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(54) **RECEPTACLE CONNECTOR**

(57) The present invention discloses a receptacle connector, comprising a housing, which has a slot extending in a length direction of the housing and configured to receive and connect an electronic module therein. One spring press finger is formed on each of a pair of side walls of the slot facing to each other in a width direction of the housing; a section of slope flat surface with a predetermined length is formed on an inner surface of each of the spring press fingers. When the electronic module is inserted into the slot, the slope flat surfaces of the spring press fingers are pressed against side edges of a top of the electronic module, so that a resultant force of pressing forces exerted on the electronic module is directed to a bottom of the slot in a height direction of the housing. In the present invention, since the slope flat surfaces of the spring press fingers can come into contact with and be pressed against side edges of a top of the electronic module of various sizes, the receptacle connector is adapted to receive electronic modules of various sizes therein and has a better universality. The electronic modules of various sizes can be retained to be clamped. Even in the condition of vibration, good electrical contact between the electronic module and the receptacle connector can still be retained.

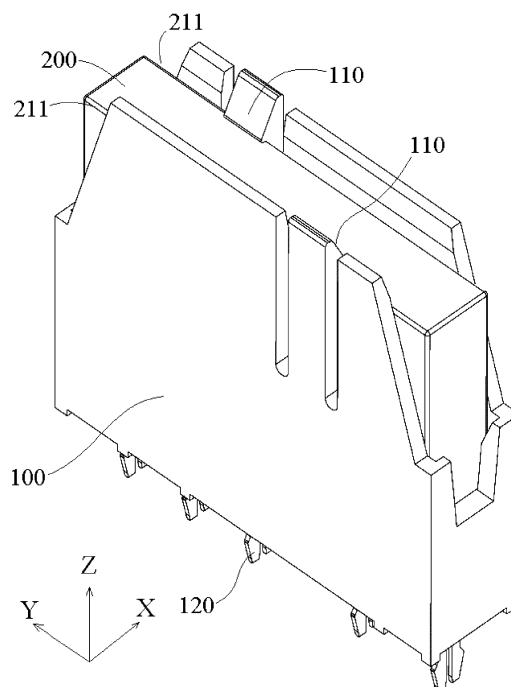


Fig. 1

## Description

### CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of Chinese Patent Application No. 201420375019. X filed on July 8, 2014 in the State Intellectual Property Office of China, the whole disclosure of which is incorporated herein by reference.

### BACKGROUND OF THE INVENTION

#### Field of the Invention

[0002] The present invention generally relates to a receptacle connector, and more particularly, to a receptacle connector used for receiving and connecting a relay therein.

#### Description of the Related Art

[0003] In prior arts, a relay is generally electrically connected to a control circuit board via a receptacle connector for the relay so as to be supplied with voltage or current control signals.

[0004] In prior art, however, a relay with one size can only be inserted into a receptacle connector matching with the relay with this size. Therefore, a receptacle connector with one size can only mate with a relay with one corresponding size, and cannot mate with relays with different sizes, resulting in that applications of the receptacle connector and the control circuit board having this receptacle connector are limited. For example, when the relay with a different size is replaced, the receptacle connector, and even the control circuit board having the receptacle connector, should be replaced simultaneously, resulting in unnecessary waste.

### SUMMARY OF THE INVENTION

[0005] The present invention has been made to solve at least one aspect of the above problems and drawbacks in prior arts.

[0006] One object of the present invention is to provide a receptacle connector adapted to electronic modules of various sizes.

[0007] Another object of the present invention is to provide a receptacle connector with a simple structure.

[0008] According to one aspect of the present invention, there is provided with a receptacle connector, comprising:

a housing, having a slot extending in a length direction of the housing and configured to receive and connect an electronic module therein,. One spring press finger is formed on each of a pair of side walls of the slot facing to each other in a width direction of the housing; a section of slope flat surface with a

predetermined length is formed on an inner surface of each of the spring press fingers, and an angle between the slope flat surface and a plane defined by the length direction and the width direction is more than 0 degree and less than 90 degrees; and when the electronic module is inserted into the slot, the slope flat surfaces of the spring press fingers are pressed against side edges of a top of the electronic module, so that a resultant force of pressing forces exerted on the electronic module is directed to a bottom of the slot in a height direction of the housing.

[0009] According to an exemplary embodiment of the present invention, the angle between the slope flat surface and the plane defined by the length direction and the width direction is more than 30 degree and less than 60 degrees.

[0010] According to a further exemplary embodiment of the present invention, the angle between the slope flat surface and the plane defined by the length direction and the width direction is equal to 45 degrees.

[0011] According to a still exemplary embodiment of the present invention, an end of each of the spring press fingers is formed with a hook-shaped projection for preventing the inserted electronic module from being separated from the receptacle connector.

[0012] According to a still further exemplary embodiment of the present invention, the spring press fingers are formed integrally with the housing.

[0013] According to a still further exemplary embodiment of the present invention, the spring press fingers are offset from each other by a predetermined distance in the length direction of the housing.

[0014] According to a still further exemplary embodiment of the present invention, the electronic module is a relay, and the receptacle connector is a relay socket.

[0015] According to a still further exemplary embodiment of the present invention, the housing is provided with electrical connection terminals, wherein one end of each electrical connection terminal is electrically connected to a circuit board and the other end thereof is electrically connected to a terminal of the inserted electronic module.

[0016] According to a still further exemplary embodiment of the present invention, the electrical connection terminals are inserted into and connected to the circuit board.

[0017] According to a still further exemplary embodiment of the present invention, the housing of the receptacle connector is vertically provided on the circuit board.

[0018] In various embodiments of the present invention, since the slope flat surfaces of the spring press fingers can come into contact and be pressed against side edges of a top of the electronic modules with various sizes, the receptacle connector of the present invention can be adapted to receive the electronic modules with various sizes therein and has a better universality, so that the electronic modules with various sizes can be

retained in state of being well clamped. Even in the condition of vibration, good electrical contact between the electronic module and the receptacle connector can still be retained. In addition, the receptacle connector of the present invention has a simple structure and is easy to be produced.

[0019] The above and other objects and features of the present invention will become more apparent by describing in detail exemplary embodiments thereof with reference to the accompanying drawings, which will contribute to the comprehensive understanding of the present invention.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

### **[0020]**

Fig.1 is a schematic perspective view of a receptacle connector for receiving and connecting an electronic module therein according to an exemplary embodiment of the present invention, wherein, the electronic module has been inserted into the receptacle connector;

Fig.2 is a structural schematic view of a pair of spring press fingers of the receptacle connector of Fig.1; Fig.3 is an exploded view of a pressing force applied by the pair of spring press fingers of the receptacle connector of Fig.1 onto the electronic module;

Fig. 4 is a schematic view of the pair of spring press fingers of the receptacle connector of Fig.1 adapted to press and retain electronic modules of various sizes; and

Fig.5 is a schematic view of a control circuit board for mounting the receptacle connector.

## **DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION**

[0021] The present disclosure will be described further hereinafter in detail with reference to the embodiments in combination with attached drawings. In the description, the same or similar reference numerals in different embodiments denote the same or similar components. The following description to the embodiments with reference to the attached drawings is intended to illustrate the general concept of the present invention, and is not intended to limit the present disclosure to the embodiment set forth herein.

[0022] Further, in the following detailed description, for the sake of easy understanding, a plurality of details have been set forth so as to provide a comprehensive understanding of the embodiments of the present disclosure. However, it is obvious that one or more embodiments can be carried out without these details. In other situations, the well-known structures and devices are embodied by way of example so as to simplify the attached drawings.

[0023] According to a general technical concept of em-

bodiments of the present disclosure, there is provided a receptacle connector, comprising a housing, having a slot extending in a length direction of the housing and configured to receive and connect an electronic module therein. One spring press finger is formed on each of a pair of side walls of the slot facing to each other in a width direction of the housing. A section of slope surface with a predetermined length is formed on an inner surface of each of the spring press fingers, and an angle between the slope flat surface and a plane defined by the length direction and the width direction of the housing is more than 0 degree and less than 90 degrees. When the electronic module is inserted into the slot, the slope flat surfaces of the spring press fingers are pressed against side edges of a top of the electronic module, so that a resultant force of a pressing force exerted on the electronic module is directed to a bottom of the slot in a height direction of the housing.

[0024] Fig.1 shows a schematic perspective view of a receptacle connector for receiving and connecting an electronic module 200 therein according to an exemplary embodiment of the present invention, wherein, the electronic module 200 has been inserted into the slot of the housing 100 of the receptacle connector.

[0025] As illustrated in Fig. 1, the receptacle connector comprises a housing 100, for instance, a plastic housing formed by injection molding.

[0026] In the illustrated embodiment, the housing 100 has a length direction Y, a width direction X perpendicular to the length direction, and a height direction Z perpendicular to the length direction Y and the width direction X. The housing 100 has a slot extending in the length direction Y thereof and configured to receive and connect an electronic module 200 therein.

[0027] Continued with Fig.1, one spring press finger 110 is formed on each of a pair of side walls of the slot facing to each other in the width direction X of the housing 100.

[0028] Fig.2 shows a structural schematic view of a pair of spring press fingers 110 of the receptacle connector of Fig.1.

[0029] As shown in Fig. 1 and Fig. 2, in an embodiment of the present invention, a section of slope flat surface 111 with a predetermined length is formed on an inner surface of each of the spring press fingers 110, and an angle  $\alpha$  between the slope flat surface 111 and a plane defined by the length direction Y and the width direction X of the housing 100 is more than 0 degree and less than 90 degrees.

[0030] Fig.3 shows an exploded view of pressing forces  $2^*F$  applied by the pair of spring press fingers 110 of the receptacle connector of Fig.1 onto the electronic module 200.

[0031] As shown in Figs. 1, 2 and 3, when the electronic module 200 is inserted into the slot of the housing 100, the slope flat surfaces 111 of the spring press fingers 110 are pressed against side edges 211 of a top of the electronic module 200, so that a resultant force  $2^*F_2$  of two

pressing forces  $2 \cdot F$  exerted on the electronic module 200 by the two spring press fingers 110 directs to a bottom of the slot in the height direction Z of the housing 100.

**[0032]** In the illustrated embodiment, as shown clearly in Fig.3, the pressing force F exerted on the electronic module 200 by each of spring press fingers 110 is directed to a direction perpendicular to the slope flat surface 111. The pressing force F exerted on the electronic module 200 by each of spring press fingers 110 has a horizontal component F1 in the width direction of the housing 100 and a vertical component F2 in the height direction Z of the housing 100. Two horizontal components of the pressing forces  $2 \cdot F$  exerted on the electronic module 200 by the two spring press fingers 110 are the same in magnitude but opposite from each other in direction, thus they counteract with each other. Therefore, the resultant force  $2 \cdot F_2$  of the two pressing forces  $2 \cdot F$  exerted on the electronic module 200 by two spring press fingers 110 is the sum of the two vertical components and is directed to a bottom of the slot in the height direction Z of the housing 100, so that a vertically downward retaining force is always exerted on the electronic module 200 and the electronic module 200 can be reliably clamped within the slot of the housing 100 the electronic module 200 from loosening. In this way, it can be ensured that terminals (not shown) at the bottom of the electronic module 200 can reliably come into contact with corresponding electrical connection terminals 120 in the housing 100, so that the receptacle connector and the electronic module 200 can still work reliably even in the condition of vibration.

**[0033]** In an exemplary embodiment of the present invention, the angle  $\alpha$  between the slope flat surface 111 and the plane defined by the length direction Y and the width direction X of the housing 100 is more than 30 degrees and less than 60 degrees.

**[0034]** In an further exemplary embodiment of the present invention, the angle  $\alpha$  between the slope flat surface 111 and the plane defined by the length direction Y and the width direction X of the housing 100 is equal to 45 degrees.

**[0035]** It should be noted that the present invention is not limited to the embodiments set forth hereinbefore, the angle  $\alpha$  between the slope flat surface 111 and the plane defined by the length direction Y and the width direction X of the housing 100 can be set to a random degree in the range of 0 degree to 90 degrees, such as, 10 degrees, 20 degrees, 30 degrees, 40 degrees, 50 degrees, 60 degrees, 70 degrees, 80 degrees or the like.

**[0036]** As shown in Fig. 3, an end of each of the spring press fingers 110 is formed with a hook-shaped projection 112 so as to prevent the inserted electronic module 200 from being separated from the receptacle connector.

**[0037]** In the illustrated embodiment, as shown in Fig. 1, the spring press fingers 110 are formed integrally with the housing 100, for instance, the spring press fingers 110 and the housing 100 can be integrally formed by injection molding.

**[0038]** In the illustrated embodiment, as shown in Fig.

1, the pair of spring press fingers 110 are offset from each other by a predetermined distance in the length direction Y, that is, the pair of spring press fingers 110 are not aligned with each other in the width direction X. In this way, the electronic module 200 can be more reliably retained within the slot of the housing 100.

**[0039]** In an exemplary embodiment of the present invention, the electronic module 200 can be a relay, and the receptacle connector can be a relay receptacle. However, the present invention is not limited thereto, for example, the electronic module 200 may be a memory bank module, and the receptacle connector may be a corresponding memory bank receptacle connector.

**[0040]** Fig. 4 is a schematic view of the pair of spring press fingers 110 of the receptacle connector of Fig.1 adapted to press and retain electronic modules 200 with various sizes.

**[0041]** In the illustrated embodiment, as shown in Fig. 4, a size W, in the width direction of the housing 100, of the electronic module 200 clamped by the pair of spring press fingers 110 can be a random size more than an illustrated first size W1 and less than an illustrated second size W2. Thus, the receptacle connector of the present invention may be adapted to press and retain electronic modules 200 with various sizes. Therefore, when an electronic module 200 with a different size is replaced, the receptacle connector is not necessary to be replaced, and the receptacle connector of the present invention thus has a better universality.

**[0042]** Fig.5 is a schematic view of a control circuit board for mounting the receptacle connector.

**[0043]** As shown in Figs. 1 and 5, the housing 100 is provided with electrical connection terminals 120, one end of each of which is electrically connected to a circuit board 300 and the other end is electrically connected to the terminal at the bottom of the inserted electronic module 200. In this way, the electronic module 200 can be electrically connected to the circuit board 300. In an embodiment of the present invention, the electrical connection terminals 120 can be directly inserted into and connected to the circuit board 300.

**[0044]** As shown in Fig. 5, the housing 100 of the receptacle connector is vertically provided on the circuit board 300, and a plurality of receptacle connectors are arranged on the circuit board 300 so as to be separated from each other and be aligned in a line.

**[0045]** It should be appreciated by those skilled in this art that the above embodiments are exemplary, and many modifications may be made to the above embodiments by those skilled in this art, and various structures described in various embodiments may be freely combined with each other without conflicting in configuration or principle.

**[0046]** Although exemplary embodiments of the present disclosure have been described hereinbefore in detail with reference to the attached drawings, it should be appreciated that the disclosed embodiments in the attached drawings are intended to illustrate the preferred

embodiments of the present invention by way of example, but are not intended to limit the present disclosure to the embodiment set forth herein.

[0047] Although several exemplary embodiments have been shown and described, it would be appreciated by those skilled in the art that various changes or modifications may be made in these embodiments without departing from the principles and spirit of the disclosure, the scope of which is defined in the claims and their equivalents.

[0048] It should be noted that, the term "comprise" doesn't exclude other elements and steps, and the term "a" or "an" doesn't exclude more than one. In addition, the reference numerals in the claims cannot be interpreted as the limitation to the scope of the present invention.

## Claims

### 1. A receptacle connector, comprising:

a housing (100), having a slot extending in a length direction (Y) of the housing and configured to receive and connect an electronic module (200) therein,

wherein,

one spring press finger (110) is formed on each of a pair of side walls of the slot facing to each other in a width direction (X) of the housing (100); a section of slope flat surface (111) with a predetermined length is formed on an inner surface of each of the spring press fingers (110), and an angle ( $\alpha$ ) between the slope flat surface (111) and a plane defined by the length direction (Y) and the width direction (X) is more than 0 degree and less than 90 degrees; and

when the electronic module (200) is inserted into the slot, the slope flat surfaces (111) of the spring press fingers (110) are pressed against side edges (211) of a top of the electronic module (200), so that a resultant force of pressing forces exerted on the electronic module (200) is directed to a bottom of the slot in a height direction (Z) of the housing (100).

### 2. The receptacle connector as recited in claim 1, wherein

the angle ( $\alpha$ ) between the slope flat surface (111) and the plane defined by the length direction (Y) and the width direction (X) is more than 30 degrees and less than 60 degrees.

### 3. The receptacle connector as recited in claim 2, wherein

the angle ( $\alpha$ ) between the slope flat surface (111) and the plane defined by the length direction (Y) and the width direction (X) is equal to 45 degrees.

### 4. The receptacle connector as recited in any one of claims 1-3, wherein

an end of each of the spring press fingers (110) is formed with a hook-shaped projection (112) for preventing the inserted electronic module (200) from being separated from the receptacle connector.

### 5. The receptacle connector as recited in claim 4, wherein the spring press fingers (110) are formed integrally with the housing (100).

### 6. The receptacle connector as recited in claim 5, wherein

the spring press fingers (110) are offset from each other by a predetermined distance in the length direction (Y) of the housing (100).

### 7. The receptacle connector as recited in claim 6, wherein the electronic module (200) is a relay, and the receptacle connector is a relay socket.

### 8. The receptacle connector as recited in claim 7, wherein

the housing (100) is provided with electrical connection terminals (120) each having one end electrically connected to a circuit board (300) and the other end electrically contacting with a terminal of the inserted electronic module (200).

### 9. The receptacle connector as recited in claim 8, wherein

the electrical connection terminals (120) of the receptacle connector are inserted into and connected to the circuit board (300).

### 10. The receptacle connector as recited in claim 9, wherein

the housing (100) of the receptacle connector is vertically provided on the circuit board (300).

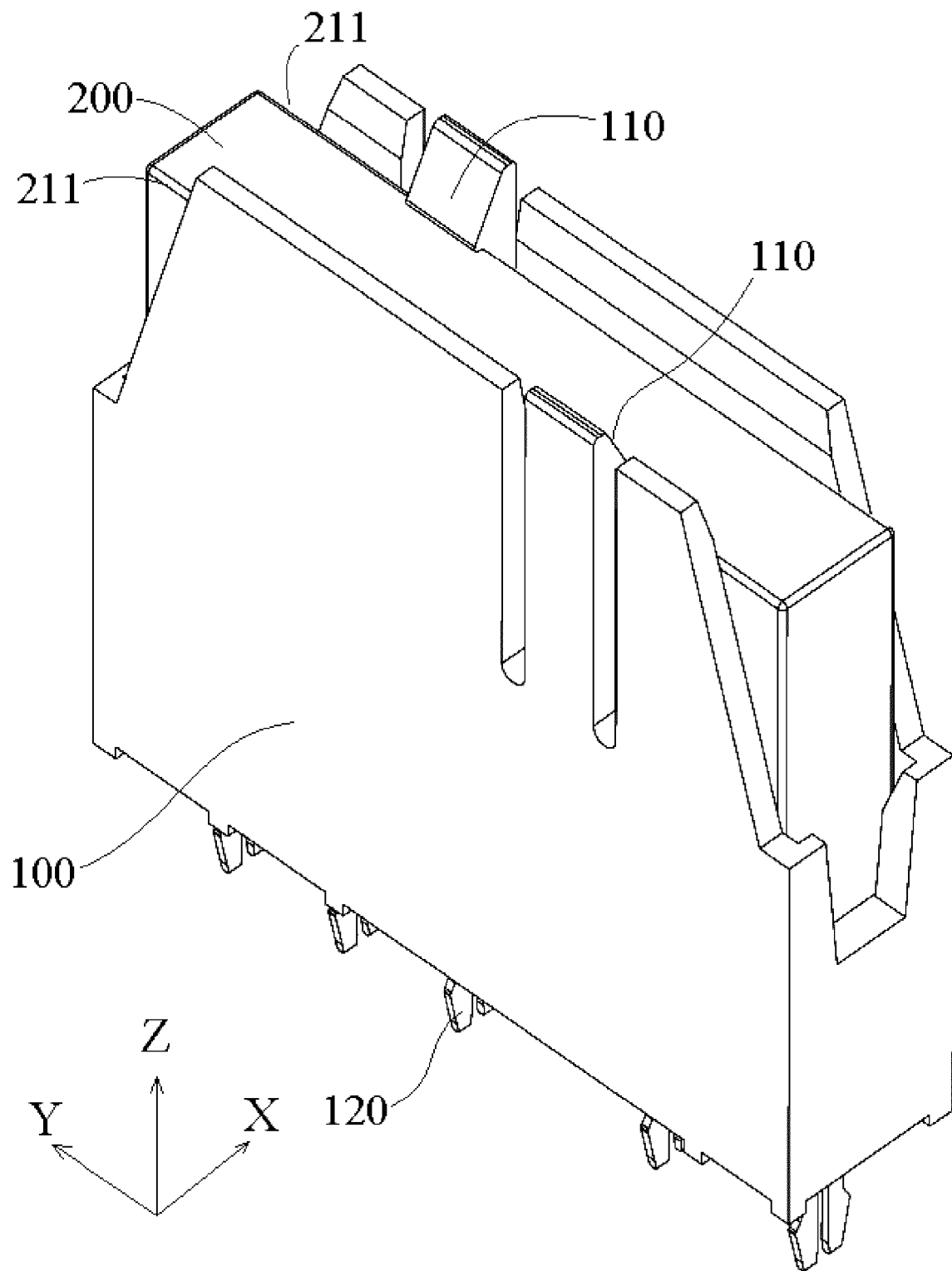


Fig. 1

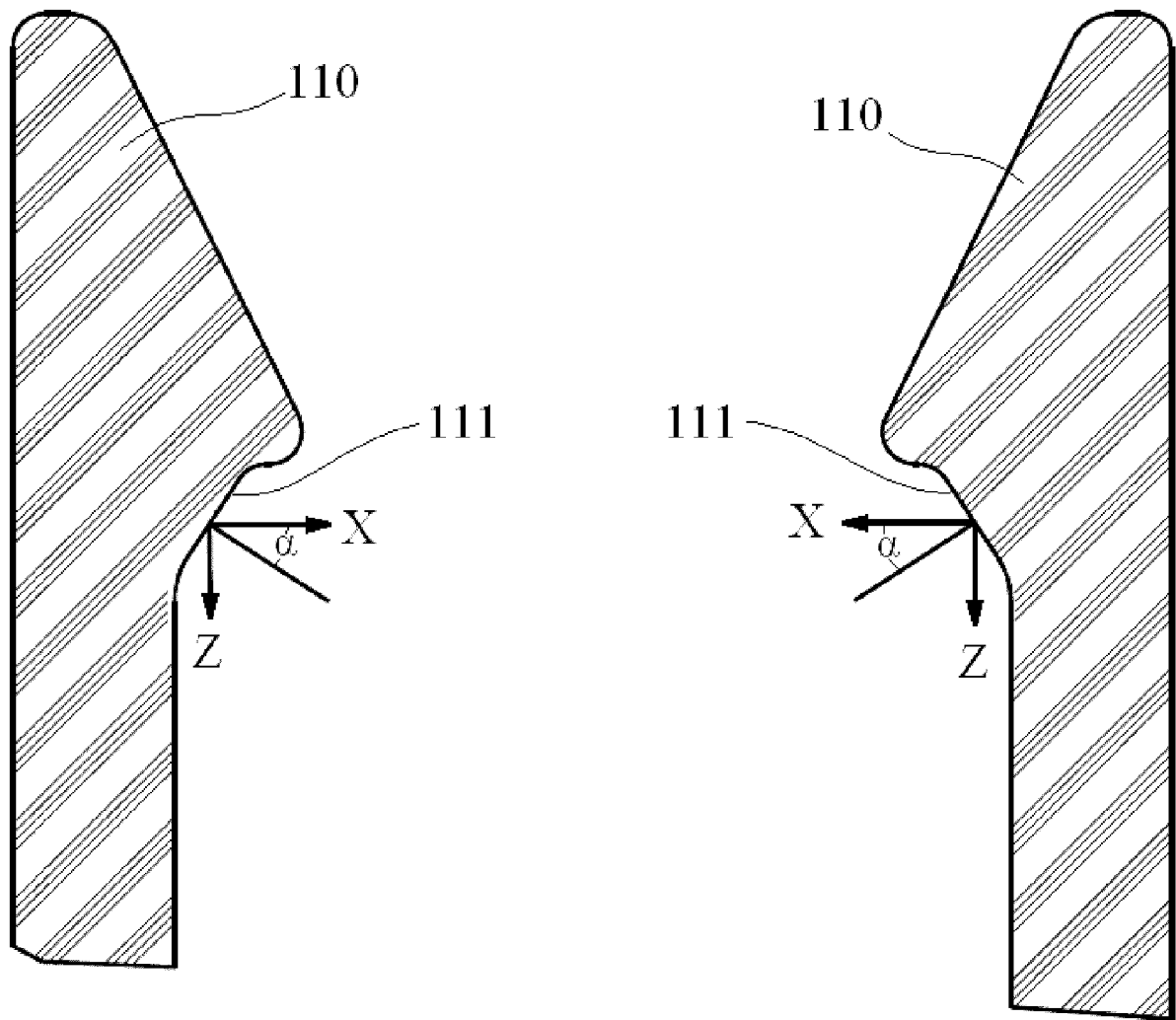


Fig. 2

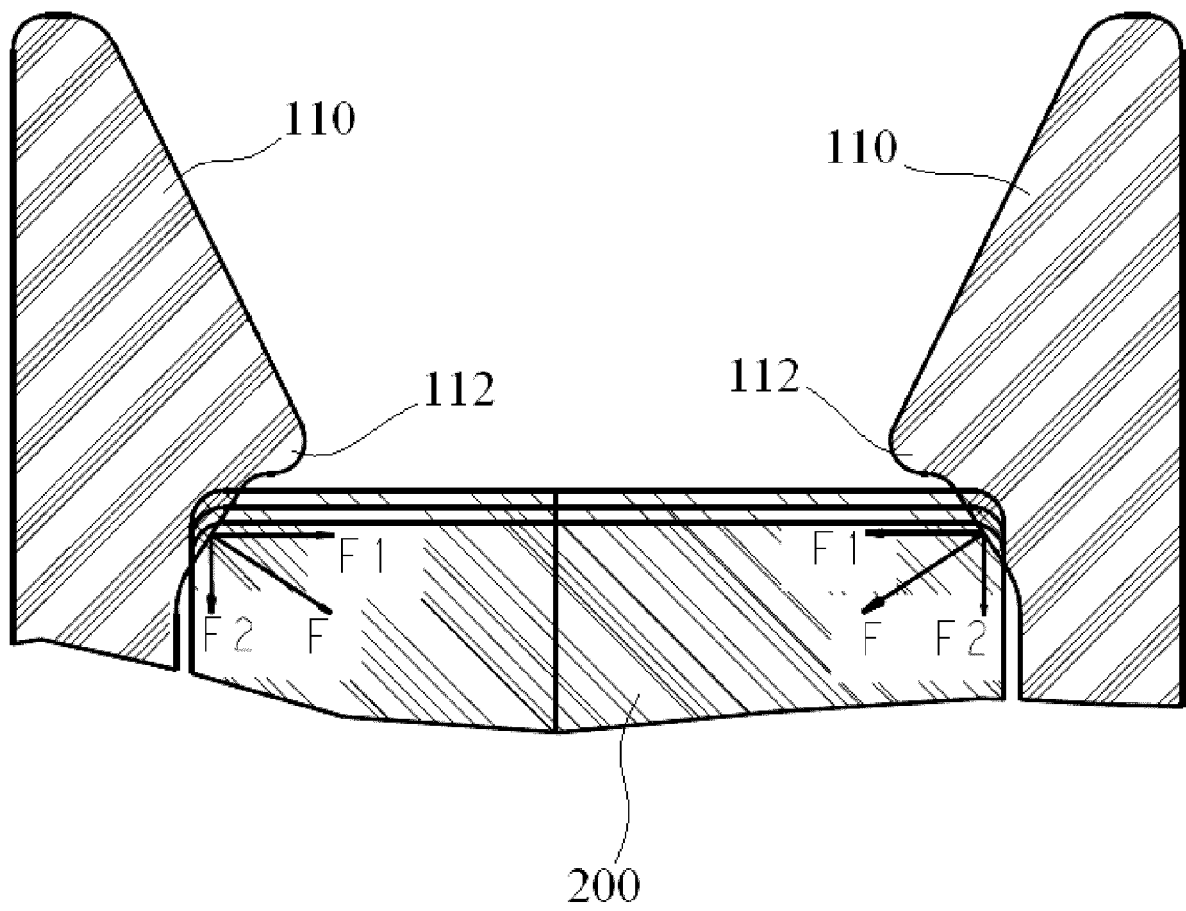
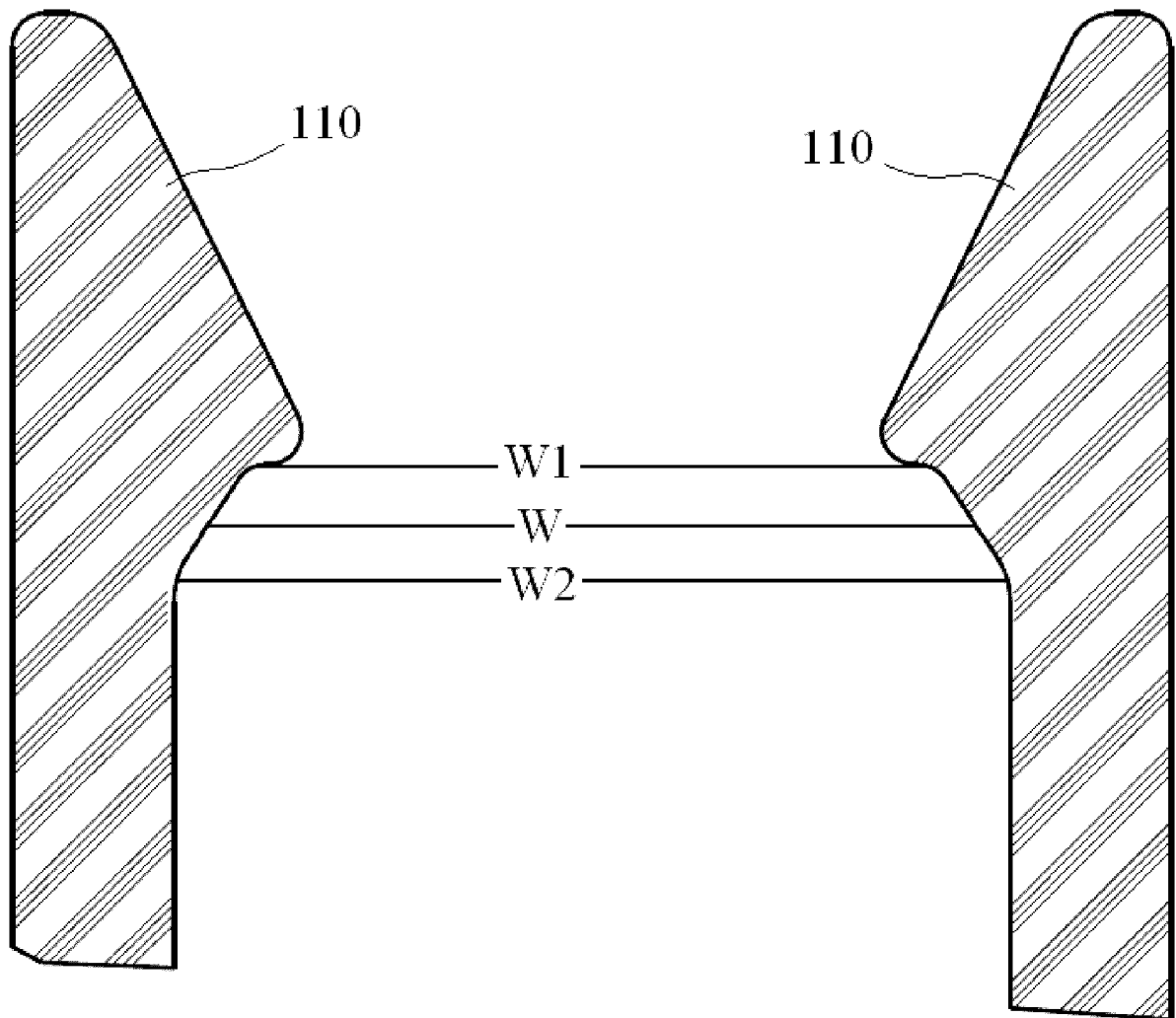


Fig. 3





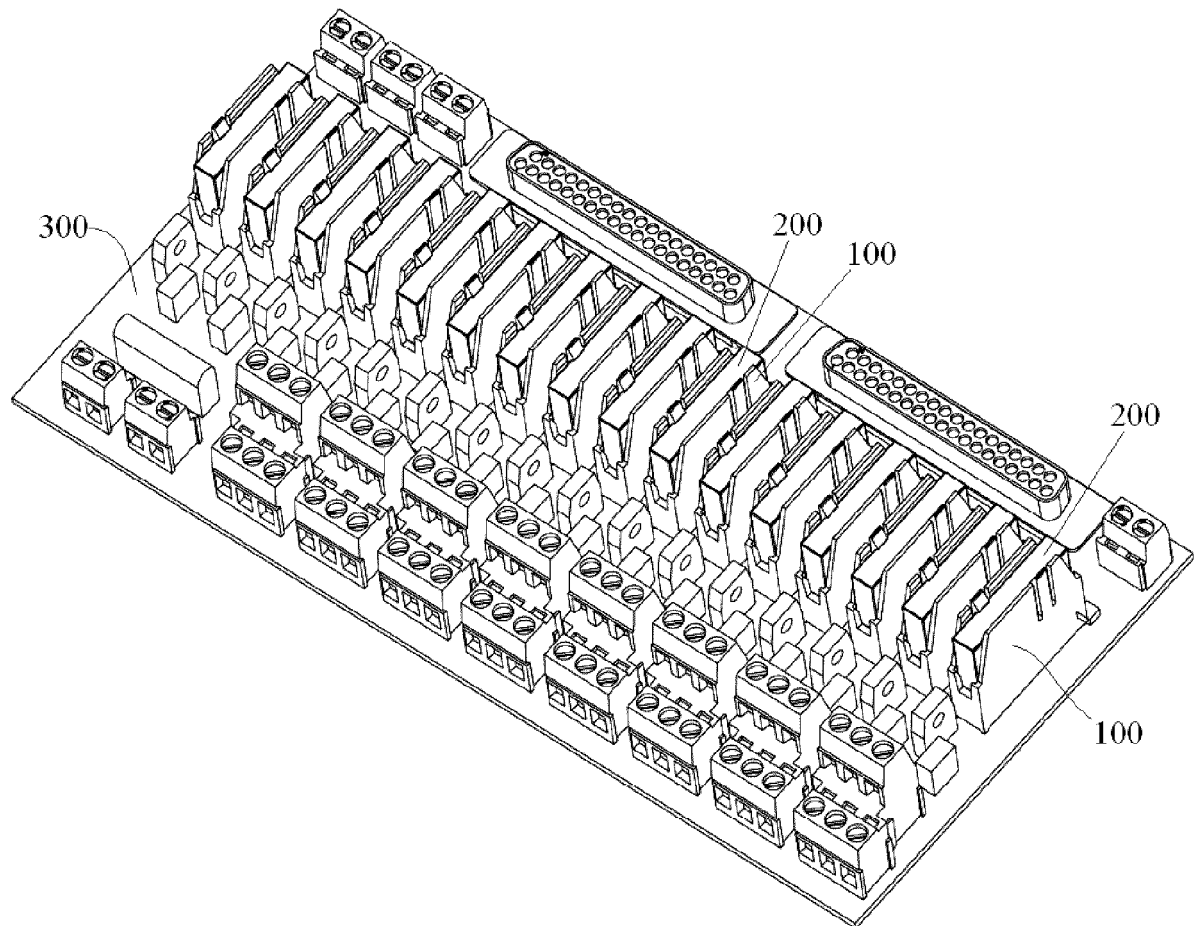


Fig. 5



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Application Number  
EP 15 17 5268

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 9 November 2015	Examiner Oliveira Braga K., A
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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09-11-2015

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