(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 498 342 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
12.09.2012 Bulletin 2012/37

(51) Int Cl.:
H01R 13/50 *(2006.01)* *H01R 13/447* *(2006.01)*

(21) Application number: **12001354.5**

(22) Date of filing: **29.02.2012**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **11.03.2011 JP 2011054303**

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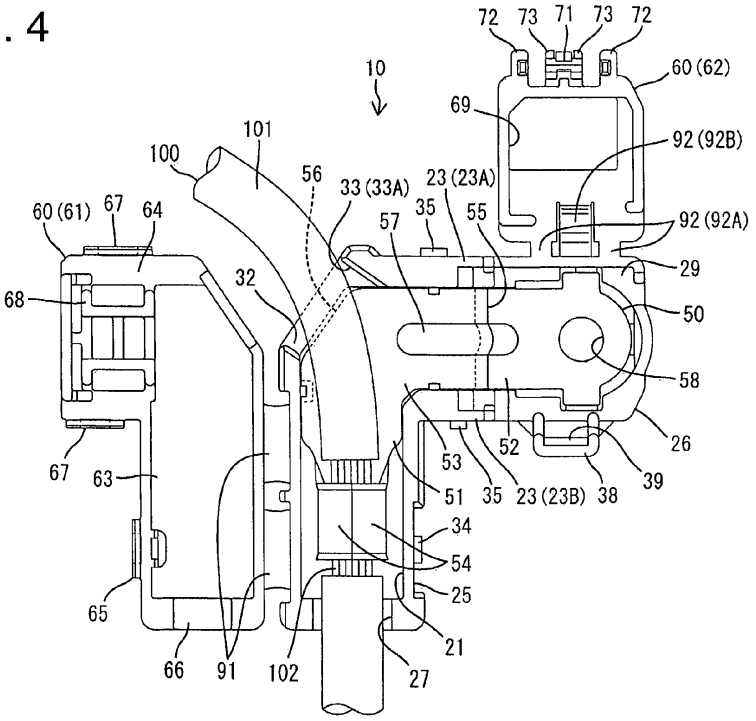
(54) **Terminal protection cover and production mehtod for terminal device**

(57) An object of the present invention is to provide a terminal protection cover with good space efficiency.

A terminal protection cover 10 is provided with a main body 20 which includes an accommodation recess 21 capable of accommodating a terminal fitting 50 and a lid portion 60 which is coupled to one side wall 23A of the main body 20 via a hinge and rotatable to a closed position and an open position about the hinge. The main body 20 is bent in conformity with the shape of the terminal fitting 50 and includes a first main body 25 arranged at one side of a bent portion 24 and a second main body 26 arranged at the other side. The lid portion 60 includes a first lid portion 61 coupled to the first main body 25 and a second lid portion 61 coupled to the second main body 26. The first and second lid portions 61, 62 are rotatable in directions crossing each other.

FIG. 4



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Description

[0001] Terminal Protection Cover And Production Method for Terminal Device

[0002] The present invention relates to a terminal protection cover and to a production method of a terminal device.

[0003] A conventional terminal protection cover is disclosed in Japanese Unexamined Patent Publication No. 2009-230993. This includes a main body with an accommodation recess capable of accommodating a terminal fitting and a lid portion coupled to one side wall of the main body via a hinge. The lid portion is rotatable about the hinge to a closed position to close the accommodation recess and an open position to open the accommodation recess. At the closed position, an end edge of the lid portion is resiliently engaged with the other side wall of the main body, whereby the lid portion is held in a closed state. Further, the lid portion is divided into a first and a second lid portions, which are arranged in a straight line. The first and second lid portions are rotatable in the same direction.

[0004] In the above case, there is a problem that the terminal protection cover is enlarged in an arrangement direction of the first and second lid portions. Further, since rotational directions of the first and second lid portions are the same, there is also a problem that, if an external matter such as a part is present at an open side of the first and second lid portions, the interference of either the first or second lid portion with this external matter is difficult to avoid.

[0005] The present invention was completed in view of the above situation and an object thereof is to provide a terminal protection cover with good space efficiency.

[0006] This object is solved according to the invention by the features of the independent claims. Particular embodiments of the invention are subject of the dependent claims.

[0007] According to one aspect of the invention, there is provided a terminal protection cover, comprising a main body which includes an accommodation recess capable of at least partly accommodating a terminal fitting; and a lid portion which is coupled to one side wall of the main body via at least one hinge, displaceable or displaced to an open position to open the accommodation recess and a closed position to at least partly close the accommodation recess by being rotated about the hinge, and is engageable or engaged with the other side wall of the main body at the closed position, wherein the main body is bent substantially in conformity with the shape of the terminal fitting and includes a first main body arranged at one side of a bent part or portion and a second main body arranged at the other side; and the lid portion includes a first lid portion coupled to the first main body and a second lid portion coupled to the second main body, the first and second lid portions being rotatable or pivotable in directions and/or about axes crossing each other.

[0008] The main body is bent substantially in conformity with the shape of the terminal fitting and includes the first main body arranged at the one side of the bent part and the second main body arranged on the other side, the lid portion includes the first lid portion coupled to the first main body and the second lid portion coupled to the second main body, and the first and second lid portions are rotatable or pivotable in the directions or about axes crossing each other. Thus, the enlargement of the terminal protection cover in the extending direction of the first main body is prevented and the interference of either one of the first and second lid portions at the open position with an external matter can be easily avoided. Therefore, according to the present invention, the terminal protection cover with good space efficiency can be obtained.

[0009] According to a particular embodiment, , an opening through which a wire connected to the terminal fitting is pulled or to be pulled out is formed in a side wall of the main body on a projecting side of the bent part or portion.

[0010] Since the opening through which the wire connected to the terminal fitting is pulled out is formed in the one side wall of the main body on the outer side of the bent part or portion, the wire can be pulled out in a specified (predetermined or predeterminable) direction without being restricted by the bent shape of the main body.

[0011] Particularly, at least one guiding surface extending in a direction crossing extending directions of the both first and second main bodies is formed on the inner surface of the opening.

[0012] Further particularly, the wire can be pulled out along the guiding surface.

[0013] Since the wire is pulled in the direction crossing the extending directions of the both first and second main bodies due to the presence of the guiding surface formed on the inner surface of the opening, the wire can be efficiently arranged at a shortest distance up to a position located in front in the crossing direction.

[0014] Particularly, the wire is connected to the terminal fitting in the first main body and pulled out from the connected part through the opening while being bent toward a side opposite to the one where the second main body is located.

[0015] Further particularly, out of the side wall forming the guide surface of the opening, a side wall part at a side of the second main body is thicker than a side wall part at a side of the first main body.

[0016] Since the wire is pulled out through the opening while being bent toward the side opposite to the side where the second main body is located and, out of the side wall forming the guide surface of the opening, the side wall part at the side of the second main body is thicker than the side wall part at the side of the first main body, a resilient reaction force acting on a bent part of the wire can be firmly received by the side wall part at the side of the second main body. As a result, reliability of a wire guiding function is improved. Further, since a fixing device such as a clip for fixing the bent part of the wire to

the main body can be omitted, cost can be suppressed low. Furthermore, strength of the side wall part at the side of the second main body can also be increased.

[0017] Particularly, at least one of the first and second lid portions is formed with a projecting stopper which comes into contact with the one side wall of the main body to prevent any further rotation or pivotal movement when the at least one of the first and second lid portions is about to be excessively rotated from the closed position beyond the open position.

[0018] If the second lid portion is about to be excessively rotated from the closed position beyond the open position, the stopper comes into contact with the one side wall of the main body to prevent any further rotation, wherefore breakage and cut of the hinge due to excessive opening of the lid portion can be avoided.

[0019] Particularly, a fixing device for fixing the terminal fitting to a target can be accommodated into the second main body; and the second lid portion is rotated from the closed position to the open position before the fixing device is operated.

[0020] Further particularly, the stopper is formed on the second lid portion.

[0021] Since the second lid portion is rotated or pivoted from the closed position to the open position before the fixing device is operated and the stopper is formed on the second lid portion, breakage and cut of the hinge due to excessive opening of the lid portion can be even more effectively avoided.

[0022] Particularly, a lock structure for holding the first lid portion at the closed position is formed on the side wall of the second main body and the first lid portion.

[0023] Further particularly, the lock structure and the stopper are proximately arranged substantially side by side in an extending direction of the second main body when the first and second lid portions are at the closed position.

[0024] Since the lock structure and the stopper are proximately arranged side by side when the first and second lid portions are at the closed position, even if an external matter moves toward the lock structure from front in the extending direction of the second main body, the stopper comes into contact with the external matter, thereby avoiding the interference of the lock structure and the external matter. As a result, a situation where the lock structure is inadvertently released from a locked state can be prevented.

[0025] Particularly, at least one auxiliary hinge is provided having a spring force for biasing the second lid portion to open and close it to an open position and a closed position from a position where the second lid portion stands on the second main body.

[0026] According to a further aspect of the invention, there is provided a production method of producing a terminal device comprising a terminal protection cover, in particular according to the above aspect of the invention or a particular embodiment thereof, the method comprising the following steps: providing a terminal protection cover having a main body which includes an accommodation recess, wherein the main body is bent substantially in conformity with the shape of the terminal fitting and includes a first main body arranged at one side of a bent portion and a second main body arranged at the other side; at least partly accommodating a terminal fitting into the accommodating recess; and providing a lid portion which is coupled to one side wall of the main body via at least one hinge, displaceable to an open position to open the accommodation recess and a closed position to at least partly close the accommodation recess by being pivoted about the hinge, and is engageable with the other side wall of the main body at the closed position, wherein the lid portion includes a first lid portion coupled to the first main body and a second lid portion coupled to the second main body, the first and second lid portions being pivotable about axes crossing each other.

[0027] According to a particular embodiment, the method further comprises pulling out a wire connected to the terminal fitting through an opening formed in a side wall of the main body on a projecting side of the bent portion.

[0028] Particularly, the wire is pulled out substantially along at least one guiding surface extending in a direction crossing extending directions of the both first and second main bodies is formed on the inner surface of the opening.

[0029] These and other objects, features and advantages of the present invention will become more apparent upon reading of the following detailed description of preferred embodiments and accompanying drawings. It should be understood that even though embodiments are separately described, single features thereof may be combined to additional embodiments.

FIG. 1 is a plan view of a terminal protection cover according to one embodiment of the present invention,

FIG. 2 is a side view of the terminal protection cover,

FIG. 3 is a plan view of the terminal protection cover in which a first and a second lid portions are at an open position before a terminal fitting is accommodated,

FIG. 4 is a plan view of the terminal protection cover accommodating the terminal fitting,

FIG. 5 is a plan view of the terminal protection cover in which the first lid portion is at a closed position and the second lid portion is at the open position,

FIG. 6 is a bottom view of the terminal protection cover in which the first lid portion is at the closed position and the second lid portion is at the open position,

FIG. 7 is a side view of the terminal protection cover in which the first lid portion is at the closed position and the second lid portion is at the open position, and

FIG. 8 is a side view of the terminal protection cover in which a stopper is in contact with one side wall of a main body.

<Embodiment>

[0030] One particular embodiment of the present invention is described with reference to FIGS. 1 to 8. A terminal protection cover 10 according to this embodiment is integrally or unitarily molded or formed e.g. of a synthetic resin material and includes a main body 20 and at least one lid portion 60. As shown in FIGS. 3 and 4, the main body 20 is formed with at least one accommodation recess 21 which is open upward or laterally and capable of at least partly accommodating at least one respective terminal fitting 50.

[0031] The terminal fitting 50 particularly is an electrically conductive (particularly metal) plate and, as shown in FIG. 4, includes a first terminal portion 51 substantially extending in forward and backward directions (vertical direction of FIG. 4), a second terminal portion 52 substantially extending in a direction at an angle different from 0° or 180°, preferably substantially normal with respect to the first terminal portion 51, particularly in a width direction (horizontal direction of FIG. 4) and at least one coupling terminal portion 53 located between the first and second terminal portions 51, 52 and coupled to both, and particularly is substantially bent or L-shaped as a whole.

[0032] As shown in FIG. 4, a wire connection portion to be connected with a wire 100 particularly comprises one or more, particularly a pair of barrel pieces 54 which are formed to project or stand up and particularly substantially face each other in the width direction at (particularly a rear end portion of) the first terminal portion 51. Further, a wire 100 is placed on the first terminal portion 51. A core 102 is exposed at (particularly an intermediate part of) the wire 100 by at least partly removing an insulation coating 101, and the wire connection portion is connected to the core 102, particularly the both barrel pieces 54 are crimped and connected to this core 102 from the opposite widthwise sides. Further, the outer edge of the coupling terminal portion 53 particularly serves as an inclined edge 56 extending in an oblique direction (particularly a direction crossing forward and backward directions and width direction).

[0033] The second terminal portion 52 is formed with at least one step 55, whereby an area at a side of the step 55 closer to the coupling terminal portion 53 is slightly higher than an area at a leading end side (one widthwise side, i.e. right side in FIG. 4). Further, the second terminal portion 52 particularly is formed with at least one rib 57 projecting upward. The rib 57 particularly extends from the coupling terminal portion 53 toward one widthwise end over the step 55. A (particularly substantially round) mounting hole 58 is formed to penetrate through (particularly a leading end portion of) the second terminal portion 52. An unillustrated bolt is or can be at least partly inserted into the mounting hole 58 from below (side of a target on which the terminal fitting 50 is to be mounted such as an unillustrated device). An unillustrated nut is fastened from above to the bolt inserted into the mounting hole 58.

[0034] As shown in FIG. 3, the main body 20 particularly is bent to have a substantially L shape substantially in conformity with the shape of the terminal fitting 50 and/or includes a bottom portion 22 on which the terminal fitting 50 is to be placed and a pair of side walls 23 standing up or projecting from (particularly the substantially opposite lateral edges of) the bottom portion 22 to substantially extend along the opposite lateral edges of the terminal fitting 50.

[0035] Further, as shown in FIG. 3, the main body 20 includes a bent portion 24, a first main body 25 arranged behind the bent portion 24 and a second main body 26 arranged at one widthwise side of the bent portion 24. The first terminal portion 51 is to be at least partly accommodated in the accommodation recess 21 of the first main body 25, the coupling terminal portion 53 is to be at least partly accommodated in the accommodation recess 21 of the bent portion 24 and the second terminal portion 52 is to be at least partly accommodated in the accommodation recess 21 of the second main body 26. A wire insertion hole 26 through which the wire 100 is to be at least partly inserted is formed to penetrate through the rear end of the first main body 25.

[0036] The second main body 26 is formed with at least one stepped portion 27, whereby the bottom portion 22 at a side of the stepped portion 27 closer to the bent portion 24 is slightly higher than the bottom portion 22 at the leading end side (one widthwise end side). The stepped portion 27 is arranged substantially along the step 55 of the terminal fitting 50. As also shown in FIG. 7, the both side walls 23 are formed with one or more, particularly a pair of cut edges 28 standing up or projecting substantially vertically at positions corresponding to the stepped portion 27. Further, as shown in FIG. 3, an area of the second main body 26 at the leading end side of the stepped portion 27 and the both cut edges 28 particularly serves as a fixing device accommodating portion 29 where a fixing device such as the bolt and the nut is to be at least partly accommodated. The bottom portion 22 of the fixing device accommodating portion 29 is formed with an insertion hole 31 through which the bolt is at least partly insertable.

[0037] Out of the both side walls 23 of the bent portion 24, one side wall 23A at a projecting side (outer side of the bend) is formed with a penetrating opening 32. The opening 32 is arranged along the inclined edge 56 of the terminal fitting 50. The wire 100 is or can be loosely inserted through the opening 32. One or more guiding surfaces 33 substantially extending in a direction crossing at an obtuse angle with respect to forward and backward directions (extending direction of the first main body 25) and width direction (extending direction of the second main body 26) are formed on the opposite inner surfaces of the opening 32. Out of the both guiding surfaces 33, a second guiding surface 33A formed on one side wall 23A of the second main body 26 is longer than a first guiding surface 33B formed on one side surface 23A of the first main body 25.

[0038] Here, as shown in FIG. 4, the wire 10 extends substantially straight in forward and backward directions and is at least partly accommodated in the first main body 25 through the wire insertion opening 27. After being connected to the both barrel pieces 54 of the first terminal portion 51, the wire 100 is arranged to be bent along the guiding surface (second guiding surface 33A) in the opening 32 and/or extend substantially straight and obliquely forward from the opening 32 toward a side of the first main body 25 opposite to the second main body 26.

[0039] Further, out of the both side walls 23 of the main body 20, wall parts of the side walls 23 located between the bent portion 24 and the fixing device accommodating portion 29 particularly are thicker than the other wall parts of the side walls 23 as shown in FIG. 3. Further, out of the wall parts of the both side walls 23 located between the bent portion 24 and the fixing device accommodating portion 29, the one side wall 23A continuous with the opening 32 particularly is thicker than the other wall part 23B on the opposite side. This particularly ensures the longer second guiding surface 33A.

[0040] As shown in FIG. 3, the lid portion 60 includes a first lid portion 61 coupled to the one side wall 23A of the first main body 25 via one or more first hinges 91 and a second lid portion 62 coupled to the one side wall 23A of the second main body 26 via one or more second hinges 92. The first and second lid portions 61, 62 are respectively rotatable or pivoted about the first and second hinges 91, 92 and displaceable to an open position (state shown in FIG. 4) where an upper part of the accommodation recess 21 is open and a closed position (state shown in FIG. 1) where the upper part of the accommodation recess 21 is closed by rotating. Because the one side wall 23A of the main body 20 particularly is substantially L-shaped, the first lid portion 61 is rotated or pivoted along the width direction and the second lid portion 62 is rotated or pivoted along forward and backward directions. That is, the first and second lid portions 61, 62 are rotated or pivoted in directions at an angle different from 0° or 180°, preferably substantially perpendicular with respect to each other.

[0041] As also shown in FIG. 5, the first lid portion 61 particularly substantially is in the form of a substantially L-shaped flat plate and includes a main lid portion 63 which at least partly covers the first main body 25 and the bent portion 24 from above at the closed position and an auxiliary lid portion 64 which at least partly covers the other widthwise part of the second main body 26 (particularly part excluding the fixing device accommodating portion 29). One or more, particularly a pair of first hinges 91 are coupled to one lateral edge of the main lid portion 63 particularly while being spaced apart. As shown in FIG. 2, a main first locking piece 65 is resiliently deformably formed to project from the other end edge of the main lid portion 63. At least one main first locking portion 34 is formed to project from the outer surface of the upper end of the other side wall 23B of the first main body 25, and the main first locking piece 65 is to be resiliently engaged with the main first locking portion 34 at the closed position. Further, at least one wire pressing portion 66 capable of pressing the wire 100 inserted through the wire insertion opening 27 (particularly substantially from above) is formed to project from the rear end of the main lid portion 63 as shown in FIG. 4.

[0042] As shown in FIG. 4, one or more (particularly front and rear) auxiliary first locking pieces 67 are resiliently deformably formed to project on (particularly substantially from the opposite front and rear edges of) the auxiliary lid portion 64. Specifically, out of the front and rear auxiliary first locking pieces 67, the front auxiliary first locking piece 67 is larger than the rear auxiliary first locking piece 67. One or more (particularly front and rear) auxiliary first locking portions 35 are formed to project from (particularly the outer surfaces of the upper ends of) the opposite side walls 23 of the second main body 26 and the auxiliary first locking piece(s) 67 is/are to be resiliently engaged with the auxiliary first locking portion (s) 35 at the closed position. Specifically, out of the front and rear auxiliary first locking portions 35, the front auxiliary first locking portion 35 is larger than the rear auxiliary first locking portion 35.

[0043] As shown in FIG. 7, at least one sealing wall 36 capable of at least partly closing a space between the cut edges 28 of the (particularly both) side wall(s) 23 at the closed position is/are formed to project along the stepped portion 27 (see FIG. 3) from the other lateral edge of the auxiliary lid portion 64. As shown in FIG. 4, at least one terminal pressing portion 68 capable of pressing the second terminal portion 52 of the terminal fitting 50 at the closed position is formed to project from the inner surface of the auxiliary lid portion 64. Here, as shown in FIG. 5, the first lid portion 61 particularly is held at the closed position by the resilient engagement of the main first locking piece 65 with the main first locking portion 34 and the resilient engagement of the auxiliary first locking pieces 67 with the auxiliary first locking portions 35.

[0044] As shown in FIGS. 5 to 7, the second lid portion 62 particularly substantially is in the form of a rectangular box as a whole and can cover the fixing device accommodating portion 29 from above at the closed position. A nut accommodating recess 69 capable of at least partly accommodating the nut is formed in or on the second lid portion 62. The one or more second hinges 92 are composed of one or more main hinges 92A spaced apart in the width direction and at least one auxiliary hinge 92B (particularly substantially arranged between the two main hinges 92A). The auxiliary hinge 92B particularly has a spring force for biasing the second lid portion 62 to open and close it to an open position and a closed position from a position where the second lid portion 62 stands on the upper edge of the second main body 26.

[0045] As shown in FIGS. 5 and 7, a (particularly substantially cantilever-shaped) lock arm 71 is resiliently deformably formed on the outer side surface on the other side (side substantially opposite to the one connected to

the second hinge(s) 92) of the second lid portion 62 (box portion 74 to be described later), and one or more, particularly a pair of protection walls 72 are formed to project or stand up on the lock arm 71, particularly at the substantially opposite sides of the lock arm 71. One or more, particularly a pair of lock projections 73 (particularly spaced apart in the width direction) are formed on the outer surface of the base end side of the lock arm 71. As shown in FIG. 6, a (particularly substantially gate-shaped) engaging portion 38 is formed on the other side wall 23B of the fixing device accommodating portion 29, and a lock claw 39 is formed in the engaging portion 38. At the closed position, the lock arm 71 engages (particularly is at least partly inserted into) the engaging portion 38 and the lock projection(s) 73 is/are resiliently engaged with the lock claw(s) 39. Further, at the closed position, the both protection walls 72 particularly substantially are arranged at the opposite sides of the engaging portion 38 as shown in FIG. 1. Here, the second lid portion 62 is held at the closed position by the resilient engagement of the lock arm 71 with the engaging portion 38.

[0046] As shown in FIGS. 6 and 7, the box portion 74 (particularly substantially in the form of a rectangular or polygonal box) is formed on the outer surface of the second lid portion 62 to project outward. At the closed position, the upper end of the box portion 74 and that of the first lid portion 61 particularly are substantially in flush as shown in FIG. 2. Further, as shown in FIG. 8, at least one stopper 75 which comes into contact with the one side wall 23A of the fixing device accommodating portion 29 from the outer side when the second lid portion 62 is about to be excessively opened from the closed position beyond the open position is formed on the outer surface of the second lid portion 62. As shown in FIG. 6, the stopper 75 particularly substantially is in the form of a plate piece, extends along an end edge of the second lid portion 62 close to the first lid portion 61 and/or is integrally or unitarily coupled to the box portion 74. As shown in FIG. 1, the stopper 75 is arranged to at least partly cover the sealing wall 36 at the closed position and/or to be proximate to a lock structure composed of the auxiliary first locking portions 35 and the auxiliary first locking pieces 67.

[0047] Next, an assembling procedure, functions and effects of the terminal protection cover 10 according to this embodiment are described.

[0048] First, as shown in FIGS. 3 and 4, the terminal fitting 50 with the wire 100 is at least partly accommodated into the accommodation recess 21 of the main body 20 with the first and second lid portions 61, 62 held at the open position. Then, the wire 100 is arranged in (particularly pulled backward through) the wire insertion hole 27 and particularly pulled obliquely forward through the opening 32. At this time, the wire 100 particularly is forcibly bent by coming into contact with the second guiding surface 33A of the second main body 26 in the opening 32, and the resulting bent shape can be maintained. A leading end portion of the terminal fitting 50 is positioned and fitted in the fixing device accommodating portion 29 particularly via the stepped portion 27. Note that even if an external matter such as a part is present in front of the first main body 25, the second lid portion 62 at the open position does not interfere with this external matter. Subsequently, the first and second lid portions 61, 62 are rotated or pivoted toward or to the closed position about respective axes 61 A, 62A (by deforming the respective hinges 91, 92) to be held onto the main body 20. In this way, the terminal protection cover 10 is transported to a site where an operation of the mounting the terminal protection cover 10 on a target (such as a device) is performed.

[0049] At the operation site, the locked state of the lock arm 71 and the engaging portion 38 is released and the second lid portion 62 is brought toward or to the open position again as shown in FIG. 7. At this time, as shown in FIG. 8, one corner of the at least one stopper 75 comes into contact with the one side wall 23A of the second main body 26 to prevent any further rotation or pivotal movement even if the second lid portion 62 is about to be excessively opened.

[0050] Subsequently, the nut is at least partly inserted into the opened fixing device accommodating portion 29 (e.g. substantially from above) and the nut is fastened to the bolt. In this way, the terminal fitting 50 is fixed to the target together-with the terminal protection cover. Then, as shown in FIGS. 1 and 2, the second lid portion 62 is rotated or pivoted to the closed position and held onto the second main body 26. Then, the wire 100 substantially extends obliquely forward from the opening 32 while being guided by the guiding surfaces 33 to be arranged at a shortest distance up to a connection position (not shown) located in front.

[0051] As described above, according to this embodiment, the main body 20 includes the first main body 25 arranged behind the bent portion 24 and the second main body 26 arranged on the one widthwise side of the bent portion 24, the lid portion 60 includes the first lid portion 61 coupled to the first main body 25 and the second lid portion 62 coupled to the second main body 26, and the first and second lid portions 61, 62 are rotatable or pivotable in the directions at an angle different from 0° or 180°, preferably substantially perpendicular to each other (or rotatable or pivotable about axes 61 A, 62A arranged at an angle different from 0° or 180°, preferably substantially perpendicular to each other). Thus, the enlargement of the terminal protection cover 10 in the extending direction of the first main body 25 is prevented and the interference of either one of the first and second lid portions 61, 62 at the open position with an external matter can be easily avoided. Therefore, the terminal protection cover 10 with good space efficiency can be obtained.

[0052] Further, since the opening 32 through which the wire 100 connected to the terminal fitting 50 is to be pulled out particularly is formed in the one side wall 23A of the bent portion 24 of the main body 20, the wire 100 can be

pulled out in a specified (predetermined or predeterminable) direction without being restricted by the bent shape of the main body 20. In addition, since the wire 100 particularly is pulled in the direction (obliquely forward) crossing the extending directions of the both first and second main bodies 25, 26 due to the presence of the one or more guiding surfaces 33 formed on the inner surface of the opening 32, the wire 100 can be efficiently arranged at a shortest distance up to the connection position located in front in its pull-out direction.

[0053] Further, since the wire 100 particularly is pulled out through the opening 32 while being bent toward the side substantially opposite to the side where the second main body 26 is located and, out of the one side walls 23A forming the guide surface(s) 33 of the opening 32, the one side wall 23A of the second main body 26 particularly is thicker than the one side wall 23A of the first main body 25, a resilient reaction force acting on a bent part of the wire 100 can be firmly received by the one side wall 23A of the second main body 26. As a result, reliability of a function of guiding the wire 100 is improved. Further, since a fixing device such as a clip for fixing the bent part of the wire 100 to the main body 20 can be omitted, cost can be suppressed low. Furthermore, strength of the one side wall 23A of the second main body 26 can be increased.

[0054] Further, if the second lid portion 62 is about to be excessively rotated from the closed position beyond the open position, the at least one stopper 75 comes into contact with the one side wall 23A of the second main body 26 to prevent any further rotation or pivotal movement, wherefore breakage and cut of the hinges due to excessive opening of the lid portion 60 can be avoided.

[0055] Furthermore, when the first and second lid portions are at the closed position, the lock structure (engaging structure of the lock arm 71 and the engaging portion 38) and the stopper 75 particularly substantially are proximately arranged side by side in the extending direction of the second main body 26. Thus, if an external matter should move toward the lock structure from front in the extending direction of the second main body 26, the stopper 75 comes or can come into contact with the external matter, thereby avoiding the interference of the lock structure and the external matter. As a result, a situation where the lock arm 71 is inadvertently resiliently deformed to be released from the locked state can be prevented.

[0056] Accordingly, to provide a terminal protection cover with good space efficiency, a terminal protection cover 10 is provided with a main body 20 which includes at least one accommodation recess 21 capable of at least partly accommodating at least one terminal fitting 50 and a lid portion 60 which is coupled to one side wall 23A of the main body 20 via at least one hinge and rotatable or pivotable towards or to a closed position and an open position about the hinge(s). The main body 20 is bent substantially in conformity with the shape of the terminal fitting 50 and includes a first main body 25 arranged at one side of a bent portion 24 and a second main body 26 arranged at the other side. The lid portion 60 includes a first lid portion 61 coupled to the first main body 25 and a second lid portion 61 coupled to the second main body 26. The first and second lid portions 61, 62 are rotatable or pivotable in directions crossing each other (or about axes 61 A, 62A crossing each other).

<Other Embodiments>

[0057] The present invention is not limited to the above described and illustrated embodiment. For example, the following embodiments are also included in the technical scope of the present invention.

(1) The first and second lid portions may be rotated or pivoted in directions which are not perpendicular to each other, but cross each other.

(2) The terminal fitting may be formed to include a part other than the first and second terminal portions and the coupling terminal portion, and the main body may be formed to include a part other than the first and second main bodies and the bent portion in conformity with the shape of this terminal fitting. Further, the lid portion may include a part other than the first and second lid portions.

(3) The first lid portion may also be formed with at least one stopper. Alternatively, a stopper may be formed only on the first lid portion.

LIST OF REFERENCE NUMERALS

[0058]

10 ...	terminal protection cover
20 ...	main body
21 ...	accommodation recess
23 ...	side wall
23A ...	one side wall
23B ...	other side wall
24 ...	bent portion
25 ...	first main body
26 ...	second main body
32 ...	opening
33 ...	guiding surface
33A ...	second guiding surface
38 ...	engaging portion (lock structure)
50 ...	terminal fitting
60 ...	lid portion
61 ...	first lid portion
61A ...	axis
62 ...	second lid portion
62A ...	axis
71 ...	lock arm (lock structure)
75 ...	stopper
91 ...	first hinge (hinge)
92 ...	second hinge (hinge)
100 ...	wire

Claims

1. A terminal protection cover (10), comprising:

   a main body (20) which includes an accommodation recess (21) capable of at least partly accommodating a terminal fitting (50); and
   a lid portion (60) which is coupled to one side wall (23A) of the main body (20) via at least one hinge (91), displaceable to an open position to open the accommodation recess (21) and a closed position to at least partly close the accommodation recess (21) by being pivoted about the hinge (91), and is engageable with the other side wall (23B) of the main body (20) at the closed position,

   wherein:

   the main body (20) is bent substantially in conformity with the shape of the terminal fitting (50) and includes a first main body (25) arranged at one side of a bent portion (24) and a second main body (26) arranged at the other side; and the lid portion (60) includes a first lid portion (61) coupled to the first main body (25) and a second lid portion (62) coupled to the second main body (26), the first and second lid portions (61, 62) being pivotable about axes (61 A, 62A) crossing each other.

2. A terminal protection cover according to claim 1, wherein an opening (32) through which a wire (100) connected to the terminal fitting (50) is to be pulled out is formed in a side wall (23) of the main body (20) on a projecting side of the bent portion (24).

3. A terminal protection cover according to claim 2, wherein at least one guiding surface (33) extending in a direction crossing extending directions of the both first and second main bodies (25, 26) is formed on the inner surface of the opening (32).

4. A terminal protection cover according to claim 3, wherein the wire (100) can be pulled out along the guiding surface (33).

5. A terminal protection cover according to claim 3 or 4, wherein the wire (100) is connected to the terminal fitting (50) in the first main body (25) and pulled out from the connected part through the opening (32) while being bent toward a side opposite to the one where the second main body (26) is located.

6. A terminal protection cover according to claim 4, wherein out of the side wall forming the guide surface (33) of the opening (32), a side wall (23A) at a side of the second main body (26) is thicker than a side wall part (23A) at a side of the first main body (25).

7. A terminal protection cover according to any one of the preceding claims, wherein at least one of the first and second lid portions (61, 62) is formed with at least one projecting stopper (75) which comes into contact with the one side wall (23) of the main body (20) to prevent any further pivotal movement when the at least one of the first and second lid portions (61, 62) is about to be excessively rotated from the closed position beyond the open position.

8. A terminal protection cover according to any one of the preceding claims, wherein:

   a fixing device for fixing the terminal fitting (50) to a target can be accommodated into the second main body (26); and
   the second lid portion (62) is rotated from the closed position to the open position before the fixing device is operated.

9. A terminal protection cover according to any one of the preceding claims, wherein the stopper is formed on the second lid portion.

10. A terminal protection cover according to any one of the preceding claims, wherein a lock structure (38; 71) for holding the first lid portion (61) at the closed position is formed on the side wall (23) of the second main body (26) and the first lid portion (61).

11. A terminal protection cover according to claim 10, wherein the lock structure (38; 71) and the stopper (75) are proximately arranged substantially side by side in an extending direction of the second main body (26) when the first and second lid portions (61, 62) are at the closed position.

12. A terminal protection cover according to any one of the preceding claims, wherein at least one auxiliary hinge (92B) is provided having a spring force for biasing the second lid portion (62) to open and close it to an open position and a closed position from a position where the second lid portion (62) stands on the second main body (26).

13. A production method of producing a terminal device comprising a terminal protection cover (10), the method comprising the following steps:

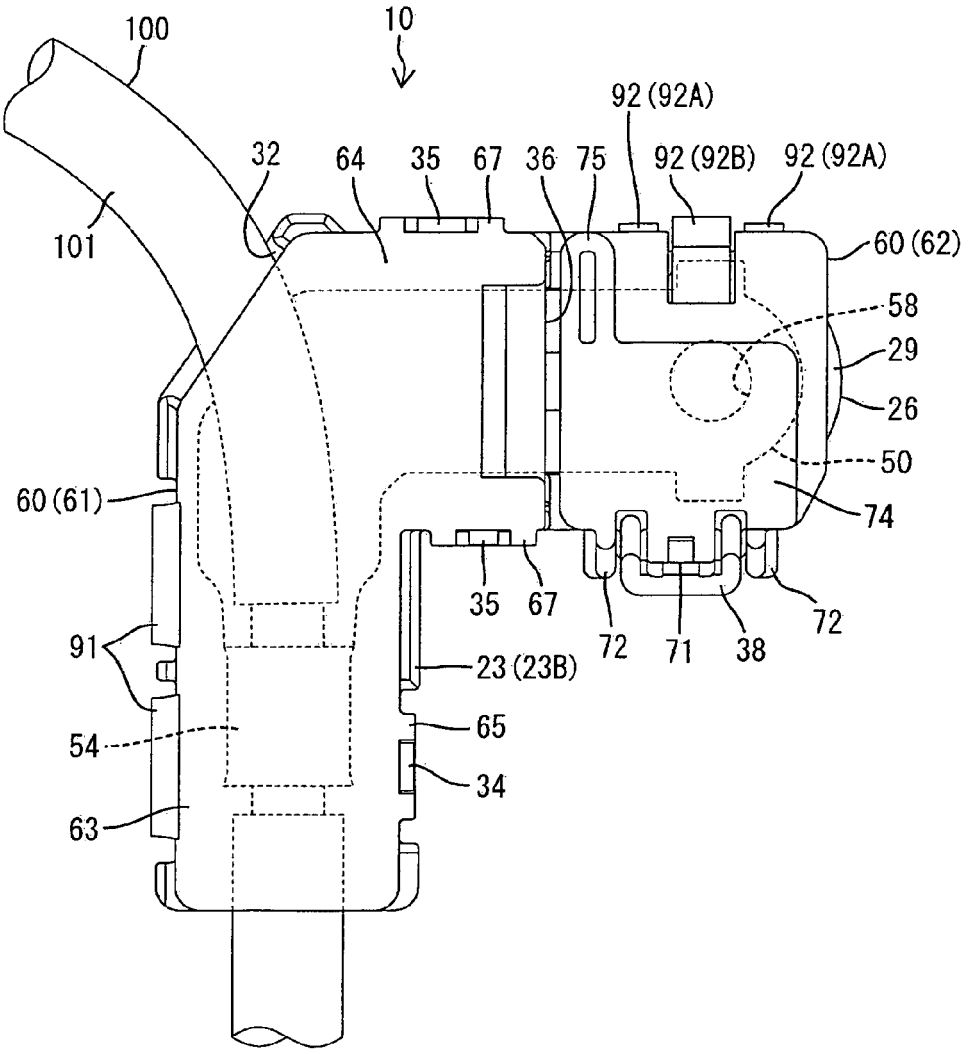
    providing a terminal protection cover (10) having a main body (20) which includes an accommodation recess (21), wherein the main body (20) is bent substantially in conformity with the shape of the terminal fitting (50) and includes a first main body (25) arranged at one side of a bent portion (24) and a second main body (26) ar-

ranged at the other side;
at least partly accommodating a terminal fitting (50) into the accommodating recess (21); and
providing a lid portion (60) which is coupled to one side wall (23A) of the main body (20) via at least one hinge (91), displaceable to an open position to open the accommodation recess (21) and a closed position to at least partly close the accommodation recess (21) by being pivoted about the hinge (91), and is engageable with the other side wall (23B) of the main body (20) at the closed position, wherein the lid portion (60) includes a first lid portion (61) coupled to the first main body (25) and a second lid portion (62) coupled to the second main body (26), the first and second lid portions (61, 62) being pivotable about axes (61A, 62A) crossing each other.

14. A method according to claim 13, further comprising pulling out a wire (100) connected to the terminal fitting (50) through an opening (32) formed in a side wall (23) of the main body (20) on a projecting side of the bent portion (24).

15. A method according to claim 14, wherein the wire (100) is pulled out substantially along at least one guiding surface (33) extending in a direction crossing extending directions of the both first and second main bodies (25, 26) is formed on the inner surface of the opening (32).

FIG. 1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36
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92 (92B)
92 (92A)
101
60 (62)
58
29
26
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67
72
71
38
72
91
23 (23B)
65
54
34
63

FIG. 2

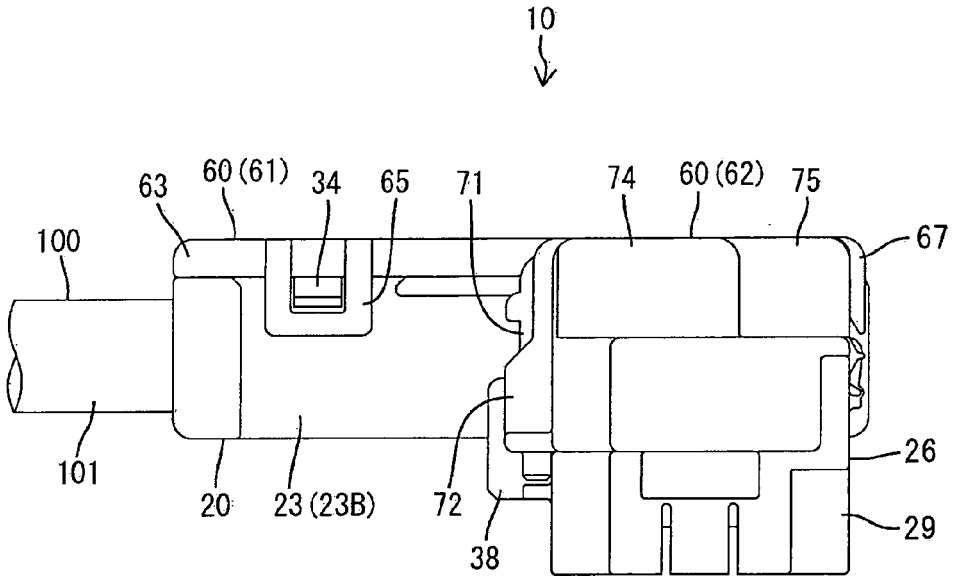
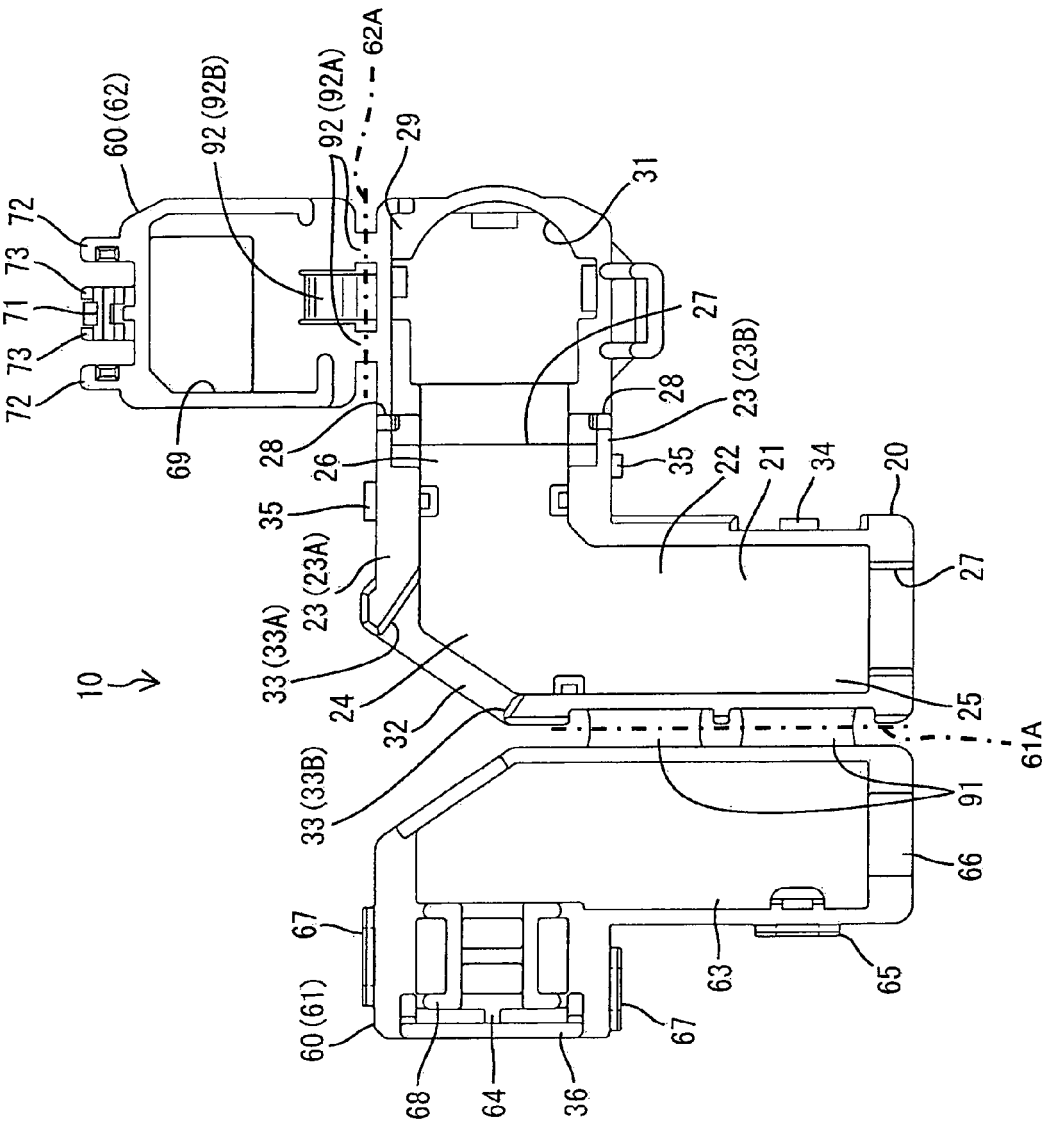


FIG. 3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69
28
26
35
22
21
34
20
35
23 (23A)
27
33 (33A)
24
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61A
33 (33B)
91
66
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63
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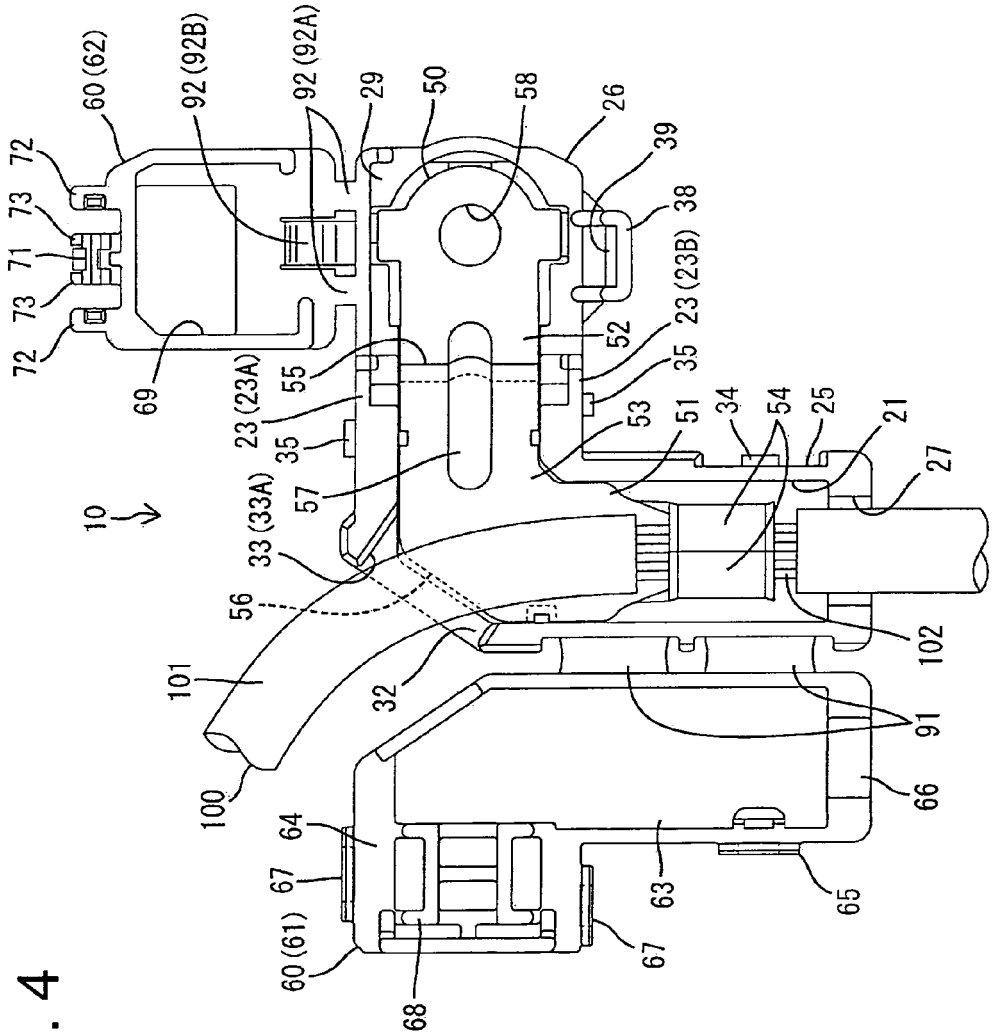
60 (61)
67
68
64
36

FIG. 4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25
21
27
72
73
71
73
72
69
23 (23A)
55
35
57
33 (33A)
56
101
100
32
102
91
66
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67
60 (61)
68
63
65
67

FIG. 5

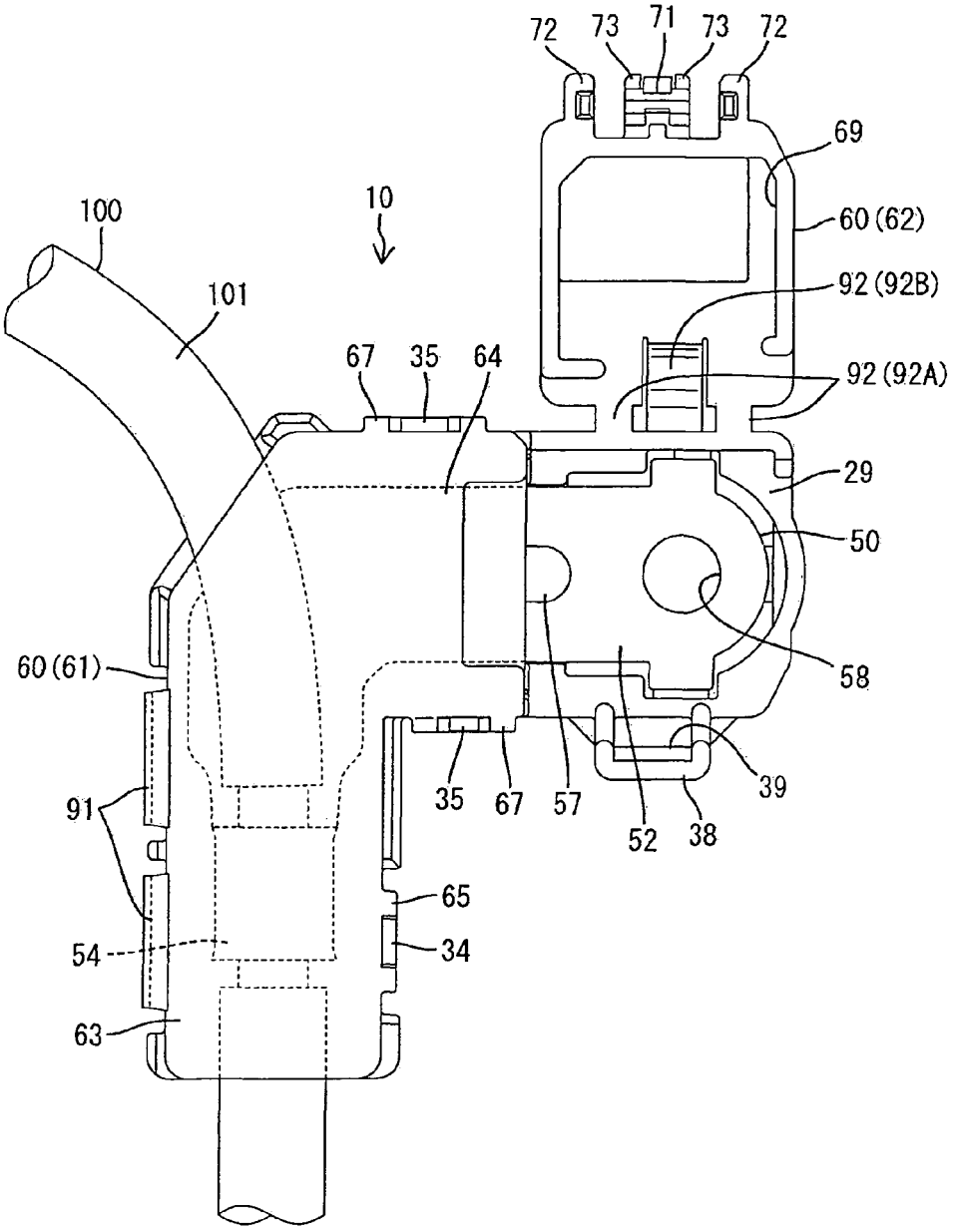
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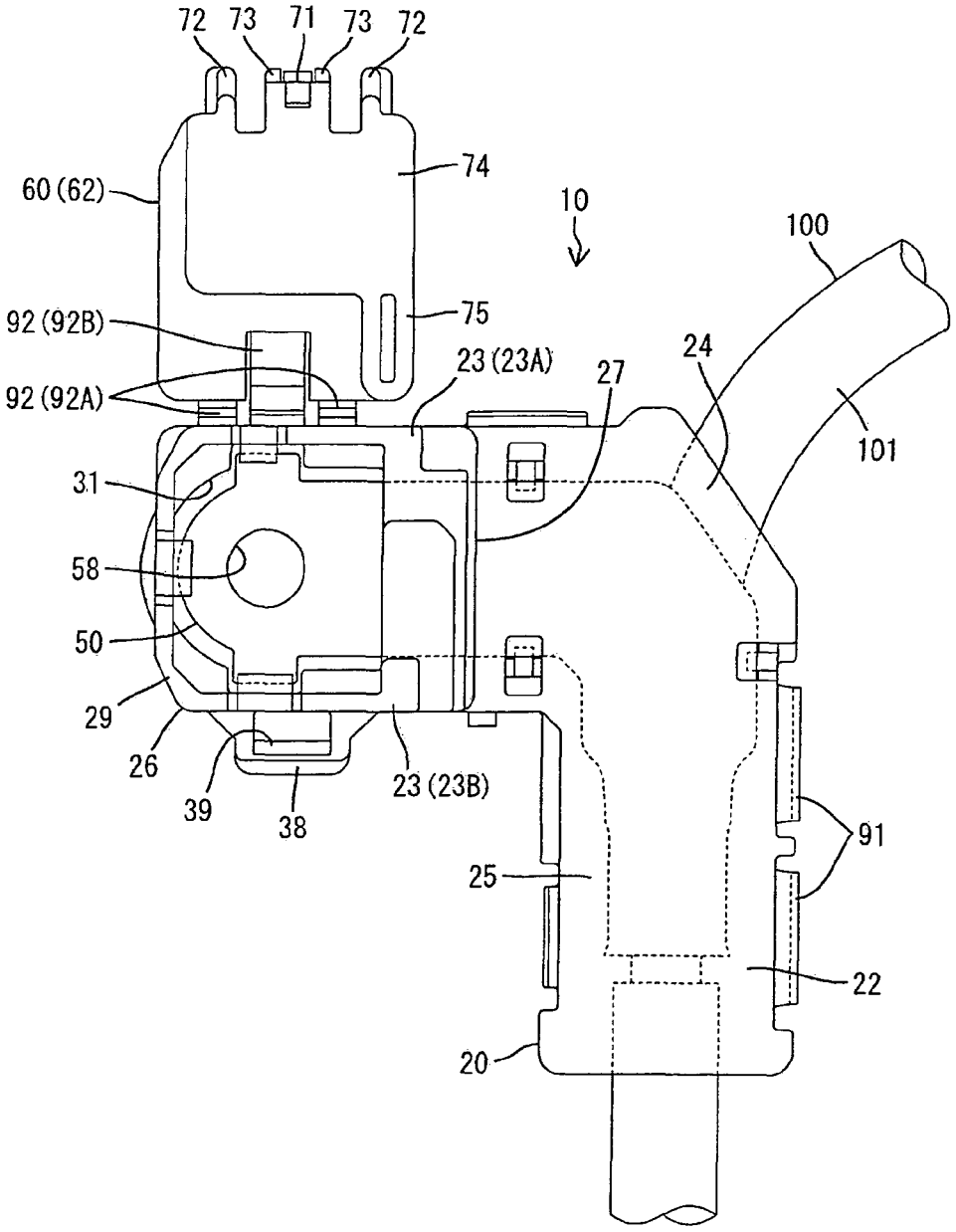
FIG. 6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23 (23A)
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101
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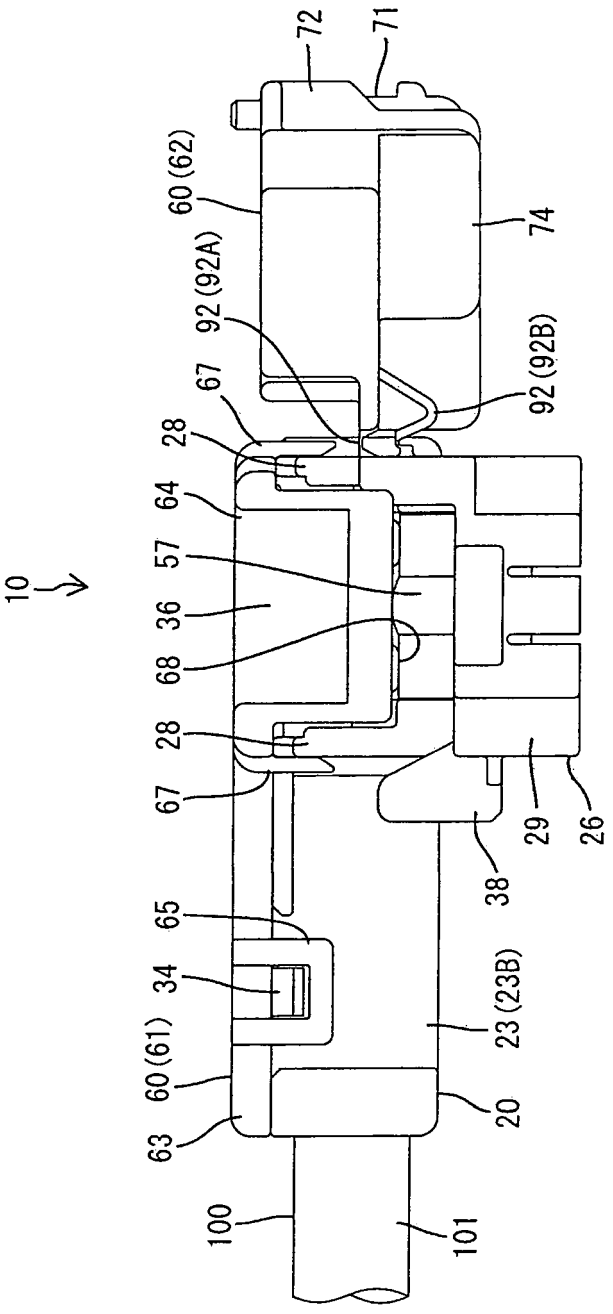
26
39
38
23 (23B)
91
25
22
20

FIG. 7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92 (92B)
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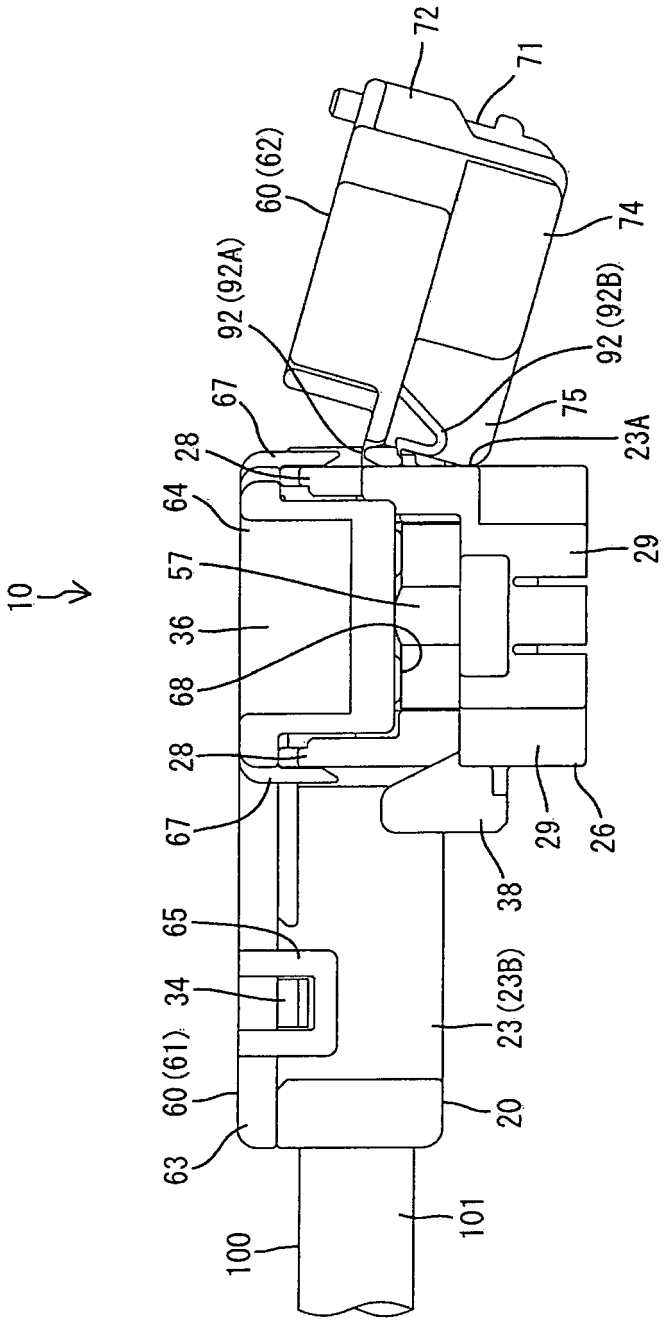
100
101
20
23 (23B)
38
29
26

FIG. 8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23 (23B)
60 (61)
20
63
101
100

REFERENCES CITED IN THE DESCRIPTION

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