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(71) Applicant *(for all designated States except US)*: **MED-EL ELEKTROMEDIZINISCHE GERAETE GMBH** [AT/US]; Fuerstenweg 77, A-6020 Innsbruck (AT).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **BALL, Geoffrey, R.** [US/AT]; Koegele Strasse 40, A-6094 Axams (AT).

(74) Agents: **SUNSTEIN, Bruce, D.** et al.; Sunstein Kann Murphy & Timbers LLP, 125 Summer Street, Boston, MA 02110 (US).

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[Continued on next page]

(54) Title: COMMUNICATIONS/AUDIO INTERFACE WITH SELF-ORIENTING MAGNET ATTACHMENT SYSTEM

(57) Abstract: An electronic connection device is described. A magnetic connector interface has at least two adjacent magnetic interface elements. One is a north wiring interface element having an outer surface with a north magnetic field orientation and at least one wiring contact for providing electrical connection to at least one north electrical wire. The other interface element is a south wiring interface element having an outer surface with a south magnetic field orientation and at least one wiring contact for providing electrical connection to at least one south electrical wire.

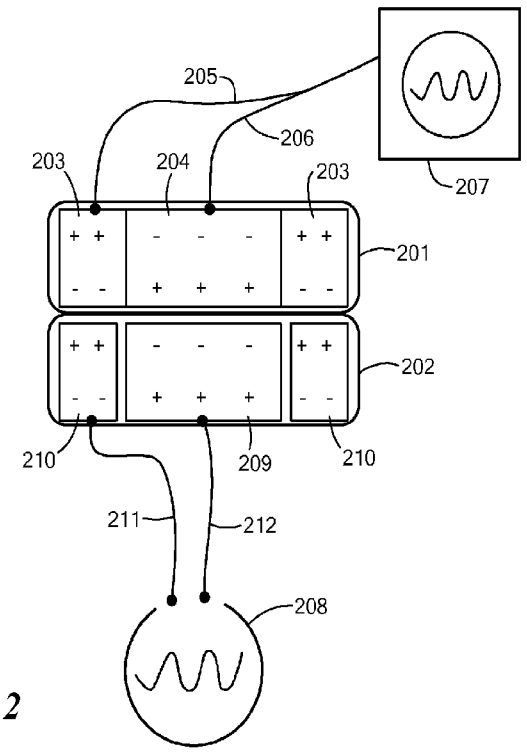


FIG. 2

WO 2011/037889 A1

SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

TITLE

Communications/Audio Interface with Self-Orienting Magnet Attachment System

[0001] This application claims priority from U.S. Provisional Patent Application 61/244,598, filed September 22, 2009, which is incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention relates to communications systems, specifically, to a useful wiring connector for such systems.

BACKGROUND ART

[0003] It has been said that we now live in a wired world. One ubiquitous device is the MP3 player where a small electronic device generates a user audio signal and resides in a convenient pocket of the user. The audio signal from the MP3 player is delivered by wires to ear buds in the ear canal of the user for hearing. These wires loosely flop around about the user's body and are subject to frequent undesirable snagging on the user's own body and that of structures in the near vicinity. Snagged wires can cause various undesired effects such as roughly snatching the ear buds out of the ear canal, ripping the MP3 player out of place to fall on the ground, knocking off glasses of the user, etc. And the wires and their connectors can also be broken by such snags.

SUMMARY OF THE INVENTION

[0004] Embodiments of the present invention are directed to an electronic connection device. A magnetic connector interface has at least two adjacent magnetic interface elements. One is a north wiring interface element having an outer surface with a north magnetic field orientation and at least one wiring contact for providing electrical connection to at least one north electrical wire. The other interface element is a south wiring interface element having an outer surface with a south magnetic field orientation and at least one wiring contact for providing electrical connection to at least one south electrical wire.

[0005] In further specific embodiments, the magnetic interface elements may be

asymmetrically arranged with respect to a central radial axis of the magnetic connector. Some embodiments may also include one or more non-wired magnetic interface elements adjacent to the wiring interface elements without a wiring contact. The wiring interface elements may be coaxially arranged such that one of the wiring interface elements forms a radial ring around the other wiring interface element. And the electrical wires may include audio signal wires (e.g., in a stereo audio arrangement) and/or digital data signal wires.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Figure 1 shows an example of one specific application of a magnetic connector interface according to an embodiment of the present invention.

[0007] Figure 2 shows various structural details of a magnetic connector according to an embodiment of the present invention.

[0008] Figure 3 shows various structural details of a mono audio magnetic connector according to an embodiment of the present invention.

[0009] Figure 4 shows various structural details of a stereo audio magnetic connector according to an embodiment of the present invention.

DETAILED DESCRIPTION OF SPECIFIC EMBODIMENTS

[0010] Embodiments of the present invention are directed to an electronic connection device. Figure 1 shows an example of one specific application of a magnetic connector interface device according to an embodiment of the present invention where a magnetic connector interface **100** connects the wires delivering a user audio signal from an audio device **101** such as an MP3 player to user ear buds **102** that reproduce the audio signal in the ear canal of the user for hearing. The wires may include audio signal wires (e.g., in a stereo audio arrangement) and/or digital data signal wires.

[0011] Figure 2 shows various structural details of a magnetic connector according to an embodiment of the present invention. An output magnetic connector interface **201** is associated with an output device **207** (e.g., ear buds) and has an output center wiring

interface element **204** having an outer surface with a north magnetic field orientation which also acts as a wiring contact to provide an electrical connection to an output center electrical wire **206**. Surrounding the output center wiring interface element **204** is an output radial ring wiring interface element **203** having an outer surface with a south magnetic field orientation which also acts as a wiring contact to provide an electrical connection to an output outer electrical wire **205**. There is also a corresponding input magnetic connector interface **202** that is associated with an input device **208** (e.g., MP3 player) which has an input center wiring interface element **209** having an outer surface with a south magnetic field orientation which also acts as a wiring contact to provide an electrical connection to an input center electrical wire **212**. Radially surrounding the input center wiring interface element **209** is a complementary input outer wiring interface element **210** having an outer surface with a north magnetic field orientation which also acts as a wiring contact to provide an electrical connection to an input outer electrical wire **211**.

[0012] When the input magnetic connector **202** and the output magnetic connector **201** are brought close together, they magnetically self-orient to magnetically connect the center wiring interface elements **204** and **209** together and the outer ring interface elements **203** and **210**. This electrically connects the center wires **206** and **212** and the outer wires **205** and **211**. The interface between the center wiring elements **204/209** and the outer ring interface elements **203/210** may include an electrical insulator film to keep electrical separation between the corresponding center and outer wires **205/206** and **211/212**. Ideally, the magnetic attraction forces are controlled to be just strong enough to maintain a secure mechanical connection between the two connectors **201** and **202**, while being weak enough to allow the connectors to easily separate under sudden stress such as from a snagging of the wires.

[0013] Figure 3 shows various structural details of a mono audio magnetic connector according to an embodiment of the present invention. Figure 4 shows various structural details of a stereo audio magnetic connector according to an embodiment of the present invention. Instead of a coaxial arrangement of wiring interface elements, the magnetic interface elements in these embodiments are asymmetrically arranged with respect to a

central radial axis. In addition, there also are non-wired magnetic interface elements adjacent to the wiring interface elements without a wiring contact. This radially asymmetric arrangement aids in ensuring an electrically correct self-orienting of the magnetic connectors when they are brought together.

[0014] Although various exemplary embodiments of the invention have been disclosed, it should be apparent to those skilled in the art that various changes and modifications can be made which will achieve some of the advantages of the invention without departing from the true scope of the invention.

CLAIMS

What is claimed is:

1. An electronic connection device comprising:

a magnetic connector interface having at least two adjacent magnetic interface elements including:

i. a north wiring interface element having an outer surface with a north magnetic field orientation and at least one wiring contact for providing electrical connection to at least one north electrical wire, and

ii. a south wiring interface element having an outer surface with a south magnetic field orientation and at least one wiring contact for providing electrical connection to at least one south electrical wire.

2. An electronic connection device according to claim 1, wherein the magnetic connector interface includes a central radial axis, and wherein the magnetic interface elements are asymmetrically arranged with respect to the central radial axis.

3. An electronic connection device according to claim 1, further comprising:

a non-wired magnetic interface element adjacent to the wiring interface elements without a wiring contact.

4. An electronic connection device according to claim 1, wherein the wiring interface elements are coaxially arranged such that one of the wiring interface elements forms a radial ring around the other wiring interface element.

5. An electronic connection device according to claim 1, wherein the electrical wires include audio signal wires.

6. An electronic connection device according to claim 5, wherein the audio signal wires have a stereo audio arrangement.

7. An electronic connection device according to claim 1, wherein the electrical wires include digital data signal wires.

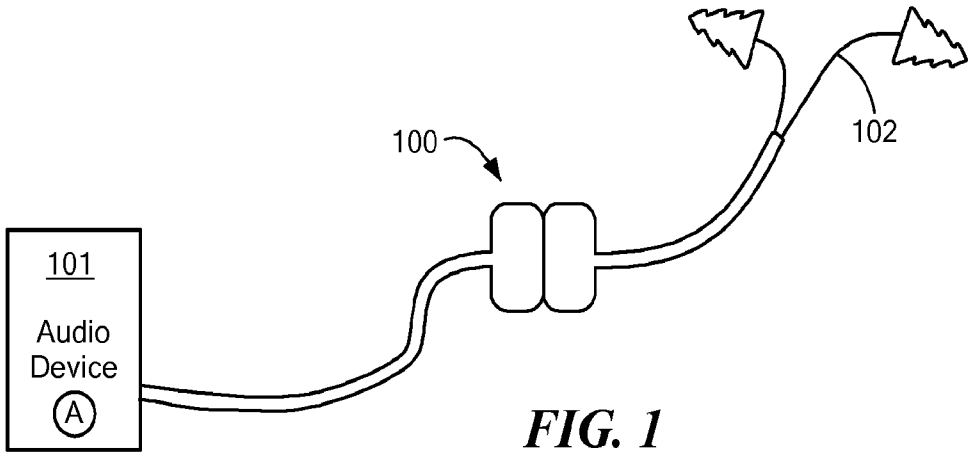

100
102
101
Audio
Device
A

FIG. 1

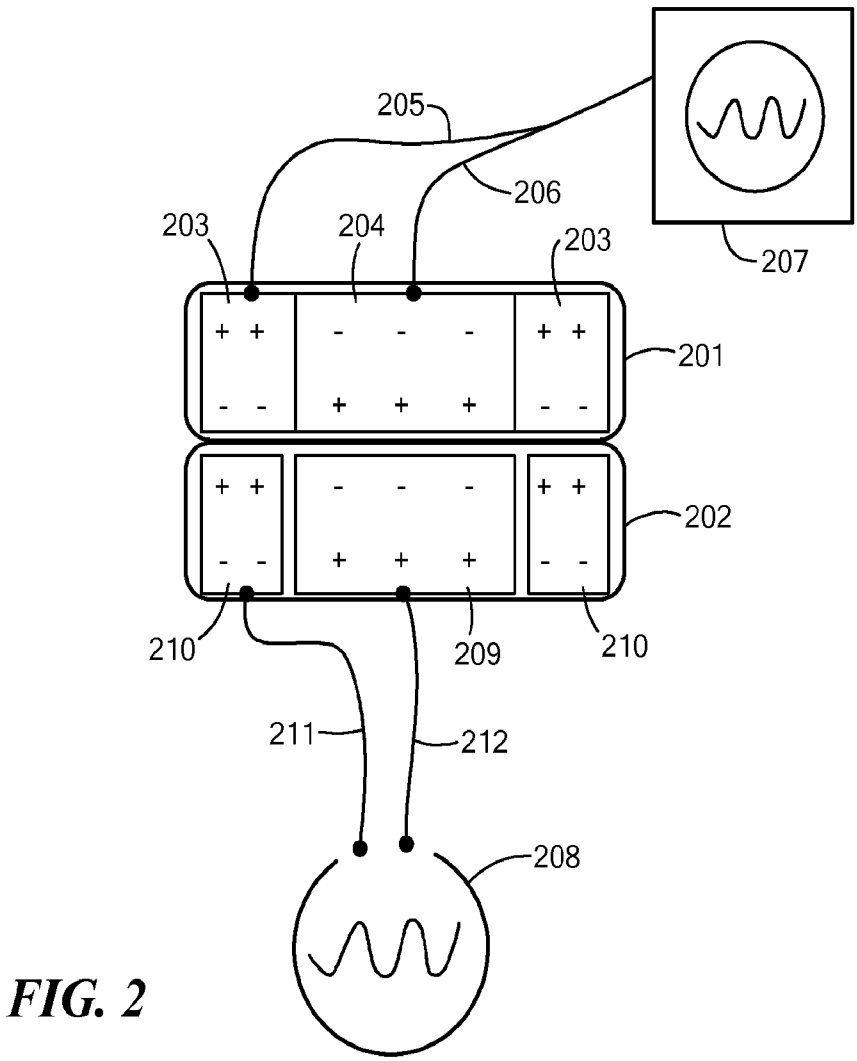

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FIG. 2

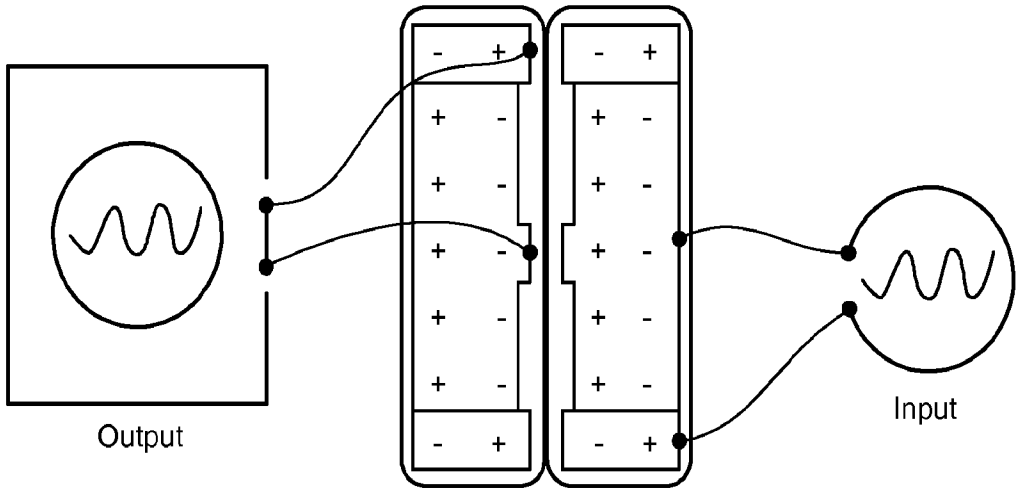


FIG. 3

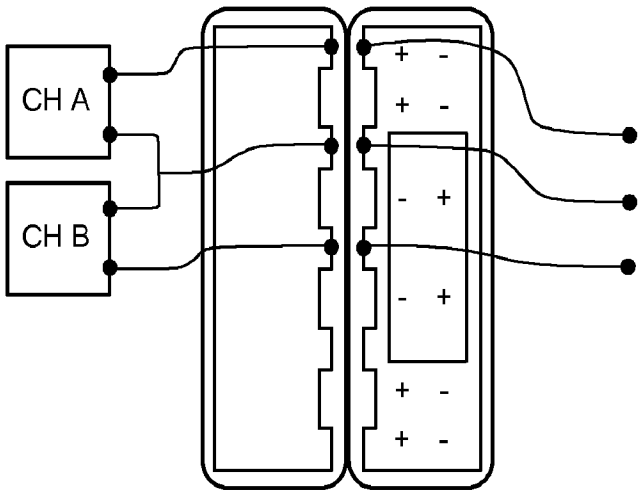


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2010/049587

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01R13/62
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H01R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2007/254510 A1 (DEBEY HENRY C [US]) 1 November 2007 (2007-11-01) paragraphs [0012], [0024]; figure 1	1-3,5-7
X	EP 1 865 581 A2 (NOKIA CORP [FI]) 12 December 2007 (2007-12-12) figures 1,2,4	1,4

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 November 2010	02/12/2010

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Corrales, Daniel

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2010/049587

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2007254510 A1	01-11-2007	WO 2007127869 A2	08-11-2007
EP 1865581 A2	12-12-2007	CN 101090179 A	19-12-2007
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