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Xu et al.

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(54) **ELECTRICAL CONNECTOR HAVING MOVEABLE METAL LATCH**

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(30) **Foreign Application Priority Data**

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(51) **Int. Cl.**
H01R 13/627 (2006.01)

(52) **U.S. Cl.** **439/353**

(58) **Field of Classification Search** 439/350, 439/352, 353

See application file for complete search history.

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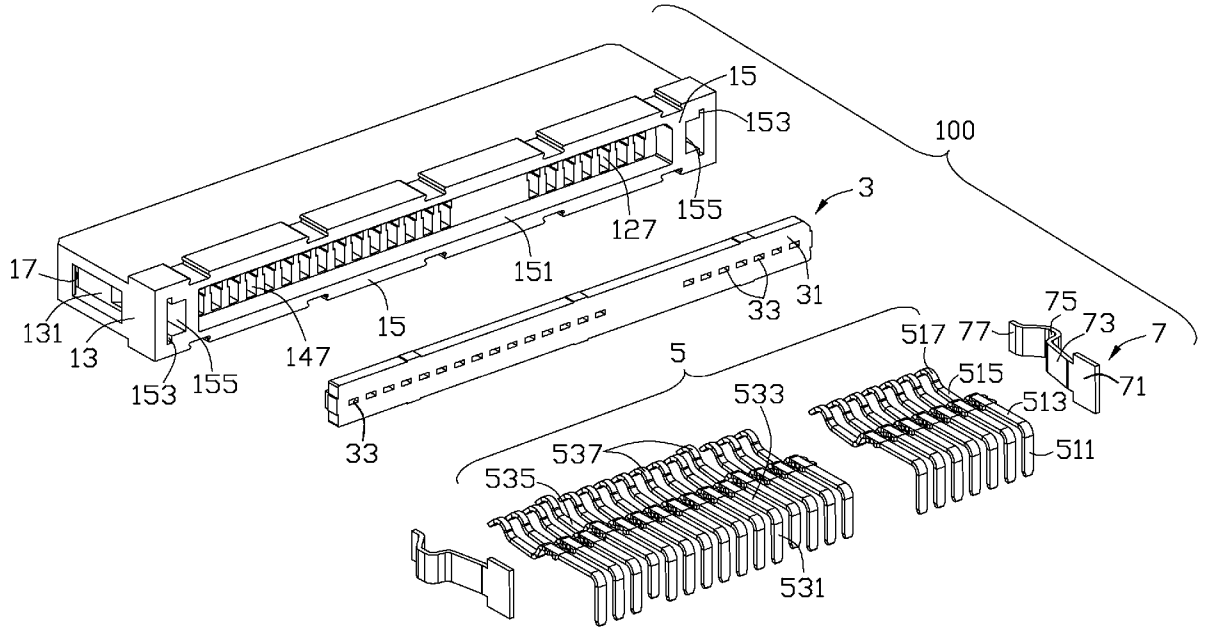
(57) **ABSTRACT**

An electrical connector (**100**) for mating with a mating connector (**800**) along a mating direction includes an insulative housing (**1**), a pair of latches (**7**) and a number of terminals (**5**) received in the insulative housing. The insulative housing has a front face (**11**), a pair of side walls (**13**) each defining an opening (**131**), a pair of receiving spaces (**12**, **14**) defined between the pair of side walls, and a partition (**16**) disposed between the pair of receiving spaces. The pair of latches are mounted in the openings and each formed with an engaging portion (**75**). The latch resiliently yields in the opening along a moving direction perpendicular to the mating direction to permit the engaging portion moveable between a locked position and an unlocked position.

14 Claims, 7 Drawing Sheets



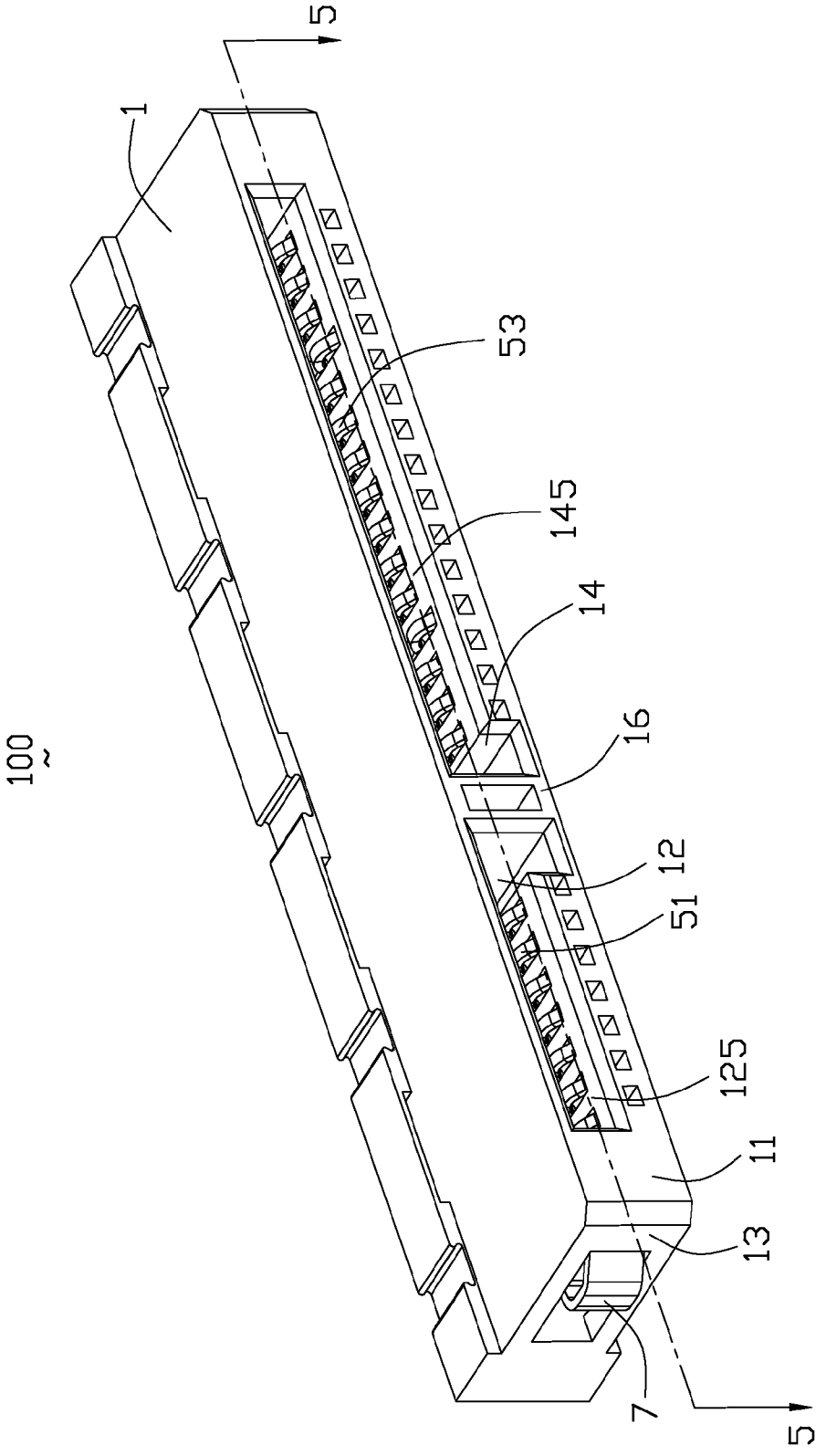


FIG. 1

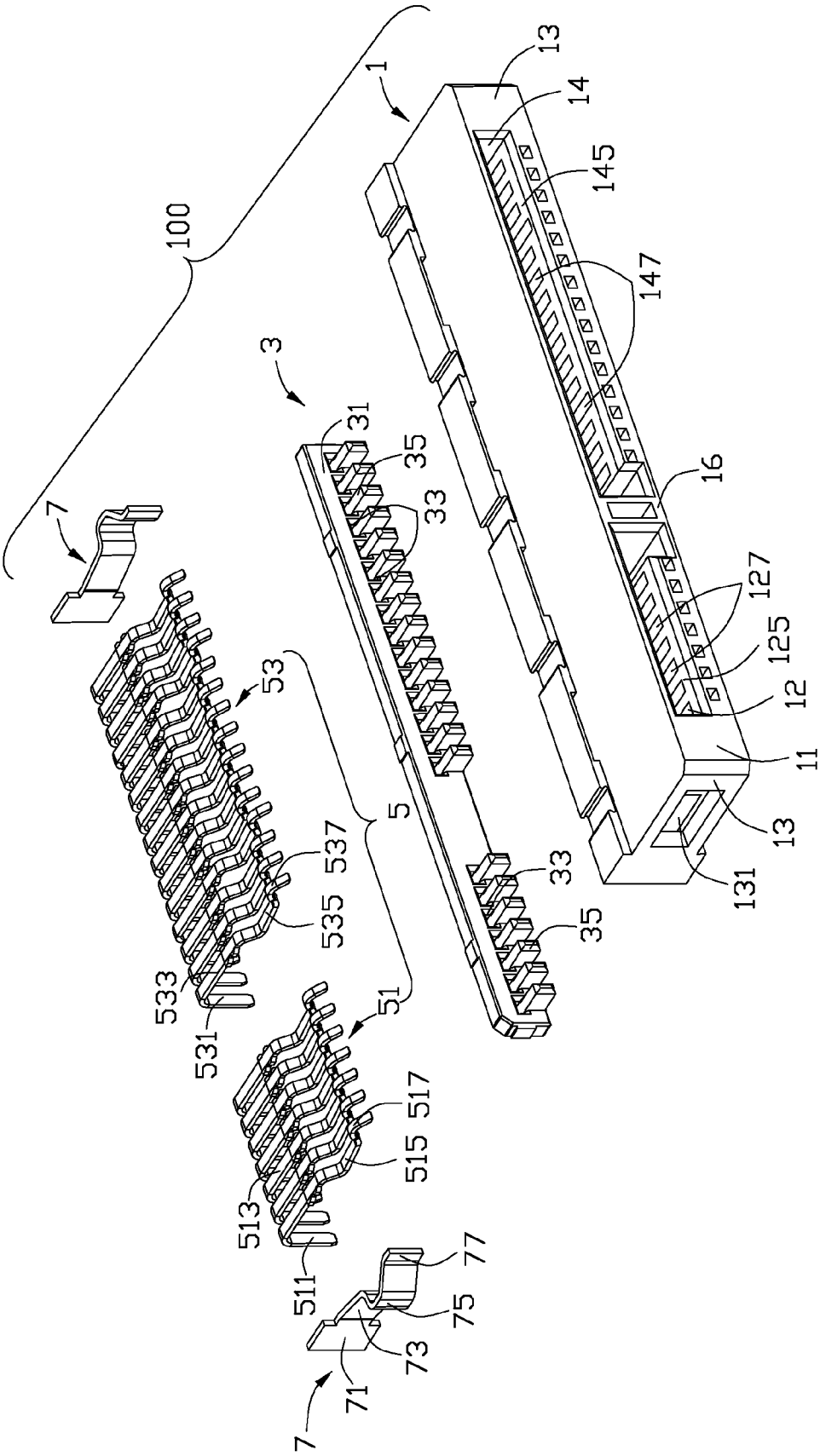

100
1
13
14
145
147
3
31
35
33
16
7
127
125
12
11
13
131
53
5
537
535
533
531
51
517
515
513
511
77
75
73
71
7

FIG. 2

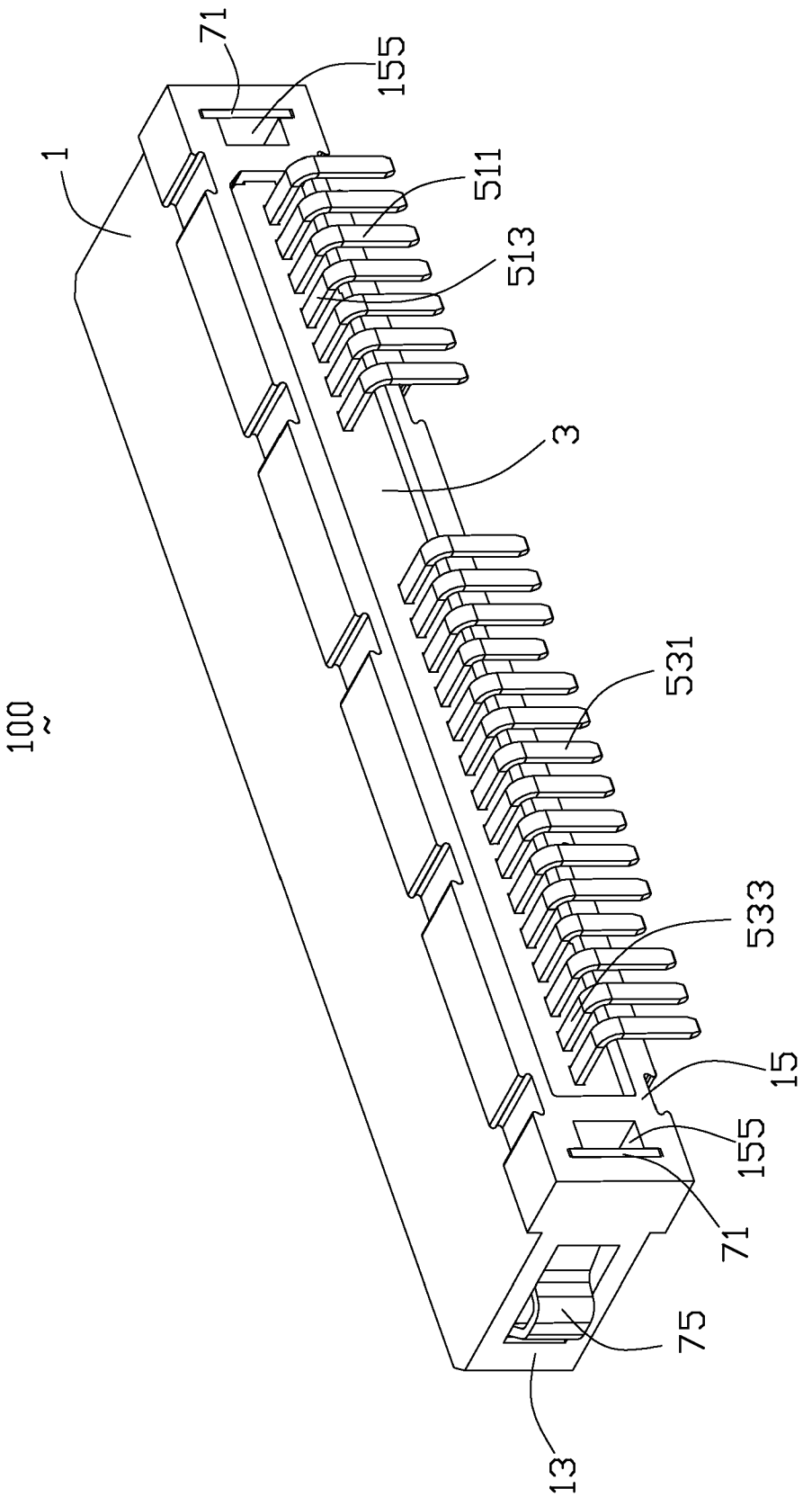


FIG. 3

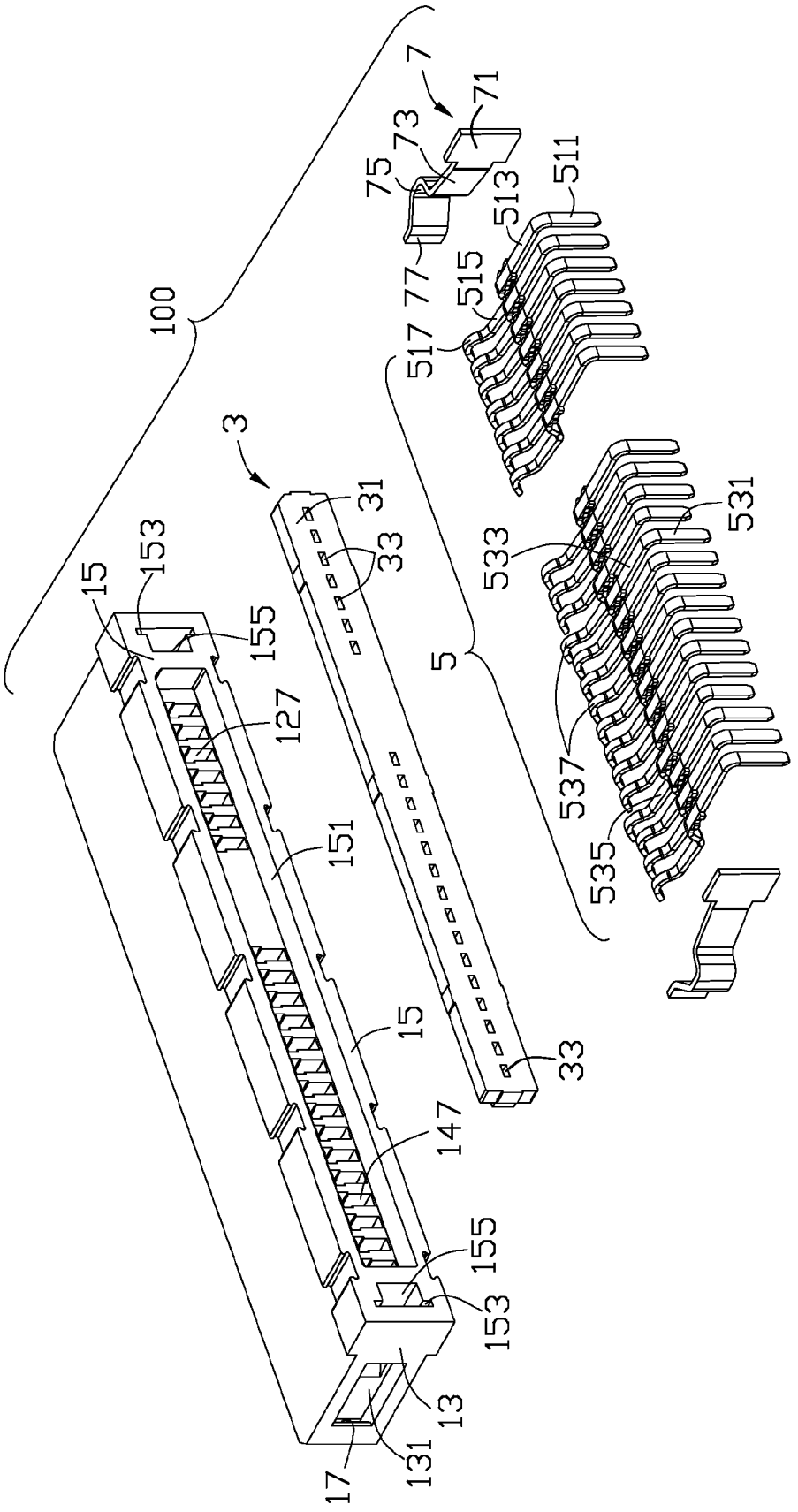

100
3
5
7
71
73
75
77
511
513
515
517
531
533
535
537
31
33
15
153
155
127
151
147
13
131
17

FIG. 4

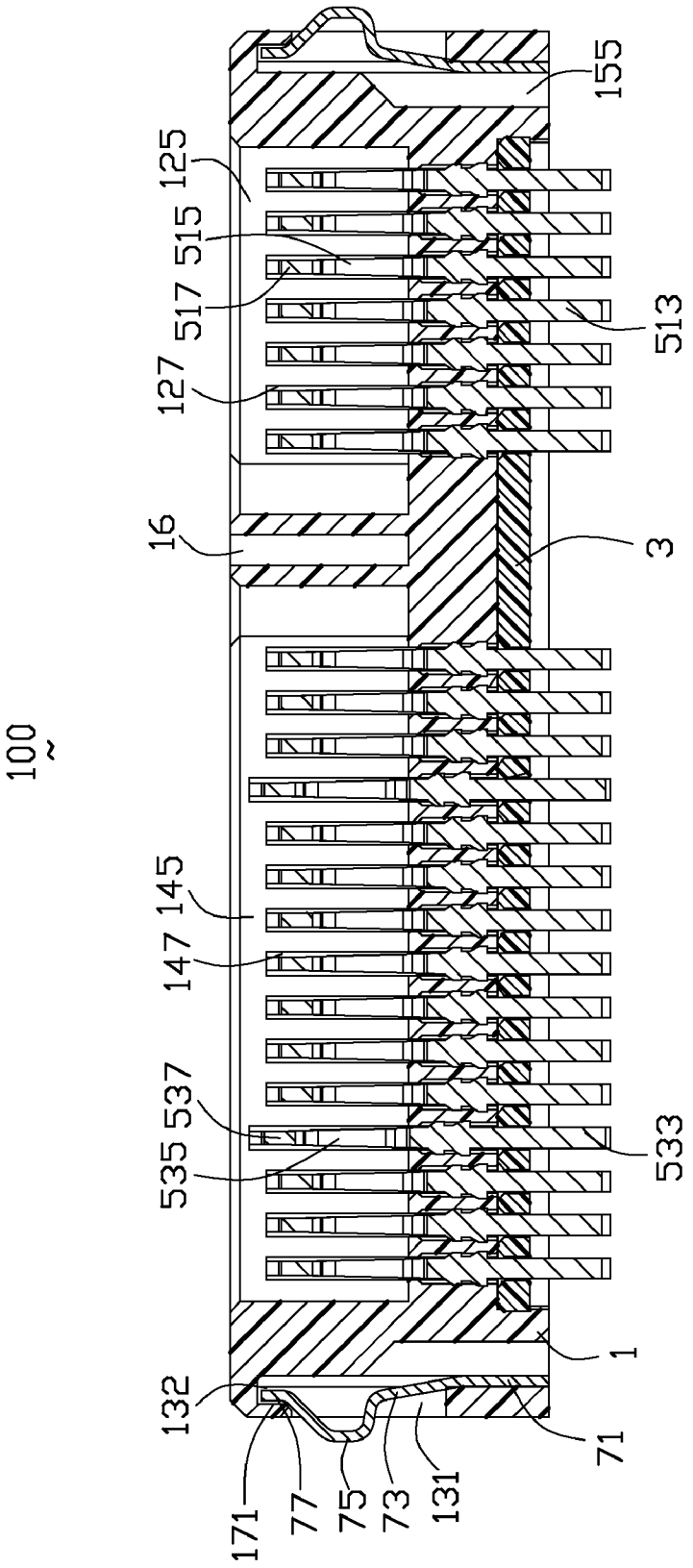

100
155
125
515
517
513
127
16
3
145
147
537
535
533
1
132
71
171
77
75
73
131

FIG. 5

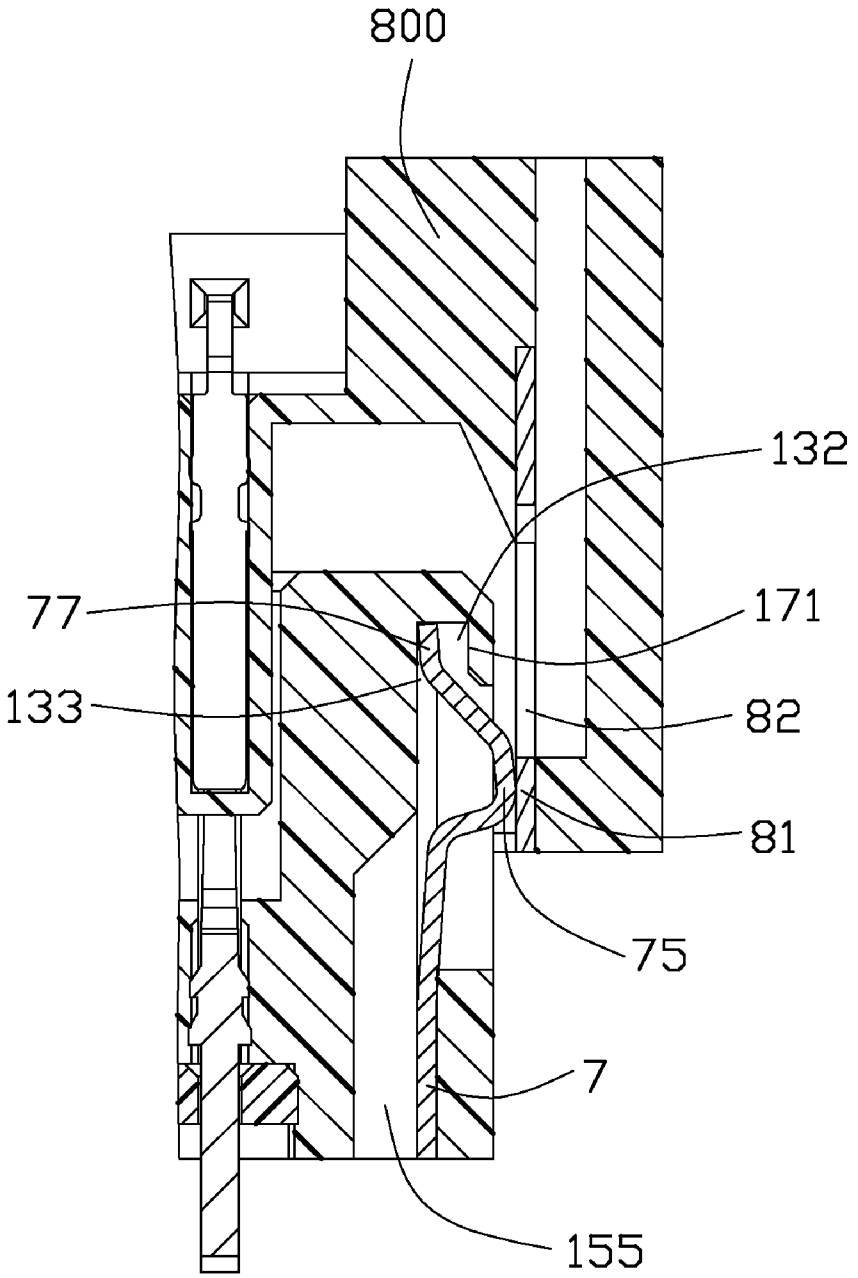


FIG. 6

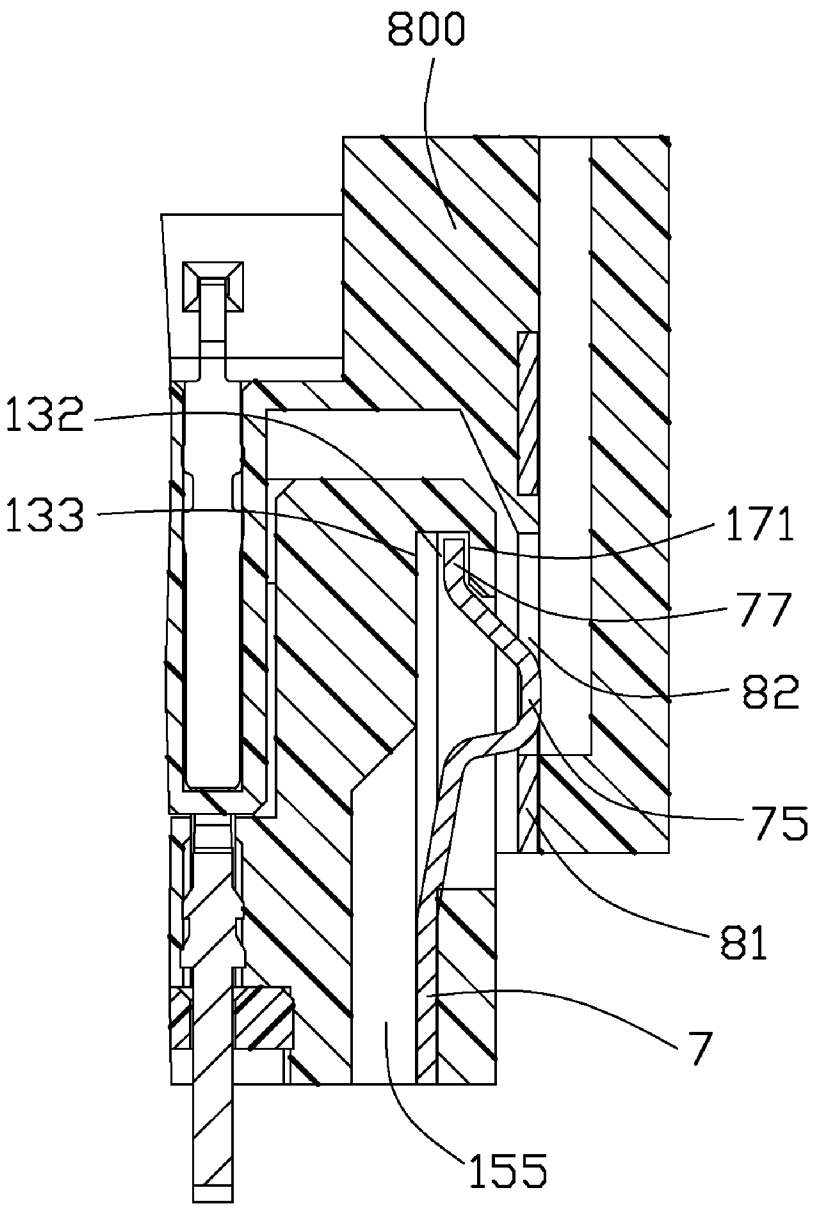


FIG. 7

ELECTRICAL CONNECTOR HAVING MOVEABLE METAL LATCH

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an electrical connector, and more particularly to a connector made according SATA (Serial Advanced Technology Attachment) protocol in which a metal latch is incorporated to securely interconnect with a mating connector.

2. Description of Related Art

A connector is described in U.S. Pat. No. Des. 412,700 issued to Gardner on Aug. 10, 1999 and entitled "Combined Signal and Power Connector". The connector comprises an insulative housing having a base portion and a mating portion projecting from the base portion. The mating portion has a pair of receiving spaces and a partition wall disposed between the pair of receiving spaces. The base wall has a pair of guiding projections formed at opposite ends. The pair of guiding projections are made from insulative material and engageable with a pair of holes defined on the mating connector.

The engagement between the guiding projections and the holes defined in the mating connector are merely via physical interference and are not so reliable as it may result in undesirable disengagement of the mating connector away from the SATA connector.

Hence, an electrical connector having moveable metal latch is highly desired.

SUMMARY OF THE INVENTION

Accordingly, an object of the present invention is to provide an electrical connector mating with a mating connector reliably due to a resilient movement of a pair of metal latches.

To achieve the above object, an electrical connector for mating with a mating connector along a mating direction includes an insulative housing, a pair of latches and a plurality of terminals received in the insulative housing. The insulative housing has a front face, a pair of side walls each defining an opening, a pair of receiving spaces defined between the pair of side walls, and a partition disposed between the pair of receiving spaces. The pair of latches are mounted in the openings and each formed with an engaging portion. The latch resiliently yields in the opening along a moving direction perpendicular to the mating direction to permit the engaging portion moveable between a locked position and an unlocked position.

The engagement between the mating connector and the electrical connector is secured due to the resilient movement of the metal latches.

Other objects, advantages and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of an electrical connector in accordance with the present invention;

FIG. **2** is an exploded perspective view of the electrical connector as shown in FIG. **1**;

FIG. **3** is another perspective view of the electrical connector as shown in FIG. **1**;

FIG. **4** is an exploded view similar to FIG. **2**, taken from another aspect;

FIG. **5** is a cross-sectional view of the electrical connector as shown in FIG. **1**, taken along line **5-5**;

FIG. **6** is a partially cross-sectional view of the electrical connector and the mating connector at an unlocked position; and

FIG. **7** is a partially cross-sectional view of the electrical connector and the mating connector at a locked position.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Reference will now be made to the drawing figures to describe the present invention in detail. Referring to FIGS. **1-7**, an electrical connector **100** in accordance with a preferred embodiment of the present invention is adapted for mating with a mating connector **800** along a mating direction. The electrical connector **100** comprises an insulative housing **1**, an organizer **3** mounted on the insulative housing **1**, a plurality of terminals **5** received in the insulative housing **1**, and a pair of metal latches **7** mounted on opposite ends of the insulative housing **1**. The mating connector **800** is formed with a conductive pad **81** and a concave portion **82** disposed in sequence along the mating direction.

Referring to FIGS. **1-4**, the insulative housing **1** has a front face **11** and a rear face **15** opposite to the front face **11**. The insulative housing **1** comprises a pair of side walls **13**, a partition **16** and a receiving cavity. The receiving cavity is divided into a first receiving cavity **12** and a second receiving cavity **14** by the partition **16**. The rear face **15** defines a passage **151** between the pair of side walls **13** and located behind the first and second receiving cavities **12**, **14**. The insulative housing **1** has a first supporting wall **125** formed in the first receiving cavity **12** and a second supporting wall **145** formed in the second receiving cavity **14**. In conjunction with FIG. **5**, the first supporting wall **125** defines a plurality of first passageways **127** exposed in the first receiving cavity **12** and a plurality of second passageways **147** exposed in the second receiving cavity **14**.

Referring to FIGS. **4** and **5**, each side wall **13** defines an opening **131** exposed outwardly, a slot **153** in communicating with the opening **131**, a recess **132** opposite to the slot **153**, a groove **155** communicating with the opening **131** and adjacent to the slot **153**. The slot **153** has a height larger than that of the groove **155**. In conjunction with FIGS. **6** and **7**, the side wall **13** is formed with a bearing face **171** facing toward the recess **132** and an inner face **133** opposite to the bearing face **171**.

Each metal latch **7** comprises a fixing portion **71**, an arcuate engaging/locking portion **75**, a resilient portion **73** formed between the fixing portion **71** and the engaging portion **75**, and a resisting portion **77** formed at a free end of the engaging portion **75**. The fixing portion **71** has a height greater than that of the engaging portion **75**, resilient portion **73** or the resisting portion **77**.

Referring to FIGS. **2** and **4**, the organizer **3** has a base **31**, a plurality of terminal recesses **33** defined in the base **31**, a plurality of blocks **35** projecting forwardly from the base **31** and below corresponding terminal recesses **33**.

Referring to FIGS. **2**, **4** and **5**, the terminals **5** comprise a plurality of first terminals **51** received in the first passageways **127** and a plurality of second terminals **53** received in the second passageways **147**. Each first terminal **51** has a first soldering end **511** adapted for soldering on a printed circuit board (not shown), a first supporting portion **513** perpendicular to the first soldering end **511**, a first neck portion **515** parallel to the first supporting portion **513**, and a first contact end **517** bending from the first neck portion **515**. Each second

terminal **53** has a second soldering end **531** adapted for soldering on the printed circuit board, a second supporting portion **533** perpendicular to the second soldering end **531**, a second neck portion **535** parallel to the second supporting portion **533**, and a second contact end **537** bending from the second neck portion **535**.

Referring to FIG. **5**, in assembly of the electrical connector **100**, the first and second terminals **51** and **53** are inserted into the terminal recesses **33** of the carrier **3**, with the first and second supporting portions **513**, **533** partially supported by the blocks **35**. The first and second terminals **51** and **53** are inserted into the first and second passageways **127**, **147**. The carrier **3** is mounted in the passage **151**. The first and second contact ends **517** and **537** of the first and second terminals **51**, **53** are exposed to the first and second receiving cavities **12** and **14**, respectively. The metal latches **7** are respectively mounted at opposite openings **131**. The engaging portion **75** together with the resilient portion **73** and the resisting portion **77** are inserted into the opening **131** through the groove **155**. The fixing portion **71** is secured to the slot **153**. The engaging portion **75** projects outwardly from the side wall **13** through the opening **131**. The resisting portion **77** resists against the bearing face **171** of the side wall **13**. The metal latch **7** is secured to a locked position. The resilient portion **73**, together with the engaging portion **75** and the resisting portion **77** are resiliently moveable in the opening **131** and the recess **132** along a moving direction perpendicular to the mating direction.

Referring to FIG. **6**, when a mating connector **800** is mating with the electrical connector **100** along the mating direction, the engaging portion **75** of metal latch **7** is depressed inwardly by the mating connector **800**. The resilient portion **73** resiliently yields inwardly along the moving direction and the resisting portion **77** moves away from the bearing face **171** toward the inner face **133**. When the resisting portion **77** arriving at or adjacent to the inner face **133**, the engaging portion **75** come to contact with the conductive pad **81** of the mating connector **800**. The metal latch **7** arrives at an unlocked position.

Referring to FIG. **7**, when the mating connector **800** is completely inserted into the electrical connector **100**, the engaging portion **75** slides across the conductive pad **81** and is plunged into the concave portion **82** of the mating connector **800**. The resilient portion **73**, the engaging portion **75** and the resisting portion **77** returns to the initial locked position.

A sufficient resilient force provided by the metal latch **7** has been exerted onto the mating connector. The engagement between the mating connector and the electrical connector **100** is reliable due to the resiliently movement of the metal latches **7**.

It is to be understood, however, that even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

What is claimed is:

1. An electrical connector assembly for mating with a mating connector along a mating direction, comprising:

an insulative housing defining a front face, a pair of side walls, a pair of receiving spaces defined between the pair of side walls, and a partition wall disposed between the pair of receiving spaces, each side wall defining an opening;

a plurality of terminals received in the receiving spaces;

a pair of latches each mounted in the opening and formed with an engaging portion, said latch resiliently yielding in the opening along a moving direction perpendicular to the mating direction to permit the engaging portion to be moveable between a locked position and an unlocked position;

wherein said engaging portion of the latch projects outwardly from the opening along the moving direction;

wherein said side wall defines therein a recess communicating with the opening, and wherein each latch has a resisting portion formed at a free end of the engaging portion and moveably received in the recess;

wherein said insulative housing has a slot communicating with the opening and opposite to the recess, and wherein each latch comprises a fixing portion secured in the slot and a resilient portion formed between the fixing portion and the engaging portion;

wherein said insulative housing has a rear face opposite to the front face, and wherein said rear face defines therein a groove communicating with the opening, the resisting portion, the engaging portion and the resilient portion of the latch inserted into the opening through the groove.

2. The electrical connector assembly as claimed in claim **1**, wherein said groove is disposed adjacent to the slot and communicating with the slot, said slot having a height corresponding to the fixing portion and greater than that of the groove.

3. The electrical connector assembly as claimed in claim **1**, wherein said latch is made from metal material.

4. The electrical connector assembly as claimed in claim **1**, the electrical connector is a Serial Advanced Technology Attachment connector.

5. The electrical connector assembly as claimed in claim **1**, wherein said side wall has a bearing face facing toward the recess, said resisting portion of the latch resisting against the bearing face at the locked position and moving away from the bearing face at the unlocked position.

6. The electrical connector assemblt as claimed in claim **5**, wherein said engaging portion of the latch contacts with a conductive pad formed on the mating connector at the unlocked position, and plunged in a concave portion defined in the mating connector at the locked position.

7. The electrical connector assembly as claimed in claim **1**, wherein said terminals comprise a plurality of first terminals and a plurality of second terminals, and wherein said pair of receiving spaces comprise a first receiving space defining a plurality of first passageways for receiving the first terminals and a second receiving space defining a plurality of second passageways for receiving that second terminals.

8. The electrical connector assembly as claimed in claim **7**, further comprising a carrier mounted on the insulative housing, said carrier defining a plurality passageways for fixing the first terminals and the second terminals.

9. The electrical connector assembly as claimed in claim **8**, wherein said carrier has a plurality of blocks formed below corresponding terminal recesses for supporting the first terminals and the second terminals.

10. An electrical connector assembly comprising:

a first connector including:

a first elongated insulative housing extending along a longitudinal direction and defining a first mating port;

a plurality of first contacts disposed in the first housing with first contacting sections exposed in the first mating port;

a first deflectable metal latch forwardly assembled to an end of the first housing and including an locking portion extending beyond a corresponding first end wall of the housing; and

a second connector including:

a second elongated insulative housing extending along the longitudinal direction and defining a second mating port;

a plurality of second contacts disposed in the second housing with second contacting sections exposed in the second mating port;

a second stationary metal latch assembled around an end of the second housing and including a locking opening to receive said locking portion; wherein

said first housing defines a groove extends forwardly from a rear face of the first housing and located essentially transversely behind the first deflectable metal latch for facilitating assembling said first metal latch to the first housing, and said second housing defines a cavity located essentially transversely behind the locking opening of the second stationary metal latch

wherein said first housing further defines an opening in the first end wall to allow said locking portion to outwardly extend therethrough under condition that the opening and the groove are essentially offset from each other in a front-to-back direction, which is perpendicular to the longitudinal direction, with portions overlapped with each other only around a middle portion of the housing in said front-to-back direction.

11. The electrical connector assembly as claimed in claim **10**, wherein said first metal latch is made from sheet metal, and a thickness direction of said first metal latch is constantly perpendicular to a height direction which is perpendicular to both said longitudinal direction and said front-to-back direction.

12. The electrical connector assembly as claimed in claim **10**, wherein said opening communicates with an exterior only along the longitudinal direction, not said front-to-back direction, while said groove communicates with the exterior essentially along said front-to-back direction.

13. An electrical connector comprising:

an insulative housing extending along a longitudinal direction and defining a mating port;

a plurality of contacts disposed in the housing with contacting sections exposed in the mating port;

said housing defining a latch mounting section at one end with an opening extending through a corresponding end wall of the housing under condition that said opening communicates with an exterior only along said longitudinal direction;

a groove formed in the latch mounting section beside the opening in said longitudinal direction under condition that said groove communicates with the exterior only in a front-to-back direction perpendicular to said longitudinal direction; and

a metallic latch forwardly assembled to the latch mounting section via said groove to have thereof a locking portion protruding through said opening and beyond the end wall in said longitudinal direction;

wherein said opening and said groove are overlapped with each other around a middle portion of the housing in said front-to-back direction.

14. The electrical connector as claimed in claim **13**, wherein said latch includes a fixing portion which is essentially located between the opening and the groove in said longitudinal direction.

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