(19) DANMARK

(10) **DK/EP 2215858 T4**

Patent- og
Varemærkestyrelsen

(12) Oversættelse af ændret europæisk patentskrift

(51) Int.Cl.: ***H 04 R 25/00 (2006.01)***

(45) Oversættelsen bekendtgjort den: **2020-09-28**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om opretholdelse af patentet i ændret form: **2020-07-22**

(86) Europæisk ansøgning nr.: **07822604.0**

(86) Europæisk indleveringsdag: **2007-11-14**

(87) Den europæiske ansøgnings publiceringsdag: **2010-08-11**

(86) International ansøgning nr.: **EP2007062356**

(87) Internationalt publikationsnr.: **WO2008025858**

(84) Designerede stater: **AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR**

(73) Patenthaver: **Sonova AG, Laubisrütistrasse 28, 8712 Stäfa, Schweiz**

(72) Opfinder: **Boretzki, Michael, Weinbergstrasse 13, 8630 Rüti, Schweiz**

(54) Benævnelse: **METODE OG ANORDNING TIL JUSTERING AF ET HØRESYSTEM**

(56) Fremdragne publikationer:
WO-A-2007/113339
FR-A- 2 664 494
US-A- 3 745 674
US-A1- 2007 217 636
DE-A1- 19 904 044
US-A1- 2001 005 420
US-A1- 2005 094 822
US-A1- 2007 297 626

DESCRIPTION

Technical Field

[0001] The invention relates to the field of hearing device and hearing systems. More particularly, it relates to the fitting of hearing device and hearing system, wherein fitting means adjusting the signal processing properties of the hearing system to the preferences of the user of the hearing system. The invention relates to methods and apparatuses according to the opening clauses of the claims. Under a hearing device, a device is understood, which is worn in or adjacent to an individual's ear with the object to improve the individual's acoustical perception. Such improvement may also be barring acoustic signals from being perceived in the sense of hearing protection for the individual. If the hearing device is tailored so as to improve the perception of a hearing impaired individual towards hearing perception of a "standard" individual, then we speak of a hearing-aid device. With respect to the application area, a hearing device may be applied behind the ear, in the ear, completely in the ear canal or may be implanted.

[0002] A hearing system comprises at least one hearing device. In case that a hearing system comprises at least one additional device, all devices of the hearing system are operationally connectable within the hearing system. Typically, said additional devices such as another hearing device, a remote control or a remote microphone, are meant to be worn or carried by said individual.

Background of the Invention

[0003] The fitting of hearing devices is typically carried out in an iterative way: The hearing device user visits his hearing device professional such as an audiologist or hearing device acoustician, who carries out hearing tests with synthetic test tones such as sine tones and noise signals. Depending on how the user reacts to the test tones, the hearing device professional will adjust certain audio processing parameters of the hearing system in a certain way. Then, the user uses his adjusted hearing device in every-day life, trying to find out, where hearing problems still persist. Then, the user will visit his hearing device professional again and report his observations, and the hearing device professional will "fine-tune" the hearing device, i.e. make further adjustments to audio processing parameters of the hearing system. The newly adjusted hearing system will be tested in real life again, followed by another visit at the hearing device professional's office and so on.

[0004] This process consumes a lot of time.

[0005] In EP 1 617 705 A2, it has been suggested to let the user himself fit his hearing device. In this case, the hearing device itself can generate test tones. This way, all or many visits at the

hearing device professional's office are unnecessary. Unfortunately, not every hearing device user is able and willing to carry out the fitting on his own. It has been suggested to use as test tones, for example, sounds known to the user from everyday life, such as the sound of a triangle or the sound of a ship horn.

[0006] In US 2007/0172088 A1, it is disclosed to fit a hearing-aid device using means for selecting simultaneous settings relating to two or more different audio processing parameters, i.e. adjusting parameters composed of two or more parameters. WO 2007/113339 describes a hearing aid fitting method that teaches the user how to manipulate the hearing aid correctly. US 2007/0217636 describes a method to adapt a hearing aid to a user in a dedicated room. Real-life sounds are used, with a visual display of the sound occurring simultaneously. FR2664494 describes a hearing aid fitting method where sounds and images of everyday life are played simultaneously to the user. US3745674 describes an apparatus to test human hearing. A sound is played and at the same time a plurality of images are visually presented to the user. The user must select the image that represents the sound. It is desirable to provide an alternative way of fitting a hearing system.

[0007] US 2001/0005420 A1 discloses a hearing aid fitting apparatus utilizing the optimal solution method.

Summary of the Invention

[0008] Accordingly, one object of the invention is to create an alternative way of fitting a hearing system.

[0009] Another object of the invention is to provide a way of fitting a hearing system, which leads to a good fitting result within a relatively short time.

[0010] Another object of the invention is to provide a way of fitting a hearing system, which leads to a good fitting result with only a relatively small amount of visits at a hearing device professional's office.

[0011] Another object of the invention is to provide a way of fitting a hearing system, which reduces the hearing device professional's resources required for fitting the hearing system in terms of time and/or in terms of expertise such as experience and knowledge.

[0012] Another object of the invention is to provide a way of fitting a hearing system, which makes the hearing system user feel more comfortable during fitting sessions.

[0013] Another object of the invention is to provide a way of fitting a hearing system, which can be accomplished by a hearing system user without support from a hearing device professional or with little support from a hearing device professional.

[0014] Another object of the invention is to provide a more effective way of fitting a hearing system.

[0015] Another object of the invention is to provide a more efficient way of fitting a hearing system.

[0016] Further objects emerge from the description and embodiments below.

[0017] At least one of these objects is at least partially achieved by apparatuses according to the patent claims.

[0018] To give a very simple example, let us consider a first sound object representing soft speech, and a second sound object representing rather loud speech. If these sound objects were used separately as test sounds for fitting, the fitting result would tend to be such that both sound objects are adjusted to a moderate loudness, employing a quite high degree of compression. On the other hand, using an audio sequence containing both, soft speech and loud speech, e.g., in alternating way, the dynamics problem becomes immediately apparent, and the related trade-off can be balanced well. The audio sequence represents a real-life situation. Or, said audio sequence is a realistic composition of acoustic events of real-life. This makes the fitting procedure more pleasant for the user, and the fitting result will tend to be better adapted to the user's real life. Advantages that otherwise would be achieved by letting the fitting take place during the user's normal life can be achieved this way, while maintaining the advantage that it is possible that a hearing device professional carries out the fitting and that the fitting can take place in one single place such as a hearing device professional's office.

[0019] Said audio sequence can, e.g., comprise synthezised and/or digitally sampled sound components. Typically, it will be a composition of several separately available sound bits such as digital sound samples.

[0020] Said audio sequence can be adjustable, e.g., by hearing device professional. This way, it can be adapted to specific needs of the hearing device user.

[0021] Typically, said audio sequence will comprise three or more sound objects.

[0022] A sound object may comprise more than one sound bits. When a sound bit of a sound object is played during a sound sequence, the corresponding sound object sounds during said audio sequence.

[0023] A fitting arrangement typically comprises a computer system and fitting software running on said computer system.

[0024] In one embodiment, said first and said second sound objects sound simultaneously during at least a portion of said audio sequence. It is - in particular in view of possible trade-offs in hearing device fitting - advantageous to have overlapping sound objects within a sound

sequence used for fitting. It allows to hear sound objects in relation to each other.

[0025] In a computer-generated animation or simulation, it is relatively easy to adapt a visualization to different audio sequences. This can be advantageous, in particular if the audio sequence comprises human speech. Since many hearing impaired people employ some kind of lip reading, they might get seriously confused if visually perceived lip movements do not correspond to acoustically perceived speech. Therefore, if a similar video sequence and a similar audio sequence shall be produced for different languages and if the visualization is a recorded video sequence, it would be advisable to record a different video sequence for each language. If, on the other hand, the visualization is a computer-generated animation or simulation, it would be possible to use the one and the same visualization and adapt (only) the lip movements, so as to simulate the effect of different languages. Even in a recorded video sequence, it is today possible to digitally edit the video data so as to change lip movements accordingly, e.g., based on separately recorded lip movements for the different lip movements. Typically, with separately recorded lip movements, the respective speech will be recorded simultaneously.

[0026] It is possible to provide that, in the fitting software, a language can be selected, so as to provide audio sequences comprising speech of the selected language and, if available, visualizations adapted - with respect to visual lip movements - to the selected language.

[0027] A visusal display, e.g., a TV set or a computer screen, can be used for displaying said visualization.

[0028] In one embodiment, movements of sound sources and/or visible changes at sound sources are visible in the visualization, e.g., mouth movements and/or optical effects highlighting currently-active sound sources.

[0029] Said visualization can be adjustable, e.g., by a hearing device professional, e.g., with respect to its length and/or to the order of events.

[0030] It is possible to provide that each sound object (or at least a portion of the sound objects) is representative of a certain sound type each, wherein a sound belonging to a certain sound type is characterized by at least one characteristic property of the sound or rather by a characteristic combination of certain properties of the sound. Examples for sound types are soft speech, speech in noise, loud music, high-frequency noise. Examples for said properties of the sound are its spectral content, its average level, its dynamic range. For each sound type, a set of (one or more) parameters is known (stored or obtainable), which are particularly well suited for influencing sounds of the respective sound type while having less influence on (most) sounds of other sound types. If the sound sequence is composed in such a way, said automatic selection is readily accomplished. Naturally-sounding audio sequences can be realized, which are acoustically quite complex, but nevertheless, given an indication by the user that he has trouble with a certain sound object / sound source or during a certain portion of the sequence, it will be possible to offer a limited number of parameters for adjustment,

which are well suited for solving the indicated hearing problem while preserving settings that work well with other sound objects / sound sources or in other situations.

[0031] Arrangement for adjusting a hearing system to the preferences of a user of said hearing system, comprising:

- a control unit;
- a first interface unit operationally connectable to said control unit and to said hearing system;
- a storage unit comprising data representative of an audio sequence comprising a first sound object representative of a first real-life sound source and a second sound object representative of a second real-life sound source;
- an input unit operationally connectable to said control unit, for receiving an input entered by a fitter or said user descriptive of an adjustment of at least one audio processing parameter of said hearing system;

wherein said control unit is configured to play said audio sequence to said user and to carry out said adjustment;
the arrangement furthermore comprising - operationally connectable to said control unit - a display unit and a storage unit comprising data descriptive of a visualization of a scene to which said audio sequence belongs, wherein said control unit is configured to display - using said display unit - said visualization synchronously with said playing of said audio sequence;
the arrangement furthermore comprising a user interface allowing an individual to select

- a sound source occurring in said visualization; wherein said control unit is adapted to
- automatically selecting at least one audio processing parameter of said hearing system in dependence of said selection; and to
- offering said selected at least one audio processing parameter for adjustment.

[0032] Said arrangement can also be referred to as fitting arrangement.

[0033] Said control unit typically comprises at least one processor plus software running on said at least one processor.

[0034] Said data can be data describing an audio stream, e.g., digital sound sampling data. Or said data can comprise bits of audio stream and data desciptive of how these bits of audio stream can be composed to represent said audio sequence. Furthermore, it is possible to use sound description data such as control signals for a sound synthesizer instead of or in addition to bits of audio stream.

[0035] In one embodiment, said audio sequence is composed such that said first and said second sound objects sound simultaneously during at least a portion of said audio sequence.

[0036] In one embodiment, said audio sequence is composed such that - during at least a portion of said audio sequence - said first sound object sounds without said second sound object sounding simultaneously. Said arrangement comprises - operationally connectable to said control unit - a display unit and a storage unit comprising data descriptive of a visualization of a scene to which said audio sequence belongs, wherein said control unit is configured to display - using said display unit - said visualization synchronously with said playing of said audio sequence.

[0037] Said visualization unit can comprise, e.g., an optical display, a TV screen, a computer monitor. The arrangement comprises a user interface allowing an individual to select a sound source occuring in said visualization.

[0038] Said user interface can comprise, e.g., a touch screen and/or a computer mouse.

[0039] Typically, said individual is said user. Said individual can also be a hearing device professional.

[0040] Said user interface can be same user interface or a (fully or partially) different user interface as the one of the before-mentioned embodiment.

[0041] Said user interface can be identical with or (fully or partially) different from said input unit. Said control unit is adapted to automatically selecting at least one audio processing parameter of said hearing system in dependence of said selection. Said control unit is adapted to offering said selected at least one audio processing parameter for adjustment.

[0042] Further embodiments and advantages emerge from the dependent claims and the figures.

Brief Description of the Drawings

[0043] Below, the invention is described in more detail by means of examples and the included drawings. The figures show:

Fig. 1
a schematic illustration of an audio sequence;
Fig. 2
a schematic illustration of a visualization;
Fig. 3
a block diagram of a fitting method;
Fig. 4
a schematic illustration of a visualization with an offering of parameters to be adjusted;
Fig. 5
a schematic illustration of a visualization with an offering of a parameter to be adjusted;

Fig. 6

a schematic illustration of a fitting arrangement and a corresponding fitting method.

[0044] The reference symbols used in the figures and their meaning are summarized in the list of reference symbols. Generally, alike or alike-functioning parts are given the same or similar reference symbols. The described embodiments are meant as examples and shall not confine the invention.

Detailed Description of the Invention

[0045] Fig. 1 is a schematic illustration of an audio sequence 5 that can be used in the invention. The audio sequence 5 comprises five sound objects 51,52,53,54,55, each comprising one or more sound bits 59. Each sound object is representative of a real-life sound source, which is indicated in the left portion of Fig. 1. The audio sequence 5 represents a real-life situation (more precisely: a real-life acoustic situation or flow of events). In the illustrated example, the audio sequence sketches events taking place in or near a kitchen in a home.

[0046] The audio sequence 5 is preferably composed of various sound bits 59, which are mixed together in a special way, such that there are - for one or more sound objects - portions during which only that respective sound object is sounding and/or only that respective sound object is sounding together with one or more sound objects such as a background noise. And, furthermore, it is composed in such a way that there are portions of the audio sequence when two or more sound objects sound simultaneously. This allows to provide an audio sequence during which several trade-offs between adjustable hearing system parameters can be checked and tested in a controlled way.

[0047] For example, each sound object can provide for one track of a multitrack recording. And each sound bit 59 of an object 51,52,53,54,55 can be a digital sample of a real-life acoustic event.

[0048] Fig. 2 is a schematic illustration of a visualization 6 belonging to the audio sequence 5 of Fig. 1. The visualization 6 is preferably not static, but provides moving or animated pictures. For example, visualization 6 can be a video sequence.

[0049] Typically, all or most of the sound sources sounding during the audio sequence 5 are visible in the visualization, and - as shown in Fig. 2 - it is possible to highlight the sound sources Q1,Q2,Q3,Q4 in the visualization 6. In particular, it is possible to highlight sound sources Q1,Q2,Q3,Q4 visible in the visualization 6 at the time they sound and should be perceivable in the audio sequence 5. For example, the lips of a speaking person Q1,Q2 can be animated, clattering dishes Q4 can be shown to be moving while being washed, or a mobile phone Q3 may be vibrating or have a lighted display when it is ringing.

[0050] In a fitting session during which a hearing system of a hearing system user is adjusted to the preferences of said user, the audio sequence 5 of Fig. 1 and the visualization of Fig. 2 can be used in the way depicted in Fig. 3.

[0051] Fig. 3 shows block diagram illustrating a fitting method. In step 100, the audio sequence 5 is played to the hearing system user, either directly via said hearing system, or via loudspeakers, while the user is using his hearing system, perceiving the sound generated by the loudspeakers via his hearing system.

[0052] At the same time and synchronously with the audio sequence 5, the visualization 6 is played to the user, typically using a display such as a computer screen. Preferably, audio sequence 5 and visualization 6 are played in a looped fashion, i.e. when audio sequence 5 and visualization 6 are finished, it will start again from the beginning.

[0053] In step 110, which preferably takes place during step 100, the user will indicate that there are perception problems - with one of the sound objects or sound sources or at a certain instant or portion during the audio sequence. For example, the user can tell his hearing device professional that the dishes (Q4) are too loud, or that he cannot understand the woman (Q1) while the man (Q2) is talking. The hearing device professional can then enter corresponding information (user input) in a fitting arrangement used in the fitting, e.g., using a computer keyboard or mouse. It is also possible that the user himself provides such a user input to the fitting arrangement, e.g., if a touch screen is used for displaying the visualization 6, the user could, upon occurrence of a perception problem, touch the screen in the place where the sound source responsible for the perception problem is visible.

[0054] Thereupon, in step 120, one or more adjustable audio processing parameters of the hearing system are selected in dependence of the user input, i.e. in dependence of the selected point in time during the audio sequence and/or in dependence of the selected sound source / sound object. That selection is automatically carried out by the fitting arrangement. E.g., a look-up table could be provided in the fitting arrangement for this purpose. The possibility of using sound objects corresponding to sound types associated with certain audio processing parameters is possible and has been mentioned before in this application.

[0055] Optionally, in step 120, a detail of the audio sequence 5 and the visualization 6 is played, which is selected so as to comprise the problematic portion. Preferably, that detail is played in a loop. This allows to quickly check whether or not parameter adjustments lead to an improved or perhaps event to a worsened perception.

[0056] In step 130, the one or more selected audio processing parameters are automatically offered - by the fitting arrangement - for adjustment.

[0057] Fig. 4 is a schematic illustration of a visualization 6 with an offering of parameters to be adjusted. In step 120, the user has - at a certain instant, e.g., while the woman (Q1) and the

man (Q2) talk simultaneously- selected the speaking woman (Q1). Therefore, the woman (source Q1) is highlighted in a special way, in Fig. 4 indicated by the thick solid circle. Thereupon, a parameter display 7 is displayed comprising one or more means 71 for adjusting audio processing parameters, i.e. selected audio processing parameters are offered for adjustment.

[0058] In step 140, the fitting arrangement receives an input indicative of a requested change in parameter. This can be accomplished by, e.g., pressing one or more of the displayed parameter changing means 71, or by clicking them with a computer mouse (cf. Fig. 4).

[0059] In step 150, the fitting arrangement carries out the requested parameter adjustment.

[0060] Fig. 5 is a schematic illustration of a visualization with an offering of a parameter to be adjusted. Fig. 5 illustrates, what the visualization could look like, if the dishes (Q4) would have been selected in step 110 (instead of the talking woman Q1 in Fig. 4). As can be seen, the choice of offered adjustable parameters is different from the situation in Fig. 4.

[0061] In step 160, the parameter adjustments can be verified during the detail loop of step 120. If the adjustment of step 150 lead to a satisfying result (improved perception), the full audio sequence 5 can be played again, possibly again in a looped fashion (step 170). If the perception problem turns out to be solved, the user can be asked to listen (and look) again at all events in the audiovisual sequence 5,6, so that possibly-existing further perception problems can be detected and solved (step 180). If the adjustment of step 150 did not lead to a satisfying result (still unsatisfactory perception), further adjustments can be made (steps 145, 150), e.g., while still in the detail loop. If an unsatisfactory result turns out during step 170, one could continue with step 110, selecting the crucial instant or sound source again.

[0062] Fig. 6 is a schematic illustration of a fitting arrangement 1 and a corresponding fitting method. It will partially be referred to the block diagram of Fig. 3 and to Figs. 1 and 2.

[0063] Fitting arrangement 1 can be or comprise a computer system and a fitting software.

[0064] The fitting arrangement 1 of Fig. 6 comprises a control unit 11, three storage units 12,14,19, an interface unit 13, a display unit 15 and a user interface 16 (possibly realized in one unit such as in a touch screen display), and an input unit 17 and a parameter adjusting means 18 (possibly realized in one unit such as in a touch screen display). These components are all operationally connected, typically via control unit 11.

[0065] It is, for example, also possible to realize units 15,16,17 and 18 altogether in one unit.

[0066] Interface unit 13 interfaces between the arrangement 1 and hearing system 2, which comprises two hearing devices 21,22 worn by user 3. The user 3 is usually assisted by hearing device professional 4 (fitter) during the fitting session.

[0067] In order to be able to provide the user 3 with audio sequence 5 (step 100), storage unit 12 comprises data A representative of audio sequence 12, which are fed, controlled by control unit 11, to interface unit 13 and from there to hearing system 2.

[0068] In order to be able to provide the user 3 with visualization 6 (step 100), storage unit 14 comprises data V representative of visualization 6, which are fed, controlled by control unit 11, to display unit 15.

[0069] When the user 3 or the fitter 4 enters an indication of a perception problem in user interface 16, corresponding data U (user input) are generated and fed to control unit 11 (step 110). In dependence of user input U, data P indicative of one or more audio processing parameters of hearing system 2 to be adjusted will be obtained from storage unit 19 or will be obtained by means of control unit 11 using storage unit 19 (step 120).

[0070] The data provided by storage unit 19 can be data relating sound objects and/or sound elements and/or instants of audio sequence 5 to at least one adjustable audio processing parameter of hearing system 2.

[0071] Controlled by control unit 11, the selected parameters indicated by data P will be offered for adjustment by parameter adjusting means 18, e.g., by displaying them on a display (step 130), and the fitter 4 (or the user 3) can enter an input R, i.e. a request for parameter adjustment, in input unit 17 (140).

[0072] Data R are fed to control unit 11, and corresponding data p descriptive of the requested parameter adjustment will be fed to the hearing system 2 via interface unit 13. Accordingly, the hearing system 2 is adjusted as requested (step 150).

[0073] The decision of whether or not to play the audio sequence and which part of it to play and whether or not to play in a loop will be controlled by control unit 11, possibly in dependence of input provided via user interface 16 and/or via input unit 17.

[0074] It is possible that the user 3 carries out the method without the help of a hearing device professional.

[0075] It is possible to dispense with the visualization 6.

[0076] It is possible to provide that in visualization 6, all or most of the sound source occuring in the audio sequence 5 are visible, and preferably also that - at least partially - it is visible that and when a sound source generates sound so that the user 3 should be able to perceive that sound. Accordingly, it is -at least in many cases - possible for the hearing system user 3 to judge from the visualization 6 whether or not he properly perceives all (or most of) the sounds that occur during audio sequence 5. Furthermore, it is - at least in many cases - possible for the user 3 to judge whether or not he perceives the spatial arrangement and appearance of the sound sources in accordance with their real arrangement, e.g., as visible in the

visualization 6.

[0077] It is possible to use any kind of everyday or real-life situation for the invention which provides suitable sound objects, e.g., situations in the street, with car traffic, or situations in a train station or others.

[0078] It is possible to use the visualization 6 for enabling a (simple) selection of a sound source (and a corresponding sound object), in particular if perception problems occur in conjunction with the selected sound source or sound object.

[0079] An audio sequence comprising a complex composition of at least two or at least three sound objects is used as test signals to be perceived a hearing system user 3 during fitting. The audio sequence can be composed such that trade-offs between adjustable audio processing parameters are very likely to become apparent during the audio sequence 5. The sound objects are preferably real-life sound objects. The audio sequence preferably reflects a real-life situation.

[0080] Aspects of the embodiments have - in part - been described in terms of functional units. As is readily understood, these functional units may be realized in virtually any number of hardware and/or software components adapted to performing the specified functions. For example, the input unit 17 can be (fully or in part) identical with user interface 16, or the storage units 12,14,19 can be realized in one unit such as one computer hard disk.

List of Reference Symbols

[0081]

1
fitting arrangement, computer system
11
control unit
12
storage unit
13
interface unit, interface
14
storage unit
15
display unit, display, TV screen, computer monitor
16
user interface, touch screen display, button, computer mouse
17
input unit, touch screen display, computer keyboard, computer mouse

18
: parameter adjusting means, parameter display, slider

19
: storage unit

2
: hearing system

21
: hearing device

22
: hearing device

3
: user, hearing system user

4
: hearing device professional, fitter

5
: audio sequence

51,...,55
: sound object

59
: sound bit

6
: visualization, video

7,7'
: parameter offer, parameter display

71,71'
: parameter adjusting means

100...180
: steps

A
: data, audio data

Q1, ..., Q4
: sound soures

p
: data, data descriptive of parameter adjustment

P
: data, data indicative of audio processing parameter(s), selected audio processing parameter

R
: data, input, request for parameter adjustment

U
: user input

V
: data, visualization data, video data

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP1617705A2 [0005]
- US20070172088A1 [0006]
- WO2007113339A [0006]
- US20070217636A [0006]
- FR2664494 [0006]
- US3745674A [0006]
- US20010005420A1 [0007]

METODE OG ANORDNING TIL JUSTERING AF ET HØRESYSTEM

Patentkrav

1. Anordning (1) til justering af et høresystem (2) ifølge brugerens præferencer (3) for ovennævnte høresystem, der omfatter:

- en kontrolenhed (11);
- en første brugerfladeenhed (13), der operationelt kan tilsluttes ovennævnte kontrolenhed (11) og ovennævnte høresystem (2);
- en lagringsenhed (12), der omfatter data (A), som repræsenterer en lydsekvens (5), der omfatter et første lydobjekt (51;...;55), som repræsenterer en første virkelig lydkilde (Q1;...;Q2), og et andet lydobjekt (55;...;551), som repræsenterer en anden virkelig lydkilde (Q4;...;Q1);
- en inputenhed (17), der operationelt kan tilsluttes ovennævnte kontrolenhed (11) for at modtage et input (R), der indlægges af en montør (4) eller ovennævnte bruger (3) og kan beskrives som en justering (p) af mindst en lydbehandlingsparameter (P) på ovennævnte høresystem (2);

kendetegnet ved at ovennævnte kontrolenhed (11) er konfigureret til at afspille ovennævnte lydsekvens (5) for ovennævnte bruger (3) og til at udføre ovennævnte justering;

anordningen (1) omfatter desuden en displayenhed (15) og en lagringsenhed (14) - der operationelt kan tilsluttes ovennævnte kontrolenhed (11) - der omfatter data (V), der beskriver en visualisering (6) af en scene, som ovennævnte lydsekvens (5) hører til, kendetegnet ved at ovennævnte kontrolenhed (11) er konfigureret til at fremvise – ved hjælp af ovennævnte displayenhed (15) – ovennævnte visualisering (6) synkront med ovennævnte afspilning af ovennævnte lydsekvens (5);

anordningen (1) omfatter yderligere en brugerflade (16), der giver en person (3;4) mulighed for at vælge

- en lydkilde (Q1;...;Q4), der fremkommer i ovennævnte visualisering (6);

kendetegnet ved at ovennævnte kontrolenhed (11) er tilpasset til

- automatisk at vælge mindst en lydbehandlingsparameter (P) for ovennævnte høresystem (2) afhængigt af ovennævnte valg; og til at

- tilbyde ovennævnte udvalgte mindst en lydbehandlingsparameter (P) til justering.

2. Anordningen (1) er ifølge patentkrav 1 kendetegnet ved at ovennævnte lydsekvens (5) er sammensat således, at ovennævnte første og ovennævnte andet lydobjekt (51;...;55) lyder samtidigt i hvert fald under en del af ovennævnte lydsekvens (5).

3. Anordningen (1) er ifølge patentkrav 2 eller patentkrav 3 kendetegnet ved at ovennævnte lydsekvens (5) er sammensat således, at – under mindst en del af ovennævnte lydsekvens – ovennævnte første lydobjekt (51;...;55) lyder uden, at ovennævnte andet lydobjekt (55;...;51) lyder samtidigt.

DRAWINGS

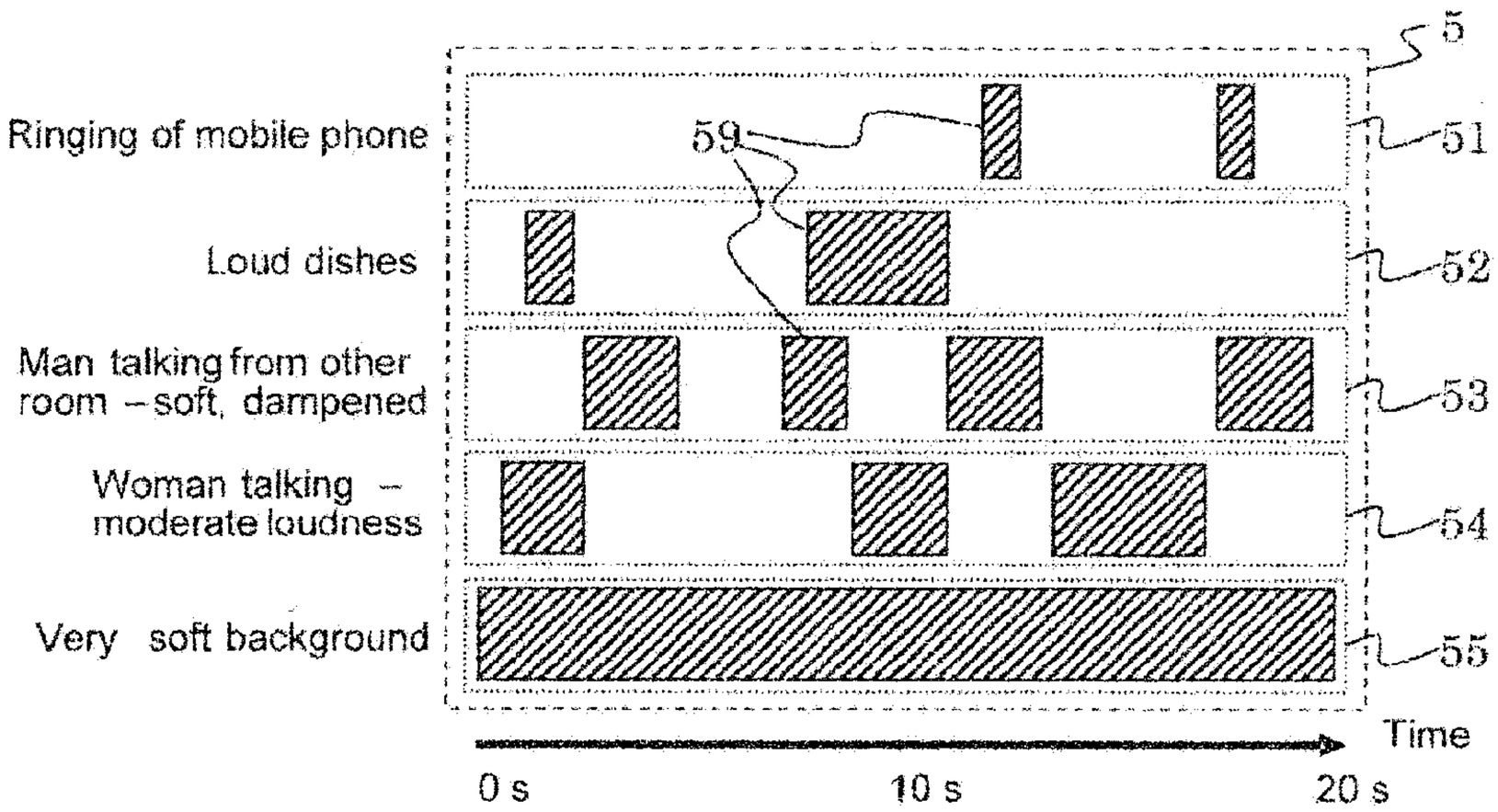

Fig. 1

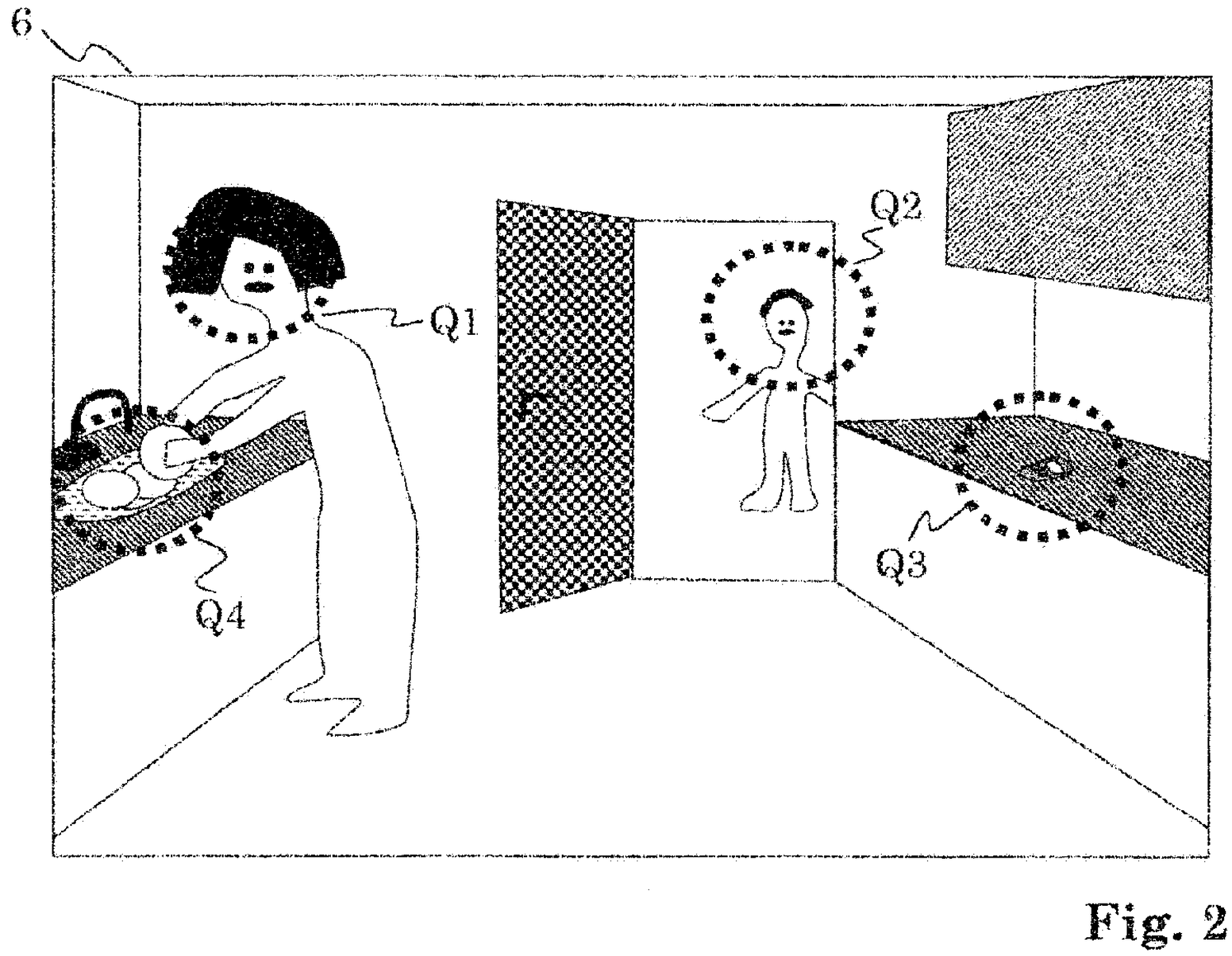

Fig. 2

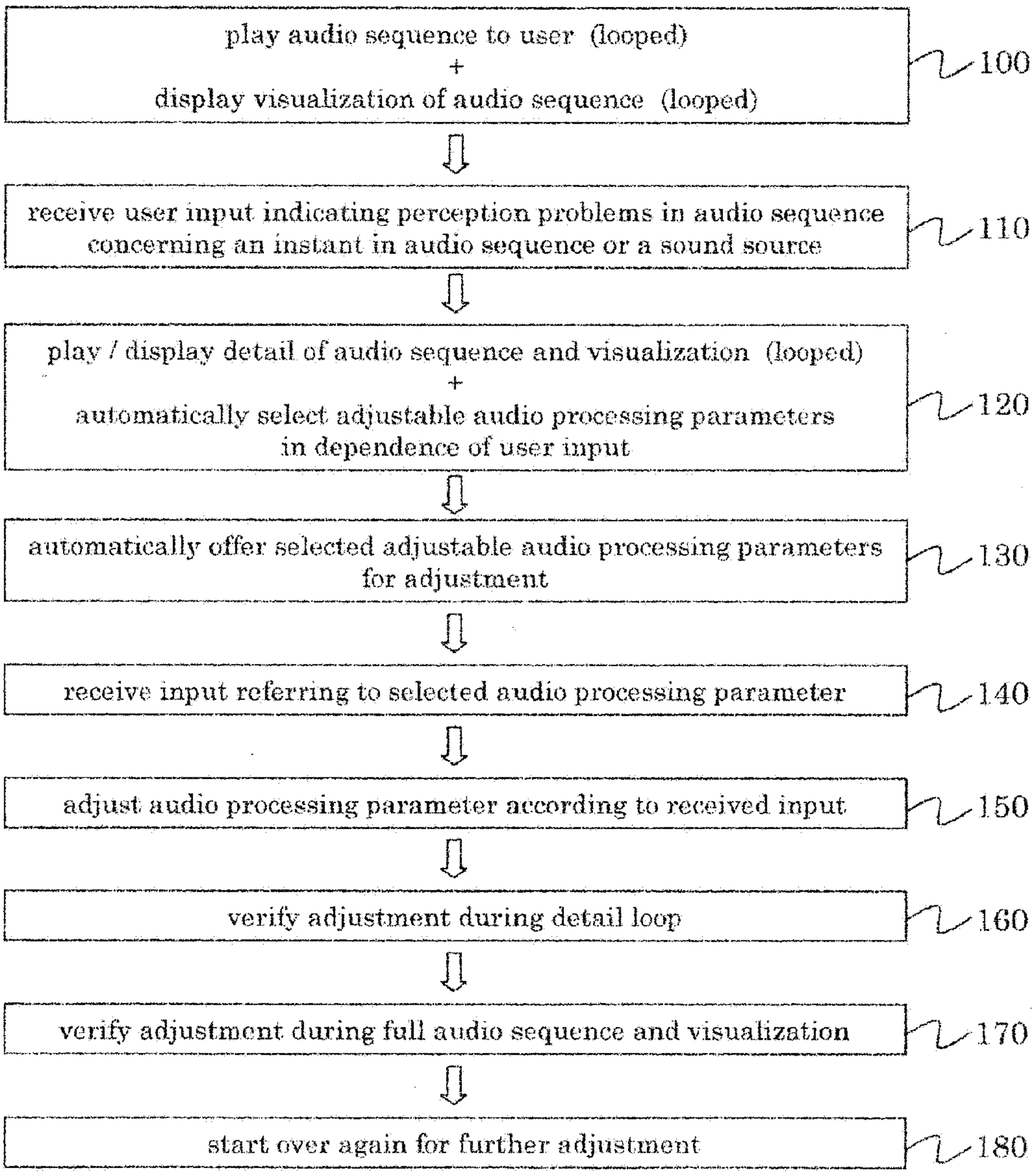
play audio sequence to user (looped)
+
display visualization of audio sequence (looped)
100
receive user input indicating perception problems in audio sequence concerning an instant in audio sequence or a sound source
110
play / display detail of audio sequence and visualization (looped)
+
automatically select adjustable audio processing parameters in dependence of user input
120
automatically offer selected adjustable audio processing parameters for adjustment
130
receive input referring to selected audio processing parameter
140
adjust audio processing parameter according to received input
150
verify adjustment during detail loop
160
verify adjustment during full audio sequence and visualization
170
start over again for further adjustment
180

Fig. 3

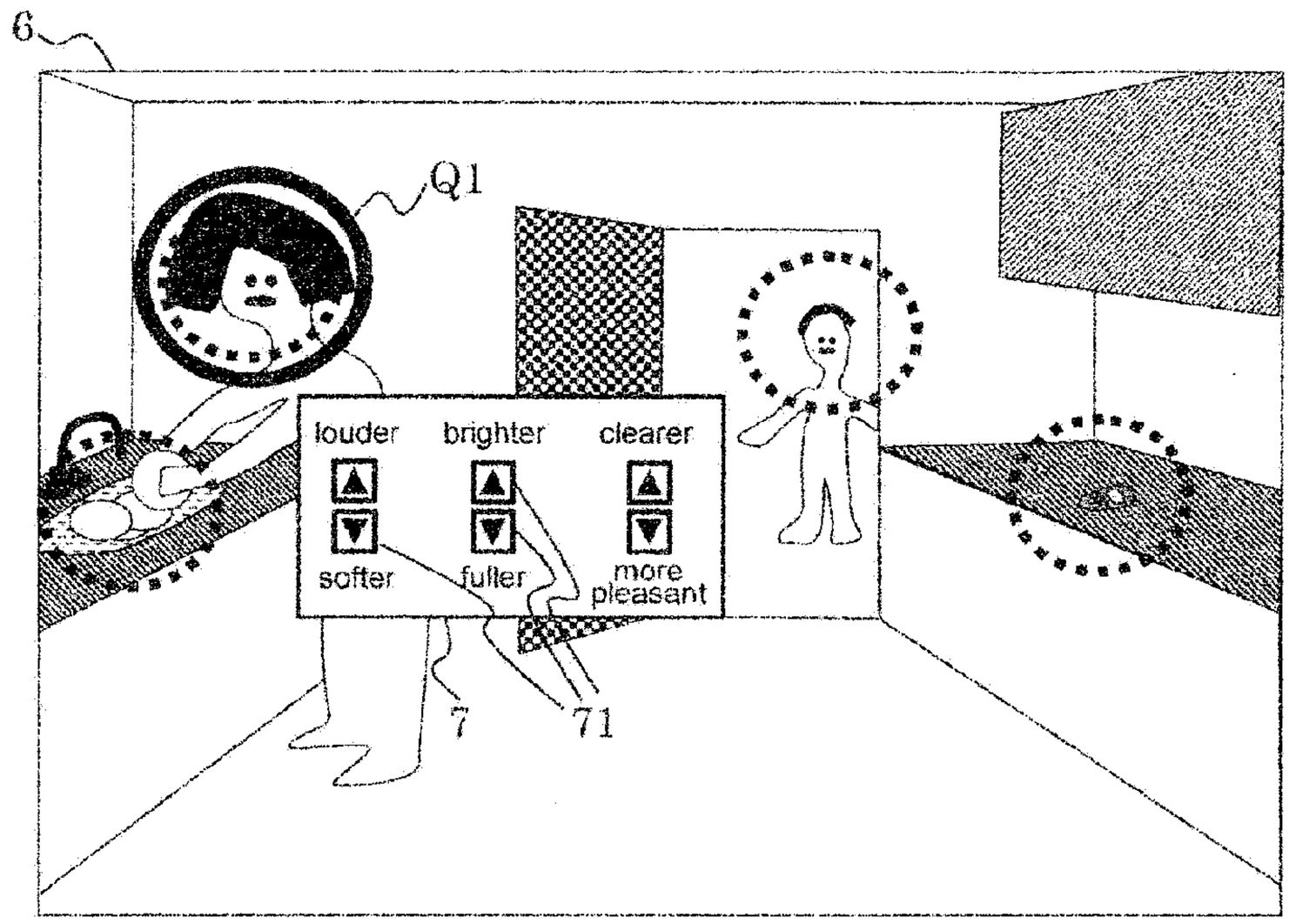
6
Q1
louder
brighter
clearer
softer
fuller
more pleasant
7
71

Fig. 4

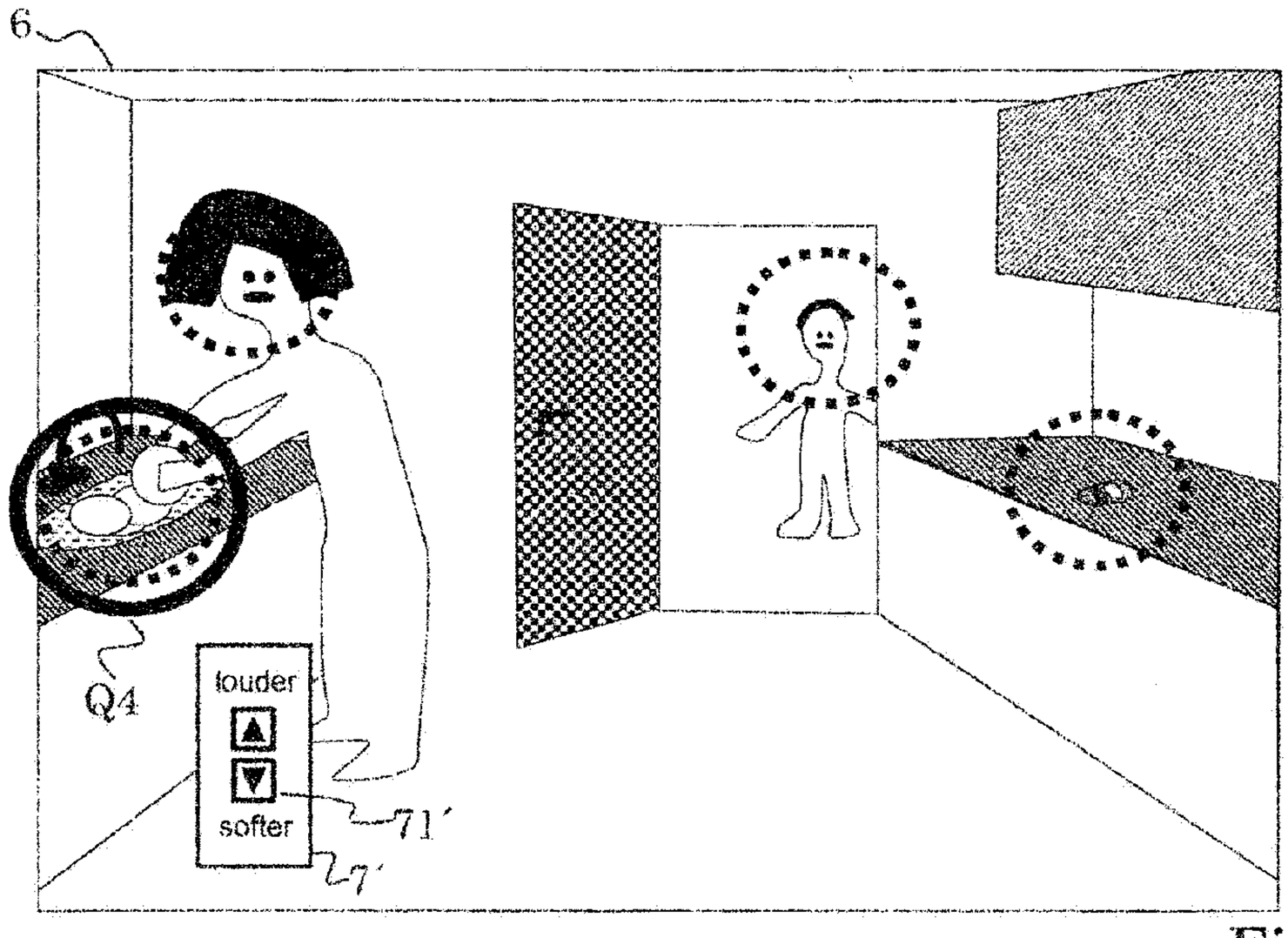
6
Q4
louder
softer
71'
7'

Fig. 5

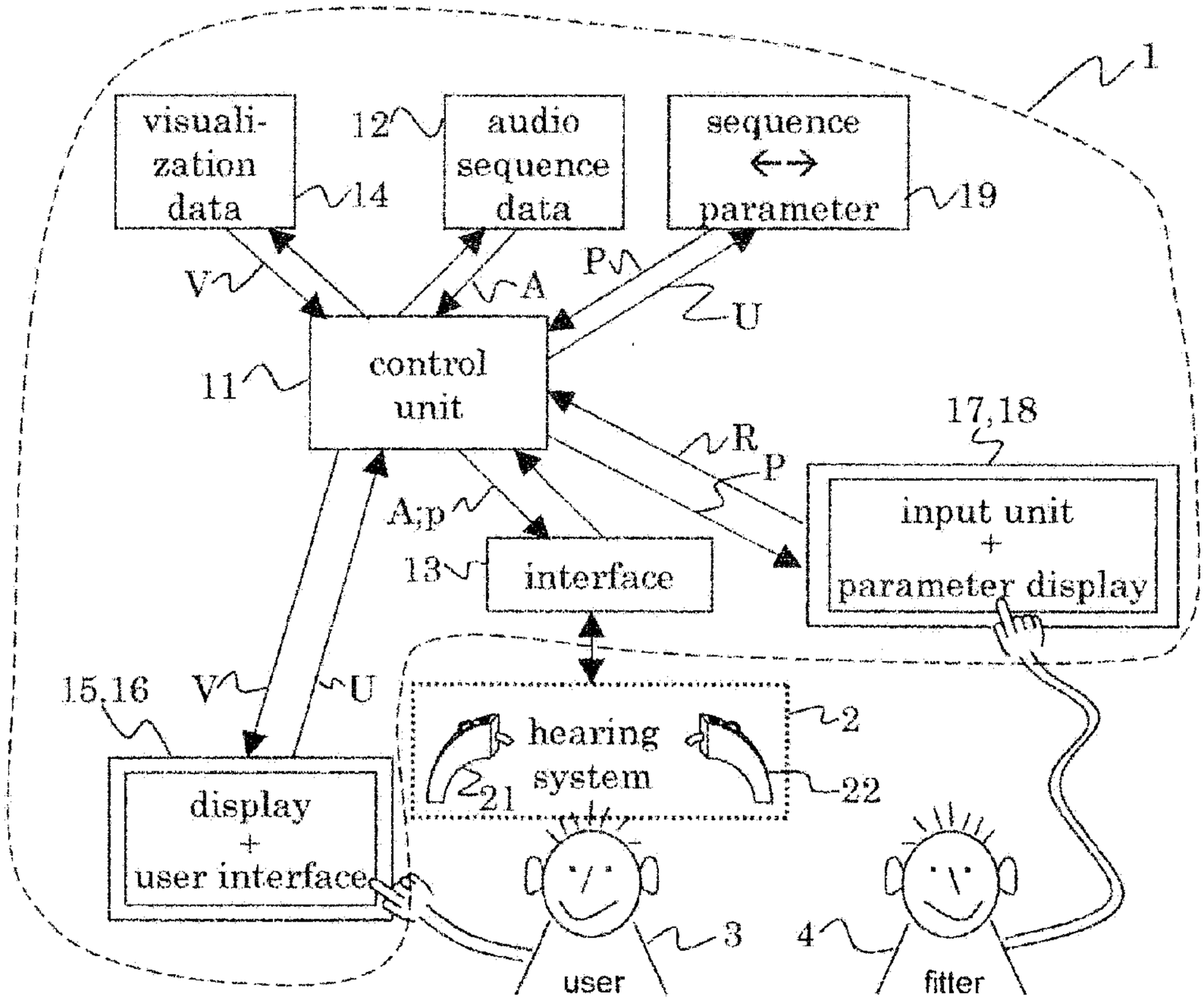
1
visuali-
zation
data
14
12
audio
sequence
data
sequence
↔
parameter
19
V
A
P
U
control
unit
11
17,18
R
P
input unit
+
parameter display
A;p
13
interface
15,16
V
U
display
+
user interface
hearing
system
2
21
22
user
3
4
fitter

Fig. 6