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(71) Applicant *(for all designated States except US)*: **PHONAK AG** [CH/CH]; Laubisrütistrasse 28, CH-8712 Stäfa (CH).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **AMBERG, Thomas** [CH/CH]; Langstr. 12, CH-8004 Zürich (CH). **LAUNER, Stefan** [DE/CH]; Im Trichtisal 39, CH-8053 Zürich (CH). **KRUEGER, Harald** [DE/CH]; Bahnhofplatz 9, CH-8910 Affoltern a. A. (CH).

(74) Agents: **SCHORER, Reinhard** et al.; Bauerstr. 22, 80796 München (DE).

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(54) Title: METHOD FOR PROVIDING DISTANT SUPPORT TO A PLURALITY OF PERSONAL HEARING SYSTEM USERS AND SYSTEM FOR IMPLEMENTING SUCH A METHOD

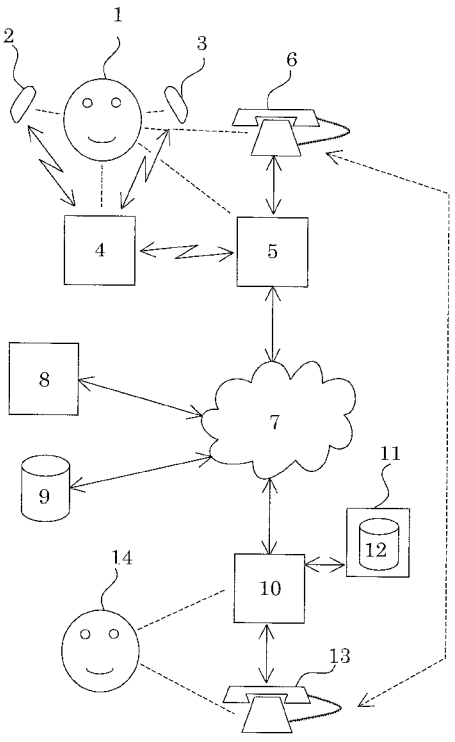

Fig. 1

(57) Abstract: Distant support is provided to a plurality of personal hearing system users (1) by a plurality of support providers (14). Prior to a support, users (1) are paired with providers (14) by storing a pairing information. When starting a support session, the stored pairing information is used to determine a support provider (14). The pairing information may be stored on a special pairing server (9). The pairing information comprises user identifications and/or support provider identifications. During a support session tasks such as remotely fine-tuning the personal hearing system (2, 3, 4) may be carried out. The method and the corresponding system have the advantage that support sessions can be initiated in a user friendly way.

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Method for providing distant support to a plurality of personal hearing system users and system for implementing such a method

Technical Field

The invention relates to the field of personal hearing systems. More particularly, it relates to a method for supporting a plurality of users of such systems over networks such as the internet by a plurality of support providers. Further, it relates to a system for implementing such a method.

Background of the Invention

A personal hearing system is a system which relates to the hearing of a particular individual. It may comprise as main components one or two hearing aids, also denoted as hearing prostheses, external and/or implanted, serving for compensating a hearing loss. However, it may also comprise as main components hearing protectors against harmful noise, communication devices allowing individuals to speak to each other remotely, inconspicuously and/or in noisy environments or headsets which deliver and/or pick-up sound at the head of an individual. There may also be auxiliary components, such as remote controls, audio streaming devices or fitting interface devices. Typically all components of a personal hearing system are designed such that they can be carried at least temporarily at the body of its user.

The configuration, also called fitting, and maintenance of a personal hearing system requires much expertise, special devices and/or special software. Therefore, conventionally, the user visits the support provider.

It is known to replace such visits by distant support sessions. For example, DE 199 38 318 A1 discloses a method for performing the fitting of a hearing aid over the internet.

Summary of the Invention

It is an object of the invention to provide for a method and system for providing distant support to a personal hearing system user in a user friendly way.

This object is achieved by a method as defined in claim 1 and a system as defined in claim 13.

The invention is beneficial in that it opens up the possibility to interconnect a support requesting user with a support provider in a user friendly way. In particular, the personal hearing system user does not have to remember and/or enter any support provider information.

The method of claim 2 is beneficial in that a memory for said pairing information is provided which allows easy monitoring and modification of said pairings.

The method of claim 4 is beneficial in that a memory for said pairing information is provided which does not require centralized infrastructure and/or which preserves or improves data privacy of the personal hearing system user.

The method of claim 6 is beneficial in that a memory for said pairing information is provided which does not require centralized infrastructure and/or which preserves or improves data privacy of the support provider.

The method of claim 8 is beneficial in that a support session workflow is defined which opens up the possibility to improve the user-friendliness for the support provider.

The method of claim 10 is beneficial in that an occasion or proceeding is identified for pairing and storing pairing information optimally during a personal hearing system usage life cycle.

The method of claim 11 is beneficial in that changing availability of support providers is handled.

Further embodiments and advantages emerge from the claims and the description referring to the figures.

Brief Description of the Drawings

Below, the invention is described in more detail by referring to the drawings showing exemplified embodiments.

Fig. 1is a block diagram of a system for providing distant support to a personal hearing device user by a support provider;

Fig. 2is a flow diagram of actions in a personal hearing system usage life cycle.

The described embodiments are meant as examples and shall not confine the invention.

Detailed Description of the Invention

Fig. 1 shows a system for providing distant support to a plurality of personal hearing device user 1 by a plurality of support providers 14. The term "distant" hereinafter is to be understood as "at least in another room ". Instead of "distant support" also the term "distance support" may be used. The personal hearing system in regard to which support is to be provided comprises a right hearing aid 2, a left hearing aid 3 and an auxiliary device 4. The auxiliary device 4 is communicating with the hearing aids and with a user computer 5. The user computer 5 is connected to the internet 7. A user voice terminal 6 is connected to the user computer 5. The user voice terminal 6 can for example be a headset comprising two earphones and a microphone. However, the voice terminal 6 can also be a conventional telephone connected to the telephone network. A relay server 8 and a pairing server 9 are connected to the internet 7. Relay server 8 and pairing server 9 may also be implemented as one device. The pairing information stored in the pairing server 9 associates identifications of hearing device users 1 with identifications of support providers 14. Also connected to the internet 7 is a supporter computer 10. A supporter voice terminal 13 is connected to the supporter computer 10. Supporter voice terminal 13 may also be a conventional telephone connected to the telephone network such that calls can be received from or made to voice terminal 6. Supporter computer 10 is configured to access a fitting server 11 which comprises a client database 12. Fig. 1

shows only one personal hearing system user 1 and only one support provider 14. However, there can be a plurality of personal hearing system users and a plurality of support providers, such as for example audiologists, acousticians and/or ENT-doctors. Instead of the internet 7 an other network as for example the telephone network may be used. The supporter computer 10, the fitting server 11 and the voice terminal 13 form part of a support provider system.

The right hearing aid 2 and the left hearing aid 3 are ear-level devices designed for compensating a hearing loss. Alternatively, only one side may be provided with a hearing aid. Further, instead of hearing aids, there may be one or two cochlear implants, each comprising implanted and external parts. In a so called bimodal fitting a conventional hearing aid on one side is combined with a cochlear implant on the other side. The term "ear-level" means worn at the ear, i.e. behind the ear, in the ear, in the canal and/or implanted.

The auxiliary device 4 shown in the example functions as an interface device for bidirectional data exchange between one or two hearing aids and a user computer 5. The data may be in particular fitting data, i.e. parameter adjustment instructions, or personal hearing system usage logging data. In a particular embodiment the auxiliary device 4 communicates with the hearing aid 2, 3 over a proprietary radio link and with the user computer 5 over Bluetooth and/or universal serial bus (USB). The auxiliary device 4 may have additional functionality, for example the functionality of a remote control for controlling hearing aids 2, 3 or the functionality of a streaming device for streaming data from alternative audio sources such as audio players, phones or companion microphones to hearing aids 2, 3. In an alternative embodiment the hearing aids 2, 3 may communicate directly with the user computer 5, such that the auxiliary device 4 may be omitted or may solely serve for the above mentioned additional functionalities. The auxiliary device 4 is preferably portable and suitable to be body-worn, for example like a medal on a necklace or in a pocket. Auxiliary device 4 and user computer 5 may also be one device, for example a portable device connected to the internet by a general packet radio service (GPRS) modem.

The user computer 5 can be a standard desktop type personal computer. However, it can also be a notebook, a net-book, a laptop, a tablet computer, a smart phone, a game or multi-media device, a set-top box or a device of the hearing system, such as enhanced remote control, an enhanced audio streaming device and/or a fitting interface device.

Fig. 2 shows a flow diagram of actions in a personal hearing system usage life cycle.

In a first stage 21 a personal hearing system user, and accordingly a personal hearing system, is paired with a support provider. It is assumed that there is only one personal hearing system per user. In the following the personal hearing system user is simply called "user". The pairing is carried out by writing a pairing information to a memory thereby obtaining a stored pairing information. For the storing of pairing information there are substantially three basic alternatives:

Alternative I: A user identification and a support provider identification are stored together in the memory of a device being distant from both, user and support provider. The device may be denominated "pairing server". The device may have further functionalities, such as the functionality of a relay server. In the process of pairing a personal hearing system user identification as well as a support provider identification must be obtained. Both are sent to, and stored in, the pairing server, in particular a database within the pairing server.

Alternative II: A support provider identification is stored in the hearing system. Any devices of the personal hearing system may receive this pairing information, in particular ear-level devices and/or auxiliary devices. It is to be noted that it is not necessary to store a user identification. The user identity is generally given by data already stored or by the context, as described further down below. Device identifications, such a serial numbers, can be used as user identification and may be already stored in the devices of the hearing system.

Alternative III: A user identification is stored in a device located at or associated with the support provider, in particular in a supporter computer. The term "associated with" is used to express the possibility that data of the support provider may not be stored locally in the supporter computer directly, but instead on a server on which the support

provider stores his or her data and/or on which he or she has a user account. It is to be noted, that it is not necessary to store a support provider identification. The support provider identity is generally given by data already stored or by the context, as described further down below. Device identifications, such a serial number of a fitting device, can be used as support provider identification and may be already stored in the devices of the support provider.

Even though the term "alternative" is used, the above described ways of storing pairing information can also be combined, i.e. the pairing information can be stored redundantly and/or in more than one place.

In the next two paragraphs it is discussed when and how such pairing information is preferably obtained and stored.

Especially for the above mentioned alternative I it is advantageous if the personal hearing system is for the pairing at least partially physically at said support provider. This is the case when user and support provider meet in person for handing over the devices and for the first fitting. According to an embodiment of the invention, preferably only the follow-up fittings, checks or support sessions are performed as distant support sessions. A personal meeting has the advantage, that user and support provider can get to know each-other, the handling of the device can be explained much better and calibrated equipment can be used, for example for audiometry, which is not available in a distant support session, because it is to expensive to be possessed by individual users. The pairing may be primarily controlled by a software running on the supporter computer. For performing the pairing all or a part of the personal hearing system may be connected to the supporter computer of the support provider, in the same or a similar manner as it can be connected to the computer of the user. Such a connection allows in particular to perform and or more of the following:

- write a user identification to the personal hearing system, in particular if there is not already a suitable identification stored in it;

- read a user identification, in particular a serial number or code, from the personal hearing system and send it together with a support provider identification to a relay and/or pairing server (alternative I);

- write a support provider identification to the personal hearing system (alternative II);

- read a user identification, in particular a serial number or code, from the personal hearing system and store it in the supporter computer or a device associated with it (alternative III).

However, the pairing can also be carried out while the personal hearing system and support provider are distant from each other and/or shortly before the actual distant support session. For such a pairing the storing according to the above mentioned alternatives II and III is most suitable. Either the user communicates a user identification to the support provider, or the support provider communicates a support provider identification to the user. Such a communication can be carried out by the telephone network, in particular verbally or by short message service. The user may call the support provider or vice versa. The person receiving the identification of the other person enters this information into his or her computer, which stores the information at least temporarily. This step is to be regarded as a storing of pairing information.

The user identification may be one or more of the following:

- an identification code or serial number of an ear-level hearing device, which is in particular readably stored in a non-volatile memory of said ear-level hearing device and/or printed on said ear-level hearing device;

- an identification code or serial number of an auxiliary device, which auxiliary device serves for connecting an ear-level hearing device with a user computer located at said personal hearing system user, which code or serial number is in particular stored in a non-volatile memory of said auxiliary device and/or printed on said auxiliary device;

- an identification code, serial number, network address and/or login name of, or for, a user computer located at said at least one personal hearing system user;

- a random number or random code;

- a random number or random code which is long enough to be substantially globally unique;

- a globally unique identifier (GUID);

- a name, pseudonym, e-mail address, web-site address, customer number and/or phone number of said at least one personal hearing system user.

The support provider identification may be one or more of the following:

- an identification code, serial number, network address and/or login name of, or for, a supporter computer located at said support provider;

- a identification code or serial number of a fitting device;

- a random number or random code;

- a random number or random code which is long enough to be substantially globally unique;

- a globally unique identifier (GUID);

- a name, pseudonym, e-mail address, web-site address, vendor number and/or phone number of said at least one support provider.

The above user and/or support provider identifications may be favorable in one or more of the following aspects:

- memorability by a user;

- communicability over a telephone;

- avoidance of additional system complexity by using already existing information;

- use of information which is already stored in and/or printed on devices for other reasons;

- possibility to exchange parts of the hearing system without having to redo the pairing;

- avoidance of redundant use of identifications, locally and/or globally.

In a second stage 22 support is request by the user over the internet. A mentioned above, the user may already have contacted the supporter already shortly before for the pairing by phone, therefor the term "request" is to be regarded in the context of the data network. The personal hearing system user should have access to a user computer connected to the internet. For performing support sessions a special application software may have to be installed on this user computer. A corresponding installation software may be stored in a memory of a component of said personal hearing system, for example in an auxiliary device. The auxiliary device may be connected to the user computer by a USB interface and may be recognized as an external hard drive. For initiating the support request the user must start the application software and establish a data connection between the personal hearing system and the user computer. This may include switching on an auxiliary or interface device, connecting cables and/or pairing Bluetooth devices. A data connection is established between the user computer and the relay server. The support request is transmitted to the relay server.

In case of the above mentioned alternatives I and III the support request should be accompanied by the user identification. The user identification can be obtained by reading it from the personal hearing system, i.e. for example from ear-level devices or from an auxiliary device.

In case of the above mentioned alternative II the support request should be accompanied by the support provider identification. The support provider identification can be obtained by reading it from the hearing system where it has been stored during the pairing.

In a third stage 23 a support provider is determined based on the stored pairing information.

According to the above mentioned alternative I the stored pairing information is on a pairing server or in a memory of the relay server and comprises pairs of user identifications and support provider identifications. The relay or pairing server or, more precisely, a software running on such a server looks up which support provider is paired with the user identification accompanying the support request. It thereby determines a support provider identification.

According to the above mentioned alternative II the support request is already accompanied by an identification of a support provider, which has been determined by pairing information stored in the hearing system.

According to the above mentioned alternative III the pairing information is a user identification which is stored in a device located at the support provider. It must therefore be transmitted to the relay and/or pairing server preferably together with a sender identification. The relay and/or pairing server determines a particular support provider by comparing user identifications received from support providers with the user identification of the support requesting user.

In a fourth stage 24 a data connection is established between the supporter computer located at the support provider and the user computer located at the support requesting user. The data connection may be direct or indirect over a relay server. The identifications may already be or contain a network address or, if necessary, network addresses may be determined based on a look-up table. The support request may be signaled to the support provider by a software running on the computer of the support provider. The support provider may have to accept the support request actively. In case of alternatives I and II a user identification may have to be transmitted to the supporter computer.

In a typical scenario the support provider signals his or her availability to the system before a user request support, for example by connecting every morning as a client to a relay server. However, it is also possible that the support provider connects "just in time", at the same time as the user or even after the user, for example according to a prearranged appointment or after being alerted by an SMS (Short Message Service) text message.

In a fifth stage 25 a support session is performed. The support provider supports the personal hearing system user who requested support in regard to his or her personal hearing system. The user identification may be used to automatically load client data associated with the user identification from a client data base, in particular into a fitting software. During the support session one or more of the following tasks in regard to said personal hearing system may be performed:

- verbally communicating with the user;
- determining a necessary support action;
- changing or adjusting parameters;
- changing or adjusting signal processing parameters;
- performing a fine tuning or follow-up fitting;
- reading and evaluating personal hearing system usage logging data;
- presenting hearing test stimuli;
- performing hardware tests;
- giving usage and/or maintenance instructions.

In the described distant support method there is a data exchange over the internet between the user computer, i.e. the computer located at the user, and the supporter computer, i.e. the computer located at the support provider. The term "located at" in this context means not being distant, i.e. substantially at the same location, namely in the same room. In a preferred embodiment, prior to such a data exchange, an internet data connection is established between the user computer and the relay server, wherein the user computer acts as client and said relay server acts as server, and a further internet data connection is established between the supporter computer and the relay server, wherein the supporter computer acts as client and the relay server acts as server. Data exchanged between the user computer and the supporter computer is relayed by the relay server. This solution has the advantage, that both, user and support provider, may be

behind a firewall which allows only basic internet access, such as access of external web-sites or web-servers in the role of a web-client. The relay server may act a conventional web-server.

The availability of support providers may change, for example due to vacation absences. In this case, the stored pairing information may be changed by replacing support provider identifications, or by a substitution look-up table. Storing pairings on a pairing server according to the above mentioned alternative I has the advantage that there is one central place where such pairings can be changed.

Storing pairings on a pairing server according to the above mentioned alternative I has further the advantage that statistical data can be obtained by evaluating stored paring information. Data can be logged in regard to successful and/or failed support requests. Further, it is possible to supervise a compliance with quality standards, in particular by analyzing the frequency and successfulness of support requests.

Claims

1. A method for providing distant support to a plurality of personal hearing system users (1) by a plurality of support providers (14), such as audiologists, acousticians and/or ENT-doctors, comprising the steps of

A) pairing at least one personal hearing system (2, 3, 4) of a personal hearing system user (1), with at least one support provider system (10, 11, 13) by writing a pairing information to a memory (9), thereby obtaining a stored pairing information;

B) requesting support by said at least one personal hearing system (1);

C) determining a support provider system (10, 11, 13) based on said stored pairing information;

D) establishing a data connection between a supporter computer (10) of said support provider system (10, 11, 13) and a user computer (5) located at said at least one personal hearing system (2, 3, 4);

E) performing a support session, in which said support provider system (14) is used for supporting said personal hearing system (2, 3, 4).

2. The method of claim 1, wherein step A) comprises the steps of:

A1) obtaining a personal hearing system user identification;

A2) obtaining a support provider identification;

A3) sending said personal hearing system user identification and said support provider identification to a pairing server (9) and storing it in said pairing server (9);

3. The method of claim 2, wherein steps B) and C) comprise the steps of:

B1) establishing a data connection between said personal hearing system (2, 3, 4) and said user computer (5);

B2) obtaining said personal hearing system user identification by reading it from said personal hearing system (2, 3, 4);

B3) establishing a data connection between said user computer (5) and a relay server (8) and/or said pairing server (9);

B4) transmitting said personal hearing system user identification to said relay server (8) and/or said pairing server (9);

C1) determining said support provider identification by said relay server (8) and/or said pairing server (9) by looking up which support provider system (10, 11, 13) is paired with said at least one personal hearing system (2, 2, 3, 4);

4. The method of claim 1, wherein step A) comprises the steps of

A1) obtaining a support provider identification;

A2) writing said support provider identification to said personal hearing system (2, 3, 4), in particular to an ear-level device (2, 3) and/or to an auxiliary device (4).

5. The method of claim 4, wherein steps B), C) and D) comprise the steps of:

B1) establishing a data connection between said personal hearing system (2, 3, 4) and said user computer (5);

C1) obtaining a first support provider identification by reading it from said personal hearing system (2, 3, 4);

D1) establishing a data connection between said user computer (5) and a relay server (9), said user computer (5) acting in a role of a first client;

D2) transmitting said first support provider identification from said user computer (5) to said relay server (9);

D3) establishing a data connection between said supporter computer (10) and said relay server (9), said supporter computer (10) acting in a role of a second client;

D4) obtaining a second support provider identification, in particular by reading it from a memory of a device located at or associated with said support provider;

D5) transmitting said second support provider identification from said supporter computer (10) to said relay server (9);

D6) detecting a concordance of said first support provider identification and said second support provider identification;

D7) establishing a data connection between said first and second client;

6. The method of claim 1, wherein step A) comprises the steps of

A1) obtaining a personal hearing system user identification;

A2) writing said personal hearing system user identification to a memory of a device located at or associated with said support provider, in particular a memory of said supporter computer (10) and/or a memory of a fitting device.

7. The method of claim 6, wherein steps B), C) and D) comprise the steps of:

B1) establishing a data connection between said personal hearing system (2, 3, 4) and said user computer (5);

C1) obtaining a first personal hearing system user identification, in particular by reading it from said personal hearing system (2, 3, 4);

D1) establishing a data connection between said user computer (5) and a relay server (9), said user computer (5) acting in a role of a first client;

D2) transmitting said first personal hearing system user identification from said user computer (5) to said relay server (9);

D3) establishing a data connection between said supporter computer (10) and said relay server (9), said supporter computer (10) acting in a role of a second client;

D4) obtaining a second personal hearing system user identification, in particular by reading it from a memory of a device located at or associated with said support provider;

D5) transmitting said second personal hearing system user identification from said supporter computer (10) to said relay server (9);

D6) detecting a concordance of said first personal hearing system user identification and said second personal hearing system user identification;

D7) establishing a data connection between said first and second client;

8. The method of one of the preceding claims, wherein step E) comprises the steps of:

E1) obtaining a personal hearing system user identification by said supporter computer (10), in particular by reading it from a memory and/or by receiving it from said relay server (8) and/or said pairing server (9);

E2) automatically loading client data which is associated with said personal hearing system user identification from a client data base (12), in particular into a fitting software;

E3) performing one or more of the following tasks in regard to said personal hearing system (2, 3, 4):

- verbally communicating with said personal hearing system user (1);

- determining a necessary support action;

- changing or adjusting parameters;

- changing or adjusting signal processing parameters;

- performing a fine tuning or follow-up fitting;

- reading and evaluating personal hearing system usage logging data;

- presenting hearing test stimuli;

- performing hardware tests;

- giving usage and/or maintenance instructions.

9. The method of one of the preceding claims, wherein said personal hearing system (2, 3, 4) comprises one or more of the following:

- an ear-level hearing aid device (2, 3) designed for compensating a hearing loss;

- a cochlear implant, comprising implanted and external parts;

- an auxiliary device (4), in particular a portable and/or body-worn device, which serves for one or more of the following purposes:

- remote controlling an ear-level device;

- streaming data from an alternative audio source to an ear-level device (2, 3);

- providing fitting functionality by interfacing between a user computer (5) and ear-level devices (2, 3), in particular based on data transmission by radio, universal serial bus and/or Bluetooth.

10. The method of one of the preceding claims, wherein step A) is carried out in one of the following ways:

- while said personal hearing system (2, 3, 4) is at least partially physically at said support provider (14), in particular during a first fitting of said personal hearing system (2, 3, 4);

- comprising the step of communicating a personal hearing system user identification over a telephone network from said at least one personal hearing system user (1) to said at least one support provider (14), in particular verbally or by short message service;

- comprising the step of communicating a support provider identification over a telephone network from said at least one support provider system (10, 11, 13) to said at least one personal hearing system (, 2, 3, 4), in particular verbally or by short message service.

11. The method of one of the preceding claims, wherein an availability of a support provider changes, said method further comprising one or more of the following steps:

- revising said stored pairing information, as the case may be, in said relay server (8) and/or said pairing server (9), by replacing support provider identifications;

- providing a substitution look-up table, in particular, as the case may be, in said relay server (8) and/or said pairing server (9).

12. The method of one of the preceding claims, wherein said user computer (5), which is used in requesting and carrying out said support session, is a fitting interface device (4).

13. A system for providing distant support to a plurality of personal hearing system users (1) by a plurality of support providers (14) comprising at least:

- a personal hearing system (2, 3, 4) in regard to which support is to be provided and which is to be used by a personal hearing system user (1);

- a data network (7);

- a user computer (5) connected to said data network (7), said user computer (5) being located at said personal hearing system (2, 3, 4);

- a supporter computer (10) connected to said data network (7), said supporter computer (10) forming part of a support provider system (10, 11, 13);

- means (4) for providing a data connection between said personal hearing system (2, 3, 4) and said user computer (5);

- a relay server (8) and/or a pairing server (9) connected to said data network (7);

- means (9) for pairing personal hearing system (2, 3, 4) with support provider systems (10, 11, 13), , said means for pairing comprising a memory (9) capable of storing pairing information;

- means for requesting support upon initiation by said personal hearing system (2, 3, 4);

- means for determining a support provider system (10, 11, 13) based on said stored pairing information;

- means for establishing a data connection between a supporter computer (10) located at said support provider (14) and said user computer (5);

- means for performing a support session, in which said support provider system (10, 11, 13) is supporting said at least one personal hearing system (2, 3, 4).

14. The system of claim 13, wherein said means for pairing in particular comprise a software running on said supporter computer (10).

15. The system of one of claims 13 and 14, wherein said memory (9) is part of at least one of said relay server (8), said pairing server (9) said personal hearing system (1), said supporter computer (10) and a device forming part of or being associated with said support provider system (10, 11, 13).

16. The system of one of claims 13 to 15, wherein said means for requesting support comprise an application software running on said user computer (5).

17. The system of one of claims 13 to 16, wherein said means for determining a support provider system (10, 11, 13 comprise a software running on said relay server (8) and/or said pairing server (9).

18. The system of one of claims 13 to 17, wherein said means for establishing a data connection between the supporter computer (10) and the user computer (5) comprise a software running on said relay server (8).

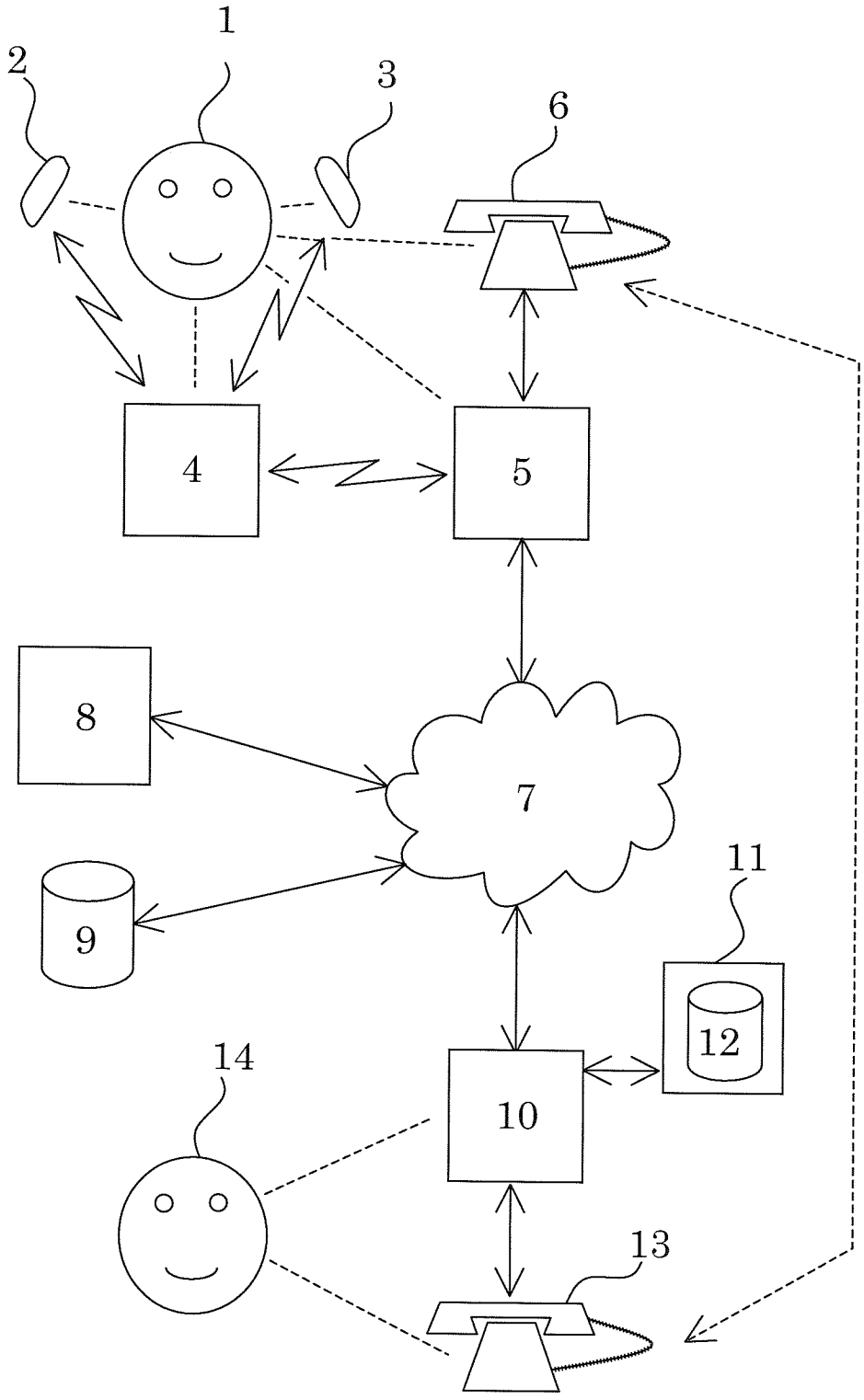

Fig. 1

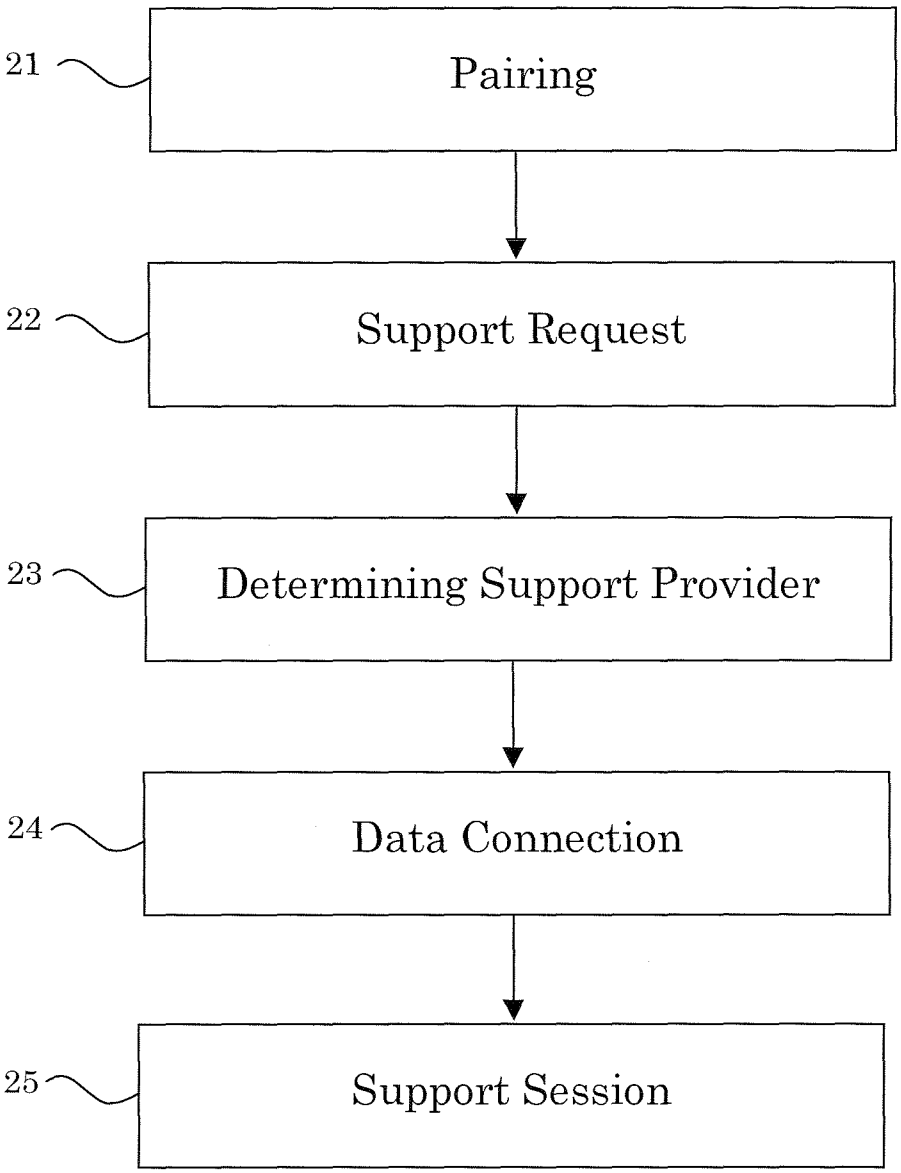
21
Pairing
22
Support Request
23
Determining Support Provider
24
Data Connection
25
Support Session

Fig. 2