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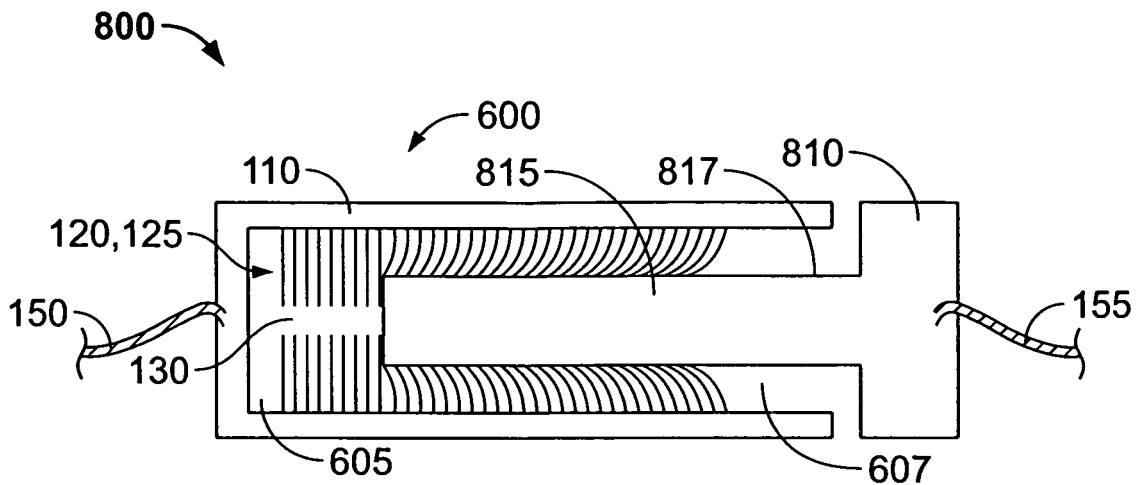
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(54) **Electrical connector**

(57) An electrical connector comprises a conductive contact surface, wherein a plurality of fibers apply a spring force on the contact surface.



**Fig. 8**

## Description

**[0001]** The invention relates to an electrical connector and to an electrical connection assembly.

**[0002]** Electrical connectors are used in various technical fields in order to provide detachable electrical connections. Known electrical connectors comprise conductive contact areas. An electrical connection is established by bringing the contact areas of two connectors into contact. Stamped springs are conventionally used in order to provide a contact pressing force between two conductive contact areas.

**[0003]** The objective of the present invention is to provide an improved electrical connector. This objective is achieved by an electrical connector according to claim 1. It is a further objective of the invention to provide an improved electrical connection assembly. This objective is achieved by an electrical connection assembly according to claim 14.

**[0004]** According to the invention, an electrical connector comprises a conductive contact surface, wherein a plurality of fibers apply a spring force on the contact surface. Advantageously, this provides a low-cost solution that is easy to adjust to various sizes and shapes of contacts.

**[0005]** In one embodiment of the invention the fibers comprise a conductive material.

**[0006]** The contact surface may be formed by a conductive overlay covering the fibers.

**[0007]** According to an embodiment of the invention the fibers are arranged on a surface of a conductive pin of the electrical connector.

**[0008]** In an alternative embodiment the electrical connector comprises a recess, wherein the fibers are arranged on a surface of the recess.

**[0009]** According to one embodiment of the invention the fibers form a non-woven material.

**[0010]** In another embodiment of the invention the fibers are arranged as a plurality of side-by-side bristles.

**[0011]** The fibers may be soldered on a surface of the electrical connector. Alternatively, the fibers may be flock-coated on a surface of the electrical connector. Alternatively, the fibers may be glued on a surface of the electrical connector.

**[0012]** Preferably, the fibers comprise a diameter of below 0.5 mm, in particular below 0.1 mm.

**[0013]** In one embodiment the fibers comprise copper. In another embodiment the fibers comprise graphite.

**[0014]** An electrical connection assembly according to the invention comprises a first electrical connector and a second electrical connector, wherein the first connector comprises a first conductive contact surface and the second connector comprises a second conductive contact surface. A plurality of fibers apply a spring force on the first contact surface. The second contact surface is designed to contact the first contact surface.

**[0015]** In one embodiment of the electrical connection assembly the first connector comprises a recess and the

fibers are arranged on a surface of the recess. In this embodiment the second connector comprises a pin and the second contact surface is a surface of the pin.

**[0016]** In another embodiment of the electrical connection assembly the first connector comprises a pin and the fibers are arranged on a surface of the pin. In this embodiment the second connector comprises a recess and the second contact surface is a surface of the recess.

**[0017]** The invention will now be explained in detail with reference to the figures in which

Figure 1 shows a detail of an electrical connector according to a first embodiment;

Figure 2 shows a detail of an electrical connector according to a second embodiment;

Figure 3 shows a detail of an electrical connector according to a third embodiment;

Figure 4 shows a detail of an electrical connector according to a fourth embodiment;

Figure 5 shows a detail of an electrical connector according to a fifth embodiment;

Figure 6 shows a sectional drawing of an electrical connector according to a sixth embodiment;

Figure 7 shows a front view of the electrical connector according to the sixth embodiment;

Figure 8 shows a sectional drawing of a first electrical connection assembly;

Figure 9 shows a sectional drawing of an electrical connector according to an eighth embodiment;

Figure 10 shows a sectional drawing of an electrical connector according to a ninth embodiment and

Figure 11 shows an electrical connection assembly according to a second embodiment.

**[0018]** Throughout the description of figures 1 to 11, the same reference symbols are used for equal or equally acting components.

**[0019]** Figure 1 schematically shows a sectional drawing of a detail of a first electrical connector 100. The first electrical connector 100 comprises a connector body 110. The connector body 110 comprises a surface 115. The connector body 110 may be made of a conductive material, for example metal. The connector body 110 may as well be made of an insulating material and may have a conductive coating on the surface 115 of the connector body 110. The conductive connector body 110 or the conductive coating of the surface 115 of the connector body 110 may be electrically coupled to further compo-

nents of the first connector 100.

**[0020]** Arranged on the surface 115 of the connector body 110 is a plurality of fibers 120. The fibers 120 are arranged as a plurality of side-by-side bristles 125. A first end of each fiber 120 is connected to the surface 115 of the connector body 110. Each fiber 120 is arranged approximately perpendicular on the surface 115. All fibers 120 comprise approximately the same length. The second ends of all fibers 120 form a contact surface 130 that is roughly parallel to the surface 115 of the connector body 110. On the surface 115 the fibers 120 may be arranged in a regular pattern. The fibers 120 may form an array. The fibers 120 may be arranged on the surface 115 similar to the bristles of a tooth brush.

**[0021]** The fibers 120 are elastically flexible and may be bent. Bending a fiber 120 creates a restoring force that tries to make the fiber 120 return to its original position. The contact surface 130 created by all fibers 120 together may therefore be a flexible resilient surface.

**[0022]** In the embodiment of figure 1 the fibers 120 comprise a conductive material. The fibers 120 may for example comprise copper. The fibers 120 may as well comprise graphite or any other suitable conductive material. The fibers 120 provide an electrical connection to the conductive connector body 110 or the conductive coating on the surface 115 of the connector body 110.

**[0023]** Each fiber 120 may comprise a diameter of for example below 0.5 mm, particularly below 0.1 mm. The fibers 120 may also have a smaller or larger diameter.

**[0024]** The fibers 120 may be soldered on the surface 115 of the connector body 110. The fibers 120 may as well be glued on the surface 115 of the connector body 110 with a conductive glue. The fibers 120 may as well be fixated on the surface 115 of the connector body 110 with another kind of fixation that provides a conductive connection between the conductive fibers 120 and the surface 115 of the connector body 110.

**[0025]** Figure 2 schematically shows a sectional drawing of a detail of a second electrical connector 200. Like the first electrical connector 100, the second electrical connector 200 comprises a connector body 110 with a surface 115. A plurality of fibers 120 is arranged on the surface of the connector body 110 as a plurality of side-by-side bristles 125.

**[0026]** Unlike the first connector 100, the second connector 200 comprises a conductive overlay 140 that is arranged on the second ends of the fibers 120. The conductive overlay 140 forms the contact surface 130 of the second connector 200. The conductive overlay 140 may be made of any suitable conductive material, for example copper. The conductive overlay 140 may for example be made of a conductive foil, a conductive grid foil or a conductive mesh. The conductive overlay 140 may for example be a copper foil with a thickness of 35  $\mu\text{m}$ .

**[0027]** In the embodiment of figure 2 the conductive overlay 140 extends over the array of side-by-side bristles 125. Beyond the array of side-by-side bristles 125 the conductive overlay 140 is bent towards the surface

115 of the connector body 110 and electrically contacts the surface 115 of the connector body 110 in a first contact region 145 and in a second contact region 146. Since the conductive overlay 140 provides a conductive connection between the contact surface 130 and the surface 115 of the connector body 110 in the second electrical connector 200 of figure 2, the plurality of fibers 120 do not necessarily need to comprise a conductive material. The fibers 120 of the second connector 200 may as well comprise an insulating material.

**[0028]** In an alternative embodiment the plurality of fibers 120 of the second connector 200 provide a conductive connection between the conductive overlay 140 and the surface 115 of the connector body 110. In this embodiment the first contact region 145 and the second contact region 146 may comprise an insulating connection or may be missing.

**[0029]** In the first contact region 145 and in the second contact region 146 the conductive overlay 140 may be soldered on the surface 115 of the connector body 110. The conductive overlay 140 may as well be glued on the surface 115 with a conductive glue in the first contact region 145 and the second contact region 146. The electrical connection between the conductive overlay 140 and the surface 115 in the first contact region 145 and the second contact region 146 may as well be provided by other means.

**[0030]** In another embodiment the conductive overlay 140 may form a sealed pillow that is filled with the plurality of fibers 120. In this embodiment one side of the pillow forms the contact surface 130 while another side of the pillow is conductively connected to the surface 115 of the connector body 110.

**[0031]** The fibers 120 may be elastic. If a force is applied on the contact surface 130 in a direction towards the surface 115 of the connector body 110, the fibers 120 may generate a restoring spring force in the opposite direction. The contact surface 130 created by the conductive overlay 140 may therefore be a flexible resilient surface.

**[0032]** The plurality of fibers 120 below the conductive overlay 140 may be immersed in a fluid or a gel. The fluid or gel may be conductive or insulating. The fluid or gel may improve heat transfer between the the conductive overlay 140, the fibers 120 and the connector body 110. The fluid or gel may also serve as a lubricant.

**[0033]** Figure 3 schematically shows sectional drawing of a detail of a third electrical connector 300. Like the first and second electrical connectors 100, 200 the third electrical connector 300 comprises a connector body 110 with a surface 115. On the surface 115 a plurality of fibers 120 is arranged. In the embodiment of the third electrical connector 300 the fibers 120 form a non-woven material 127. The contact surface 130 is formed by a surface of the non-woven material 127 that is opposed to the surface 115 of the connector body 110 in the embodiment of figure 3. In the non-woven material 127 the fibers 120 may be arranged chaotically. The non-woven material

127 may be a fleece or a felt.

**[0034]** The non-woven material 127 may be elastic. If a force is applied in a direction perpendicular to the surface 115 of the connector body 110 on the non-woven material 127, the non-woven material 127 may generate a restoring restoring force in an opposite direction.

**[0035]** In the embodiment of figure 3 the fibers 120 forming the non-woven material 127 are conductive. The fibers 120 may for example comprise copper, graphite or any other conductive material. The fibers 120 may be soldered on the surface 115, glued on the surface 115 with a conductive glue, flock-coated on the surface 115 or be fixated on the surface 115 with any other conductive fixation. The fibers 120 provide a conductive connection from the contact surface 130 to the surface 115 of the connector body 110.

**[0036]** Figure 4 schematically shows a sectional drawing of a detail of a fourth electrical connector 400. The fourth electrical connector 400 is similar to the third electrical connector 300 shown in figure 3. The fourth electrical connector 400 however comprises a conductive overlay 140 covering the non-woven material 127. The conductive overlay 140 may be made of a conductive foil, for example a copper foil or a copper grid foil. The conductive overlay 140 forms the contact surface 130. In the embodiment of figure 4 the conductive overlay 140 is not directly connected to the surface 115 of the connector body 110. In the embodiment of figure 4 the non-woven material 127 provides an electrical connection between the conductive overlay 140 and the surface 115 of the connector body 110. In an alternative embodiment the conductive overlay 140 may be directly connected to the surface 115 of the connector body 110.

**[0037]** Figure 5 schematically shows a perspective view of a detail of a fifth electrical connector 500. The fifth electrical connector 500 comprises a connector body 110 with a surface 115. A plurality of fibers 120 is arranged on the surface 115. The fibers 120 are designed as teeth 122. The teeth 122 are fabricated by cutting out, punching out or stamping out parts of the connector body 110 to form a plurality of cuttings 124. Each tooth 122 is made up of the material of a cutting 124 in the connector body 110. Each tooth 122 is bent into a direction perpendicular to the surface 115 of the connector body 110 at a base 123 of the respective tooth 122. The plurality of teeth 122 form a contact surface 130 that is essentially parallel to the surface 115 of the connector body 110. The fibers 120 of the fifth connector 500 of figure 5 are elastic.

**[0038]** Figure 6 schematically shows a sectional drawing of a sixth electrical connector 600. The sixth electrical connector 600 comprises a connector body 110 that forms a recess 605. The connector body 110 is made of a conductive material, for example a metal. The connector body 110 is electrically coupled to a first electrical connection 150. The first electrical connection 150 may for example be a cable. The connector body 110 may be arranged in an insulating housing that is not shown in

figure 6.

**[0039]** The recess 605 comprises an open end 610 through which the recess 605 is accessible. Inside the recess 605 the connector body 110 comprises a surface 607. A plurality of fibers 120 is arranged on the surface 607 of the connector body 110 inside the recess 605 as a plurality of side-by-side bristles 125. Each fiber 120 is oriented approximately perpendicular on the surface 607 of the connector body 110.

**[0040]** Figure 7 schematically shows a front view of the sixth electrical connector 600. Figure 7 shows that the recess 605 has a circular profile. Each fiber 120 is arranged approximately perpendicular on the surface 607 inside the recess 605 of the connector body 110 and points radially towards a central access of the circular recess 605.

**[0041]** In an alternative embodiment the recess 605 may comprise another profile than a circular profile. The recess 605 may for example comprise an elliptic or a rectangular profile. In any case the plurality of fibers 120 are arranged perpendicular on the inner surface 607 of the recess 605.

**[0042]** The fibers 120 may or may not cover the entire surface 607 inside the recess 605.

**[0043]** In an alternative embodiment the fibers 120 of the sixth connector 600 may be covered with a conductive overlay 140 the forms the contact surface 130.

**[0044]** Figure 8 schematically shows a sectional drawing of a first electrical connection assembly 800. The first electrical connection assembly 800 comprises the sixth electrical connector 600 shown in figures 6 and 7 and a seventh electrical connector 810.

**[0045]** The seventh electrical connector 810 comprises a first pin 815. The first pin 815 may comprise the same profile as the recess 605 of the sixth electrical connector 600. The diameter of the first pin 815 is smaller than the diameter of the recess 605. The first pin 815 comprises a conductive surface 817.

**[0046]** The seventh electrical connector 810 is electrically coupled to a second electrical connection 155. The second electrical connection 155 may be a cable or any other type of conductive line that electrically couples the seventh electrical connector 810 to further electric components. The seventh electrical connector 810 provides an electric connection between the conductive surface 817 of the first pin 815 and the second electric connection 155. The seventh electrical connector 810 may also comprise an insulating housing that is not shown in figure 8.

**[0047]** The first pin 815 of the seventh electrical connector 810 is designed to be plugged into the recess 605 of the sixth electrical connector 600 of the first electrical connection assembly 800. If the first pin 815 of the seventh connector 810 is plugged into the recess 605 the first pin 815 elastically deforms the side-by-side bristles 125 on the surface 607 of the recess 605. If the first pin 815 is removed from the recess 605, the plurality of fibers 120 approximately revert to their original side-by-side arrangement with an orientation that is perpendicular to the

surface 607 of the recess 605.

**[0048]** If the first pin 815 is plugged into the recess 605, an electrical connection is created between the contact surface 130 and the surface 817 of the first pin 815, thereby setting up an electrical connection between the first electric connection 150 and the second electric connection 155. The first electric connection 150 is electrically connected to the connector body 110 of the sixth electrical connector 600. The connector body 110 of the sixth electrical connector 600 is electrically connected to the plurality of fibers 120. The plurality of fibers is electrically connected to the contact surface 130 provided by the plurality of fibers 120. The contact surface 130 is electrically connected to the surface 817 of the first pin 815 of the seventh electrical connector 810. The seventh electrical connector 810 is electrically connected to the second electric connection 155.

**[0049]** The electrical connection between the contact surface 130 and the surface 817 of the first pin 815 is a multi contact point connection. The electrical connection between the contact surface 130 and the surface 817 of the first pin 815 may be suitable for high-power applications. Due to the elastic nature of the fibers 120, an electrical connection between the contact surface 130 and the surface 817 of the first pin 815 is ensured even if the first pin 815 is not perfectly centered inside the recess 605.

**[0050]** A further advantage of the first electrical connection assembly 800 is that the diameter of the first pin 815 can be chosen from of a range of values. The diameter of the first pin 815 needs to be small enough to make the first pin fit into the recess 605. The diameter of the first pin 815 needs to be large enough to ensure that the first pin 815 is in contact with the contact surface 130 of the plurality of fibers 120 when the first pin 815 is plugged into the recess 605.

**[0051]** The first electrical connection assembly 800 may comprise additional means to fasten the seventh electrical connector 810 on the sixth electrical connector 600 when the connectors 810, 600 are plugged together.

**[0052]** Figure 9 schematically shows a sectional drawing of an eighth electrical connector 900. The eighth electrical connector 900 may serve as an alternative to the sixth electrical connector 600 in the first electrical connection assembly 800 of figure 8. The eighth electrical connector 900 comprises a connector body 110 that forms a recess 605. The connector body 110 is electrically connected to a first electrical connection 150. Also the eighth electrical connector 900 may comprise an insulating housing that is not shown in figure 9.

**[0053]** On a surface 607 of the inside of the recess 605 a plurality of fibers 120 is arranged. The fibers 120 are arranged as a non-woven material 127. The non-woven material 127 is covered by a conductive overlay 140 that provides a contact surface 130. In the embodiment of Figure 9 the conductive overlay 140 is electrically connected to the connector body 110 in a third contact region 147 and in a fourth contact region 148.

**[0054]** In this embodiment the fibers 120 of the non-woven material 127 may or may not be conductive. If the fibers 120 are not conductive, an electrical connection between the contact surface 130 and the connector body 110 may be provided by the conductive overlay 140 via the third and fourth contact regions 147, 148. In another embodiment the third and/or the fourth contact region 147, 148 directly provides an electrical connection between the conductive overlay 140 and the first electrical connection 150. In this embodiment the connector housing 110 may be insulating.

**[0055]** In yet an alternative embodiment the third contact region 147, the fourth contact region 148 or both contact regions 147, 148 may be omitted. If the conductive overlay 140 is not directly electrically connected to the connector body 110, the non-woven material 127 may be conductive and provide an electric connection between the contact surface 130 of the conductive overlay 140 and the connector body 110. In yet another embodiment the conductive overlay 140 may be omitted. In this embodiment, the contact surface 130 is provided by the non-woven material 127. The non-woven material 127 provides an electrical connection between the contact surface 130 and the connector body 110.

**[0056]** The seventh electrical connector 810 shown in figure 8 may be plugged into the recess 605 of the eighth electrical connector 900 of figure 9.

**[0057]** Figure 10 schematically shows a sectional drawing of a ninth electrical connector 1000. The ninth electrical connector 1000 comprises a second pin 1010 with a surface 1015. A plurality of fibers 120 is arranged on the surface 1015 of the pin 1010. The fibers 120 are arranged as side-by-side bristles 125 that provide a contact surface 130. The plurality of fibers 120 provide an electrical connection between the contact surface 130 and the second pin 1010 of the ninth electrical connector 1000. The ninth electrical connector 1000 may be electrically connected to a cable or another conductive line that is conductively connected to the surface 1015 and that is not shown in figure 10.

**[0058]** The ninth electrical connector 1000 is designed to be plugged into a recess of a female electrical connector. If the second pin 1010 is plugged into the recess of a female connector, the contact surface 130 of the ninth electrical connector 1000 touches the conductive surface of the female connector and an electrical connection between the female connector and the ninth electrical connector 1000 is established. In another embodiment the fibers 120 on the surface 1015 of the second pin 1010 may as well be arranged as a non-woven material. The plurality of fibers 120 may also be covered with a conductive overlay.

**[0059]** Figure 11 schematically shows a sectional drawing of a second electrical connection assembly 1100. The second electrical connection assembly 1100 comprises a tenth electrical connector 1150 and an eleventh electrical connector 1160. The tenth electrical connector 1150 comprises a first connector surface 1155

that is electrically conductive. The eleventh electrical conductor 1160 comprises a second connector surface 1165 that is also electrically conductive. Arranged on the first connector surface 1155 is a plurality of fibers 120 that forms a non-woven material 127. The fibers 120 arranged on the first connector surface 1155 of the tenth electrical connector 1150 are electrically conductive and provide a contact surface 130 that is parallel to the first connector surface 1155. The second connector surface 1165 of the eleventh electrical connector 1160 is pressed against the contact surface 130 provided by the plurality of fibers 120, thereby creating an electrical connection between the tenth electrical connection 1150 and the eleventh electrical connector 1160.

**[0060]** While the foregoing is directed to embodiments of the invention, other and further embodiments of this invention may be devised without departing from the basic scope of the invention, the scope of the present invention being determined by the claims that follow.

### Claims

1. An electrical connector (100, 200, 300, 400, 500, 600, 900, 1000, 1150) comprising a conductive contact surface (130),  
**characterized in that**  
a plurality of fibers (120) apply a spring force on the contact surface (130).
2. The electrical connector (100, 200, 300, 400, 500, 600, 900, 1000, 1150) according to claim 1, wherein the fibers (120) comprise a conductive material.
3. The electrical connector (200, 400, 900) according to any of claims 1 or 2, wherein the contact surface (130) is formed by a conductive overlay (140) covering the fibers (120).
4. The electrical connector (100, 200, 300, 400, 500, 1000) according to any of the previous claims, wherein the fibers (120) are arranged on a surface (115, 1015) of a conductive pin (1010) of the electrical connector (100, 200, 300, 400, 500, 1000).
5. The electrical connector (100, 200, 300, 400, 500, 600, 900) according to any of claims 1 to 3, wherein the electrical connector (100, 200, 300, 400, 500, 600, 900) comprises a recess (605), wherein the fibers (120) are arranged on a surface (115, 607) of the recess (605).
6. The electrical connector (300, 400, 900, 1150) according to any of the previous claims, wherein the fibers (120) form a non-woven material (127).
7. The electrical connector (100, 200, 600, 1000) according to any of claims 1 to 5, wherein the fibers (120) are arranged as a plurality of side by side bristles (125).
8. The electrical connector (100, 200, 300, 400, 600, 900, 1000, 1150) according to any of the previous claims, wherein the fibers (120) are soldered on a surface (115, 607, 1015, 1155) of the electrical connector (100, 200, 300, 400, 600, 900, 1000, 1150).
9. The electrical connector (100, 200, 300, 400, 600, 900, 1000, 1150) according to any of claims 1 to 7, wherein the fibers (120) are flock coated on a surface (115, 607, 1015, 1155) of the electrical connector (100, 200, 300, 400, 600, 900, 1000, 1150).
10. The electrical connector (100, 200, 300, 400, 600, 900, 1000, 1150) according to any of claims 1 to 7, wherein the fibers (120) are glued on a surface (115, 607, 1015, 1155) of the electrical connector (100, 200, 300, 400, 600, 900, 1000, 1150).
11. The electrical connector (100, 200, 300, 400, 500, 600, 900, 1000, 1150) according to any of the previous claims, wherein the fibers (120) comprise a diameter of below 0.5 mm, in particular below 0.1 mm.
12. The electrical connector (100, 200, 300, 400, 500, 600, 900, 1000, 1150) according to any of the previous claims, wherein the fibers (120) comprise copper.
13. The electrical connector (100, 200, 300, 400, 500, 600, 900, 1000, 1150) according to any of claims 1 to 11, wherein the fibers (120) comprise graphite.
14. An electrical connection assembly comprising a first electrical connector (100, 200, 300, 400, 500, 600, 900, 1000, 1150) and a second electrical connector (810, 1160), wherein the first connector (100, 200, 300, 400, 500, 600, 900, 1000, 1150) comprises a first conductive contact surface (130) and the second connector (810, 1160) comprises a second conductive contact surface (817, 1165),  
**characterized in that,**  
a plurality of fibers (120) apply a spring force on the first contact surface (130),  
and that the second contact surface (817, 1165) is designed to contact the first contact surface (130).
15. The electrical connection assembly according to claim 14, wherein the first connector (100, 200, 300, 400, 500, 600, 900) comprises a recess (605) and the fibers (120) are arranged on a surface (115, 607)

of the recess (605), and wherein the second connector (810) comprises a pin (815) and the second contact surface is a surface (817) of the pin (815).

16. The electrical connection assembly according to claim 14, wherein the first connector (100, 200, 300, 400, 500, 1000) comprises a pin (1010) and the fibers (120) are arranged on a surface (1015) of the pin (1010),  
and wherein the second connector comprises a recess and the second contact surface is a surface of the recess.
17. The electrical connection assembly according to one of claims 15 or 16,  
wherein the pin (815, 1010) is designed to be plugged into the recess (605).

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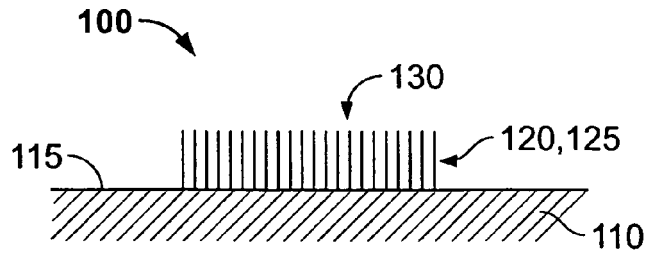


Fig. 1

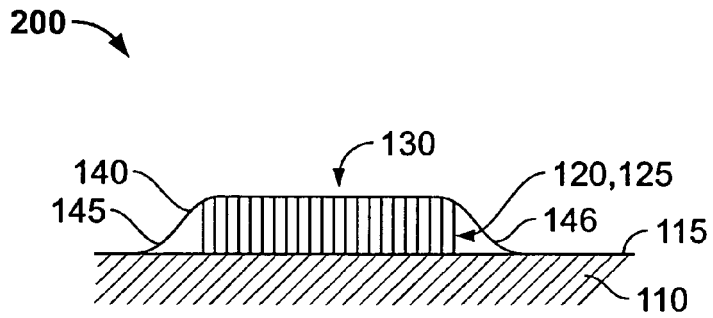


Fig. 2

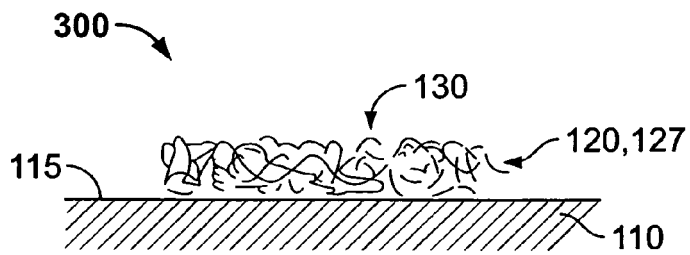


Fig. 3

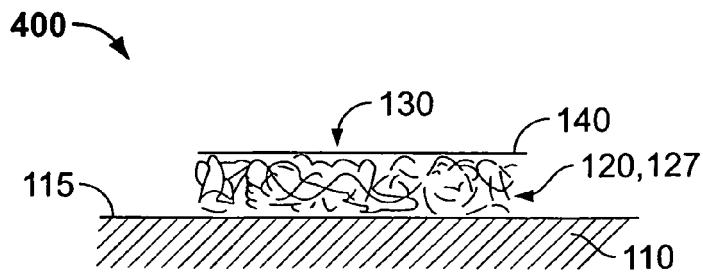


Fig. 4

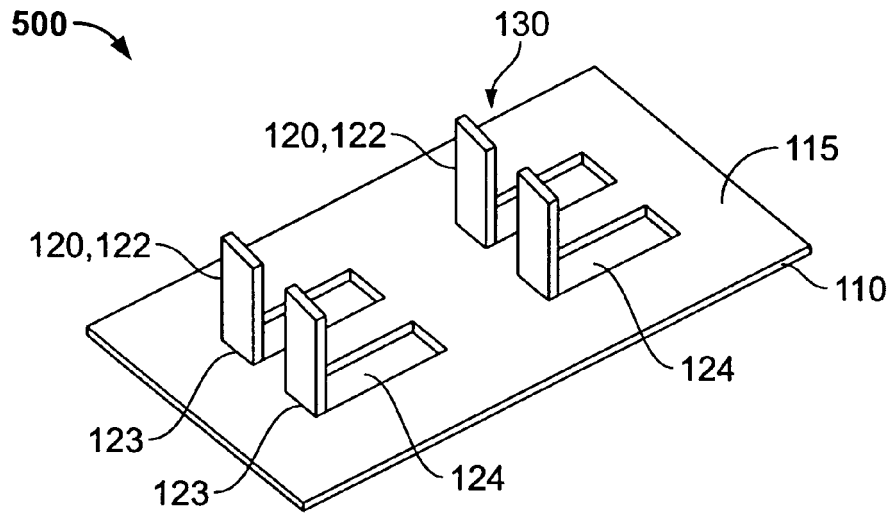


Fig. 5

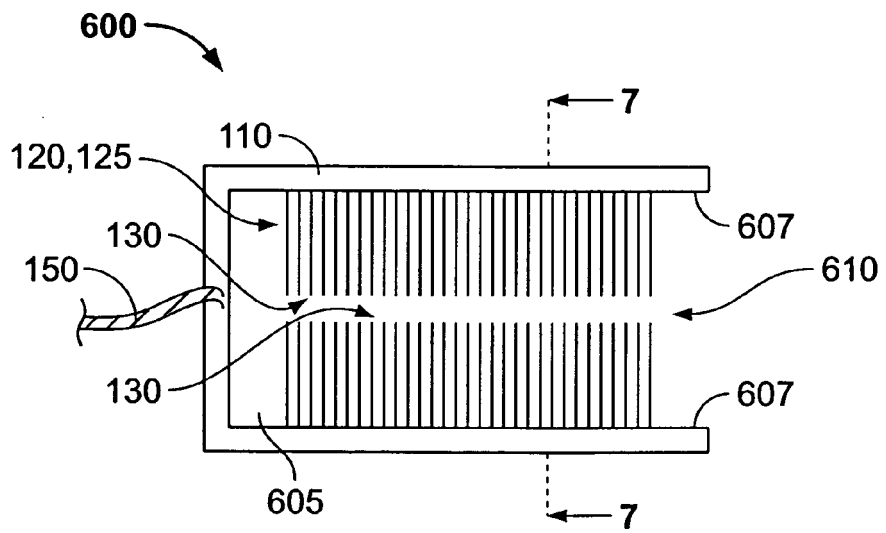


Fig. 6

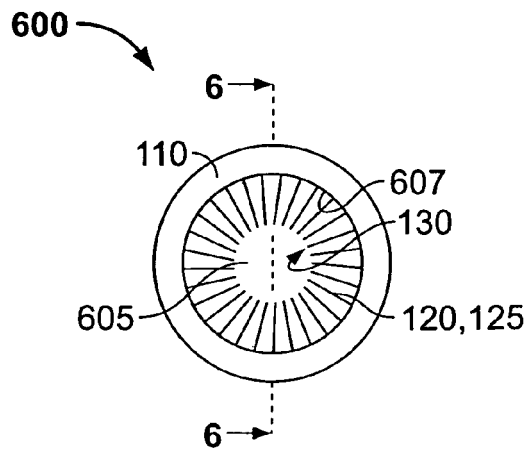


Fig. 7

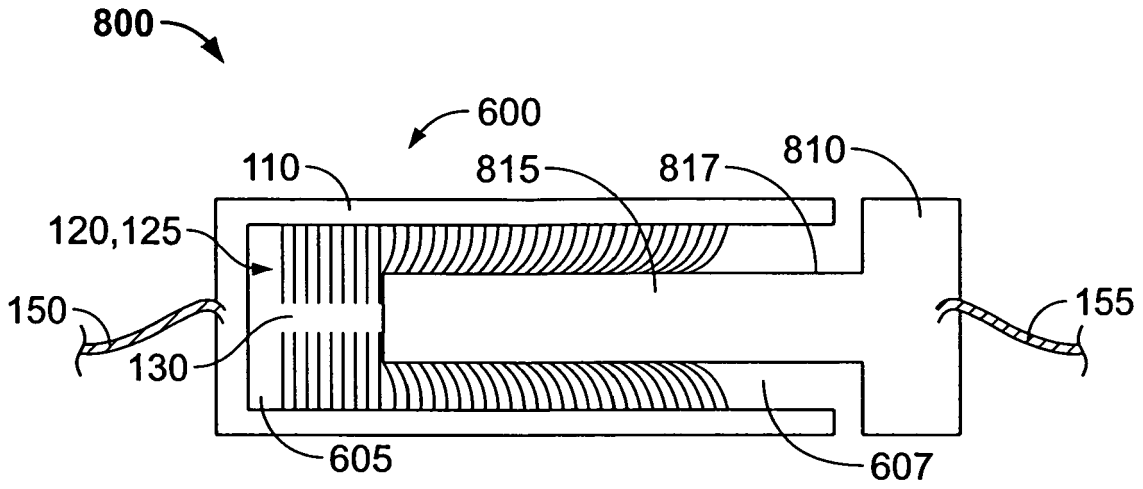


Fig. 8

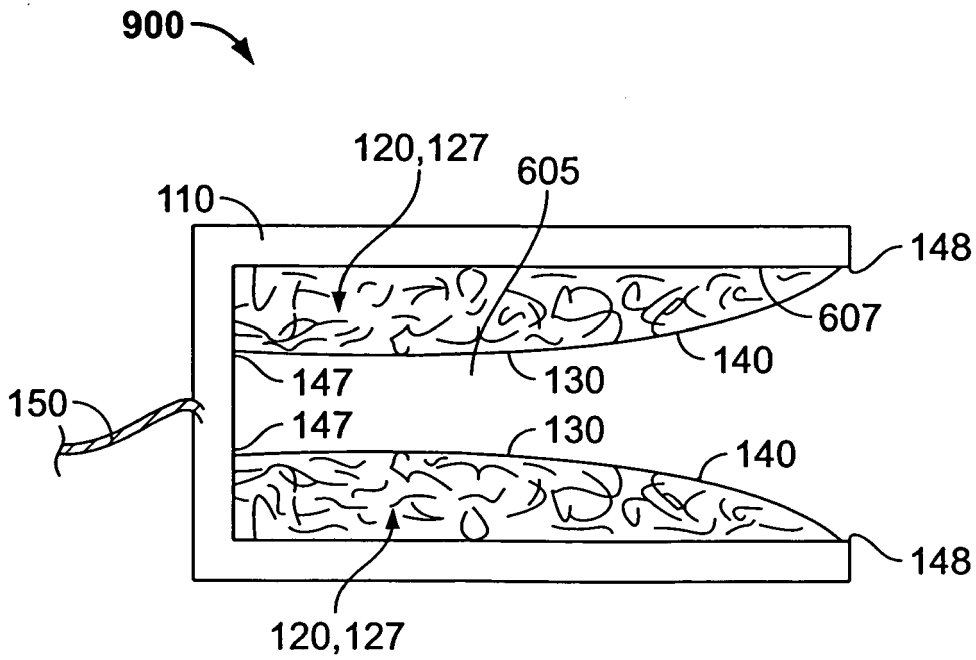


Fig. 9

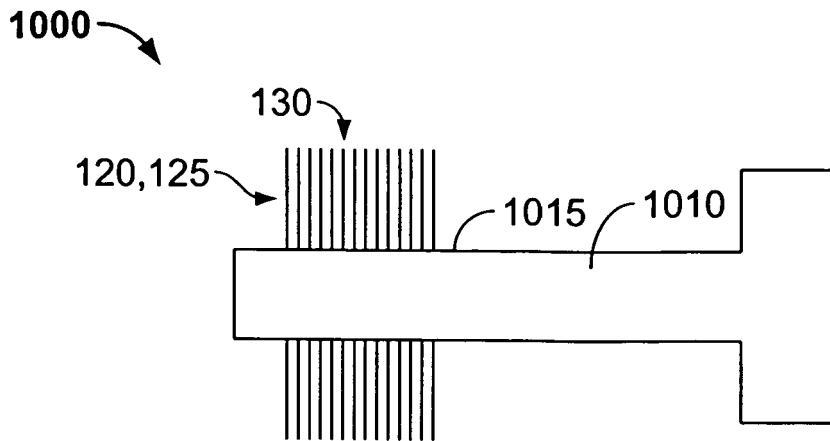


Fig. 10

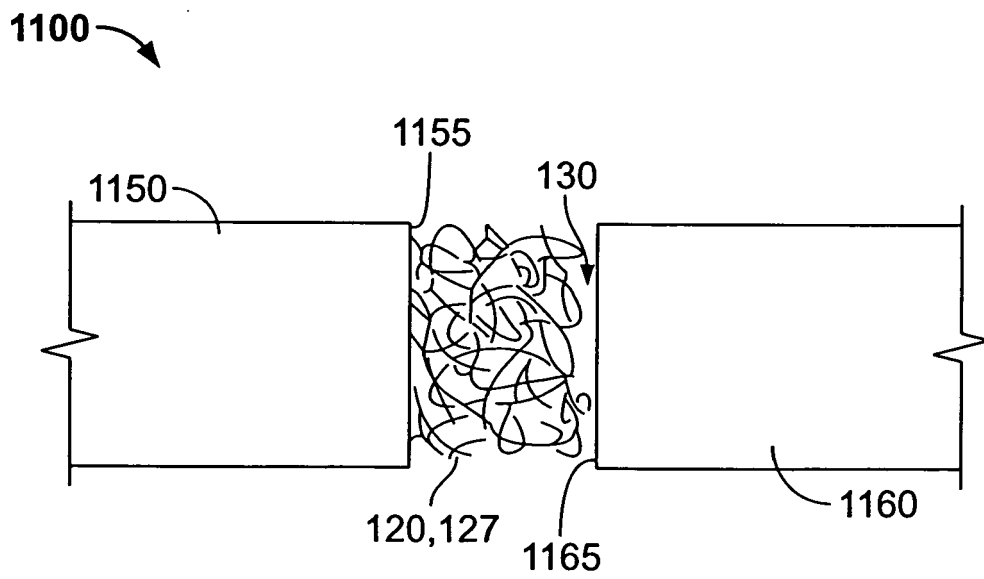


Fig. 11



EUROPEAN SEARCH REPORT

Application Number  
EP 08 16 4419

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC)
			H01R
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		3 February 2009	Corrales, Daniel
CATEGORY OF CITED DOCUMENTS			
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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 08 16 4419

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03-02-2009

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