



(11) **EP 1 809 068 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
18.07.2007 Bulletin 2007/29

(51) Int Cl.:
H04R 1/10 (2006.01)

(21) Application number: **06450005.1**

(22) Date of filing: **11.01.2006**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

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(54) **Headphone cable assembly**

(57) The invention relates to a headphone cable assembly comprising a headphone plug (5) at one end for connecting the headphone cable assembly (1) to a headphone (2), a connection plug (6) on its opposite end and a headphone audio line (9) connecting the headphone plug (5) with the connection plug (6).

In order to upgrade a headphone to a headset easily a microphone (7) is provided to the headphone cable assembly in the area of headphone plug (5), a microphone audio line (10) for the microphone (7) being integrated in the headphone cable assembly (1).

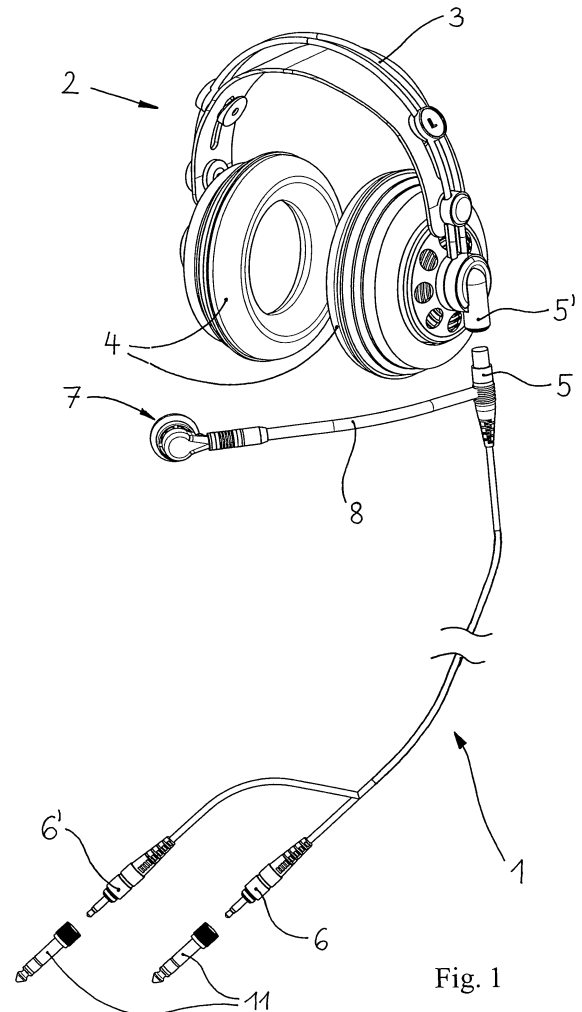


Fig. 1

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Description

[0001] The invention relates to a headphone cable assembly comprising a headphone plug at one end for connecting the headphone cable assembly to a headphone, a connection plug on its opposite end and a headphone audio line connecting the headphone plug with the connection plug.

[0002] Headphones are known in the art in which the headphone cable is not connected in one entire piece with the headphones; rather, it is detachable from the headphones by means of a plug connection. The plug connection part provided on the headphones is mostly arranged on the frame in the area of the earpiece or directly on or behind the earpiece. The same cable may thus be used with various headphones, provided the plug connections are designed alike.

[0003] So-called headsets are further known in the art which comprise a combination of headphones with a microphone. Meanwhile it is known to design a microphone piece which is detachable from the headphones. For this purpose the headphones usually include a plug socket in the area of one of the earpieces into which the microphone connector may be plugged. The microphone itself is usually arranged on a microphone boom which guarantees the position of the microphone in the mouth area. The headset cable itself is non-detachably connected with one of the earpieces and simultaneously contains the audio wires for the loudspeakers provided in the headphones as well as for the microphone.

[0004] Such a headset is known for example from AU-B-52675/93. Accordingly, the microphone boom is screwed directly onto the earpiece of a headphone. Such headsets therefore require a special connection device corresponding to the microphone boom, in other words, a plug connection or screw connection on the headphone, so that the microphone can be attached to form a headset.

[0005] Since many headphone sets do not exhibit such a connection option for a microphone or a microphone boom they are significantly limited in their functionality, since they are merely designed for listening to audio information. New technologies, however, increasingly demand interactive communication in addition to listening, for example, in the area of telephony, communication with computers, but also in the automotive field, in particular in cockpits, in order to warrant smooth communication between the driver and his conversation party. The problem thus arises that headphones which are not designed for such applications from the beginning are excluded from this area of use and remain limited to the listening of music, news, information, etc. Consequently, should microphone functions be required in addition to the headphones, one is absolutely forced to purchase a complete headset.

[0006] There is hence a demand for a device with which headphones that only feature a plug connection for a headphone cable, but do not allow the attachment

of a microphone, can also be retroactively upgraded to a headset.

[0007] This object is met by means of a headphone cable assembly of the afore-mentioned type in that a microphone is provided to the headphone cable assembly in the area of headphone plug, a microphone audio line for the microphone being integrated in the headphone cable assembly.

[0008] By using the headphone cable assembly according to the present invention it is also possible to use headphones which were not initially designed for recording purposes as part of a headset. With a conventional headphone cable the headphones provide the basic, originally intended listening functionality. If this headphone cable is replaced by the headphone cable assembly according to the invention, the functionality of the headphones is upgraded to a headset. By inserting the headphone plug of the headphone cable assembly according to the invention into the corresponding plug provided on the headphone, a compact unit between headphone and microphone is created. If the function of the microphone is not needed, a conventional headphone cable can be used.

[0009] In a preferred embodiment of the invention, the microphone extends directly away from the headphone plug. In this way, the position of the microphone in relation to the headphones and thus in relation to the user's mouth area is fixed when there is a mechanically stable connection between the headphone plug and the plug provided on the headphone.

[0010] In a particularly preferred embodiment the microphone is located at the end of an arm which extends directly away from the headphone plug and preferably is deformable or can be swivelled.

[0011] As will be clear from following disclosure the wording "provided to the headphone cable assembly in the area of headphone plug" includes of course also the possibility, that the microphone is arranged at a distance from the headphone plug, which is in the order of magnitude of the distance between the headphone plug and user's mouth area region in the case the headphone together with the headphone cable assembly is worn by the user. "In the area of headphone plug" means, that the microphone is not near the other end of the headphone cable assembly, thus the connection plug. Preferably the microphone is connected to the headphone cable assembly in the area of the headphone plug, particularly preferably directly mounted on the headphone plug.

[0012] The invention is illustrated in the drawings in more detail as follows: Fig. 1 shows a headphone cable assembly according to the invention immediately prior to connecting to the headphones, Fig. 2 shows a schematic view of the interior of a headphone cable assembly according to the invention, and Fig. 3 is variation of the invention.

[0013] Fig. 1 shows headphones 2 comprising a headband 3 at which ends an earpiece 4 each is attached.

The mounting of the earpieces 4 on the headband 3 can be effected in many ways, for example, via gimbal mounting, various swivelling pins, etc.; however, it does not have an effect on the essence of the invention. The loudspeaker is located inside or behind the earpiece. A plug receptacle 5' is located on the headphone 2 into which a headphone plug 5 of the headphone cable assembly 1 can be inserted. The arrangement and position of this plug 5' on the headphones 2 also does not play a part in the invention. Thus, it can either be positioned directly on the headband 3 or also on or behind the earpiece 4. Instead of earpieces that cover the ear, headphone types may be considered in which the loudspeaker or a small foam-padded part extends into the opening of the outer auditory canal in a worn position.

[0014] A headphone cable assembly 1 according to the invention is shown under the headphones 2 in Fig. 1. It comprises a headphone plug 5 at one end for connecting the headphone cable assembly to the headphone, the headphone plug 5 being insertable into the plug receptacle 5', and a connection plug 6 at the opposite end of the headphone cable assembly 1. The connection plug 6 can be connected to an appropriate plug located on an audio source, for example, a stereo unit, a computer, a telephone set or an additional extension cable arranged to connect thereto. A microphone 7 is provided to the headphone cable assembly and connected to it in the area of the headphone plug 5. In the illustrated preferred embodiment, the microphone 7 is arranged at the end of an arm 8. The arm 8 is connected with the headphone plug 5 such that when the headphone cable assembly is connected to the headphones 2, it is orientated at least approximately in the direction of the user's mouth area. A second connection plug 6' which branches off from the main piece of headphone cable houses the end of the audio line to the microphone 7 and is also plugged into an appropriate opening of a recording device, computer, telephone set, mixer, etc. Adapters 11 serve to adapt the plug connections to different plug sizes and/or shapes.

[0015] The headphone plug connection 5, 5' may be positive fitting and include, for example, guided elements in the shape of bars, for example, which only permit an insertion of the headphone plug 5 into the plug receptacle 5' in a certain direction, whereby the orientation of the microphone boom, as the arm is often called, is always distinctly defined. A twisting of the microphone boom can also be prevented by means of a positive fitting component in the plug connection.

[0016] In addition, a locking device can be provided in the headphone plug 5 in order to guarantee a mechanically stable connection between the headphone cable assembly according to the invention and the headphones. This is effected by means of a detachable, force-fitted connection, for example, by means of a snap mechanism which can be released by pressing a button or a spring. A friction-type connection of both plug parts with each other would also be conceivable.

[0017] In a particularly preferred embodiment the arm 8 is designed to be deformable, such that the position of the microphone can be adjusted in relation to the mouth. A pivotable arm 8 located on the headphone plug 5 would also be possible. Such measures themselves are known in the art and do not require further explanation.

[0018] It is an important feature of the invention that the microphone 7 is integrated on the headphone cable assembly and that the headphone cable assembly envelops the electrical wires which lead to the corresponding loudspeakers of the headphones, as well as the electrical wires of the microphone. This is shown schematically in Fig. 2. The headphone audio line 9 which comprises the audio wires to the speakers of the headphones, and the microphone audio line 10 which comprises the audio wires to the microphone 7 are incorporated in the same headphone cable, either within the same jacket or sealed next to each other with separate insulation.

[0019] There is also the possibility of having both audio lines 9, 10 meet in a common connection plug 6 at the end of the headphone cable assembly being opposite to the headphone plug 5 as illustrated in Fig. 3. However, it is especially advantageous for audio devices having separate inputs and outputs for headphones and microphones, if both audio lines 9, 10 each flow into separate connection plugs 6, 6' at the end of the headphone cable assembly. Fig. 3 shows an embodiment with only one connection plug 6, from which two plug heads emerge, while Figs. 1 and 2 show an embodiment with a connection plug 6 for the headphone audio line and a second connection plug 6' for microphone audio line.

[0020] The audio lines 9, 10 are only shown schematically and naturally each audio line can include two or more wires necessary for the operation of a speaker or microphone. Thus, the headphone audio line 9 may also comprise the supply lines for the second speaker.

[0021] The invention is certainly not limited to the illustrated embodiment. Thus, the headphones may only comprise one speaker and the headband 3 may be designed for placing on the head or on or around the ear. The particular design of the plugs 5, 6, 6' is also not relevant to the invention.

[0022] It is not absolutely necessary that the microphone is attached at the end of an arm; it is also possible that the microphone is located directly on the headphone plug 5 or also in the immediate area of the headphone plug 5 secured on the headphone cable itself. However, the embodiment with the extended arm which preferably can be shaped or swivelled constitutes a preferred embodiment.

Claims

1. A headphone cable assembly comprising a headphone plug (5) at one end for connecting the headphone cable assembly (1) to a headphone (2), a connection plug (6) on its opposite end and a headphone

audio line (9) connecting the headphone plug (5) with the connection plug (6), **characterized in that** a microphone (7) is provided to the headphone cable assembly in the area of headphone plug (5), a microphone audio line (10) for the microphone (7) being integrated in the headphone cable assembly (1). 5

2. The headphone cable assembly according to claim 1, **characterized in that** the microphone (7) is attached to the headphone plug (5). 10
3. The headphone cable assembly according to one of claims 1 or 2, **characterized in that** the microphone (7) is arranged at the end of an arm (8) which is attached to the headphone plug (5). 15
4. The headphone cable assembly according to one of claims 1 to 3, **characterized in that** the arm (8) is deformable. 20
5. The headphone cable assembly according to one of claims 1 to 3, **characterized in that** arm (8) can be swivelled relative to the headphone plug (5).
6. The headphone cable assembly according to one of the claims 1 to 5, **characterized in that** the headphone audio line (9) for headphone (2) and the microphone audio line (10) for the microphone (7) meet in a common connection plug (6) on the opposite end of the headphone cable assembly. 25 30
7. The headphone cable assembly according to one of claims 1 to 5, **characterized in that** the microphone audio line (10) for the microphone (7) branches into a microphone connection plug (6') separated from connection plug (6). 35

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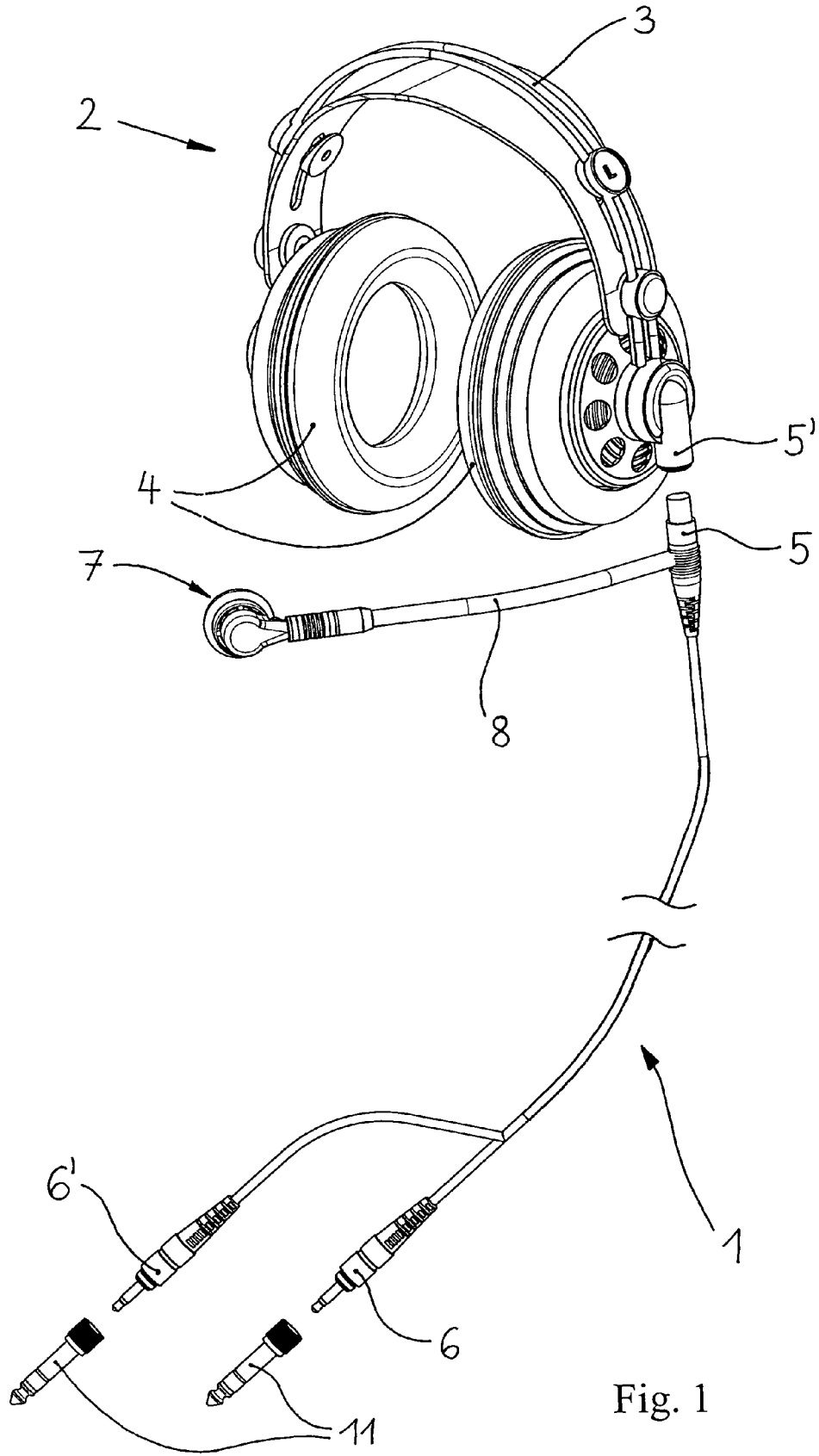


Fig. 1

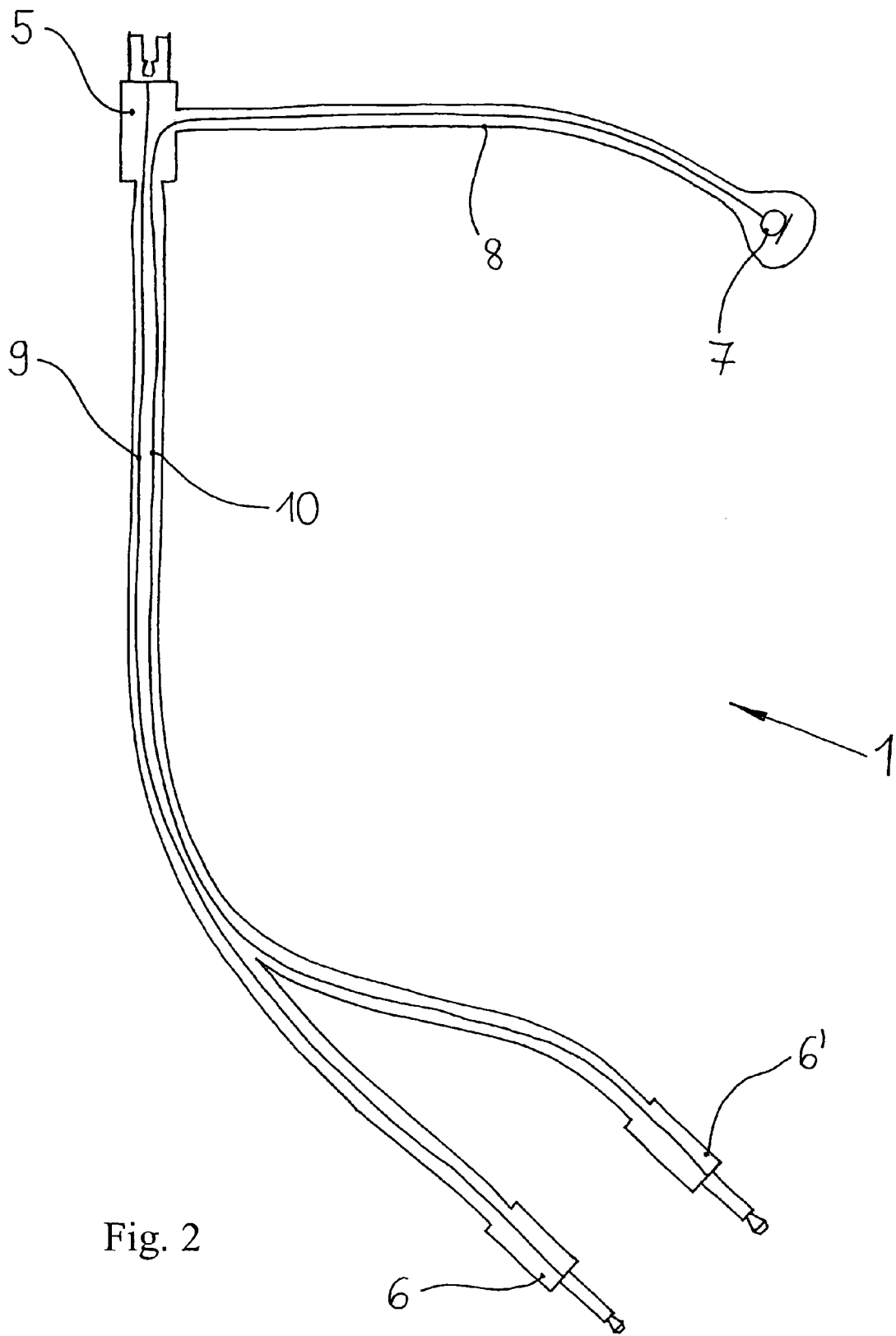


Fig. 2

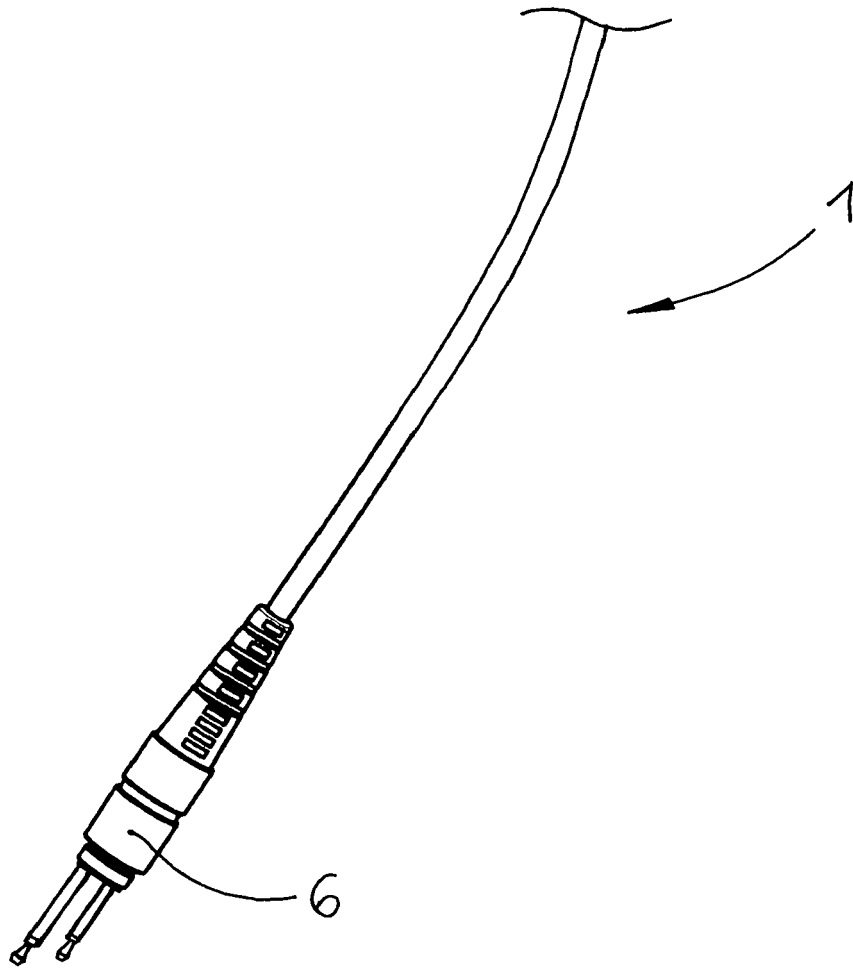


Fig. 3



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	PATENT ABSTRACTS OF JAPAN vol. 2002, no. 07, 3 July 2002 (2002-07-03) -& JP 2002 094632 A (NAKAJIMA YUKIO), 29 March 2002 (2002-03-29) * abstract; figures 1-5 *	1-7	INV. H04R1/10
X	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 14, 5 March 2001 (2001-03-05) -& JP 2000 324225 A (SONY CORP), 24 November 2000 (2000-11-24) * abstract *	1-7	
A	US 5 761 298 A (DAVIS ET AL) 2 June 1998 (1998-06-02) * column 2, line 45 - column 4, line 8 * * column 4, line 49 - column 7, line 38 * * figures 1,2,10 *	1-7	
			TECHNICAL FIELDS SEARCHED (IPC)
			H04R
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		30 June 2006	Meiser, J
CATEGORY OF CITED DOCUMENTS		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	
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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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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30-06-2006

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

REFERENCES CITED IN THE DESCRIPTION

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