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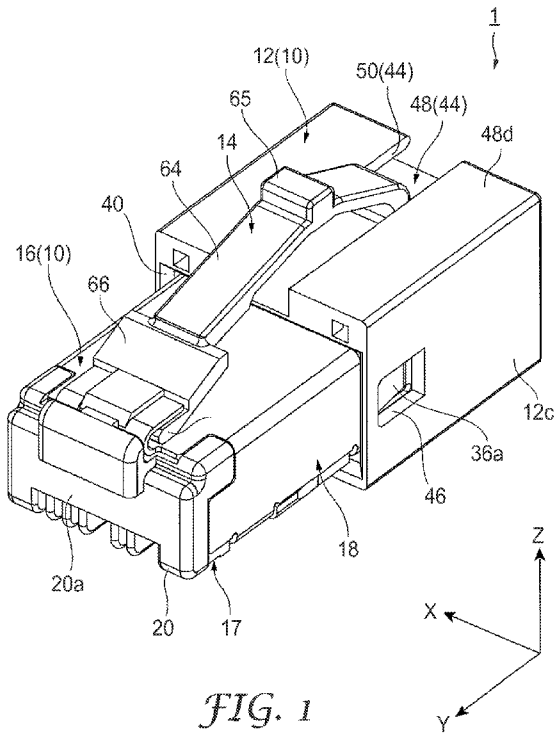


FIG. 1

(57) Abstract: The electrical connector (1) includes a connector main body (10) and a latch member (14), wherein the connector main body (10) includes an insertion end (20a) inserted into a mate side connector, a back end (12a) disposed opposite the insertion end (20a), and a slide groove (48) provided in a length direction of the connector main body (10) where the insertion end (20a) and the back end (12a) oppose; and the latch member 14, forming a long shape that extends in the length direction, includes a fixed end (60) fixed near the insertion end (20a), a sliding end (62) provided slidably in the slide groove (48), an arm (64) linking the fixed end (60) and the sliding end (62), and a latch portion (66) provided on the arm (64), that engages with the mate side connector; and when the engagement of the latch portion (66) and the mate side connector is released, the sliding end (62) slides in the length direction in the slide groove (48) when the arm (64) is pressed.

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ELECTRICAL CONNECTOR

FIELD OF INVENTION

The present invention relates to an electrical connector.

BACKGROUND ART

As an example of an electrical connector attached to a communication cable, a connector described in Patent Document 1 below is known.

Patent Document 1 discloses "a connector having a latch arm that protrudes outward from the connector includes a free end part that extends inward and is formed on the latch arm, and the free end part protrudes inward toward an upper surface of the connector and, at an upper part of the upper surface, reaches a position that is sufficiently close to the upper surface such that there is little entanglement or catching of the latch arm with such other articles".

PRIOR ART DOCUMENTS

Patent Documents

Patent Document 1: Japanese Unexamined Patent Application Publication No. 2006-222097

SUMMARY OF THE INVENTION

Problem to be Solved by the Invention

In a latch member of an electrical connector, when a first end of an arm is a free end, that arm inevitably will catch on other articles and the like. Further, the latch member may break on occasion when pressing the arm during connection or removal with a receptacle connector (modular jack) due to a load applied to the arm. Accordingly, there is a need to improve a structure that can prevent failure of the arm in the latch member of the electrical connector.

An object of the present invention is to provide an electrical connector that can prevent failure of a latch member.

Means to Solve the Problem

One aspect of the present invention is an electrical connector including a connector main body and a latch member attached to the connector main body, wherein the connector main body includes an insertion end inserted into a mate side connector, a back end disposed opposite the insertion end, and a slide groove provided in a length direction of the connector main body where the insertion end and the back end oppose; and the latch member, forming a long shape that extends in the length direction, includes a fixed end fixed near the insertion end, a sliding end provided slidably in the slide groove, an arm linking the fixed end and the sliding end, and a latch portion provided on the arm, that engages with the mate side connector; and when the engagement of the latch portion and the mate side connector is released, the sliding end slides in the length direction in the slide groove when the arm is pressed.

EFFECT OF THE INVENTION

According to the present invention, the fixed end, which is a first end of the arm, is fixed, and the sliding end, which is a second end of the arm, is provided slidably in the length direction in the slide groove. Accordingly, in the present invention, because both ends of the arm are not free ends, failure due to the arm catching on other articles and the like can be prevented. Further, in the present invention, because the sliding end slides along the slide groove when the arm is pressed, the load applied to the arm can be reduced. Therefore, failure of the latch member can be prevented.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a perspective view illustrating an electrical connector according to an embodiment of the present invention.

FIG. 2 is a perspective view illustrating, from a lower portion side, the electrical connector depicted in FIG. 1.

FIG. 3 is a perspective view illustrating a connector main body.

FIG. 4 is an exploded perspective view of the electrical connector.

FIG. 5 is a perspective view illustrating a connector portion and a connector case.

FIG. 6 is a perspective view illustrating a latch member.

FIGs. 7a and 7b are perspective views illustrating the latch member.

FIG. 8 is a perspective view illustrating the electrical connector from the rear side.

FIG. 9 is a perspective view illustrating a partial cross-sectional configuration of the connector main body.

FIG. 10 is a view illustrating the assembly procedures of the electrical connector.

FIGs. 11a and 11b are views illustrating the assembly procedures of the electrical connector.

DETAILED DESCRIPTION OF THE INVENTION

Preferred embodiments of the present invention are described below in detail while referring to the drawings. In the explanation of the drawings, the same or corresponding elements are given the same reference numeral, and duplicate explanations are omitted.

FIG. 1 is a perspective view illustrating an electrical connector according to an embodiment of the present invention. FIG. 2 is a perspective view illustrating, from a lower portion side, the electrical connector depicted in FIG. 1. FIG. 3 is a perspective view illustrating a connector main body. FIG. 4 is an exploded perspective view of the electrical connector. FIG. 5 is a perspective view illustrating a connector portion and a connector case. FIG. 6 is a perspective view illustrating a latch member. FIG. 7 is a perspective view illustrating the latch member. FIG. 8 is a perspective view illustrating the electrical connector from the rear side. FIG. 9 is a perspective view illustrating a partial cross-sectional configuration of the connector main body.

In the description below, as illustrated in FIG. 1 and FIG. 2, a width direction of an electrical connector 1 is defined as an X direction, a length direction (a direction in which the electrical connector 1 is inserted) of the electrical connector 1 is defined as a Y direction, and a height direction of the electrical connector 1 is defined as a Z direction. Further, in this embodiment, a side in which the electrical

connector 1 is inserted into a plug insertion opening (not illustrated) of a receptacle connector (modular jack) which is a mate side connector is designated as the "front" and a side in which a cable 3 is inserted is designated as the "back".

The electrical connector 1 illustrated in FIG. 1 and FIG. 2 is an RJ (Registered Jack)-45 connector in compliance with, for example, the ISO/IEC8877 standard and is configured as a plug connector that is inserted into the plug insertion opening of the receptacle connector. The electrical connector 1 is attached to a terminal of the cable 3 (see FIG. 10). The cable 3 is a communication cable that is a LAN (local area network) cable having, for example, four core wires 5 (see FIG. 10) and a shielding (not illustrated) that covers an outer circumference of the core wires 5 as a whole.

The electrical connector 1 includes a connector main body 10 and a latch member 14. In the electrical connector 1, the latch member 14 is attached to the connector main body 10.

The connector main body 10 includes a connector portion (front section) 16 and a connector case (rear section) 12. The connector main body 10 is configured having a portion of the connector portion 16 housed in the connector case 12. The connector portion 16 is a portion that plugs into the plug insertion opening of the connection target receptacle connector. The connector portion 16 includes an assembly (housing) 17 and a shielding member 18.

The assembly 17 includes a housing 20, a cable cover 22, and a contact member (contact portion) 24. The housing 20 is formed of an industrial plastic material having insulating properties such as polybutylene terephthalate (PBT) and polyamide (PA). The housing 20 has an encasing portion 26 and a contact member holding portion 28. The encasing portion 26 is a portion that encases and holds the cable cover 22. The encasing portion 26 is provided on a back portion of the housing 20. The encasing portion 26 is open to the rear side. A locking portion 26a that locks the cable cover 22 is provided on the encasing portion 26. A front end portion 20a of the housing 20 (connector portion 16) is an insertion end of the electrical connector 1 inserted into the receptacle connector.

The contact member holding portion 28 is a portion that holds and fixes the contact member 24. The contact member holding portion 28 has a plurality of (four here) groove portions 28a where the contact members 24 are disposed. The groove portions 28a are provided from the encasing portion 26 to the front end portion 20a of the housing 20. The groove portions 28a have shapes that correspond to the shape of the contact member 24.

The cable cover 22 is formed of, for example, polybutylene terephthalate, polyamide (PA), or the like. The cable cover 22 encases the core wires 5 of the cable 3. The cable cover 22 has a plurality of (four here) insertion through holes 23 where the core wires 5 of the cable 3 are inserted through. The insertion through holes 23 are disposed in the back end portion of the cable cover 22 and open to the rear side. In the cable cover 22, an opening (not illustrated) where a contact 30 is inserted through is provided in a position that corresponds to the contact 30 (described below) of the contact member 24 when encased in the encasing portion 26 of the housing 20.

A locking pawl 22a is provided on a side wall portion of the cable cover 22. The locking pawl 22a engages with the locking portion 26a provided on the encasing portion 26 of the housing 20. By this, the cable cover 22 is fixed to the housing 20.

The contact member 24 is provided in plurality (four here) according to the number of the core

wires 5 of the cable 3. Each of the contact members 24 are formed of a conductive member, such as metal, or the like. Each of the contact members 24 includes the contact 30 and a contact terminal 32. The contact 30 and the contact terminal 32 are integrally provided. The contacts 30 are disposed in the encasing portion 26 in a staggered shape (see FIG. 10). The contacts 30 are in a forked shape forming a slit 30a. Inserting (pushing) the core wires 5 into the slit 30a of the contact 30 enables the core wires 5 to be electrically connected to the contact 30. In other words, the contact 30 cuts into the cover of the core wires 5, and the contact 30 reaches the conductor of the lead wire of the core wires 5 making an electrical connection.

The contact terminal 32 is a portion that conducts one to one with a contact of the receptacle connector and makes an electrical connection to each of the contacts of the receptacle connector which is the mate side connector. The contact terminal 32 has an approximate U shape. The contact terminal 32 is disposed in the groove portion 28a of the housing 20 and is exposed to the front end side (front end portion 20a of the electrical connector 1) of the housing 20.

The shielding member 18 is formed of, for example, a metal material having spring characteristics. The shielding member 18 partially encloses the assembly 17. The shielding member 18 electrically conducts between the receptacle connector and the shielding of the cable 3 while also having a function of an electrostatic shield. The shielding member 18 is constituted by a base portion 18a and a pair of side wall portions 18b and 18c projected from both end portions of the base portion 18a, and a cross-section thereof is an approximate U shape. The shielding member 18 includes a fixed portion 34, protruding portions 36a and 36b, and a crimping portion 38.

The fixed portion 34 is a portion that fixes a fixed portion 60 (described below) of the latch member 14. The fixed portion 34 is disposed on the front end side of the shielding member 18. The fixed portion 34 has two fixed pieces 34a and 34b and a protruding piece 34c. The two fixed pieces 34a and 34b are disposed with a predetermined distance in the X direction. The fixed pieces 34a and 34b are integrally provided with the base portion 18a of the shielding member 18. The fixed pieces 34a and 34b have a cross-section that appears as an approximate U shape and are folded back so as to open to the rear side (connector case 12 side).

The protruding piece 34c is disposed between the two fixed pieces 34a and 34b. The protruding piece 34c protrudes slightly upward toward the front side from a surface 18S of the base portion 18a. The protruding piece 34c engages with an indented portion 60c of the latch member 14 to be described hereinafter. The fixed portion 34 lifts the fixed portion 60 of the latch member 14 by the protruding piece 34c to hold the fixed portion 60 by the two fixed pieces 34a and 34b which fixes the fixed portion 60 of the latch member 14 by the cooperation of the fixed pieces 34a and 34b and the protruding piece 34c.

The protruding portions 36a and 36b are disposed on the side wall portions 18b and 18c, respectively. The protruding portions 36a and 36b are provided on the rear side of the shielding member 18. The protruding portions 36a and 36b are plate-like members having a substantially rectangular shape. The protruding portions 36a and 36b have the back end portions linked to the side wall portions 18b and 18c and protrude in the X direction so as to separate outward from the outer surface of the side wall portions 18b and 18c as they approached the tip end portion. The protruding portions 36a and 36b

have elasticity. By this, the protruding portions 36a and 36b elastically deform when pressed to the side wall portion 18b and 18c side to move the tip end portion in a direction to approach the outer surface and then returns to its original position when pressing is released.

Crimping portions 38a and 38b are portions that hold and fix the cable 3 to the connector main body 10 by crimping and fixing the cable 3. The crimping portions 38a and 38b extend rearward from the side wall portions 18b and 18c and are mutually opposed. The crimping portions 38a and 38b are electrically connected to the shielding of the cable 3. By this, the shielding member 18 is electrically connected to the shielding of the cable 3.

The connector case 12 is formed of an industrial plastic material having insulating properties such as polybutylene terephthalate, polyamide, or the like. The connector case 12 is provided such that it can be operated without contacting the shielding member 18 when an electrical charge is generated in the shielding member 18 of the assembly 17.

The connector case 12 has a hollow substantially rectangular parallelepiped shape. The connector case 12 has an encasing space S to encase the connector portion 16. The connector case 12 is includes an opening 40, a cable insertion portion (opening) 42, a slide guiding portion 44, and an engagement portion (opening) 46. The back end portion 12a of the connector case 12 is the back end of the electrical connector 1. The front end portion (insertion end) 20a of the connector portion 16 and the back end portion 12a of the connector case 12 oppose in the Y direction, and more specifically, oppose in the length direction of the connector main body 10.

The opening 40 is a portion where the connector main body 10 is inserted through. The opening 40 is provided on the front end portion of the connector case 12. The opening 40 has a shape that corresponds to the external shape of, for example, the connector main body 10 and has, for example, a substantially rectangular shape.

The cable insertion portion 42 is a portion where the cable 3 is inserted through. The cable insertion portion 42 is provided on the back end portion 12a of the connector case 12. The cable insertion portion 42 has, for example, a substantially circular shape.

The slide guiding portion 44 is a portion where the latch member 14 slides. The slide guiding portion 44 has a slide groove 48 and a slit portion 50. The slide groove 48 is a portion where a sliding portion 62 (described below) of the latch member 14 slides. The slide groove 48 is disposed upward of the cable insertion portion 42 of the connector case 12 and open to the back end portion 12a. The slide groove 48 has a bottom portion 48a, side portions 48b and 48c, and a top portion 48d. A cross-section of the slide groove 48 in the Z direction has a substantially rectangular shape.

The bottom portion 48a is placed upward of the cable insertion portion 42 and is a flat portion that extends from the front end portion to the back end portion of the connector case 12. The top portion 48d is a portion that opposes the bottom portion 48a. The top portion 48d constitutes the upper side portion of the connector case 12. The pair of side portions 48b and 48c extend in the Z direction from both end portions in the X direction of the bottom portion 48a and link the bottom portion 48a and the top portion 48d and are mutually opposing.

The slide groove 48 has a dimension (first dimension) H1 between the bottom portion 48a and the top portion 48d on the back end side of the connector case 12, a dimension (third dimension) H2

between the bottom portion 48a and the top portion 48d on the front end side of the connector case 12, a dimension (second dimension) W1 between the pair of side portions 48b and 48c on the back end side of the connector case 12, and a dimension (fourth dimension) W2 between the pair of side portions 48b and 48c on the front end side of the connector case 12 to satisfy the following relationship.

$H1 \fallingdotseq H2$

$W1 \fallingdotseq W2$

In other words, the slide groove 48 is a substantially constant space from the front end to the back end of the connector case 12. The dimensions H1 and H2 between the bottom portion 48a and the top portion 48d are approximately equal to or slightly greater than the thickness of the sliding portion 62 of the latch member 14. The dimensions W1 and W2 between the pair of side portions 48b and 48c are approximately equal to or slightly greater than the width dimension (dimension in the X direction) of the sliding portion 62 of the latch member 14. With such a configuration, the movement of the sliding portion 62 of the latch member 14 in the slide groove 48 can be regulated in the X direction that crosses substantially perpendicular to the Y direction and in the Z direction that crosses substantially perpendicular to the Y direction and the X direction. More specifically, the slide groove 48 regulates (restricts) the movement in the X direction and the Z direction of the sliding portion 62 of the latch member 14.

The slide groove 48 regulates movement in the direction where the sliding portion 62 of the latch member 14 approaches the fixed portion 60 and in the direction retreating from the fixed portion 60. Specifically, the slide groove 48 includes first regulating portions 52a and 52b and the second regulating portions 54a and 54b. The first regulating portions 52a and 52b and the second regulating portions 54a and 54b are portions that regulate sliding (slide region) in the Y direction of the sliding portion 62 of the latch member 14. The first regulating portions 52a and 52b are disposed on the front end of the slide groove 48 and are wall portions that link the bottom portion 48a and the top portion 48d. The first regulating portions 52a and 52b are disposed with a predetermined distance (equal to the width of the slit portion 50) in the X direction. The first regulating portions 52a and 52b regulate the movement of the sliding portion 62 in the direction approaching the fixed portion 60 (forward).

The second regulating portions 54a and 54b are disposed further to the center portion in the Y direction of the slide groove 48 and are projections that protrude from the pair of side portions 48b and 48c. The second regulating portions 54a and 54b regulate the movement of the sliding portion 62 in the direction retreating from the fixed portion 60 (rearward). The sliding portion 62 is disposed between the first regulating portions 52a and 52b and the second regulating portions 54a and 54b so as to slide freely. The distance between the first regulating portions 52a and 52b and the second regulating portions 54a and 54b, which is to say, the maximum sliding distance of the sliding portion 62, is, for example, less than 5 mm when the length in the Y direction of the connector main body 10 is approximately from 20 to 40 mm and is in this embodiment approximately from 2 to 3 mm.

The slit portion 50 is a portion that an arm portion 64 of the latch member 14 is made to pass through. The slit portion 50 is disposed in the top portion 48d of the connector case 12 and is integrated with the slide groove 48. The slit portion 50 extends in a belt like shape in the Y direction at substantially the center portion in the X direction of the top portion 48d. The slit portion 50 is formed

from the front end to the back end of the connector case 12. The width of the slit portion 50 is formed to be equal to or slightly greater than the width of the arm portion 64 of the latch member 14. By this, the slit portion 50 regulates the movement in the X direction of the arm portion 64.

The engagement portions 46 are portions that engage with the protruding portions 36a and 36b provided on the shielding member 18 of the connector main body 10. The engagement portions 46 are provided on the side wall portions 12c and 12d, respectively, of the connector case 12. The engagement portions 46 are disposed on the front end side of the connector case 12 and are openings that pass through the side wall portion 12c and 12d. The engagement portions 46 abut and engage with the tip end portions of the protruding portions 36a and 36b when the connector main body 10 is inserted into the connector case 12. In the electrical connector 1, the connector main body 10 and the connector case 12 are removably attached by the engagement portions 46 and the protruding portions 36a and 36b. In other words, the connector main body 10 can be removed from the connector case 12 by pressing the protruding portions 36a and 36b.

The latch member 14 is formed in a long shape and includes the fixed portion (fixed end) 60, the sliding portion (sliding end) 62, the arm portion (arm) 64, and a latch portion 66. The latch member 14, when the connector main body 10 and the connector case 12 are attached, is provided in order from the front side with the fixed portion 60, the latch portion 66, the arm portion 64, and the sliding portion 62.

The fixed portion 60 is a portion fixed to the shielding member 18 of the connector portion 16. The fixed portion 60 has two sandwiched portions 60a and 60b that are inserted and sandwiched by the fixed pieces 34a and 34b of the fixed portion 34 of the shielding member 18, and the indented portion 60c that is locked with the protruding piece 34c. The sandwiched portions 60a and 60b are disposed with a prescribed distance in the X direction. The indented portion 60c is positioned between the sandwiched portion 60a and the sandwiched portion 60b in the X direction and has a substantially rectangular shape. The fixed portion 60 can be attached to and detached from the fixed portion 34 of the connector main body 10.

The sliding portion 62 is provided slidably in the slide groove 48 of the connector case 12. The sliding portion 62 can be attached to and detached from the slide groove 48. The sliding portion 62 has an approximate U shape. The sliding portion 62 has a base portion 70 and first and second extension portions (first and second arm portions) 71 and 72. The base portion 70 forms a plate-like shape that extends in the X direction and is linked to a first end portion (the end portion on the opposite side of the fixed portion 60) of the arm portion 64. The arm portion 64 is linked at substantially the center portion of the base portion 70. The first and second extension portions 71 and 72 are provided on both end portions 70a and 70b respectively of the base portion 70.

The first extension portion 71 is a plate-like member that extends from the end portion 70a of the base portion 70 to the fixed portion 60. The first extension portion 71 has a locking pawl 71a and an abutting portion 71b. The locking pawl 71a is provided on the tip end portion of the first extension portion 71 and projects outward in the X direction. The tip end portion of the first extension portion 71 is substantially L shaped due to the locking pawl 71a. The abutting portion 71b is provided on the base end portion side of the first extension portion 71 and oppose the locking pawl 71a with a predetermined distance.

The second extension portion 72 extends from the end portion 70b of the base portion 70 to the fixed portion 60. The first extension portion 71 and the second extension portion 72 mutually extend substantially in parallel. The second extension portion 72 has a locking pawl 72a and an abutting portion 72b. The locking pawl 72a is provided on the tip end portion of the second extension portion 72 and projects outward in the X direction. The tip end portion of the second extension portion 72 is substantially L shaped due to the locking pawl 72a. The abutting portion 72b is provided on the base end portion side of the second extension portion 72 and oppose the locking pawl 72a with a predetermined distance.

As illustrated in FIG. 9, when the first and second extension portions 71 and 72 slide to the front end side in the slide groove 48, the tip end portions abut the first regulating portions 52a and 52b and the abutting portions 71b and 72b are locked into the second regulating portions 54a and 54b. In other words, the movement of the sliding portion 62 is regulated in the direction approaching the fixed portion 60 (front end side) in the slide groove 48 by the first regulating portions 52a and 52b, the second regulating portions 54a and 54b, and the first and second extension portions 71 and 72. Meanwhile, when the first and second extension portions 71 and 72 slide to the back end side in the slide groove 48, the locking pawls 71a and 72a are locked in the second regulating portions 54a and 54b. In other words, the movement of the sliding portion 62 is regulated in the direction retreating from the fixed portion 60 (back end side) in the slide groove 48 by the second regulating portions 54a and 54b and the locking pawls 71a and 72a. The sliding portion 62 is disposed between the first regulating portions 52a and 52b and the second regulating portions 54a and 54b so as to slide freely.

The arm portion 64 is a portion that links the fixed portion 60 and the sliding portion 62. The arm portion 64 is a long member that has flexibility and elasticity. The arm member 64 holds the fixed portion 60 and the sliding portion 62 in positions having substantially the same height. The arm portion 64 convexly curves in the Z direction when viewed from the X direction. A pressing portion 65 is provided on the arm portion 64 for pressing down when operating the latch member 14.

The latch portion 66 is a portion for engaging the receptacle connector. The latch portion 66 is provided in the vicinity of the fixed portion 60. The latch portion 66 has a flat surface 67 in a substantially rectangular shape. The flat surface 67 extends in the X direction. The flat surface 67 has a first portion 67a that extends further outward in the X direction than a first side portion (first end portion) 64a of the arm portion 64, and a second portion 67b that extends further outward in the X direction than a second side portion (second end portion) 64b of the arm portion 64.

Next, a description will be provided of the action of the latch member 14 of the electrical connector 1. When removing the electrical connector 1 from the receptacle connector which is the mate side connector, the pressing portion 65 provided on the arm portion 64 of the latch member 14 is pressed toward the connector case 12 side. A successive pressing operation of the pressing portion 65 slides the sliding portion 62 that is linked to the arm portion 64 to the rear side (direction retreating from the fixed portion 60) along the slide groove 48 while also moving the arm portion 64 along the slit portion 50. By this, the latch portion 66 lowers to the connector case 12 side and the engagement between the receptacle connector and the latch portion 66 is released.

After the engagement between the latch portion 66 and the receptacle connector is released,

releasing the pressing of the latch member 14 allows the sliding portion 62 to slide to the front side (direction approaching the fixed portion 60) and return to the initial position (position depicted in FIG. 9) due to the elastic force of the latch member 14 (arm portion 64).

Next, a method of assembling the electrical connector 1 will be described. FIG. 10 and FIG. 11 are views illustrating assembly procedures of the electrical connector.

As illustrated in FIG. 10, the terminal of the cable 3 is first inserted into the cable insertion portion 42 of the connector case 12. The sliding portion 62 of the latch member 14 is attached to the connector case 12. Next, respective core wires 5 are inserted into respective insertion through holes 23 of the cable cover 22 on the terminal of the cable 3.

Next, as illustrated in FIG. 11A, the cable cover 22 is encased in the encasing portion 26 of the housing 20 with the core wires 5 of the cable 3 held by the cable cover 22. At this time, the core wires 5 are pushed into the contacts 30 of the contact member 24, and the lead wires of the core wires 5 are electrically connected to the contacts 30. Subsequently, the crimping portions 38a and 38b of the shielding member 18 are crimped to fix the cable 3 to the shielding member (connector main body 10).

Next, as illustrated in FIG. 11B, the connector case 12 is moved along the cable 3 to the connector main body 10 side and the connector main body 10 and the connector case 12 are linked. Finally, as illustrated in FIG. 1, the fixed portion 60 of the latch member 14 is fixed to the fixed portion 34 of the connector main body 10 (shielding member 18). Accordingly, the electrical connector 1 is attached to the terminal of the cable 3.

As described above, in the electrical connector 1 of this embodiment, the fixed portion 60 of the latch member 14 is fixed to the connector main body 10, and the sliding portion 62 slides along the slide groove 48 of the connector case 12 of the connector main body 10. In the slide groove 48, movement in the X direction and the Z direction of the sliding portion 62 is regulated. By this, in the electrical connector 1, because both end portions of the arm portion 64 of the latch member 14 are not free (free ends), failure of the arm portion 64 due to catching on other articles or the like can be prevented.

Further, in the electrical connector 1 of this embodiment, because the sliding portion 62 of the arm portion 64 is configured to be slidably, the load applied to the arm portion 64 can be reduced compared to a configuration where both end portions are fixed. Therefore, in the electrical connector 1, failure of the arm portion 64 can be prevented. This configuration is particularly effective in reducing the size of the electrical connector 1.

In this embodiment, the first regulating portions 52a and 52b and the second regulating portions 54a and 54b are provided on the slide groove 48. By this, in the electrical connector 1, movement of the sliding portion 62 in the Y direction can be restricted. Therefore, in the electrical connector 1, the application of an excessive load to the arm portion 64 can be prevented. Therefore, in the electrical connector 1, failure of the arm portion 64 can be prevented.

In this embodiment, the slide groove 48 satisfies the relationship of $H1 \fallingdotseq H2$ and $W1 \fallingdotseq W2$ as described above. In this manner, configuring the slide groove 48 to have a substantially constant space in the Y direction allows the sliding portion 62 to slide smoothly. Further, this type of configuration for the slide groove 48 is also preferred from the perspective of manufacturing the electrical connector 1.

A description is given above of a preferred embodiment for the present invention, but the

present invention is not necessarily limited to the embodiment given above and various modifications are possible within the scope that does not deviate from the spirit thereof.

In the embodiment given above, a single cable 3 is attached to the electrical connector 1, but one or a plurality of cables may be attached to the electrical connector 1. In this case, cable insertion portions 42 of the connector case 12 may be formed according to the number of cables.

In the embodiment given above, the protruding portions 36a and 36b are provided on the shielding member 18 of the connector portion 16 and the engagement portion (opening) 46 is provided on the connector case 12, but a configuration may provide the opening on the shielding member 18 and provide the protruding portion on the connector case 12.

The slide groove may also have a shape that tapers toward the front. In case of this configuration, the shape of the sliding portion 62 may also be shaped to taper toward the fixed portion 60.

Reference Numerals

1…Electrical connector
10...Connector main body
12...Connector case (rear section)
12a...Back end portion (back end)
14...Latch member
16...Connector portion (front section)
17...Assembly (front section)
18...Shielding member (front section)
20a...Front end portion (insertion end)
36a, 36b...Protruding portion
46...Engagement portion (opening)
48...Slide groove
48a...Bottom portion
48b, 48c...Side portion
48d...Top portion
42...Cable insertion portion (opening)
48b, 48c...Side portion
48d...Top portion
50...Slit portion
52a, 52b...First regulating portion
54a, 54b...Second regulating portion
60...Fixed portion (fixed end)
62...Sliding portion (sliding end)
64...Arm portion (arm)
66...Latch portion
66a...First side portion (first end portion)
66b...Second side portion (second end portion)

67a...First portion

67b...Second portion

The following are a list of items of the present disclosure:

Item 1 is an electrical connector comprising a connector main body and a latch member attached to the connector main body, wherein

the connector main body includes

an insertion end inserted into a mate side connector,

a back end disposed opposite the insertion end, and

a slide groove provided in a length direction of the connector main body where the insertion end and the back end oppose; and

the latch member, forming a long shape that extends in the length direction, includes

a fixed end fixed near the insertion end,

a sliding end provided slidably in the slide groove,

an arm linking the fixed end and the sliding end, and

a latch portion provided on the arm, that engages with the mate side connector; and

when the engagement of the latch portion and the mate side connector is released, the sliding end slides in the length direction in the slide groove when the arm is pressed.

Item 2 is the electrical connector according to item 1, wherein the slide groove regulates movement of the sliding end in a width direction of the connector main body that crosses substantially perpendicular to the length direction and in a height direction of the connector main body that crosses substantially perpendicular to the length direction and to the width direction.

Item 3 is the electrical connector according to item 1, wherein the slide groove regulates sliding of the sliding end in a direction approaching the fixed end and in a direction retreating from the fixed end.

Item 4 is the electrical connector according to item 1, wherein the slide groove includes:

a first regulating portion that regulates sliding of the sliding end in a direction approaching the fixed end, and

a second regulating portion that regulates sliding of the sliding end in a direction retreating from the fixed end.

Item 5 is the electrical connector according to item 1, wherein a maximum sliding distance of the sliding end in the slide groove is less than 5 mm.

Item 6 is the electrical connector according to item 2, wherein the latch portion includes:

a first portion that extends further outward than a first end portion in the width direction of the arm, and

a second portion that extends further outward than a second end portion in the width direction of the arm.

Item 7 is the electrical connector according to item 1, wherein the connector main body includes:

a front section having the insertion end, and

a rear section having the back end, provided with the ability to be attached to and detached from

the front section, and having insulating properties.

Item 8 is the electrical connector according to item 7, wherein: the slide groove is provided on the rear section, and

the fixed end of the latch member is attached to the front section.

Item 9 is the electrical connector according to item 7, wherein: an opening is provided on first ends of the front section and the rear section, and a protruding portion that engages with the opening is provided on second ends, and

the front section and the rear section can be attached and detached by the opening and the protruding portion.

Item 10 is the electrical connector according to item 9, wherein the protruding portion has elasticity and protrudes in the width direction of the electrical connector that is substantially orthogonal to the length direction.

Item 11 is the electrical connector according to item 7, wherein the front section includes:

a housing having insulating properties, and

a shielding member having conductivity and that covers at least a portion of the housing; and

the fixed end of the latch member is attached to the shielding member.

Item 12 is the electrical connector according to item 11, wherein: the housing includes a plurality of contact portions that contacts contact portions of the mate side connector.

Item 13 is the electrical connector according to item 1, wherein the back end has an opening for inserting one or a plurality of cables.

Item 14 is the electrical connector according to item 1 that is a plug connector connecting to a receptacle connector that is the mate side connector.

Item 15 is the electrical connector according to item 1 that is an RJ-45 connector compatible with the ISO/IEC8877 standard.

Item 16 is the electrical connector according to item 1, wherein the slide groove includes:

a bottom portion,

a top portion that opposes the bottom portion, and

a pair of mutually opposing side portions that link the bottom portion and the top portion;

a slit portion that extends in the length direction is provided on the top portion;

the arm passes through the slit portion; and

when the engagement of the latch portion and the mate side connector is released, the sliding end slides in the length direction in the slide groove and the arm moves along the slit portion when the arm is pressed.

Item 17 is the electrical connector according to item 15, wherein the slide groove includes:

a first regulating portion regulating sliding of the sliding end in a direction approaching the fixed end, and

a second regulating portion regulating sliding of the sliding end in a direction retreating from the fixed end.

Item 18 is the electrical connector according to item 16, wherein: a first dimension between the bottom portion and the top portion on the back end side of the slide groove and a second dimension

between the pair of side portions on the back end side of the slide groove are, respectively, substantially equal to a third dimension between the bottom portion and the top portion on the insertion end side of the slide groove and a fourth dimension between the pair of side portions on the insertion end side of the slide groove.

Item 19 is the electrical connector according to item 1, wherein the sliding end, having an approximate U shape, includes:

a base portion extending in the width direction of the connector main body substantially perpendicular to the length direction and the arm is linked at the center portion thereof, and

first and second arm portions extending from both end portions of the base portion to the fixed end side.

Item 20 is the electrical connector according to item 1, wherein the fixed end of the latch member can be attached to and detached from the connector main body.

Item 21 is the electrical connector according to item 1, wherein the sliding end of the latch member can be attached to and detached from the slide groove.

What is Claimed Is:

1. An electrical connector comprising a connector main body and a latch member attached to the connector main body, wherein

the connector main body includes

an insertion end inserted into a mate side connector,

a back end disposed opposite the insertion end, and

a slide groove provided in a length direction of the connector main body where the insertion end and the back end oppose; and

the latch member, forming a long shape that extends in the length direction, includes

a fixed end fixed near the insertion end,

a sliding end provided slidably in the slide groove,

an arm linking the fixed end and the sliding end, and

a latch portion provided on the arm, that engages with the mate side connector; and

when the engagement of the latch portion and the mate side connector is released, the sliding end slides in the length direction in the slide groove when the arm is pressed.

2. The electrical connector according to claim 1, wherein the slide groove regulates movement of the sliding end in a width direction of the connector main body that crosses substantially perpendicular to the length direction and in a height direction of the connector main body that crosses substantially perpendicular to the length direction and to the width direction.

3. The electrical connector according to claim 1, wherein the slide groove regulates sliding of the sliding end in a direction approaching the fixed end and in a direction retreating from the fixed end.

4. The electrical connector according to claim 1, wherein the slide groove includes:

a first regulating portion that regulates sliding of the sliding end in a direction approaching the fixed end, and

a second regulating portion that regulates sliding of the sliding end in a direction retreating from the fixed end.

5. The electrical connector according to claim 2, wherein the latch portion includes:

a first portion that extends further outward than a first end portion in the width direction of the arm, and

a second portion that extends further outward than a second end portion in the width direction of the arm.

6. The electrical connector according to claim 1, wherein the connector main body includes:

a front section having the insertion end, and

a rear section having the back end, provided with the ability to be attached to and detached from

the front section, and having insulating properties.

7. The electrical connector according to claim 1 that is an RJ-45 connector compatible with the ISO/IEC8877 standard.

8. The electrical connector according to claim 1, wherein the slide groove includes:

a bottom portion,

a top portion that opposes the bottom portion, and

a pair of mutually opposing side portions that link the bottom portion and the top portion;

a slit portion that extends in the length direction is provided on the top portion;

the arm passes through the slit portion; and

when the engagement of the latch portion and the mate side connector is released, the sliding end slides in the length direction in the slide groove and the arm moves along the slit portion when the arm is pressed.

9. The electrical connector according to claim 8, wherein: a first dimension between the bottom portion and the top portion on the back end side of the slide groove and a second dimension between the pair of side portions on the back end side of the slide groove are, respectively, substantially equal to a third dimension between the bottom portion and the top portion on the insertion end side of the slide groove and a fourth dimension between the pair of side portions on the insertion end side of the slide groove.

10. The electrical connector according to claim 1, wherein the sliding end, having an approximate U shape, includes:

a base portion extending in the width direction of the connector main body substantially perpendicular to the length direction and the arm is linked at the center portion thereof, and

first and second arm portions extending from both end portions of the base portion to the fixed end side.

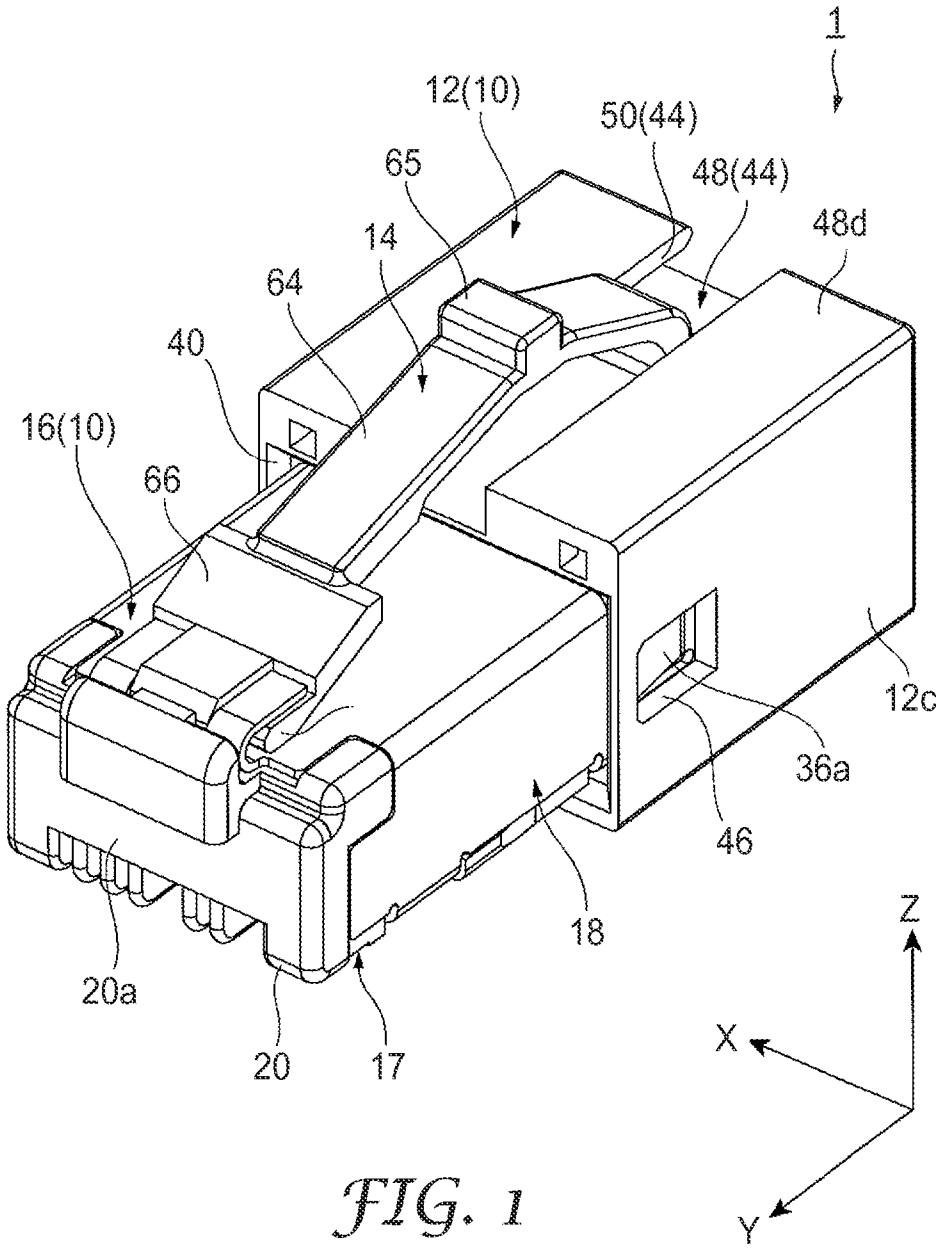

1
12(10)
50(44)
65
48(44)
14
48d
64
40
16(10)
66
12c
36a
46
18
20a
20
17
Z
X
Y

FIG. 1

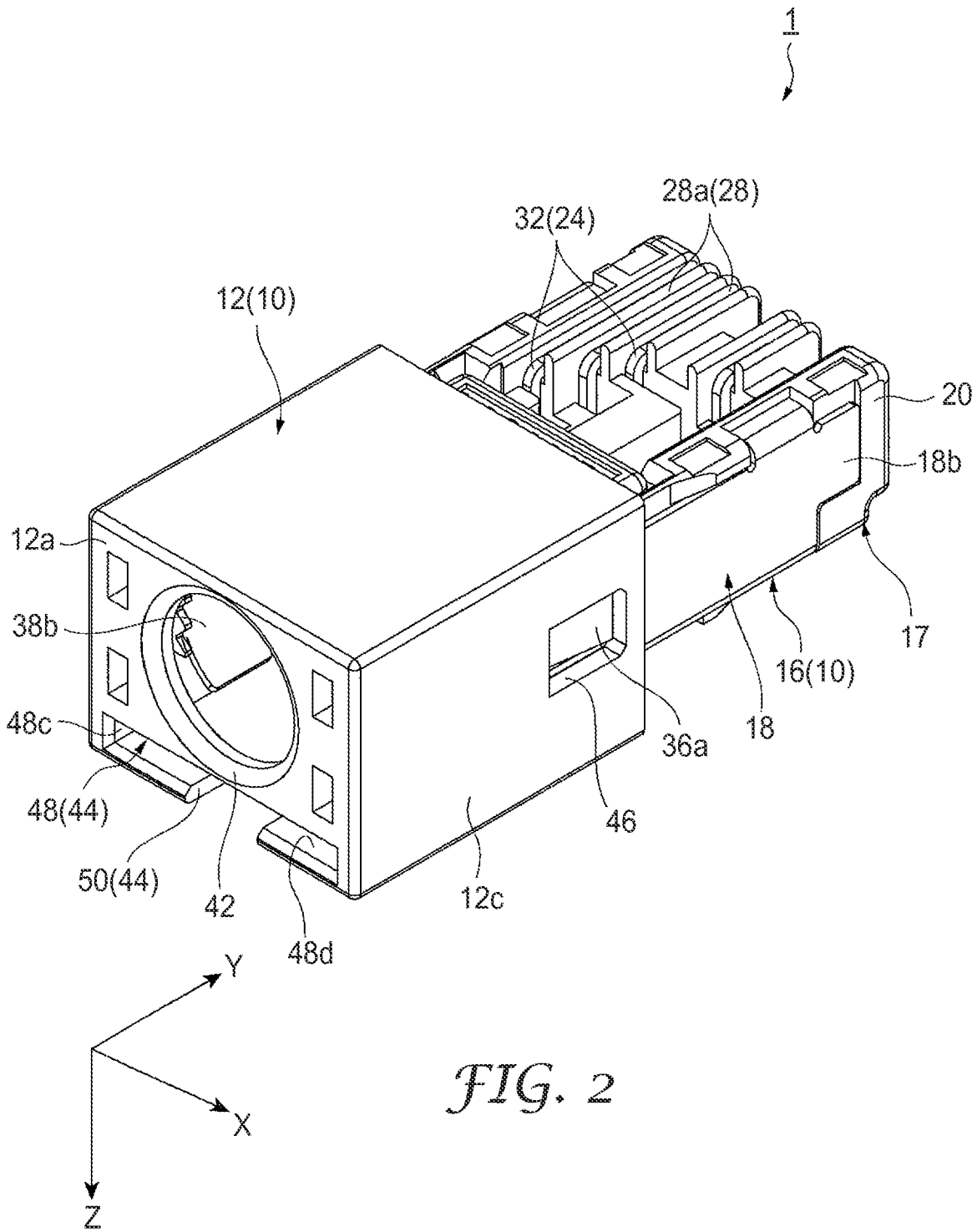

1
28a(28)
32(24)
12(10)
20
18b
12a
38b
48c
48(44)
50(44)
42
48d
12c
46
36a
18
16(10)
17
Y
X
Z

FIG. 2

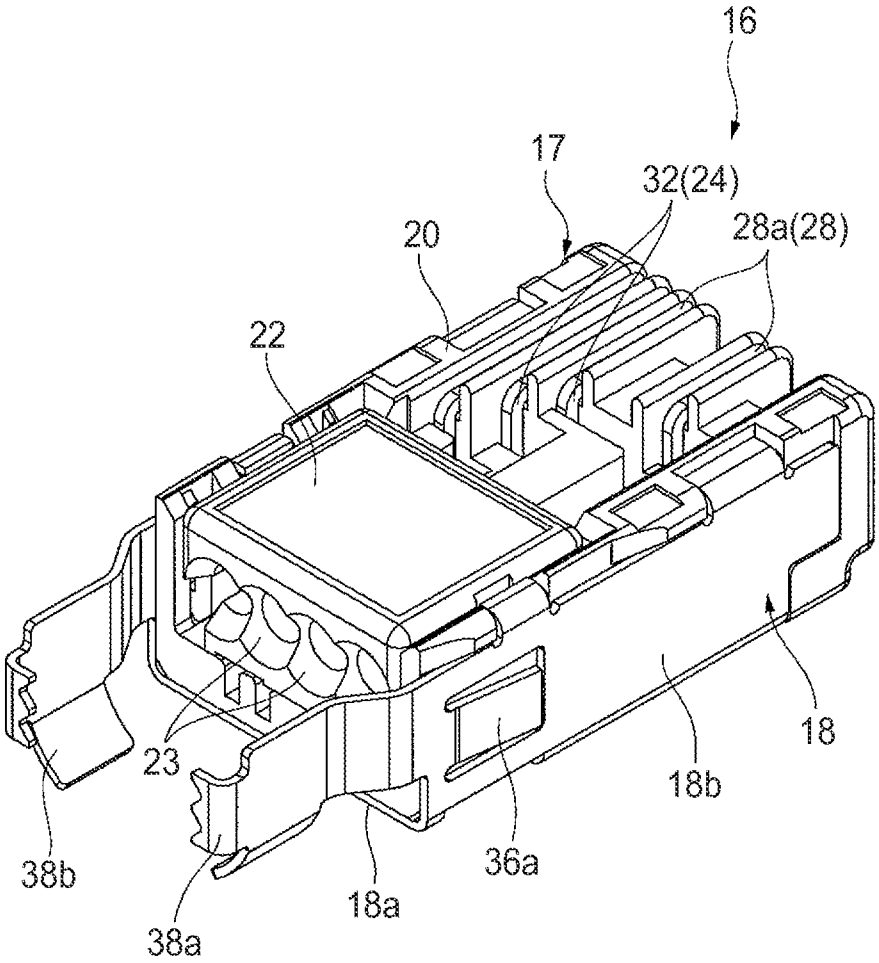


FIG. 3

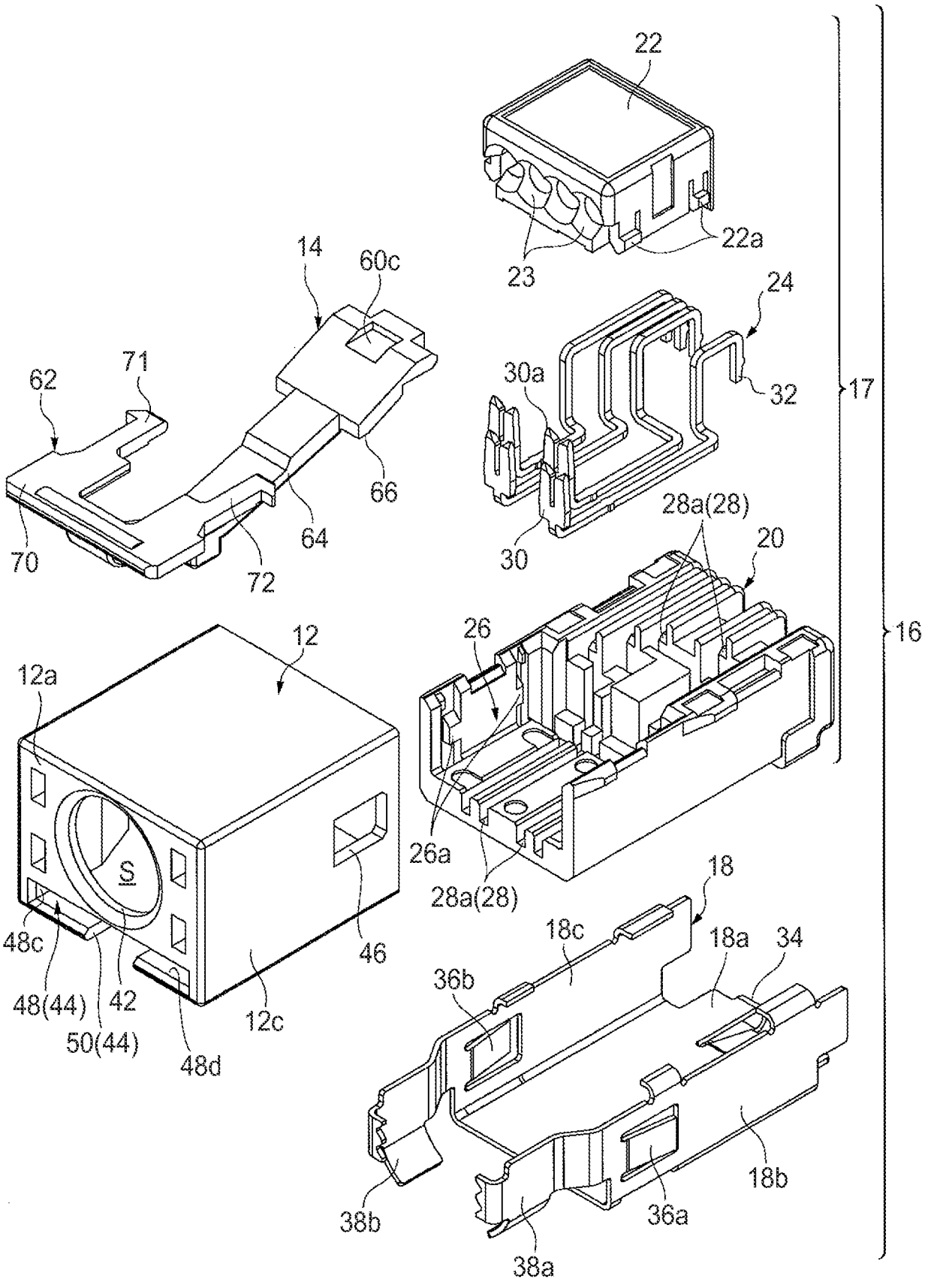

22
22a
23
24
32
30a
30
17
14
60c
62
71
66
64
70
72
28a(28)
20
16
12
12a
26
26a
28a(28)
S
48c
48(44)
42
50(44)
48d
12c
46
18
18c
18a
34
36b
38b
36a
18b
38a

FIG. 4

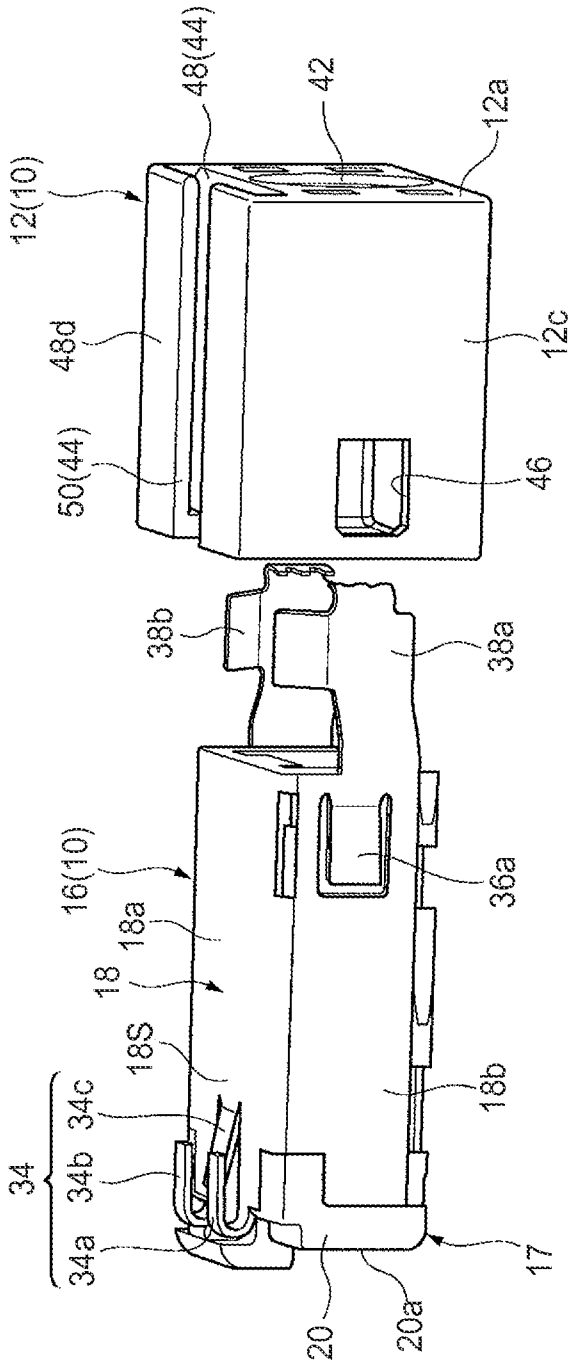

48(44)
42
12a
12(10)
48d
12c
50(44)
46
38b
38a
16(10)
36a
18a
18
18S
18b
34
34c
34b
34a
17
20
20a

FIG. 5

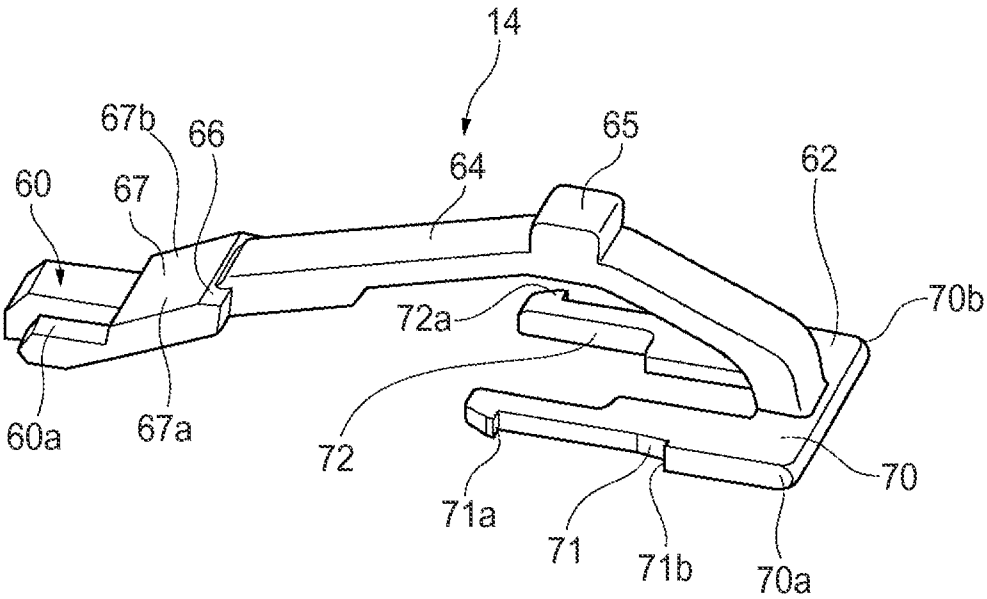


FIG. 6

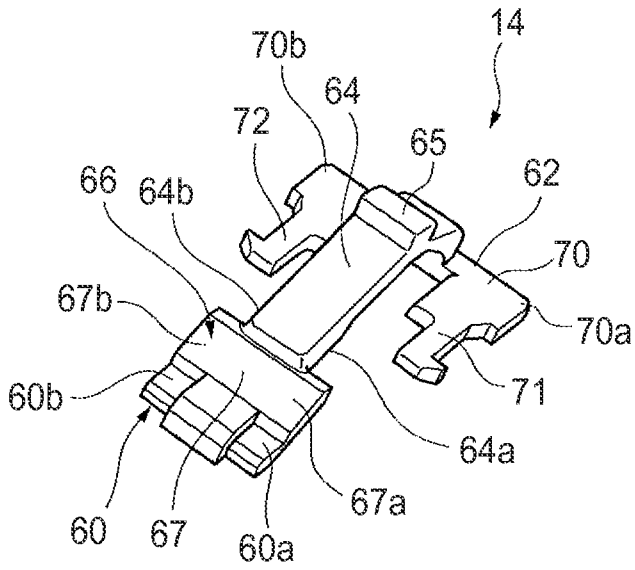

14
70b
64
72
65
62
66
64b
70
67b
70a
60b
71
64a
67a
60
67
60a

FIG. 7a

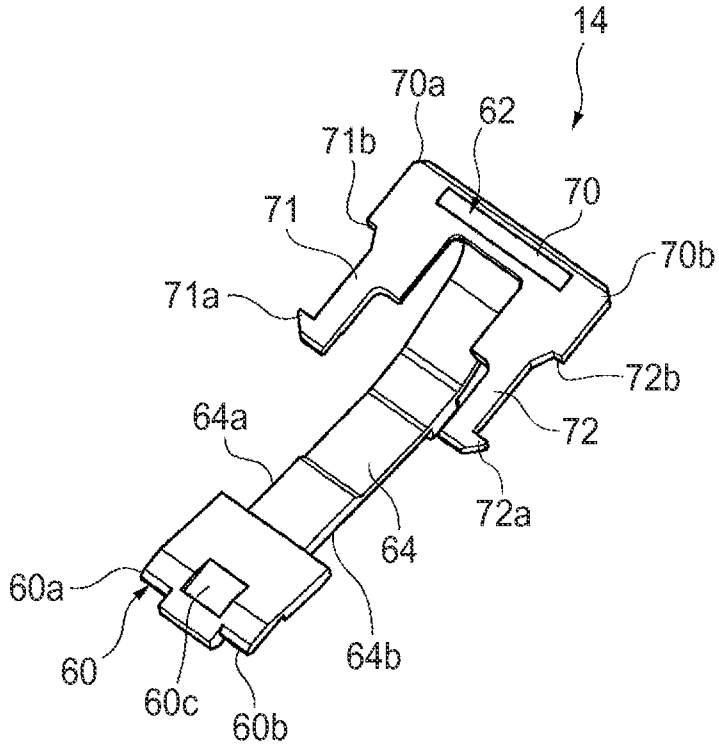

14
70a
62
71b
70
71
70b
71a
72b
72
64a
72a
64
60a
64b
60
60c
60b

FIG. 7b

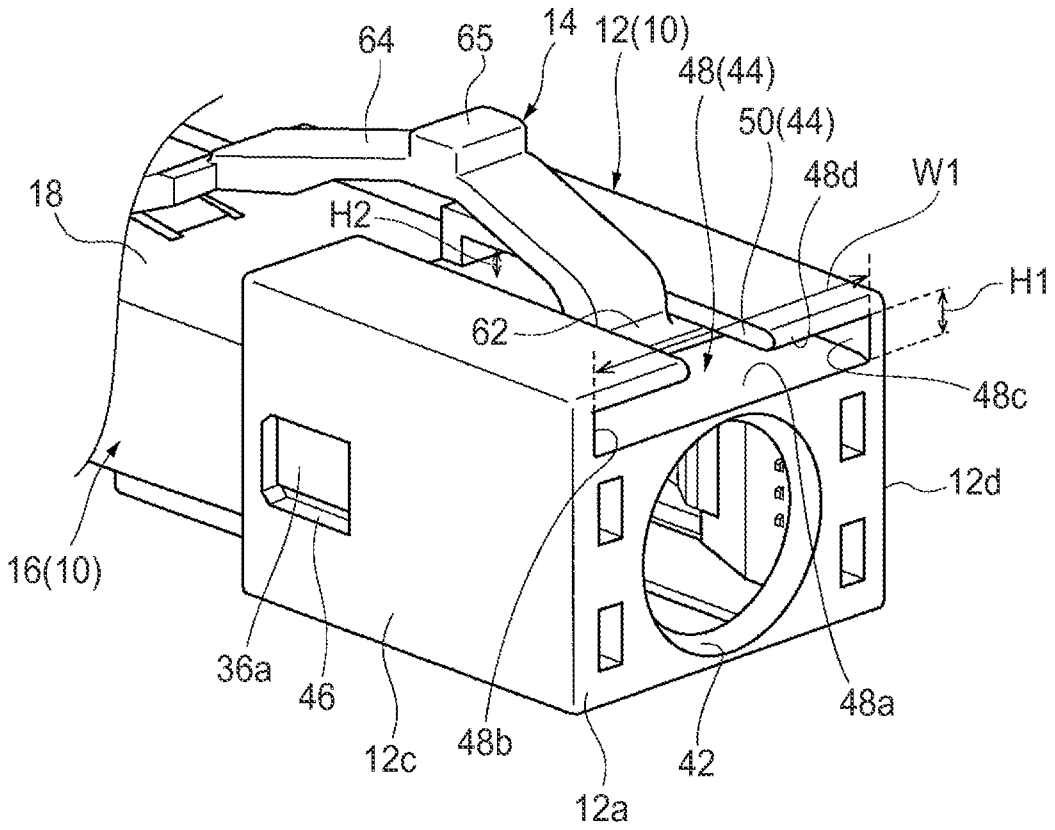

64
65
14
12(10)
48(44)
50(44)
48d
W1
18
H2
H1
62
48c
12d
16(10)
36a
46
12c
48b
42
48a
12a

FIG. 8

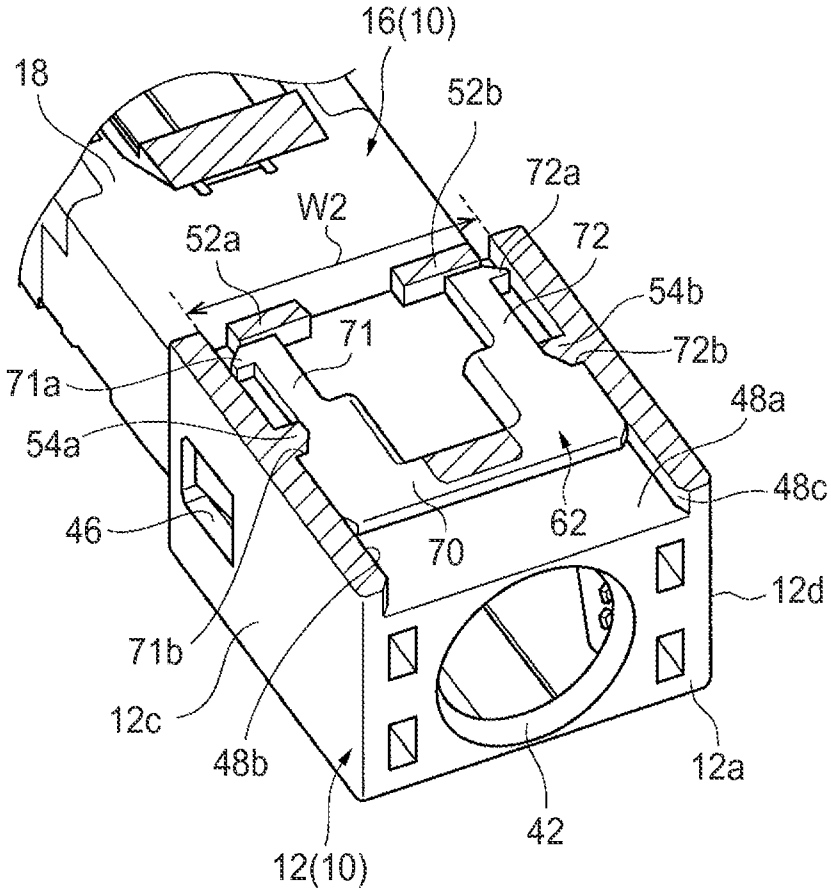

16(10)
18
52b
72a
W2
52a
72
54b
71
72b
71a
48a
54a
48c
46
62
70
12d
71b
12c
48b
12a
42
12(10)

FIG. 9

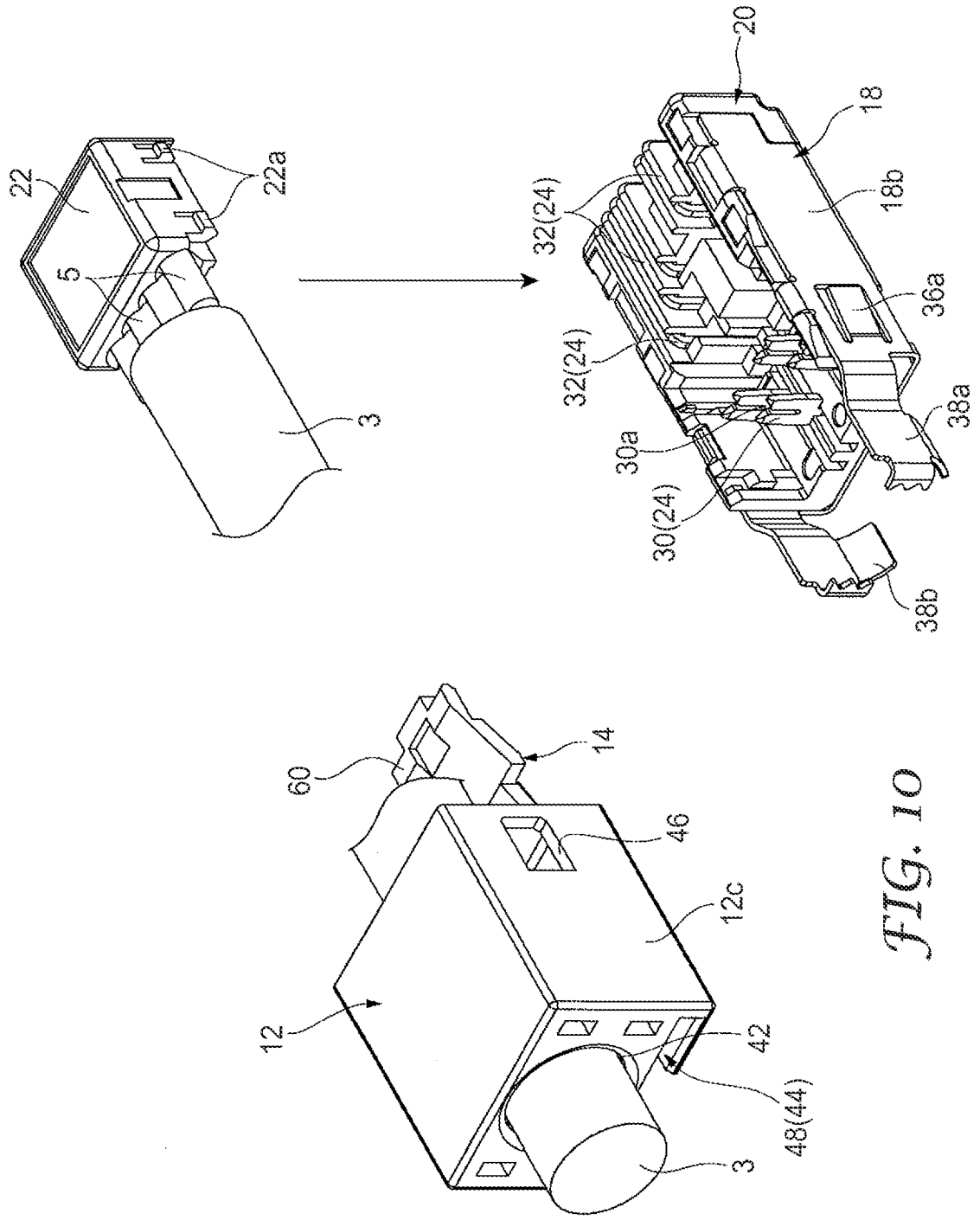

22
22a
5
3
20
18
18b
32(24)
36a
32(24)
38a
30a
30(24)
38b
60
14
46
12c
12
42
48(44)
3

FIG. 10

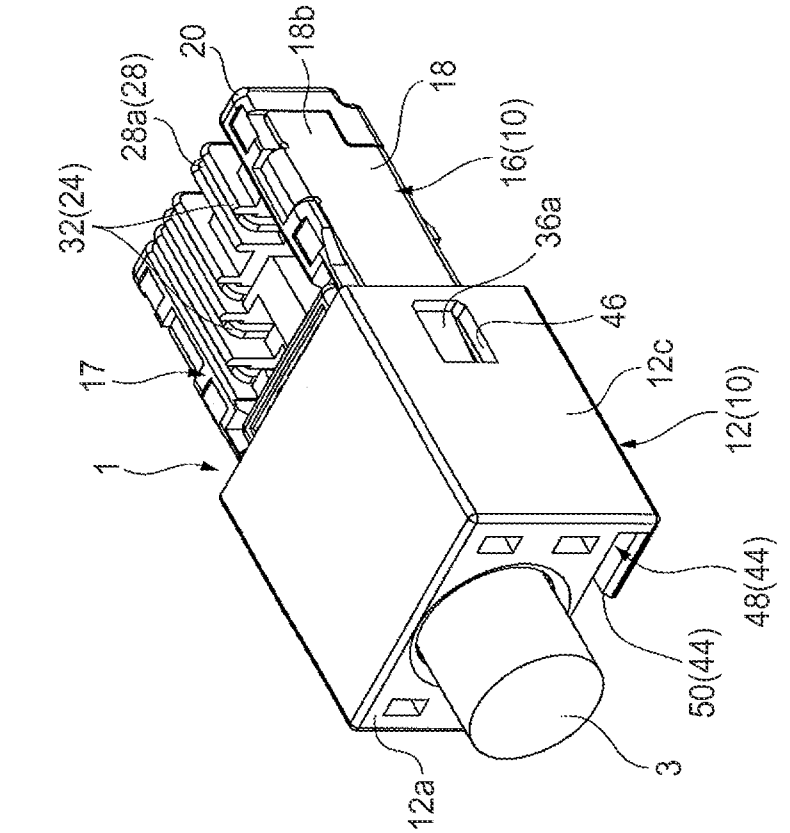


FIG. 11b

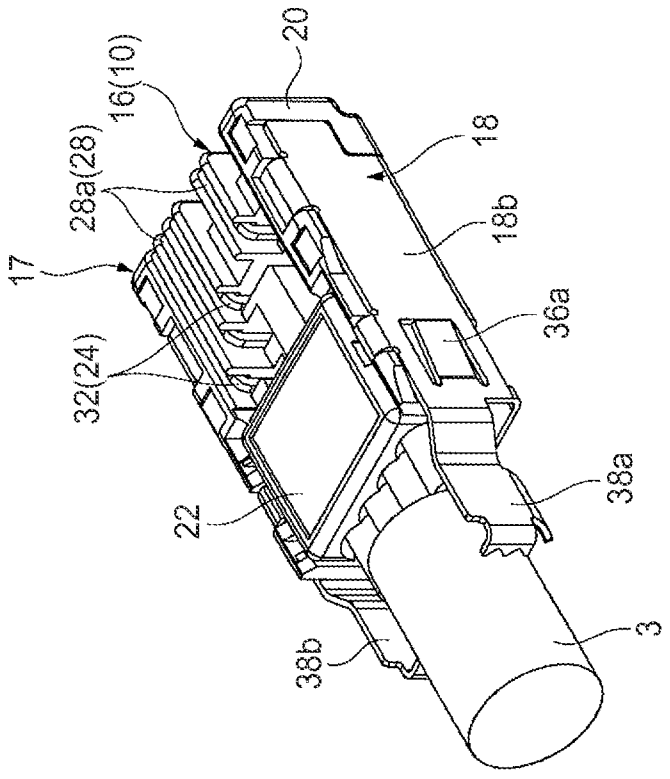


FIG. 11a

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/075540

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01R24/64 H01R13/627
ADD. H01R107/00

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)
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 2007/077806 A1 (MARTIN RALPH S [US] ET AL MARTIN RALPH SYKES [US] ET AL) 5 April 2007 (2007-04-05) figures 2,7,8,9,10,11,14	1-10
X	DE 20 2008 007149 U1 (PHOENIX CONTACT GMBH & CO [DE]) 24 July 2008 (2008-07-24) figures 1-4	1-5,7
X	EP 2 337 163 A1 (FUJITSU LTD [JP]) 22 June 2011 (2011-06-22) figures 1-3,5,6,8,9,10	1-3,5-7
X	EP 1 122 566 A2 (PANDUIT CORP [US]) 8 August 2001 (2001-08-08) figures 1-4	1-3,5,6

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"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
4 March 2014	13/03/2014

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	Esmiol, Marc-Olivier

1

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/075540

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 835 086 B1 (TSAI SHOU-CHUN [TW]) 28 December 2004 (2004-12-28) figures 1-4 -----	1-3,5,7

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2013/075540

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