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(54) **ELECTRICALLY CONDUCTIVE CONTACT AND ELECTRICAL CONNECTOR UTILIZING SAME**

(57) A conductive contact element and an electrical connector using the conductive contact element are provided. The conductive contact element has a front contact portion (140) and a rear contact portion spaced apart from each other at front and rear and respectively in conductive contact with a suitable conductive contact element. The front contact portion and the rear contact por-

tion have an insertion space in an up-down direction for the suitable conductive contact element to be inserted therein. The conductive contact element has a simple structure, capable of achieving multi-point contact, and eliminates the short pile radiation effect while reducing insertion loss.

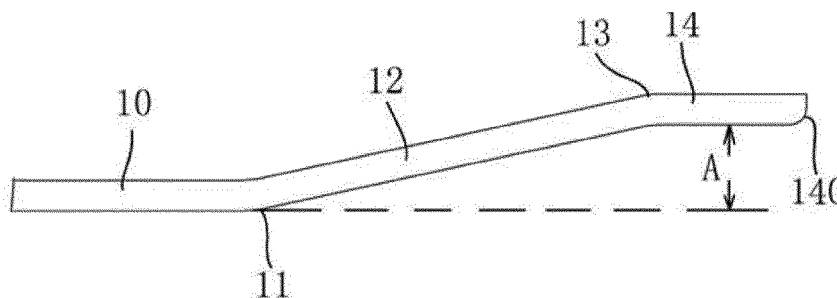


FIG. 1

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Description

BACKGROUND OF THE DISCLOSURE

Field of the Disclosure

[0001] The present disclosure relates to a conductive connection device, and more particularly to a conductive contact element and an electrical connector using the same.

Description of Related Art

[0002] The sheet contact element is widely used in high-speed differential data transmission due to its simple structure and is easy for characteristic impedance calculation. For example, Chinese Patent Publication No. CN105428939A, which was published on March 23, 2016, discloses a conductive contact element, an electrical connector, and an electrical connector assembly. The conductive contact element includes a male contact body. The male contact body includes a male contact segment, a front end of the male contact segment is provided with a male front contact portion protruding downward, and the male front contact portion includes a male lower bending segment and a male upper bending segment. A contact point is located at a transition position of the male lower bending segment and the male upper bending segment, wherein the male upper bending segment and a suitable female contact segment cooperate to achieve a guiding effect during insertion, avoiding that end portions of the male and female contact elements butt against each other and be damaged during insertion. However, in the insertion state, the male upper bending segment of the contact element is curved upward, resulting in short pile radiation effect and causing greater insertion loss.

SUMMARY OF THE DISCLOSURE

[0003] The purpose of the present disclosure is to provide a conductive contact element having a low insertion loss. Another purpose of the present disclosure is to provide an electrical connector using the conductive contact element.

[0004] To achieve the above purpose, the conductive contact element of the present disclosure has front and rear contact portions that are spaced apart from each other at front and rear and respectively configured to electrically contact a suitable conductive contact element. The front and rear contact portions have an insertion space in an up-down direction for insertion of the suitable conductive contact element.

[0005] The conductive contact element includes a base body extending in a front-rear direction. A front end of the base body is connected to a first connecting segment which is inclined upwardly through a first bending segment, and a front end of the first connecting segment

is connected to a contact segment through a second bending segment. The front contact portion is located on the contact segment, and the rear contact portion is located on the base body or a lower side surface of the first connecting segment.

[0006] A front side of a front contact point of the front contact portion is further provided with an insertion guiding surface that prevents the conductive contact element and the suitable conductive contact element from butting against each other and becoming stuck during insertion.

[0007] The front contact portion is an inclined extending segment disposed at a front end of the contact segment and in parallel with the first connecting segment. The front contact point is a lower side surface of the inclined extending segment, and a rear contact point of the rear contact portion is formed by a part of the lower side surface of the first connecting segment.

[0008] The insertion guiding surface is an inclined surface or a curved surface which is provided on a lower side of a front end of the inclined extending segment and gradually extends upward in a direction from the rear to the front.

[0009] The front contact portion is a circular arc-shaped surface provided on a lower side of the front end of the contact segment.

[0010] The front contact portion is an inclined surface provided on the lower side of the front end of the contact segment and parallel to an oblique direction of the first connecting segment.

[0011] A portion where the contact segment is connected to the second bending segment is disposed in parallel with the base body.

[0012] The electrical connector of the present disclosure includes a connector housing and a conductive contact element disposed in the connector housing. The conductive contact element has front and rear contact portions that are spaced apart from each other at front and rear and are respectively configured to electrically contact a suitable conductive contact element. The front and rear contact portions have an insertion space in an up-down direction for insertion of the suitable conductive contact element.

[0013] The conductive contact element includes a base body extending in a front-rear direction. A front end of the base body is connected to a first connecting segment which is inclined upwardly through a first bending segment, and a front end of the first connecting segment is connected with a contact segment through a second bending segment. The front contact portion is located on the contact segment, and the rear contact portion is located on the base body or a lower side surface of the first connecting segment.

[0014] A front side of a front contact point of the front contact portion is further provided with an insertion guiding surface that prevents the conductive contact element and the suitable conductive contact element from butting against each other and becoming stuck during insertion.

[0015] The front contact portion is an inclined extend-

ing segment disposed at a front end of the contact segment and in parallel with the first connecting segment. The front contact point is a lower side surface of the inclined extending segment, and a rear contact point of the rear contact portion is formed by a part of the lower side surface of the first connecting segment.

[0016] The insertion guiding surface is an inclined surface or a curved surface which is provided on a lower side of a front end of the inclined extending segment and gradually extends upward in a direction from the rear to the front.

[0017] The front contact portion is a circular arc-shaped surface provided on a lower side of the front end of the contact segment.

[0018] The front contact portion is an inclined surface provided on the lower side of the front end of the contact segment and parallel to an oblique direction of the first connecting segment.

[0019] A portion where the contact segment is connected to the second bending segment is disposed in parallel with the base body.

[0020] When the electrical connector of the present disclosure is in use, the conductive contact element and the suitable conductive contact element are disposed in a reversed manner vertically and inserted into each other. The suitable conductive contact element is capable of inserting into the conductive element through the insertion space formed between the front and rear contact portions of the conductive contact element, and electrically contacts the front and rear contact portions respectively. As compared with the related art, there is no need to provide a guiding structure for avoiding the end portions of the conductive contact elements from butting against each other, thereby avoiding the short pile radiation effect and reducing the insertion loss.

[0021] Further, the conductive contact element is provided with the first connecting segment that is disposed in an inclined manner such that a certain distance is formed between the contact segment and the base body in the up-down direction, thereby forming the insertion space between the front contact portion and the base body. When the conductive contact element and the suitable conductive contact element are inserted into each other, the contact segment is directly in electrical contact with the first connecting segment of the suitable conductive contact element or the rear contact portion of the lower side of the base body through the front contact portion of the front end. The base body or the rear contact point on the lower side of the first connecting segment is in electrical contact with the front contact portion of the suitable conductive connecting element. The entire conductive contact element has a simple structure and takes up less space for the insertion.

[0022] Further, by providing the insertion guiding surface on the front side of the front contact point of the front contact portion, it is possible to effectively prevent the end portions of the conductive contact element and the suitable conductive contact element from butting against

each other and becoming stuck or damaged during the insertion.

[0023] Further, the front contact portion is set as the inclined extending segment disposed in parallel with the first connecting segment. The front contact point is the lower side surface of the inclined extending segment, and the rear contact point is a portion of the lower side surface of the first connecting segment, such that the front contact point can be in contact with the rear contact point, and the front and rear contact points can slide relative to each other when the conductive contact element and the suitable conductive contact element are inserted into each other.

[0024] Or, when the front contact portion is set as a circular arc-shaped surface, insertion resistance is reduced while ensuring good electrical contact.

[0025] Alternatively, when the front contact portion is set as the inclined surface parallel to the oblique direction of the first connecting segment, a better conductive contact with the rear contact point of the first connecting portion is achieved, and the conductive contact area is increased.

[0026] By configuring the portion where the contact segment is connected to the second bending segment to be parallel with the base body, it is possible to reduce the space occupied by the conductive contact element in the up-down direction, so as to reduce the space of the insertion cavity in the connector, and thereby reducing the volume of the connector.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027]

FIG. 1 is a schematic structural view of a first embodiment of a conductive contact element of the present disclosure.

FIG. 2 is a view showing a state of the conductive contact element in the first embodiment of the present disclosure at the time of insertion.

FIG. 3 is a schematic structural view of a second embodiment of the conductive contact element of the present disclosure.

FIG. 4 is a view showing a state of the conductive contact element in the second embodiment of the present disclosure at the time of insertion.

FIG. 5 is a schematic structural view of a third embodiment of the conductive contact element of the present disclosure.

FIG. 6 is a view showing a state of the conductive contact element in the third embodiment of the present disclosure at the time of insertion.

FIG. 7 is a view showing a state of the conductive contact element in a fourth embodiment of the present disclosure at the time of insertion.

FIG. 8 is a view showing a state of the conductive contact element in a fifth embodiment of the present disclosure at the time of insertion.

FIG. 9 is a view showing a state of the conductive contact element in a sixth embodiment of the present disclosure at the time of insertion.

FIG. 10 is a view showing a state of the conductive contact element in a seventh embodiment of the present disclosure at the time of insertion.

FIG. 11 is a view showing a state of the conductive contact element in an eighth embodiment of the present disclosure at the time of insertion.

DESCRIPTION OF EMBODIMENTS

[0028] Embodiments of the present disclosure will be further described below with reference to the accompanying drawings.

[0029] A first embodiment of the electrical connector of the present disclosure includes a connector housing and a conductive contact element disposed within the connector housing.

[0030] The electrical connector of the present disclosure achieves an electrically conductive connection by electrically contacting the conductive contact element with a suitable conductive contact element of the suitable electrical connector, wherein the suitable conductive contact element is identical with the conductive contact element in terms of structure, except that the suitable conductive contact element and the conductive contact element are disposed in opposite directions in an up-down direction. Following description only focuses on details of the structure of the conductive contact element.

[0031] The structure of the conductive contact element is as shown in FIG. 1-FIG. 2, and includes a base body 10 extending in an insertion direction. A front segment of the base body 10 is connected to a first connecting segment 12 through a first bending segment 11. The first connecting segment 12 extends inclinedly and upwardly from a front end of the base body 10. A front end of the first connecting segment 12 is connected to a contact segment 14 through a second bending segment 13. As the name suggests, the contact segment is configured for electrically contacting the suitable conductive contact element. A front end of the contact segment 14 is provided with a front contact portion 140 for electrically contacting the suitable conductive contact element. The contact segment 14 is disposed in parallel with the base body 10. Certainly, in other embodiments, the contact segment may be disposed obliquely upward, but such configuration increases the space occupied by the conductive contact element in the up-down direction as compared with the solution of configuring the contact segment to be parallel with the base body. Alternatively, the contact segment may be disposed obliquely downward or curved downwardly and the front contact portion is disposed at the front end of the contact segment. However, as compared with the solution of configuring the contact segment to be parallel with the base body, when the front contact portion of the conductive contact element is in contact with a rear contact point of the suitable conductive

contact element, the second bending segment of the conductive contact element is likely to be curved upward and deformed due to abutting pressure, which results in decrease of service life of the conductive contact element.

If a certain angle is formed between the contact segment and the base body, the angle is not greater than 45°.

[0032] The first connecting segment 12 is further provided with a rear contact point 15 that is configured to be in electrical contact with a front contact portion of the suitable conductive contact element at a lower side surface close to one end of the base body 10. In this embodiment, the front contact portion is a circular arc-shaped surface disposed on a lower side surface of the front end of the contact segment, and the rear contact point 15 is a segment close to the base body of a lower inclined plane of the first connecting segment. By making the circular arc-shaped surface to be in electrical contact with the lower inclined plane of the first connecting segment of the suitable conductive contact element, it is possible to facilitate the conductive contact element to slide relative to the suitable conductive contact element during insertion, thereby reducing insertion resistance. In actual production, the circular arc-shaped surface may be formed through rounding a lower side of the front end of the contact segment. Of course, it is also possible to provide a circular arc-shaped projection that protrudes downward at the front end of the contact segment.

[0033] The first connecting segment is disposed inclinedly such that the conductive contact element is elastically deformed when being inserted into the suitable conductive contact element, and such elastic deformation enables the conductive contact element and the suitable conductive contact element to be in stable contact. Furthermore, the oblique arrangement of the first connecting segment also allows a certain distance to be formed between the front contact portion and the rear contact point in the up-down direction, and exactly, the distance is formed to be the insertion space A for the suitable conductive contact element to be inserted therein. The insertion space A allows the suitable conductive contact element to be inserted directly and allows the front contact portion of the suitable conductive contact element to be in direct contact with the rear contact point of the conductive contact element without causing the conductive contact element to butt against the suitable conductive contact element. In this way, there is no need to provide a guiding structure on the conductive contact element, thereby eliminating the short pile radiation effect and achieving the purpose of reducing the insertion loss.

[0034] The present disclosure also provides a second embodiment of the electrical connector, which differs from the first embodiment in the structure of the conductive contact element, specifically, in the structure of the front contact portion on the conductive contact element.

[0035] As shown in FIG. 3-FIG. 4, in the second embodiment, the front contact portion 140 disposed on the contact segment of the conductive contact element is an inclined surface disposed on the lower side of the front

end of the contact segment and parallel to the oblique direction of the first connecting segment, such that the conductive contact element can be adhered to and in contact with a lower inclined surface of the first connecting segment of the suitable conductive contact element, i.e., rear contact point, through the inclined surface, thereby increasing conductive contact area of the conductive contact element and the suitable conductive contact element, and simultaneously, the conductive contact is more stable through planar adhesion contact.

[0036] The present disclosure also provides a third embodiment of the electrical connector that differs from the first embodiment in the structure of the conductive contact element.

[0037] As shown in FIG. 5-FIG. 6, in the third embodiment, the front contact portion disposed on the contact segment 14 of the conductive contact element is the inclined extending segment 140 disposed at the front end of the contact segment and disposed in parallel with the first connecting segment. The portion where the contact segment is connected to the second connecting segment 13 is disposed in parallel with the base body. A lower side of the inclined extending segment 140 has a conductive inclined surface 141 parallel to a lower side surface of the first connecting segment 12. Furthermore, the lower side of the inclined extending segment 140 is further provided with a guiding inclined surface 142 at the front side of the conductive inclined surface 141, wherein the conductive inclined surface 141 is configured for electrically contacting the rear contact point of the suitable conductive contact element, and the guiding inclined surface 142 is for more effectively avoiding the conductive contact element from butting against and being stuck with the front end of the suitable conductive contact element during the insertion process. In this embodiment, since the front contact portion of the conductive contact element is disposed in an inclined manner, the probability of butting of the conductive contact element in the insertion process is relatively small. Therefore, the configuration that the guiding inclined surface is disposed at the front end of the conductive inclined surface completely overcomes the problem that the conductive contact element butts against the suitable conductive contact element. Meanwhile, since the front contact portion itself is inclined, there is no need for a length of the guiding inclined surface to be too long, thereby reducing occurrence of the short pile radiation effect and decreasing the insertion loss.

[0038] In the embodiment of the electrical connector, the guiding inclined surface is served as a guiding insertion surface. In other embodiments, the guiding insertion surface may also be an arc-shaped surface that extends upward gradually in the direction from the rear to the front and that is disposed at the lower side of the front end of the inclined extending segment.

[0039] In the embodiment of the electrical connector, the front contact portion is an inclined extending portion disposed at the front end of the contact segment and

disposed in parallel with the first connecting segment. In other embodiments, the front contact portion may be disposed in parallel with the base body, that is, may extend forward along the front end of the contact segment. A lower side surface of the front contact portion includes a first portion disposed in parallel with the lower side surface of the first connecting segment as well as a second portion disposed on a front side of the inclined surface and inclined upward in the direction from the rear to the front, wherein the first portion serves as a front contact point that is in conductive contact with a rear contact portion of the suitable conductive connector, and the second portion serves as an insertion guiding surface.

[0040] The present disclosure also provides a fourth embodiment of the electrical connector, which differs from the first embodiment in the structure of the conductive contact element, specifically, in the form of the first connecting segment.

[0041] As shown in FIG. 7, in the fourth embodiment, the first connecting segment 12 of the conductive contact element is an arc-shaped segment. The base body 10 is connected to the arc-shaped first connecting segment 12 through the first bending segment 11, and the first connecting segment 12 is connected to the contact segment 14 through the second bending segment 13. Correspondingly, the rear contact point 15 of the rear contact portion is located on an arc-shaped inner side surface of the first connecting segment 12. A structural type of the conductive contact element is similar to that of the conductive contact element of the first embodiment, and difference between the two is that the second bending segment and the contact segment are not clearly distinguished.

[0042] The present disclosure also provides a fifth embodiment of the electrical connector, which differs from the first embodiment in the structure of the conductive contact element, specifically, structural types of the first connecting segment, the second bending segment, the contact segment, and configuration position of the rear contact portion.

[0043] As shown in FIG. 8, in the fifth embodiment, the first connecting segment 12 of the conductive contact element is an arc-shaped segment, the base body 10 is connected to the arc-shaped first connecting segment 12 through the first bending segment 11, the first connecting segment 12 is connected to the contact segment 14 through the second bending segment 13, and the rear contact portion is a part of the lower side surface of the base body 10. Correspondingly, the rear contact point 15 is provided on the lower side surface of the base body 10. After the insertion is completed, the contact segment 14 is in conductive contact with the base body of the suitable conductive contact element through the front contact portion 140 at its end. The conductive contact element of this type is similar to the conductive contact element of the first embodiment. The obvious difference between the two is that the first connecting segment, the second bending segment and the contact segment are

smoothly transitioned, the distinction is not obvious, and the rear contact portion is located on the base body. When being in use, the conductive contact element occupies a larger insertion space. When assembly error of the conductive contact element is relatively large, the front contact portion is likely to butt against the first bending segment of the suitable conductive contact element and become stuck, and the insertion cannot be performed smoothly.

[0044] The present disclosure also provides a sixth embodiment of the electrical connector, which differs from the first embodiment in the structure of the conductive contact element, specifically, in the arrangement position of the rear contact portion and the structural type of the contact segment.

[0045] As shown in FIG. 9, in this embodiment, the rear contact portion is provided on the base body 10, and the rear contact point is a portion of the lower side surface of the base body 10. The contact segment 14 extends forward and downward from the second bending segment 13, and is in conductive contact with the rear contact point of the suitable conductive contact element on the base body 10 through the front contact point 140 at its front end.

[0046] The present disclosure also provides an embodiment of an electrical connector having a special structure. As shown in FIG. 10, as compared with the sixth embodiment, the base body 10 of the conductive contact element does not extend straight in a front-rear direction, but has a Z-shape having two horizontal edges and transition edge connecting the two horizontal edges. The rear contact portion is disposed on a lower horizontal edge of the Z-shaped base body 10, and an upper horizontal edge of the Z-shaped base body is higher than the front contact portion 140. The conductive connector of this type is relatively complicated. As compared with the above six embodiments, it is obvious that the shape of the base body has a relatively obvious change, and the similarity is that the two contact portions are disposed at the front and the rear of a suspended segment. The suspended segment is located at a front side of the base body for being in conductive contact with the suitable conductive contact element. The insertion space configured for the suitable conductive contact element to be inserted therein is provided on the rear contact portion and the front contact portion in the up-down direction. Certainly, in order to adapt to connectors with different structures, the shape of the base body may be other shapes, which are omitted herein.

[0047] The present disclosure also provides an eighth embodiment of the electrical connector. As shown in FIG. 11, in the embodiment, the conductive contact element includes the base body 10 extending straight in the front-rear direction, and the front segment of the base body 10 is connected with the first connecting segment 12 through the first bending segment 11 that is bent in an arc-shape. The first connecting segment 12 extends obliquely upward from the front end of the base body 10.

The first connecting segment is linear-shaped, and the front end of the first connecting segment 12 is connected to the contact segment 14 through the second bending segment 13 that is bent in an arc-shape. The contact segment 14 extends forward and downward. As the name suggests, the contact segment is configured for electrically contacting the suitable conductive contact element. The front end of the contact segment 14 is provided with the front contact portion 140 for electrically contacting the suitable conductive contact element. The front contact portion is a spherical projection. The base body 10 is provided with the rear contact portion 15 for electrically contacting the front contact portion of the suitable conductive contact element. When the conductive contact element and the suitable conductive contact element are inserted into each other, the front contact portion 140 of the conductive contact element is in conductive contact with the rear contact portion disposed on an upper side surface of the base body of the suitable conductive contact element that is disposed in an opposite manner. Correspondingly, the front contact portion of the suitable conductive contact element is in conductive contact with the rear contact portion on a lower side surface of the conductive contact element.

[0048] In the various embodiments described above, the first connecting segment is a straight edge disposed obliquely or an arc-shaped edge that is inclined upwardly, and the arrangement is mainly for forming the insertion space between the front contact portion and the rear contact portion. In other embodiments, the first connecting segment may have a plurality of bends, and may be a curved transition or a multi-segment polygonal structure, these do not greatly affect the technical problem to be solved by the present disclosure, and the disclosure provides no limitation to the specific shape of the first connecting segment.

[0049] The conductive contact element of the electrical connector of the present disclosure has a simple structure which is electrically contacted through two points when in use, and eliminates the short pile radiation effect, thereby reducing the insertion loss.

[0050] The embodiment of the conductive contact element of the present disclosure has the same structure as that of the conductive contact element in the embodiment of the above electrical connector, and related descriptions are omitted herein.

Claims

1. A conductive contact element, **characterized in that** the conductive contact element has a front contact portion and a rear contact portion spaced apart from each other at front and rear and respectively configured to be in conductive contact with a suitable conductive contact element, the front contact portion and the rear contact portion have an insertion space in an up-down direction for the suitable conductive con-

tact element to be inserted therein.

2. The conductive contact element according to claim 1, **characterized in that** the conductive contact element comprises a base body extending in a front-rear direction, a front end of the base body is connected to a first connecting segment inclined upwardly through a first bending segment, a front end of the first connecting segment is connected to a contact segment through a second bending segment, the front contact portion is located on the contact segment, and the rear contact portion is located on the base body or a lower side surface of the first connecting segment.
3. The conductive contact element according to claim 2, **characterized in that** a front side of a front contact point of the front contact portion is further provided with an insertion guiding surface preventing the conductive contact element and the suitable conductive contact element from butting against each other and becoming stuck during insertion.
4. The conductive contact element according to claim 3, **characterized in that** the front contact portion is an inclined extending segment disposed at a front end of the contact segment and in parallel with the first connecting segment, the front contact point is a lower side surface of the inclined extending segment, and a rear contact point of the rear contact portion is formed by a portion of the lower side surface of the first connecting segment.
5. The conductive contact element according to claim 4, **characterized in that** the insertion guiding surface is an inclined surface or a curved surface provided on a lower side of a front end of the inclined extending segment and gradually extending upward in a direction from the rear to the front.
6. The conductive contact element according to claim 2, **characterized in that** the front contact portion is a circular arc-shaped surface provided on a lower side of a front end of the contact segment.
7. The conductive contact element according to claim 2, **characterized in that** the front contact portion is an inclined surface provided on a lower side of a front end of the contact segment and parallel to an oblique direction of the first connecting segment.
8. The conductive contact element according to any one of claims 2-7, **characterized in that** a portion where the contact segment is connected to the second bending segment is disposed in parallel with the base body.
9. An electrical connector, comprising a connector

housing and a conductive contact element disposed in the connector housing, **characterized in that** the conductive contact element has a front contact portion and a rear contact portion spaced apart from each other at front and rear and respectively configured to be in conductive contact with a suitable conductive contact element, the front contact portion and the rear contact portion have an insertion space in an up-down direction for the suitable conductive contact element to be inserted therein.

10. The electrical connector according to claim 9, **characterized in that** the conductive contact element comprises a base body extending in a front-rear direction, a front end of the base body is connected to a first connecting segment inclined upwardly through a first bending segment, a front end of the first connecting segment is connected to a contact segment through a second bending segment, the front contact portion is located on the contact segment, and the rear contact portion is located on the base body or a lower side surface of the first connecting segment.
11. The electrical connector according to claim 10, **characterized in that** a front side of a front contact point of the front contact portion is further provided with an insertion guiding surface preventing the conductive contact element and the suitable conductive contact element from butting against each other and becoming stuck during insertion.
12. The electrical connector according to claim 11, **characterized in that** the front contact portion is an inclined extending segment disposed at a front end of the contact segment and in parallel with the first connecting segment, the front contact point is a lower side surface of the inclined extending segment, and a rear contact point of the rear contact portion is formed by a portion of the lower side surface of the first connecting segment.
13. The electrical connector according to claim 12, **characterized in that** the insertion guiding surface is an inclined surface or a curved surface provided on a lower side of a front end of the inclined extending segment and gradually extending upward in a direction from the rear to the front.
14. The electrical connector according to claim 10, **characterized in that** the front contact portion is a circular arc-shaped surface provided on a lower side of a front end of the contact segment.
15. The electrical connector according to claim 10, **characterized in that** the front contact portion is an inclined surface provided on a lower side of a front end of the contact segment and parallel to an oblique direction of the first connecting segment.

16. The electrical connector according to any one of claims 10-15, **characterized in that** a portion where the contact segment is connected to the second bending segment is disposed in parallel with the base body.

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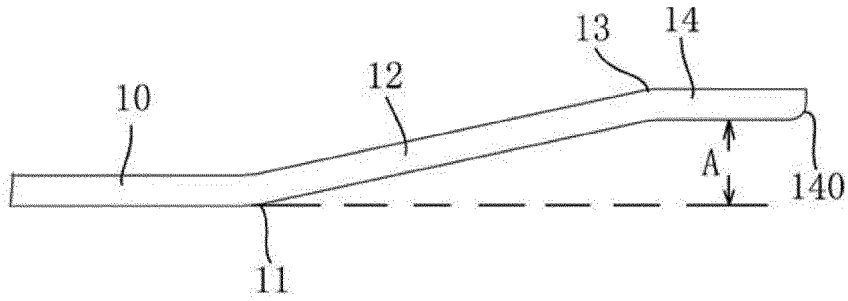


FIG. 1

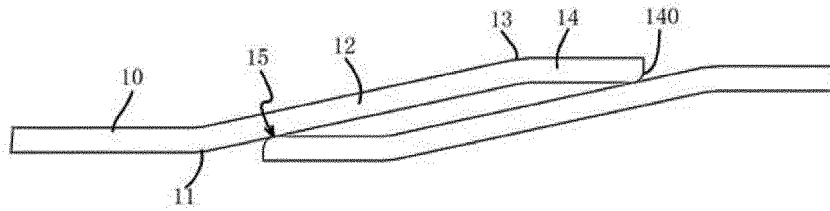


FIG. 2

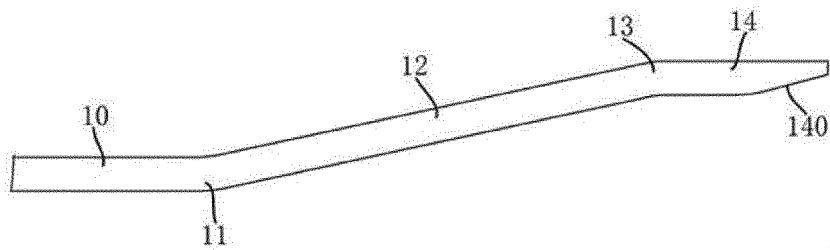


FIG. 3

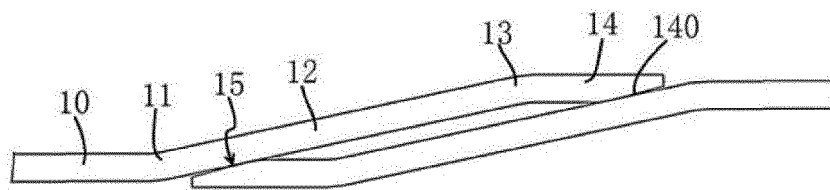


FIG. 4

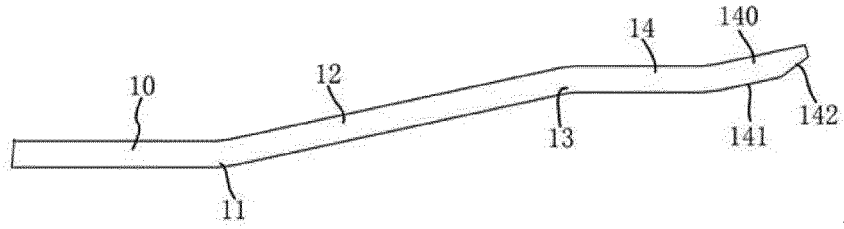


FIG. 5

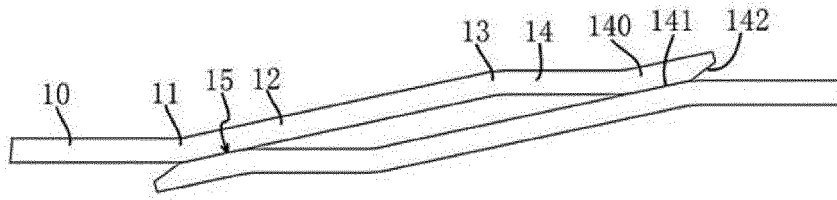


FIG. 6

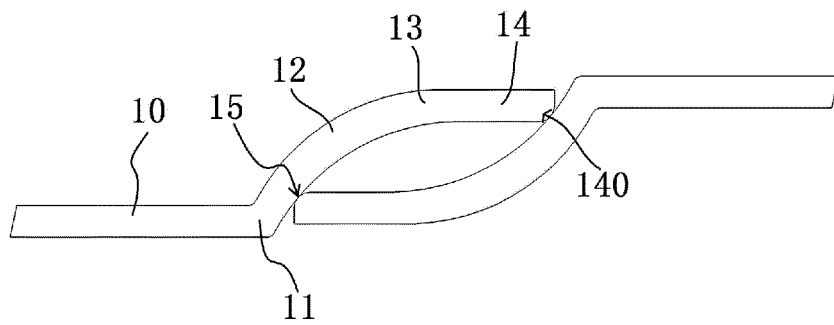


FIG. 7

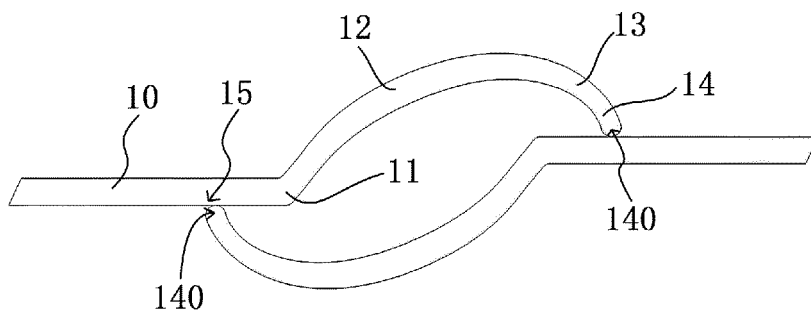


FIG. 8

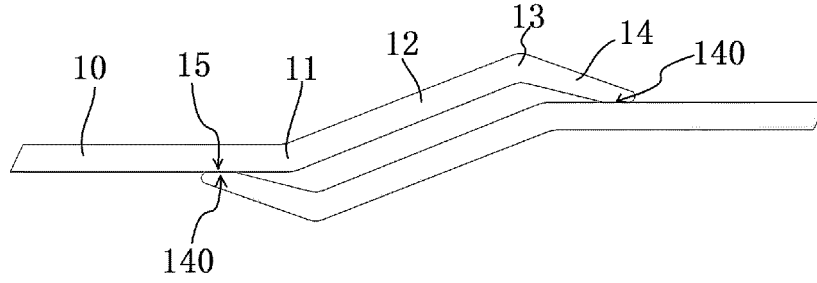


FIG. 9

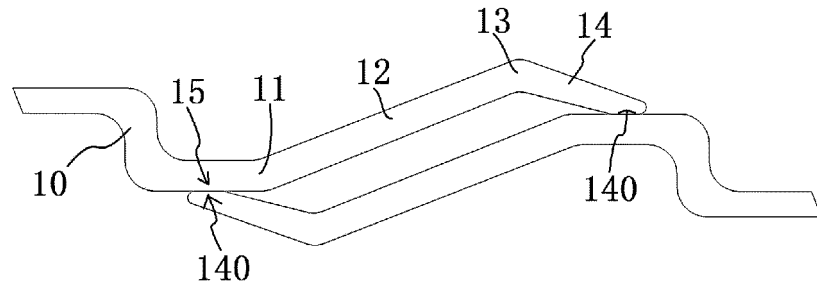


FIG. 10

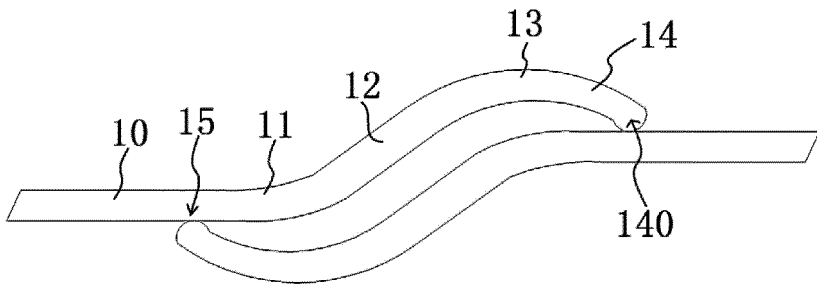


FIG. 11

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2017/077540

A. CLASSIFICATION OF SUBJECT MATTER		
H01R 13/28 (2006.01) i; H01R 13/40 (2006.01) i; H01R 13/05 (2006.01) i; H05K 3/32 (2006.01) i 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 H05K		
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 practicable, search terms used) WPI, VEN, CNABS, CNTXT, CNKI: connector contact terminal differential insertion loss radiation piece height space; contact member contact element socket		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 105958247 A (CHINA AVIATION OPTICAL-ELECTRICAL TECHNOLOGY CO., LTD.), 21 September 2016 (21.09.2016), claims 1-8, and figures 1-2	1-5, 8-13, 16
PX	CN 105977678 A (CHINA AVIATION OPTICAL-ELECTRICAL TECHNOLOGY CO., LTD.), 28 September 2016 (28.09.2016), claims 1-8, and figures 1-3	1, 2, 6, 7, 9, 10, 14, 15
X	US 2008/0274654 A1 (YASUMURA, G. et al.), 06 November 2008 (06.11.2008), description, paragraph 0094, and figure 5	1, 9
A	CN 104167620 A (CHINA AVIATION OPTICAL-ELECTRICAL TECHNOLOGY CO., LTD.), 26 November 2014 (26.11.2014), the whole document	1-16
A	CN 105428939 A (CHINA AVIATION OPTICAL-ELECTRICAL TECHNOLOGY CO., LTD.), 23 March 2016 (23.03.2016), the whole document	1-16
A	CN 102738621 A (FOXCONN (KUNSHAN) COMPUTER CONNECTOR CO., LTD. et al.), 17 October 2012 (17.10.2012), the whole document	1-16
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents:	“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
“A” document defining the general state of the art which is not considered to be of particular relevance	“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
“E” earlier application or patent but published on or after the international filing date	“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
“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)	“&”	document member of the same patent family
“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		
Date of the actual completion of the international search 14 June 2017 (14.06.2017)	Date of mailing of the international search report 28 June 2017 (28.06.2017)	
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer WANG, Xiaoyan Telephone No.: (86-10) 62411731	

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No. PCT/CN2017/077540

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Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 105958247 A	21 September 2016	None	
CN 105977678 A	28 September 2016	None	
US 2008/0274654 A1	06 November 2008	US 7651382 B2	26 January 2010
CN 104167620 A	26 November 2014	None	
CN 105428939 A	23 March 2016	None	
CN 102738621 A	17 October 2012	US 8715005 B2	06 May 2014
		US 2012252271 A1	04 October 2012
		CN 102738621 B	10 August 2016

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 105428939 A [0002]