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Protector and wire harness

Abstract

A protector applied to a wire harness includes: a base member that includes a housing space part that is formed with a wall part and in which wiring materials are inserted and an opening part that allows the housing space part to communicate with outside; and a cover member that closes the opening part by being assembled to the base member. The cover member, in a state of being assembled to the base member, includes a positioning part that is formed to protrude toward the housing space part side and abuts against the wiring materials housed in the housing space part. The positioning part is capable of correcting positions of the wiring materials, in a state of being assembled to the base member.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION(S)

(1) The present application claims priority to and incorporates by reference the entire contents of Japanese Patent Application No. 2022-145825 filed in Japan on Sep. 14, 2022.

BACKGROUND OF THE INVENTION

1. Field of the Invention

(2) The present invention relates to a protector and a wire harness.

2. Description of the Related Art

(3) For example, Japanese Patent No. 6198183 discloses a protector that includes a protector main body (base member) extending in a gutter shape and a lid body (cover member) assembled to the protector main body.

(4) By the way, although the protector described in the above-mentioned Japanese Patent No. 6198183 can hold wiring materials with the base member, it is difficult to dispose the wiring materials in a prescribed position within the base member, and the wiring materials may pop out from an opening part of the base member when a cover member is assembled to the base member. Therefore, there is a need for a configuration capable of holding and housing the wiring material in an appropriate position within the base member.

SUMMARY OF THE INVENTION

(5) The present invention is designed in view of the aforementioned circumstances, and it is an object thereof to provide a protector and a wire harness capable of holding and housing wiring materials in an appropriate position.

(6) In order to achieve the above mentioned object, a protector according to one aspect of the present invention includes a base member that includes a housing space part that is formed with a wall part and in which wiring materials exhibiting conductivity are inserted and an opening part that allows the housing space part to communicate with outside; and a cover member that is capable of closing the opening part by being assembled to the base member, wherein the cover member, in a state of being assembled to the base member, includes a positioning part that is formed to protrude toward the housing space part side, the positioning part abutting against the wiring materials housed in the housing space part, and the positioning part is capable of correcting positions of the wiring materials, in a state where the cover member is being assembled to the base member.

(7) In order to achieve the above mentioned object, a wire harness according to another aspect of the present invention includes wiring materials exhibiting conductivity; and a protector that includes a base member including a housing space part that is formed with a wall part and in which the wiring materials are inserted and an opening part that allows the housing space part to communicate with outside, and a cover member that closes the opening part by being assembled to the base member, wherein the cover member, in a state of being assembled to the base member, includes a positioning part that is formed to protrude toward the housing space part side, the positioning part abutting against the wiring materials housed in the housing space part, and the positioning part is capable of correcting positions of the wiring materials, in a state of being assembled to the base member.

(8) The above and other objects, features, advantages and technical and industrial significance of this invention will be better understood by reading the following detailed description of presently preferred embodiments of the invention, when considered in connection with the accompanying drawings.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) FIG. 1 is an exploded perspective view illustrating a schematic configuration of a wire harness to which a protector according to a first embodiment is applied;

(2) FIG. 2 is a top view illustrating a schematic configuration of the wire harness to which the protector according to the first embodiment is applied;

(3) FIG. 3 is a sectional view illustrating a schematic configuration of the wire harness to which the protector according to the first embodiment is applied; and

(4) FIG. 4 is a sectional view illustrating a schematic configuration of a wire harness to which a protector according to a second embodiment is applied.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

(5) Hereinafter, embodiments according to the present invention will be described in detail with reference to the accompanying drawings. Note, however, that the present invention is not limited by the embodiments. Furthermore, structural components in the following embodiments include those that can be easily replaced by those skilled in the art, or those that are substantially the same.

First Embodiment

(6) A wire harness WH illustrated in FIG. 1 is, for example, configured as an aggregate component formed with a bundle of a plurality of wiring materials W used for power supply and signal communication so as to connect the wiring materials W to each device by a connector or the like for connecting each of the devices loaded on a vehicle.

(7) The wire harness WH includes the wiring materials W, a protector 1, and a caterpillar-shaped sheathing material C that is assembled to the protector 1. In addition, the wire harness WH may further include a grommet, a fixture, a connector, and the like.

(8) The wiring material W is, for example, an insulated electric wire with the core wire, which is a bundle of a plurality of conductive metal element wires, covered with an insulation coating part. Note that the wiring material W may be a bundle of a plurality of insulated electric wires. Furthermore, the wiring material W may be an insulated metal rod, which is a conductive metal rod covered with an insulation coating part.

(9) The sheathing material C is formed with an insulation resin material or the like, a plurality of which are connected into a long shape. As illustrated in FIG. 1, the sheathing material C is attached to an end part of the protector 1, and protects the wiring material W by having the wiring material W inserted into the inside thereof. The wiring material W is connected to movable components such as a sliding door, a sliding seat, and a sunroof, and the extending direction thereof changes in accordance with the movement of the corresponding movable components. The caterpillar-shaped sheathing material C is used as a member that is capable of guiding the wiring material W from the protector 1 to the movable component while holding the wiring material W in a straight state or a bent state.

(10) The protector 1 is formed with an insulation resin material or the like, and houses the wiring material W so as to protect the wiring material W. The protector 1 is fixed to the vehicle to be used as a member that regulates the routing path of the wiring material W. As illustrated in FIG. 1, the protector 1 includes a base member 10 having a housing space part 10S through which the wiring material W is inserted, and a cover member 20 that is assembled to the base member 10.

(11) Furthermore, the protector 1 of the present embodiment is provided with a positioning part 200 in the cover member 20 as a structure for holding and housing the wiring material W in an appropriate position to implement a configuration that is capable of correcting the position of the wiring material W when assembled to the base member 10. Hereinafter, each structure of the protector 1 will be described in detail by referring to FIG. 1 to FIG. 3.

(12) In the description hereinafter, in regards to a first direction, a second direction, and a third direction intersecting with each other, the first direction is referred to as a “length direction X”, the second direction as a “width direction Y”, and the third direction as a “height direction Z”. The length direction X, the width direction Y, and the height direction Z are orthogonal to each other. The length direction X typically corresponds to an insertion direction or the like of the wiring material W with respect to the protector 1. Furthermore, the height direction Z corresponds to an attachment/detachment direction of the cover member 20 with respect to the base member 10, and an opening direction or the like of an opening part 14 (described later) of the base member 10. Unless otherwise noted, each of the directions used in the following description will be described as the direction in a state where each part of the protector 1 is being mounted.

(13) Furthermore, the upper side in the height direction Z corresponds to the side where the cover

member **20** is positioned, or the like, in a state where each part of the protector **1** is being mounted. The lower side in the height direction Z corresponds to the side where the base member **10** is positioned, or the like, in a state where each part of the protector **1** is being mounted.

(14) The base member **10** is configured including, as a wall part **10K**, a bottom wall part **11** and sidewall parts **12**, **13** as illustrated in FIG. 1 to FIG. 3. The base member **10** is formed integrally with the bottom wall part **11** and the sidewall parts **12**, **13** to have a U-shaped cross section along the height direction Z. Therefore, the base member **10** includes the housing space part **10S** (see FIG. 1 and FIG. 3) as an interior space, the opening part **14** that opens in the height direction Z (see FIG. 1 and FIG. 3), and insertion opening parts **15A** and **15B** (see FIG. 2) that open in the length direction X.

(15) The bottom wall part **11** extends along the length direction X and the width direction Y and is formed in a substantially rectangular plate shape with the height direction Z being the thickness direction, which is disposed opposing to the opening part **14** with a space provided therebetween in the height direction Z that is the opening direction of the opening part **14**.

(16) The sidewall parts **12** and **13** extend along the length direction X and the height direction Z and are formed in a substantially rectangular plate shape with the width direction Y being the thickness direction, which are disposed opposing to each other with a space provided therebetween in the width direction Y that intersects with the opening direction of the opening part **14**.

Furthermore, the sidewall parts **12** and **13** are connected to both end parts of the bottom wall part **11** in the width direction Y, respectively. More specifically, the sidewall part **12** is erected along the height direction Z from one end part of the bottom wall part **11** in the width direction Y, and the sidewall part **13** is erected along the height direction Z from the other end part of the bottom wall part **11** in the width direction Y. Note that each of the sidewall parts **12** and **13** herein may be formed in various shapes including a recessed portion, a protruded portion, a curved portion, or a bent portion.

(17) The housing space part **10S** is an area sectioned and formed by the bottom wall part **11** and a pair of sidewall parts **12**, **13**. The protector **1** is capable of routing the wiring material W along the length direction X by inserting the wiring material W into the housing space part **10S** through the insertion opening parts **15A** and **15B** positioned at the end parts in the length direction X. Note that the housing space part **10S** herein means the area that can hold the wiring material W by any of the bottom wall part **11**, the sidewall part **12**, and the sidewall part **13**. Therefore, the housing space part **10S** includes a space surrounded by a plurality of wall parts, a space sectioned by wall parts positioned opposing to each other, a space positioned along the wall face of one wall part, and the like.

(18) The opening part **14** is the area sectioned and formed by the pair of sidewall parts **12** and **13**, and it is the area sandwiched by the end parts of each of the sidewall parts **12** and **13** positioned on the upper side in the height direction Z. In the protector **1** according to the present embodiment, when the cover member **20** is assembled to the base member **10**, part of the opening part **14** is blocked by the cover member **20**, and part of the housing space part **10S** positioned corresponding to the opening part **14** is covered. Therefore, the protector **1** includes: an area that holds the wiring material W by housing the wiring material W in the internal space surrounded by the wall part **10K** of the base member **10** and a wall part **20K** (described later) of the cover member **20**; and an area that holds the wiring material W only by the wall part **10K**.

(19) The insertion opening parts **15A**, **15B** are the areas sectioned and formed by the pair of sidewall parts **12**, **13**, which are the areas sandwiched by the end parts positioned on the base end side (left side in FIG. 2) and the tip side (right side in FIG. 2) of each of the sidewall parts **12**, **13** in the length direction X.

(20) On the other hand, the cover member **20** is configured with the wall part **20K**, as illustrated in FIG. 1 to FIG. 3. The cover member **20**, when assembled to the base member **10**, extends from one sidewall part **12** to the other sidewall part **13** and is formed in a size capable of closing the opening

part **14** of the base member **10** in the width direction Y. Furthermore, the cover member **20** can partially close the opening part **14** along the length direction X, and it is formed in a plate shape with the height direction Z being the thickness direction when the opening part **14** is being closed (see FIG. 2 and the like). In this state, the cover member **20** is held in a closing position for closing the opening part **14** of the base member **10** by being engaged to each of the sidewall parts **12** and **13** of the base member **10** via a locking mechanism **30**, and it is positioned opposing to the bottom wall part **11** with a space provided therebetween in the height direction Z.

(21) Note that the locking mechanism **30** is configured including: a plurality of locking pieces **31** provided to each of the sidewall parts **12** and **13** of the base member **10**; and locked pieces **32** provided to the cover member **20** to correspond to each of the locking pieces **31** (see FIG. 1, FIG. 3, and the like). The base member **10** can lock the cover member **20** via the locking mechanism **30** by engaging the protruded parts formed in the locked pieces **32** of the cover member **20** with the hole parts formed in each of the locking pieces **31**.

(22) Next, the configuration of a positioning part **200** provided in the cover member **20** will be described.

(23) The positioning part **200** is a part formed to protrude from the inner face side of the cover member **20**. The positioning part **200** has a protruded part **210** and a pressing plane part **220** provided at the tip part of the protruded part **210**, as illustrated in FIG. 3.

(24) The protruded part **210** extends along the length direction X and extends across between the pair of sidewall parts **12** and **13** with respect to the width direction Y, when the cover member **20** is being assembled to the base member **10**. Furthermore, the protruded part **210** is formed in the height direction Z along each of the sidewall parts **12** and **13**, when the cover member **20** is being assembled to the base member **10**. Therefore, when the cover member **20** is assembled to the base member **10**, the housing space part **10S** of the base member **10** is narrowed by the protruded part **210**.

(25) The pressing plane part **220** extends along the length direction X and the width direction Y and is positioned facing the bottom wall part **11** of the base member **10**, when the cover member **20** is being assembled to the base member **10**. Therefore, when the cover member **20** is assembled to the base member **10**, the height of the housing space part **10S** of the base member **10** is narrowed by the pressing plane part **220** of the protruded part **210**. The height (distance from the bottom wall part **11** to the pressing plane part **220**) is narrowed to a prescribed height with which each of the wiring materials W can be inserted.

(26) Next, an operation when assembling the protector **1** will be described.

(27) First, an operator assembles a plurality of wiring materials W to the base member **10**. Then, the operator assembles the cover member **20** to the base member **10** in a state where each of the wiring materials W are being inserted into the housing space part **10S** of the base member **10**. At this time, the positioning part **200** of the cover member **20**, when inserted from the opening part **14** of the base member **10**, is pushed in toward the bottom wall part **11** side of the base member **10** with the pressing plane part **220** being abutted against each of the wiring materials W housed in the housing space part **10S**. Therefore, the cover member **20** can place each of the wiring materials W housed in the housing space part **10S** toward the bottom wall part **11** side of the base member **10** via the positioning part **200**. As a result, with the protector **1** in which the cover member **20** is assembled to the base member **10** in this manner, it is possible to correct the positions of the wiring materials W in the housing space part **10S** by disposing each of the wiring materials W between the positioning part **200** of the cover member **20** and the bottom wall part **11** of the base member **10**, and sandwiching the wiring materials W with the positioning part **200** and the bottom wall part **11**. More specifically, in the protector **1**, when the cover member **20** is assembled to the base member **10**, the height of the housing space part **10S** is narrowed by the pressing plane part **220** of the protruded part **210**. The height is narrowed down to a height equivalent to the height of the wiring materials W. Therefore, in the protector **1**, each of the wiring materials W can be disposed side by

side along the width direction Y in a state where the cover member **20** is being assembled to the base member **10** (see FIG. 3).

(28) Furthermore, in the protector **1**, it is possible to close the opening part **14** of the base member **10** against the width direction Y by the positioning part **200** of the cover member **20**, when the cover member **20** is assembled to the base member **10**. Therefore, the cover member **20** can prevent each of the wiring materials W housed in the housing space part **10S** from moving toward the opening part **14** and popping out from the opening part **14** to the outside.

(29) The wire harness WH described above includes: the wiring materials W exhibiting conductivity; and the protector **1** that includes: the base member **10** having the housing space part **10S** which is formed with the wall part **10K** and into which the wiring materials W are inserted, and the opening part **14** that allows the housing space part **10S** to communicate with the outside; and the cover member **20** that closes the opening part **14** by being assembled to the base member **10**. Furthermore, the cover member **20**, in a state of being assembled to the base member **10**, includes the positioning part **200** that is formed to protrude toward the housing space part **10S** side and abuts against the wiring materials W housed in the housing space part **10S**. The positioning part **200** can correct the position of the wiring material W in a state of being assembled to the base member **10**.

(30) According to such a configuration, the wire harness WH and the protector **1** can press each of the wiring materials W housed in the housing space part **10S** from the opening part **14** side by pushing in the positioning part **200** of the cover member **20** from the opening part **14** of the base member **10**. Therefore, the wire harness WH and the protector **1** can hold and house the wiring materials W in an appropriate position within the housing space part **10S**.

(31) Furthermore, the wire harness WH and the base member **10** of the protector **1** described above include, as the wall part **10K**, the bottom wall part **11** positioned opposing to the opening part **14** in the opening direction (height direction Z) of the opening part **14**, and the pair of sidewall parts **12** and **13** extending from both end parts of the bottom wall part **11** and opposing to each other in the width direction Y that intersects with the height direction Z. Furthermore, the positioning part **200** includes: the protruded part **210** which extends across between the pair of sidewall parts **12**, **13** with respect to the width direction Y and which is formed along each of the sidewall parts **12**, **13** with respect to the height direction Z in a state where the cover member **20** is being assembled to the base member **10**; and the pressing plane part **220** that is provided at the tip part of the protruded part **210** and positioned facing the bottom wall part **11** in a state where the cover member **20** is being assembled to the base member **10**. Each of the wiring materials W is disposed side by side along the width direction Y between the pressing plane part **220** and the bottom wall part **11** in a state where the cover member **20** is being assembled to the base member **10**. According to such a configuration, the wire harness WH and the protector **1** can prevent each of the wiring materials W from moving toward the opening part **14** and popping out from the opening part **14** to the outside by placing each of the wiring materials W housed in the housing space part **10S** to the bottom wall part **11** side via the protruded part **210** of the positioning part **200**. Furthermore, the wire harness WH and the protector **1** can correct the position of the wiring materials W via the pressing plane part **220** of the protruded part **210** such that each of the wiring materials W is disposed along a prescribed direction within the housing space part **10S**. Therefore, the wire harness WH and the protector **1** can prevent the wiring materials W from tangling with each other when each of the wiring materials W moves within the housing space part **10S** because the movable component to which the wiring materials W are connected is operated. Therefore, the wire harness WH and the protector **1** can hold and house the wiring materials W in an appropriate position within the housing space part **10S**.

Second Embodiment

(32) Next, a wire harness WHA according to a second embodiment will be described. The wire harness WHA differs from the wire harness WH and the protector **1** according to the first

embodiment described above in terms of the shape of a positioning part **200A** provided to a cover member **20A** of a protector **1A**. In the second embodiment, the same reference signs are applied to the same structural components as those of the first embodiment, and their detailed descriptions thereof are omitted.

(33) The positioning part **200A** is a part formed to protrude from the inner face side of the cover member **20A**. The positioning part **200A** has the protruded part **210** and a notch part **230** provided at the tip side of the protruded part **210**, as illustrated in FIG. 4.

(34) The notch part **230** is formed from the tip side of the protruded part **210** toward the based end side, and it is a groove part formed from the bottom wall part **11** side of the base member **10** toward the opening part **14** side in a state where the cover member **20** is being assembled to the base member **10**. The protruded part **210** with the groove part formed therein has a U-shaped cross section along the height direction Z, and a pair of protrusions are formed on both sides by sandwiching the notch part **230**. Therefore, when the cover member **20** is assembled to the base member **10**, the housing space part **10S** of the base member **10** is narrowed by the protruded part **210**, and the housing space part **10S** is turned into a space part (inner side of the notch part **230**) surrounded by the notch part **230**.

(35) According to such a configuration, the wire harness WHA and the protector **1A** can prevent each of the wiring materials W from moving toward the opening part **14** and popping out from the opening part **14** to the outside by guiding each of the wiring materials W housed in the housing space part **10S** of the base member **10** to the inside of the notch part **230** and placing them to the center side of the housing space part **10S**. Therefore, the wire harness WHA and the protector **1A** can hold and house the wiring materials W in an appropriate position within the housing space part **10S**.

(36) Note that the protectors **1**, **1A**, and the wire harnesses WH, WHA according to the embodiments of the present invention described above are not limited to the embodiments described above, and various changes are possible within the scope of the appended claims.

(37) For example, while the positioning part is described to be formed in the length direction X and formed from one insertion opening part to the other insertion opening part formed by the base member when the cover member is assembled to the base member, there is no specific limit set for the position of the positioning part with respect to the length direction X.

(38) Furthermore, the positioning part may not include the pressing plane part, and may not include the notch part.

(39) The protector and the wire harness according to the present embodiments may be configured by combining the structural components of the embodiments and modification examples described above as appropriate.

(40) The protector and the wire harness according to the present embodiments can achieve such an effect that the wiring materials can be held and housed in an appropriate position.

(41) Although the invention has been described with respect to specific embodiments for a complete and clear disclosure, the appended claims are not to be thus limited but are to be construed as embodying all modifications and alternative constructions that may occur to one skilled in the art that fairly fall within the basic teaching herein set forth.

Claims

1. A protector comprising: a base member that includes a housing space part that is formed with a wall part and in which wiring materials exhibiting conductivity are inserted and an opening part that allows the housing space part to communicate with outside; and a cover member that is capable of closing the opening part by being assembled to the base member, wherein the cover member, in a state of being assembled to the base member, includes a positioning part that is formed to protrude toward the housing space part side, the positioning part abutting against the

wiring materials housed in the housing space part, and the positioning part is capable of correcting positions of the wiring materials, in a state where the cover member is being assembled to the base member, the base member includes, as the wall part: a bottom wall part that is positioned opposing to the opening part in an opening direction of the opening part; and a pair of sidewall parts extending from both ends of the bottom wall part and opposing to each other in a width direction that intersects with the opening direction, the base member includes a first insertion opening and a second insertion opening spaced away from the first insertion opening, the first insertion opening and the second insertion opening are bound by the pair of sidewalls and the bottom wall, the wiring materials extend through each of the first insertion opening, the second insertion opening, and the housing space part, the bottom wall is flat from the first insertion opening to the second insertion opening, and the cover member includes a pair of flanges protruding outwardly from the positioning part, each of the flanges extends over a respective one of the sidewall parts.

2. The protector according to claim 1, wherein the positioning part includes: a protruded part extending across between the pair of sidewall parts with respect to the width direction, the protruded part being formed along each of the sidewall parts with respect to the opening direction, in a state where the cover member is being assembled to the base member; and a pressing plane part provided at a tip part of the protruded part, the pressing plane part being positioned facing the bottom wall part in a state where the cover member is being assembled to the base member, and each of the wiring materials is disposed side by side along the width direction between the pressing plane part and the bottom wall part in a state where the cover member is being assembled to the base member.

3. The protector according to claim 1, wherein the positioning part includes: a protruded part extending across between the pair of sidewall parts with respect to the width direction, the protruded part being formed along each of the sidewall parts with respect to the opening direction, in a state where the cover member is being assembled to the base member; and a notch part provided in the protruded part, the notch part being formed from a tip side toward a base end side, each of the wiring materials being disposed on an inner side of the notch part in a state where the cover member is being assembled to the base member.

4. A wire harness comprising: wiring materials exhibiting conductivity; and a protector that includes a base member including a housing space part that is formed with a wall part and in which the wiring materials are inserted and an opening part that allows the housing space part to communicate with outside, and a cover member that closes the opening part by being assembled to the base member, wherein the cover member, in a state of being assembled to the base member, includes a positioning part that is formed to protrude toward the housing space part side, the positioning part abutting against the wiring materials housed in the housing space part, and the positioning part is capable of correcting positions of the wiring materials, in a state where the cover member is being assembled to the base member, the base member includes, as the wall part: a bottom wall part that is positioned opposing to the opening part in an opening direction of the opening part; and a pair of sidewall parts extending from both ends of the bottom wall part and opposing to each other in a width direction that intersects with the opening direction, the base member includes a first insertion opening and a second insertion opening spaced away from the first insertion opening, the first insertion opening and the second insertion opening are bound by the pair of sidewalls and the bottom wall, the wiring materials extend through each of the first insertion opening, the second insertion opening, and the housing space part, the bottom wall is flat from the first insertion opening to the second insertion opening, and the cover member includes a pair of flanges protruding outwardly from the positioning part, each of the flanges extends over a respective one of the sidewall parts.
