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(54) **CONNECTOR, CIRCUIT BOARD, AND COMMUNICATION DEVICE**

(57) This application discloses a connector, a circuit board, and a communications device. The connector includes a first connection end and a cable (11). The first connection end includes a first terminal (12), and the first terminal (12) includes two terminal pieces that are disposed opposite to each other, and each terminal piece includes a connection portion (121). The connection portion (121) is connected to the cable (11), and a thickness of a part that is of the connection portion (121) and that is connected to the cable (11) is less than a thickness of a part that is of the connection portion (121) and that is not connected to the cable. When the structure is used, a thinning process is performed on the part that is of the connection portion (121) and that is connected to the

cable (11), so that the thickness of the part that is of the connection portion (121) and that is connected to the cable (11) is less than the thickness of the part that is of the connection portion (121) and that is not connected to the cable (11). Therefore, when the cable (11) is connected to the connection portion (121), an overall thickness after the cable (11) is connected is approximately equal to the thickness of the part that is of the connection portion (121) and that is not connected to the cable (11), so that a soldering wire area matches impedance of the cable (11) and the terminal pieces, thereby improving the signal transmission effect.

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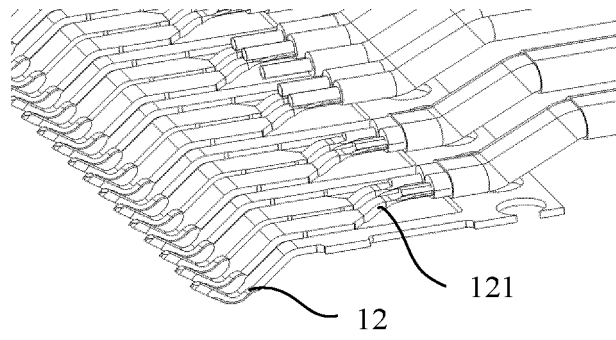


FIG. 3

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to Chinese Patent Application No. 201811221499.3, filed with the Chinese Patent Office on October 19, 2018 and entitled "CONNECTOR, CIRCUIT BOARD, AND COMMUNICATIONS DEVICE", and claims priority to Chinese Patent Application No. 201811460632.0, filed with the Chinese Patent Office on December 1, 2018 and entitled "CONNECTOR, CIRCUIT BOARD, AND COMMUNICATIONS DEVICE", which are incorporated herein by reference in their entireties.

TECHNICAL FIELD

[0002] This application relates to the field of communications technologies, and in particular, to a connector, a circuit board, and a communications device.

BACKGROUND

[0003] As bandwidth and rate requirements become increasingly high, it is increasingly difficult to meet performance and cost requirements through interconnection between low-cost and high-cost PCBs. A connector used in specific connection includes two connection ends, where one end is used to connect to a panel side, the other end is used to connect to a circuit board, and the two connection ends are connected using a cable. In the specific connection, the cable is soldered to a terminal of each connection end. However, because the cable path is relatively long, a high loss may be easily caused.

SUMMARY

[0004] This application provides a connector, a circuit board, and a communications device to improve a connection effect of the connector.

[0005] According to a first aspect, a connector is provided, where one end of the connector is a first connection end, and the connector further includes a cable connected to the first connection end. In specific arrangement, the first connection end includes a first terminal, where the first terminal is a female terminal and includes two terminal pieces disposed opposite to each other, the two terminal pieces are disposed with a spacing, and each terminal piece includes a connection portion, where the connection portion is configured to connect to a cable. When the cable is specifically connected to the connection portion, a thickness of a part that is of the connection portion and that is connected to the cable is less than that of a part that is of the connection portion and that is not connected to the cable. When the structure is used, a thinning process is performed on the part that is of the connection portion and that is connected to the cable, so that the thickness of the part that is of the connection

portion and that is connected to the cable is less than that of the part that is of the connection portion and that is not connected to the cable. Therefore, when the cable is connected to the connection portion, the overall thickness after the cable is connected is approximately equal to that of the part that is of the connection portion and that is not connected to the cable, so that a soldering wire area matches impedance of the cable and the terminal pieces, thereby improving the signal transmission effect.

[0006] In specifically fixing the two terminal pieces in the first terminal, the first connection end further includes a fixing member, where the fixing member includes a two-layer structure. The first fixing member is configured to fix the first terminal, and specifically, to fix the opposite positions of the two terminal pieces in the first terminal. The second fixing member is nested on the outside of the first fixing member and coats the first fixing member, thereby forming a two-layer protection for the terminal piece. A dielectric constant of the first fixing member is less than that of the second fixing member when the first fixing member and the second fixing member are provided. When the first fixing member having a low dielectric constant is used, a capacitance of the first fixing member is reduced to facilitate impedance matching with the first terminal. When a second fixing member having a high dielectric constant is used, for example, the dielectric constant of the first fixing member is 2, and the dielectric constant of the second fixing member is 4. Alternatively, the first fixing member is an insulator, and the second fixing member is a conductive plastic member, so that the electromagnetic shielding is improved.

[0007] When the first fixing member specifically fixes the terminal pieces, the first fixing member includes two first fixing portions disposed opposite to each other, where the two fixing positions are configured to respectively fix the two terminal pieces in the first terminal. When the first terminals are in one row, each first fixing portion fixes one row of terminal pieces.

[0008] When the second fixing member is specifically provided, the second fixing member includes two second fixing portions, where the two second fixing portions respectively coat the two first fixing portions, and the two second fixing portions are connected in a detachable manner. When a detachable connection is used, the detachable connection may be a detachable engagement connection, or a bolt connection, a screw connection, or a bolt assembly connection.

[0009] When there are a plurality of first terminals, different types of terminals may be used as the first terminals. For example, there are a plurality of first terminals, a portion of the first terminals are high-speed terminals, and another portion of the first terminals are low-speed terminals.

[0010] Further, the first connection end includes a connection block, where the connection block is provided with soldering pins that are connected in one-to-one correspondence with terminal pieces of the low-speed ter-

minals.

[0011] When the fixing member is specifically provided, there are a plurality of fixing members, and one of the fixing members is configured to fix the low-speed terminals, and remaining fixing members are configured to fix the high-speed terminals, so that different module structures are formed, and a plurality of fixing members are fixed connected in a detachable manner, so that different first terminals required can be assembled. For example, the first terminal fixed by the fixing member at both ends is a high-speed terminal, and the first terminal fixed by the fixing member in the middle is a low-speed terminal.

[0012] To improve the signal transmission effect of the connector, the first connection end further includes a first shielding case, where the first connection end is located in the first shielding case. External signals are shielded by the first shielding case.

[0013] To further enhance the shielding effect, the first connection end further includes a metal ring sleeved on the cable. The metal ring is sleeved on the cable and is adjacent to the first shielding case.

[0014] Further, the connector includes a second connection end, where the second connection end includes a second terminal connected to the cable, a third fixing member coating the second terminal, and a fourth fixing member coating the third fixing member, where a dielectric constant of the third fixing member is less than that of the fourth fixing member. The third fixing member uses a low dielectric constant to reduce a capacitance of the third fixing member, so as to facilitate impedance matching with the second terminal. In addition, when the fourth fixing member having a high dielectric constant is used, it is advantageous to improve the shielding effect of the entire fourth fixing member.

[0015] To implement the connection of the second connection end to the circuit board, an elastic bending structure is provided at one end that is of the second terminal and that is away from the cable. The edge connector on the circuit board is connected using the elastic bending structure, so that the connection effect is improved.

[0016] When the second connection end is specifically provided, the second connection end further includes a second shielding case covering the plurality of second terminals. The second terminals are shielded by the second shielding case.

[0017] When the second connection end is specifically fixed, an engagement structure for engaging the second connection end with the circuit board may be provided on the second shielding case.

[0018] In a specific implementation solution, the engagement structure includes a U-shaped fixing frame rotatably connected to the second shielding case, and an engagement projection provided on a side wall of the second shielding case.

[0019] According to a second aspect, a circuit board is provided, where the circuit board includes a circuit board body, and an edge connector that is disposed on

the circuit board body and configured to electrically connect to the second terminal; and the circuit board further includes a connecting base for matching the engagement structure.

[0020] When the connecting base is specifically provided, the connecting base includes a base fixed to the circuit board body, and a flip cover that is rotatably connected to the base and slidable relative to the base, where the base is provided with a bending structure for engaging the second shielding case with the second connection end, the flip cover is provided with a protrusion, and the base is provided with an engagement slot that matches the protrusion.

[0021] To facilitate fixing to the second connection end, when the engagement structure includes a U-shaped fixing frame, a side wall of the connecting base is provided with a bending structure for engagement with the second shielding case and an engagement slot for engagement with the U-shaped fixing frame.

[0022] According to a third aspect, a communications device is provided, where the communications device provides a connector according to any one of the foregoing implementations and a circuit board according to any one of the foregoing implementations.

[0023] When the structure is used, a thinning process is performed on the part that is of the connection portion and that is connected to the cable, so that a thickness of a part that is of the connection portion and that is connected to the cable is less than that of a part that is of the connection portion and that is not connected to the cable. Therefore, when the cable is connected to the connection portion, the overall thickness after the cable is connected is approximately equal to that of the part that is of the connection portion and that is not connected to the cable, so that a soldering wire area matches impedance of the cable and the terminal pieces, thereby improving the signal transmission effect. In addition, the thinning structure is provided so that a distance between the entire cable and a shielding box and a distance between the part that is of the connection portion and that is not connected to the cable and the shielding box is relatively small, thereby improving the overall shielding effect.

BRIEF DESCRIPTION OF DRAWINGS

[0024]

FIG. 1 is an exploded schematic diagram of a first connection end according to an embodiment of this application;

FIG. 2 is an exploded schematic diagram of a female structure according to an embodiment of this application;

FIG. 3 is a schematic diagram of a connection between a first terminal and a cable according to an embodiment of this application;

FIG. 4 is a schematic diagram of a connection be-

tween a metal sheet and a cable according to an embodiment of this application;

FIG. 5 is a schematic diagram of a connection between a second fixing portion to a metal sheet according to an embodiment of this application;

FIG. 6 is a schematic diagram of a connection between a third fixing portion to a metal sheet according to an embodiment of this application;

FIG. 7 is a schematic diagram of a connection between a connection block and a first terminal according to an embodiment of this application;

FIG. 8 is a schematic structural diagram of a connection block according to an embodiment of this application;

FIG. 9 is an exploded schematic diagram of a module structure according to an embodiment of this application;

FIG. 10 is a schematic assembly diagram of a module structure according to an embodiment of this application;

FIG. 11 is a schematic structural diagram of a first shielding case according to an embodiment of this application;

FIG. 12 is a cross-sectional view of a first shielding case according to an embodiment of this application;

FIG. 13 is a schematic structural diagram of a metal ring according to an embodiment of this application;

FIG. 14 is a schematic structural diagram of a conductive plastic case according to an embodiment of this application;

FIG. 15 is an exploded schematic diagram of a second connection end according to an embodiment of this application;

FIG. 16 is a schematic assembly diagram of a second connection end according to an embodiment of this application;

FIG. 17 is a schematic structural diagram of a second connection end according to an embodiment of this application;

FIG. 18 is a schematic structural diagram of a connecting base according to an embodiment of this application;

FIG. 19a and FIG. 19b are schematic diagrams showing assembly of a connecting base and a second connection end according to an embodiment of this application; and

FIG. 20a to FIG. 20c are schematic diagrams showing assembly of another connecting base and a second connection end according to an embodiment of this application.

DESCRIPTION OF EMBODIMENTS

[0025] To make the objectives, technical solutions, and advantages of this application clearer, the following further describes this application in detail with reference to the accompanying drawings.

[0026] To facilitate understanding of a connector pro-

vided in an embodiment of this application, an application scenario of the connector provided in the embodiment of this application is first described, where the connector is configured to transmit electrical signals on a circuit board to a panel side of an entire device for connection to an external device. The connector according to the embodiment of this application is described below with reference to the accompanying drawings.

[0027] The connector according to the embodiment of this application includes two ends: a first connection end and a second connection end 90, where the first connection end and the second connection end 90 are connected using a cable 11, the first connection end is configured to connect to a panel side of the device, and the second connection end 90 is configured to connect to a circuit board.

[0028] FIG. 1 is an exploded schematic diagram of a first connection end according to an embodiment of this application; and FIG. 2 is an exploded schematic diagram of a female structure 10 according to an embodiment of this application. The first connection end includes the female structure 10, where the female structure 10 includes one or more first terminal 12, and when there are a plurality of first terminals 12, the plurality of first terminals 12 are disposed in a single row. For the structure of the first terminal 12, reference may be made to FIG. 2, FIG. 2 shows the structure of the first terminal 12. The first terminal 12 includes two terminal pieces disposed opposite to each other, there is a spacing between the two terminal pieces, and the spacing forms a space for male insertion. Each of the terminal pieces has a connection portion 121. In the structure shown in FIG. 3, one end of the terminal piece is a connection portion 121, and the other end of the terminal piece is an insertion portion, where the insertion portion is configured to electrically connect to a male pin, and the connection portion 121 is configured to connect to a cable 11. When the connection portion 121 is provided, as shown in FIG. 4, a thickness of a part that is of the connection portion 121 and that is connected to the cable 11 is less than that of a part that is of the connection portion 121 and that is not connected to the cable 11, so that when the cable 11 is connected to the connection portion 121, an overall thickness after the cable 11 is connected to the connection portion 121 is approximately equal to the thickness of the part that is of the connection portion 121 and that is not connected to the cable 11. As can be seen from the structure shown in FIG. 4, the thickness of the part that is of the connection portion 121 and that is connected to the cable 11 is equal to that of the part that is of the connection portion 121 and that is not connected to the cable 11, that is, the cross-sectional areas of the two parts are approximately equal. Therefore, when a signal is propagated, the signal reflection caused by impedance mismatch is reduced, thereby improving the signal transmission effect.

[0029] Referring back to FIG. 2, when the female structure 10 is provided, the two terminal pieces of each terminal need to be fixed using a fixing member. The fixing

member includes two parts: a first fixing member and a second fixing member, where the first fixing member is configured to fix the opposite positions of the two terminal pieces. When the first fixing member is specifically provided, an integrated structure may be used, or a separated structure may be used. As shown in FIG. 5, the first fixing member is of a separated structure; and the first fixing member includes two portions, specifically two first fixing portions 132 disposed opposite to each other, and the two first fixing portions 132 are configured to respectively fix the two terminal pieces in the first terminal 12. Because the structures of the two first fixing portions 132 are symmetrically disposed, only one of the first fixing portions 132 is shown in FIG. 5. When there are a plurality of first terminals 12, the first terminals 12 are disposed in a single row, and each first fixing portion 132 fixes one row of terminal pieces.

[0030] As shown in FIG. 2 and FIG. 6, when the second fixing member is specifically provided, the second fixing member is nested on the first fixing member and coats the first fixing member. To improve the protective effect, the second fixing member is made of a rigid material, such as hard plastic. When the second fixing member is specifically provided, the second fixing member corresponds to the first fixing member; and when the first fixing member is of an integrated structure, the corresponding second fixing member is also of an integrated structure. When the first fixing member includes two first fixing portions 132, the corresponding second fixing member also includes two second fixing portions 131, and the second fixing portions 131 are in one-to-one correspondence with the first fixing portions 132. FIG. 2 shows two second fixing portions 131; and FIG. 2 shows the structure of one of the two second fixing portions 131. When two second fixing portions 131 are used, the two second fixing portions 131 respectively coat the two first fixing portions 132. When the second fixing portion 131 is provided, the two second fixing portions 131 are fixedly connected in a detachable manner. For example, the two second fixing portions 131 are connected using a bolt, a screw, a bolt assembly, or are engaged using a buckle. In the structure shown in FIG. 2, the two second fixing portions 131 are engaged using a buckle. As shown in FIG. 2, a protruding hook is provided at each end of each second fixing portion 131, and when the two second fixing portions 131 are oppositely fixed, the two rows of terminal pieces can be engaged using the provided hooks, so that the two rows of terminal pieces can be oppositely fixed, thereby forming a slot structure of the female structure 10. Further, to improve the stability of the opposite positions of the terminal pieces in the first terminal 12, optionally, the female structure 10 provided in this embodiment of this application may further include a positioning sleeve 14, where the positioning sleeve 14 is sleeved on the ends of the two second fixing portions 131 disposed opposite to each other, and the ends are ends that are of the terminal pieces and that are exposed outside the second connection portion 121.

[0031] The female structure 10 is formed by the first fixing member, the second fixing member, and the positioning sleeve 14 that are provided above. Further, to improve the electrical performance, when the first fixing member and the second fixing member are provided, a dielectric constant of the first fixing member is less than that of the second fixing member. When the first fixing member having a low dielectric constant is used, a capacitance of the first fixing member can be reduced to facilitate impedance matching with the terminal piece of the first terminal 12. For example, the dielectric constant of the first fixing member is 2, and the dielectric constant of the second fixing member is 4. Alternatively, the dielectric constant of the first fixing member is 3, and the dielectric constant of the second fixing member is 5. Certainly, both the first fixing member and the second fixing member can be insulators. Alternatively, when the first fixing member and the second fixing member are provided, the first fixing member can be an insulator, and the second fixing member can be a conductive plastic member. When the second fixing member is a conductive plastic member coating the first fixing member, the electromagnetic shielding effect of the terminal can be improved.

[0032] When there are a plurality of first terminals 12, different types of terminals may be used as the first terminals 12. For example, there are a plurality of first terminals 12, a portion of the first terminals 12 are high-speed terminals, and another portion of the first terminals 12 are low-speed terminals. Alternatively, all of the first terminals 12 are high-speed terminals or low speed terminals. A specific arrangement solution is shown in FIG. 7 and FIG. 8. FIG. 7 shows a structure in which a portion of the first terminals 12 are high-speed terminals and another portion of the first terminals 12 are low-speed terminals. During connection, the low-speed terminal needs to be connected to the circuit board, and therefore, the female structure 10 further includes a connection block 20, where the connection block 20 is provided with soldering pins 51 that are connected in one-to-one correspondence with terminal pieces of the low-speed terminal. During arrangement, as shown in FIG. 7 and FIG. 8, the cable 11 connected to the low-speed terminal is directly connected to the connection block 20, and the soldering pins 51 provided on the connection block 20 are configured to connect to the circuit board.

[0033] In addition to the connection of the low-speed terminal to the circuit board using the connection block 20, other methods may be used. For example, when the first terminal 12 is fixed by the foregoing fixing member, there are a plurality of fixing members, and one of the fixing members is configured to fix the low-speed terminals, and remaining fixing members are configured to fix the high-speed terminals, so that different module structures 50 are formed, specifically as shown in FIG. 9. FIG. 9 shows an exploded schematic diagram with different fixing members, where a plurality of fixing members are fixed connected in detachable manner, so that different

first terminals 12 required can be assembled. As shown in FIG. 10, the first terminal 12 fixed using the fixing members at both ends is a high-speed terminal, and the first terminal 12 fixed using the fixing member in the middle is a low-speed terminal. In implementing the detachable connection, the positioning sleeve 14 may be configured to integrate the different module structures 50.

[0034] When the female structure 10 is used, the first connection end may include a female structure 10, or may include two female structures 10. As shown in FIG. 1, two female structures 10 are disposed one after the other. Certainly, one female structure 10 may alternatively be used.

[0035] In forming the first connection end, in addition to the female structure 10, an outer case 30 is provided, as shown in the exploded schematic diagram in FIG. 1. The outer case 30 is nested outside the female structure 10 for fixing the female structure 10, so that the first connection end is of an integrated structure. In addition, the first connection end includes a fixing structure 40 to keep the structure located in the outer case 30 stable.

[0036] To improve the signal transmission effect, as shown in FIG. 11 and FIG. 12, the first connection end further includes a first shielding case, where the first terminal 12 is located in the first shielding case. More specifically, the female structure 10 and the outer case 30 are nested in the first shielding case to avoid interference from external signals. In addition, when the first shielding case is used, the position where the terminal piece and the cable 11 are connected is thinned, so that a distance from the position where the terminal piece is soldered to the cable 11 to the first shielding case is approximately equal to a distance from another position of the connection portion 121 of the terminal piece to the first shielding case, thereby improving the shielding effect.

[0037] When the first fixing member and the second fixing member are used, a dielectric constant of the second fixing member is relatively large, so that the insulating effect between the first shielding case and the first terminal 12 can be improved, and the shielding effect is improved.

[0038] To further improve the shielding effect, as shown in FIG. 13, in a specific implementation solution, the first connection end further includes a metal ring 70 sleeved on the cable 11. The metal ring 70 is sleeved on a portion that is of the cable 11 and that is exposed outside the outer case 30.

[0039] In addition to the foregoing method for fixing the cable 11, as shown in FIG. 14, conductive plastic injection molding may alternatively be performed on one end of the second fixing member adjacent to the cable 11 to form a conductive plastic case 80, so as to form cavity resonance to suppress noise while fixing the cable 11.

[0040] In addition to the foregoing first connection end, the connector according to this embodiment of this application further includes a second connection end 90. The second connection end 90 may be a second connection end in the prior art or a second connection end

of another structure. However, in the prior art, when the connection end is connected to a circuit board, an overall height exceeds a height of a chip conventionally provided on the circuit board, and a heat sink is generally provided above the chip in the prior art. As a result, the connection end cannot be disposed at the bottom of the heat sink and can only be disposed outside the heat sink, so that the connection end is away from the chip, and PCB cabling needs to be performed within the distance, thereby further increasing the loss. To rectify this problem, an embodiment of this application provides a second terminal, as shown in FIG. 15. FIG. 15 shows the structure of a second connection terminal 90. The second connection end 90 includes a second terminal 91 connected to a cable 11, and a third fixing member 94 coating a second terminal 91, and a fourth fixing member 92 coating a third fixing member 94, where a dielectric constant of the third fixing member 94 is less than that of the fourth fixing member 92. The third fixing member 94 uses a low dielectric constant to reduce a capacitance of the third fixing member 94, so as to facilitate impedance matching with the second terminal 91. In addition, when the fourth fixing member 92 is provided, the fourth fixing member 92 is made of conductive plastic to form a conductive plastic case, so as to form cavity resonance to suppress noise while fixing the cable 11.

[0041] As shown in FIG. 15, to implement the connection of the second connection end 90 to the circuit board, an elastic bending structure is provided at one end that is of the second terminal 91 and that is away from the cable 11. The second terminal 91 is connected to an edge connector provided on the circuit board using the elastic bending structure, to increase the contact pressure between the second terminal 91 and the edge connector.

[0042] To shield external signals, the second connection end 90 further includes a second shielding case 93, where the second shielding case 93 covers a plurality of second terminals 91. Specifically, as shown in FIG. 16 and FIG. 17, the second shielding case 93 is rotatably connected to the fourth fixing member 92 and can coat the structure that is of the second terminal 91 and that is exposed outside the fourth fixing member 92.

[0043] The connection of the second connection end 90 to the circuit board can be implemented using a different method. For example, in a specific solution, the second connection end 90 is fixed to the circuit board using a connecting base provided on the circuit board. As shown in FIG. 18, the connecting base includes a base 100 fixed to the circuit board body, and a flip cover 101 rotatably connected to the base 100 and slidable relative to the base 100. The flip cover 101 is provided with a protrusion, and the base 100 is provided with a slot for matching the protrusion. Alternatively, the flip cover 101 is provided with a slot, and the base 100 is provided with a protrusion for engaging with the slot. Reference is made to both FIG. 19a and FIG. 19b. In specific use, the flip cover 101 is opened, and the second connection end 90 is inserted into the base 100, so that the second ter-

minal 91 is connected to the edge connector. Then, the flip cover 101 is closed, and the second connection end 90 is fixed in the connecting base through engagement of the engagement slot with the protrusion, and a pressing force for electrically connecting the edge connector to the second terminal 91 is provided.

[0044] Certainly, in addition to the foregoing structure, another method may be used. For example, the second shielding case 93 is provided with an engagement structure engaging the second connection end 90 with the circuit board, as shown in FIG. 20a to FIG. 20c. The engagement structure includes two parts: One part is a U-shaped fixing frame 95 rotatably connected to the second shielding case 93, and correspondingly, the base of the connecting base is provided with an engagement slot for matching the U-shaped fixing frame 95, and a side wall of the connecting base is provided with a bending structure for engagement with the second shielding case 93.

[0045] During assembly, as shown in FIG. 20b, the second shielding case 93 is first inserted into the base 100 of the connecting base, so that the bending structure catches the second shielding case 93; and then the U-shaped fixing frame 95 is rotated, as shown in FIG. 20c, so that the U-shaped fixing frame 95 is caught in the engagement slot. In the foregoing engagement structure, it can be seen that the bending structure and the position where the U-shaped fixing frame 95 is engaged with the engagement slot are respectively located at the opposite ends of the second shielding case 93, so that the stability of the electrical connection between the second connection end 90 and the circuit board can be ensured during engagement.

[0046] In addition, because the second connection end 90 is in the form of a spring plate, an overall thickness after the entire second connection end 90 is connected to the circuit board is relatively low, and a height of the second connection end 90 after being fixed to the circuit board is reduced compared with the matching manner of the male end and the female end used in the prior art, so that the second connection end 90 can be disposed at the bottom of the heat sink of the chip.

[0047] An embodiment of this application further provides a circuit board, where the circuit board includes a circuit board body, and an edge connector that is disposed on the circuit board body to match a second terminal 91; and the circuit board further includes a connecting base for matching an engagement structure. For the connecting base, reference may be made to the foregoing two different structures.

[0048] When the structure is used, a part that is of the connection portion 121 and that is connected to the cable 11 is thinned, so that a thickness of the part that is of the connection portion 121 and that is connected to the cable 11 is less than that of a part that is of the connection portion 121 and that is not connected to the cable 11. When the cable 11 is connected to the connection portion 121, an overall thickness after the cable 11 is connected to the connection portion 121 is approximately equal to

a thickness of the part that is of the connection portion 121 and that is not connected to the cable 11, thereby ensuring the impedance matching between a soldering wire area and both the cable and the terminal pieces, and improving the signal transmission effect. In addition, the thinning structure is provided so that a distance between the entire cable 11 and a shielding box and a distance between the part that is of the connection portion 121 and that is not connected to the cable 11 and the shielding box is small, thereby improving the overall shielding effect. Further, a height of the connector after being connected to the circuit board can be effectively reduced through matching between the edge connector and the second terminal, so that the second connection end connected to the circuit board can be disposed below the heat sink of the circuit board, thereby reducing wiring on the circuit board and further reducing loss.

[0049] An embodiment of this application further provides a communications device, where the communications device includes a connector according to any one of the foregoing implementations and a circuit board according to any one of the foregoing implementations.

[0050] When the structure is used, a part that is of the connection portion 121 and that is connected to the cable 11 is thinned, so that a thickness of the part that is of the connection portion 121 and that is connected to the cable 11 is less than that of a part that is of the connection portion 121 and that is not connected to the cable 11. When the cable 11 is connected to the connection portion 121, an overall thickness after the cable 11 is connected to the connection portion 121 is approximately equal to a thickness of the part that is of the connection portion 121 and that is not connected to the cable 11, thereby ensuring the impedance matching between a soldering wire area and both the cable and the terminal pieces, and improving the signal transmission effect. In addition, the thinning structure is provided so that a distance between the entire cable 11 and a shielding box and a distance between the part that is of the connection portion 121 and that is not connected to the cable 11 and the shielding box is small, thereby improving the overall shielding effect.

Claims

1. A connector, comprising a first connection end and a cable, wherein the first connection end comprises a first terminal, wherein the first terminal comprises two terminal pieces disposed opposite to each other, each terminal piece comprises a connection portion, the connection portion is connected to the cable, and a thickness of a part that is of the connection portion and that is connected to the cable is less than a thickness of a part that is of the connection portion and that is not connected to the cable.

2. The connector according to claim 1, wherein the first connection end further comprises a fixing member, wherein the fixing member comprises a first fixing member configured to fix the first terminal, and a second fixing member nested outside the first fixing member, wherein a dielectric constant of the first fixing member is less than a dielectric constant of the second fixing member; or the first fixing member is an insulator, and the second fixing member is a conductive plastic member. 5
3. The connector according to claim 2, wherein the first fixing member comprises two first fixing portions disposed opposite to each other, and the two first fixing portions are configured to respectively fix the two terminal pieces of the first terminal. 10
4. The connector according to claim 3, wherein the second fixing member comprises two second fixing portions that respectively coat the two first fixing portions, and the two second fixing portions are connected in a detachable manner. 15
5. The connector according to claim 2, wherein there are a plurality of first terminals, a portion of the first terminals are high-speed terminals, and another portion of the first terminals are low-speed terminals. 20
6. The connector according to claim 5, wherein the first connection end further comprises a connection block, and the connection block is provided with soldering pins that are connected in a one-to-one correspondence with terminal pieces of the low-speed terminals. 25
7. The connector according to claim 5, wherein there are a plurality of fixing members, one of the fixing members is configured to fix the low-speed terminals, and remaining fixing members are configured to fix the high-speed terminals. 30
8. The connector according to claim 1, wherein the first connection end further comprises a first shielding case, and the first connection end is located in the first shielding case. 35
9. The connector according to claim 8, wherein the first connection end further comprises a metal ring sleeved on the cable. 40
10. The connector according to any one of claims 1 to 9, further comprising a second connection end, wherein the second connection end comprises a second terminal connected to the cable, a third fixing member coating the second terminal, and a fourth fixing member coating the third fixing member, wherein a dielectric constant of the third fixing member is less than that of the fourth fixing member. 45
11. The connector according to claim 10, wherein an elastic bending structure is disposed at one end that is of the second terminal and that is away from the cable. 50
12. The connector according to claim 10, wherein the second connection end further comprises a second shielding case covering the second terminal. 55
13. The connector according to claim 12, wherein an engagement structure for engaging the second connection end with a circuit board is disposed on the second shielding case.
14. The connector according to claim 13, wherein the engagement structure comprises a U-shaped fixing frame rotatably connected to the second shielding case.
15. A circuit board, configured to connect to the connector according to claim 13 or 14, wherein the circuit board comprises a circuit board body and an edge connector disposed on the circuit board body and configured to electrically connect to the second terminal, and the circuit board further comprises a connecting base for matching the engagement structure.
16. The circuit board according to claim 15, wherein the connecting base comprises: a base fixed to the circuit board body, and a flip cover that is rotatably connected to the base and slidable relative to the base, and the base is provided with a bending structure for engaging the second shielding case with the second connection end, the flip cover is provided with a protrusion, and the base is provided with an engagement slot that matches the protrusion.
17. The circuit board according to claim 15, wherein when the engagement structure comprises a U-shaped fixing frame, a side wall of the connecting base is provided with a bending structure for engagement with the second shielding case and an engagement slot for engagement with the U-shaped fixing frame.
18. A communications device, comprising the connector according to any one of claims 1 to 14 and the circuit board according to any one of claims 15 to 17.

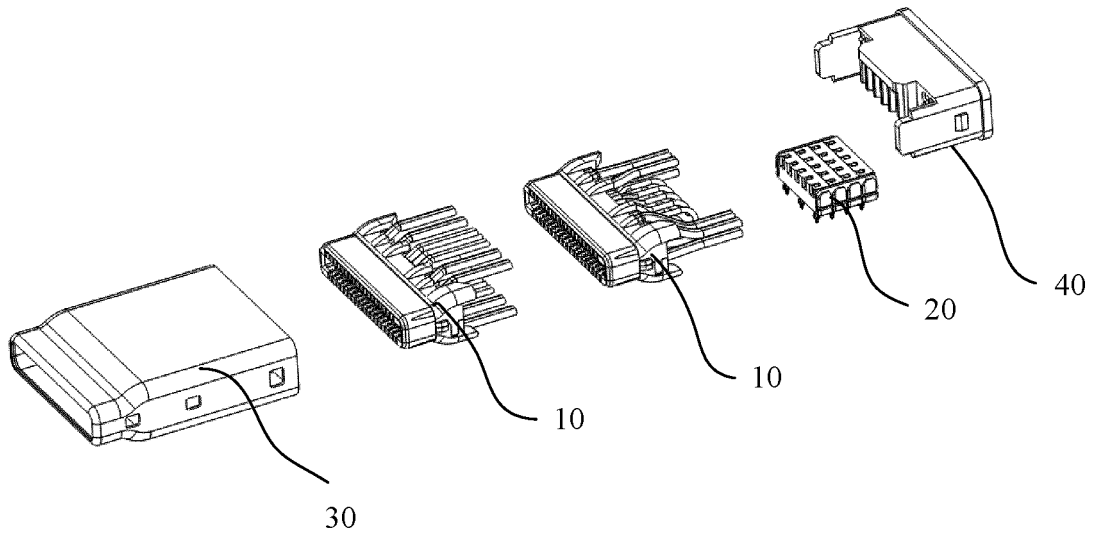


FIG. 1

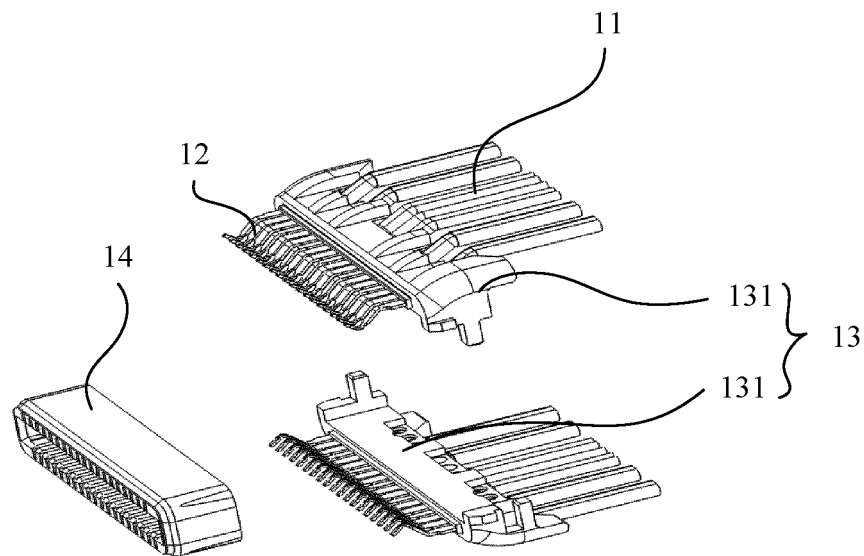


FIG. 2

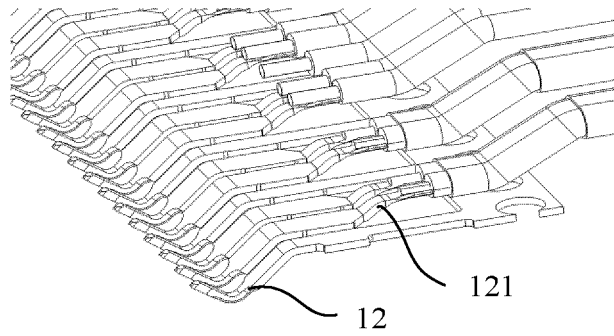


FIG. 3

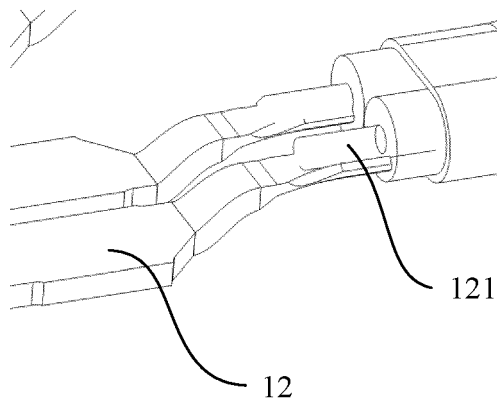


FIG. 4

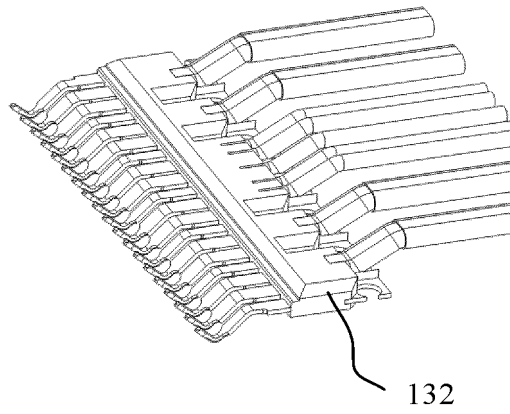


FIG. 5

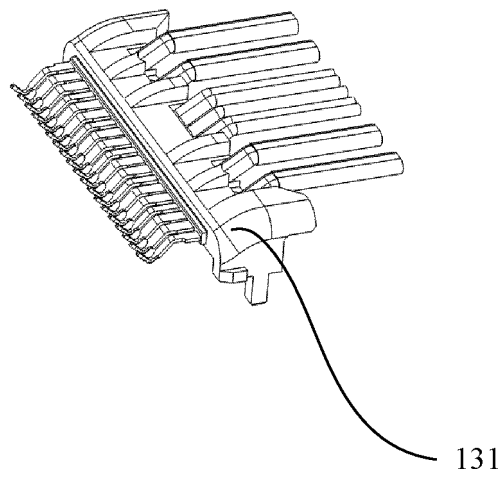


FIG. 6

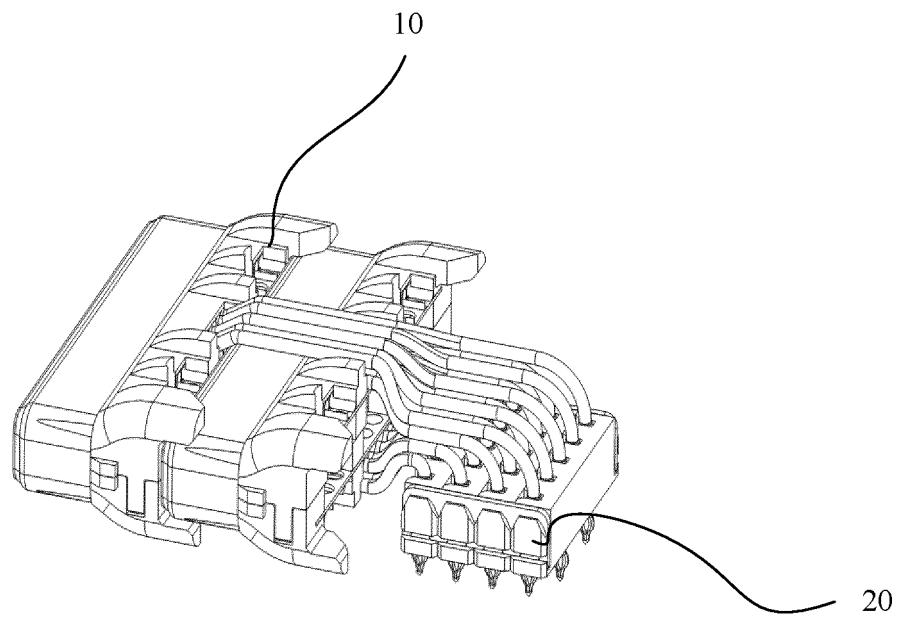


FIG. 7

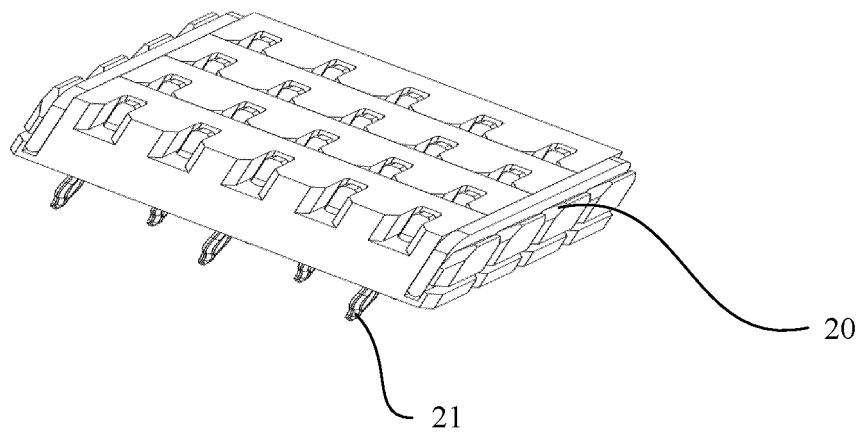


FIG. 8

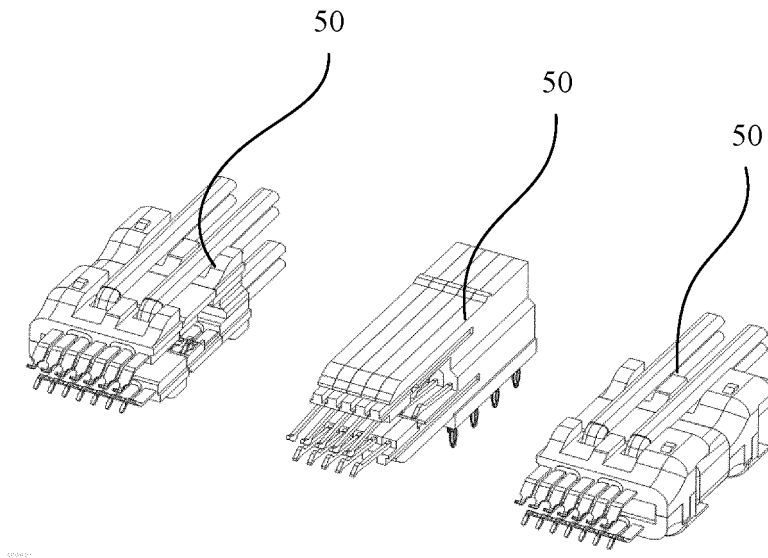


FIG. 9

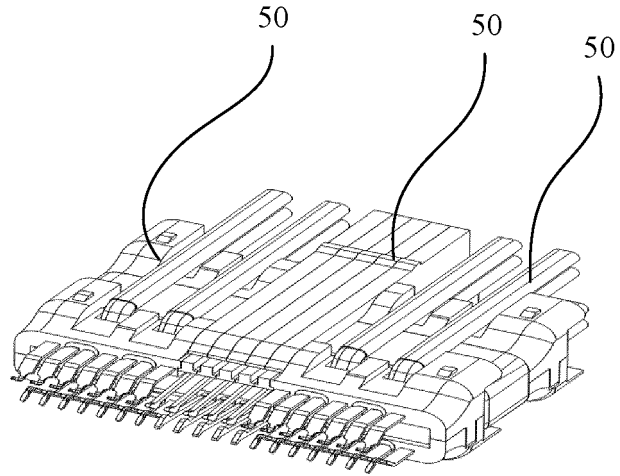


FIG. 10

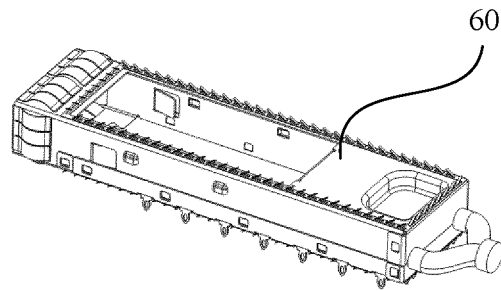


FIG. 11

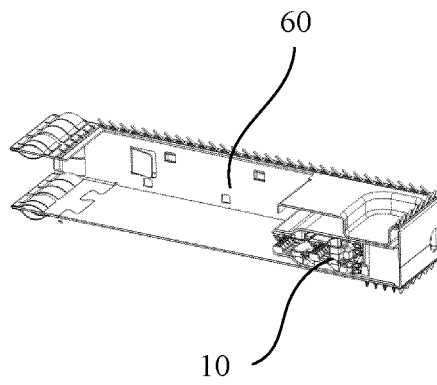


FIG. 12

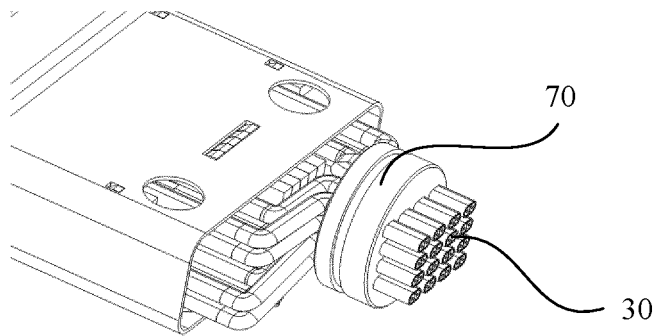


FIG. 13

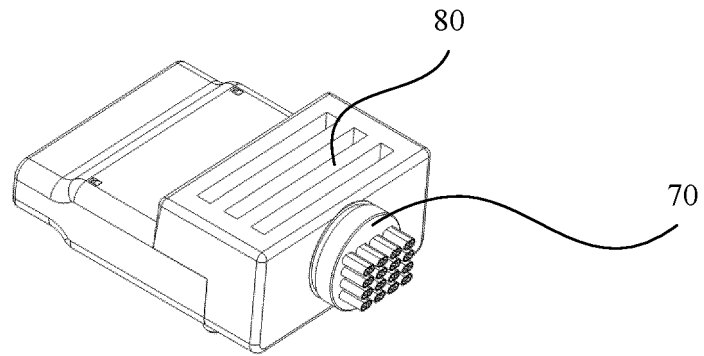


FIG. 14

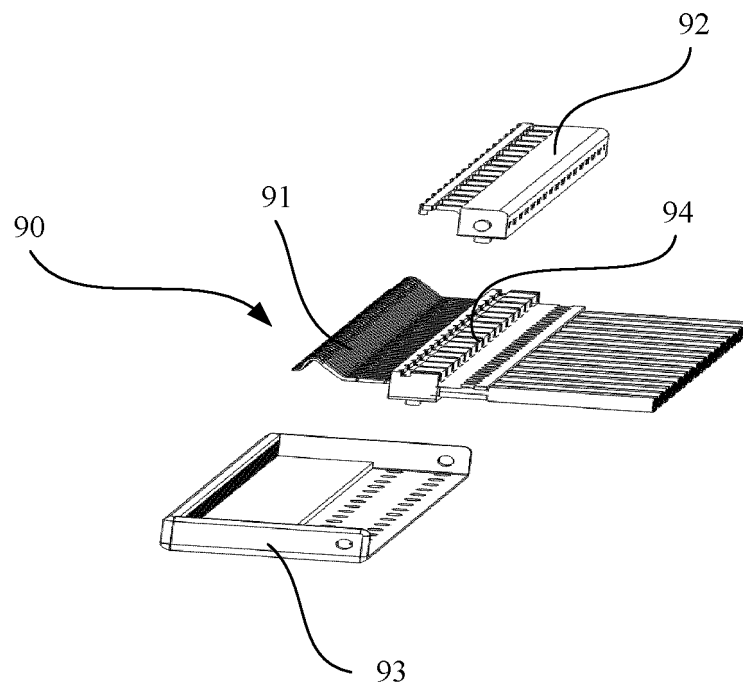


FIG. 15

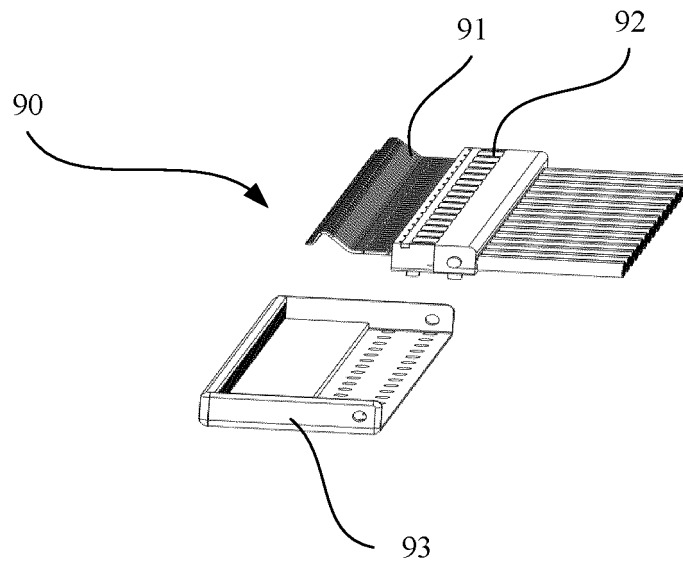


FIG. 16

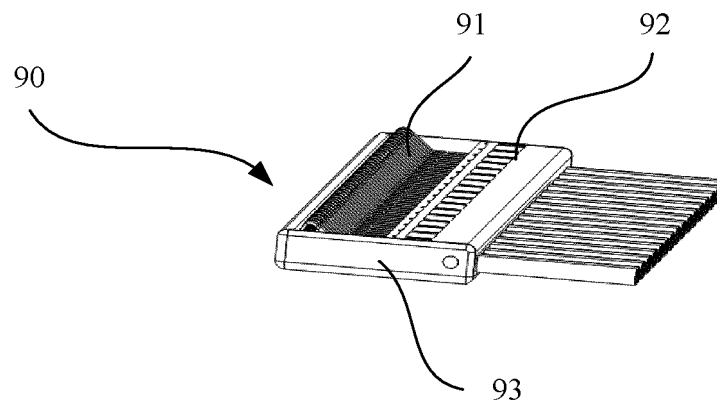


FIG. 17

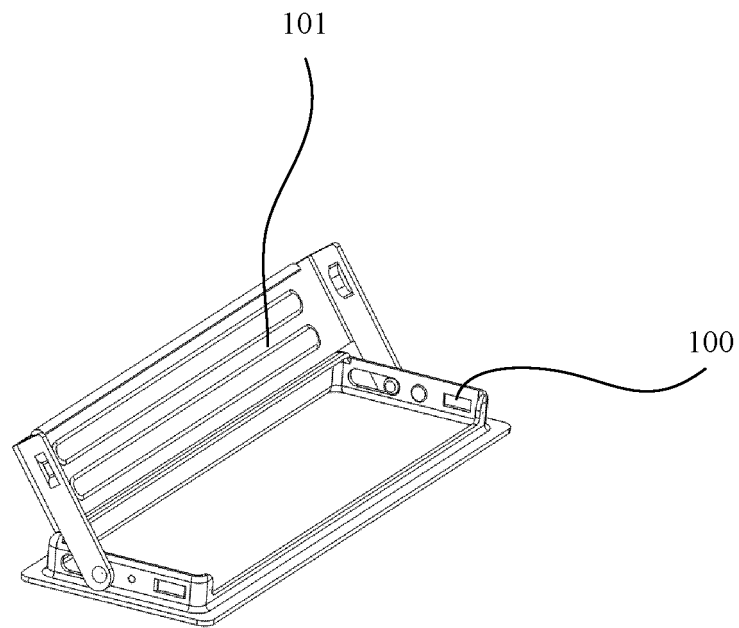


FIG. 18

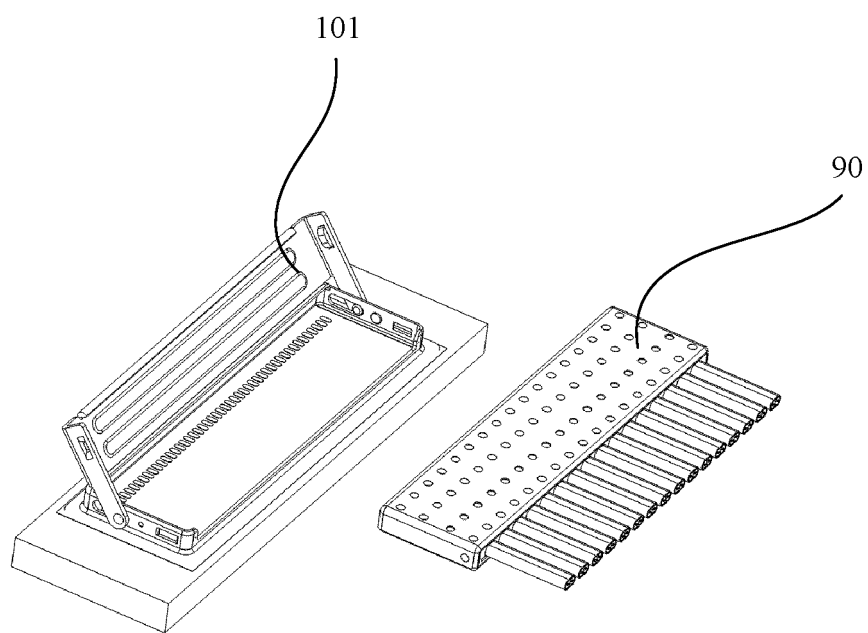


FIG. 19a

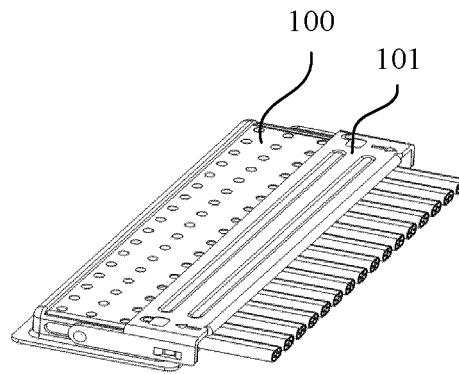


FIG. 19b

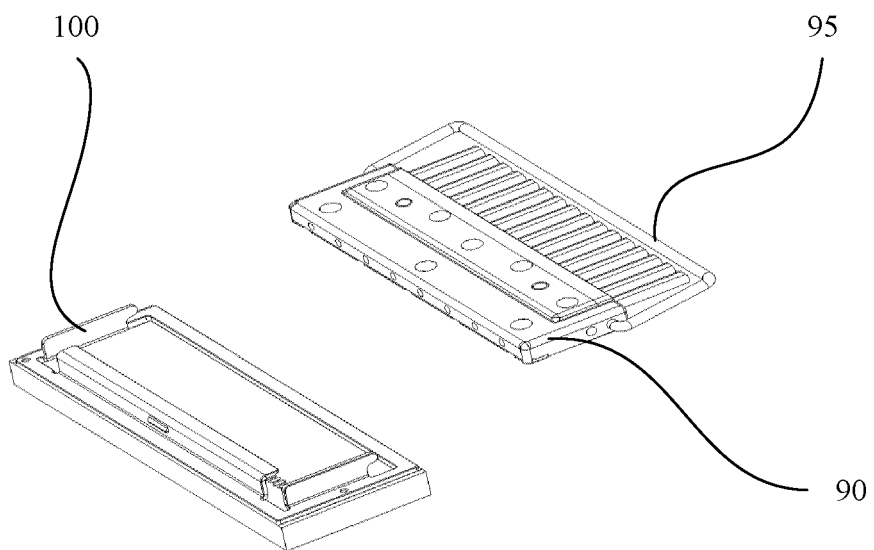


FIG. 20a

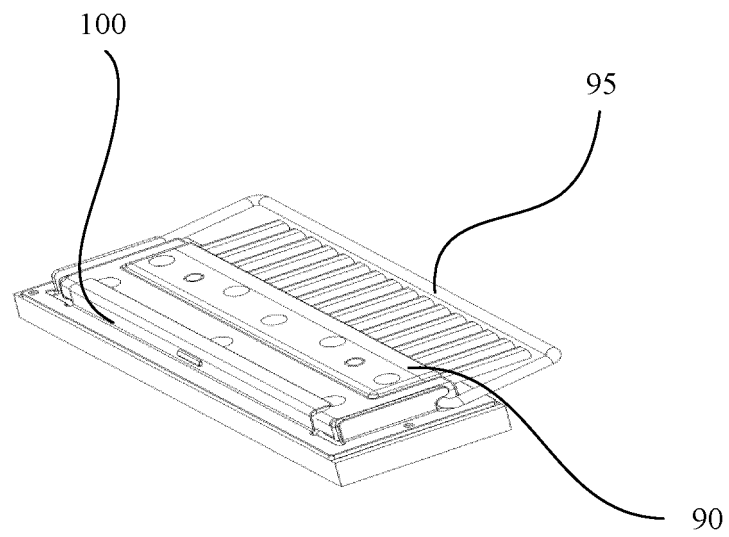


FIG. 20b

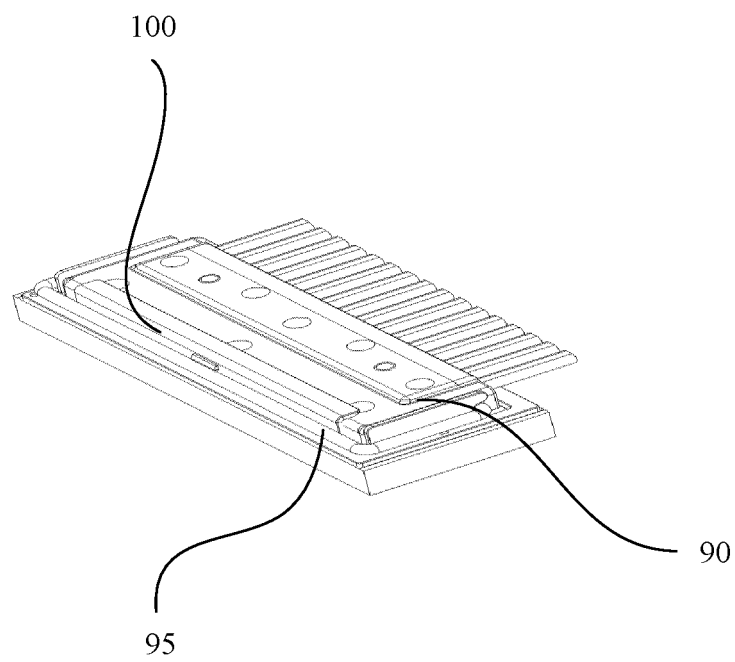


FIG. 20c

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2019/110781

A. CLASSIFICATION OF SUBJECT MATTER H01R 13/6474(2011.01)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 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) CNPAT, CNKI, WPI, EPODOC: 端子, 电缆, 线缆, 电线, 厚, 薄, 阻抗, 匹配, 壳, 盖, 电路板, 基板, terminal+, cable, wire, thick +, thin+, impedance, match+, shell, casing, housing, cover, pcb, substrate																								
C. DOCUMENTS CONSIDERED TO BE RELEVANT																								
<table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>CN 103227389 A (HOSIDEN CORPORATION) 31 July 2013 (2013-07-31) description, paragraphs 0069-0089, and figures 1A-4B</td> <td>1, 8-12</td> </tr> <tr> <td>Y</td> <td>CN 103227389 A (HOSIDEN CORPORATION) 31 July 2013 (2013-07-31) description, paragraphs 0069-0089, and figures 1A-4B</td> <td>2-7, 13-18</td> </tr> <tr> <td>Y</td> <td>CN 108631086 A (HOSIDEN CORPORATION) 09 October 2018 (2018-10-09) description, paragraph 0082, and figure 3</td> <td>2-7</td> </tr> <tr> <td>Y</td> <td>CN 106058580 A (DAI-ICHI SEIKO CO., LTD.) 26 October 2016 (2016-10-26) description, paragraphs 0040-0076, and figures 1-10</td> <td>13-18</td> </tr> <tr> <td>Y</td> <td>CN 103579794 A (TYCO ELECTRONICS CORP.) 12 February 2014 (2014-02-12) description, paragraphs 0045-0047, and figure 7</td> <td>16</td> </tr> <tr> <td>A</td> <td>CN 104124549 A (FOXCONN (KUNSHAN) COMPUTER CONNECTOR CO., LTD. et al.) 29 October 2014 (2014-10-29) entire document</td> <td>1-18</td> </tr> <tr> <td>A</td> <td>CN 107230852 A (CANON INC.) 03 October 2017 (2017-10-03) entire document</td> <td>1-18</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	CN 103227389 A (HOSIDEN CORPORATION) 31 July 2013 (2013-07-31) description, paragraphs 0069-0089, and figures 1A-4B	1, 8-12	Y	CN 103227389 A (HOSIDEN CORPORATION) 31 July 2013 (2013-07-31) description, paragraphs 0069-0089, and figures 1A-4B	2-7, 13-18	Y	CN 108631086 A (HOSIDEN CORPORATION) 09 October 2018 (2018-10-09) description, paragraph 0082, and figure 3	2-7	Y	CN 106058580 A (DAI-ICHI SEIKO CO., LTD.) 26 October 2016 (2016-10-26) description, paragraphs 0040-0076, and figures 1-10	13-18	Y	CN 103579794 A (TYCO ELECTRONICS CORP.) 12 February 2014 (2014-02-12) description, paragraphs 0045-0047, and figure 7	16	A	CN 104124549 A (FOXCONN (KUNSHAN) COMPUTER CONNECTOR CO., LTD. et al.) 29 October 2014 (2014-10-29) entire document	1-18	A	CN 107230852 A (CANON INC.) 03 October 2017 (2017-10-03) entire document	1-18
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Date of the actual completion of the international search 31 December 2019	Date of mailing of the international search report 09 January 2020																							
Name and mailing address of the ISA/CN China National Intellectual Property Administration No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088 China Facsimile No. (86-10)62019451	Authorized officer Telephone No.																							

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2019/110781

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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 204947182 U (FOXCONN (KUNSHAN) COMPUTER CONNECTOR CO., LTD. et al.) 06 January 2016 (2016-01-06) entire document	1-18
A	US 2005112959 A1 (LAI, Kuangchih) 26 May 2005 (2005-05-26) entire document	1-18

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2019/110781

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
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US 2005112959 A1	26 May 2005	None	

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