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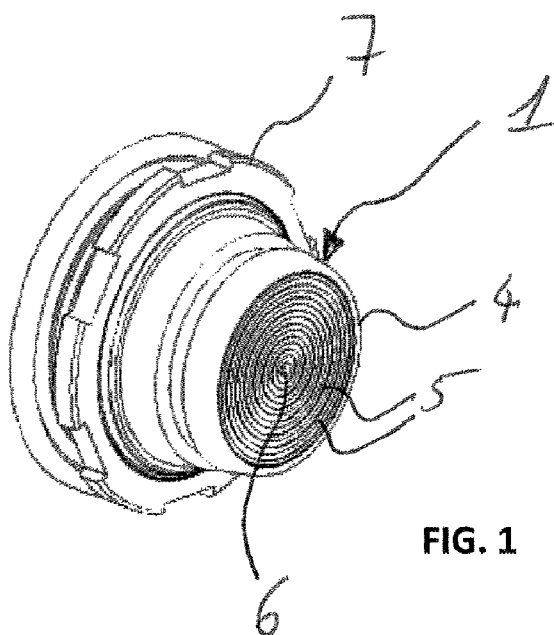
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[Suite sur la page suivante]

(54) Title : MULTIPOLAR CONNECTOR

(54) Titre : CONNECTEUR MULTIPOLAIRE



(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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**MULTIPOLAR CONNECTOR**FIELD

The present disclosure relates to connectors, in particular  
5 electrical connectors.

DEFINITION

In the specification the term "comprising" shall be  
understood to have a broad meaning similar to the term  
10 "including" and will be understood to imply the inclusion of  
a stated integer or step or group of integers or steps but  
not the exclusion of any other integer or step or group of  
integers or steps. This definition also applies to variations  
on the term "comprising" such as "comprise" and "comprises".

BACKGROUND

In some 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  
20 to one another according to a specific angular orientation.

SUMMARY OF THE DISCLOSURE

Applicant has recognized the limitations of having to align  
one component relative to another prior to connection as  
25 described in the background.

According to one aspect of the disclosure there is provided  
a connector comprising a socket of substantially cylindrical  
form, and a plug that can be removably connected to the  
30 socket, in which there are arranged a plurality of contacts;  
the socket comprising a conductive face 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  
35 arranged so as to allow a mechanical electrical coupling  
with one of said contacts, connector in which each contact  
is mounted to be axially mobile, independently of the other

contacts, the contacts being arranged through a flexible membrane, said membrane being seal-tight, the connector comprising a mechanism exerting a return force on each contact and an elastic element inducing a return mechanism  
5 toward the socket making it possible to exert an individual pressure on each contact, said elastic element being formed by the membrane.

10 In an embodiment, the connector comprises a mechanism comprising an elastical element exerting a return force on each contact in the direction of the socket and making it possible to exert an individual pressure on each contact, said elastic element being formed by the membrane, the plug comprising a spring ring bearing on balls which house in a  
15 groove of the socket such that the plug can be connected to be free to rotate about the socket or house in ball housings forming locking points in such that the plug can be connected according to a limited number of orientations about the socket.

20 The disclosure provides 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  
25 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  
30 with one of said contacts.

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

35 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.

- 5 The connector may comprise 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  
10 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.

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

- 20 The plug, overall, may be bent. Alternatively, it may be oriented in a single direction.

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

The contacts may be distributed asymmetrically on the surface of the conductive face.

- 30 The plug may comprise a "socket" part allowing a stacking of several plugs/sockets.

The plug may comprise a spring ring producing the locking and/or the acknowledgement of plugging-in of the connector.

35 The ring may bear on balls which are housed in a groove of the socket upon connection.

The socket may be fixed to an external device by a fixing element and may be connected to the device by contacts interconnecting directly with the device or through an electrical circuit welded to the socket and interfacing with the device.

#### BRIEF DESCRIPTION OF THE FIGURES

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

Figure 1 represents a variant of the disclosure with a socket designed for a free orientation of the plug.

Figure 2 represents another variant of the disclosure 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 are listed below:

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
- 5 11. Spring ring
- 12. Ball
- 13. Circular groove
- 14. Ball housing

10 DETAILED DESCRIPTION

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

15 It goes without saying that the disclosure 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 disclosure can be any dimensions.

20

The connector according to the disclosure 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  
25 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  
30 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  
35 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).

5

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  
5 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.

10 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  
15 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  
20 "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  
25 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  
30 disclosure, 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).

35 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.

15

**CLAIMS:**

1. A connector comprising a socket of substantially  
cylindrical form, and a plug that can be removably  
5 connected to the socket, in which there are arranged a  
plurality of contacts; the socket comprising a  
conductive face on or in which there is arranged at  
least one conductive track forming at least one circular  
arc whose center substantially coincides with the  
10 center of the conductive face; said track being also  
arranged so as to allow a mechanical electrical coupling  
with one of said contacts, connector in which each  
contact is mounted to be axially mobile, independently  
of the other contacts, the contacts being arranged  
15 through a flexible membrane, said membrane being seal-  
tight, the connector comprising a mechanism comprising  
an elastical element exerting a return force on each  
contact in the direction of the socket and making it  
possible to exert an individual pressure on each  
20 contact, said elastic element being formed by the  
membrane, the plug comprising a spring ring bearing on  
balls which house in a groove of the socket such that  
the plug can be connected to be free to rotate about  
the socket or house in ball housings forming locking  
25 points in such that the plug can be connected according  
to a limited number of orientations about the socket.
2. The connector as claimed in claim 1, comprising at least  
two circular conductive tracks arranged concentrically.  
30
3. The connector as claimed in claim 1 or claim 2, in which  
the plug is bent.
4. The connector as claimed in any one of claims 1 to 3,  
35 in which the contacts are distributed asymmetrically on  
the surface of the conductive face.

5. The connector as claimed in any one of claim 1 to 4, in which the plug comprises a "socket" part allowing a stacking of several plugs/sockets.
- 5 6. The connector as claimed in any one of claims 1 to 5, in which the socket is fixed to an external device by a fixing element and is connected to the device by contacts interconnecting directly with the device or through an electrical circuit welded to the socket and  
10 interfacing with the device.

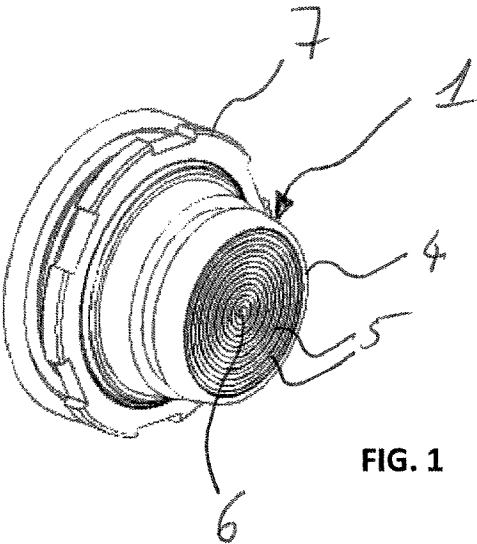


FIG. 1

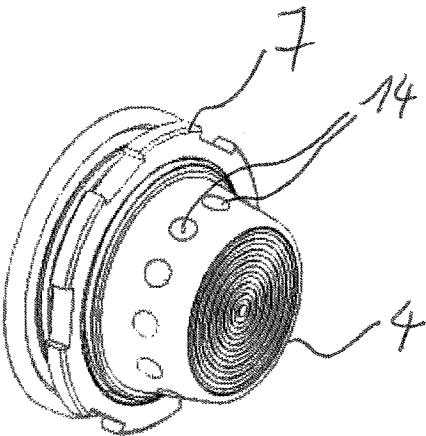


FIG. 2

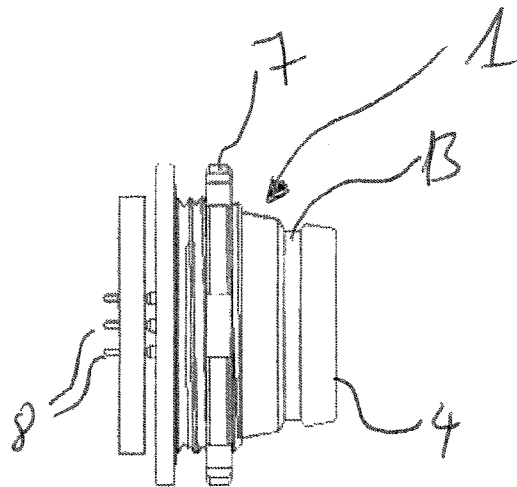


FIG.3

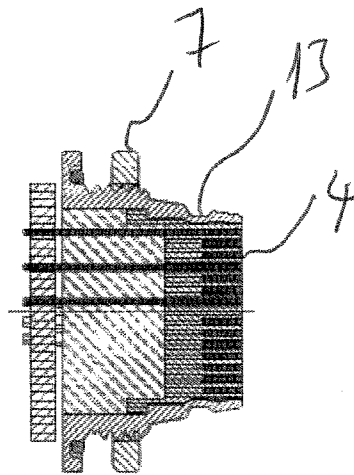


FIG.4

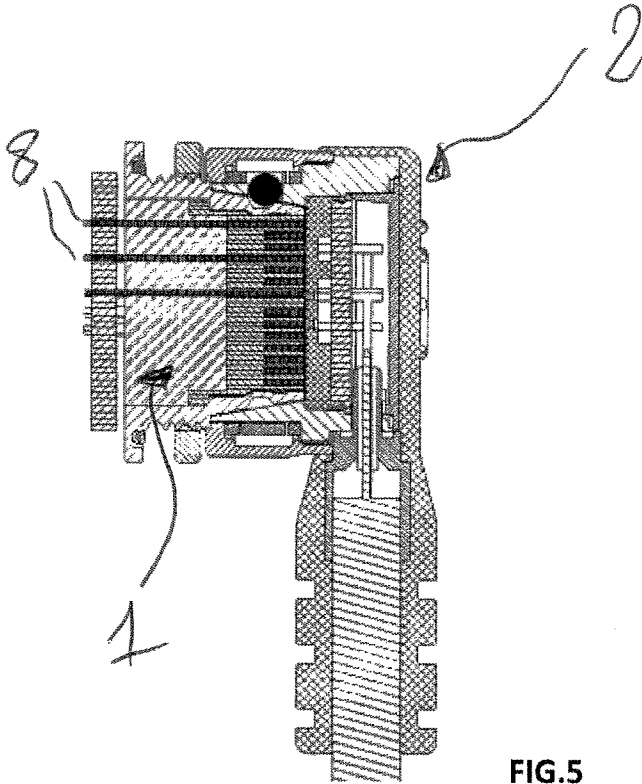


FIG.5



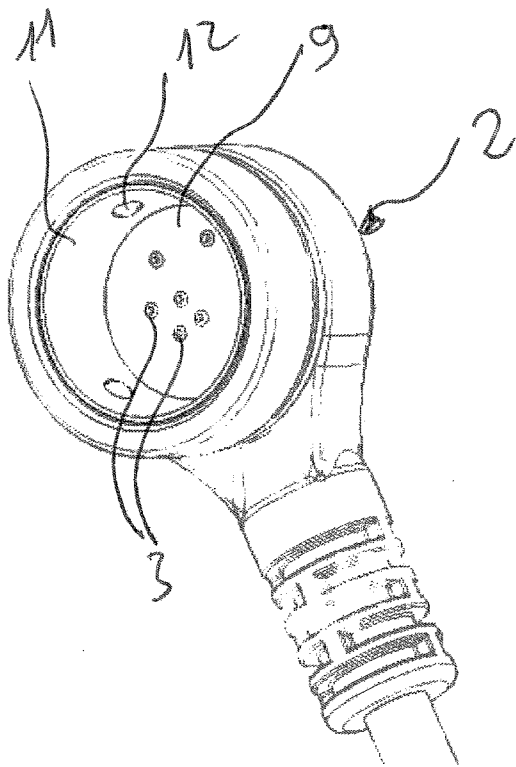


FIG.6

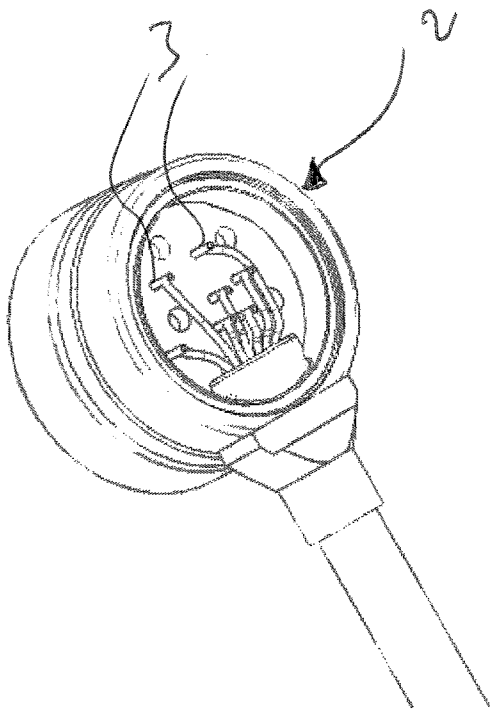


FIG. 7

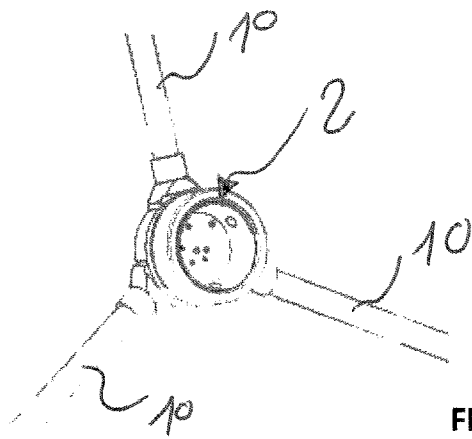


FIG. 8

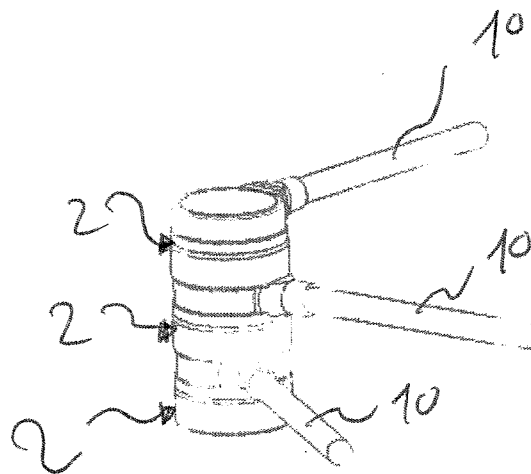


FIG. 9

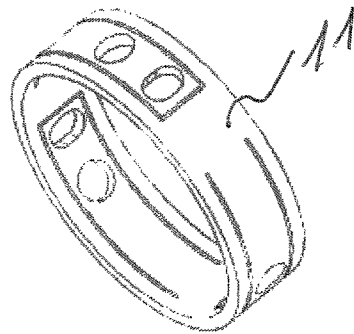


FIG.10

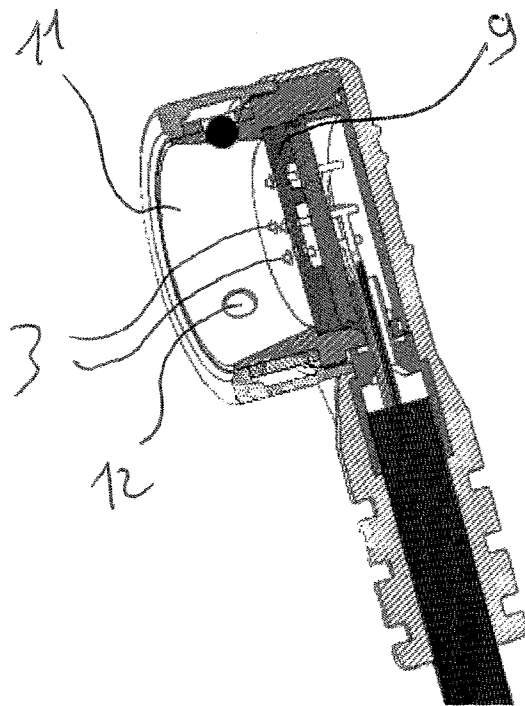


FIG.11