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(54) **Title**: CARD EDGE CONNECTOR UNIT HAVING A COVER

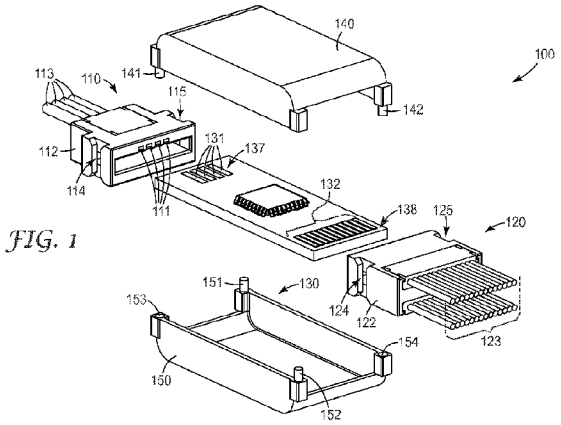

FIG. 1

(57) **Abstract**: To provide a card edge connector unit, wherein a connector and a board are firmly secured and contaminants such as dirt and dust are prevented from adhering to a surface of the board. A card edge connector unit (100) having a board (130) on which a plurality of pads are disposed on an edge, a first connector (110) connecting to one end of the board (130), a second connector (120) connecting to a second end of the board (130), and a cover (140, 150) surrounding the board (130). The cover (140,150) includes cover securing parts for securing the first connector (110) and the second connector 120, and the first connector (110) and the second connector (120) include connector securing parts (114, 115, 124, 125) for securing the cover securing parts.

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CARD EDGE CONNECTOR UNIT HAVING A COVER

Field of the Invention

The present invention relates to a card edge connector unit having a cover.

Background

Conventionally, boards for use in card edge connectors have been configured by disposing a pad on one end of a circuit board such as a printed circuit board. By inserting one end of the board into a connector, electrical contact between the pad and a contact provided in the connector is formed and the board is secured to the connector.

If the board and the connector are not firmly secured, the board will move and a contact fault between the pad and the contact will occur. In order to remedy this, configurations have been made such as providing a metal lock spring mechanism or a latch mechanism (Patent Documents 1 and 2).

For example, Patent Document 1 describes a card edge connector including an insulative housing that is mounted onto a board and a latch member that is attached to the housing for holding a daughter board, wherein the latch member has a daughter board locking portion for restraining the daughter board from becoming dislocated in a horizontal direction by engaging with an inner wall of a semicircular recess formed on an edge of the daughter board.

These metal lock spring mechanisms and latch mechanisms are used by attaching them to the connector. Therefore, there are problems such as that an attaching process is necessary, and additional space is needed for the mechanism.

Moreover, there are problems such as operation becoming unstable when contaminants such as dust, toner, or the like, and particularly conductive contaminants, become adhered to a surface of the board.

Summary

The present invention was developed to solve the aforementioned problems and more firmly secures the connector and the board and prevents contaminants from adhering to the surface of the board. Furthermore, because other components (especially conductive components) do not come in contact with the surface of the board due to the cover, the board can be disposed at any location desired.

A card edge connector unit is provided according to an aspect of the present invention. The card edge connector unit has a board on which a plurality of pads is disposed on an edge, a first connector connecting to one end of the board, a second connector connecting to a second end of the board, and a cover surrounding the board. The cover includes cover securing parts for securing the first connector and

the second connector, and the first connector and the second connector include connector securing parts for securing the cover securing parts.

According to the present invention, contact reliability between a contact in a connector and a pad of a board can be improved and adhering of contaminants to a surface of the board can be prevented. Furthermore, with the card edge connector unit of the present invention, because other components do not come in contact with the surface of the board due to the cover, the card edge connector unit can be disposed at any location desired. For example, by applying a double-sided tape or an adhesive layer to the cover, the card edge connector unit can be easily disposed securely at a desired location.

Brief Description of the Drawings

FIG. 1 is a schematic perspective view of an exploded view of a card edge connector unit according to an embodiment of the present invention looked down on from an angle.

FIG. 2 is a schematic perspective view of the card edge connector unit according to the embodiment of the present invention looked down on from an angle.

FIG. 3 is a schematic perspective view of an exploded view of a card edge connector unit according to another embodiment of the present invention looked down on from an angle.

FIG. 4 is a schematic perspective view of the card edge connector unit according to another embodiment of the present invention looked down on from an angle.

FIG. 5 is a schematic perspective view of an exploded view of a card edge connector unit according to another embodiment of the present invention looked down on from an angle.

FIG. 6 is a schematic perspective view of the card edge connector unit according to another embodiment of the present invention looked down on from an angle.

FIG. 7 is a schematic perspective view of an exploded view of a card edge connector unit according to another embodiment of the present invention looked down on from an angle.

FIG. 8 is a schematic perspective view of the card edge connector unit according to another embodiment of the present invention looked down on from an angle.

FIG. 9 is a schematic view of a usage example of a card edge connector unit of the present invention.

FIG. 10 is a schematic view of a usage example of a card edge connector unit of the present invention.

Detailed Description

Card edge connector units according to embodiments of the present invention are described below while referring to the drawings. This unit can be used in office automation devices such as printers and facsimile machines, internal components of electronic devices such as automatic vending machines and medical devices, and in networks such as sensor networks, home security networks, and the like

Additionally, the unit may be used as a slave unit when an internal component of an electronic device or wiring of a network is converted to a serial bus.

The card edge connector unit is provided with a cover that surrounds a board. Therefore, adhesion of dirt and dust to the board can be prevented, and, simultaneously, because connectors connected to the cover and the board are secured, the cover acts as an exoskeleton to protect the board, and contact reliability between contacts and the board within the connectors is improved. Furthermore, because the board surface is protected by the cover, other conductive components that exist in electronic devices or in the network vicinity will not contact the board and the board can be disposed at any location desired without worrying about these other conductive components.

A card edge connector unit 100 according to an embodiment of the present invention illustrated in FIG. 1 has a first connector 110, a second connector 120, a board 130, a cover top part 140, and a cover bottom part 150.

The first connector 110 and the second connector 120 engage with the board 130, which is a connection target thereof. The connectors have conductive contacts 111, 121 (not shown) and housings 112, 122 that hold the conductive contacts. The conductive contacts are in electrical contact with cables 113, 123.

The housings of the connectors have connector securing parts 114, 115, 124, 125. As illustrated in FIG. 1, recess provided in the housings are the connector securing parts. Other than recessed shapes for the connector securing parts, protruding shapes and other shapes that allow for the securing of the housings of the connectors and the cover can be employed.

A plurality of pads 131, 132 is disposed on the board 130. Additionally, integrated circuits, resistors, electrolytic capacitors and the like may be disposed on the board. Note that when using the card edge connector unit as a slave unit, a slave integrated circuit or an address setting unit is mounted thereon.

A first end 137 of the board is engaged with the first connector 110 and a second end 138 is engaged with the second connector 120. The pads 131, 132 of the board are in electrical contact with the corresponding conductive contacts of the connectors. By disposing the contacts so as to push against the board, the pads and the contacts are brought into electrical contact, but the degree of securing in this state is not sufficient. Note that in FIG. 1, the first end and the second end are disposed in a longitudinal direction of the board (180 degree direction), but, as illustrated in FIG. 3 and FIG. 4, the ends may be disposed in a right angle direction. Additionally, as illustrated in FIG. 5, and FIG. 6, the second end may be disposed in both the right angle direction and the 180 degree direction.

Next, the cover will be described. In FIG. 1, the cover surrounding the board has the cover top part 140 and the cover bottom part 150, but the cover may be formed so as to be integrated. The cover top part 140 has engaging protrusions 141, 142 that engage with receiving recesses 153, 154 of the cover bottom part 150 to form the cover. Likewise, the cover bottom part 150 also has engaging protrusions 151, 152 that engage with receiving recesses 143, 144 (not shown) of the cover top part 140.

When engaging the receiving recesses and the engaging protrusions, by vertically engaging along the securing parts 114, 115, 124, 125 of the first connector and the second connector, as illustrated in FIG. 2, the cover securing parts 201, 202, 203, 204 of the cover 200 are secured with the connector securing parts 114, 115, 124, 125 of the first and the second connectors. Thus, the cover and the first and the second connectors are secured and, therefore, the engagement between the board and the first and the second connectors is stabilized and high contact reliability between each contact of the connectors and the pads of the board can be obtained.

Note that a number of components can be reduced when the cover top part 140 and the cover bottom part 150 are the same shape.

Examples of a material of the cover include various resins such as polyacetal, polyamide, polycarbonate, modified polyphenylene ether, polybutylene terephthalate, polyethylene terephthalate, ultra high molecular weight polyethylene, syndiotactic polystyrene,

amorphous polyarylate, polysulfone, polyethersulfone, polyphenylene sulfide, polyetheretherketone, polyimide, polyetherimide, fluororesins, liquid crystal polymers, and the like, but from the perspective of processability and strength, polycarbonate may be used. Additionally, a transparent material (including colored transparent materials such as milky transparent materials) may be used so that the board can be seen from outside the cover.

A card edge connector unit 300, 400 according to another embodiment of the present invention illustrated in FIG. 3 and FIG. 4 has nearly the same construction as the card edge connector unit illustrated in FIG. 1 and FIG. 2 with the exception that a second end 338 of a board 330 is provided in the right angle direction with regards to a first end 337 of the board. By vertically engaging engaging protrusions 341,342, 343, 344 (partially not shown) of a cover top part 340 with receiving recesses of a cover bottom part 350 along the securing parts 314, 315, 324, 325 of the first connector and the second connector, as illustrated in FIG. 4, the cover securing parts 401, 402, 403, 404 of a cover are secured with the connector securing parts 314, 315, 324, 325 of the first and the second connectors.

A card edge connector unit 500, 600 according to another embodiment of the present invention illustrated in FIG. 5 and FIG. 6 has nearly the same construction as the card edge connector unit illustrated in FIG. 1 and FIG. 2 with the exception that another second end 539 is provided in the right angle direction with regards to a first end 537 and a second end 538 in the 180 degree direction of the board 530.

A card edge connector unit 700, 800 according to another embodiment of the present invention illustrated in FIG. 7 and FIG. 8 has nearly the same construction as the card edge connector unit illustrated in FIG. 1 and FIG. 2 with the exception that shapes of a cover top part 740 and a cover bottom part 750 have been changed.

FIG. 9 illustrates an example of a card edge connector unit of the present invention being used as a slave unit when internal components of an electronic device or wiring of a network is converted to a serial bus. Here, the board of the slave unit has an address setting unit and a slave integrated circuit.

A board 930 of the a slave unit 900, connected via a cable (serial bus) 913 from a control circuit unit 960 that subsequently serially outputs a plurality of data signals, performs an operation of acquiring the data when a data signal corresponding to the slave unit board is received from the control circuit unit 960. The slave integrated circuit determines whether an address of the received data signal from the address setting unit corresponds to it. Various elements such as motors, sensors, and the like are connected to ends 970 of the slave unit, and each of the elements is operated based on the data signals from the control circuit unit 960 received via the slave unit.

Only two of the slave units are illustrated in FIG. 9, but when used as internal components of an electronic device or the wiring of a network, a plurality of the slave units is necessary, and the card edge connector unit having a cover of the present invention can be used in all or a portion of these slave units.

FIG. 10 illustrates a state of a card edge connector unit 1000 of the present invention in which an internal component 1200 of an electronic device is adhered via a double-sided tape 1100. The double-sided tape can be replaced with a material having a function of adhering surfaces together such as an adhesive layer, a surface fastener, or the like.

As described herein, a person skilled in the art can make various modifications within the scope of the present invention, according to the form to be embodied.

List of reference numbers:

100, 200, 300, 400, 500, 600, 700, 800, 900 Card edge connector unit
110 First connector
120, 320, 520, 560 Second connector
130, 330, 530, 930 Board
140, 340, 740 Cover top part
150, 350, 750 Cover bottom part
201, 202, 203, 204, 401, 402, 403, 404 Cover securing part
114, 115, 124, 125, 314, 315, 324, 325 Connector securing part

Following are exemplary embodiments of a card edge connector unit having a cover according to aspects of the present invention.

Embodiment 1 is acard edge connector unit comprising a board on which a plurality of pads is disposed on an edge, a first connector connecting to one end of the board, a second connector connecting to another end of the board, and a cover surrounding the board, wherein the cover comprises a cover

securing part for securing the first connector and a cover securing part for securing the second connector; and the first connector and the second connector comprise connector securing parts for securing the cover securing parts.

Embodiment 2 is the card edge connector unit according to embodiment 1, wherein the cover securing parts are protrusions, the connector securing parts are recesses, and the cover, the first connector, and the second connector are secured through engaging of the recesses and the protrusions.

Embodiment 3 is the card edge connector unit according to embodiments 1 or 2, wherein the cover comprises a cover top part that covers one side of the board and a cover bottom part that covers another side of the board.

Embodiment 4 is the card edge connector unit according to any one of embodiments 1 to 3, wherein the board comprises a slave integrated circuit and an address setting unit.

Although specific embodiments have been illustrated and described herein for purposes of description of the preferred embodiment, it will be appreciated by those of ordinary skill in the art that a wide variety of alternate and/or equivalent implementations calculated to achieve the same purposes may be substituted for the specific embodiments shown and described without departing from the scope of the present invention. Those with skill in the mechanical, electro-mechanical, and electrical arts will readily appreciate that the present invention may be implemented in a very vide variety of embodiments. This application is intended to cover any adoptions or variations of the preferred embodiments discussed herein. Therefore, it is manifestly intended that this invention be limited only by the claims and the equivalents thereof.

What is claimed is:

1. A card edge connector unit comprising a board on which a plurality of pads is disposed on an edge, a first connector connecting to one end of the board, a second connector connecting to another end of the board, and a cover surrounding the board, wherein

the cover comprises a cover securing part for securing the first connector and a cover securing part for securing the second connector; and

the first connector and the second connector comprise connector securing parts for securing the cover securing parts.

2. The card edge connector unit according to claim 1, wherein the cover securing parts are protrusions, the connector securing parts are recesses, and the cover, the first connector, and the second connector are secured through engaging of the recesses and the protrusions.

3. The card edge connector unit according to claim 1 or 2, wherein the cover comprises a cover top part that covers one side of the board and a cover bottom part that covers another side of the board.

4. The card edge connector unit according to any one of claims 1 to 3, wherein the board comprises a slave integrated circuit and an address setting unit.

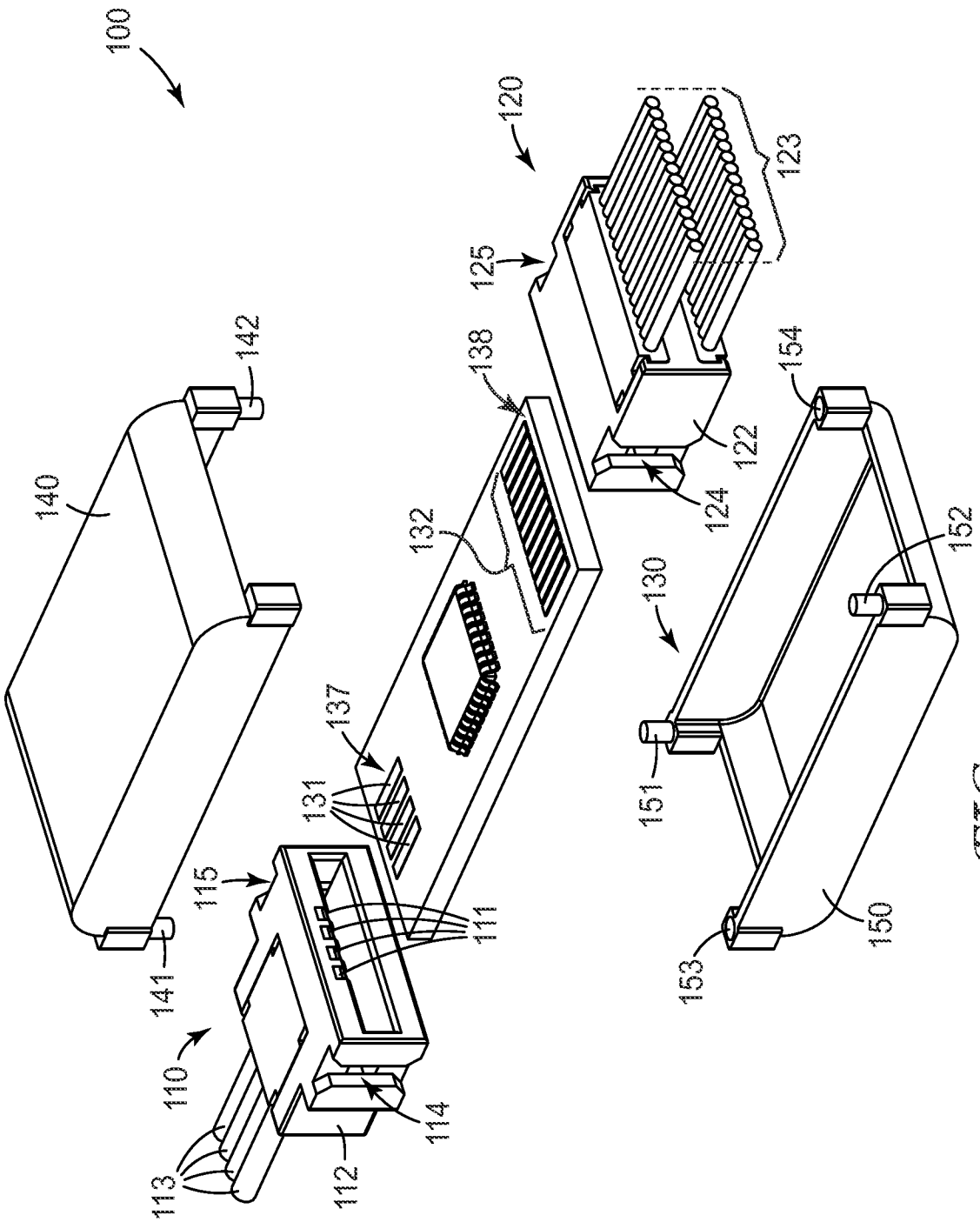
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FIG. 1

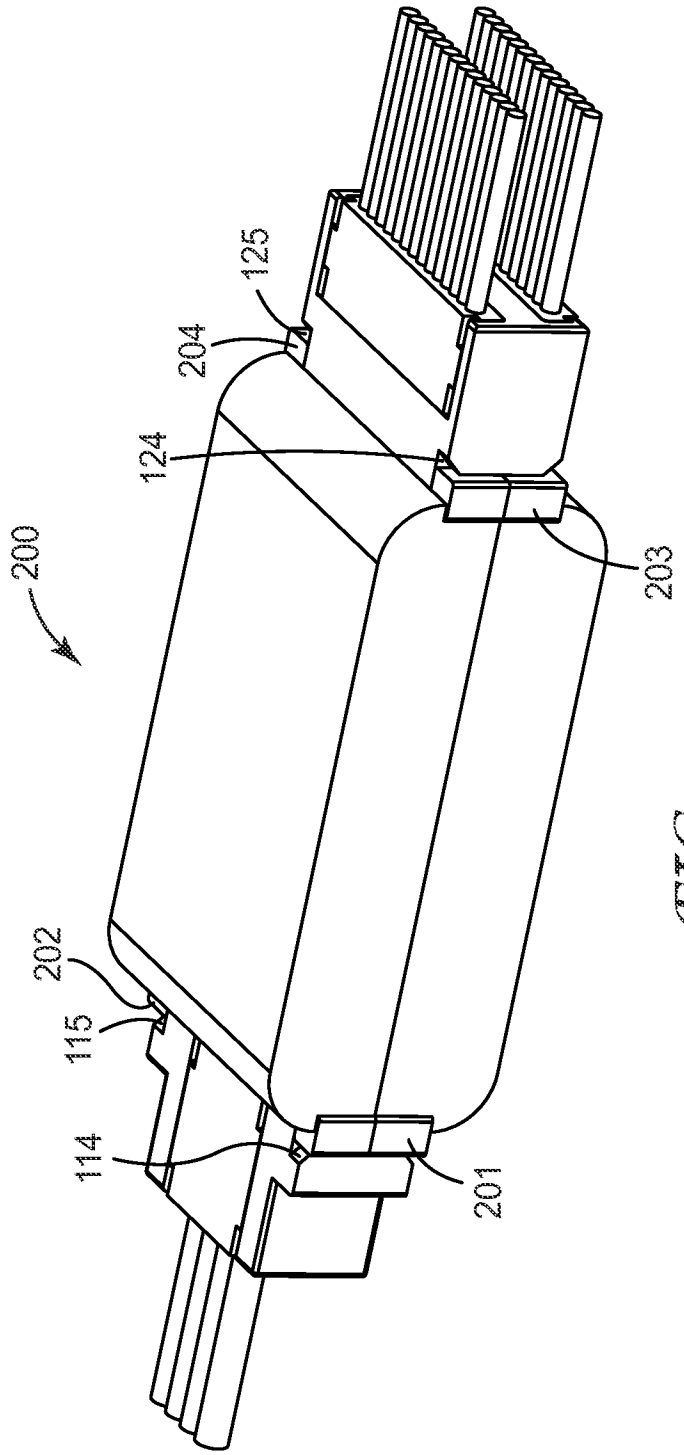

FIG. 2

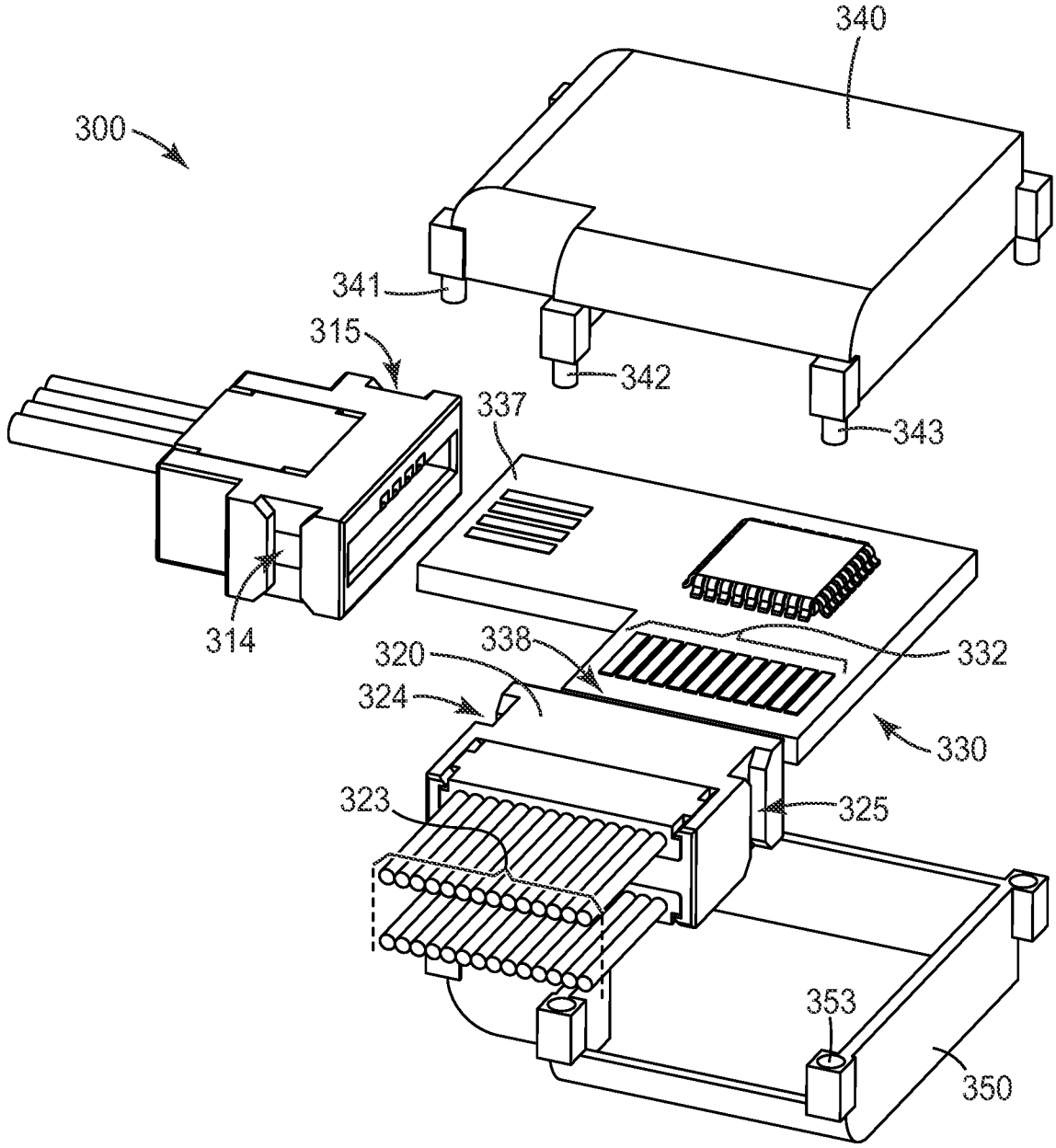
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FIG. 3

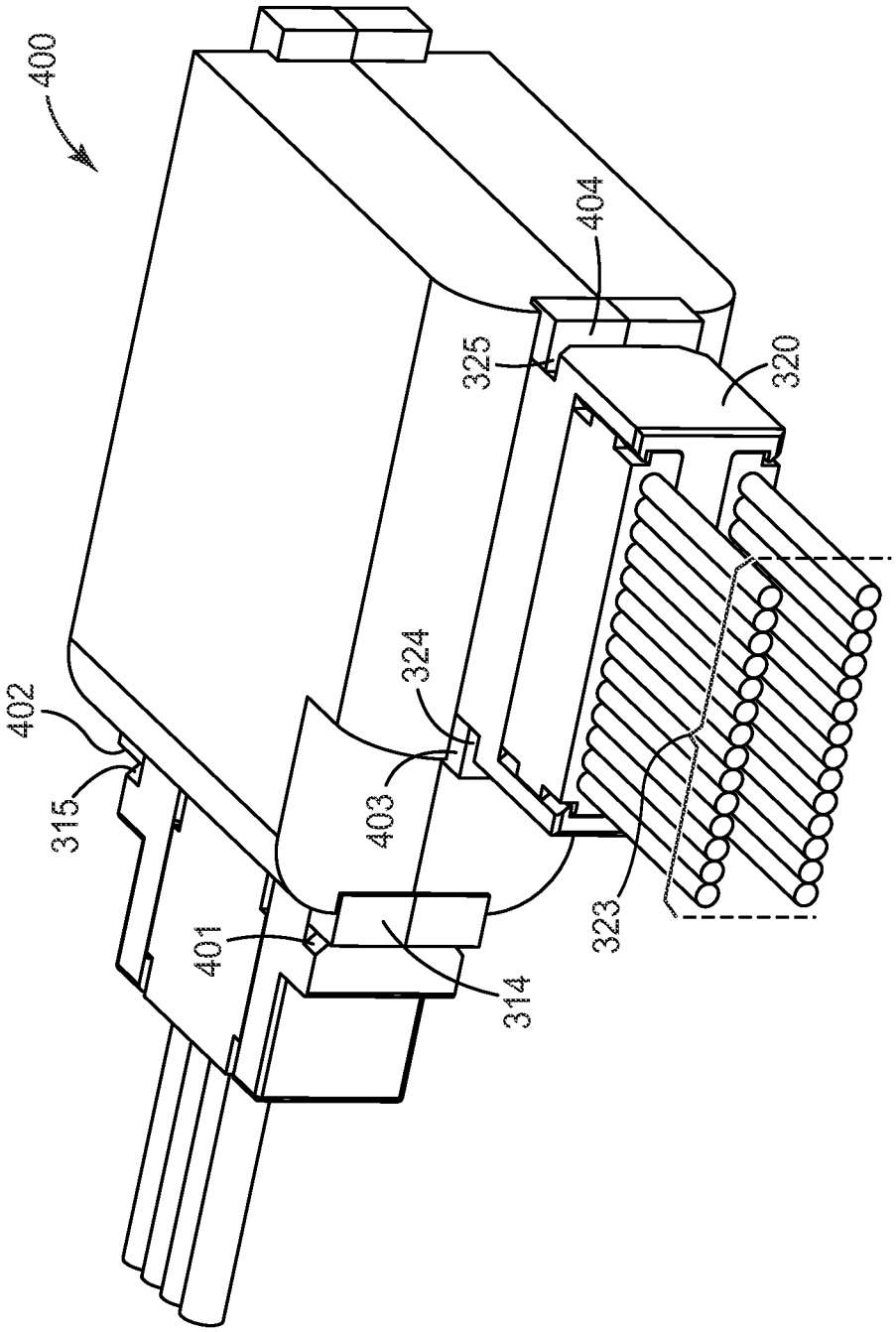

FIG. 4

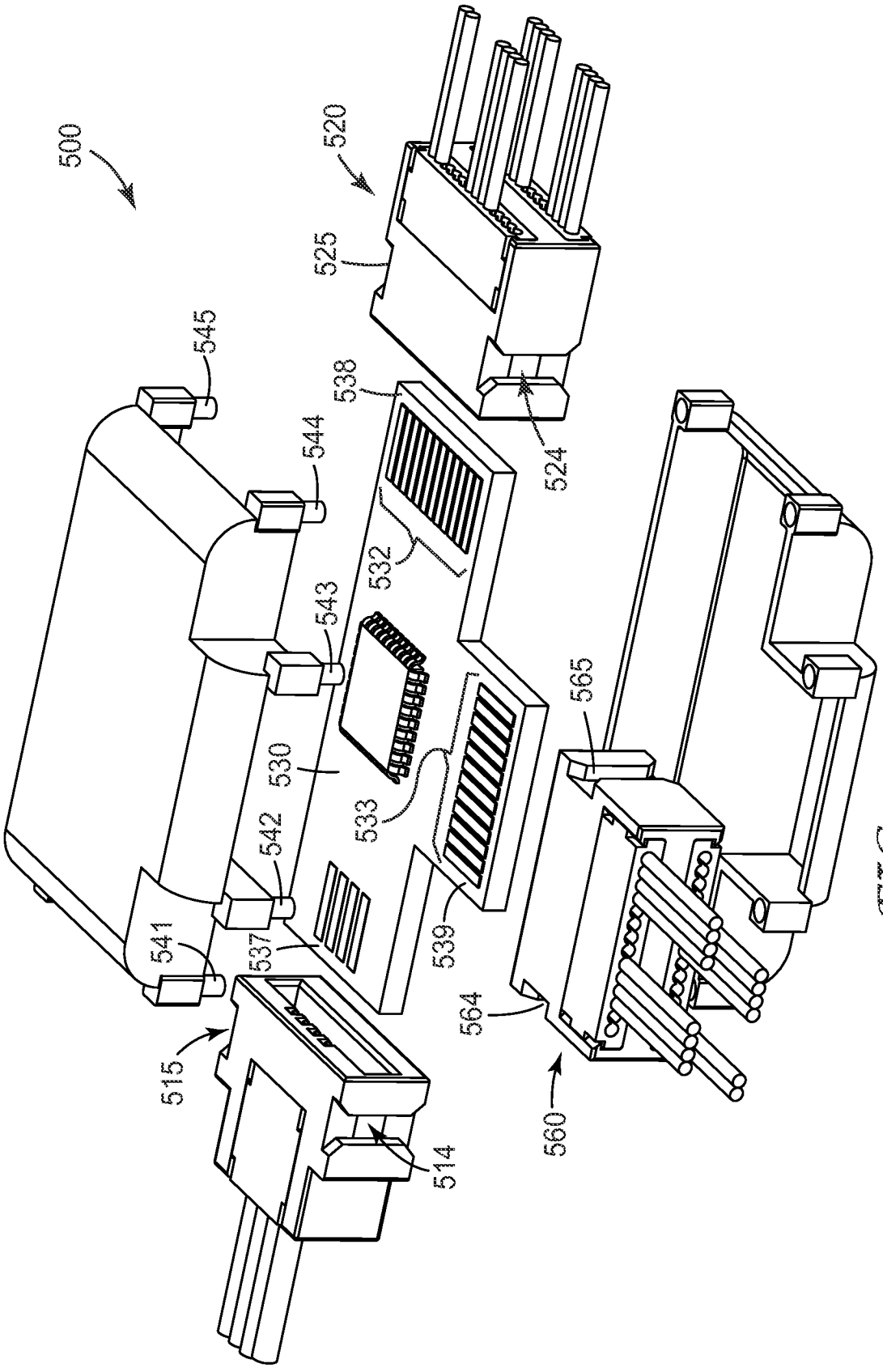
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FIG. 5

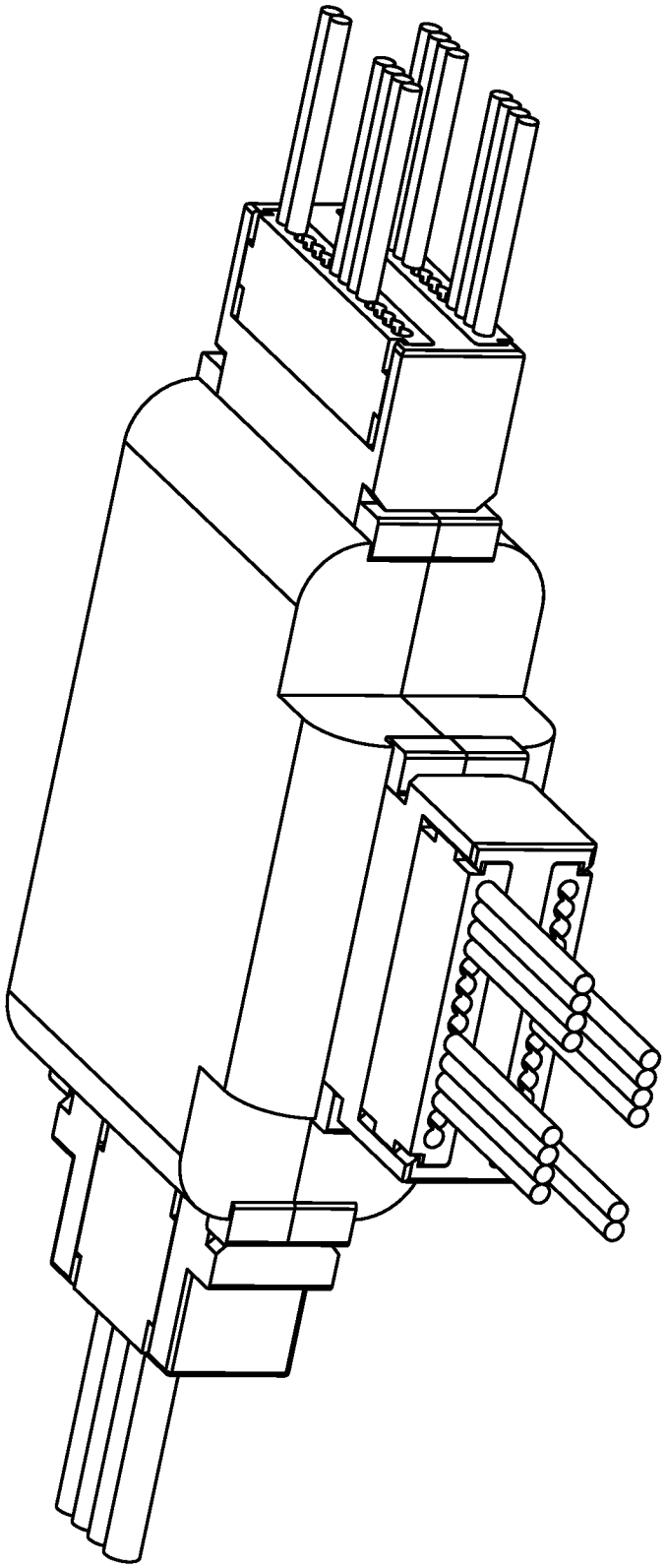

FIG. 6

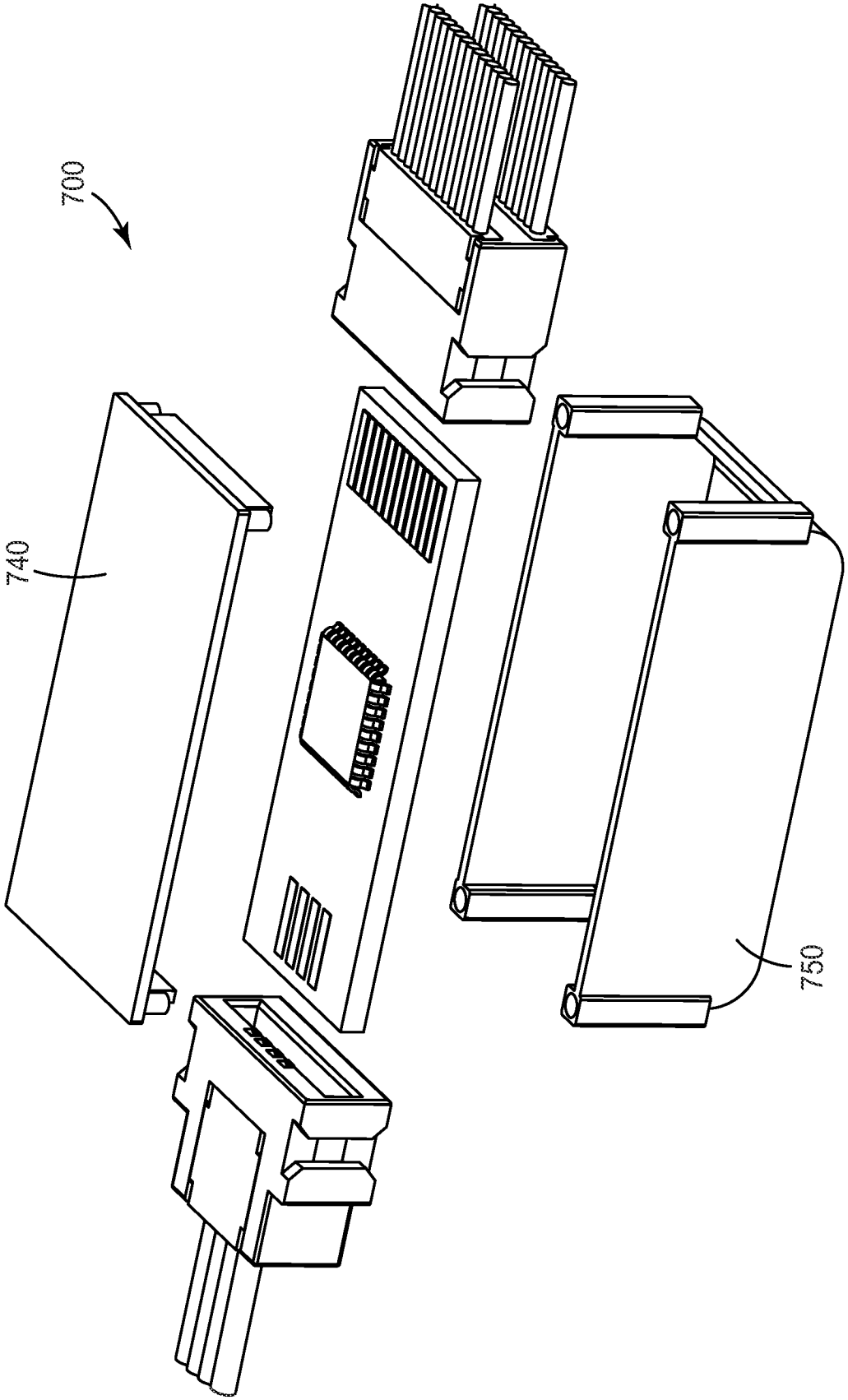

FIG. 7

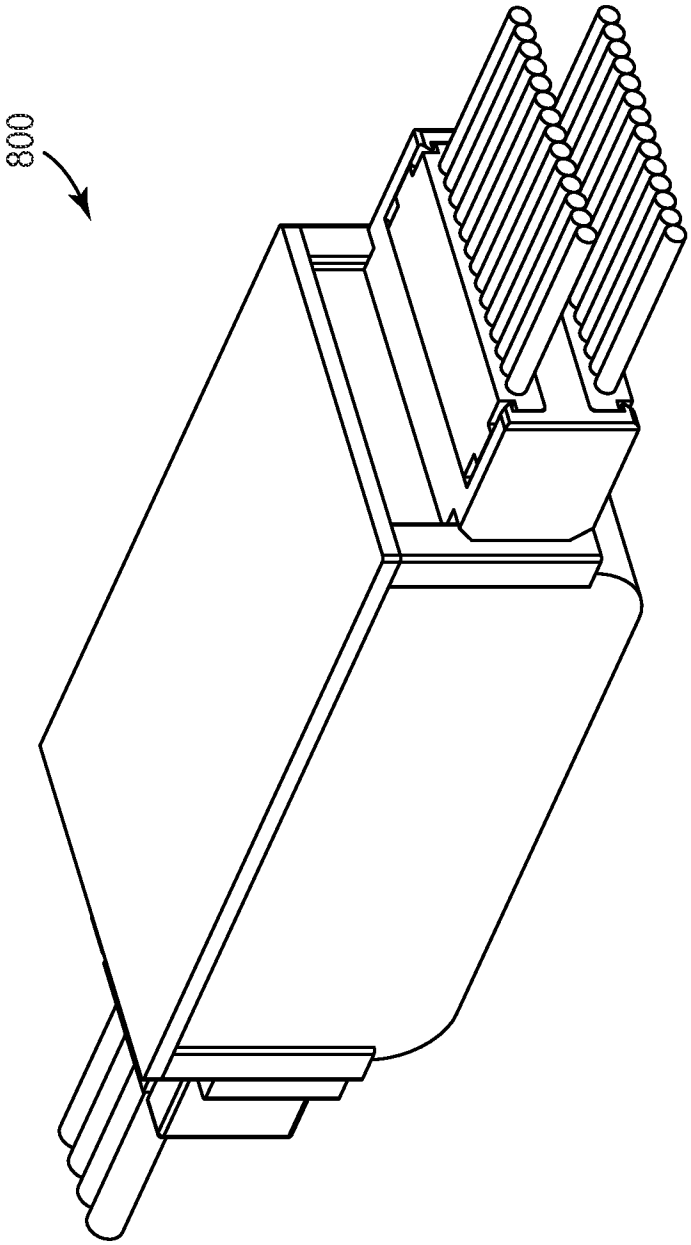

FIG. 8

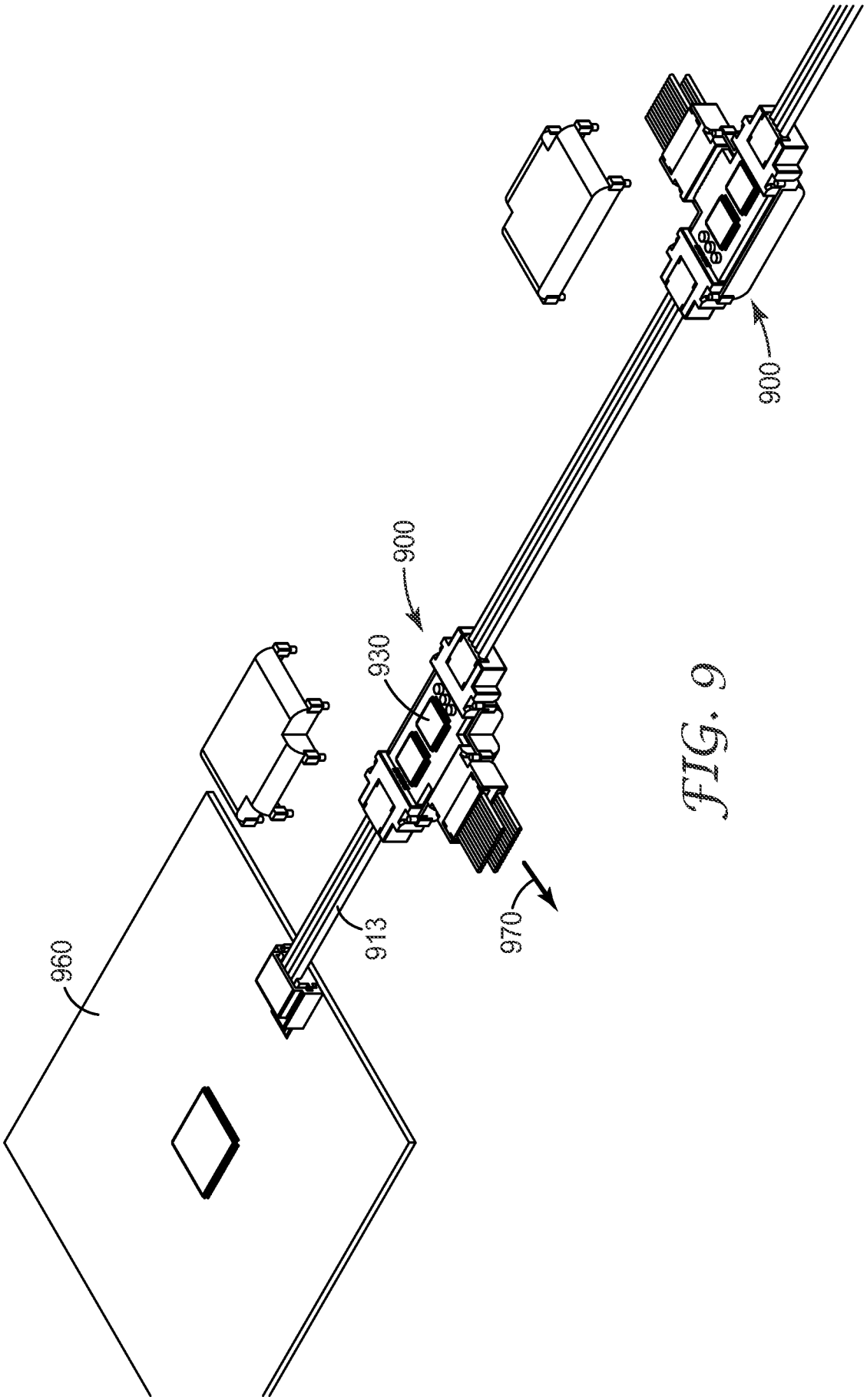

FIG. 9

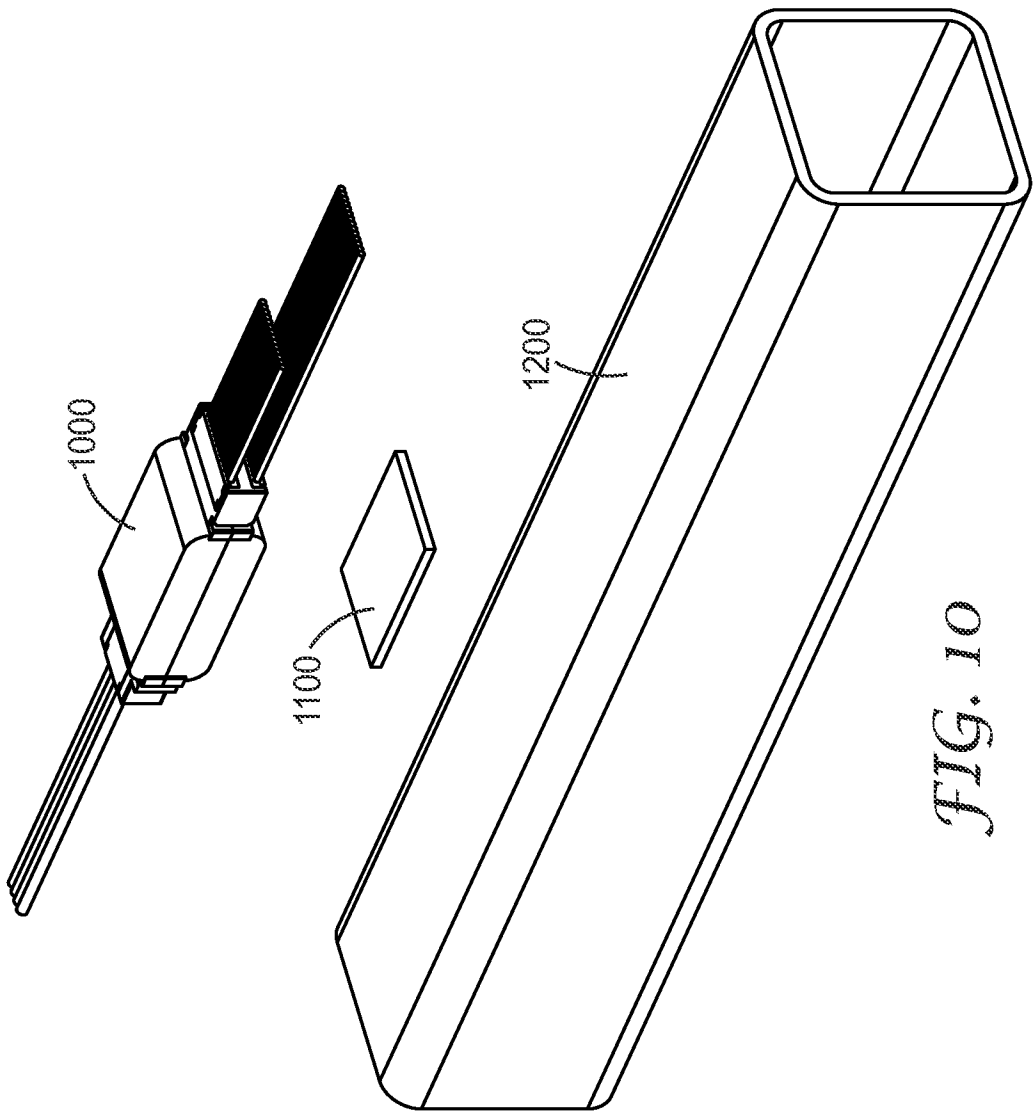

FIG. 10

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2011/065963

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01R12/72 H01R13/66 H01R13/74
ADD.

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 practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2008/032560 A1 (SHI HOU-YU [CN] ET AL) 7 February 2008 (2008-02-07)	1,3,4
A	paragraphs [0002], [0015] - paragraph [0021]; figures 1,2,3,4	2

X	US 6 343 957 B1 (KUO YU-JEN [TW] ET AL) 5 February 2002 (2002-02-05)	1,2,4
A	column 2, line 34 - column 3, line 67; figures 1-4	3

X	US 2010/151705 A1 (SU PING-SHENG [TW] ET AL) 17 June 2010 (2010-06-17)	1,3,4
A	paragraph [0015] - paragraph [0020]; figures 1-4	2

X	US 5 184 961 A (RAMIREZ FERNANDO J [US] ET AL) 9 February 1993 (1993-02-09)	1,2,4
A	column 3, line 21 - column 4, line 12; figure 1	3

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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"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.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
5 April 2012	16/04/2012

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Bouhana, Emmanuel

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2011/065963

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