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(54) **Ear appliance cleaning system and method**

(57) Ear appliance cleaning system comprising a container (1) with an opening (2) adapted for receiving an ear appliance (3) and a fluid handling system (5) adapted to apply a cleaning fluid (33) to the ear appliance when placed in the opening. The cleaning fluid comprise water with a salt dissolved therein.

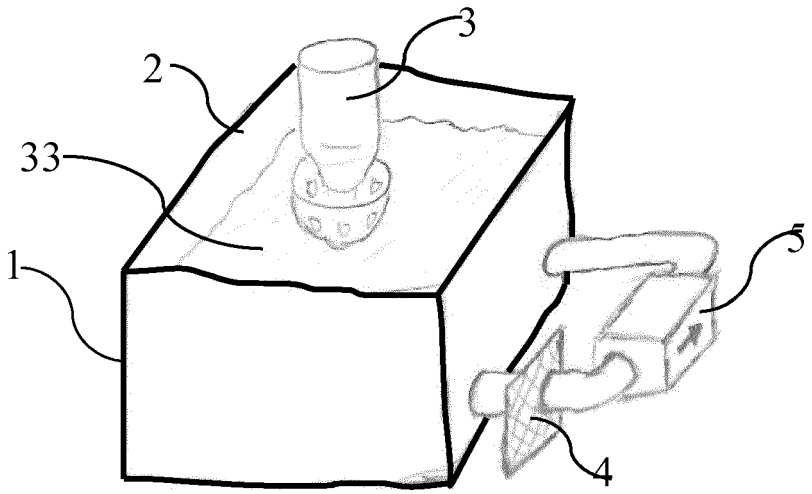

Fig. 2

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Description

AREA OF THE INVENTION

[0001] The invention comprises an ear appliance cleaning system and method. It is known to clean hearing aids and other ear appliances such as headsets by using different solvents and detergents with the aim of removing residues such as earwax, however the results are not always convincing, as earwax is a substance, which is not altogether easy to dissolve.

BACKGROUND OF THE INVENTION

[0002] It has surprisingly been found that sear-water has the capacity to loosen earwax from surfaces such as rubber and harder plastics. The invention aims at providing an improved cleaning system for ear appliances.

SUMMARY OF THE INVENTION

[0003] Accordingly an ear appliance cleaning system is provided which comprises a container with an opening adapted for receiving an ear appliance and a fluid handling system adapted to apply a cleaning fluid to the ear appliance when placed in the opening, wherein the cleaning fluid comprise water with a salt dissolved therein. When the earwax which may have been deposited on surfaces of the ear appliance is subject to the rinsing action of the salt water, the cleaning fluid will dissolve the ear wax which will release itself from the surface and end up in the cleaning fluid without brushing, rubbing or other mechanical action which is otherwise common in cleaning action.

[0004] The salt comprises NaCl which is the most prominent ingredient in sea salt. But other salt materials may also be present as is the case when the solution is based on sea salt.

[0005] The salt concentration in the cleaning fluid may be no less than 10 g/liter, or preferably no less than 20 g/liter, or no less than 30 g/liter.

[0006] Other types of detergents or solvents may be part of the cleaning fluid.

[0007] A timer may be part of a cleaning system, and adapted to limit the time in which the ear appliance is subject to the influence of the cleaning fluid.

[0008] The time may be adapted to control the action of a pump delivering and/or removing the salt water to respectively from the ear appliance or the timer may be adapted to control the action of a motor adapted to move the ear appliance and the cleaning fluid with respect to each other.

[0009] An opening of a container, which is part of the system, may comprise a holding means adapted to hold the ear appliance in a pre-defined orientation with respect to the opening.

[0010] The invention also regard a method for cleaning an ear appliance, wherein the a part of the appliance, situated within the ear canal during normal use of the appliance is subject to the influence of a cleaning fluid with salt comprising NaCl dissolved therein. A main component of the cleaning fluid may be water. Preferably the salt concentration is no less than 10 g/liter, or preferably no less than 20 g/liter or most preferably is at least 30 g/liter.

[0011] Other detergents or solvents may be part of the cleaning fluid.

[0012] The method may comprise placing the ear appliance in a holder which is part of the cleaning system, and where holder and the cleaning fluid are moved with respect to each other, to ensures that at least a part of the appliance is subject to the influence of the salt containing fluid.

[0013] It is intended that the structural features of the system described above, in the detailed description of and in the claims can be combined with the method, when appropriately substituted by a corresponding process. Embodiments of the method have the same advantages as the corresponding systems.

[0014] Further objects of the invention are achieved by the embodiments defined in the dependent claims and in the detailed description of the invention.

[0015] From the view point of the skilled person, the use of salt water is not advisable, as the delicate electronics of ear appliances such as hearing aids or headsets are likely to sustain some damage due to the corrosive action of the combination of salt and water. However, it has been shown, that careful control of the watertightness of the in-the-ear parts of the device may surprisingly overcome such problems.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

Fig. 1 shows a hearing aid partially submerged in a salt water solution,

Fig. 2 shows a schematic representation of a hearing aid placed in a container with a water conditioning and agitation system,

Fig. 3 shows a hearing aid in a container with a water agitation propeller,

Fig. 4 shows a hearing aid in a holder or fixture above a water surface,

Fig. 5 shows a schematic representation of a system for moving the hearing aid and the water container with respect to each other,

Fig. 6 shows an alternative system for moving hearing aid and water container with respect to each other,

Fig. 7 is a schematic representation of a pair of hearing aids of the type having a part behind the ear and a part situated in the ear canal of a user, when in use,

Fig. 8 shows a holder for a hearing aid of the type,

Fig. 9 shows a schematic representation of a waterproof hearing aid.

[0017] The figures are schematic and simplified for clarity, and they just show details which are essential to the understanding of the invention, while other details are left out. Throughout, the same reference numerals are used for identical or corresponding parts.

[0018] Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

DESCRIPTION OF A PREFERRED EMBODIMENT

[0019] An ear appliance cleaning system is shown in fig. 1 and fig. 2. A container 1 with an opening 2 adapted for receiving an ear appliance 3 and a fluid handling system 5 adapted to apply a fluid 33 to the ear appliance 3 when placed in the opening 2. The fluid 33 comprise water with salt dissolved therein. In fig. 2, further a filter 4 is schematically indicated, and possibly the fluid handling system comprises a pump 5, which is adapted to cause the water to flow through the filter 4 in order that ear wax or other debris from the cleaning or rinsing operation may be filtered out of the water. As seen in fig. 1, the ear appliance 3 may simply be plunged into the fluid through the opening 2 and left for a certain time in the water. The user may perform some kind of time keeping, and possibly agitate the ear appliance with respect to the water if needed in order to make sure, that all earwax has been rinsed of the ear appliance.

[0020] There are a number of salts, which could be used, but preferably sea salt may be employed as this performs satisfactory and is very common all over the world. The main ingredient in seasalt is NaCl. The salt concentrations may be no less than 10 g/liter, or preferably no less than 20 g/liter, or no less than 30 g/liter. Possibly the user may mix salt and water, and pour the mixture into container 1. Alternatively, pre-mixed solutions may be sold to the user. Further detergents or solvents may be part of the cleaning fluid.

[0021] In an embodiment a cleaning system comprises a timer 10, 10a (shown in fig. 5) which is adapted to limit the time in which the ear appliance is subject to the influence of the salt water. The timer 10 may directly control the immersion of the hearing aid in the fluid 33, such as by elevating the hearing aid 3 out of the fluid 33 after a predetermined time. The timer 10a may alternatively or also control some aspect of the fluid 33, such as fluid motion and fluid agitation, and in fig. 5 this is indicated by the timer 10a being in control of a motor 6 driving a fluid impeller such as a propeller 7 submerged into the fluid in the container 1. Also such a timer 10, 10a could be used to control the fluid by the control of a pump, adapted to pump fluid into and out of the container 1.

[0022] In fig. 5 it is indicated that the hearing aid 3 is lifted or lowered with respect to the fluid 33, but it is possible to move the container 1 with respect to a stationary hearing aid or it is possible to pump the fluid and sprinkle it onto parts of the hearing aid 3.

[0023] As further seen in fig. 4 and 5 the opening 2 of the container 1 may be equipped with holder 9 for holding the ear appliance or hearing aid 3 in a pre-defined orientation with respect to the opening 2. As seen a domed part 34 is shown submerged into the water 33 and thereby cerumen or ear-wax may be rinsed off the surface of such a domed part.

[0024] The holder 9 is part of a fixture 8, and in the fixture charging points 31a, 30a may be provided corresponding to charging points 30, 31 in the hearing aid. In this way the hearing aid may be charged while being cleaned.

[0025] Fig. 6 discloses a further way of ensuring relative movement between the hearing aid and the body of water 33. In this embodiment the container 2 is a cup or similar vessel, and the holder 9 and agitator 7 are attached to a yoke 12 placed above the cup 2. The yoke 12 is hingedly attached to a base 13, and may swing or pivot about a hinge axle 14 to lift the hearing aid 3 and agitator 7 out of or into the body of water 33 contained in the cup 2 as indicated by arrow 15. The agitator 7 is driven by a motor 6 when the yoke is moved into position to submerge the hearing aid or parts thereof in the water 33.

[0026] In fig. 7 a hearing aid is shown which comprises a behind the ear part 16 and an in the ear part 17 and only the in the ear part 17 is waterproof and subjected to the water treatment. As seen, the holder 9 is adapted to grip the in the ear part 17 and lower it into the water, while the behind the ear part 16 is not subjected to the water treatment. The arrows 28 indicates how the in the ear part is to be moved by the user in order to become engaged by holder 9. A holder 9 is shown in more detail in fig. 8 where also it is shown that the behind the ear part 16 may be removed from the device prior to treatment in case the hearing aid allows for such taking apart of the device. The hearing aid part 23 may be a simple ear plug or may comprise a receiver or speaker.

[0027] In fig. 9 a schematic representation of a hearing aid 3 is shown. The hearing aid comprises a sound exit opening 23 with a membrane 24 which is sound transparent and water impermeable provided to cover the sound exit opening 23. The hearing aid 3 further comprises a microphone 25, and here also a membrane 26 may be placed over the sound entrance opening 27. The microphone 25 captures sounds in the surroundings, transduce the sound signal into an equivalent electrical signal. The electrical signal is enhanced in a signal processor 35 and an enhanced electrical signal is served at the receiver 22, which then in turn transduce the electrical signal back into a sound signal, which is served at the ear of the user. The various parts mentioned here may be provided in one and the same casing as schematically

shown in fig. 9 or they may be dispersed in various different casing parts such as is the case in the embodiment shown in fig. 7. The hearing aid usually comprises a number of further elements such as a battery and an antenna, but for reasons of simplicity these elements have not been shown in the drawing. In any of the above described cleaning devices, provisions may be made for a subsequent drying process, such that a dry device may be handed over to the user.

Claims

1. Ear appliance cleaning system comprising a container with an opening adapted for receiving an ear appliance and a cleaning fluid handling system adapted to apply a cleaning fluid to the ear appliance when placed in the opening, wherein the cleaning fluid comprise water with a salt dissolved therein.

2. Ear appliance cleaning system as claimed in claim 1 wherein the salt comprises NaCl.

3. Ear appliance cleaning system as claimed in claim 2 wherein the salt is sea salt.

4. Ear appliance cleaning system as claimed in claim 2 wherein the salt concentrations is no less than 10 g/liter, or preferably no less than 20 g/liter, or no less than 30 g/liter.

5. Ear appliance cleaning system as claimed in claim 4, wherein further detergents or solvents are part of the cleaning fluid

6. Ear appliance cleaning system as claimed in any one of claims 1- 5 wherein the system comprises a timer adapted to limit the time in which the ear appliance is subject to the influence of the cleaning fluid.

7. Ear appliance cleaning system as claimed in claim 6, wherein the timer is adapted to control the action of a pump delivering and/or removing the cleaning fluid to the ear appliance or a motor adapted to move the ear appliance and the cleaning fluid with respect to each other.

8. Ear appliance cleaning system as claimed in any of the above claims, wherein the opening comprise a holder adapted to hold the ear appliance in a predefined orientation with respect to the opening.

9. Method for cleaning an ear appliance, the ear appliance comprising an ear part situated within the ear canal during normal use of the appliance, the method comprising the step of subjecting at least the in-the-ear part to the influence of a cleaning fluid comprising water with salt comprising NaCl dissolved therein.

10. Method as claimed in claim 9, wherein the salt concentration in the cleaning fluid is no less than 10 g/liter, or preferably no less than 20 g/liter or most preferably is at least 30 g/liter.

11. Method as claimed in claim 9 whereby the appliance is placed in a holder which is part of the cleaning system, and where relative movement between the holder and the cleaning fluid ensures that at least the ear part of the appliance is subject to the influence of the cleaning fluid.

12. Method as claimed in claim 11, whereby the subjection to the cleaning fluid is timed to last a pre-determined duration.

13. Ear appliance apparatus adapted to be used in a method as claimed in claim 9, whereby the ear appliance is water-proof.

14. Ear appliance apparatus as claimed in claim 13, whereby the apparatus comprises a behind the ear part and an in the ear part, and wherein only the in the ear part is waterproof.

15. Ear appliance apparatus as claimed in claim 13, wherein a sound exit opening is provided in an in the ear part of the appliance and that an acoustically transparent and water impermeable membrane is provided to cover the sound exit opening.

16. Ear appliance apparatus as claimed in claim 15, wherein a microphone sound input opening is provided at the in the ear part of the appliance and that an acoustically transparent and water impermeable membrane is provided to cover the microphone sound input opening.

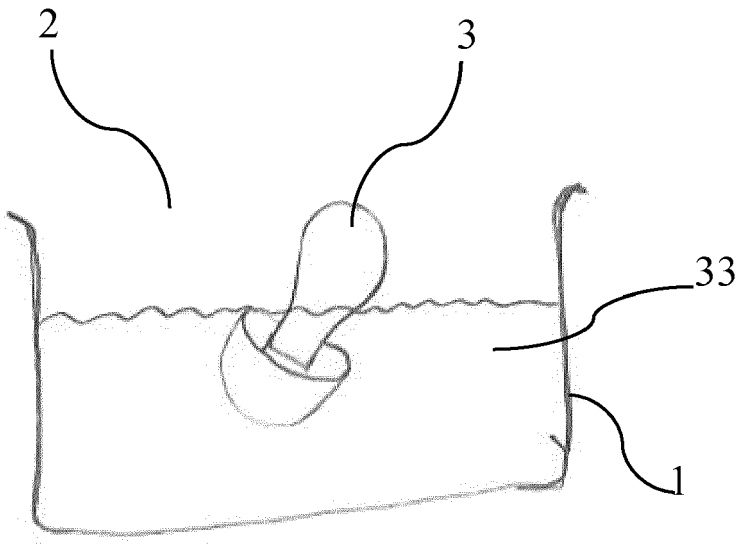

Fig. 1

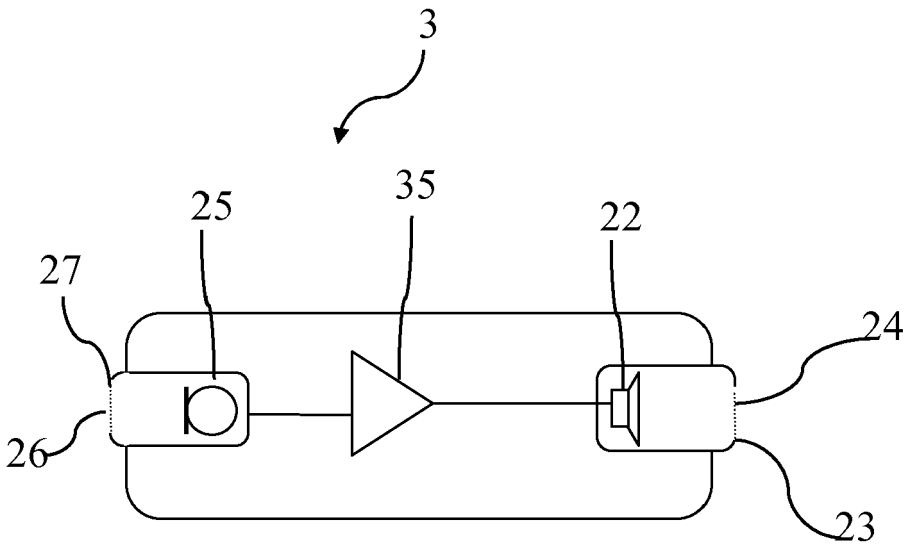

Fig. 9

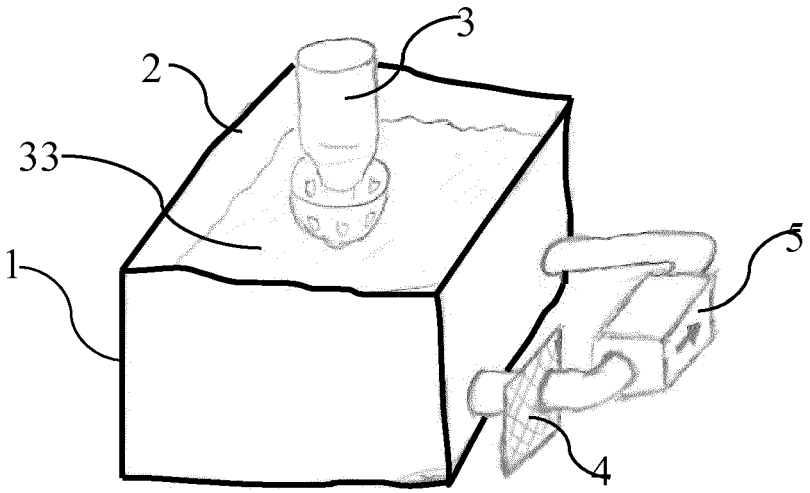

Fig. 2

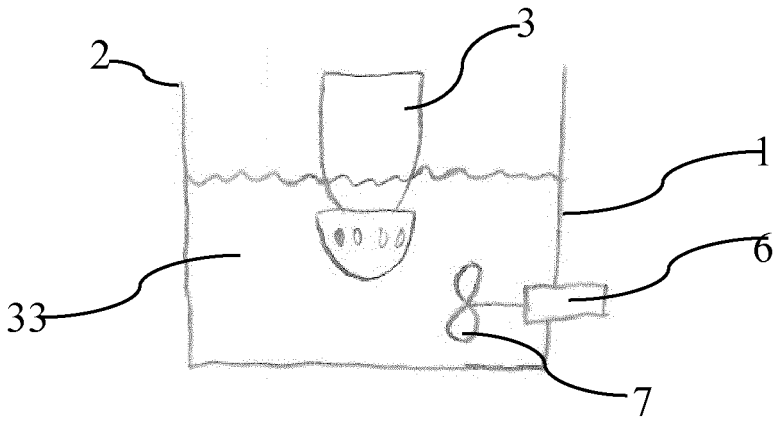

Fig. 3

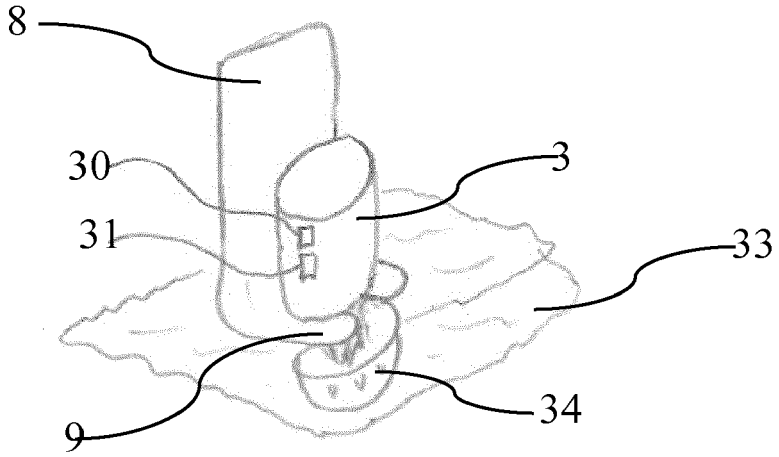

Fig. 4

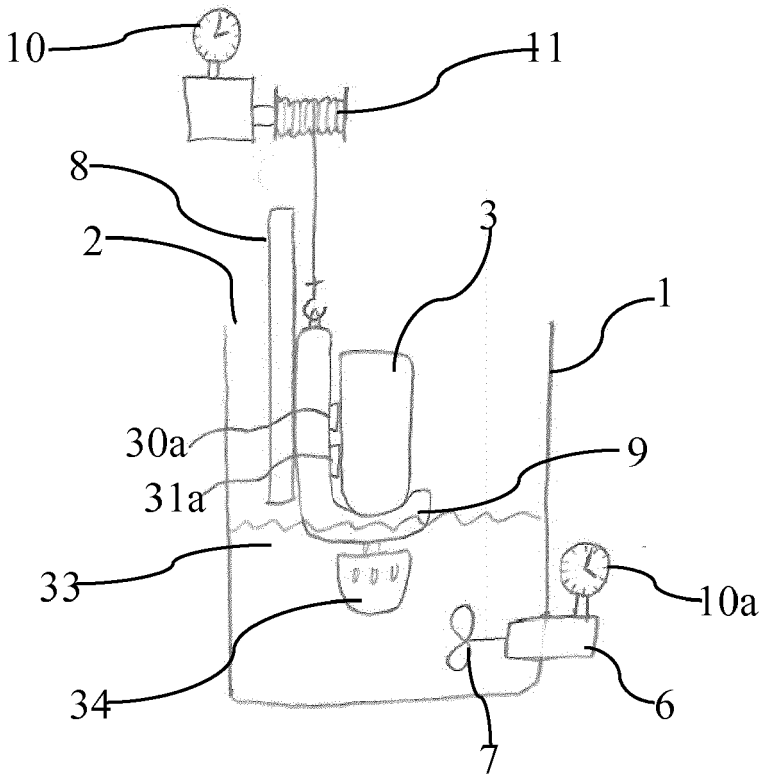

Fig. 5

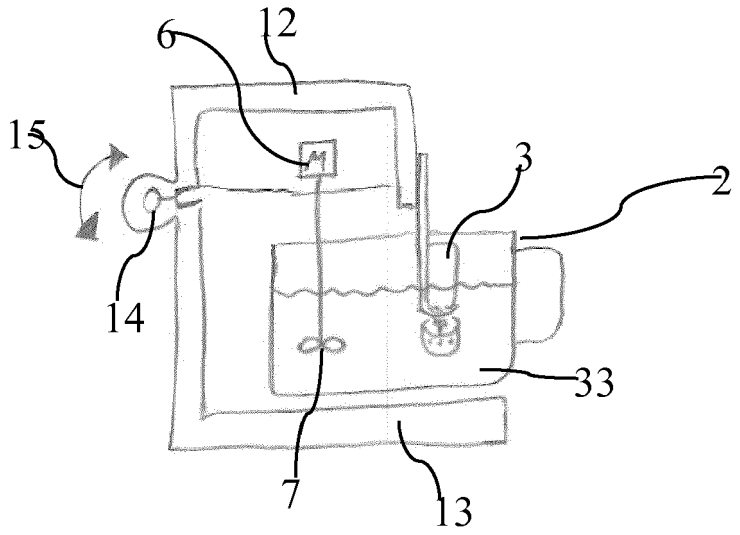

Fig. 6

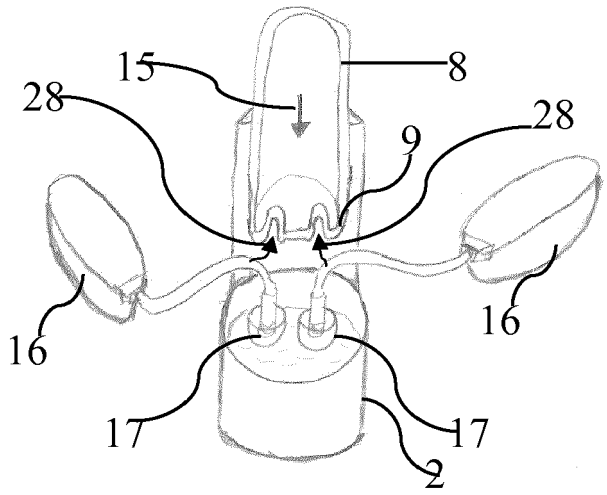

Fig. 7

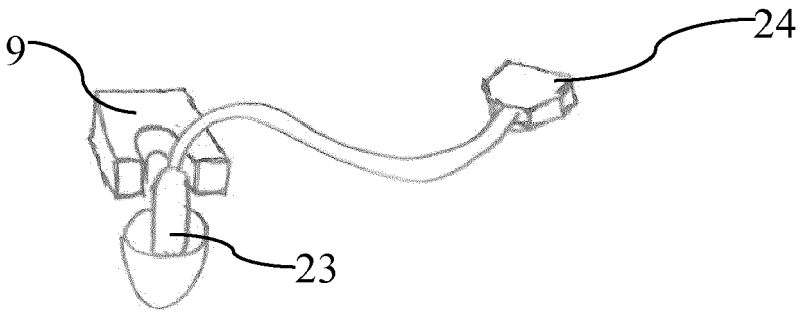

Fig. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 12 18 8496

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	WO 2005/125276 A1 (JOHNSON & JOHNSON CONSUMER [US]; CRONIN JOHN; NARSANA TUSHAR [US]; BUR) 29 December 2005 (2005-12-29) * page 6, line 19 - line 21 * * page 16, line 28 - page 17, line 5 * * page 18, line 1 - line 3 * * page 18, line 1 - line 21 * * page 29, line 23 - page 30, line 2 * * figure 3 *	1-12	INV. B08B3/04 B08B3/08 A61L2/18
Y	EP 0 747 044 A1 (MAUGENDRE RENEE JANE [FR]) 11 December 1996 (1996-12-11) * page 4, line 36 * * page 2, line 32 - line 33 *	1-12	
A	US 2 675 814 A (BUTLER STANLEY S) 20 April 1954 (1954-04-20) * column 2, line 38 - line 49 *	1	
A	US 2008/128007 A1 (STERN ARI K [US]) 5 June 2008 (2008-06-05) * paragraph [0003] * * paragraph [0026] - paragraph [0028] * * paragraph [0044] * * paragraph [0065] - paragraph [0066] * * figure 5 *	1,8,11	

TECHNICAL FIELDS SEARCHED (IPC)
B08B
A61L
C11D

~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
The Hague	14 February 2013	Posten, Katharina

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

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Application Number
EP 12 18 8496

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-12

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 12 18 8496

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-12

Ear appliance cleaning system with a salt-based cleaning solution, a timer and an ear appliance holder element.

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2. claims: 13-16

Ear appliance that is at least partially waterproof, using for example a water impermeable membrane.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 12 18 8496

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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14-02-2013

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2005125276 A1	29-12-2005	EP 1767055 A1	28-03-2007
		EP 1792518 A2	06-06-2007
		US 2008240452 A1	02-10-2008
		US 2008253579 A1	16-10-2008
		WO 2005122730 A2	29-12-2005
		WO 2005125276 A1	29-12-2005
EP 0747044 A1	11-12-1996	DE 69612525 D1	23-05-2001
		DE 69612525 T2	25-10-2001
		EP 0747044 A1	11-12-1996
		ES 2157414 T3	16-08-2001
		FR 2735021 A1	13-12-1996
		GR 3036145 T3	28-09-2001
		PT 747044 E	28-09-2001
US 2675814 A	20-04-1954	NONE	
US 2008128007 A1	05-06-2008	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82