(12) DEMANDE INTERNATIONALE PUBLIÉE EN VERTU DU TRAITÉ DE COOPÉRATION EN MATIÈRE DE BREVETS (PCT)

(19) Organisation Mondiale de la Propriété Intellectuelle
Bureau international

(43) Date de la publication internationale
4 mai 2017 (04.05.2017)

WIPO | PCT

(10) Numéro de publication internationale
WO 2017/072620 A1

(51) Classification internationale des brevets :
H01R 24/38 (2011.01) *H01R 13/627* (2006.01)
H01R 13/24 (2006.01) *H01R 35/04* (2006.01)
H01R 13/52 (2006.01)

(21) Numéro de la demande internationale :
PCT/IB2016/056139

(22) Date de dépôt international :
13 octobre 2016 (13.10.2016)

(25) Langue de dépôt : français

(26) Langue de publication : français

(30) Données relatives à la priorité :
PCT/IB2015/058257
27 octobre 2015 (27.10.2015) IB
PCT/IB2016/052275 21 avril 2016 (21.04.2016) IB

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(81) États désignés *(sauf indication contraire, pour tout titre de protection nationale disponible)* : AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) États désignés *(sauf indication contraire, pour tout titre de protection régionale disponible)* : ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ,

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(54) Title : MULTIPOLAR CONNECTOR

(54) Titre : CONNECTEUR MULTIPOLAIRE

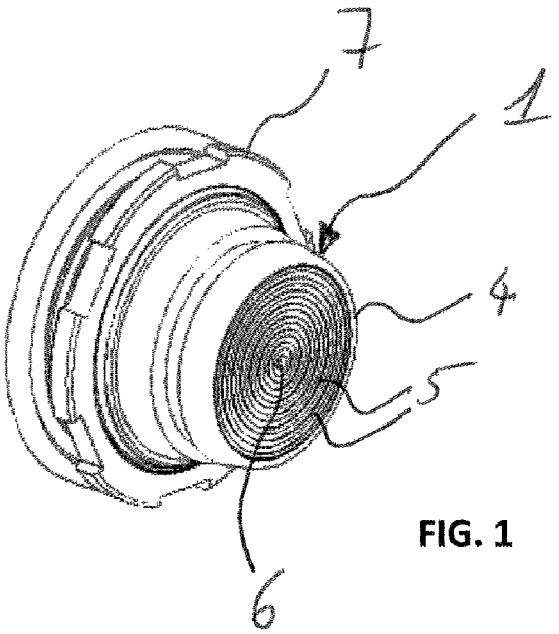

FIG. 1

(57) Abstract : Connector comprising a base (1) of substantially cylindrical form and a plug (2), connectable to the base in a removable manner to the base (2), in which are disposed a plurality of contacts (3); the base (1) comprising a conducting face (4) on or in which is disposed at least one conducting track (5) forming at least one arc of a circle whose centre (6) is substantially coincident with the centre of the conducting face (4); said track (5) furthermore being disposed in such a way as to permit a mechanical electrical coupling with one of said contacts (3).

(57) Abrégé : Connecteur comprenant une embase (1) de forme sensiblement cylindrique et une fiche (2), connectable à l'embase de manière amovible à l'embase (2), dans lequel sont disposés une pluralité de contacts (3); l'embase (1) comportant une face conductrice (4) sur ou dans laquelle est disposée au moins une piste conductrice (5) formant au moins un arc de cercle dont le centre (6) se confond sensiblement avec le centre de la face conductrice (4); ladite piste (5) étant en outre disposée de manière à autoriser un couplage électrique mécanique avec l'un des dits contacts (3).

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TZ, UG, ZM, ZW), eurasien (AM, AZ, BY, KG, KZ, RU, TJ, TM), européen (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Publiée :

— *avec rapport de recherche internationale (Art. 21(3))*

Multipolar connector

Field of the invention

The present invention relates to connectors, in particular electrical connectors.

State of the art

In most cases, the use of a multipole connector requires the two main components (e.g. one component containing male contacts and one component with female contacts) to be fixed to one another according to a specific angular orientation.

The fact of having to align one component relative to the other, prior to connection, constitutes a nuisance. There is therefore a need to be able to eliminate this nuisance.

General description of the invention

The invention proper consists of a connector comprising a socket of substantially cylindrical form and a plug, that can be removably connected to the socket, in which there are arranged a plurality of contacts. The socket comprises a conductive face in the form of a disk on or in which there is arranged at least one conductive track forming at least one circular arc whose center substantially coincides with the center of the conductive face, said track being also arranged so as to allow a mechanical electrical coupling with one of said contacts.

In the connector according to the invention, the socket and the plug constitute the two main components which form the connector.

In the particular configuration which comprises only a single circular track, the center of the face of the socket is a conductive disk, which is arranged so as to

allow an electrical coupling with a contact of the plug arranged at the center thereof.

Preferably, the connector comprises at least two circular conductive tracks which are arranged concentrically.

Advantageously, each contact of the plug is mounted to be axially mobile, independently of the other contacts, in order to ensure a permanent mechanical contact with the conductive tracks of the socket.

A mechanism can be provided to exert a return force on each contact.

According to a variant of the invention, the contacts are arranged through a flexible membrane, for example made of rubber, which is preferably seal-tight.

The plug, overall, can be oriented in a single direction. Alternatively, it can be bent.

The plug can be connected to be free to rotate about the socket, or according to a limited number of angular orientations.

Detailed description of the invention

The invention will be better understood from the following description which in particular contains a few illustrated examples.

Brief description of the figures

Figure 1 represents a variant of the invention with a socket designed for a free orientation of the plug.
Figure 2 represents another variant of the invention with a socket designed for limited angular orientations

of the plug.
Figure 3 represents a side view of the socket.
Figure 4 represents a cross-sectional view of a socket.
Figure 5 represents a plug (bent)-socket pair connected together.
Figure 6 represents another view of a bent plug.
Figure 7 shows the wiring of a plug.
Figure 8 represents a plug comprising several outputs.
Figure 9 represents a stack of plugs/sockets.
Figure 10 represents a spring ring.
Figure 11 represents the incorporation of a spring ring in a plug.

Numeric references used in the figures

1. Socket
2. Plug
3. Contact
4. Conductive face
5. Conductive track
6. Center of the conductive face
7. Nut
8. Contact
9. Membrane
10. Output
11. Spring ring
12. Ball
13. Circular groove
14. Ball housing

According to the embodiment illustrated in the present document, the connector comprises seven contacts.

It goes without saying that the invention is not limited to this configuration. It also covers all the connectors comprising at least two contacts.

Likewise, the dimensions of the connector according to the invention can be any dimensions.

The connector according to the invention has the particular feature of not requiring prior orientation of the plug **2** (e.g. a wired element) relative to the socket **1** (e.g. a unit housing element). This advantage results from the cylindrical/circular geometry of the socket and of its conductive face **4** (see for example figure 1). Once connected, the relative rotation between the socket **1** and the plug **2** can be free or blocked via a bistable-type system, for example a locking by lateral pressure and unlocking by axial pressure).

An orientation can nevertheless be given and limit the plugging-in possibilities to a finite number of different angular positions (e.g. four positions separated by 90° or 12 positions separated by 30°) as described in figure 2.

The socket **1** is composed of a body that can be fixed onto an external device via a fixing element such as a nut **7** (figure 1) or rivets or any other suitable means making it possible to durably fix these two elements (e.g.: socket sewn onto a fabric/clothing item).

The socket **1** can be connected to the device via metallic contacts **8** which interconnect directly with the device (that can be a fabric incorporating conductive parts incorporated or not in the fabric) or through an electrical circuit (PCB, flex, etc.) welded to the socket and interfacing with the device (figure 3).

The plug **2** is composed of electrically conductive parts

separated by electrically insulating parts. It can be composed of any type of assembly of parts making it possible to ensure the function of signal transmission and of electrical insulation (figure 1 and figure 4). The plug **2** and the socket **1** are preferably "cleanable" in as much as it is easy to access the surface in order to eliminate dirt/deposits/particles without a specific cleaning tool.

Advantageously, the plug **2** connects to and disconnects from the socket **1** by a single hand.

The connection/disconnection can be performed by simple pressure/pulling force on the plug **2** (variant without locking) (figure 5). According to another variant, the connector comprises a locking and a lateral pressure on the two sides (or any other deliberate action) is necessary in order to free the locking mechanism.

Preferably, the plug **2** should exhibit a certain elasticity in order to guarantee the electrical contact with the socket **1**. To this end, each contact **3** can be mounted to be axially mobile independently of the other contacts **3** in order to guarantee that each contact **3** is pressed onto the corresponding track **5** of the socket **1**. Advantageously, the contacts **3** pass through a flexible membrane **9**, obtained for example by overmolding a rubber over the contacts **3** or any other means in order to constitute a subassembly allowing the individual mobility of the contacts **3** relative to one another (figure 5).

The membrane **9** also makes it possible to guarantee the seal-tightness of the assembly.

An elastic element (not represented in the illustrations), inducing a return mechanism toward the

socket **1**, makes it possible to exert an individual pressure on each contact **3** in order to guarantee the electrical continuity on each contact **3**. It should be noted that the membrane **9** can exert this elastic element function.

The quasi-smooth surface of the membrane **9** and of the contacts **3** makes it possible to also guarantee a perfect "cleanability", similar to that of the socket **1** (figure 6).

The wires of the cables or any other link means, e.g. PCB (not illustrated), are connected (e.g. horizontally welded) onto the rear face of each contact **3** in order to guarantee the electrical link while limiting the bulk. A cap covers the assembly in order to mechanically protect the system and render it seal-tight (figure 7).

According to another variant (not illustrated) of the invention, the concentric tracks form circular grooves in the face of the socket.

The number of outputs **10** of the plug **2** and of the socket **1** can be multiple (figure 8).

The plug **2** can include a "socket" part in order to allow a stacking of several plugs/sockets (figure 9).

The locking and/or the acknowledgement of plugging-in of the connector can be produced by means of a spring ring **11** exhibiting a certain elasticity, the ring **11** bearing on balls **12** which have themselves come to be housed in a groove **13** formed on the socket (figures 1 and 3).

A possible illustration of the spring ring **11** is

illustrated in figure 10 and its incorporation in the plug **2** is illustrated in figure 11.

The position of the ball housings **14** (figure 2) can be multiple and offer several locking points in order to avoid the rotation once plugged in.

Claims

1. A connector comprising a socket (1) of substantially cylindrical form and a plug (2), that can be connected to the socket removably from the socket (2), in which there are arranged a plurality of contacts (3); the socket (1) comprising a conductive face (4) on or in which there is arranged at least one conductive track (5) forming at least one circular arc whose center (6) substantially coincides with the center of the conductive face (4); said track (5) being also arranged so as to allow a mechanical electrical coupling with one of said contacts (3).

2. The connector as claimed in claim 1, comprising at least two circular conductive tracks (5) arranged concentrically.

3. The connector as claimed in claim 1 or 2, in which each contact (3) is mounted to be axially mobile, independently of the other contacts.

4. The connector as claimed in any one of the preceding claims, in which the contacts are arranged through a flexible membrane.

5. The connector as claimed in claim 4, in which the membrane is seal-tight.

6. The connector as claimed in any one of the preceding claims, in which the the plug (2) is bent.

7. The connector as claimed in any one of the preceding claims, in which the plug (2) can be connected to be free to rotate about the socket

(1).

8. The connector as claimed in any one of the preceding claims 1 to 7, in which the plug (2) can be connected according to a limited number of orientations about the socket (1).

9. The connector as claimed in any one of the preceding claims, in which the contacts (3) are distributed asymmetrically on the surface of the conductive face (4).

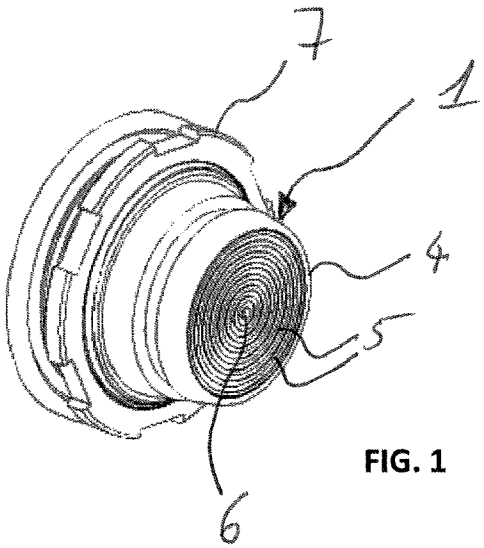

FIG. 1

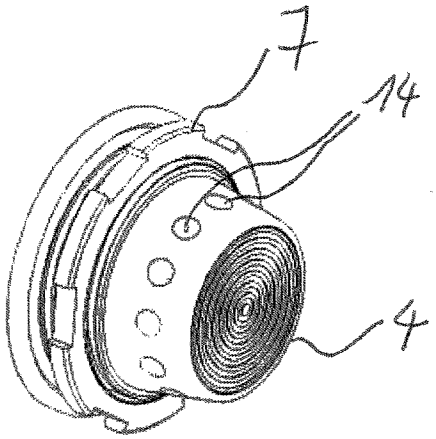

FIG.2

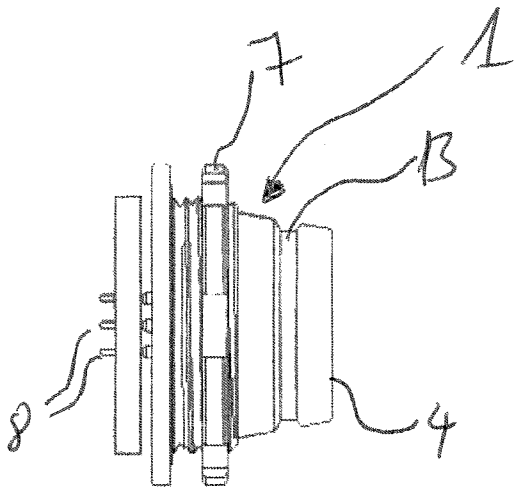

FIG.3

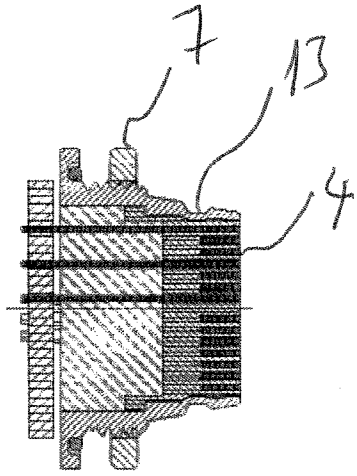

FIG.4

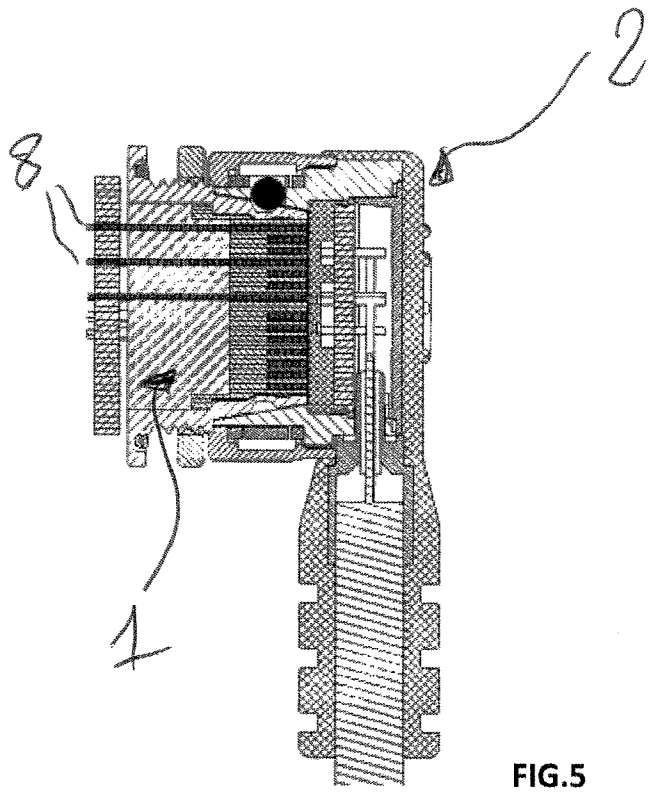

FIG.5

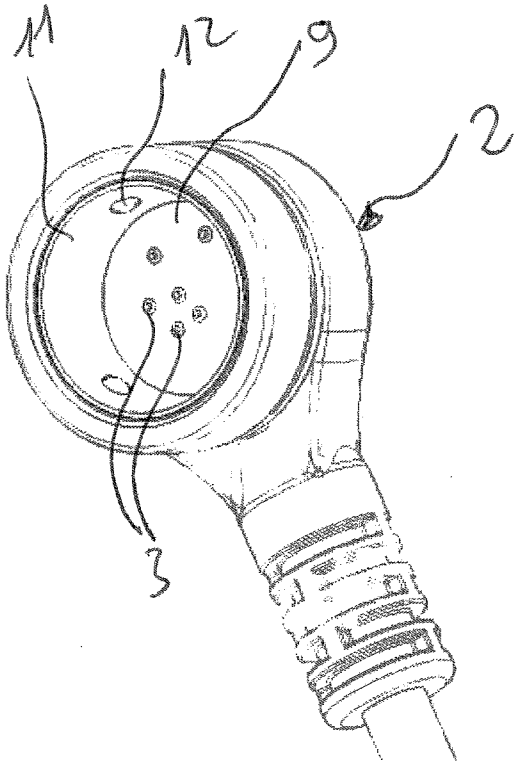

FIG.6

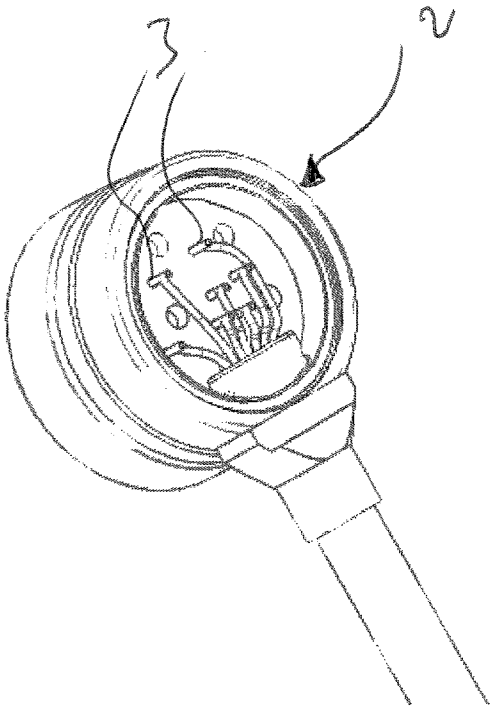

FIG.7

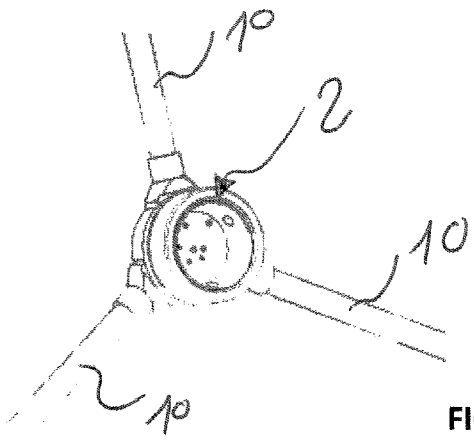

FIG.8

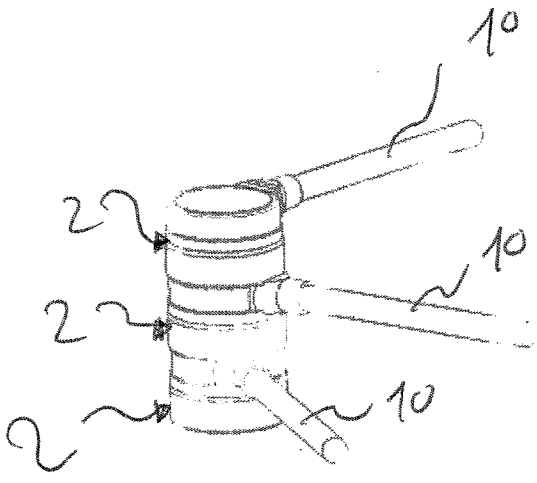

FIG.9

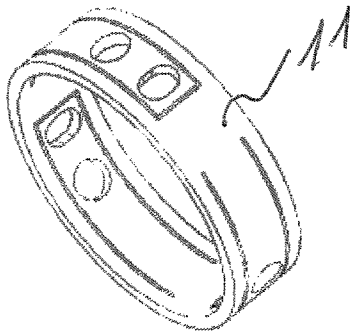

FIG.10

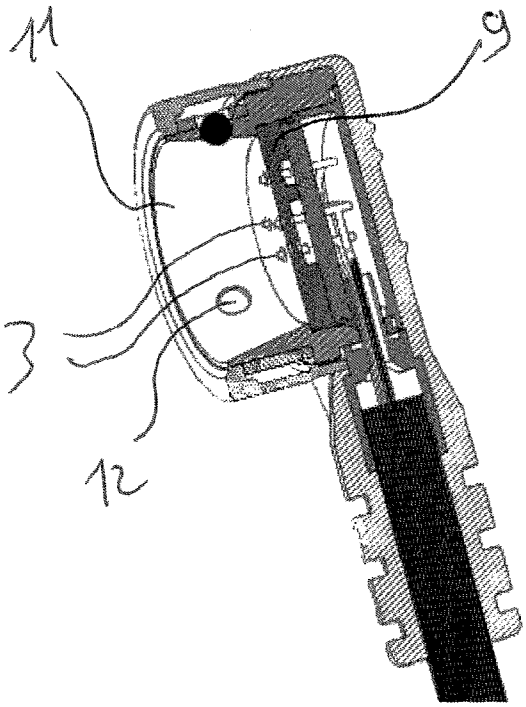

FIG.11