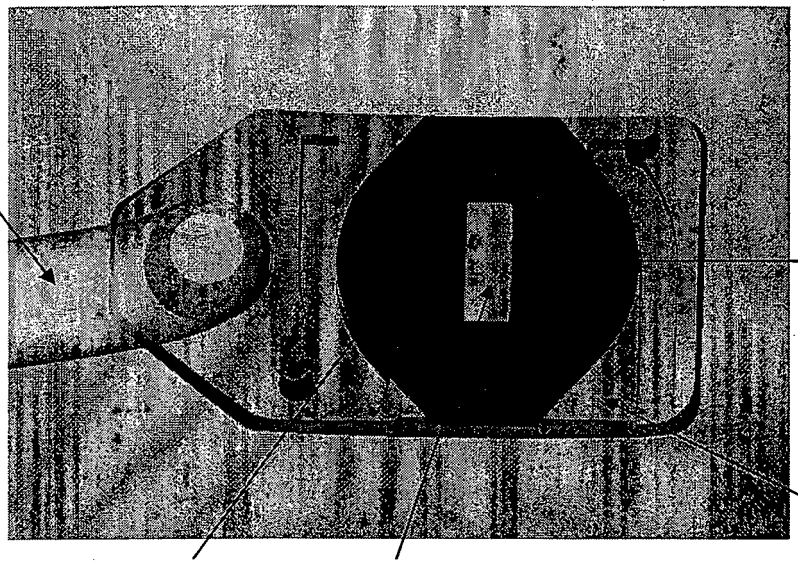


Fig. 10

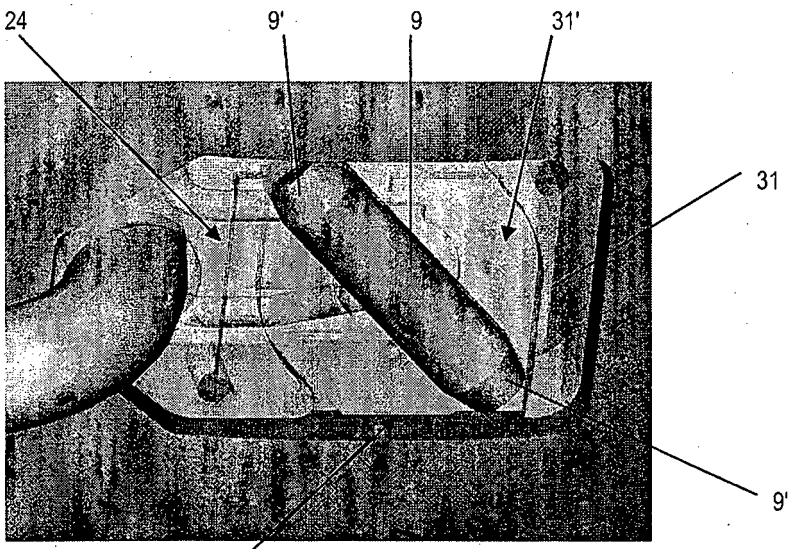
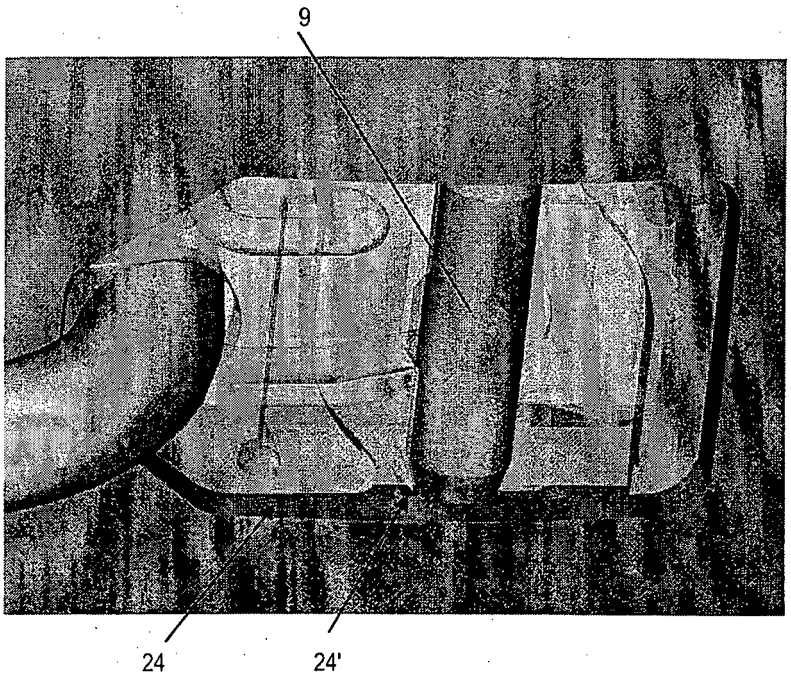


Fig. 11



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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