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(54) **CONNECTOR HOUSING AND CONNECTOR**

(57) Provided is a connector housing with which integral coupling property of two members for clamping harness can be enhanced and the coupling is not prone to misalign or detach. In a connector housing 1 which clamps the harness between a housing body 10 and a cover 50 when they are coupled, a front frame portion 52 which is engaged to a front end of the housing body when the cover is coupled to the housing body is arranged at the front end of the cover 50, and a rear projecting piece 53 which is engaged to a rear end of the housing body when the cover is coupled to the housing body is arranged at the rear end of the cover.

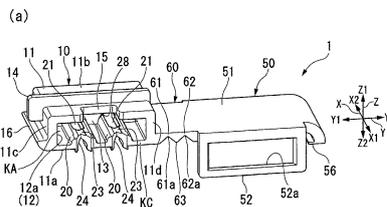


FIG. 1

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(b)

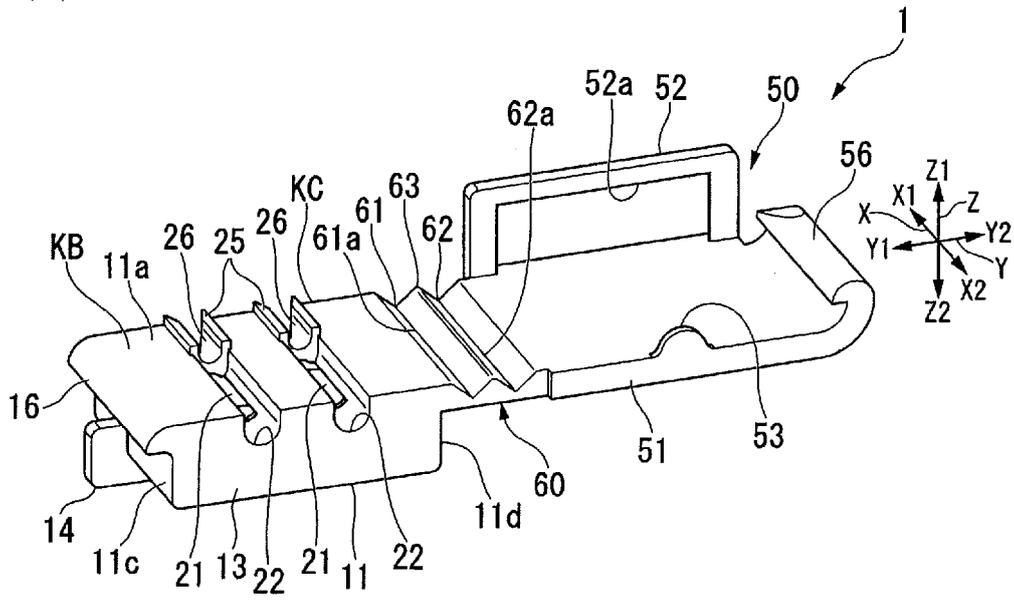


FIG. 1

Description

BACKGROUND OF THE INVENTION

Technical Field

[0001] The present invention relates to a connector housing for configuring a connector in which a conductor exposed portion at a fore-end of a harness is directly used as an electric contact, and relates to a connector configured using the connector housing.

Related Art

[0002] A connector is known which uses a conductor exposed portion at a fore-end of a harness (electric wire) directly as an electric contact. Since this type of connector can omit a terminal fitting, the connector can be configured simply. Therefore, for example, the connector is used as a connector for connecting a power supply terminal of a bicycle hub dynamo and a lamp.

[0003] In patent literature 1, as this type of connector, a connector is disclosed which includes a housing body (a first housing portion), a cover (a second housing portion), and a connection portion which connects the housing body and the cover. In this connector, the connector that clamps the harness between the housing body and the cover by coupling the housing body and the cover in a manner of bending the connection portion by about 90 degrees is disclosed. The connecting portion serves as one end of the coupling between the housing body and the cover.

In this connector, a middle portion of the conductor exposed portion at the fore-end of the harness is bent into a U shape at a front end edge of the board to prevent the harness from coming out, and a part of the conductor exposed portion serves as an electric contact which is in conductive contact with an electric contact of a mating connector.

[Literature of related art]

[Patent literature]

[0004] Patent literature 1: Japanese Patent Laid-open No. 2016-41591

SUMMARY

[Problems to be Solved]

[0005] Meanwhile, the connector described in patent literature 1 has a structure that when a tensile force is applied to the harness, the force is mainly received by either the housing body or the cover. Therefore, when a strong tensile force acts, the coupling between the housing body and the cover tends to misalign or detach. In addition, in patent literature 1 described above, the

connecting portion serves as one end of the coupling between the housing body and the cover. Thus, for example, if the connection portion is damaged due to deterioration over time, an external force or the like, the cover may also fall off from the housing body.

[0006] Therefore, the present invention is completed in view of the above situations and aims to provide a connector housing with which integral coupling property of two members for clamping harness can be enhanced and the coupling is not prone to misalign or detach, and a connector which is configured using the connector housing.

[Means to Solve Problems]

[0007] In order to solve the above problems, the connector housing according to the present invention includes: a board which supports a conductor exposed portion bent in a U shape at a fore-end of a harness when a direction in which a mating connector is fitted is set as the front, wherein the board has a front end edge where a U-shaped bent portion of the conductor exposed portion is arranged, a first plate surface on which a part of the conductor exposed portion closer to a base-end side than the U-shaped bent portion is arranged along a front-rear direction, and a second plate surface on which a part of the conductor exposed portion closer to a fore-end side than the U-shaped bent portion is arranged along the front-rear direction; a harness guide portion which is arranged on one plate surface of the first plate surface and the second plate surface and support the part on the fore-end side or the part on the base-end side of the conductor exposed portion which is arranged on the one plate surface, the part serving as an electric contact which is in conductive contact with an electric contact of the mating connector; a cover which clamps the harness between the board and the cover by being in surface matching with other plate surface of the first plate surface and the second plate surface; a coupling part which couples the board and the cover and releases the coupling in a state when the harness is clamped therebetween; and a front projecting piece and a rear projecting piece which are arranged at a front end and a rear end of the cover, and restrict, by being respectively engaged with a front end and a rear end of the board, a position of the board in the front-rear direction when the cover is coupled to the board.

[0008] By configuring in this way, the conductor exposed portion supported by the harness guide portion on the one plate surface of the board can function as the electric contact in conductive contact with the electric contact of the mating connector. In addition, by coupling the cover to the board, the harness can be clamped between the cover which is in surface matching with the other plate surface of the board and the board. For example, in a first example (a first embodiment) in which the other plate surface is set as the first plate surface and the one plate surface is set as the second plate

surface, the U-shaped bent portion of the conductor exposed portion at the fore-end of the harness is arranged on the front end edge. In addition, the part of the conductor exposed portion closer to the base-end side than the U-shaped bent portion is arranged on the first plate surface (the other plate surface) along the front-rear direction. In addition, the part of the conductor exposed portion closer to the fore-end side than the U-shaped bent portion is arranged on the second plate surface (the one plate surface) along the front-rear direction. In this state, the cover is coupled to the board, and the cover is brought into surface matching with the first plate surface (the other plate surface). Thereby, the base-end side of the conductor exposed portion can be clamped between the first plate surface (the other plate surface) of the board and the cover. At the same time, by supporting the fore-end side of the conductor exposed portion with the harness guide portion on the second plate surface (the one plate surface), the part on the fore-end side of the conductor exposed portion can function as the electric contact which is in conductive contact with the electric contact of the mating connector.

On the contrary, in a second example (a second embodiment) in which the other plate surface is set as the second plate surface and the one plate surface is set as the first plate surface, the U-shaped bent portion of the conductor exposed portion at the fore-end of the harness is arranged on the front end edge. In addition, the part of the conductor exposed portion closer to the base-end side than the U-shaped bent portion is arranged on the first plate surface (the one plate surface) along the front-rear direction. In addition, the part of the conductor exposed portion closer to the fore-end side than the U-shaped bent portion is arranged on the second plate surface (the other plate surface) along the front-rear direction. In this state, the cover is coupled to the board, and the cover is brought into surface matching with the second plate surface (the other plate surface), and thereby the fore-end side of the conductor exposed portion can be clamped between the second plate surface (the other plate surface) of the board and the cover. At the same time, by supporting the base-end side of the conductor exposed portion with the harness guide portion on the first plate surface (the one plate surface), the part on the base-end side of the conductor exposed portion can function as the electric contact which is in conductive contact with the electric contact of the mating connector. In addition, when the cover is coupled to the board by the coupling part in this way, the front projecting piece of the cover is engaged with the front end of the board, and the rear projecting piece of the cover is engaged with the rear end of the board. Therefore, movement of the board in the front-rear direction can be restricted by the cover, and the integral coupling property between the cover and the board can be enhanced. In addition, even when an external force in the front-rear direction acts via the harness or the mating connector, the coupling between the board and the cover can be prevented from being mis-

aligned or detached.

[0009] The connector housing according to the present invention includes a box, wherein an insertion hole into which an insertion piece being strip-like of the mating connector is inserted is formed by enclosing four sides with a lower plate, an upper plate facing the lower plate, left and right plates connecting the lower plate and the upper plate, and an opening in a front surface serves as a receiving port of the insertion piece into the insertion hole, wherein the board is arranged as the lower plate of the box, the one plate surface of the board on which the harness guide portion is formed serves as an upper surface of the lower plate configuring an inner surface of the insertion hole, and the other plate surface of the board in surface matching with the cover to clamp the harness serves as a lower surface of the lower plate, and the front projecting piece of the cover is formed as a front frame portion which covers the front surface of the box when the cover is coupled to the box, and an opening for opening the receiving port at the front is arranged in the front frame portion.

[0010] By configuring in this way, the insertion piece of the mating connector can be inserted into the insertion hole of the box from the receiving port which is open on the front surface of the box. Besides, the electric contact on the lower surface of the insertion piece being inserted can be brought into sliding contact with the conductor exposed portion (the electric contact) disposed on the harness guide portion on the upper surface of the lower plate (the board) of the box. In addition, the insertion piece of the mating connector can be inserted into the receiving port of the box through the opening of the front frame portion of the cover. Therefore, the front frame portion can be arranged in a size for covering the entire front end surface of the box, and the integral coupling property with the box can be further enhanced.

Furthermore, since the front frame portion and the mating connector are fitted with each other, the cover is supplementarily supported by the mating connector. Thus, the cover can be reliably prevented from falling off the box.

[0011] In the connector housing according to the present invention, a notch where the U-shaped bent portion of the conductor exposed portion is housed is arranged at a front edge portion of the harness guide portion.

[0012] By configuring in this way, when the conductor exposed portion is bent at the front end edge of the board, the bending can be easily performed at a stable position without lateral displacement. In addition, since the bent place of the conductor exposed portion can be housed inside the notch, a protrusion caused by the bending is not prone to occur at the front end of the board (the lower plate of the box), and the front frame portion of the cover is easily brought into close contact with to the front end surface of the box.

[0013] In the connector housing according to the present invention, the connector housing is provided that a through hole which penetrates from the one plate surface

to the other plate surface of the board is arranged at a rear portion of the harness guide portion.

[0014] By configuring in this way, the fore-end of the conductor exposed portion is hooked in the through hole arranged in the lower plate (the board), and the fore-end side of the conductor exposed portion can be arranged in the harness guide portion. Besides, in this state, for example, the middle portion of the conductor exposed portion can be bent into a U shape with the front end edge of the lower plate (the board) as a bending fulcrum. Therefore, since the bending operation can be performed in a state that the fore-end of the conductor exposed portion is constrained by the through hole, the bending work can be performed particularly stably and easily. In addition, a position of the fore-end of the conductor exposed portion inside the box can be confirmed from the outside through the through hole regardless of whether or not the fore-end of the conductor exposed portion is hooked in the through hole arranged in the lower plate (the board). Therefore, precision of the position of the conductor exposed portion arranged in the harness guide portion or the bending position can be enhanced.

[0015] In the connector housing according to the present invention, a window through which the through hole can be visually recognized from the outside is arranged in the upper plate of the box.

[0016] By configuring in this way, the hooked state of the conductor exposed portion to the through hole can be confirmed by watching through the window, and the bending work of conductor exposed portion or the like can be performed while the hooked state is confirmed.

[0017] In the connector housing according to the present invention, the box is arranged as a part of a housing body, and the cover is integrally connected to the housing body via a bendable hinge.

[0018] By configuring in this way, the connector housing can be made of an integrally molded resin product. In addition, by bending the hinge, the cover can be coupled to the housing body in a state that the cover is aligned.

[0019] A connector according to the present invention is configured to introduce the fore-end of the harness to the above connector housing, wherein the U-shaped bent portion of the conductor exposed portion at the fore-end of the harness is arranged at a front end edge of the board, the part of the conductor exposed portion closer to the fore-end side than the U-shaped bent portion is arranged on the first plate surface of the board along the front-rear direction, and the part of the conductor exposed portion closer to the base-end side than the U-shaped bent portion is arranged on the second plate surface of the board along the front-rear direction; the part on the fore-end side or the part on the base-end side of the conductor exposed portion is disposed in the harness guide portion which is arranged on one plate surface of the first plate surface and the second plate surface, and thereby the base-end side or the fore-end side of the conductor exposed portion is configured as an electric

contact which is in conductive contact with an electric contact of the mating connector; the harness is clamped between the cover and the board by bringing the cover into surface matching with the other plate surface of the first plate surface and the second plate surface of the board; and the cover is coupled to the board by the coupling part in this state, and thereby the front projecting piece and the rear projecting piece which are formed in the cover are respectively engaged with the front end and the rear end of the board.

[0020] By configuring in this way, movement of the board in the front-rear direction can be restricted by the cover, and the integral coupling property between the cover and the board can be enhanced. In addition, even when an external force in the front-rear direction acts via the harness or the mating connector, the coupling between the board and the cover can be prevented from being misaligned or detached.

[Effect]

[0021] According to the present invention, the movement of the board in the front-rear direction can be restricted by the cover, and the integral coupling property between the cover and the board can be enhanced. In addition, even when an external force in the front-rear direction acts via the harness or the mating connector, the coupling between the board and the cover can be prevented from being misaligned or detached.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022]

FIG. 1 are perspective views showing a state before use of a connector housing in a first embodiment of the present invention, where (a) is a perspective view viewed from the front, and (b) is a perspective view viewed from the rear with the top and the bottom turned upside down.

FIG. 2 are diagrams showing a state before use of the connector housing in the first embodiment of the present invention, where (a) is a front view viewed from the front, and (b) is a rear view viewed from the rear with the top and the bottom turned upside down.

FIG. 3 are illustration views of a method for assembling a connector by using the connector housing according to the first embodiment of the present invention, where (a) is a perspective view showing a state that conductor exposed portions at fore-ends of harnesses are about to be inserted into a housing body from the front, (b) is a perspective view showing a state that base-end sides of the harnesses are bent and extended rearward, and (c) is a perspective view showing a state that a cover is coupled to the housing body and the connector is completed.

FIG. 4 is a perspective view showing a state that a mating connector is about to be fitted to the complet-

ed connector in the first embodiment of the present invention.

FIG. 5 is a perspective view for illustrating a procedure when the fore-ends of the conductor exposed portions are inserted into an insertion hole of a box of the housing body in the first embodiment of the present invention.

FIG. 6 is a perspective view for illustrating a procedure of bending middle portions of the conductor exposed portions in the first embodiment of the present invention into a U shape on a lower surface side of the housing body.

FIG. 7 is a diagram for illustrating a method of incorporating the conductor exposed portions at the fore-ends of the harnesses into the housing body in the first embodiment of the present invention and is a cross-sectional side view which shows a state that the conductor exposed portions at the fore-ends of the harnesses are about to be inserted into the insertion hole of the housing body.

FIG. 8 is a cross-sectional side view showing a state that the fore-ends of the conductor exposed portions are hooked in through holes after the state of FIG. 7.

FIG. 9 is a cross-sectional side view showing a state that the middle portions of the conductor exposed portions are extended rearward after the state of FIG. 8.

FIG. 10 is a cross-sectional side view showing a state that the connector is completed in the state of FIG. 9 and an insertion piece of the mating connector is about to be inserted into the connector.

FIG. 11 is a diagram for illustrating another method for incorporating the conductor exposed portions at the fore-ends of the harnesses into the housing body in the first embodiment of the present invention and is a cross-sectional side view which shows a state that the conductor exposed portions at the fore-ends of the harnesses are about to be inserted into the insertion hole of the housing body.

FIG. 12 is a cross-sectional side view showing a state that the connector is completed after the state of FIG. 11 and the insertion piece of the mating connector is about to be inserted into the connector.

FIG. 13 is a cross-sectional side view of a connector in a modification example of the first embodiment of the present invention.

FIG. 14 is a perspective view in which a state before use of a connector housing in a second embodiment of the present invention is viewed from a diagonally upper front side.

FIG. 15 is a perspective view in which the state before use of the connector housing in the second embodiment of the present invention is viewed from a diagonally lower front side.

FIG. 16 is a perspective view showing a state that conductor exposed portions at fore-ends of harnesses are about to be inserted into penetration holes of a housing body of the connector housing in the sec-

ond embodiment of the present invention.

FIG. 17 is a perspective view showing a state that the fore-end sides of the conductor exposed portions inserted into the housing body after the state of FIG.

16 are about to be bent in a U shape on a lower surface side of the housing body.

DESCRIPTION OF THE EMBODIMENTS

[0023] Embodiments of the present invention are described below with reference to the drawings.

[0024] A connector described here is useful as a two-wire type connector which is connected to a power supply terminal (a mating connector) of a hub dynamo of a bicycle, and can also be used widely as other general electrical connectors. In a first embodiment, an example is shown where a connector housing configuring the connector is configured by one component (an integrally molded product). Besides, in a second embodiment, an example is shown where a connector housing configuring the connector is configured by two components (separately molded products).

<First embodiment

[0025] The connector housing of the first embodiment of the present invention and a connector configured using the connector housing are described with reference to FIG. 1-FIG. 12.

[0026] FIG. 1 are perspective views showing a state before use of a connector housing 1 in the first embodiment of the present invention, where (a) is a perspective view viewed from the front, and (b) is a perspective view viewed from the rear with the top and the bottom turned upside down. FIG. 2 are diagrams showing a state before use of the connector housing 1, where (a) is a front view viewed from the front, and (b) is a rear view viewed from the rear with the top and the bottom turned upside down. FIG. 3 are illustration views of a method for assembling a connector 2 by using the connector housing 1, where (a) is a perspective view showing a state that conductor exposed portions Wa at fore-ends Wa1 of harnesses W are about to be inserted into a housing body 10 from the front, (b) is a perspective view showing a state that base-end sides of the harnesses W are bent and extended rearward, and (c) is a perspective view showing a state that a cover 50 is coupled to the housing body 10 and the connector 2 is completed. FIG. 4 is a perspective view showing a state that a mating connector 200 is about to be fitted to the completed connector 2.

[0027] The connector housing 1 of the first embodiment shown in FIG. 1 and FIG. 2 is a main component for configuring a two-wire connector connected to a power supply terminal (the mating connector) of a hub dynamo. The connector housing 1 is integrally molded by resin and includes the housing body 10, the cover 50, and a hinge 60 which connects the housing body 10 and the cover 50.

[0028] Here, prior to the following description, directionality is defined in advance as follows.

[0029] Each direction described below indicates a direction in the state of the connector 2 finally completed (see FIG. 3(c) and FIG. 4). First, a direction in which a mating connector is received while being fitted to the mating connector (the power supply terminal of the hub dynamo or the like) is referred to as the front (a front side) X1, and the opposite direction is referred to as a rear direction (a rear side) X2, and a front-rear direction is represented by X. Accordingly, FIG. 1(a) is a diagram viewed from diagonally front, and FIG. 1(b) is a diagram viewed from diagonally rear. In addition, a left side of FIG. 1(a) when viewed from the front is referred to as the left (a left side) Y1 of the connector housing 1, a right side of FIG. 1(a) when viewed from the front is referred to as the right (a left side) Y1, and a left-right direction is represented by Y. In addition, a direction where the housing body 10 and the cover 50 are coupled is referred to as an up-down direction Z, and in the coupled state, a direction where the housing body 10 is positioned is referred to as the up (an upper side) Z1, and a direction where the cover 50 is positioned is referred to as the down (a lower side) Z2.

[0030] By being combined with the fore-ends of the harnesses, the connector housing 1 configures a connector without using a terminal fitting.

[0031] As shown in FIG. 3(c) and FIG. 4, in the finally completed connector 2, the harnesses W extend rearward from the connector 2. Therefore, when viewed from the harnesses W extending rearward from the connector 2, the fore-ends of the harnesses W are introduced from the rear toward the front with respect to the connector 2. For example, even if the fore-ends of the harnesses W are introduced from the front toward the rear in the middle of the assembly as shown in FIG. 3(a), when the connector 2 is finally completed, as shown in FIG. 3(c), the fore-ends of the harnesses W are introduced from the rear to the front.

[0032] As shown in FIG. 1 and FIG. 2, the housing body 10 of the connector housing 1 has a box 11 being a rectangular shape in which the dimension in the up-down direction is smaller than the dimension in the left-right direction when viewed from the front. The box 11 is configured by surrounding four sides with a lower plate 11a, an upper plate 11b facing the lower plate 11a, and a left plate 11c and a right plate 11d that connect the lower plate 11a and the upper plate 11b. The inside of the box 11 is configured as an insertion hole 12 into which a strip-like insertion piece 201 (see FIG. 4) of the mating connector 200 is inserted. A front surface of the insertion hole 12 is opened as a receiving port 12a for receiving the insertion piece 201 of the mating connector 200. A depth portion of the insertion hole 12 of the box 11 is blocked by a rear wall 13.

[0033] In the left plate 11c and the right plate 11d of the box 11, an outer peripheral surface of an upper half portion and an outer peripheral surface of the upper plate

11b are integrated so as to cover a plate-like rib 14 having a U shape in a front view. On the outer side of a left end portion of the lower plate 11a of the box 11, an engagement claw 16 (a coupling part) which protrudes toward the left Y1 is arranged. In addition, the cover 50 is connected to the outer side of a right end portion of the lower plate 11a of the box 11 via the hinge 60. Accordingly, the cover 50 before assembly is arranged on the right side Y2 of the housing body 10.

[0034] Here, as shown in FIG. 3(a), the harnesses W are obtained by covering harness core wires (conductive wires) Wa with insulation coatings Wb. The harness core wire Wa may be composed of a large number of strands or be composed of a single strand (a single wire). When the fore-ends of the harnesses W are introduced into the connector housing 1, the insulation coatings Wb within a predetermined length of the fore-ends of the harnesses W are peeled off to expose the harness core wires Wa. Here, the exposed core wires Wa at the fore-ends are referred to as the conductor exposed portions Wa and are denoted by the same symbol as the conductors Wa.

[0035] As shown in FIG. 1 and FIG. 2, the lower plate 11a of the box 11 is configured as a board which supports the conductor exposed portions Wa bent in a U shape at the fore-ends of the harnesses W. The lower plate 11a serving as the board has parts which function as a first plate surface, a front end edge, and a second plate surface described below, respectively. That is, the lower plate 11a serving as the board has a front end edge KC where U-shaped bent portions of the conductor exposed portions Wa are disposed. In addition, the lower plate 11a has a lower surface KB serving as the first plate surface where parts of the conductor exposed portions Wa closer to the base-end sides than the U-shaped bent portions are disposed along the front-rear direction. In addition, the lower plate 11a has an upper surface KA (an inner bottom surface of the insertion hole 12) serving as the second plate surface where parts of the conductor exposed portions Wa closer to the fore-end sides than the U-shaped bent portions are disposed along the front-rear direction.

[0036] On the upper surface KA (corresponding to one plate surface) of the lower plate 11a of the housing body 10, along the front-rear direction, two harness holding projection portions 20 having a semi-circular cross section are arranged in parallel and spaced from each other in the left-right direction Y. On upper surfaces of the harness holding projection portions 20, harness guide grooves (harness guide portions) 23 are arranged on which the fore-end sides of the conductor exposed portions Wa are placed. By disposing the fore-end sides of the conductor exposed portions Wa (closer to the fore-end sides than the U-shaped bent portions) in the harness guide grooves 23, the fore-end sides of the conductor exposed portions Wa can be used as electric contacts.

[0037] At front edge portions of the harness guide grooves 23, notches 24 are arranged which guide the bending when middle portions of the conductor exposed

portions Wa are bent into a U shape and serve as fulcrums for bending, the notches 24 being V-shaped or U-shaped when viewed from above. In addition, through holes 21 penetrating from the upper surface KA to the lower surface KB of the lower plate 11a are arranged at positions on the rear side X2 on the harness guide grooves 23 of the harness holding projection portions 20. In addition, a notch-shaped window 15 through which the periphery of the through holes 21 can be visually recognized from above the box 11 is arranged in the upper plate 11b of the box 11. In addition, on the rear wall 13 which blocks the rear end of the box 11, conical guide walls 28 are arranged. When the fore-ends Wa1 of the conductor exposed portions Wa placed on the harness guide grooves 23 are abutted against the rear wall 13, the conical guide walls 28 hold the fore-ends Wa1 and guide the fore-ends Wa1 toward the lower side.

[0038] In addition, on a lower surface of the housing body 10, that is, the lower surface KB of the lower plate 11a, harness support portions 25 which have harness support grooves 26 are arranged corresponding to the harness holding projection portions 20 of the upper surface KA of the lower plate 11a. The harness support portions 25 are arranged only in a part at a front end side of the lower plate 11a, and on rear sides of the harness support portions 25, harness guide grooves which can house the parts of the harnesses W with the coatings Wb are arranged. Inner peripheral surfaces of the harness guide grooves 22 are larger in size than inner peripheral surfaces of the harness support grooves 26 on the front side of the harness guide grooves 22 in order to house the parts of the harnesses W with the coatings Wb. Accordingly, there is a slight step at the boundary between the harness support grooves 26 and the harness guide grooves 22.

[0039] The through holes 21 formed on rear sides of the harness guide grooves 23 on the upper surface KA side of the above-described lower plate 11a are open at inner bottom portions of the harness guide grooves 22. Specifically, the harness guide grooves 23 are arranged on the upper surface KA side of the lower plate 11a, and the harness guide grooves 22 are arranged on the lower surface KB side of the lower plate 11a. Besides, the through holes 21 are open by being formed at height positions where inner bottom surfaces of the harness guide grooves 23 on the upper surface KA side and inner bottom surfaces of the harness guide grooves 22 on the lower surface KB side overlap each other. Therefore, inner surfaces of the conical guide walls 28 arranged on the rear wall 13 are continuous with the inner surfaces of the harness guide grooves 22 on the lower surface KB side.

[0040] The lower surface KB of the housing body 10 is a plate surface in surface matching with the cover 50. The cover 50 includes a main plate 51 having a plate surface which is in surface matching with the lower surface KB of the housing body 10. The plate surface visible from above in FIG. 1(b) is the matching surface of the

main plate 51. The harnesses W are clamped between the plate surface and the lower surface KB of the housing body 10.

[0041] One side end portion of the main plate 51 is connected to a part outside the right end portion of the lower plate 11a of the housing body 10 via the bendable hinge 60. The hinge 60 can be bent by 180 degrees as a whole and is configured by two stages of hinge portions 61, 62 which can be bent by 90 degrees. In the two-stage hinge portions 61, 62, on a surface on the bending side of a strip having a constant thickness which connects the lower plate 11a of the housing body 10 and the main plate 51 of the cover 50, V-grooves 61a, 61b along the front-rear direction are respectively formed and set as thin portions.

[0042] By bending the two-stage hinge portions 61, 62 by 90 degrees, the cover 50 can be rotated by 180 degrees and the main plate 51 of the cover 50 can be brought into surface matching with the lower surface KB of the housing body 10. At that time, the V-grooves 61a, 61b are crushed, and the other inclined surfaces of the V-grooves 61a, 62a are combined with both inclined surfaces of a mountain-shaped portion 63 formed by common inclined surfaces of the two V-grooves 61a and 62a. Thereby, the main plate 51 can be in surface matching with the lower surface KB of the housing body 10 while eliminating the positional deviation in the left-right direction Y.

[0043] An engagement claw 56 (a coupling part) which is elastically engaged with the engagement claw 16 on the housing body 10 side when the main plate 51 is matched with the housing body 10 is arranged on a side edge opposite to the hinge 60 of the main plate 51 of the cover 50. The engagement claws 16, 56 are engaged with each other when the housing body 10 and the cover 50 are brought into surface matching in the state that the harnesses W are clamped between the housing body 10 and the cover 50, and thereby the housing body 10 and the cover 50 are coupled integrally. In this case, since one end side is already coupled with the hinge 60, it is sufficient to arrange the engagement claws 16, 56 only on the other end side. In addition, by disengaging the engagement between the engagement claw 16 on the housing body 10 side and the engagement claw 56 on the cover 50 side, the coupling between the housing body 10 and the cover 50 can be released.

[0044] A front frame portion 52 is arranged as a front projecting piece at the front end of the cover 50. The front frame portion 52 is arranged to cover the front surface of the housing body 10 when the cover 50 is coupled to the housing body 10. By being arranged to cover the front surface of the housing body 10 in this way, the front frame portion 52 can restrict the housing body 10 from moving forward in a state of being engaged with the front end of the housing body 10. In addition, an opening 52a which opens the receiving port 12a of the insertion hole 12 of the housing body 10 at the front is arranged in the front frame portion 52.

[0045] In addition, a rear projecting piece 53 is arranged at the rear end of the cover 50. The rear projecting piece 53 is engaged with the rear end of the housing body 10 when the cover 50 is coupled to the housing body 10. Thereby, the housing body 10 is restricted from moving rearward.

[0046] Next, a procedure of assembling the connector using the connector housing 1 with the above configuration is described.

[0047] FIG. 5 is a perspective view for illustrating a procedure when the fore-ends Wa1 of the conductor exposed portions Wa are inserted into the insertion hole 12 of the box 11 of the housing body 10. FIG. 6 is a perspective view for illustrating a procedure of bending the middle portions of the conductor exposed portions Wa into a U shape on the lower surface KB side of the housing body 10. Moreover, FIG. 5 corresponds to a detailed diagram for illustrating the process in FIG. 3(a). FIG. 6 corresponds to a detailed diagram for illustrating the process in FIG. 3(b).

[0048] In addition, FIG. 7 is a view for illustrating a method of incorporating the conductor exposed portions Wa at the fore-ends of the harnesses W into the housing body 10 and is a cross-sectional side view which shows a state that the conductor exposed portions Wa at the fore-ends of the harnesses W are about to be inserted into the insertion hole 12 of the housing body 10 from the front. FIG. 8 is a cross-sectional side view showing a state that parts bent into a hook shape of the fore-ends Wa1 of the conductor exposed portions Wa are hooked in the through holes 21 after the state of FIG. 7. FIG. 9 is a cross-sectional side view showing a state that the middle portions of the conductor exposed portions Wa are bent into a U shape on the lower surface KB side of the housing body 10 and the base-end sides of the harnesses W are extended rearward after the state of FIG. 8. Moreover, FIG. 7 and FIG. 8 correspond to cross-sectional views for illustrating the process in FIG. 3(a). FIG. 9 corresponds to a cross-sectional view for illustrating the process in FIG. 3(b).

[0049] In addition, FIG. 10 is a cross-sectional side view showing a state in which the cover 50 is coupled with the housing body 10 in the state of FIG. 9 to thereby clamp the base-end sides of the harnesses W between the housing body 10 and the cover 50 to complete the connector 2 and the insertion piece 201 of the mating connector 200 is about to be inserted into the connector 2, the connector 2 taking the fore-end sides of the conductor exposed portions Wa as electric contacts inside the insertion hole 12. FIG. 10 is a cross-sectional view showing a state corresponding to FIG. 4.

[0050] When the connector 2 is assembled, first, as shown in FIG. 3(a), FIG. 5, and FIG. 7, the fore-ends Wa1 of the conductor exposed portions Wa of the harnesses W are inserted into the insertion hole 12 of the housing body 10 from the front. At that time, the fore-ends Wa1 of the conductor exposed portions Wa are bent downward into a hook shape, and the hook parts

are hooked into the through holes 21 of the lower plate 11a of the housing body 10 (an operation indicated by an arrow S1 in FIG. 5 and FIG. 7). As a result, as shown in FIG. 8, the fore-end sides of the conductor exposed portions Wa can be disposed on the harness guide grooves 23 based on the parts hooked in the through holes 21.

[0051] Next, in this state, as shown in FIG. 3(b), FIG. 6, and FIG. 9, the middle portions of the conductor exposed portions Wa are bent downward while being fitted into the notches 24 arranged in the front end edge KC of the lower plate 11a. Furthermore, the middle portions of the conductor exposed portions Wa are further bent into a U shape with the front end edge KC of the lower plate 11a as a bending fulcrum (an operation indicated by an arrow S2 in FIG. 6 and FIG. 9).

[0052] At this time, since the bending operation is performed in a state that the fore-ends Wa1 of the conductor exposed portions Wa are constrained to the through holes 21, the bending can be stably and easily performed. In addition, the bending operation of the conductor exposed portions Wa can be performed while a state of hooking the fore-ends Wa1 of the conductor exposed portions Wa in the through holes 21 is confirmed through the window 15. At the time of bending, the notches 24 are used for bending, and thus the conductor exposed portions Wa can be bent at stable positions without lateral displacement.

[0053] The base-end sides of the conductor exposed portions Wa guided to the lower surface KB side of the lower plate 11a after being bent is, as shown in FIG. 6, housed in the hinge support grooves 26 of the harness support portions 25 arranged on the lower surface KB side of the lower plate 11a. In addition, the parts of the harnesses W with the coatings Wb extending further toward the base-end sides of the harnesses W than the conductor exposed portions Wa are housed in the harness guide grooves 22 in a state of extending rearward of the connector housing 1.

[0054] In this state, as shown in FIG. 3(c) and FIG. 10, the hinge 60 (see FIG. 1 and FIG. 2) is bent and the main plate 51 of the cover 50 is brought into surface matching with the lower surface KB of the housing body 10 (an operation indicated by an arrow F in FIG. 10). Then, the engagement claw 56 of the cover 50 is engaged with the engagement claw 16 of the housing body 10. Thereby, the harnesses W can be clamped between the lower surface KB of the lower plate 11a of the housing body 10 and the main plate 51 of the cover 50.

[0055] Through the above procedure, the connector 2 shown in FIG. 3(c) and FIG. 10 is completed.

[0056] In this connector 2, the base-end sides of the conductor exposed portions Wa at the fore-ends of the harnesses W introduced from the rear toward the front are disposed on the lower surface KB (the first plate surface) of the lower plate 11a of the housing body 10. In addition, the U-shaped bent portions of the conductor exposed portions Wa are disposed at the front end edge

KC of the lower plate 11a. In addition, the fore-end sides of the conductor exposed portions Wa are disposed on the upper surface KA (the second plate surface) side of the lower plate 11a. Moreover, the fore-end sides of the conductor exposed portions Wa are disposed in the harness guide grooves 23 formed on the upper surface of the lower plate 11a and are thereby configured as electric contacts in conductive contact with the electric contacts 202 on the lower surface of the insertion piece 201 of the mating connector 200. In addition, the harnesses W are clamped between the housing body 10 and the cover 50.

[0057] In addition, when the cover 50 is coupled to the housing body 10 in this way, the front frame portion 52 which is a front projecting piece of the cover 50 is engaged with the front end of the housing body 10, and the rear projecting piece 53 of the cover 50 is engaged with the rear end of the housing body 10. Therefore, the movement of the housing body 10 in the front-rear direction can be restricted by the cover 50, and the integral coupling property between the cover 50 and the housing body 10 can be enhanced.

[0058] In addition, because the bent portions of the conductor exposed portions Wa can be housed inside the notches 24, protrusion caused by the bending does not occur at the front end of the lower plate 11a of the housing body 10. Therefore, the front frame portion 52 of the cover 50 can be disposed in close contact with the front end surface of the box 11 of the housing body 10.

[0059] With respect to the connector 2 configured as described above, as shown in FIG. 4 and FIG. 10, the insertion piece 201 of the mating connector 200 can be inserted into the insertion hole 12 of the housing body 10 through the opening 52a of the front frame portion 52 of the cover 50 and the receiving port 12a (an operation indicated by an arrow M in FIG. 10). Then, the electric contacts 202 on the lower surface of the inserted insertion piece 201 can be brought into sliding contact with the conductor exposed portions Wa (the electric contacts) supported on the harness guide grooves 23 of the lower plate 11a of the insertion hole 12. When the mating connector 200 is inserted, a friction force is received in a direction in which the fore-ends Wa1 of the conductor exposed portions Wa are pushed into the deep side of the insertion hole 12. Thus, the harnesses W are not prone to fall off the connector housing 1.

[0060] In addition, since the mating connector 200 is fitted to the housing body 10 through the opening 52a of the front frame 52 having a size covering the entire front end surface of the housing body 10, the coupling property between the housing body 10, the cover 50 and the mating connector 200 is also increased. Therefore, when an external force in the front-rear direction acts on the connector 2 via the harnesses W or the mating connector 200, the coupling between the housing body 10 and the cover 50 can also be prevented from being misaligned or detached.

Furthermore, since the front frame portion 52 and the mating connector 200 are fitted, the cover 50 is supple-

mentarily supported by the mating connector 200. Thus, the cover 50 can be reliably prevented from falling off the housing body 10.

[0061] Moreover, in the above description, an example is described in which when the fore-ends Wa1 of the conductor exposed portions Wa are inserted into the insertion hole 12 of the housing body 10, the fore-ends Wa1 of the conductor exposed portions Wa are hooked into the through holes 21 after the fore-ends Wa1 are bending into a hook shape. However, the present invention is not limited thereto.

[0062] FIG. 11 is a diagram for illustrating another method for incorporating the conductor exposed portions Wa at the fore-ends of the harnesses W in the housing body 10, and is a cross-sectional side view which shows a state that the conductor exposed portions Wa at the fore-ends of the harnesses W are about to be inserted into the insertion hole 12 of the housing body 10 from the front. FIG. 12 is a cross-sectional side view showing a state in which after the state of FIG. 11, the middle portions of the conductor exposed portions Wa are bent into a U shape on the lower surface KB side of the housing body 10, the base-end sides of the harnesses W are extended rearward, and the cover 50 is coupled to the housing body 10 in this state, and thereby the base-end sides of the harnesses W are clamped between the housing body 10 and the cover 50, the connector 2 in which the fore-end sides of the conductor exposed portions Wa serve as the electric contacts inside the insertion hole 12 is completed, and the insertion piece 201 of the mating connector 200 is about to be inserted into the connector 2.

[0063] As shown in FIG. 11, in this example, the fore-ends Wa1 of the conductor exposed portions Wa are inserted into the insertion hole 12 while the conductor exposed portions Wa of the harnesses W are placed in the harness guide grooves 23 of the housing body 10. Besides, the fore-ends Wa1 of the conductor exposed portions Wa in an unbent state are abutted against the conical guide walls 28 of the rear wall 13 at the depth of the insertion hole 12. Then, the fore-ends Wa1 of the conductor exposed portions Wa are held inside the conical guide walls 28, and the fore-ends Wa1 of the conductor exposed portions Wa can be guided downward.

[0064] In this state, the middle portions of the conductor exposed portions Wa are bent into a U shape inside the notches 24 with the front end edge KC of the lower plate 11a as the bending fulcrum. In this bending, since the parts inserted into the conical guide walls 28 are fixed to the conical guide walls 28, the fore-ends Wa1 of the conductor exposed portions Wa do not float due to the reaction caused by the bending. Therefore, the bending can be stably performed. In addition, positions of the fore-ends Wa1 of the conductor exposed portions Wa (the parts inserted into the conical guide walls 28) can be confirmed from the upper side or the lower side of the housing body 10 through the window 15 or the through holes 21. Accordingly, bending failure due to the reaction during the bending can be prevented, and precision of

the positions of the conductor exposed portions Wa arranged in the harness guide grooves 23 and the positions of the bending can be improved.

[0065] After being bent into a U-shape, the harnesses W are arranged as in the previous example, the hinge 60 (see FIG. 1 and FIG. 2) is bent, and the main plate 51 of the cover 50 is brought into surface matching with the lower surface KB of the housing body 10. Then, by engaging the engagement claw 56 of the cover 50 with the engagement claw 16 of the housing body 10, the harnesses W are clamped between the housing body 10 and the cover 50 as shown in FIG. 12. Thereby, the connector 2 can be completed.

[0066] Moreover, in the above description, the case is described in which the conductor exposed portions Wa in an unbent state are inserted into the housing body 10, and the middle portions of the exposed conductor portion Wa are bent into a U shape using the front end edge KC of the lower plate 11a.

However, it is not always necessary to bend the conductor exposed portions Wa into a U shape after the conductor exposed portions Wa are introduced into the housing body 10. That is, the conductor exposed portions Wa may be previously bent in a U shape, and the conductor exposed portions Wa bent in a U shape may be incorporated into the housing body 10. In that case, the U-shaped bent portions are arranged at the front end edge KC of the housing body 10, and the sides of the conductor exposed portions Wa closer to the fore-end than the U-shaped bent portions are inserted into the insertion hole 12 and are arranged in the harness guide grooves 23 on the upper surface KA side of the lower plate 11a. In addition, the sides of the conductor exposed portions Wa closer to the base-end than the U-shaped bent portions are disposed in the harness support grooves 26 of the lower surface KB of the lower plate 11a of the housing body 10, and the parts of the harnesses W with the coatings Wb are disposed in the harness guide grooves 22. The subsequent procedures are the same as described above.

[0067] In addition, in the above description, the case is described in which the fore-ends Wa1 of the conductor exposed portions Wa of the harnesses W are disposed on the upper surface KA of the lower plate 11a of the housing body 10, and the parts of the conductor exposed portions Wa closer to the base-end sides than the U-shaped bent portions are disposed on the lower surface KB of the lower plate 11a.

However, as shown in FIG. 13, the housing body 10 may also be configured in a manner that the parts of the conductor exposed portions Wa of the harnesses W closer to the base-end sides than the U-shaped bent portions are disposed on the upper surface KA of the lower plate 11a, and the fore-ends Wa1 of the conductor exposed portions Wa of the harnesses W are disposed on the lower surface KB of the lower plate 11a.

<Second embodiment

[0068] Next, a connector housing according to a second embodiment of the present invention and a connector configured using the connector housing are described with reference to FIG. 14-FIG. 17.

[0069] Here, the difference between the first embodiment described above and the second embodiment is that the connector housing 1 of the first embodiment has a one-component configuration in which the housing body 10 and the cover 50 are connected by the hinge 60, whereas the connector housing of the second embodiment has a two-component configuration in which the housing body and the cover are separated.

The other major differences are as follows.

[0070] That is, in the first embodiment, the base-end sides of the conductor exposed portions Wa are disposed on the lower surface KB side of the lower plate 11a of the housing body 10, and the fore-end sides of the conductor exposed portions Wa are disposed on the upper surface KA side of the lower plate 11a of the housing body 10. Besides, the fore-end sides of the conductor exposed portions Wa serve as the electric contacts. In contrast, in the second embodiment, the base-end sides of the conductor exposed portions Wa are disposed on an upper surface KA side of a lower plate 11a of a housing body 10, and the fore-end sides of the conductor exposed portions Wa are disposed on a lower surface KB of the lower plate 11a of the housing body 10. Besides, the fore-end sides of the conductor exposed portions Wa serve as electric contacts.

[0071] Due to the differences, positions in which the fore-ends of the harnesses W are introduced into the connector housing (or positions in which the harnesses W are extracted from the connector housing) differ between the first embodiment and the second embodiment. That is, in the first embodiment, the introduction positions are between the lower surface KB of the housing body 10 and the cover 50. On the other hand, in the second embodiment, the introduction positions are penetration holes 121 (described later) in a rear wall 113 of the housing body 110.

[0072] FIG. 14 is a perspective view in which a state before use of a connector housing 101 in the second embodiment of the present invention is viewed from a diagonally upper front side, and FIG. 15 is a perspective view viewed from a diagonally lower front side.

[0073] The connector housing 101 of the second embodiment shown in FIG. 14 and FIG. 15 is also a main component for configuring a two-wire type connector connected to a power supply terminal (a mating connector) of a hub dynamo. The connector housing 101 of this embodiment has the housing body 110 and a cover 150 which are separately molded from resin. Since the directionality of the members is the same as that of the first embodiment, the description thereof is omitted.

[0074] As shown in FIG. 14 and FIG. 15, the housing body 110 has a box 111 being a rectangular shape in which the dimension in the up-down direction is smaller than the dimension in the left-right direction when viewed from the front. The box 111 is configured by surrounding four sides with a lower plate 111a, an upper plate 111b facing the lower plate 111a, and a left plate 111c and a right plate 111d connecting the lower plate 111a and the upper plate 111b. The inside of the box 111 is configured as an insertion hole 112 into which a strip-like insertion piece 201 (see FIG. 4) of a mating connector 200 is inserted. A front surface of the insertion hole 112 is open as a receiving port 112a for receiving the insertion piece 201 of the mating connector 200. A depth portion of the insertion hole 112 of the box 111 is blocked by the rear wall 113.

[0075] Outer peripheral surfaces of upper half portions of the left plate 111c and the right plate 111d of the box 111 and an outer peripheral surface of the upper plate 111b of the box 111 are integrated so as to cover a plate-shaped rib 114 having a U shape in a front view. Engagement claws 116 (coupling parts) are respectively arranged on outer sides of a left end portion and a right end portion of the lower plate 111a of the box 111.

[0076] The lower plate 111a of the box 111 is configured as a board for assembling the conductor exposed portions Wa at the fore-ends of the harnesses W. The lower plate 111a serving as the board has parts which function as a first plate surface, a front end edge, and a second plate surface described later, respectively. That is, the lower plate 111a serving as the board has a front end edge KC where the U-shaped bent portions of the conductor exposed portions Wa are disposed. In addition, the lower plate 111a has an upper surface KA (an inner bottom surface of the insertion hole 12) serving as the first plate surface where parts of the conductor exposed portions Wa closer to the base-end sides than the U-shaped bent portions are disposed along the front-rear direction. In addition, the lower plate 111a has a lower surface KB serving as the second plate surface where parts of the conductor exposed portions Wa closer to the fore-end sides than the U-shaped bent portions are disposed along the front-rear direction.

[0077] On the upper surface KA (corresponding to one plate surface) of the lower plate 111a of the housing body 110, along the front-rear direction, two harness holding projection portions 120 are arranged in parallel and spaced from each other in the left-right direction Y. On upper surfaces of the harness holding projection portions 120, harness guide grooves (harness guide portions) 123 are arranged on which the fore-end sides of the conductor exposed portions Wa are placed. By arranging the base-end sides of the conductor exposed portions Wa (closer to the base-end sides than the U-shaped bent portions) in the harness guide grooves 123, the base-end sides of the conductor exposed portions Wa can be used as electric contacts.

[0078] At front edge portions of the harness guide

grooves 123, notches 124 are arranged which guide the bending when the middle portions of the conductor exposed portions Wa are bent into a U shape and serve as fulcrums for bending, the notches 124 being V-shaped or U-shaped when viewed from above. In addition, on the rear wall 113 which blocks a rear end of the box 111, two penetration holes 121 into which the conductor exposed portions Wa are inserted from the rear are arranged. The penetration holes 121 are positioned on extension of the harness guide grooves 123 in a manner that the conductor exposed portions Wa introduced from the penetration holes 121 are directly placed on the harness guide grooves 123.

[0079] In addition, on the lower surface of the housing body 110, that is, the lower surface KB of the lower plate 111a, two harness support grooves 126 are arranged corresponding to the two harness guide grooves 123 on the upper surface KA of the lower plate 111a. The harness support grooves 126 extend rearward from the front end edge of the lower plate 111a and have fore-ends which are dead ends.

[0080] The lower surface KB of the housing body 110 is a plate surface in surface matching with the cover 150 is. The cover 150 has a main plate 151 including a plate surface which is in surface matching with the lower surface KB of the housing body 110. In FIG. 14, the plate surface which is visible from above is a matching surface of the main plate 151. The fore-end sides of the conductor exposed portions Wa are clamped between the plate surface and the lower surface KB of the housing body 110. On the matching surface of the cover 150, two harness support grooves 154 are arranged corresponding to the harness support grooves 126 on the lower surface of the housing body 110. The harness support grooves 154 also extend rearward from a front end edge of the main plate 151 and have fore-ends which are dead ends.

[0081] Engagement claws 156 (coupling part) which are elastically engaged with the engagement claws 116 on the housing body 110 side when the main plate 151 is matched with the housing body 110 are arranged on both end portions in the left-right direction of the main plate 151. The engagement claws 116, 156 are engaged with each other when the housing body 110 and the cover 150 are brought into surface matching in the state that the harnesses W are clamped between the housing body 110 and the cover 150, and thereby the housing body 110 and the cover 150 are coupled integrally. In addition, by disengaging the engagement between the engagement claws 116 on the housing body 110 side and the engagement claws 156 on the cover 150 side, the coupling between the housing body 110 and the cover 150 can be released.

[0082] A front frame portion 152 is arranged as a front projecting piece at the front end of the cover 150. The front frame portion 152 is arranged to cover the front surface of the housing body 110 when the cover 150 is coupled to the housing body 110. By being arranged to cover the front surface of the housing body 110 in this way, the

front frame portion 152 can restrict the housing body 110 from moving forward in a state of being engaged with the front end of the housing body 110. In addition, an opening 152a which opens the receiving port 112a of the insertion hole 112 of the housing body 110 at the front is arranged in the front frame portion 152.

[0083] In addition, a rear projecting piece 153 is arranged at the rear end of the cover 150. The rear projecting piece 153 is engaged with the rear end of the housing body 110 when the cover 150 is coupled to the housing body 110. Thereby, the housing body 110 is restricted from moving rearward.

[0084] Next, a procedure of assembling the connector using the connector housing 101 with the above configuration is described.

[0085] FIG. 16 is a perspective view showing a state that the conductor exposed portions Wa at the fore-ends of the harnesses W are about to be inserted from the rear into the penetration holes 121 which are arranged in the rear wall 113 of the housing body 110 of the connector housing 101. FIG. 17 is a perspective view showing a state that the fore-end sides of the conductor exposed portions Wa inserted into the housing body 110 after the state of FIG. 16 are about to be bent in a U shape on the lower surface side of the housing body 110.

[0086] When the connector is assembled using this connector housing 101, first, as shown in FIG. 16, the fore-ends Wa1 of the conductor exposed portions Wa of the harnesses W are inserted into the insertion hole 112 from the penetration holes 121 arranged on the rear wall 113 of the connector housing 101 (an operation indicated by an arrow S1). The base-end sides of the inserted conductor exposed portions Wa are placed on the harness guide grooves 123 as shown in FIG. 17. Then, the fore-end sides of the conductor exposed portions Wa protruding from the harness guide grooves 123 are bent downward while the middle portions are housed in the notches 124, and are directly bent in a U shape along the lower surface KB of the housing body 110 (an operation indicated by an arrow S2). At this time, since the base-end sides of the conductor exposed portions Wa are held and fixed in the penetration holes 121, the bending can be stably and easily performed. Then, the fore-end sides of the conductor exposed portions Wa are disposed in the harness support grooves 126 of the lower surface KB of the housing body 110.

[0087] In this state, the main plate 151 of the cover 150 is brought into surface matching with the lower surface KB of the housing body 10 (an operation indicated by an arrow F in FIG. 17). Then, the engagement claws 156 of the cover 150 are engaged with the engagement claws 116 of the housing body 110. Thereby, the fore-end sides of the conductor exposed portions Wa of the harnesses W can be clamped between the lower surface KB of the lower plate 111a of the housing body 110 and the main plate 151 of the cover 150.

[0088] Through the above procedure, the connector is completed. In this connector, the base-end sides of the

conductor exposed portions Wa at the fore-ends of the harnesses W introduced from the rear toward the front are disposed on the upper surface KA (the first plate surface) of the lower plate 111a of the housing body 110. In addition, the U-shaped bent portions of the conductor exposed portions Wa are arranged at the front end edge KC of the lower plate 111a. In addition, the fore-end sides of the conductor exposed portions Wa are arranged on the lower surface KB (the second plate surface) side of the lower plate 111a. Moreover, the base-end sides of the conductor exposed portions Wa are disposed in the harness guide grooves 123 formed on the upper surface of the lower plate 111a and are thereby configured as electric contacts in conductive contact with the electric contacts 202 on the lower surface of the insertion piece 201 of the mating connector 200. In addition, the fore-end sides of the conductor exposed portions Wa are clamped between the housing body 110 and the cover 150.

[0089] In addition, when the cover 150 is coupled to the housing body 110 in this way, the front frame portion 152 which is the front projecting piece of the cover 150 is engaged with the front end of the housing body 110, and the rear projecting piece 153 of the cover 150 is engaged with the rear end of the housing body 110. Therefore, the movement of the housing body 110 in the front-rear direction can be restricted by the cover 150, and the integral coupling property between the cover 150 and the housing body 110 can be enhanced.

[0090] In addition, because the bent portions of the conductor exposed portions Wa can be housed inside the notches 124, protrusion caused by the bending does not occur at the front end of the lower plate 111a of the housing body 110. Therefore, the front frame portion 152 of the cover 150 can be disposed in close contact with the front end surface of the box 111 of the housing body 110.

[0091] With respect to the connector configured as described above, similarly to the first embodiment, the insertion piece 201 of the mating connector 200 can be inserted into the insertion hole 112 of the housing body 110 through the opening 152a of the front frame portion 152 of the cover 150 and the receiving port 112a. Then, the electric contacts 202 on the lower surface of the inserted insertion piece 201 can be brought into sliding contact with the conductor exposed portions Wa (the electric contacts) supported on the harness guide grooves 123 of the lower plate 111a of the insertion hole 112.

[0092] In addition, since the mating connector 200 is fitted into the housing body 110 through the opening 152a of the front frame portion 152 having a size covering the entire front end surface of the housing body 110, coupling property between the housing body 110, the cover 150, and the mating connector 200 is also increased. Therefore, when an external force in the front-rear direction acts on the connector via the harnesses W or the mating connector 200, the coupling between the housing body

110 and the cover 150 can also be prevented from being misaligned or detached.

[0093] Meanwhile, when the conductor exposed portions Wa are bent into a U shape, the conductor exposed portions Wa can also be pushed and bent by the cover 150. In that case, the cover 150 is directly coupled to the housing body 110, and thereby the fore-end sides of the conductor exposed portions Wa can be clamped between the housing body 110 and the cover 150.

[0094] Moreover, the present invention is not limited to the above-described embodiments, and includes various modifications made to the above-described embodiments without departing from the gist of the present invention.

[0095] For example, in the above embodiments, the cases are shown in which two harnesses W are introduced into the connector housings 1, 101, but the number of the harnesses to be introduced may also be one or three or more. Accordingly, the number of the parts for supporting the conductor exposed portions may be changed.

[Reference Signs List]

[0096]

1, 101	connector housing
10, 110	housing body
11, 111	box
11a, 111a	lower plate (board)
11b, 111b	upper plate
11c, 111c	left plate
11d, 111d	right plate
12, 112	insertion hole
12a, 112a	receiving port
13, 113	rear wall
15	window
16, 56, 116, 156	engagement claw (coupling part)
21	through hole
22	harness guide groove
23, 123	harness guide groove (harness guide portion)
24, 124	notch
26, 126, 154	harness support groove
28	conical guide wall
50, 150	cover
51, 151	main plate
52, 152	front frame portion (front projecting piece)
52a, 152a	opening
53, 153	rear projecting piece
60	hinge
121	penetration hole
200	mating connector
201	insertion piece
202	electric contact
KA	upper surface (one plate surface, the other plate surface)

KB	lower surface (the other plate surface, one plate surface)
KC	front end edge
W	harness
5 Wa	conductor, conductor exposed portion
Wa1	fore-end

10 Claims

1. A connector housing, comprising:
 - a board which supports a conductor exposed portion bent in a U shape at a fore-end of a harness when a direction in which a mating connector is fitted is set as the front, wherein the board has a front end edge where a U-shaped bent portion of the conductor exposed portion is arranged, a first plate surface on which a part of the conductor exposed portion closer to a base-end side than the U-shaped bent portion is arranged along a front-rear direction, and a second plate surface on which a part of the conductor exposed portion closer to a fore-end side than the U-shaped bent portion is arranged along the front-rear direction;
 - a harness guide portion which is arranged on one plate surface of the first plate surface and the second plate surface and support the part on the fore-end side or the part on the base-end side of the conductor exposed portion which is arranged on the one plate surface, the part serving as an electric contact which is in conductive contact with an electric contact of the mating connector;
 - a cover which clamps the harness between the board and the cover by being in surface matching with other plate surface of the first plate surface and the second plate surface;
 - a coupling part which couples the board and the cover and releases the coupling in a state when the harness is clamped therebetween; and
 - a front projecting piece and a rear projecting piece which are arranged at a front end and a rear end of the cover, and restrict, by being respectively engaged with a front end and a rear end of the board, a position of the board in the front-rear direction when the cover is coupled to the board.

2. The connector housing according to claim 1, comprising a box, wherein an insertion hole into which a insertion piece being strip-like of the mating connector is inserted is formed by enclosing four sides with a lower plate, an upper plate facing the lower plate, left and right plates connecting the lower plate and the upper plate, and an opening in a front surface

serves as a receiving port of the insertion piece into the insertion hole, wherein the board is arranged as the lower plate of the box, the one plate surface of the board on which the harness guide portion is formed serves as an upper surface of the lower plate configuring an inner surface of the insertion hole, and the other plate surface of the board in surface matching with the cover to clamp the harness serves as a lower surface of the lower plate, and the front projecting piece of the cover is formed as a front frame portion which covers the front surface of the box when the cover is coupled to the box, and an opening for opening the receiving port at the front is arranged in the front frame portion.

3. The connector housing according to claim 2, wherein a notch where the U-shaped bent portion of the conductor exposed portion is housed is arranged at a front edge portion of the harness guide portion.

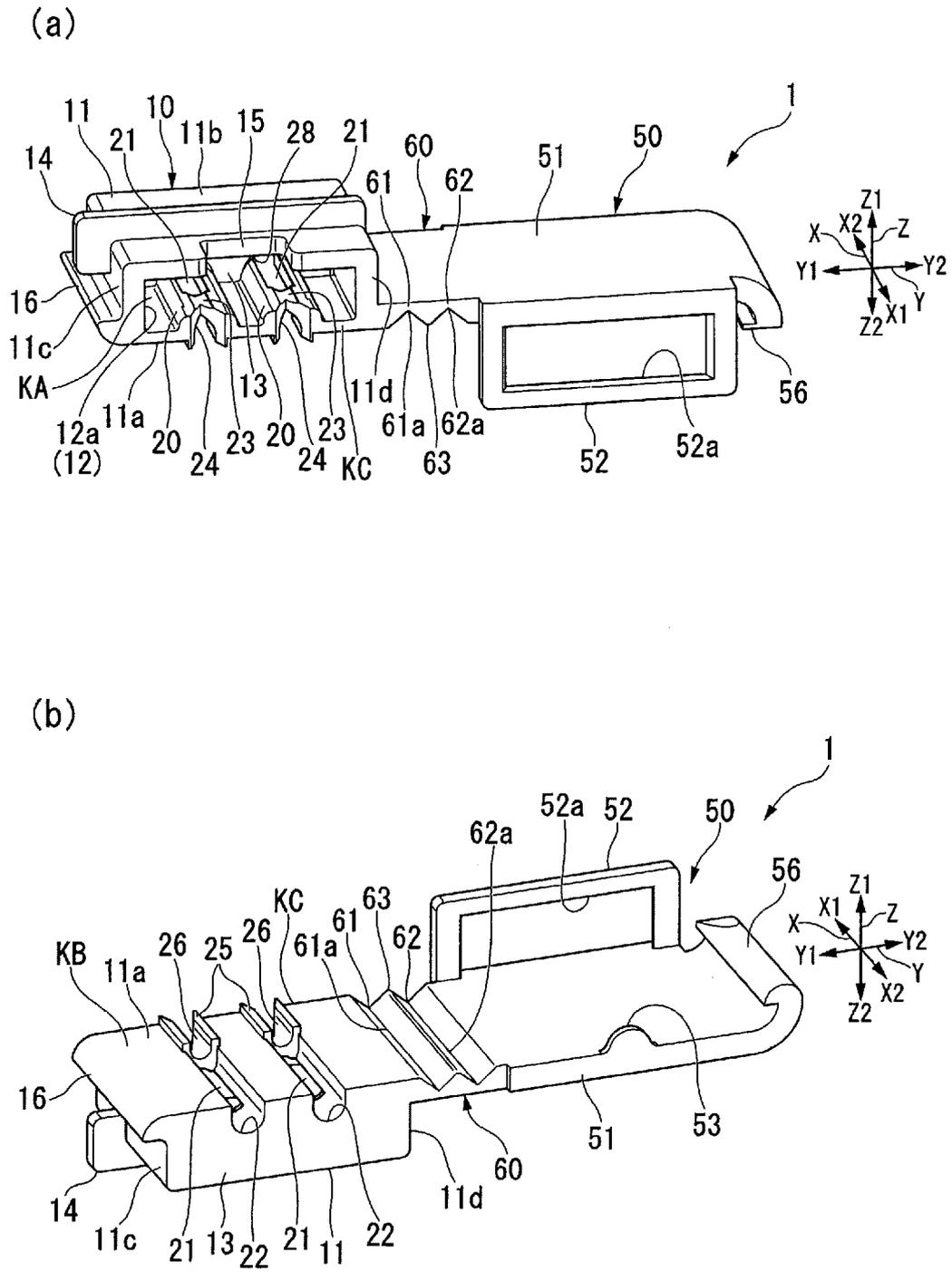
4. The connector housing according to claim 2 or claim 3, wherein a through hole which penetrate from the one plate surface to the other plate surface of the board is arranged at a rear portion of the harness guide portion.

5. The connector housing according to claim 4, wherein a window through which the through hole can be visually recognized from the outside is arranged in the upper plate of the box.

6. The connector housing according to any one of claims 2 to 5, wherein the box is arranged as a part of a housing body, and the cover is integrally connected to the housing body via a bendable hinge.

7. A connector which is configured to introduce the fore-end of the harness to the connector housing according to any one of claims 1-6, wherein the U-shaped bent portion of the conductor exposed portion at the fore-end of the harness is arranged at a front end edge of the board, the part of the conductor exposed portion closer to the fore-end side than the U-shaped bent portion is arranged on the first plate surface of the board along the front-rear direction, and the part of the conductor exposed portion closer to the base-end side than the U-shaped bent portion is arranged on the second plate surface of the board along the front-rear direction; the part on the fore-end side or the part on the base-end side of the conductor exposed portion is disposed in the harness guide portion which is arranged on one plate surface of the first plate surface and the second plate surface, and thereby the base-end side or the fore-end side of the conductor exposed portion is configured as an electric contact which is in conductive contact with an electric contact of the mating

connector; the harness is clamped between the cover and the board by bringing the cover into surface matching with the other plate surface of the first plate surface and the second plate surface of the board; and the cover is coupled to the board by the coupling part in this state, and thereby the front projecting piece and the rear projecting piece which are formed in the cover are respectively engaged with the front end and the rear end of the board.



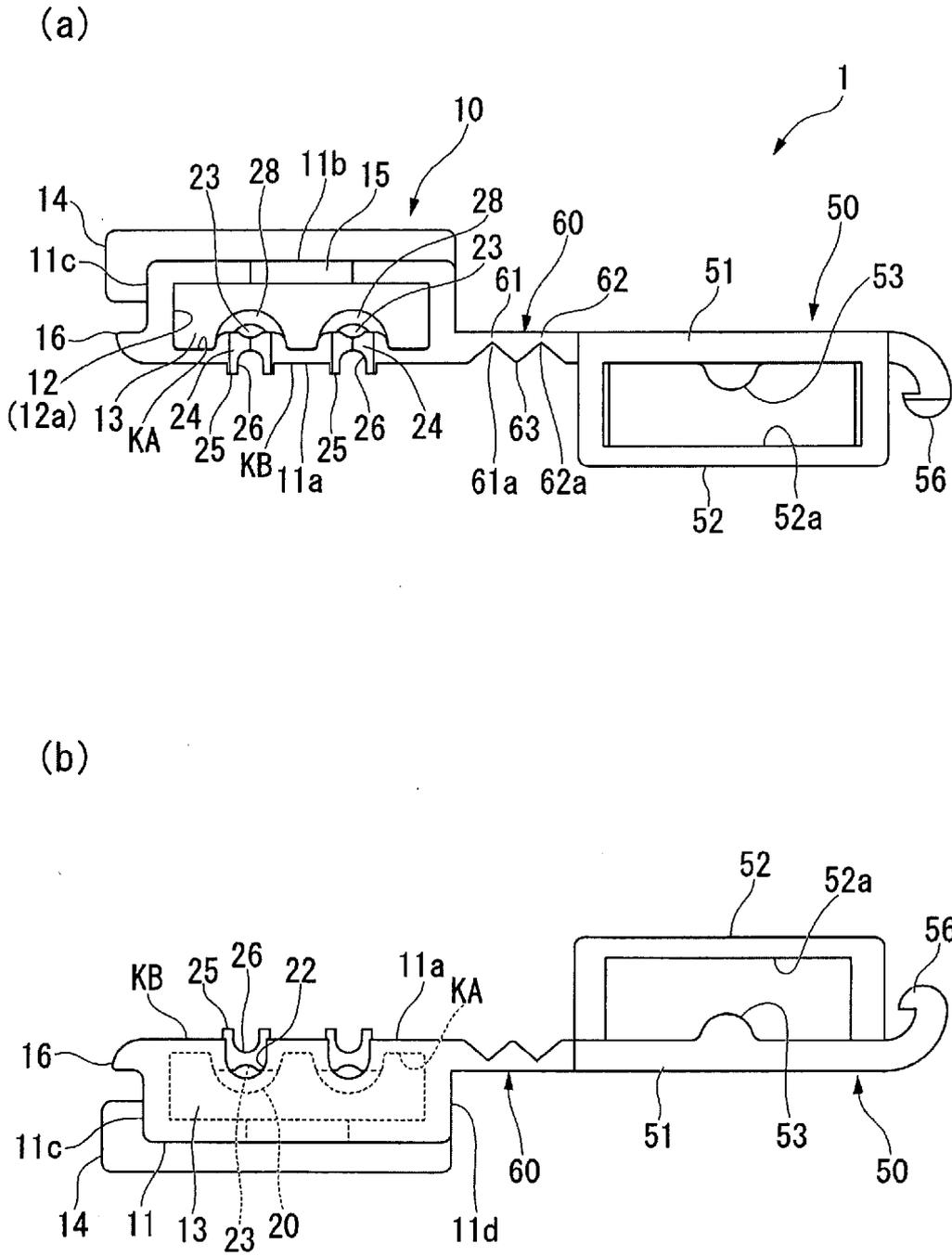


FIG. 2

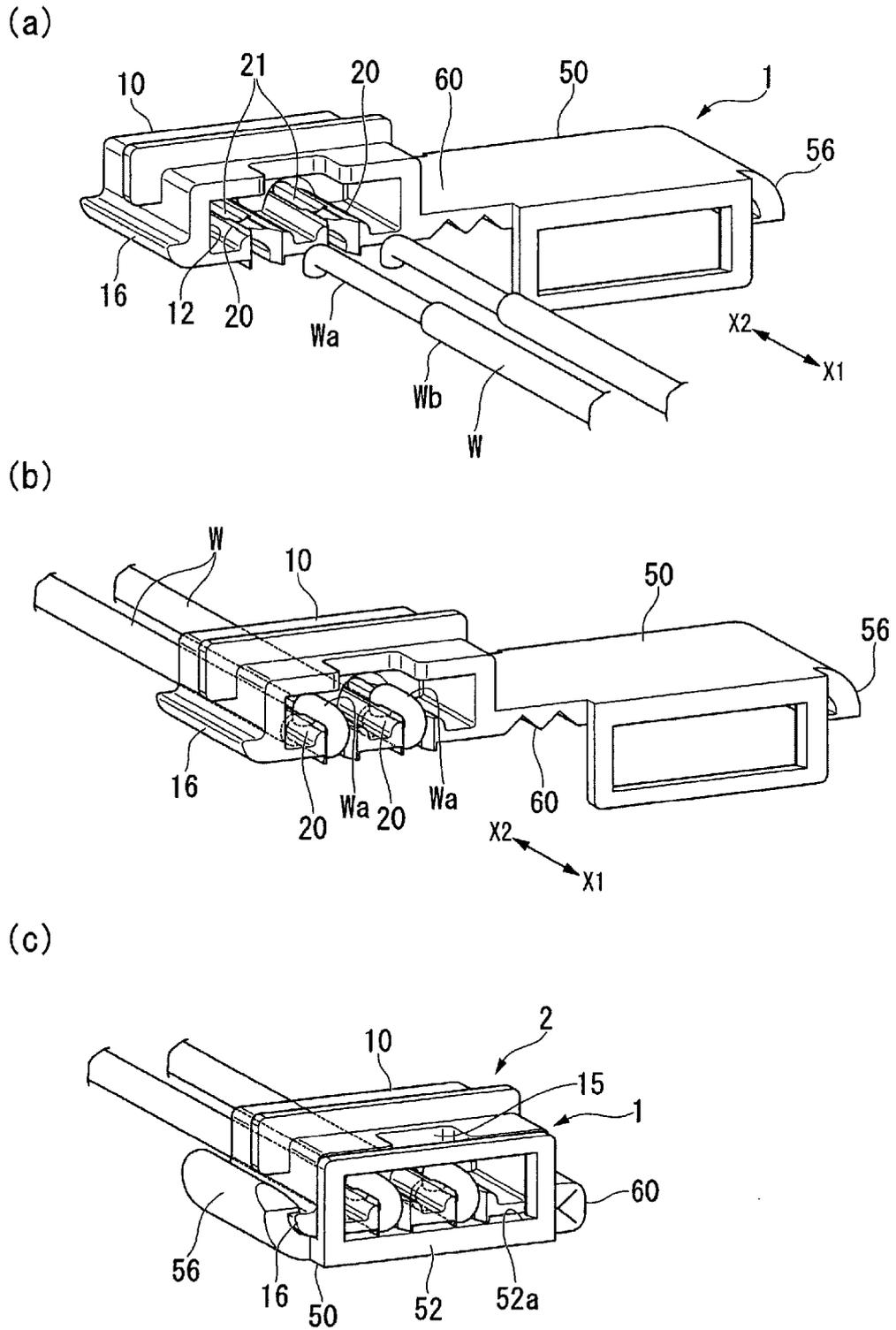


FIG. 3

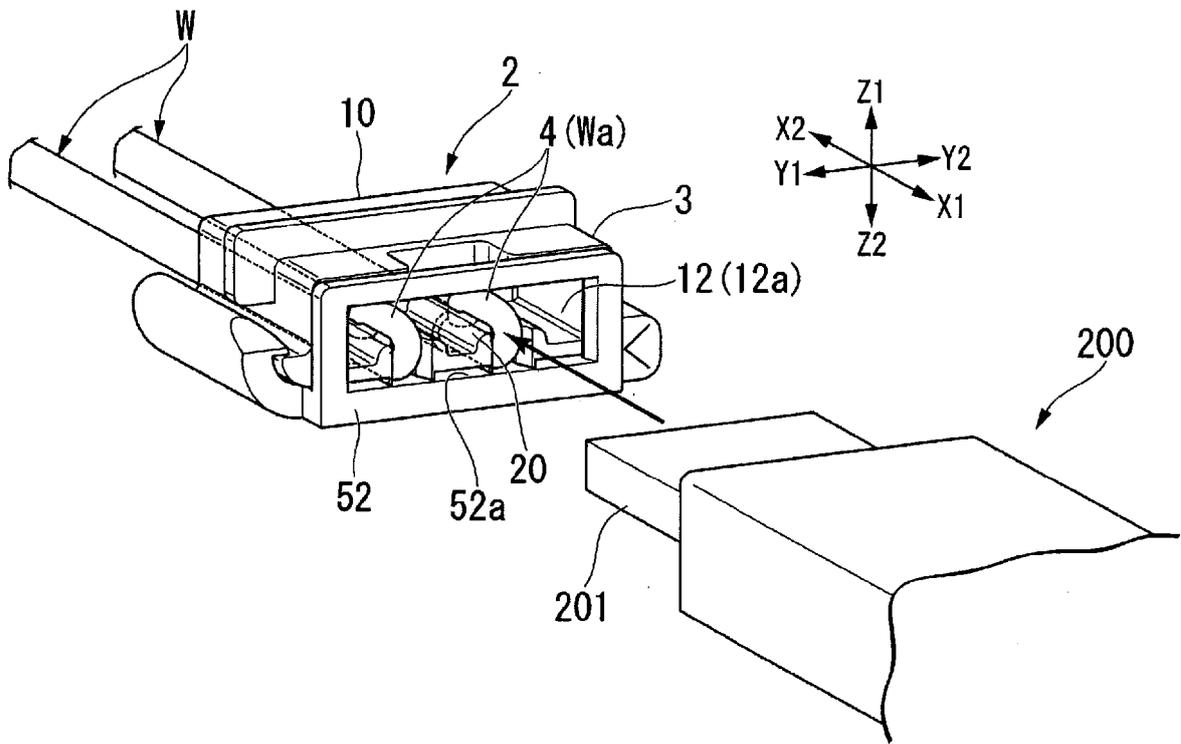


FIG. 4

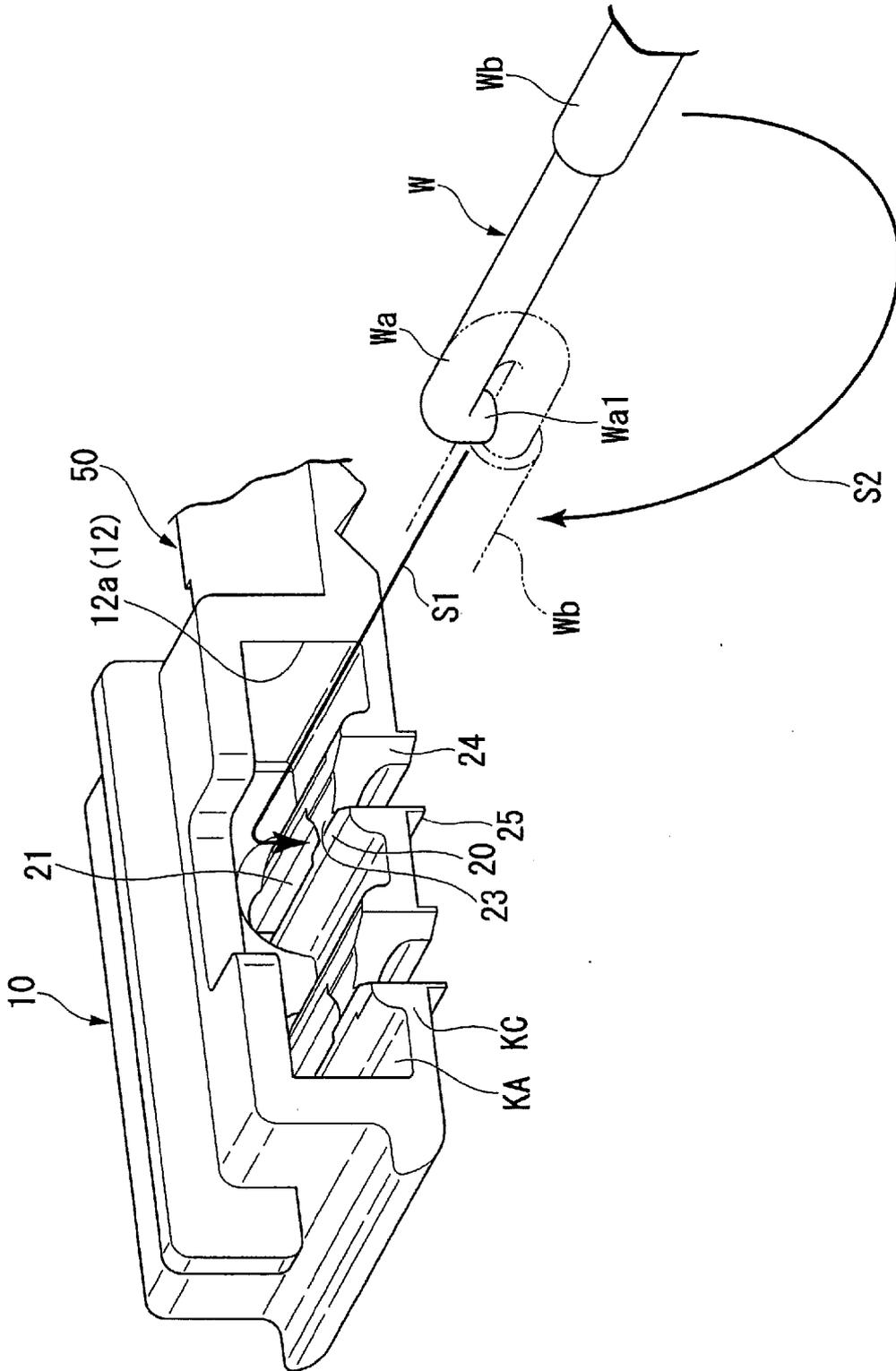


FIG. 5

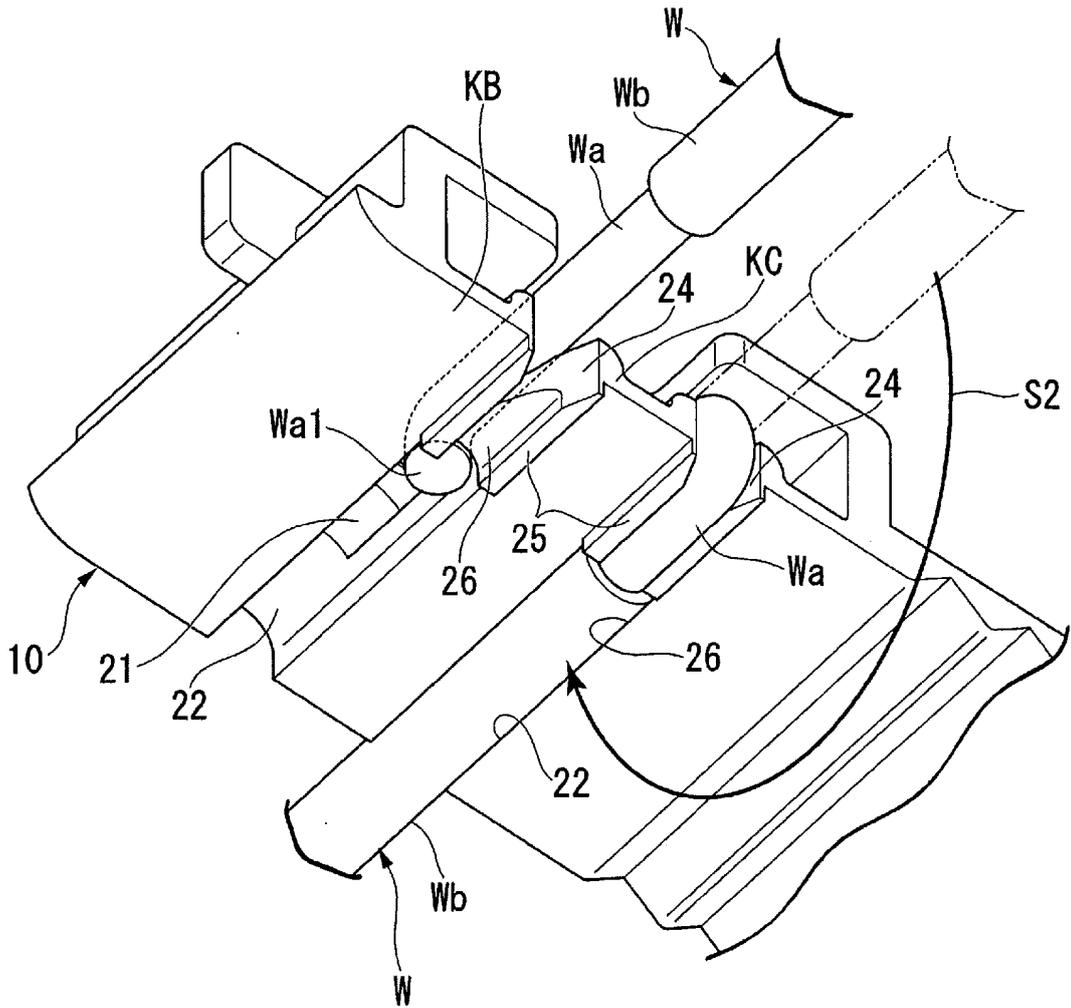


FIG. 6

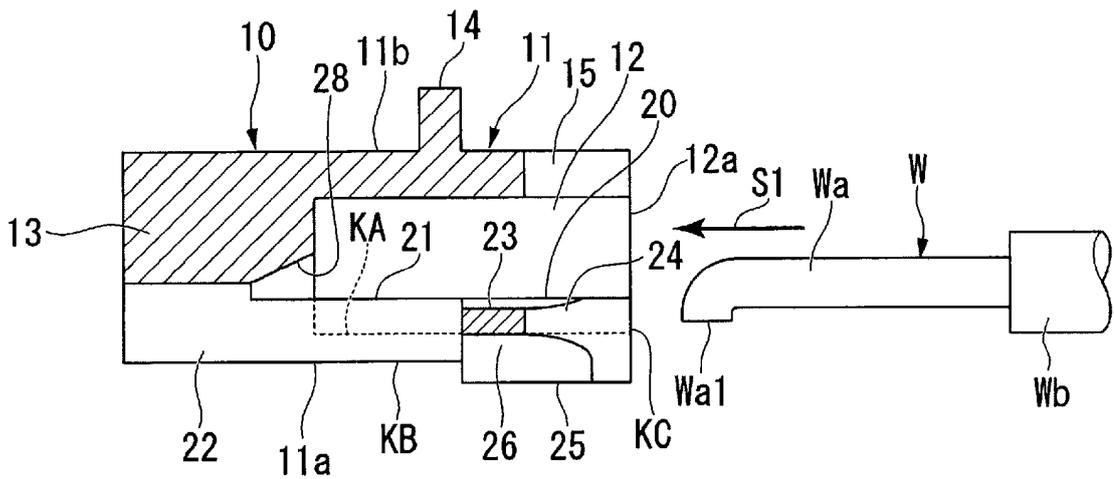


FIG. 7

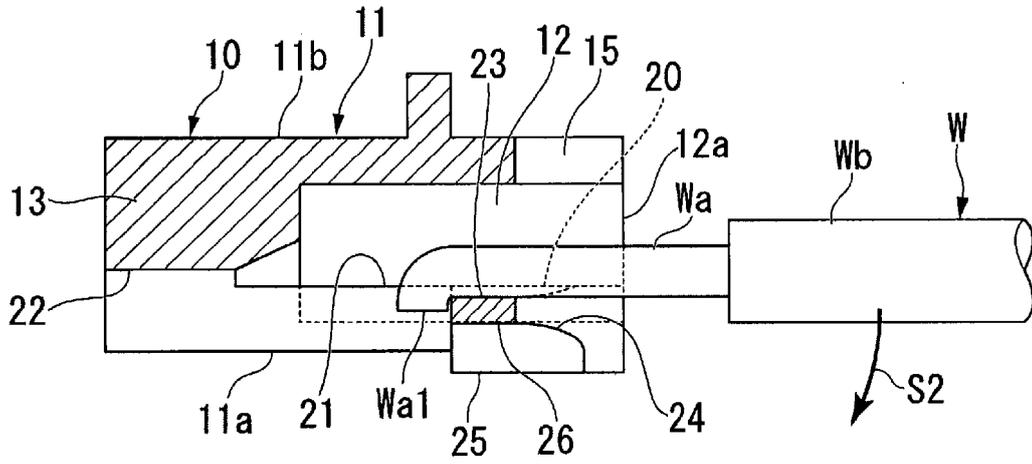


FIG. 8

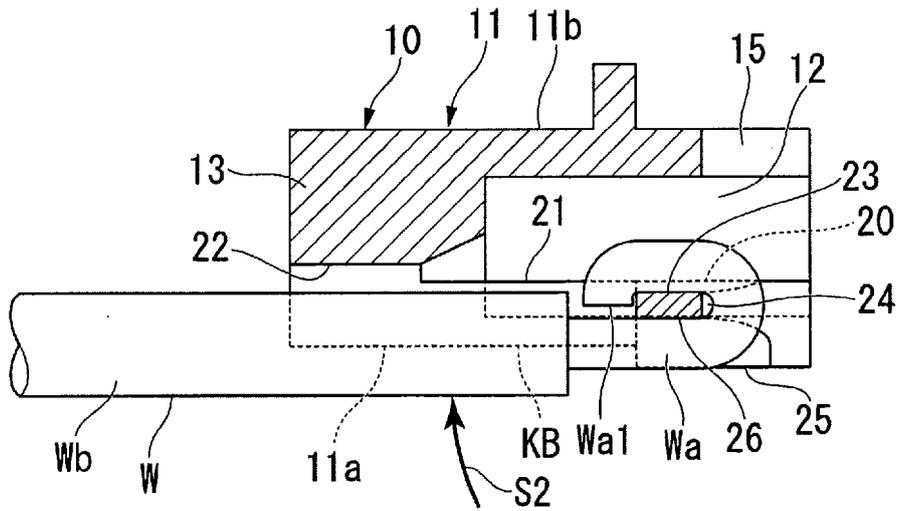


FIG. 9

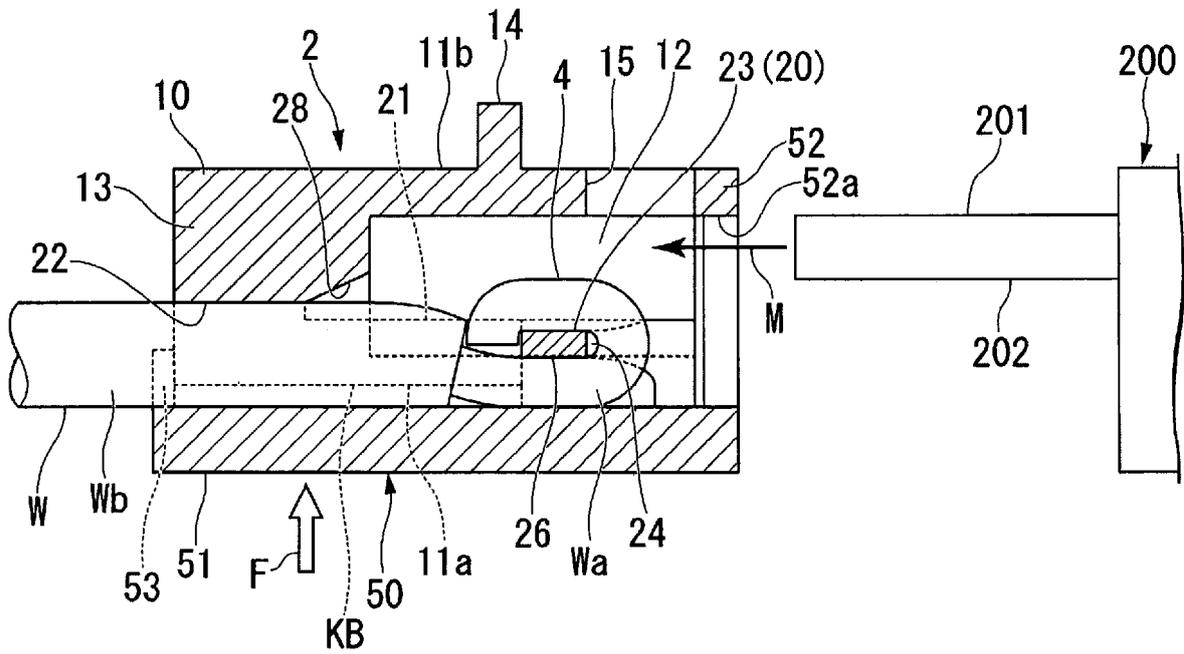


FIG. 10

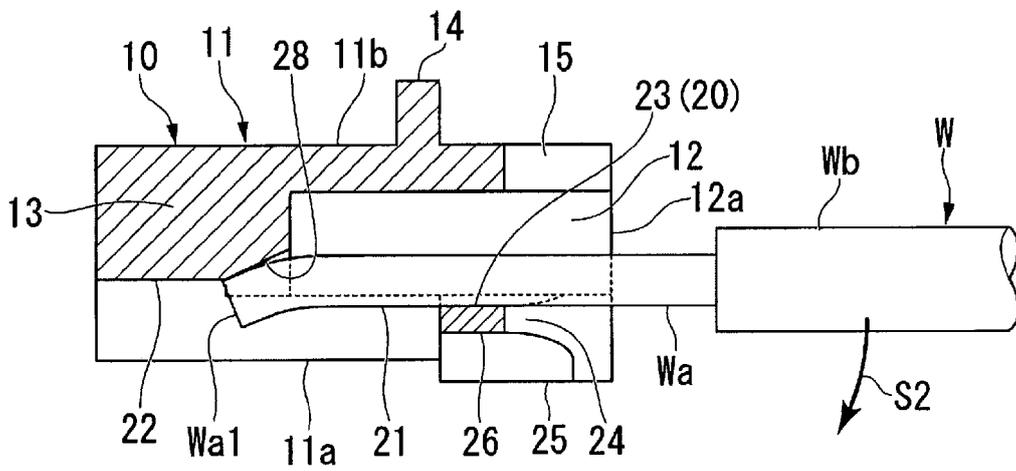


FIG. 11

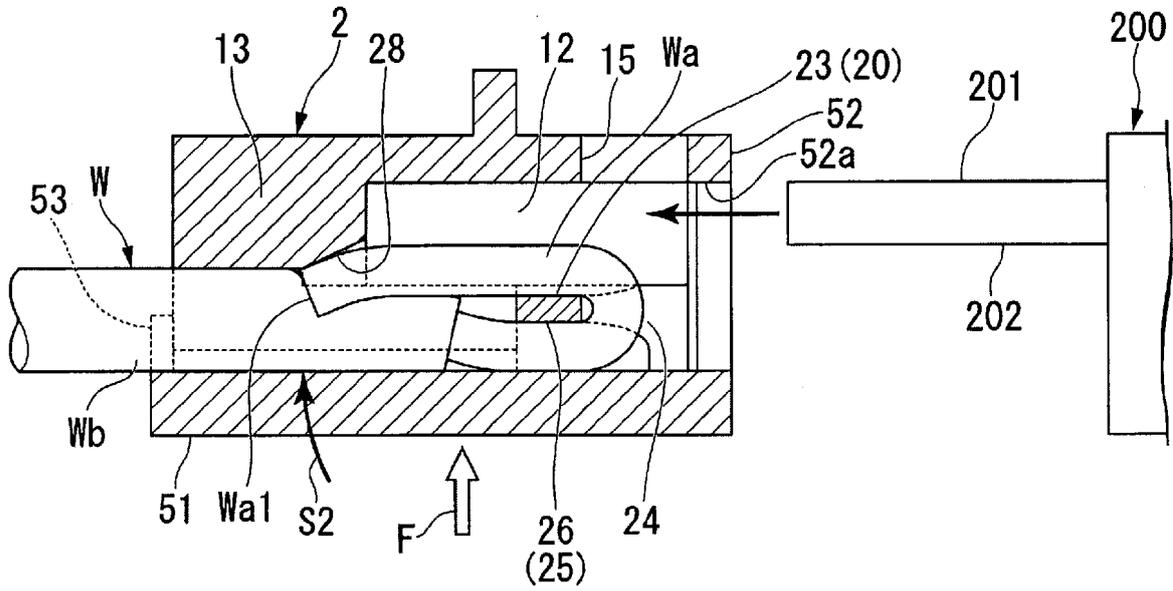


FIG. 12

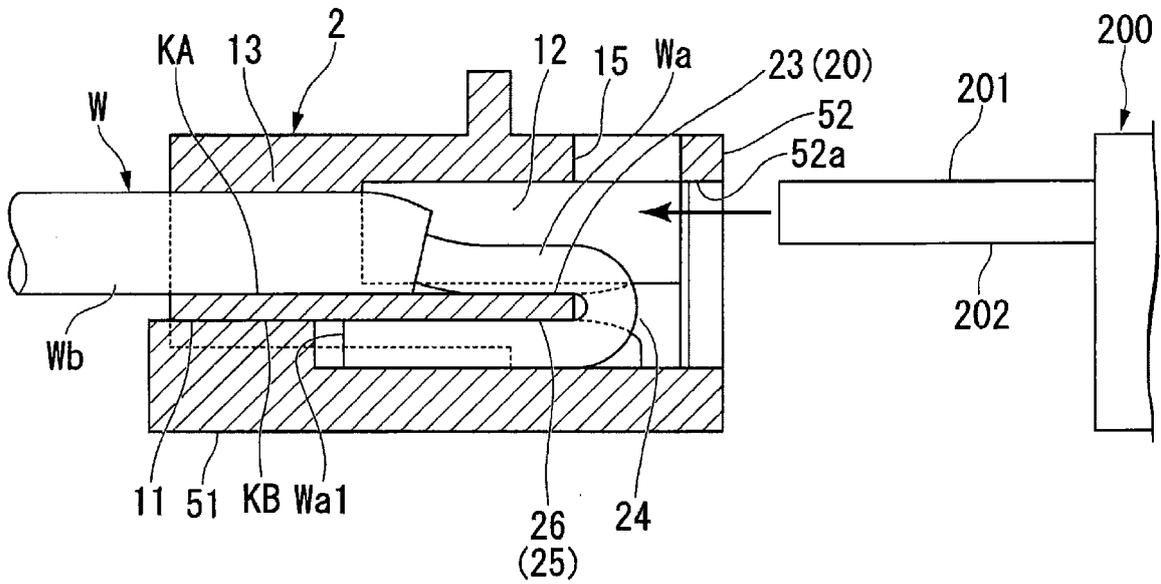


FIG. 13

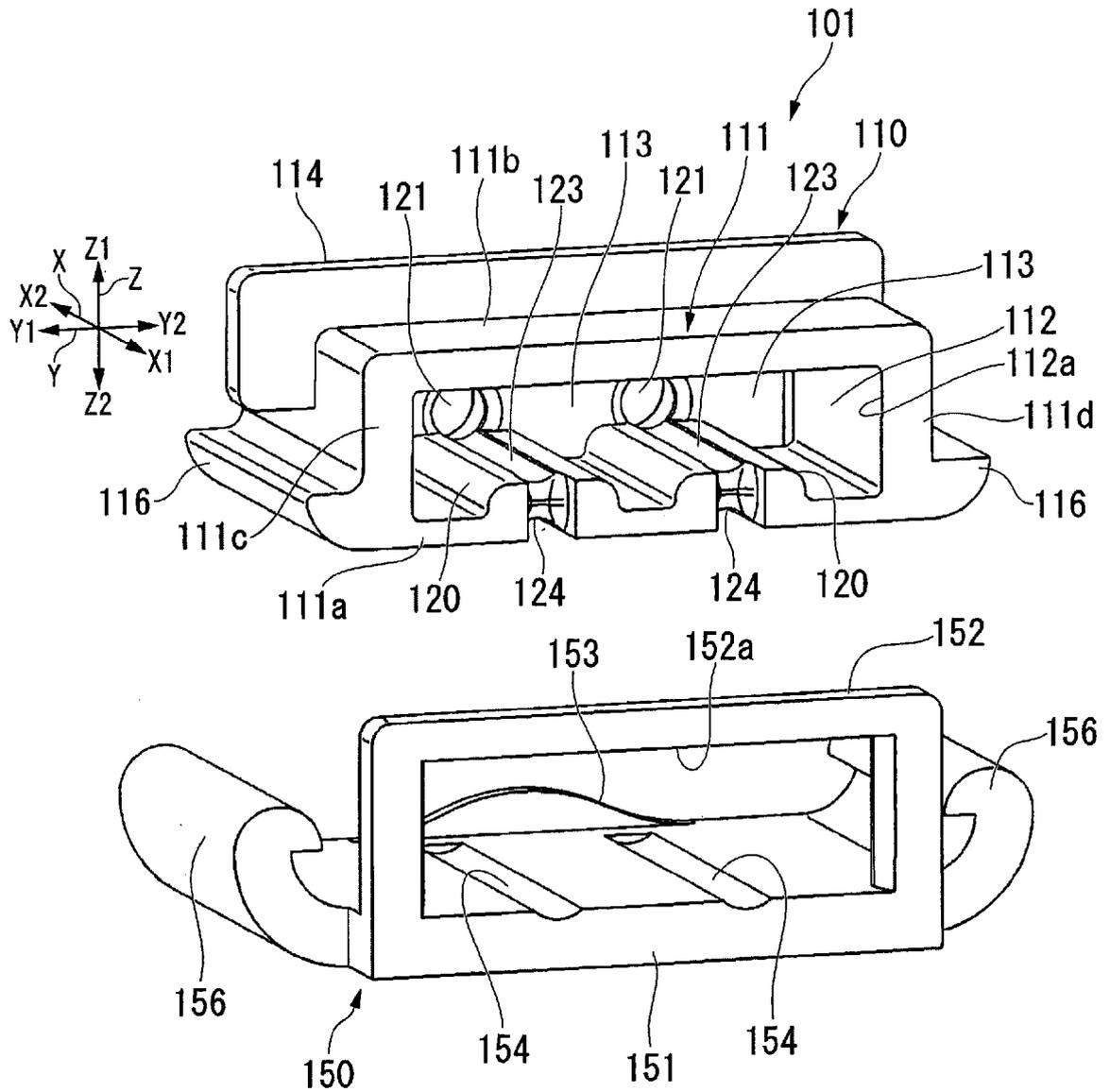


FIG. 14

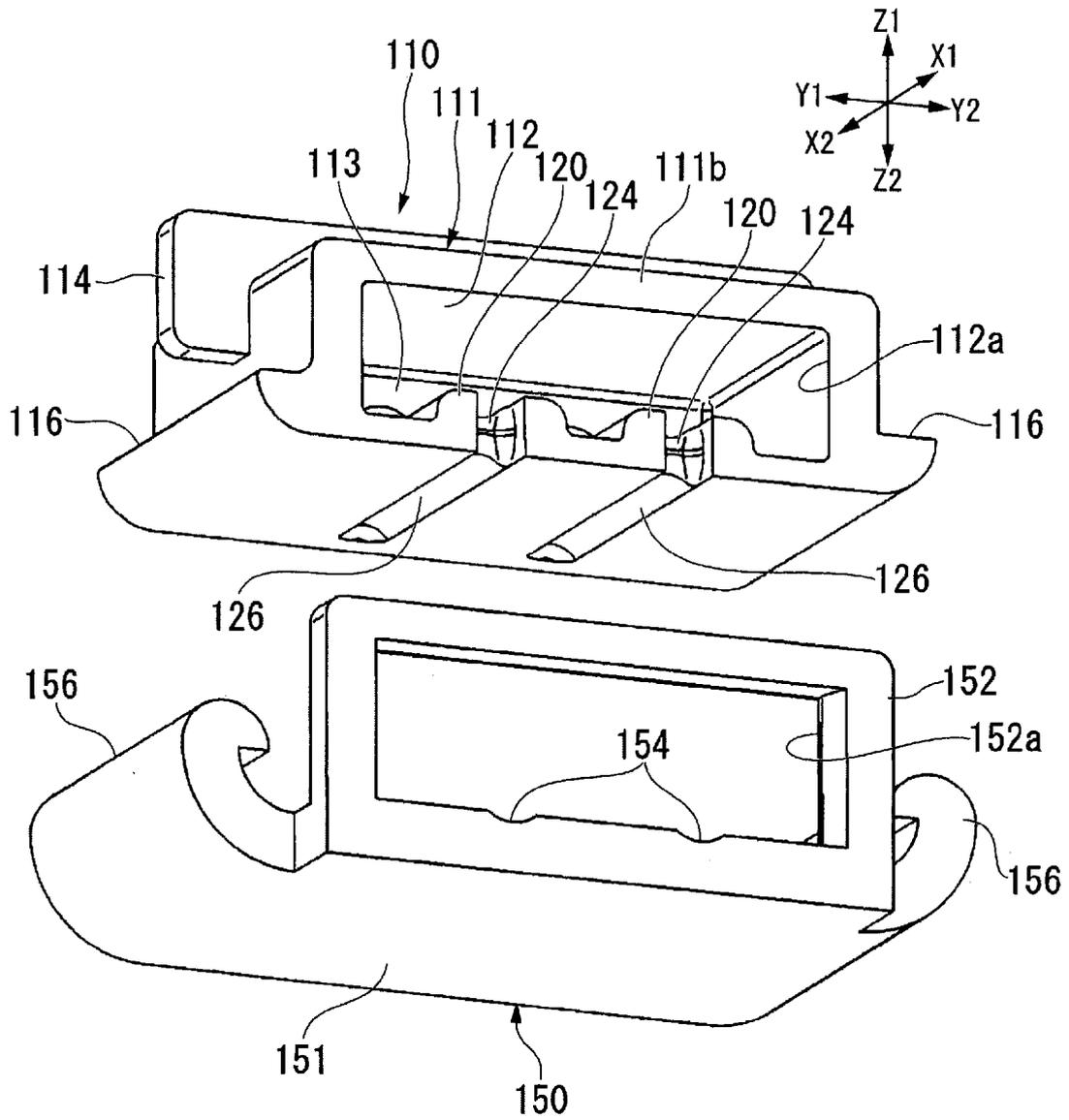


FIG. 15

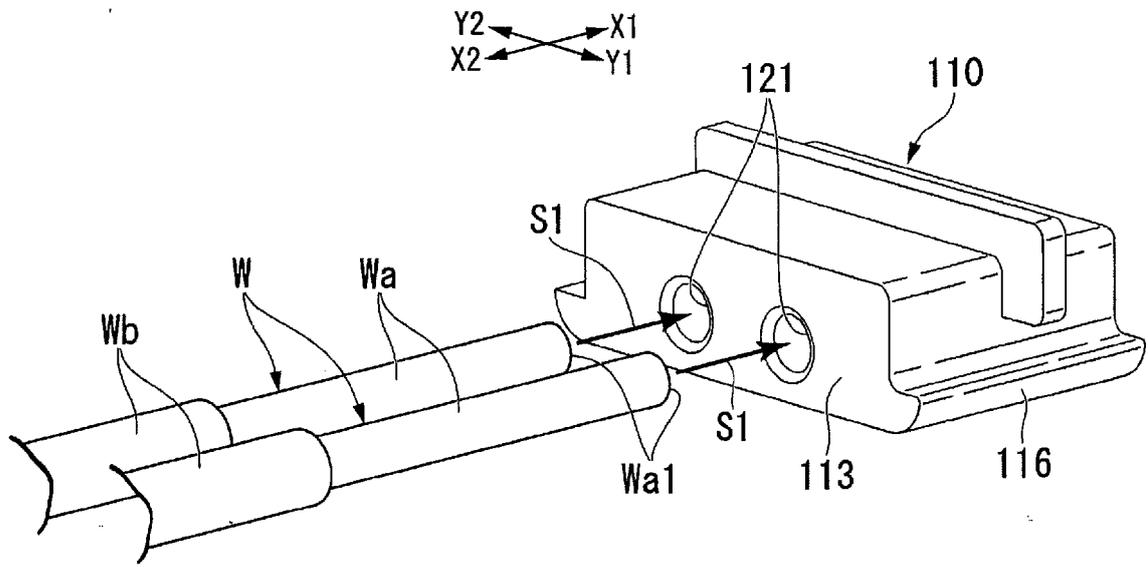


FIG. 16

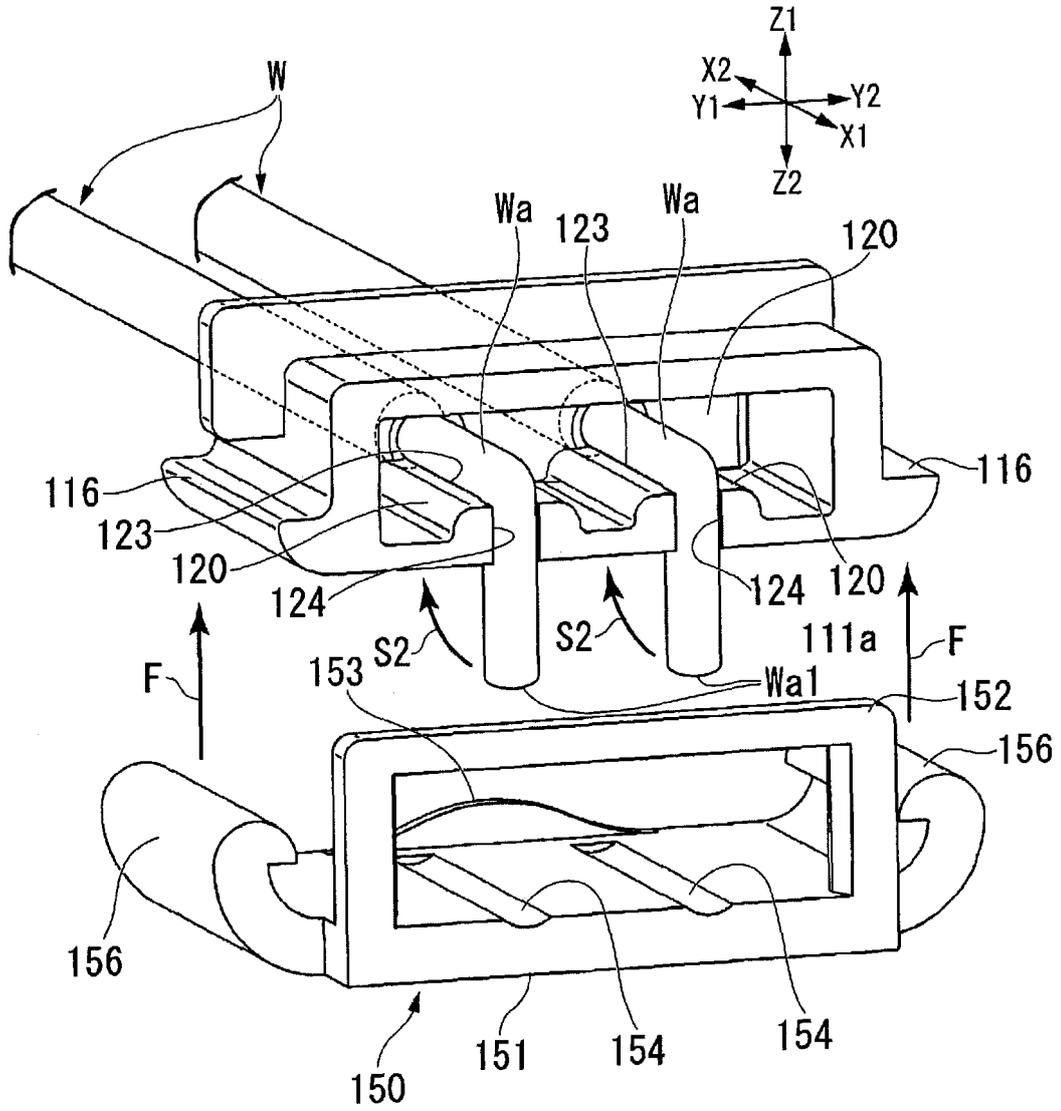


FIG. 17

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2018/031746

A. CLASSIFICATION OF SUBJECT MATTER		
Int.Cl. H01R13/56(2006.01)i, B62J6/06(2006.01)i, H01R11/11(2006.01)i, H01R13/508(2006.01)i		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) Int.Cl. H01R13/56, B62J6/06, H01R11/11, H01R13/508		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Published examined utility model applications of Japan	1922-1996	
Published unexamined utility model applications of Japan	1971-2018	
Registered utility model specifications of Japan	1996-2018	
Published registered utility model applications of Japan	1994-2018	
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	JP 2016-41591 A (SHIMANO INC.) 31 March 2016, paragraphs [0025]-[0039], fig. 3-8 (Family: none)	1, 3, 6-7 2, 4-5
Y A	JP 11-26103 A (I-PEX CO., LTD.) 29 January 1999, paragraphs [0015]-[0018], fig. 1-6 & US 6264500 B1, column 7, line 40 to column 8, line 20, fig. 17-22 & GB 2325793 A	1, 3, 6-7 2, 4-5
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C.		<input type="checkbox"/> See patent family annex.
* Special categories of cited documents:		
"A" document defining the general state of the art which is not considered to be of particular relevance	"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	
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"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	
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Date of the actual completion of the international search 10 October 2018 (10.10.2018)	Date of mailing of the international search report 20 November 2018 (20.11.2018)	
Name and mailing address of the ISA/ Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Authorized officer	Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2018/031746

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 109248/1982 (Laid-open No. 14283/1984) (HOSIDEN ELECTRONICS CO., LTD.) 28 January 1984 (Family: none)	1-7
A	US 5083939 A (LABINAL S. A.) 28 January 1992 & EP 427615 A1 & FR 2654557 A	1-7

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Patent documents cited in the description

- JP 2016041591 A [0004]