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Fixing member and fixing structure

Abstract

Objects are: to make a fixing structure in which an engagement part of a fixing member is inserted and fixed in a through hole of a plate-shaped member, into a structure in which the fixing member is easily detached from the through hole and is less likely to be damaged or broken when being detached; and to, in doing so, maintain the dustproof and waterproof performance, the molding processability, and the elasticity of a dish-like contact portion of the fixing member at the conventional level, and suppress a size increase. To attain these objects, in a fixing structure, arc-shaped bent portions are respectively formed at both ends of a dish-like contact portion which annularly contacts a through hole surrounding portion from a near side in an insertion direction, and are guide portions for a detachment jig to enter the inside of the dish-like contact portion in the fixing structure.

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Background/Summary

CROSS REFERENCE TO RELATED APPLICATIONS

(1) This application claims priority on Patent Application No. 2022-164652 filed in JAPAN on Oct. 13, 2022. The entire contents of this Japanese Patent Applications are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

(2) This disclosure relates to a fixing member and a fixing structure.

Description of Related Art

(3) A vehicle fixing member for fixing a wire harness to a vehicle body side in a state of holding the wire harness is formed as a resin injection-molded article including a holding part for holding a

wire harness and an engagement part to be engaged and inserted into a through hole of a plate-shaped member (vehicle panel material) (see Japanese Laid-Open Patent Publication No. 2019-161880).

(4) Specifically, the engagement part is provided with a support column, elastic locking pieces which are paired such that the support column is interposed therebetween and each extend from the upper end side toward the lower end side of the support column, and a dish-like contact portion which extends obliquely upward and outward in the radial direction of the support column from the lower end side of the support column so as to surround the support column. When the support column and the elastic locking pieces are inserted into the through hole of the plate-shaped member from the upper end side of the support column, the paired elastic locking pieces pass through the through hole with inward elastic deformation approaching the support column, and when a predetermined engagement position is reached, the elastic locking pieces elastically return (do not have to come into a fully returned state), each of locking portions at the distal ends of the elastic locking pieces presses outward an inner peripheral wall of the through hole and comes into a locking state of locking a surrounding portion of the through hole from the far side in the insertion direction, and the dish-like contact portion comes into a contact state of annularly contacting the surrounding portion of the through hole from the near side in the insertion direction. Accordingly, the engagement part comes into an engagement and fixation state where the plate-shaped member is sandwiched in the insertion direction.

(5) In a fixing structure for the fixing member by this engagement part, in order to detach the engagement part from the plate-shaped member, conventionally, for example, a jig such as a flat-blade screwdriver is inserted between the plate-shaped member and the dish-like contact portion, and a projecting distal end portion of each elastic locking piece projecting downward from the through hole is pressed toward the support column side to become elastically deformed, thereby disengaging the engagement part. Then, the engagement part is pulled out in a direction opposite to the insertion direction.

(6) However, in this conventional method, it is difficult to insert the jig such as a flat-blade screwdriver between the plate-shaped member and the dish-like contact portion which are strongly adhered to each other, and the engagement part cannot be easily detached. In addition, there is a possibility of damaging or breaking the plate-shaped member and the dish-like contact portion when inserting the jig between the plate-shaped member and the dish-like contact portion. It is difficult to reuse the damaged or broken fixing member even when the fixing member can be detached. On the other hand, even if it is possible to produce a new fixing member that can be detached such that the fixing member can be reused, it is difficult to adopt such a fixing member from the viewpoint of cost and the freedom of placement if the size of a dish-like contact portion is larger than that of a conventional product.

(7) An object of this disclosure is to make a fixing structure in which an engagement part of a fixing member is inserted and fixed in a through hole of a plate-shaped member, into a structure in which the fixing member is easily detached from the through hole and is less likely to be damaged or broken when being detached. In addition, another object of this disclosure is to, in doing so, maintain dustproof and waterproof performance during insertion and fixation of the fixing member, processability with an injection mold, and the elasticity (flexibility) of a dish-like contact portion at the same level as in the conventional art, and suppress a size increase.

SUMMARY OF THE INVENTION

(8) A fixing member for attaining the aforementioned objects is a fixing member including (provided with an engagement part including): a support column extending in an up-down direction; elastic locking pieces paired such that the support column is interposed therebetween in a right-left direction and each extending from a support column upper end side toward a support column lower end side; and a dish-like contact portion radially extending obliquely upward and outward from the support column lower end side so as to surround the support column, wherein by

inserting the support column and the elastic locking pieces into a through hole of a plate-shaped member from the support column upper end side, the elastic locking pieces pass through the through hole with elastic deformation approaching the support column, and when the elastic locking pieces reach a predetermined engagement position, the elastic locking pieces elastically return (do not have to fully return to a natural state) and project downward from the through hole to lock a surrounding portion of the through hole from a far side in an insertion direction (upper side) while pressing an inner wall surface of the through hole, and the dish-like contact portion annularly contacts the surrounding portion of the through hole from a near side in the insertion direction (lower side) (to obtain an engagement and fixation state), thereby fixing (inserting and fixing) the fixing member to the plate-shaped member, the dish-like contact portion includes a bent portion which is bent obliquely downward and outward after the dish-like contact portion extends obliquely upward and outward, the bent portion is independently formed outside of each of connection positions of the elastic locking pieces with the support column in the right-left direction, and an upper surface of each bent portion forms a smoothly continuous curved surface around an axis of the support column, and is formed such that a direction from an outer edge of the curved surface when seen in an axial direction of the support column toward a lowest end of the elastic locking piece in a natural state (non-elastically deformed state) is directed upward.

(9) A fixing structure for attaining the aforementioned objects is a fixing structure including: a plate-shaped member provided with a through hole; and a fixing member provided with an engagement part including a support column extending in an up-down direction, elastic locking pieces paired such that the support column is interposed therebetween in a right-left direction and each extending from a support column upper end side toward a support column lower end side, and a dish-like contact portion radially extending obliquely upward and outward from the support column lower end side so as to surround the support column, wherein by inserting the support column and the elastic locking pieces into the through hole of the plate-shaped member from the support column upper end side, the elastic locking pieces pass through the through hole with elastic deformation approaching the support column, and when the elastic locking pieces reach a predetermined engagement position, the elastic locking pieces elastically return and project downward from the through hole to lock a surrounding portion of the through hole from a far side in an insertion direction while pressing an inner wall surface of the through hole, and the dish-like contact portion annularly contacts the surrounding portion of the through hole from a near side in the insertion direction, thereby engaging and fixing the engagement part to the plate-shaped member, the dish-like contact portion includes a bent portion which is bent obliquely downward and outward after the dish-like contact portion extends obliquely upward and outward, the bent portion is independently formed outside of each of connection positions of the elastic locking pieces with the support column in the right-left direction, and an upper surface of each bent portion forms a smoothly continuous curved surface around an axis of the support column, and is formed such that a direction from an outer edge of the curved surface when seen in an axial direction of the support column toward a lowest end of the elastic locking piece in a natural state is directed upward.

(10) In the above configuration, since the bent portions are formed in the dish-like contact portion, it is easier to insert a jig such as a flat-blade screwdriver between the plate-shaped member and the dish-like contact portion. In addition, since it is easier to insert the jig, the possibility of damaging or breaking the fixing member is greatly reduced, so that it is possible to reuse the fixing member, thereby contributing to the Sustainable Development Goals (SDGs). In addition, since the bent portions are formed in the dish-like contact portion only on the sides on which the paired elastic locking pieces are located, the increase in size due to the bent portions can be minimized, and it is easy to grasp the position of a claw at a distal end of each elastic locking piece (i.e., the position where the jig is inserted). Moreover, since each bent portion slopes upward from the outer edge thereof toward the position of the lowest end of the elastic locking piece when seen in the axial

direction of the support column, and forms a smoothly continuous arc-shaped curved surface around the axis, the access of the jig to a locking portion located below the elastic locking piece becomes good. That is, even if the insertion position of the jig is misaligned, it is possible to easily correct the direction in which the jig is directed to the locking portion. Furthermore, each bent portion is formed outside of the connection position of each elastic locking piece with the support column in the right-left direction. Since the elastic locking piece engaged with the surrounding portion of the through hole is bent at most to the vicinity of the connection position with the support column, if the bent portion is formed in a somewhat long arc-shaped curved surface around the axis of the support column, even if the insertion position of the jig is misaligned, the jig can be caused to reach the locking portion while correcting the direction of the jig such that the jig slides on the upper surface of the bent portion. In addition, since each bent portion is formed in the dish-like contact portion limitedly only on the side on which the elastic locking piece is located, the dustproof and waterproof performance, the processability with an injection mold, and the elastic ability (flexibility) of the dish-like contact portion of the fixing member are not impaired as compared to a conventional one.

(11) Each bent portion can be formed such that a length of the bent portion in a radial direction with respect to the axis of the support column is longest on an outer side in the right-left direction with respect to the support column and becomes shorter with increasing distance therefrom around the axis, and can be formed so as to be smoothly connected on both end sides around the axis to non-formation portions, of the dish-like contact portion, in which the bent portion is not formed. In the above configuration, each bent portion is formed with a longer slope width (slope length) at a center portion of the arc shape outside the locking portion of the elastic locking piece such that the jig can be reliably guided, and is formed such that a slope width (slope length) becomes shorter with decreasing distance to both end portions of the arc shape, so that an unnecessary shape for extensive guidance for a jig insertion operation in which the jig is greatly misaligned can be omitted, and the increase in size can be minimized. In addition, on both end sides around the axis of the support column on which the slope width (slope length) of each bent portion is short, the bent portion approaches the non-formation portions, of the dish-like portion, in which the bent portion is not formed, such that the slope width (slope length) thereof decreases. Finally, the slope width (slope length) becomes zero, and the bent portion is connected to the non-formation portions. Therefore, no portion (recess, projection, or notch) by which the jig may become caught is formed in the dish-like contact portion. Thus, even if the jig is inserted from both end sides around the axis, it is possible to correct the direction of the jig and direct the jig to the locking portion.

(12) Each bent portion can be formed such that the bent portion does not project downward from a lowest surface of the dish-like contact portion. For example, the bent portion can be prevented from projecting downward from a position whose distance from the top of the dish-like contact portion is ⅔ of the height (width in the up-down direction) of the dish-like contact portion. Accordingly, the extension of the dish-like contact portion due to the bent portion can be minimized while the insertion of the jig can be reliably guided.

(13) A wire harness holding part (predetermined functional part) may be provided below the dish-like contact portion. With this configuration, when adding functions after a vehicle is sold, it is possible to, for example, replace or move a wire harness and reuse a removed wire harness, thereby contributing to the SDGs.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) FIG. **1**A is a perspective view showing a fixing member according to one embodiment;

(2) FIG. **1**B is a perspective view showing the fixing member in FIG. **1**A from a different angle;

(3) FIG. **2**A is a partially-enlarged front view of FIG. **1**;
(4) FIG. **2**B is a partially-enlarged rear view of FIG. **1**;
(5) FIG. **3** is a perspective view illustrating a use state of the fixing member in FIG. **1**A;
(6) FIG. **4** is a cross-sectional view of FIG. **3** as seen from the side surface side;
(7) FIG. **5** is an enlarged rear view of an engagement part in FIG. **2**A;
(8) FIG. **6** is an enlarged plan view of the engagement part in FIG. **2**A;
(9) FIG. **7** is a cross-sectional view showing an engagement and fixation state of the engagement part in FIG. **2**A with respect to an insertion hole (fixing structure);
(10) FIG. **8** is a cross-sectional view illustrating release of the engagement and fixation state in FIG. **7**;
(11) FIG. **9** is a cross-sectional view showing an IX-IX cross-section in FIG. **5**;
(12) FIG. **10**A is a perspective view showing a fixing member according to a first modification;
(13) FIG. **10**B is a perspective view showing the fixing member in FIG. **10**A from a different angle;
(14) FIG. **10**C is a side view of FIG. **10**A;
(15) FIG. **10**D is a plan view of FIG. **10**A;
(16) FIG. **11**A is a perspective view showing a fixing member according to a second modification;
(17) FIG. **11**B is a perspective view showing the fixing member in FIG. **11**A from a different angle;
(18) FIG. **11**C is a plan view of FIG. **11**A;
(19) FIG. **11**D is a front view of FIG. **11**A;
(20) FIG. **11**E is a rear view of FIG. **11**A; and
(21) FIG. **12** is a cross-sectional view showing a method for using a functional part included in the fixing member in FIG. **11**A.

DETAILED DESCRIPTION

(22) Hereinafter, an embodiment of this disclosure will be described with reference to the drawings. FIG. **1**A and FIG. **1**B are a perspective view of a fixing member **10** according to this embodiment as seen from above and a perspective view of the fixing member **10** as seen from below. FIG. **2**A and FIG. **2**B are enlarged views of the upper side of II-II cross-sections of the fixing member **1** in FIG. **1**A and FIG. **1**B.
(23) The fixing member **10** shown in FIG. **1**A, FIG. **1**B, FIG. **2**A, and FIG. **2**B is a resin molded article, and includes an engagement part **15** which is inserted and fixed in a through hole **101** (see FIG. **7** and FIG. **8**) of a plate-shaped member **100**, and a functional part **16** which is located below the engagement part **15** and has a predetermined function. Accordingly, the fixing member **10** allows the functional part **16** to function in a state of being fixed to the plate-shaped member **100**.
(24) The functional part **16** is provided as a longitudinal routing material holding part. Specifically, as shown in FIG. **3** and FIG. **4**, the functional part **16** is a known binding part (e.g., wire harness holding part) including a belt portion **16**B for surrounding the outer periphery of a longitudinal routing material **200** (e.g., wire harness) and a buckle portion **16**A capable of receiving and fixing the belt portion **16**B from a distal end side of the belt portion **16**B.
(25) As shown in FIG. **5** and FIG. **6**, the engagement part **15** includes: a support column **11** which extends in an up-down direction Z; elastic locking pieces **12** which are paired such that the support column **11** is interposed therebetween from the right and left sides (in a right-left direction Y), each extend from a support column upper end side toward a support column lower end side, and each have a locking portion **12**A at a distal end portion thereof, and a dish-shaped (skirt-shaped) dish-like contact portion **13** (radially-extending contact portion) which is connected to the lower end side of the support column **11** and radially extends obliquely upward and outward so as to surround the support column **11**. The mutually orthogonal up-down direction Z and right-left direction Y and a front-back direction X orthogonal thereto are directions that are set for the sake of convenience to describe a three-dimensional shape, and, for example, the direction in which the support column **11** extends does not have to coincide with the up-down direction Z (gravity direction).
(26) As shown in FIG. **7**, the engagement part **15** is inserted and fixed in the through hole **101** of

the plate-shaped member **100** by inserting the support column **11** and the elastic locking pieces **12** into the through hole **101** from the support column upper end side (in an insertion direction I). Upon insertion, the paired elastic locking pieces **12** pass through the through hole **101** while narrowing the widths thereof with inward elastic deformation approaching the support column **11**, and when the elastic locking pieces **12** pass through the through hole **101** and reach a predetermined engagement position, the elastic locking pieces **12** elastically return (do not have to fully return to a natural state) and widen. At this time, each locking portion **12**A projects downward through the inside of the through hole **101**, presses outward an inner wall surface **101***a*, and comes into a locking state (pull-out prevention state) of locking a surrounding portion **102** of the through hole **101** from the upper side (far side in the insertion direction I). Meanwhile, the dish-like contact portion **13** is not inserted into the through hole **101**, and comes into a pressing state (contact state) of annularly contacting and pressing the surrounding portion **102** of the through hole **101** from the lower side (near side in the insertion direction I). As a result, the plate-shaped member **100** comes into an engagement and fixation state of being sandwiched (specifically, compressed) from the upper and lower sides (from the near side and the far side in the insertion direction I) at the surrounding portion **102** of the through hole **101**. Accordingly, a fixing structure **1** in which the fixing member **10** is fixed to the plate-shaped member **100** is formed.

(27) Each locking portion **12**A has a locking projection portion **12***c* which projects outward (in a direction away from the support column **11**) in the alignment direction of the paired elastic locking pieces **12** (right-left direction Y) at multiple steps (here, three steps) in a step-wise manner. By having the locking projection portion **12***c* at multiple steps in a step-wise manner, it is possible to handle plate-shaped members **100** having various thicknesses and various through hole shapes. In the locking projection portion **12***c* having multiple steps, a downward-facing surface at each step is a locking surface for locking the surrounding portion **102** of the through hole **101** from the upper side, and a surface, at each step, facing the outer side in the alignment direction Y of the elastic locking pieces **12** is a pressing surface for pressing outward the inner wall surface **101***a* of the through hole **101**.

(28) As shown in FIG. **9**, the engagement part **15** includes through hole positioning portions **14**A, **14**A, and **14**B which come into contact with the inner wall surface **101***a* of the through hole **101** and position the engagement part **15** when being inserted into the through hole **101** of the plate-shaped member **100** together with the support column **11** and the elastic locking pieces **12** and the engagement and fixation state is obtained.

(29) Meanwhile, as shown in FIG. **5** and FIG. **6**, the dish-like contact portion **13** includes a bottom surface portion **13**B which is connected to the support column **11**, a main dish-like portion **13**A which extends from the bottom surface portion **13**B obliquely upward and outward in the radial direction with respect to an axis **11**Z, and a bent portion **13**S which is bent outward and obliquely downward from the main dish-like portion **13**A. The bent portion **13**S is provided on each of the sides of the paired elastic locking pieces **12**. More particularly, the bent portions **13**S are independently formed outside of connection positions **12***r* of the respective elastic locking pieces **12** with the support column **11** in the right-left direction Y (root portions of the respective elastic locking pieces **12**). The dish-like contact portion **13** has a substantially elliptical shape (oval shape: including an egg shape, an oblong circular shape, an elliptical shape, a rounded rectangular shape, etc.) when seen in the direction of the axis **11**Z of the support column **11** (see FIG. **6**), and the bent portions **13**S are formed on both sides in the major-axial direction of the dish-like contact portion **13** (here, coinciding with the Y direction).

(30) As shown in FIG. **5** and FIG. **6**, an upper surface **13***s* of each bent portion **13**S forms a smoothly continuous curved surface around the axis **11**Z of the support column **11**, and is formed such that a direction from the outer edge of the curved surface when seen in the direction of the axis **11**Z of the support column **11** toward a lowest end **12***b* of the elastic locking piece **12** in a natural state (state of not being elastically deformed) is directed upward. Specifically, each bent

portion **13**S is formed in an arc shape and surrounds the lowest end **12***b* (see FIG. **5** and FIG. **6**) of the corresponding elastic locking piece **12** on the outer side in the right-left direction Y when the elastic locking piece **12** is in the natural state, and the positions of both ends of the arc shape are located on the outer side in the right-left direction Y with respect to the connection position **12***r* of the elastic locking piece **12** with the support column **11** (root portion of the elastic locking piece **12**) (on the right or left outer side with respect to a dashed line RP in FIG. **5** and FIG. **6**).

(31) As shown in FIG. **7** and FIG. **8**, the dish-like contact portion **13** in the engagement and fixation state presses the plate-shaped member **100** upward (toward the far side in the insertion direction I) by an annular end portion **13**U (bent portion, annular contact portion) at an end of the main dish-like portion **13**A which extends obliquely upward and outward, and also comes into a state where the end portion **13**U is pressed downward and the main dish-like portion **13**A is elastically deformed.

(32) The upper surface **13***s* of each bent portion **13**S in the engagement and fixation state faces the plate-shaped member **100** in the up-down direction Z with a gap therebetween. As shown in FIG. **6**, the upper surface **13***s* forms a smoothly continuous arc-shaped curved surface around the axis **11**Z of the support column **11**, and is formed such that the direction from the outer edge of the curved surface when seen in the direction of the axis **11**Z (axial direction) toward the position of the lowest end **12***b* of the elastic locking piece **12** in the natural state is directed upward.

(33) As shown in FIG. **6**, each bent portion **13**S is formed such that the length of the bent portion **13**S in the radial direction with respect to the axis **11**Z of the support column **11** is longest on the outer side in the right-left direction Y with respect to the support column **11** and becomes shorter with increasing distance therefrom around the axis **11**Z, and each bent portion **13**S is formed so as to be smoothly connected on both end sides around the axis **11**Z to non-formation portions **13**T, of the dish-like contact portion **13**, in which the bent portion **13**S is not formed. That is, the bent portion **13**S which forms an arc-shaped curved surface is formed such that the slope length is longer (the slope width is wider) the closer to a center portion of the arc shape, and the slope length is shorter (the slope width is narrower) the closer to both end sides of the arc shape. Specifically, the bent portion **13**S is formed such that the length of the bent portion **13**S is almost the same until the distance from the outer side in the alignment direction Y (opposing direction of the elastic locking pieces **12**) along the arc shape reaches a certain distance, and becomes shorter with further increasing the distance therefrom around the axis **11**Z. Each bent portion **13**S is smoothly connected to the non-formation portions **13**T at both ends of the arc shape at which the length of the bent portion **13**S is zero.

(34) Each bent portion **13**S is formed such that the bent portion **13**S does not project downward from a bottom surface **13***b* (or a connection surface with the functional part **16**) of the dish-like contact portion **13**. As shown in FIG. **5**, each bent portion **13**S is formed such that the bent portion **13**S does not project downward from a position h**0** whose distance from the top of the dish-like contact portion **13** is ⅔ of a height h (width in the up-down direction) of the dish-like contact portion **13** (the bent portion **13**S is located above the position h**0**), thereby limiting the length of the bent portion **13**S. This is not only to avoid an increase in size, but also to avoid interference with the functional part **16** immediately below the dish-like contact portion **13**.

(35) Meanwhile, as shown in FIG. **7**, in the engagement and fixation state, a part (**12***p*) of the locking portion **12**A of each elastic locking piece **12** projects downward from the through hole **101** of the plate-shaped member **100**. At this time, the projecting distal end portion **12***p* projecting downward from the through hole **101** is hidden inside the dish-like contact portion **13** and is not exposed below the plate-shaped member **100**.

(36) The locking state (pull-out prevention state) of each elastic locking piece **12** by the locking portion **12**A is released by bringing a jig **300** (see FIG. **8**) into contact with the projecting distal end portion **12***p* and pressing the projecting distal end portion **12***p* toward the support column **11** side, so that it is possible to pull out the engagement part **15** from the through hole **101** in a direction

opposite to the insertion direction I.
(37) However, in order to cause the jig **300** to reach the projecting distal end portion **12***p*, the jig **300** has to be caused to enter the inside of the dish-like contact portion **13** while widening the space between the dish-like contact portion **13** in the pressing state and the plate-shaped member **100** (surrounding portion **102**). At this time, since the bent portions **13**S are formed in the dish-like contact portion **13**, the jig **300** can be inserted between the dish-like contact portion **13** and the plate-shaped member **100** (surrounding portion **102**) so as to slide on the upper surface **13***s* of each bent portion **13**S, which makes it easier to widen the space therebetween. In addition, since the upper surface **13***s* of each bent portion **13**S forms a smoothly continuous curved surface around the axis **11**Z, and the curved surface is an inclined surface sloping upward toward the locking portion **12**A, even if the insertion direction of the jig **300** slightly deviates around the axis **11**Z, the direction can be easily corrected while sliding the jig **300** on the upper surface **13***s* of the bent portion **13**S.
(38) Therefore, even if the jig **300** is a flat-blade screwdriver or the like, it is easy to pull out the engagement part **15** from the through hole **101**. In addition, since the jig **300** enters the inside of the dish-like contact portion **13** while sliding on the upper surface **13***s* of the bent portion **13**S, the dish-like contact portion **13** is less likely to be damaged or broken.
(39) The locking state (pull-out prevention state) by the locking portion **12**A may be released by simultaneously pressing both elastic locking pieces **12** inward from both outer sides in the alignment direction Y of the elastic locking pieces **12** with the jig **300** such that both elastic locking pieces **12** are elastically deformed, as shown in FIG. **8**, or may be released by pressing the elastic locking pieces **12** from one side toward the other side in the alignment direction Y of the elastic locking pieces **12** with the jig **300** such that both elastic locking pieces **12** are elastically deformed.
(40) As described above, the fixing structure **1** (see FIG. **7**) according to this embodiment in which the fixing member **10** is engaged and fixed to the plate-shaped member **100** is not only a structure in which the fixing member **10** can be removed by the jig **300** (see FIG. **8**), but also a structure in which, since the bent portions **13**S are formed in the dish-like contact portion **13**, it is easy to insert the jig **300**, and the possibility of damaging or breaking the dish-like contact portion **13** when inserting the jig **300** can be greatly reduced.
(41) Although one embodiment of this disclosure has been described above, this embodiment is merely illustrative, this disclosure is not limited thereto, and various modifications such as additions and omissions may be made on the basis of the knowledge of a person skilled in the art without departing from the scope of the claims.
(42) A first modification of the above embodiment will be described with reference to FIG. **10**A to FIG. **10**D. FIG. **10**A is a perspective view showing a use state of a fixing member **10** according to the first modification, FIG. **10**B is a perspective view of the fixing member **10** according to the first modification as seen in a direction different from that in FIG. **10**A, and FIG. **10**C and FIG. **10**D are a right side view and a plan view of the fixing member **10** according to the first modification. A left side view of the fixing member **10** according to the first modification is the same as FIG. **10**C, which is a right side view, or is represented so as to be bilaterally symmetrical to FIG. **10**C.
(43) The dish-like contact portion **13** of the above embodiment has a substantially elliptical shape whose major-axis direction is the alignment direction Y of the paired elastic locking pieces **12**, when seen in the direction of the axis **11**Z of the support column **11**, and the bent portions **13**S are formed at both ends in the major-axis direction of the dish-like contact portion **13**, respectively. However, the dish-like contact portion **13** of the fixing member **10** of the first modification has a main dish-like portion **13**A which has a substantially perfectly circular shape (here, which is perfectly circular) when seen in the direction of the axis **11**Z of the support column **11**, and bent portions **13**S are provided at both ends in the alignment direction Y of the paired elastic locking pieces **12**, respectively (see FIG. **10**D).
(44) The functional part **16** of the fixing member **10** of the first modification has a function of

holding the longitudinal routing material **200** (e.g., wire harness) as in the above embodiment, but has a different holding manner. That is, while the functional part **16** of the above embodiment binds and holds the longitudinal routing material **200** by the belt portion **16**B, the functional part **16** of the first modification has a shape having plate-shaped sleeve portions **16**C extending from the lower end of the engagement part **15** in a predetermined direction orthogonal to the up-down direction Z. The longitudinal routing material **200** is placed on the bottom surfaces of the plate-shaped sleeve portions **16**C, and the placed longitudinal routing material **200** is bound by binding members **20** such as tape together with the sleeve portions **16**C to obtain a holding state (see FIG. **10**A).

(45) A second modification of the above embodiment will be described with reference to FIG. **11**A to FIG. **11**E and FIG. **12**. FIG. **11**A and FIG. **11**B are a perspective view of a fixing member **10** according to the second modification as seen from above and a perspective view of the fixing member **10** as seen from below. FIG. **11**C, FIG. **11**D, and FIG. **11**E are a plan view, a front view, and a rear view of the fixing member **10** according to the second modification. FIG. **12** illustrates a method for using the functional part **16** of the fixing member **10** in FIG. **11**A to FIG. **11**E.

(46) In the second modification, the dish-like contact portion **13** of the engagement part **15** has a substantially elliptical shape whose minor-axis direction is the alignment direction Y of the paired elastic locking pieces **12**, when seen in the direction of the axis **11**Z of the support column **11**, and the bent portions **13**S are formed at both ends in the minor-axis direction of the dish-like contact portion **13**, respectively (see FIG. **11**C). The functional part **16** is an attachment-detachment part, and a separate assembly functional part **160** having a predetermined function can be assembled to and detached from the functional part **16** (see FIG. **12**). This assembling structure and method are a known structure and method, and thus the detailed description thereof is omitted. Although the entire assembly functional part **160** is not shown, the assembly functional part **160** may be a functional part for holding the longitudinal routing material **200** (e.g., wire harness) as described in the above embodiment and first modification, may be a connector or the like provided at an end portion of a wiring member, or may be any other functional part.

(47) In the above embodiment, the first modification, and the second modification, the functional part **16** located below the engagement part **15** may be replaced.

(48) For example, in the case of the fixing member **10** according to the above embodiment shown in FIG. **1**A, FIG. **1**B, FIG. **2**A, and FIG. **2**B, the engagement part **15** above the A-A cross-section in FIG. **2**A and FIG. **2**B may be left, and the functional part **16** below the B-B cross-section (see FIG. **10**C) of the first modification shown in FIG. **10**A to FIG. **10**D may be assembled below the engagement part **15**, for example, such that the front and the back thereof face in the same direction as or a direction opposite to those of the engagement part **15**, or the functional part **16** below the C-C cross-section (see FIG. **11**D and FIG. **11**E) of the second modification shown in FIG. **11**A to FIG. **11**E may be assembled below the engagement part **15**, for example, such that the front and the back thereof face in the same direction as or a direction opposite to those of the engagement part **15**.

(49) In the case of the fixing member **10** according to the first modification shown in FIG. **10**A to FIG. **10**D, the engagement part **15** above the B-B cross-section (see FIG. **10**C) shown in FIG. **10**C may be left, and the functional part **16** below the A-A cross-section of the above embodiment shown in FIG. **2**A and FIG. **2**B may be assembled below the engagement part **15**, for example, such that the front and the back thereof face in the same direction as or a direction opposite to those of the engagement part **15**, or the functional part **16** below the C-C cross-section (see FIG. **11**D and FIG. **11**E) of the second modification shown in FIG. **11**A to FIG. **11**E may be assembled below the engagement part **15**, for example, such that the front and the back thereof face in the same direction as or a direction opposite to those of the engagement part **15**.

(50) In the case of the fixing member **10** according to the second modification shown in FIG. **11**A to FIG. **11**E and FIG. **12**, the engagement part **15** above the C-C cross-section shown in FIG. **11**D and FIG. **11**E may be left, and the functional part **16** below the A-A cross-section of the above

embodiment shown in FIG. **2**A and FIG. **2**B may be assembled below the engagement part **15**, for example, such that the front and the back thereof face in the same direction as or a direction opposite to those of the engagement part **15**, or the functional part **16** below the B-B cross-section (see FIG. **10**C) of the first modification shown in FIG. **10**A to FIG. **10**D may be assembled below the engagement part **15**, for example, such that the front and the back thereof face in the same direction as or a direction opposite to those of the engagement part **15**.

(51) The orientations of the engagement part **15** and the functional part **16** in a different embodiment and modifications when assembling the engagement part **15** and the functional part **16** are not limited to those described above, and the engagement part **15** and the functional part **16** may be assembled in orientations different from the above. The functional part **16** may have a different function and shape from the above embodiment and the various modifications described above.

(52) In the above embodiment and the various modifications described above, a part of the engagement part **15** other than the dish-like contact portion **13** may be replaced. However, in this case, the bent portions **13**S in the dish-like contact portion **13** need to be assembled so as to be positioned in a direction that coincides with the alignment direction Y of the elastic locking pieces **12**. The engagement part **15** may have a shape different from that of the above embodiment and the various modifications described above.

(53) In the above embodiment and the various modifications described above, the elastic locking pieces **12** are provided with the support column **11** interposed therebetween, the alignment direction Y is set for the pair of elastic locking pieces **12** between which the support column **11** is interposed, and the bent portions **13**S are formed on both sides in the alignment direction Y However, in the case where there are multiple pairs of elastic locking pieces **12** between which the support column **11** is interposed, multiple alignment directions Y intersect each other, and thus bent portions **13**S whose number corresponds to the number of alignment directions Y can be formed in the dish-like contact portion **13**. In this case, bent portions **13**S may be formed for at least one pair of elastic locking pieces **12**, and bent portions **13**S do not necessarily have to be formed for all the pairs of elastic locking pieces **12**.

DESCRIPTION OF THE REFERENCE CHARACTERS

(54) **1** fixing structure of fixing member **10** fixing member **11** support column **11**Z axis of support column **12** elastic locking piece **12**A locking portion **12***p* projecting distal end portion (downward projection portion) **12***c* locking projection portion **13** dish-like contact portion **13**S bent portion **13***s* upper surface of bent portion **15** engagement part **16** functional part (wire harness holding part) **100** plate-shaped member **101** through hole **101***a* inner wall surface of through hole **102** surrounding portion of through hole **200** longitudinal member (wire harness) **300** jig I insertion direction X front-back direction Y right-left direction (alignment direction of elastic locking pieces) Z up-down direction

Claims

1. A fixing member comprising: a support column extending in an up-down direction; elastic locking pieces paired such that the support column is interposed therebetween in a right-left direction and each elastic locking piece extending from connection positions at a support column upper end side toward a support column lower end side; and a dish-like contact portion radially extending obliquely upward and outward from the support column lower end side so as to surround the support column, wherein by inserting the support column and the elastic locking pieces into a through hole of a plate-shaped member from the support column upper end side, the elastic locking pieces pass through the through hole with elastic deformation approaching the support column, and when the elastic locking pieces reach a predetermined engagement position, the elastic locking pieces elastically return and project downward from the through hole to lock a surrounding portion

of the through hole from a far side in an insertion direction while pressing an inner wall surface of the through hole, and the dish-like contact portion annularly contacts the surrounding portion of the through hole from a near side in the insertion direction, thereby fixing the fixing member to the plate-shaped member, the dish-like contact portion includes a bent portion which is bent obliquely downward and outward after the dish-like contact portion extends obliquely upward and outward, the bent portion is independently formed outside of each of the connection positions of the elastic locking pieces with the support column in the right-left direction, and an upper surface of each bent portion forms a smoothly continuous curved surface around an axis of the support column, and is formed such that a direction from an outer edge of the curved surface when seen in an axial direction of the support column toward a lowest end of the elastic locking piece in a natural state is directed upward.

2. The fixing member according to claim 1, wherein each bent portion is formed such that a length of the bent portion in a radial direction with respect to the axis of the support column is longest on an outer side in the right-left direction with respect to the support column and becomes shorter with increasing distance therefrom around the axis, and is formed so as to be smoothly connected on both end sides around the axis to non-formation portions, of the dish-like contact portion, in which the bent portion is not formed.

3. The fixing member according to claim 1, wherein each bent portion does not project downward from a lowest surface of the dish-like contact portion.

4. The fixing member according to claim 1, further comprising a wire harness holding part below the dish-like contact portion.

5. A fixing structure comprising: a plate-shaped member provided with a through hole; and a fixing member provided with an engagement part including a support column extending in an up-down direction, elastic locking pieces paired such that the support column is interposed therebetween in a right-left direction and each elastic locking piece extending from connection positions at a support column upper end side toward a support column lower end side, and a dish-like contact portion radially extending obliquely upward and outward from the support column lower end side so as to surround the support column, wherein by inserting the support column and the elastic locking pieces into the through hole of the plate-shaped member from the support column upper end side, the elastic locking pieces pass through the through hole with elastic deformation approaching the support column, and when the elastic locking pieces reach a predetermined engagement position, the elastic locking pieces elastically return and project downward from the through hole to lock a surrounding portion of the through hole from a far side in an insertion direction while pressing an inner wall surface of the through hole, and the dish-like contact portion annularly contacts the surrounding portion of the through hole from a near side in the insertion direction, thereby engaging and fixing the engagement part to the plate-shaped member, the dish-like contact portion includes a bent portion which is bent obliquely downward and outward after the dish-like contact portion extends obliquely upward and outward, the bent portion is independently formed outside of each of the connection positions of the elastic locking pieces with the support column in the right-left direction, and an upper surface of each bent portion forms a smoothly continuous curved surface around an axis of the support column, and is formed such that a direction from an outer edge of the curved surface when seen in an axial direction of the support column toward a lowest end of the elastic locking piece in a natural state is directed upward.