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(57) A connector including a housing and a mating retentioner. The housing has elastic deformation portions, and restricted portions and latching portions that are displaced in accompaniment with deformation of the elastic deformation portions. In a state in which the housing is inserted into a partner connector and is fully mated to the partner connector, the latching portions are latched to the partner connector and the restricted portions are

exposed outside the partner connector. The mating retentioner is configured to limit displacement of the restricted portions in a state in which the mating retentioner is attached to the housing and disposed in a mating retention position at the housing, and is disposed entirely outside the partner connector in a state in which the mating retentioner is disposed in the mating retention position.

Description

BACKGROUND

Technical Field

[0001] The present disclosure relates to a connector and a connector set.

Related Art

[0002] Japanese Patent Application Laid-open (JP-A) No. 2018-101603 discloses a female connector assembly having a connector latch. The connector latch of the female connector assembly disclosed in this document includes latch beams that are deformed in accompaniment with operation of a button and a latch surface that is displaced in accompaniment with the deformation of the latch beams.

[0003] In a state in which the female connector assembly and a male connector assembly are mated together, the latch surface of the female connector assembly is latched to the male connector assembly. Furthermore, an aperture is formed in the female connector assembly, and a connector position assurance unit is inserted into this aperture. Because of this, deformation of the latch beams is limited by the connector position assurance unit, and the state in which the latch surface of the female connector assembly is latched to the male connector assembly is maintained.

SUMMARY

[0004] In this regard, in JP-A No. 2018-101603, part of the connector position assurance unit is disposed inside the male connector assembly, and there is room for improvement from the standpoint of reducing the physical size of the mated portion of the female connector assembly and the male connector assembly.

[0005] In consideration of these circumstances, the present disclosure obtains a connector and a connector set with which the physical size of the mated portion can be reduced.

[0006] A connector of a first aspect of the disclosure includes a housing and a mating retentioner. The housing has elastic deformation portions that are elastically deformable, and restricted portions and latching portions that are displaced in accompaniment with deformation of the elastic deformation portions. The housing is configured such that, in a state in which the housing is inserted into a partner connector and is fully mated to the partner connector, the latching portions are latched to the partner connector and the restricted portions are exposed outside the partner connector. The mating retentioner is configured to limit displacement of the restricted portions in a state in which the mating retentioner is attached to the housing and disposed in a mating retention position at the housing, and is configured to be disposed

entirely outside the partner connector in a state in which the mating retentioner is disposed in the mating retention position.

[0007] In the connector of the first aspect, when the housing is inserted into the partner connector and is fully mated to the partner connector, the latching portions are latched to the partner connector. When the mating retentioner is disposed in the mating retention position at the housing, the mating retentioner limits displacement of the restricted portions. Deformation of the elastic deformation portions is limited, and the state in which the latching portions are latched to the partner connector is maintained. In the connector of the first aspect, the mating retentioner is disposed entirely outside the partner connector in a state in which the mating retentioner is disposed in the mating retention position. Compared with a configuration where the mating retentioner is disposed inside the partner connector, the physical size of the mated portion of the connector of the first aspect and the partner connector can be reduced.

[0008] A connector of a second aspect is the connector of the first aspect, wherein the elastic deformation portions are configured to be energized toward the partner connector in a state in which the housing is fully mated to the partner connector.

[0009] In the connector of the second aspect, the elastic deformation portions are energized toward the partner connector in a state in which the housing is fully mated to the partner connector. In this configuration, the sound when the latching portions become latched to the partner connector can be made louder compared with a configuration where the elastic deformation portions are not energized toward the partner connector in a state in which the housing is fully mated to the partner connector.

[0010] A connector of a third aspect is the connector of the second aspect, wherein the mating retentioner is provided with cavities inside of which the restricted portions are disposed in a state in which the mating retentioner is disposed in the mating retention position. Parts of the mating retentioner adjacent to the cavities are provided with first abutment portions against which the restricted portions abut in a state before the elastic deformation portions are deformed, and movement of the mating retentioner toward the mating retention position is blocked by the restricted portions abutting against the first abutment portions.

[0011] In the connector of the third aspect, when the mating retentioner is moved to the mating retention position in a state in which the housing is fully mated to the partner connector, the restricted portions are disposed inside the cavities of the mating retentioner. If one tries to move the mating retentioner to the mating retention position in a state before the elastic deformation portions are deformed, that is, in a state before the housing is fully mated to the partner connector, the restricted portions abut against the first abutment portions of the mating retentioner. Movement of the mating retentioner toward the mating retention position is blocked. In this way, in

the connector of the third aspect, the mating retentioner can be prevented or inhibited from being moved toward the mating retention position in a state before the housing is fully mated to the partner connector.

[0012] A connector of a fourth aspect is the connector of the third aspect, wherein parts of the mating retentioner adjacent to the cavities are provided with second abutment portions against which the restricted portions abut in a state before the housing is fully mated to the partner connector and in a state in which the elastic deformation portions are deformed, and movement of the mating retentioner toward the mating retention position is blocked by the restricted portions abutting against the second abutment portions.

[0013] In the connector of the fourth aspect, if one tries to move the mating retentioner to the mating retention position in a state before the housing is fully mated to the partner connector and in a state in which the elastic deformation portions are deformed, the restricted portions abut against the second abutment portions of the mating retentioner. Movement of the mating retentioner toward the mating retention position is blocked. In this way, in the connector of the fourth aspect, the mating retentioner can be prevented or inhibited from being moved toward the mating retention position in a state before the housing is fully mated to the partner connector.

[0014] A connector of a fifth aspect is the connector of any one of the first aspect to the fourth aspect, wherein the mating retentioner is configured to be movable between an allowance position, in which deformation of the elastic deformation portions is allowed in a state in which the mating retentioner is attached to the housing, and the mating retention position.

[0015] In the connector of the fifth aspect, the mating retentioner is attached to the housing. In this state, the mating retentioner can be moved between the allowance position and the mating retention position.

[0016] A connector of a sixth aspect is the connector of the fifth aspect, wherein the housing is provided with a press portion whereby, upon being pressed the elastic deformation portions are deformed, the mating retentioner is provided with a surrounding portion inside of which the press portion is disposed, and the surrounding portion and the press portion move away from each other when the mating retention member is moved from the mating retention position to the allowance position.

[0017] In the connector of the sixth aspect, the surrounding portion and the press portion move away from each other when the mating retentioner is moved from the mating retention position to the allowance position. When the mating retentioner has been moved to the allowance position, the surrounding portion of the mating retention member can be inhibited from becoming an obstruction when the press portion is pressed.

[0018] A connector set of a seventh aspect includes a first connector having a first housing, a second connector having a second housing, and a mating retentioner. The second housing having elastic deformation portions that

are elastically deformable, and latching portions and restricted portions that are displaced in accompaniment with deformation of the elastic deformation portions. The second housing is configured such that, in a state in which the second housing is inserted into the first housing and is fully mated to the first housing, the latching portions are latched to the first housing and the restricted portions are exposed outside the first housing. The mating retentioner is configured to limit displacement of the restricted portions in a state in which the mating retentioner is attached to the second housing and disposed in a mating retention position at the second housing, and is configured to be disposed entirely outside the first housing in a state in which the mating retentioner is disposed in the mating retention position.

[0019] In the connector set of the seventh aspect, when the second housing of the second connector is inserted into the first housing of the first connector and is fully mated to the first housing, the latching portions are latched to the first housing. When the mating retentioner is disposed in the mating retention position at the second housing, the mating retentioner limits displacement of the restricted portions. Deformation of the elastic deformation portions is limited, and the state in which the latching portions are latched to the first housing is maintained. In the connector set of the seventh aspect, the mating retentioner is disposed entirely outside the first housing in a state in which the mating retentioner is disposed in the mating retention position. Compared with a configuration where the mating retentioner is disposed inside the first housing, the physical size of the mated portion of the first connector and the second connector can be reduced.

[0020] The connector and the connector set pertaining to the disclosure have the excellent effect that the physical size of the mated portion can be reduced.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

FIG. 1 is a perspective view showing a connector set; FIG. 2 is a perspective view of the connector set seen from the opposite side of the side shown in FIG. 1; FIG. 3 is an exploded perspective view of a board connector; FIG. 4 is a perspective view of the board connector seen from the opposite side of the side shown in FIG. 3; FIG. 5 is an exploded perspective view of a wire connector; FIG. 6 is a perspective view showing a wire connector housing; FIG. 7 is a perspective view of the wire connector housing seen from the opposite side of the side shown in FIG. 6; FIG. 8 is a plan view showing the wire connector

housing;

FIG. 9 is a sectional view showing the wire connector housing cut along line 9-9 shown in FIG. 8;

FIG. 10 is a perspective view showing a mating retention member;

FIG. 11 is a perspective view of the mating retention member seen from the opposite side of the side shown in FIG. 10;

FIG. 12A is a side sectional view showing a state before the wire connector and the board connector are mated together;

FIG. 12B is a sectional perspective view showing the state before the wire connector and the board connector are mated together;

FIG. 13A is a side sectional view showing a state in which the wire connector and the board connector are in the process of being mated together;

FIG. 13B is a sectional perspective view showing the state in which the wire connector and the board connector are in the process of being mated together;

FIG. 14A is a side sectional view showing a state in which the wire connector and the board connector are fully mated together, and shows a state in which a mating retention member is disposed in an allowance position;

FIG. 14B is a sectional perspective view showing the state in which the wire connector and the board connector are fully mated together, and shows the state in which the mating retention member is disposed in the allowance position;

FIG. 15A is a side sectional view showing the state in which the wire connector and the board connector are fully mated together, and shows a state in which the mating retention member is disposed in a mating retention position; and

FIG. 15B is a sectional perspective view showing the state in which the wire connector and the board connector are fully mated together, and shows the state in which the mating retention member is disposed in the mating retention position.

DETAILED DESCRIPTION

[0022] A connector set 10 pertaining to an embodiment of the disclosure will now be described using FIG. 1 to FIG. 11.

[0023] As shown in FIG. 1 and FIG. 2, the connector set 10 is configured to include a board connector 14, serving as a partner connector and a first connector secured to a circuit board 12, and a wire connector 18, serving as a connector and a second connector secured to end portions of electrical wires 16. It will be noted that the direction in which the board connector 14 and the wire connector 18 are mated (connected) together will be called a mating axis direction. Furthermore, the direction orthogonal to the mating axis direction and parallel to the circuit board 12 will be called a width direction. Moreover, the direction orthogonal to the mating axis di-

rection and the width direction will be called an up-down direction. Furthermore, one side in the mating axis direction (the mating direction side; hereinafter called a first direction side) is indicated by arrow Z, one side in the width direction is indicated by arrow W, and the upward direction in the up-down direction is indicated by arrow U.

(Configuration of Board Connector 14)

[0024] As shown in FIG. 3 and FIG. 4, the board connector 14 is configured to include a board connector housing 20 serving as a first housing, plural board connector terminals 22 secured to the board connector housing 20, and plural board securing terminals 24 secured to the board connector housing 20.

[0025] The board connector housing 20 is formed using a resin material and is formed in the shape of a box that opens to the other side in the mating axis direction (an unmating direction side; hereinafter called a second direction side). It will be noted that in the following description the "mating axis direction" will simply be called the "axial direction." The board connector housing 20 includes a pair of side walls 20A spaced apart from each other in the width direction, an upper wall 20B that interconnects the upper ends of the pair of side walls 20A in the width direction, and a lower wall 20C that interconnects the lower ends of the pair of side walls 20A in the width direction. Furthermore, the board connector housing 20 includes a bottom wall 20D that interconnects the end portions on the first direction side of the pair of side walls 20A in the width direction and interconnects the end portion on the first direction side of the upper wall 20B and the end portion on the first direction side of the lower wall 20C in the up and down direction. Moreover, the board connector housing 20 includes a pair of projecting pieces 20E that project toward the first direction side from the lower end sides of the ends on the first direction side of the pair of side walls 20A. Here, a space defined by the pair of side walls 20A, the upper wall 20B, the lower wall 20C, and the bottom wall 20D is a connector insertion portion 20F into which the wire connector 18 described later is inserted.

[0026] As shown in FIG. 4, in the width direction central portion of the upper wall 20B, a pair of first grooves 20G that open toward the lower wall 20C are formed along the axial direction. Furthermore, in bottom surfaces 20H of the pair of first grooves 20G, latch receiving portions 20K that are recessed upward relative to end portions 20J on the first direction side of the bottom surfaces 20H are formed. Because of this, step portions 20L having a height difference in the up-down direction are formed at the boundaries between the latch receiving portions 20K and the end portions 20J on the first direction side of the bottom surfaces 20H of the pair of first grooves 20G. Furthermore, in parts on both width direction sides of the upper wall 20B, a pair of second groove portions 20M that open toward the lower wall 20C are formed along the axial direction.

[0027] In the upper sides of the pair of side walls 20A, third groove portions 20N that open inward in the width direction are formed along the axial direction. Furthermore, the pair of board securing terminals 24 described later are secured to the pair of side walls 20A. It will be noted that, as shown in FIG. 3, board securing terminal insertion holes 20P into which the board securing terminals 24 are inserted from above are formed in the side walls 20A. Furthermore, as shown in FIG. 4, projection holes 20Q from which parts of the board securing terminals 24 project downward are formed in the side walls 20A.

[0028] In the bottom wall 20D, plural terminal insertion holes 20R that run through the bottom wall 20D in the axial direction are formed. The plural board connector terminals 22 described later are inserted into the plural terminal insertion holes 20R.

[0029] As shown in FIG. 1, FIG. 3, and FIG. 4, the plural board connector terminals 22 are formed using a conductive metal material. The plural board connector terminals 22 each include a first terminal portion 22A, which extends in the axial direction and is joined to the circuit board 12, and a second terminal portion 22B, which extends upward from the end on the second direction side of the first terminal portion 22A. Furthermore, the plural board connector terminals 22 each include a third terminal portion 22C, which extends toward the second direction side from the upper end of the second terminal portion 22B, and a fourth terminal portion 22D, which extends toward the one side or the other side in the width direction from the end on the second direction side of the third terminal portion 22C. Moreover, the plural board connector terminals 22 each include a fifth terminal portion 22E that extends toward the second direction side from the width direction middle portion of the fourth terminal portion 22D. The fifth terminal portions 22E are inserted into the plural terminal insertion holes 20R formed at the board connector housing 20. The plural board connector terminals 22 are secured to the board connector housing 20. Furthermore, in a state in which the plural board connector terminals 22 are secured to the board connector housing 20, the second direction sides of the fifth terminal portions 22E are disposed inside the connector insertion portion 20F of the board connector housing 20.

[0030] The pair of board securing terminals 24 are each formed in a tabular shape whose thickness direction coincides with the width direction. The board securing terminals 24 each include a first tabular portion 24A formed in a rectangular shape whose lengthwise direction coincides with the axial direction and whose widthwise direction coincides with the up-down direction. Furthermore, the board securing terminals 24 each include a second tabular portion 24B that extends downward from the lower end of the first tabular portion 24A. The second tabular portion 24B is formed in a rectangular shape whose lengthwise direction coincides with the up-down direction and whose widthwise direction coincides

with the axial direction. Moreover, the board securing terminals 24 each include a pair of board joining portions 24C that extend downward from the lower end of the second tabular portion 24B and are spaced apart from each other in the axial direction. The pair of board securing terminals 24 are inserted into the board securing terminal insertion holes 20P formed in the pair of side walls 20A of the board connector housing 20. The pair of board securing terminals 24 are secured to the board connector housing 20. Furthermore, in a state in which the board securing terminals 24 are secured to the board connector housing 20, the lower ends of the second tabular portions 24B and the pairs of board joining portions 24C project downward from the projection holes 20Q formed in the pair of side walls 20A. Because of this, the pair of board joining portions 24C can be joined to the circuit board 12.

(Configuration of Wire Connector 18)

[0031] As shown in FIG. 5, the wire connector 18 includes a wire connector housing 26 serving as a second housing, plural wire connector terminals 28 secured to the wire connector housing 26, and a mating retention member 30 attached to the wire connector housing 26.

[0032] As shown in FIG. 6 to FIG. 8, the wire connector housing 26 is formed using a resin material. The wire connector housing 26 includes a housing body 32 formed in the shape of a rectangular block, a latch 34 provided on the upper portion of the housing body 32, and a slide support portion 36 provided on the upper portion of the housing body 32 and to which the mating retention member 30 described later is slidably attached.

[0033] In the housing body 32 are formed plural terminal accommodating portions 32A in which the plural wire connector terminals 28 described later are accommodated. The plural terminal accommodating portions 32A are formed so as to run through the housing body 32 in the axial direction. It will be noted that, in this embodiment, sixteen terminal accommodating portions 32A are formed in the housing body 32 in correspondence to sixteen wire connector terminals 28 described later. Furthermore, in this embodiment, a pair of second raised portions 32B and a pair of third raised portions 32C corresponding to the pair of second groove portions 20M and the pair of third groove portions 20N, respectively, of the board connector housing 20 are formed on the upper portion of the part of the housing body 32 on the first direction side.

[0034] As shown in FIG. 6 to FIG. 9, the latch 34 includes a pair of elastic deformation portions 34A provided in the width direction central portion of the housing body 32. As shown in FIG. 9, the pair of elastic deformation portions 34A extend upward from the end on the first direction side of the housing body 32 and extend toward the second direction side. Furthermore, in the pair of elastic deformation portions 34A, parts 34C on the second direction side of connecting portions 34B connected to the housing body 32 are spaced apart from the housing

body 32. Because of this, the parts 34C of the elastic deformation portions 34A can be elastically deformed in the up-down direction. It will be noted that, in a state in which external force is not acting on the elastic deformation portions 34A, the clearance between the parts 34C and the housing body 32 gradually increases heading toward the second direction side.

[0035] Furthermore, as shown in FIG. 6, FIG. 7, and FIG. 9, the latch 34 includes a pair of latching portions 34D that project upward from the axial direction middle portions of the pair of elastic deformation portions 34A. The pair of latching portions 34D are disposed near the center in the width direction when the pair of elastic deformation portions 34A are seen from above.

[0036] Furthermore, the latch 34 includes a press portion 34E that interconnects the end on the second direction side of the pair of elastic deformation portions 34A in the width direction. The press portion 34E is formed in the shape of a cuboid and projects upward relative to the pair of elastic deformation portions 34A. It will be noted that, in this embodiment, the shape of the press portion 34E seen from above is a rectangular shape whose lengthwise direction coincides with the width direction and whose widthwise direction coincides with the axial direction.

[0037] Furthermore, as shown in FIG. 6, FIG. 7, and FIG. 8, the latch 34 includes a pair of restricted portions 34F that project in the width direction from the end on the second direction side and the lower end of the press portion 34E. One restricted portion 34F projects toward the one side in the width direction from the surface of the press portion 34E on the one side in the width direction. The other restricted portion 34F projects toward the other side in the width direction from the surface of the press portion 34E on the other side in the width direction.

[0038] By pressing downward the press portion 34E of the latch 34, the elastic deformation portions 34A are deformed downward. Furthermore, when the elastic deformation portions 34A are deformed downward, the latching portions 34D and the restricted portions 34F are displaced downward together with the elastic deformation portions 34A. When pressing of the press portion 34E is stopped, the elastic deformation portions 34A return to their original state. The latching portions 34D and the restricted portions 34F are displaced upward together with the elastic deformation portions 34A. Furthermore, by limiting the displacement of the restricted portions 34F, the deformation of the elastic deformation portions 34A is limited and the displacement of the latching portions 34D is also limited.

[0039] The slide support portion 36 is provided on the second direction side of the upper portion of the housing body 32. The slide support portion 36 includes a pair of side walls 36A, which project upward from both width direction end portions of the upper portion of the housing body 32, and a bridge 36B, which interconnects the end portions on the first direction side of the pair of side walls 36A in the width direction. In the lower ends of the pair

of side walls 20A, slide grooves 36C that open inward in the width direction are formed along the axial direction. A space defined by an upper surface 36D of the housing body 32 and the pair of side walls 36A is a mating retention member disposing portion 36E in which the mating retention member 30 described later is disposed.

[0040] As shown in FIG. 5, the plural wire connector terminals 28 are secured to ends of the plural electrical wires 16. In this embodiment, sixteen wire connector terminals 28 are provided in correspondence to sixteen electrical wires 16. In FIG. 5, to improve drawing legibility, one electrical wire 16 and one wire connector terminal 28 out of the sixteen electrical wires 16 and the sixteen wire connector terminals 28 are offset toward the second direction side.

[0041] The wire connector terminals 28 are formed by, for example, bending a conductive metal sheet that has been cut into a predetermined shape. The parts of the wire connector terminals 28 on the first direction side are tubular terminal insertion portions 28A into which the fifth terminal portions 22E of the board connector terminals 22 are inserted. Furthermore, the parts of the wire connector terminals 28 on the second direction side are wire securing portions 28B that are swaged and secured to ends 16A on the first direction side of the electrical wires 16. The plural wire connector terminals 28 described above are secured to the housing body 32 in a state in which they are accommodated in the plural terminal accommodating portions 32A formed in the housing body 32.

[0042] As shown in FIG. 10 and FIG. 11, the mating retentioner 30 is formed using a resin material. The mating retentioner 30 includes a first base wall 30A in the shape of a prism that extends in the width direction, a pair of second base walls 30B in the shapes of prisms that extend toward the first direction side from both width direction end portions of the first base wall 30A, and a third base wall 30C that projects upward from the upper end of the first base wall 30A.

[0043] Furthermore, the mating retentioner 30 includes a pair of lower limiting portions 30D in the shapes of prisms that extend toward the first direction side from parts on both width direction sides of the first base wall 30A between the pair of second base walls 30B. Furthermore, the mating retentioner 30 includes a pair of upper limiting portions 30E in the shapes of prisms that extend toward the first direction side from both width direction end portions of the third base wall 30C. The positions in the width direction of the pair of upper limiting portions 30E and the width direction positions of the pair of lower limiting portions 30D are mutually the same positions. Furthermore, the pair of upper limiting portions 30E and the pair of lower limiting portions 30D are spaced apart from each other in the up-down direction. The spaces between the pair of upper limiting portions 30E and the pair of lower limiting portions 30D are cavities 30F inside of which the pair of restricted portions 34F are disposed. Furthermore, surfaces of the pair of upper limiting por-

tions 30E on the first direction side are first abutment portions 30G. Furthermore, surfaces of the pair of lower limiting portions 30D on the first direction side are second abutment surfaces 30H.

[0044] Furthermore, the mating retentioner 30 includes housing latching projections 30J that project in the width direction from the end portions on the first direction side of the pair of second base walls 30B. One housing latching projection 30J projects toward the one side in the width direction from the second base wall 30B on the one side in the width direction. The other housing latching projection 30J projects toward the other side in the width direction from the second base wall 30B on the other side in the width direction.

[0045] The mating retentioner 30 includes a tabular central wall 30K that extends toward the first direction side from the width direction central part of the first base wall 30A between the pair of lower limiting portions 30D. As shown in FIG. 11, the undersurface of the central wall portion 30K is substantially flush with the undersurface of the first base wall 30A and the undersurfaces of the pair of second base walls 30B. Furthermore, the undersurface of the central wall 30K configures, together with the undersurface of the first base wall 30A and the undersurfaces of the pair of second base wall 30B, slide surfaces 30L.

[0046] As shown in FIG. 1, FIG. 6, FIG. 7, FIG. 10, and FIG. 11, the mating retentioner 30 described above is attached to the slide support portion 36 of the wire connector housing 26. In a state in which the mating retentioner 30 is attached to the slide support portion 36, the slide surfaces 30L of the mating retentioner 30 are in contact with the upper surface 36D of the housing body 32, and the pair of second base wall 30B are disposed along the pair of slide grooves 36C of the slide support portion 36. Because of this, the mating retentioner 30 is slidable (movable) in the axial direction. Furthermore, the mating retentioner 30 is slidable in a range between an allowance position P1 and a mating retention position P2 described later. The housing latching projections 30J are latched to the side wall 36A configuring part of the slide support portion 36, so that the mating retentioner 30 does not come out from the wire connector housing 26. Furthermore, in a state in which the mating retentioner 30 is attached to the slide support portion 36, the press portion 34E of the wire connector housing 26 is surrounded by the third base wall 30C and the pair of upper limiting portions 30E of the mating retentioner 30. The third base wall 30C and the pair of upper limiting portions 30E will be called as a surrounding portion 30M.

(Action and Effects of Embodiment)

[0047] Next, the action and effects of the embodiment will be described.

[0048] As shown in FIG. 1 and FIG. 2, the wire connector 18 and the board connector 14 are connected (mated) together by the following procedure.

[0049] FIG. 12A and FIG. 12B show the wire connector 18 and the board connector 14 in a pre-mating state. It will be noted that, to improve drawing legibility, FIG. 12A and FIG. 12B show only the wire connector housing 26 and the mating retentioner 30 of the wire connector 18 and the board connector housing 20 of the board connector 14. Furthermore, FIG. 13A to FIG. 15B, which will be used later, also similarly show only the wire connector housing 26 and the mating retentioner 30.

[0050] The state before the housing body 32 of the wire connector housing 26 is inserted into the connector insertion portion 20F of the board connector housing 20 will be called a "pre-mating state." In the pre-mating state, the mating retentioner 30 is disposed in the allowance position P1. The allowance position P1 is the position of the mating retentioner 30 relative to the wire connector housing 26. In a state in which the mating retentioner 30 is disposed in the allowance position P1, the mating retentioner 30 does not block deformation of the pair of elastic deformation portions 34A. Furthermore, in the pre-mating state, as shown in FIG. 12B, the restricted portions 34F of the wire connector housing 26 are disposed opposing in the axial direction, and in close proximity to, the first abutment portions 30G of the mating retentioner 30. If, in this pre-mating state, the mating retentioner 30 is pressed toward the mating retention position P2 (the first direction side), the first abutment portions 30G of the mating retention member 30 abut against the restricted portions 34F. Because of this, movement of the mating retentioner 30 from the allowance position P1 toward the mating retention position P2 is blocked. In this way, in the pre-mating state, the mating retentioner 30 can be prevented or inhibited from being moved toward the mating retention position P2.

[0051] As shown in FIG. 12A and FIG. 12B, and in FIG. 13A and FIG. 13B, to connect the wire connector 18 to the board connector 14, the housing body 32 is inserted into the connector insertion portion 20F. At this time, as shown in FIG. 4 and FIG. 6, the pair of elastic deformation portions 34A, the pair of second raised portions 32B, and the pair of third raised portions 32C of the housing body 32 engage with the pair of first groove portions 20G, the pair of second groove portions 20M, and the pair of third groove portions 20N, respectively, of the board connector housing 20.

[0052] As shown in FIG. 13A and FIG. 13B, when the housing body 32 is inserted into the connector insertion portion 20F, the latching portions 34D come into contact with the end portions 20J on the first direction side of the bottom surfaces 20H of the first groove portions 20G. Because of this, the elastic deformation portions 34A are displaced downward. The state in which the elastic deformation portions 34A are displaced downward as a result of the latching portions 34D being in contact with the end portions 20J of the bottom surfaces 20H of the first groove portions 20G will be called a "half-mated state."

[0053] In the half-mated state, as shown in FIG. 13B, the restricted portions 34F of the wire connector housing

26 are disposed opposing in the axial direction, and in close proximity to, the second abutment portions 30H of the mating retentioner 30. If, in this half-mated state, the mating retentioner 30 is pressed toward the mating retention position P2 (the first direction side), the second abutment portions 30H of the mating retentioner 30 abut against the restricted portions 34F of the wire connector housing 26. Because of this, movement of the mating retentioner 30 from the allowance position P1 toward the mating retention position P2 is blocked. In this way, in the half-mated state, the mating retentioner 30 can be prevented or inhibited from being moved toward the mating retention position P2.

[0054] As shown in FIG. 14A and FIG. 14B, to connect the wire connector 18 to the board connector 14, the housing body 32 is inserted into the connector insertion portion 20F of the board connector housing 20. This fully connects the wire connector 18 to the board connector 14. The state in which the wire connector 18 is fully connected to the board connector 14 will be called a "fully mated state." When the procedure moves from the half-mated state shown in FIG. 13A and FIG. 13B to the fully mated state shown in FIG. 14A and FIG. 14B, the latching portions 34D cross over the end portions 20J of the bottom surfaces 20H of the first groove portions 20G and are disposed in the latch receiving portions 20K. Because of this, the latching portions 34D oppose in the axial direction the step portions 20L formed at the boundaries between the latch receiving portions 20K and the end portions 20J on the first direction side of the bottom surfaces 20H of the first groove portions 20G. As a result, the housing body 32 becomes unable to be pulled out of the connector insertion portion 20F unless one deforms the elastic deformation portions 34A to thereby displace the latching portions 34D downward. Furthermore, in the fully mated state, the restricted portions 34F of the wire connector housing 26 are disposed outside the connector insertion portion 20F of the board connector housing 20.

[0055] The elastic deformation portions 34A in the fully mated state are deformed downward relative to the elastic deformation portions 34A in the pre-mating state. Because of this, in the fully mated state, the elastic deformation portions 34A are energized toward the upper wall 20B of the board connector housing 20. Because the elastic deformation portions 34A are energized toward the upper wall 20B in the fully mated state, the sound produced when the latching portions 34D cross over the end portions 20J of the bottom surfaces 20H of the first groove portions 20G can be made louder. In a configuration where the elastic deformation portions 34A are not energized toward the upper wall portion 20B of the board connector housing 20 in the fully mated state, the sound becomes quieter. As described above, in this embodiment, the fully mated state can be easily perceived by the sound generated by the latching portions 34D.

[0056] As shown in FIG. 15A and FIG. 15B, when, in the fully mated state, the mating retentioner 30 is pushed toward the mating retention position P2 (the first direction

side), the mating retentioner 30 moves from the allowance position P1 to the mating retention position P2. In a state in which the mating retentioner 30 is disposed in the mating retention position P2, the restricted portions 34F of the wire connector housing 26 are disposed inside the cavity portions 30F formed between the upper limiting portions 30E and the lower limiting portions 30D of the mating retentioner 30. Displacement of the restricted portions 34F in the up and down direction is limited by the upper limiting portions 30E and the lower limiting portions 30D. Even if the press portion 34E is pressed, the elastic deformation portions 34A are unable to be deformed, and the state in which the latching portions 34D are disposed in the latch receiving portions 20K is maintained. Namely, the state of connection between the wire connector 18 and the board connector 14 is maintained.

[0057] In the present embodiment, the mating retentioner 30 is disposed entirely outside the board connector housing 20 of the board connector 14 in a state in which the mating retentioner 30 is disposed in the mating retention position P2. Compared with a configuration where the mating retentioner 30 is disposed inside the board connector housing 20, the physical size of the mated portion of the wire connector 18 and the board connector 14 can be reduced.

[0058] Furthermore, the mating retentioner 30 can be moved between the allowance position P1 and the mating retention position P2 in a state in which the mating retentioner 30 is attached to the wire connector housing 26. The mating retention member 30 can be handled integrally with the wire connector housing 26.

[0059] Furthermore, when disconnecting the wire connector 18 and the board connector 14 from each other, as shown in FIG. 14A and FIG. 14B, the mating retentioner 30 is pushed toward the allowance position P1 (the second direction side) to thereby move the mating retentioner 30 from the mating retention position P2 to the allowance position P1.

[0060] Next, the press portion 34E is pressed downward to thereby deform the elastic deformation portions 34A downward and displace the latching portions 34D downward. The latching portions 34D no longer oppose the step portions 20L in the axial direction, and the housing body 32 can be pulled out of the connector insertion portion 20F. Namely, the wire connector 18 and the board connector 14 can be disconnected from each other.

[0061] When the mating retentioner 30 is moved from the mating retention position P2 to the allowance position P1, the surrounding portion 30M of the mating retention member 30 and the press portion 34E move away from each other. When the mating retentioner 30 has been moved to the allowance position P1, the surrounding portion 30M of the mating retention member 30 can be inhibited from becoming an obstruction when the press portion 34E is pressed.

[0062] Although in this embodiment an example was described using the mating retentioner 30 that includes both the first abutment portions 30G and the second abut-

ment portions 30H, the disclosure is not limited to this. For example, the mating retentioner 30 may be configured to include only either one of the first abutment portions 30G and the second abutment portions 30H. Furthermore, the mating retentioner 30 may be configured to not include the first abutment portions 30G and the second abutment portions 30H.

[0063] Furthermore, an example was described where the mating retentioner 30 can be moved between the allowance position P1 and the mating retention position P2 in a state in which the mating retentioner 30 is attached to the wire connector housing 26, but the disclosure is not limited to this. For example, the mating retentioner 30 may be configured to be attachable to and detachable from the wire connector housing 26, so that at the same time the mating retentioner 30 is attached to the wire connector housing 26, the mating retentioner 30 is disposed in the mating retention position P2.

[0064] Furthermore, an example was described where the elastic deformation portions 34A are energized toward the upper wall portion 20B of the board connector housing 20 in the fully mated state, but the disclosure is not limited to this. Whether or not to configure the elastic deformation portions 34A to be energized toward the upper wall portion 20B of the board connector housing 20 in the fully mated state may be appropriately set in consideration of the level of the sound produced at the time of full mating.

[0065] Furthermore, an example was described where the press portion 34E of the wire connector housing 26 is surrounded by the surrounding portion 30M of the mating retention member 30, but the disclosure is not limited to this. Whether or not to configure the press portion 34E of the wire connector housing 26 to be surrounded by the surrounding portion 30M of the mating retention member 30 may be appropriately set in consideration of the shapes of the mating retention member 30 and the press portion 34E.

[0066] An embodiment of the disclosure has been described above, but the disclosure is not limited to what is described above and can of course be modified and implemented in various ways, in addition to what is described above, in a range that does depart from the scope thereof.

Claims

1. A connector comprising a housing and a mating retentioner,

the housing having elastic deformation portions that are elastically deformable, and restricted portions and latching portions that are displaced in accompaniment with deformation of the elastic deformation portions,
the housing being configured such that, in a state in which the housing is inserted into a part-

ner connector and is fully mated to the partner connector, the latching portions are latched to the partner connector and the restricted portions are exposed outside the partner connector, and the mating retentioner being configured to limit displacement of the restricted portions in a state in which the mating retentioner is attached to the housing and disposed in a mating retention position at the housing, and being configured to be disposed entirely outside the partner connector in a state in which the mating retentioner is disposed in the mating retention position.

2. The connector of claim 1, wherein the elastic deformation portions are configured to be energized toward the partner connector in a state in which the housing is fully mated to the partner connector.

3. The connector of claim 2, wherein:

the mating retentioner is provided with cavities inside of which the restricted portions are disposed in a state in which the mating retentioner is disposed in the mating retention position, parts of the mating retentioner adjacent to the cavities are provided with first abutment portions against which the restricted portions abut in a state before the elastic deformation portions are deformed, and movement of the mating retentioner toward the mating retention position is blocked by the restricted portions abutting against the first abutment portions.

4. The connector of claim 3, wherein parts of the mating retentioner adjacent to the cavities are provided with second abutment portions against which the restricted portions abut in a state before the housing is fully mated to the partner connector and in a state in which the elastic deformation portions are deformed, and movement of the mating retentioner toward the mating retention position is blocked by the restricted portions abutting against the second abutment portions.

5. The connector of any one of claim 1 to claim 4, wherein the mating retentioner is configured to be movable between an allowance position, in which deformation of the elastic deformation portions is allowed in a state in which the mating retentioner is attached to the housing, and the mating retention position.

6. The connector of claim 5, wherein:

the housing is provided with a press portion whereby, upon being pressed, the elastic deformation portions are deformed,
the mating retentioner is provided with a surrounding portion inside of which the press por-

tion is disposed, and
the surrounding portion and the press portion
move away from each other when the mating
retentioner is moved from the mating retention
position to the allowance position.

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7. A connector set comprising a first connector having
a first housing, a second connector having a second
housing, and a mating retentioner,

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the second housing having elastic deformation
portions that are elastically deformable, and
latching portions and restricted portions that are
displaced in accompaniment with deformation
of the elastic deformation portions,

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the second housing being configured such that,
in a state in which the second housing is inserted
into the first housing and is fully mated to the
first housing, the latching portions are latched
to the first housing and the restricted portions

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are exposed outside the first housing, and
the mating retentioner being configured to limit
displacement of the restricted portions in a state
in which the mating retentioner is attached to
the second housing and disposed in a mating
retention position at the second housing, and
being configured to be disposed entirely outside
the first housing in a state in which the mating
retentioner is disposed in the mating retention
position.

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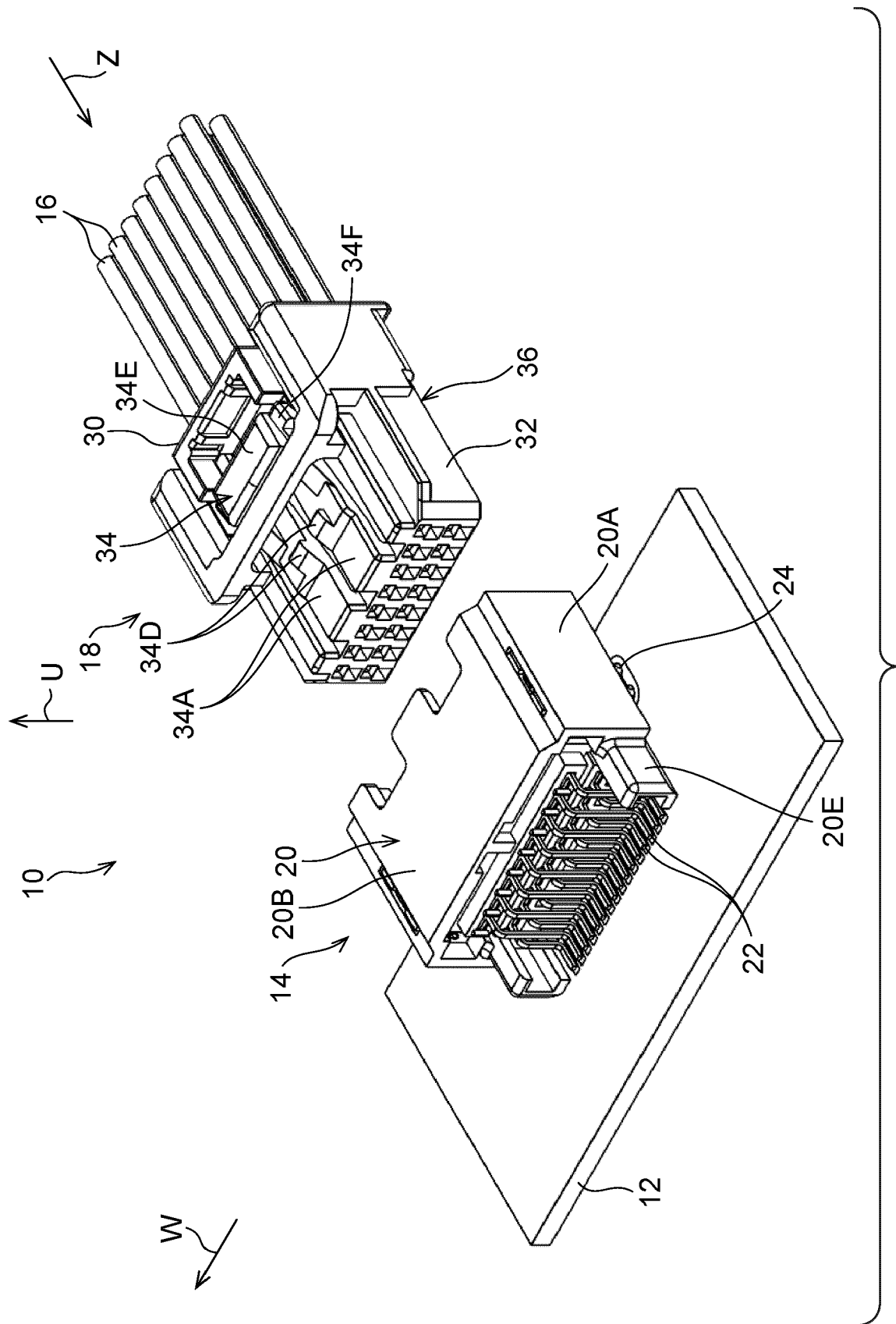
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FIG.1



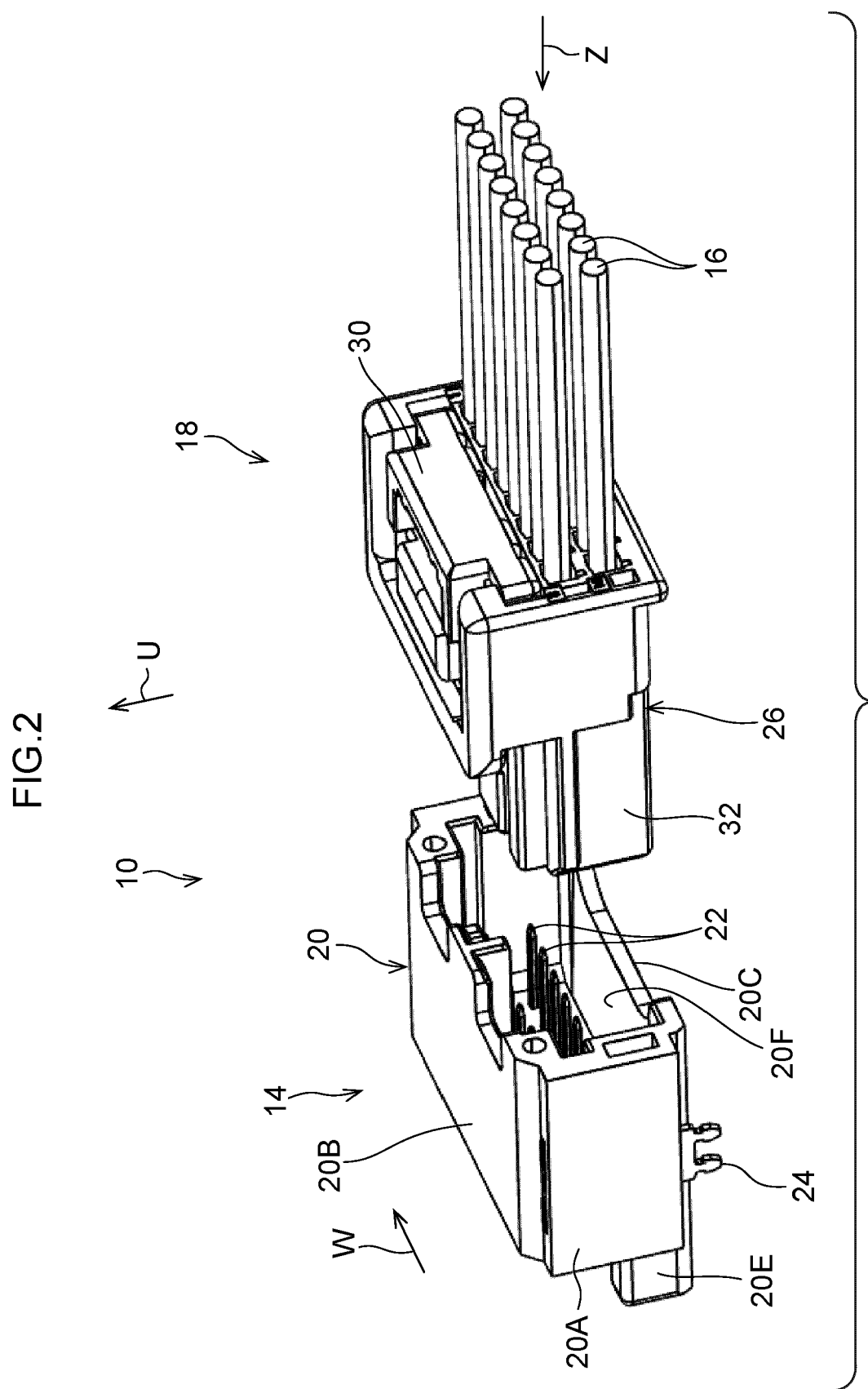
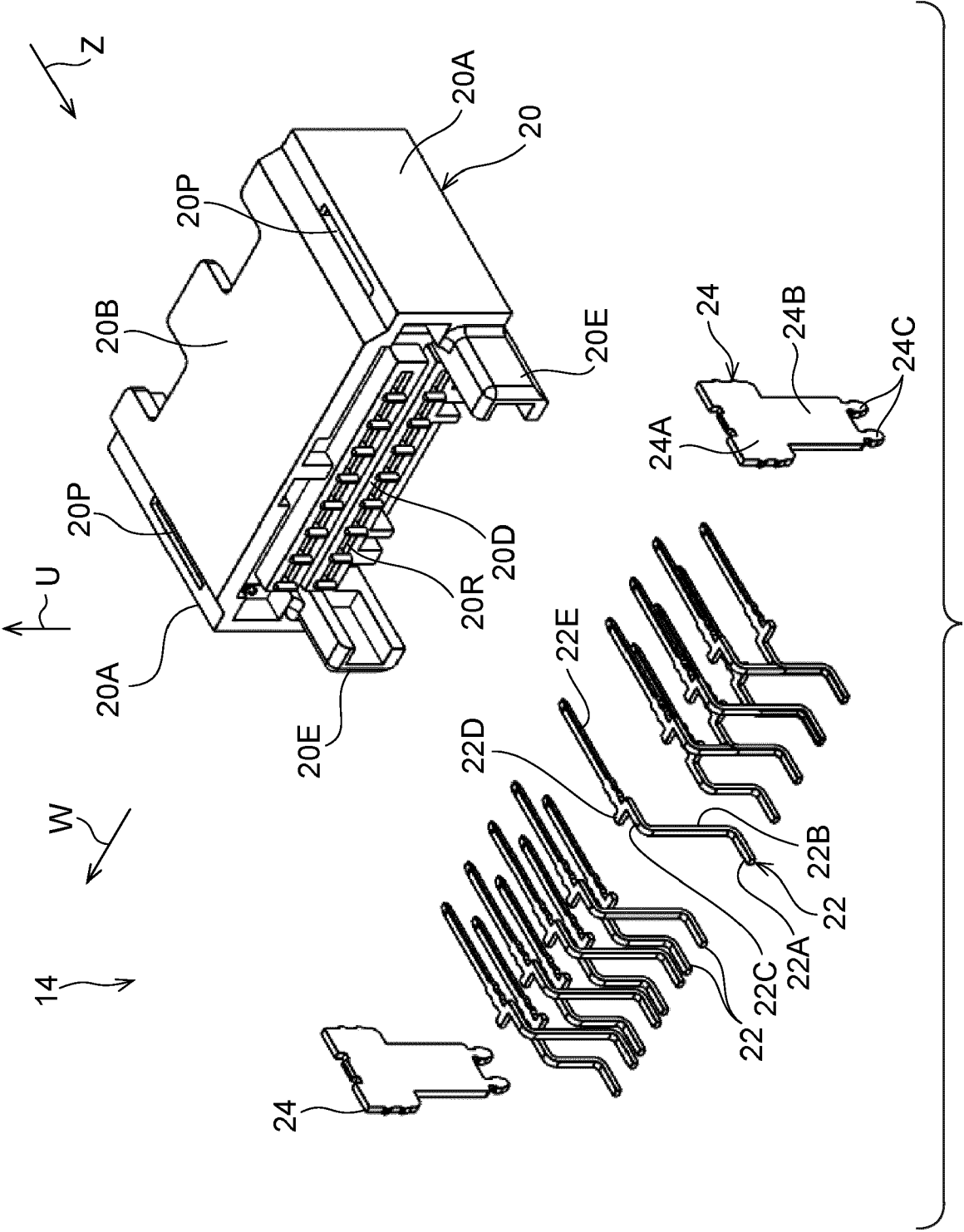
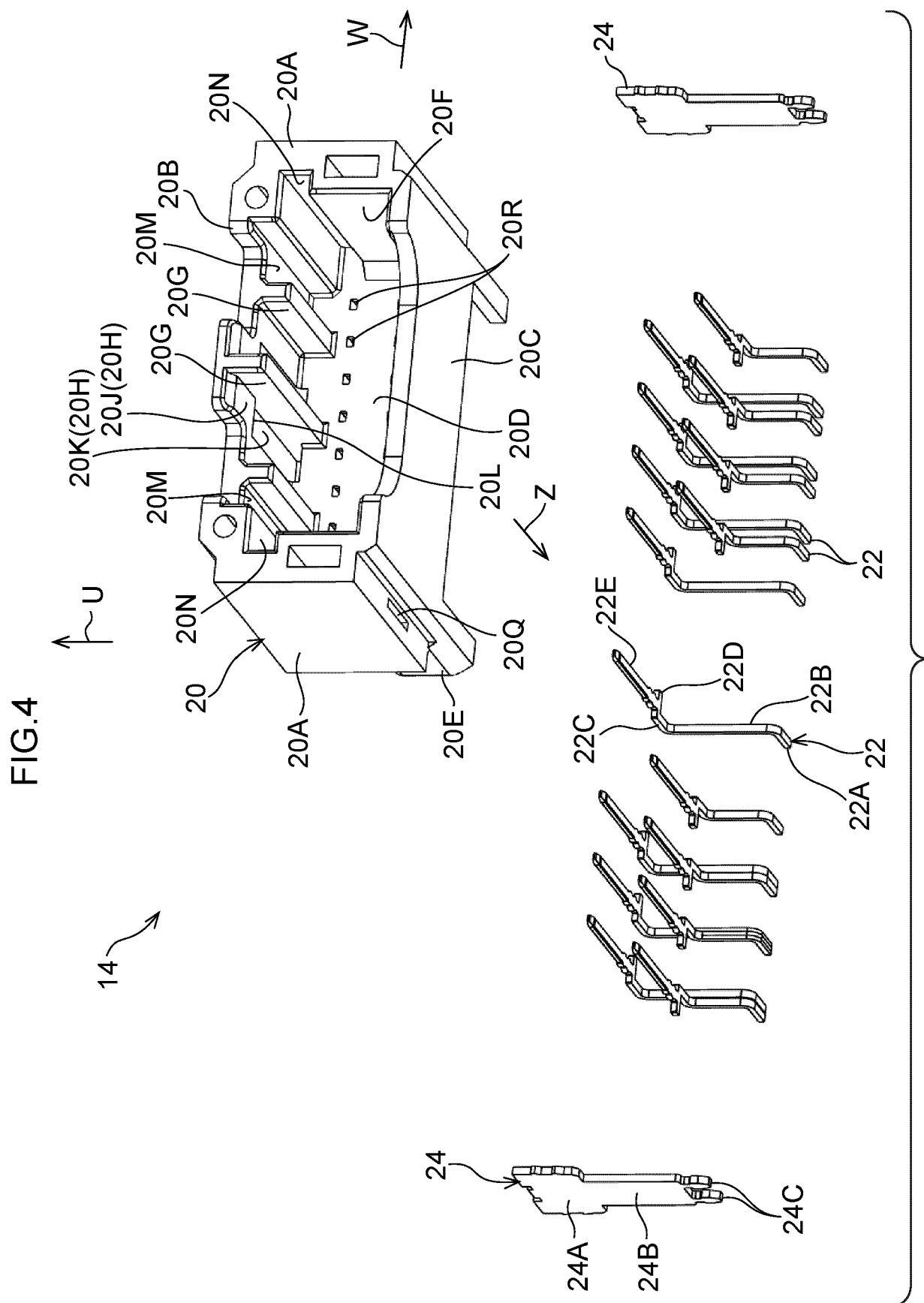


FIG.3





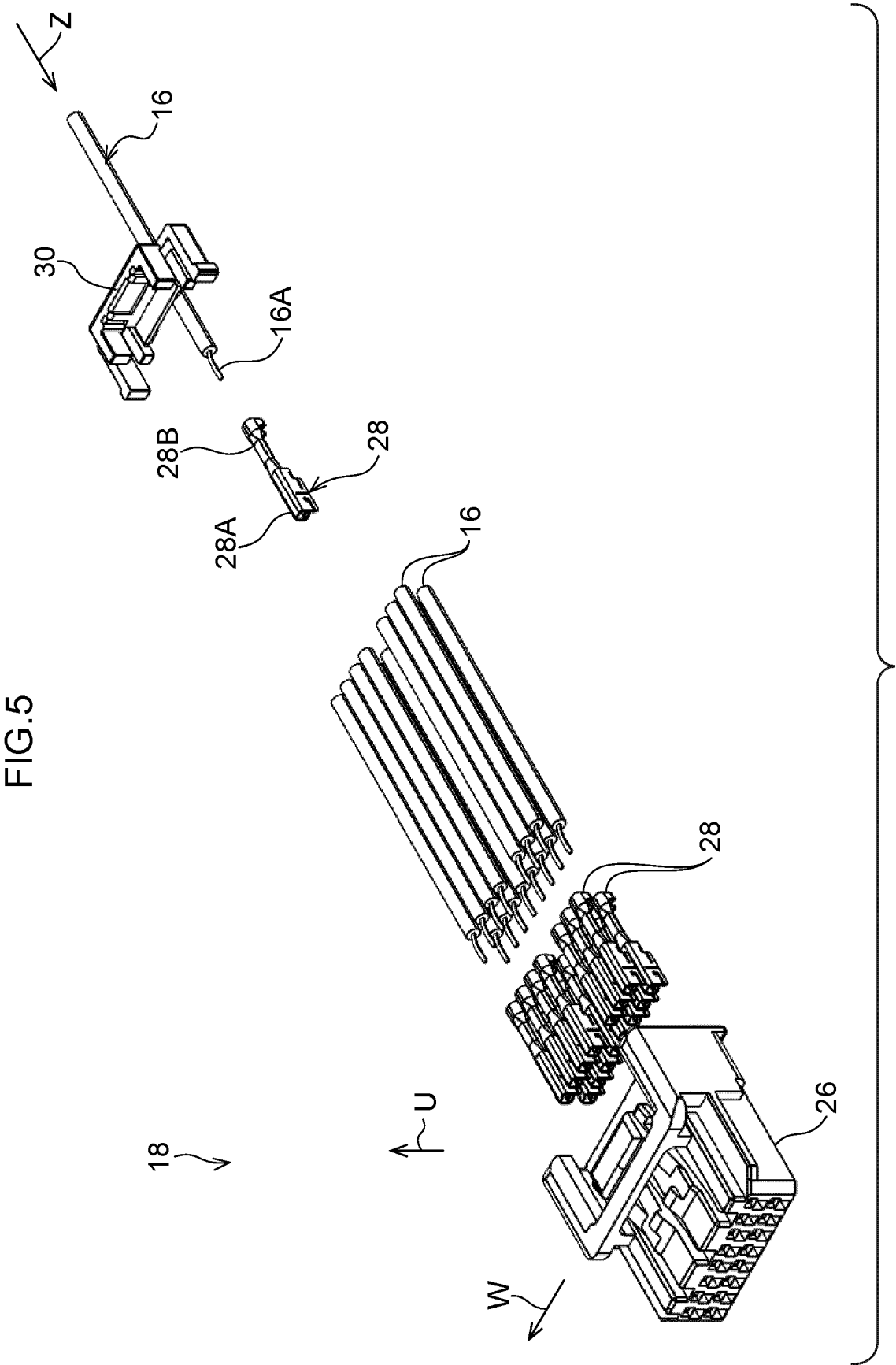


FIG.6

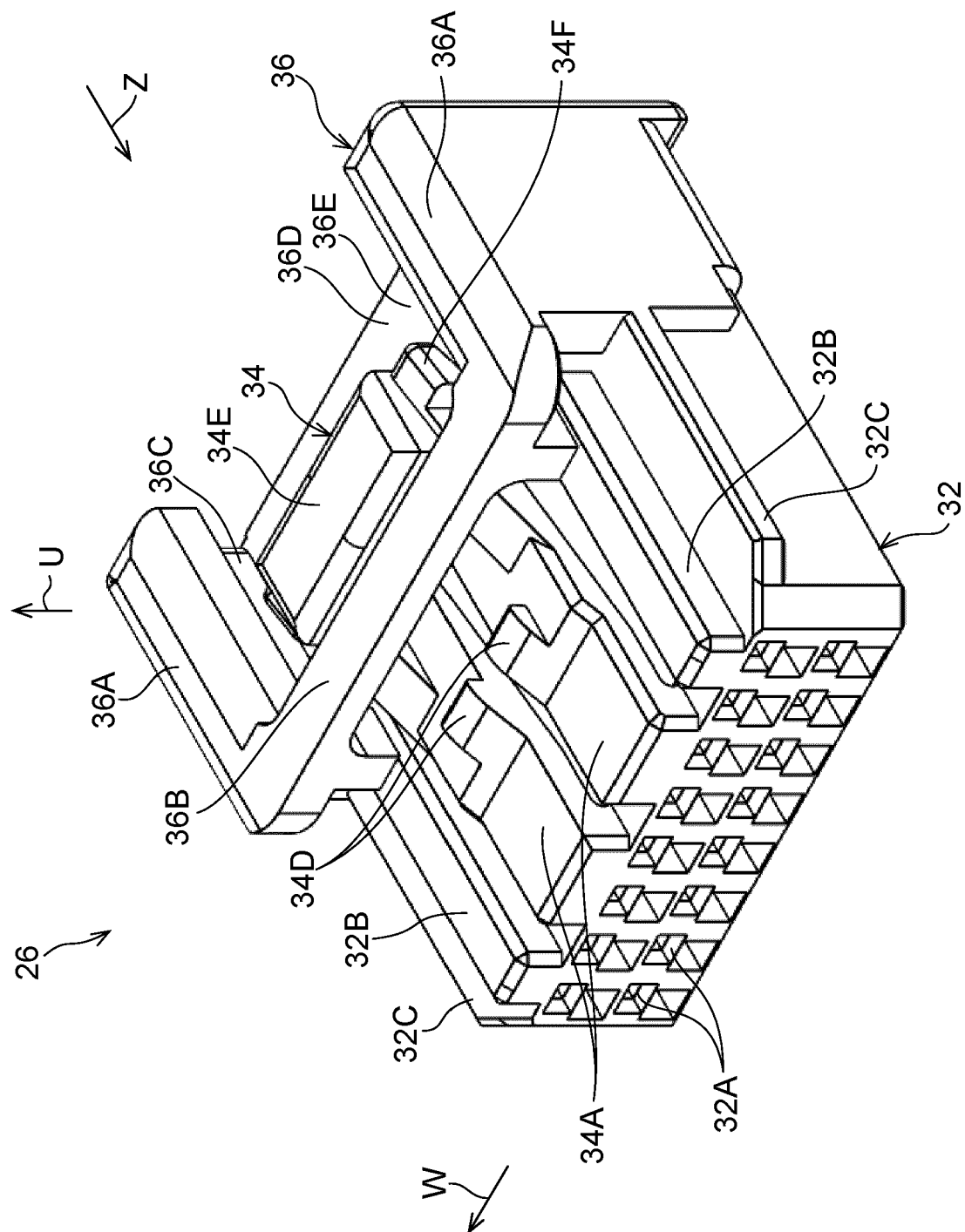


FIG.7

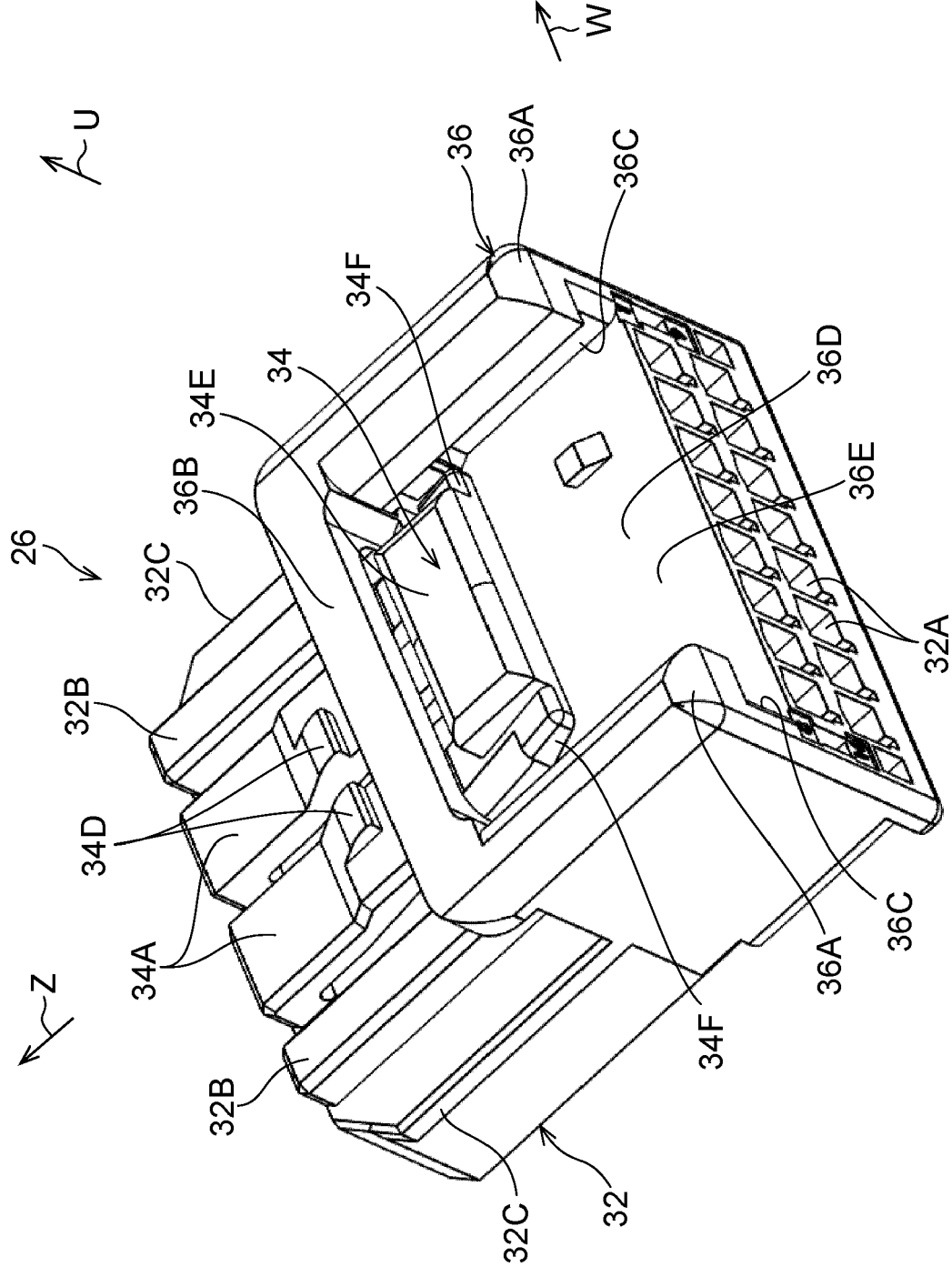


FIG.8

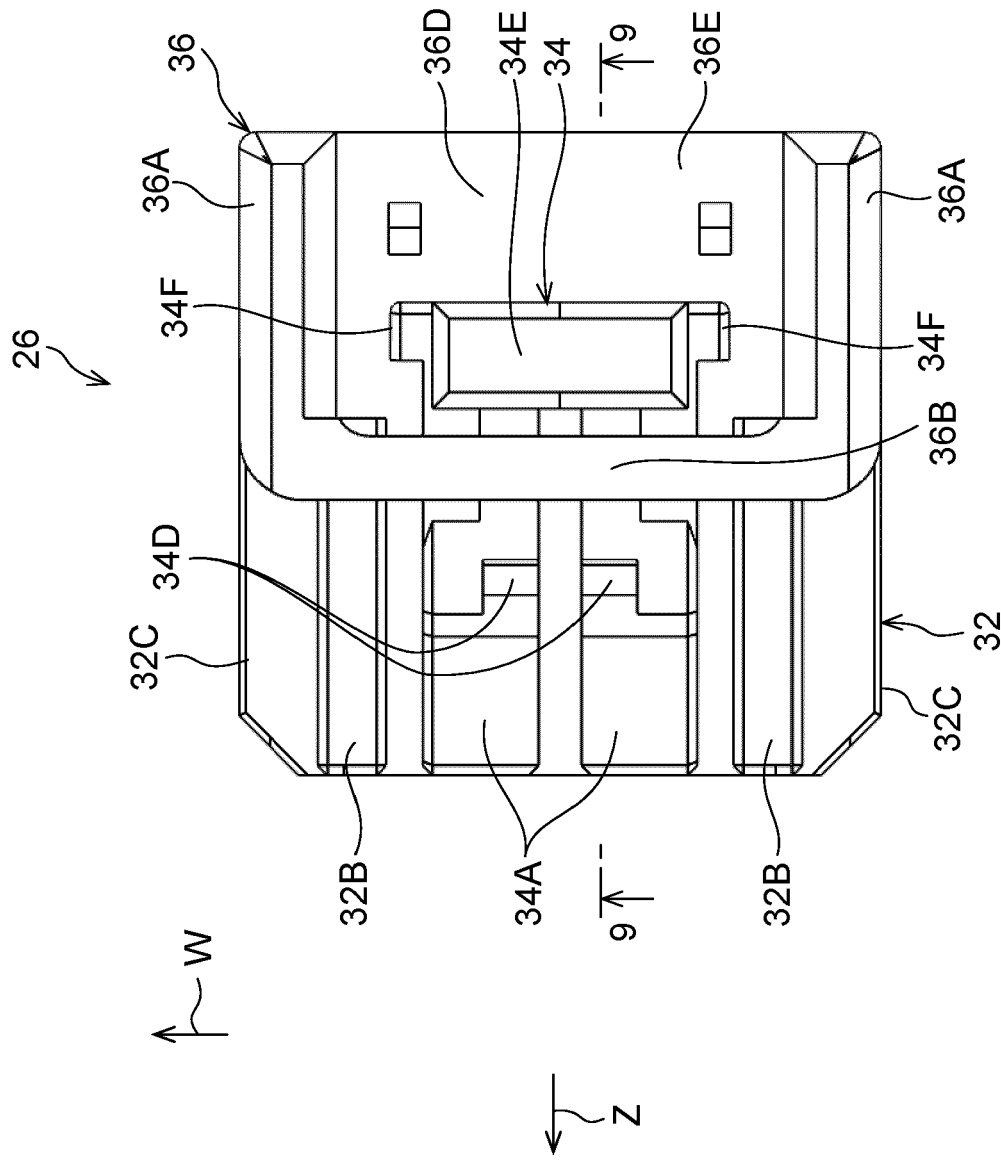


FIG.10

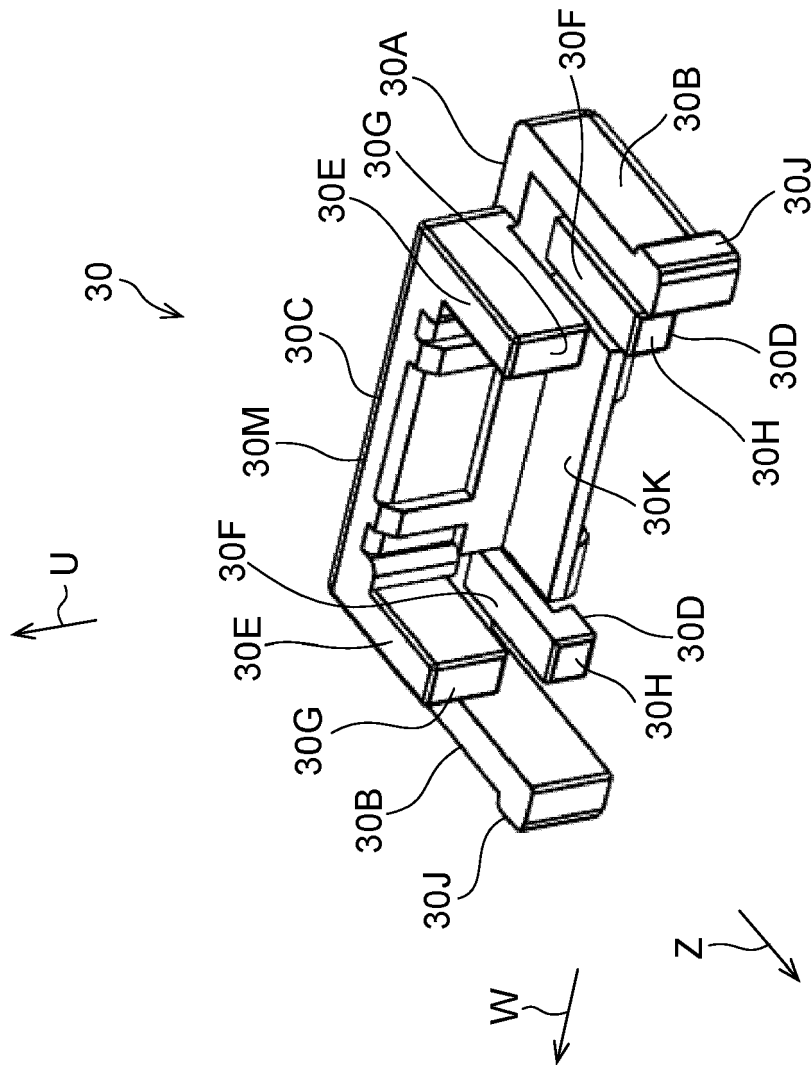


FIG.11

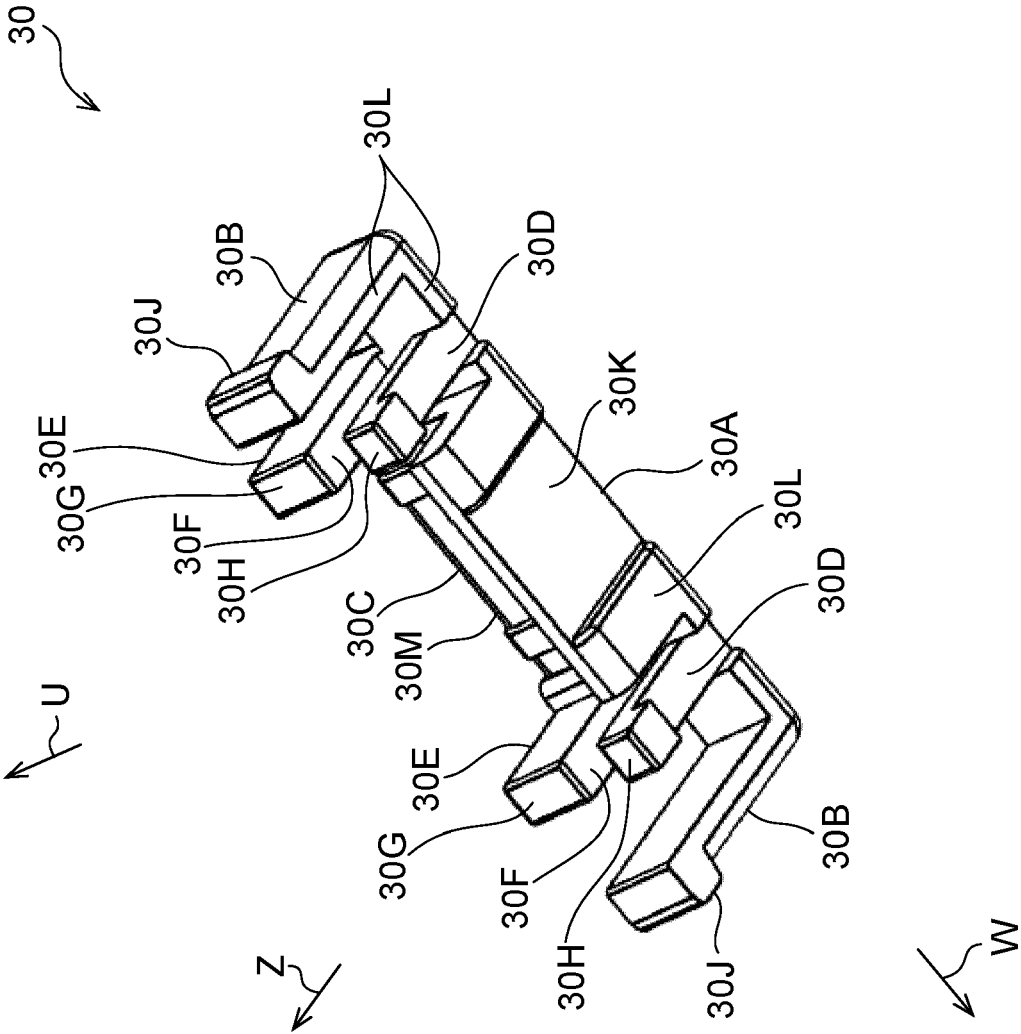


FIG.12A

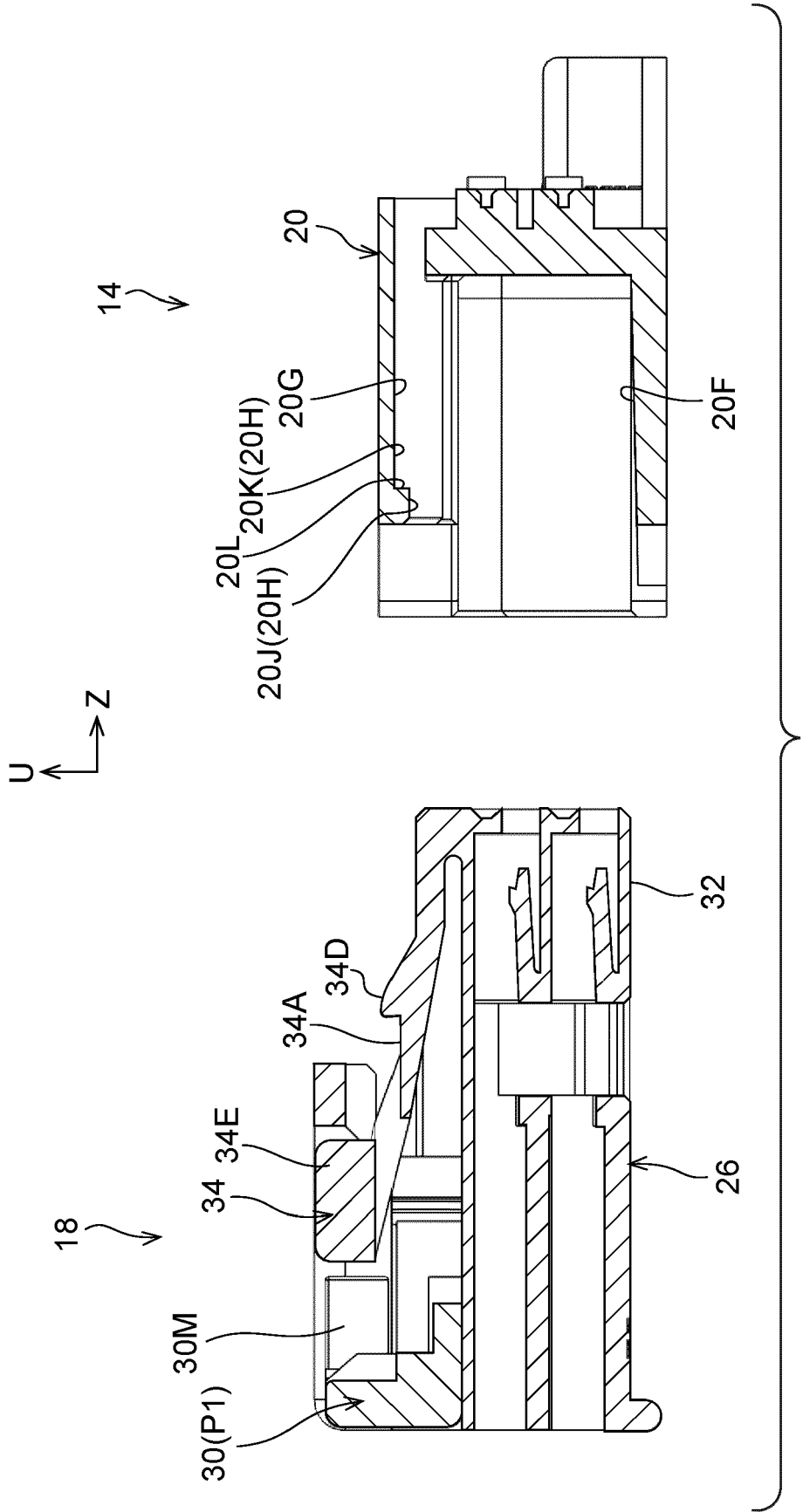


FIG. 12B

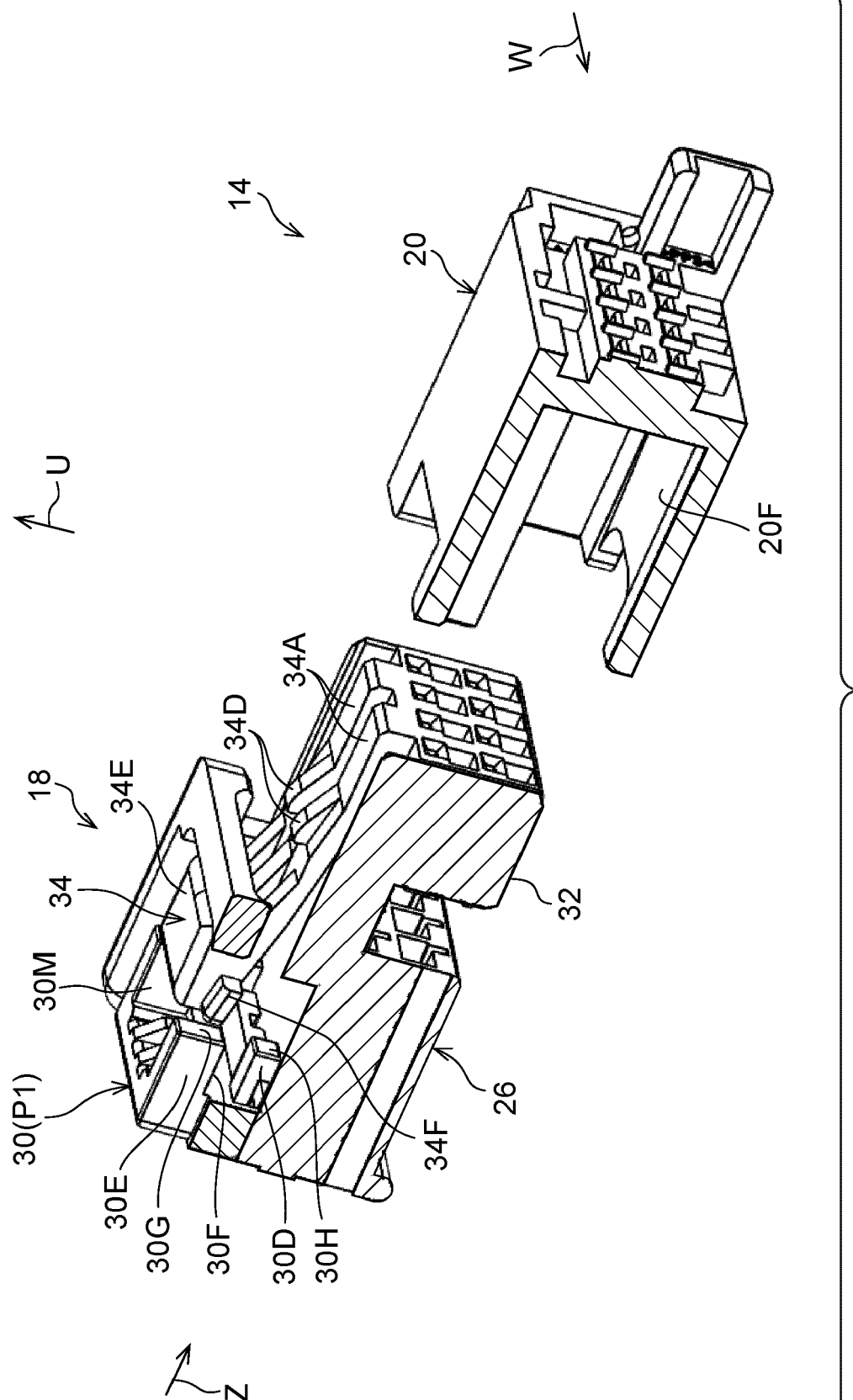
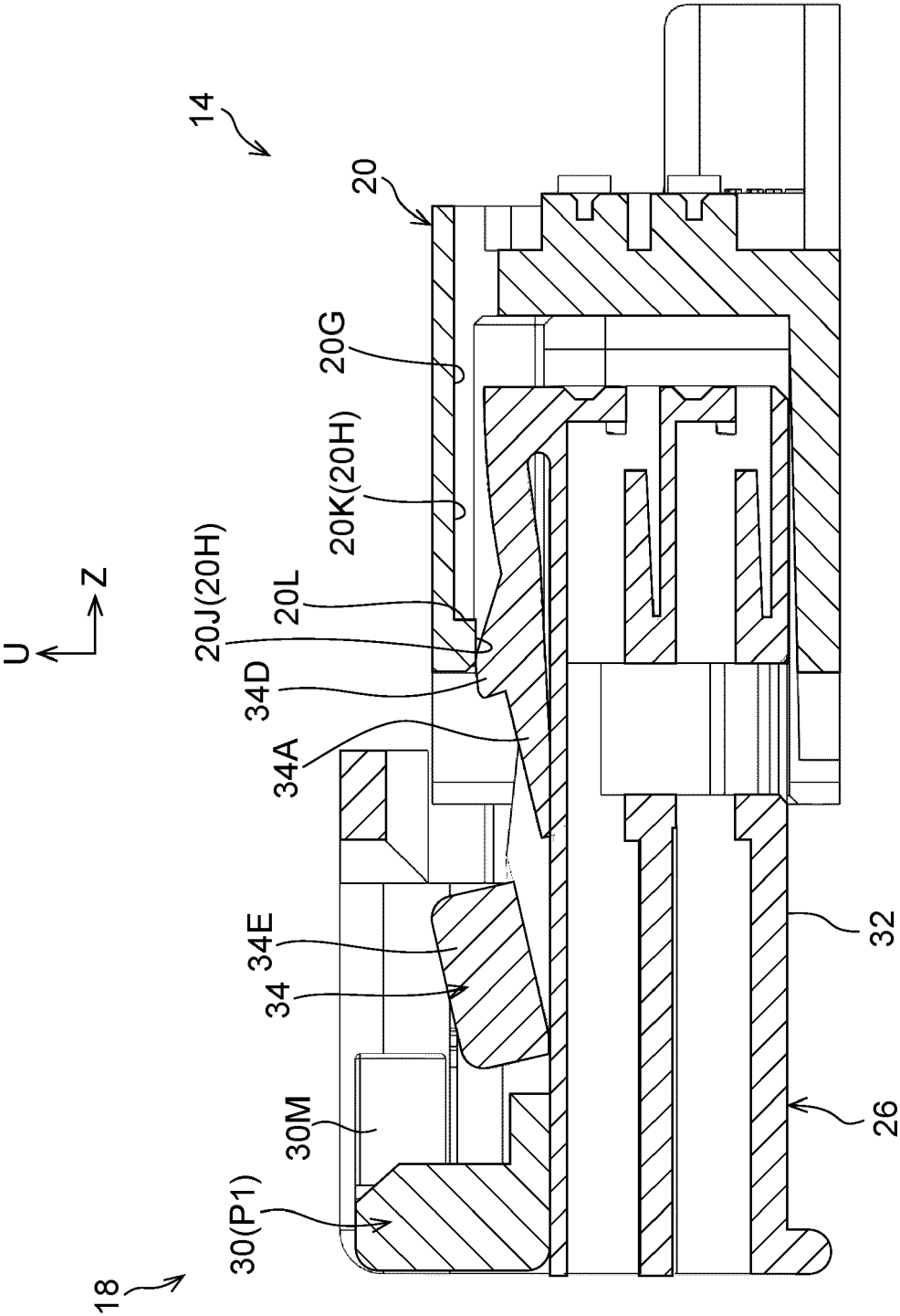


FIG.13A



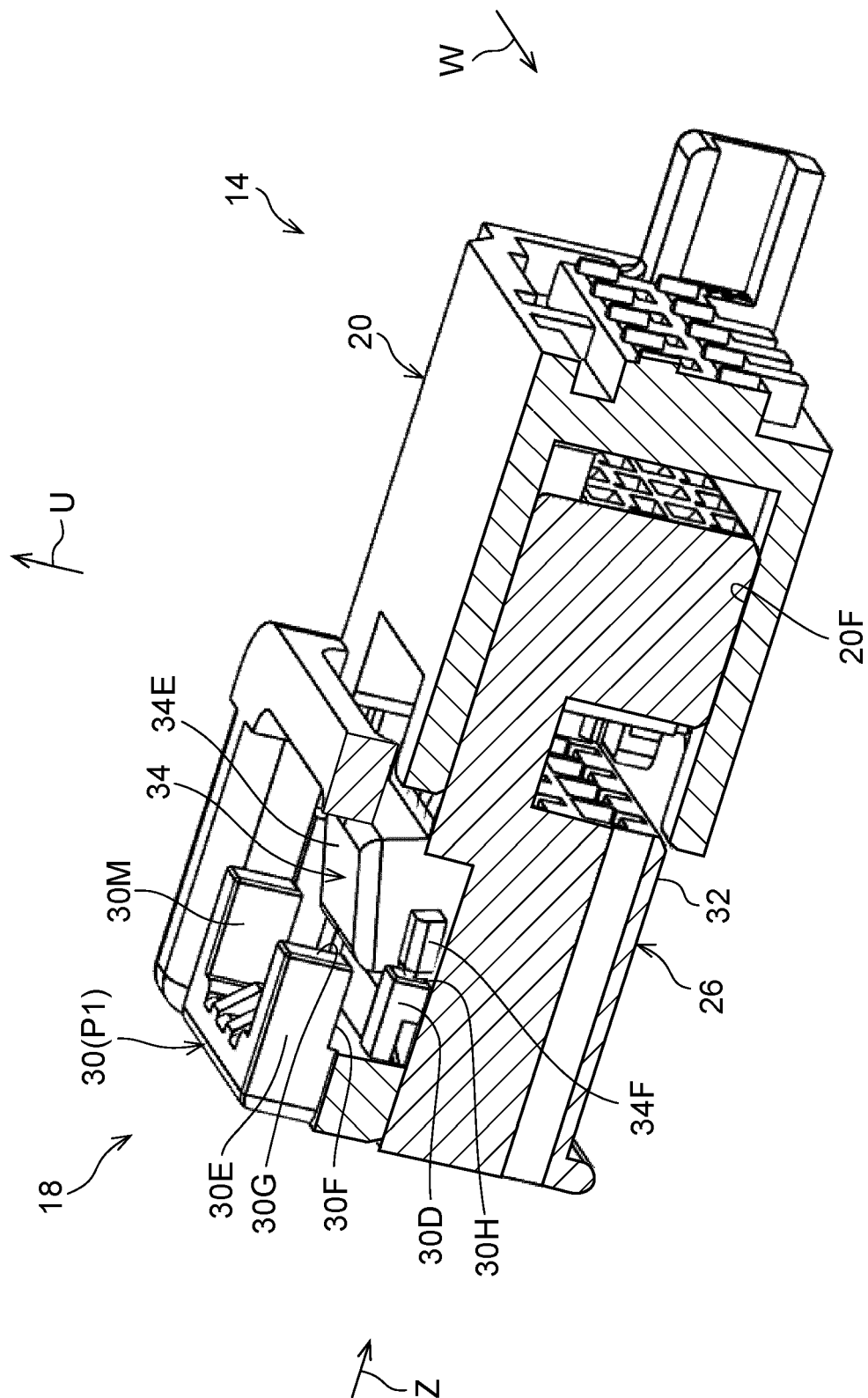


FIG. 13B

FIG.14A

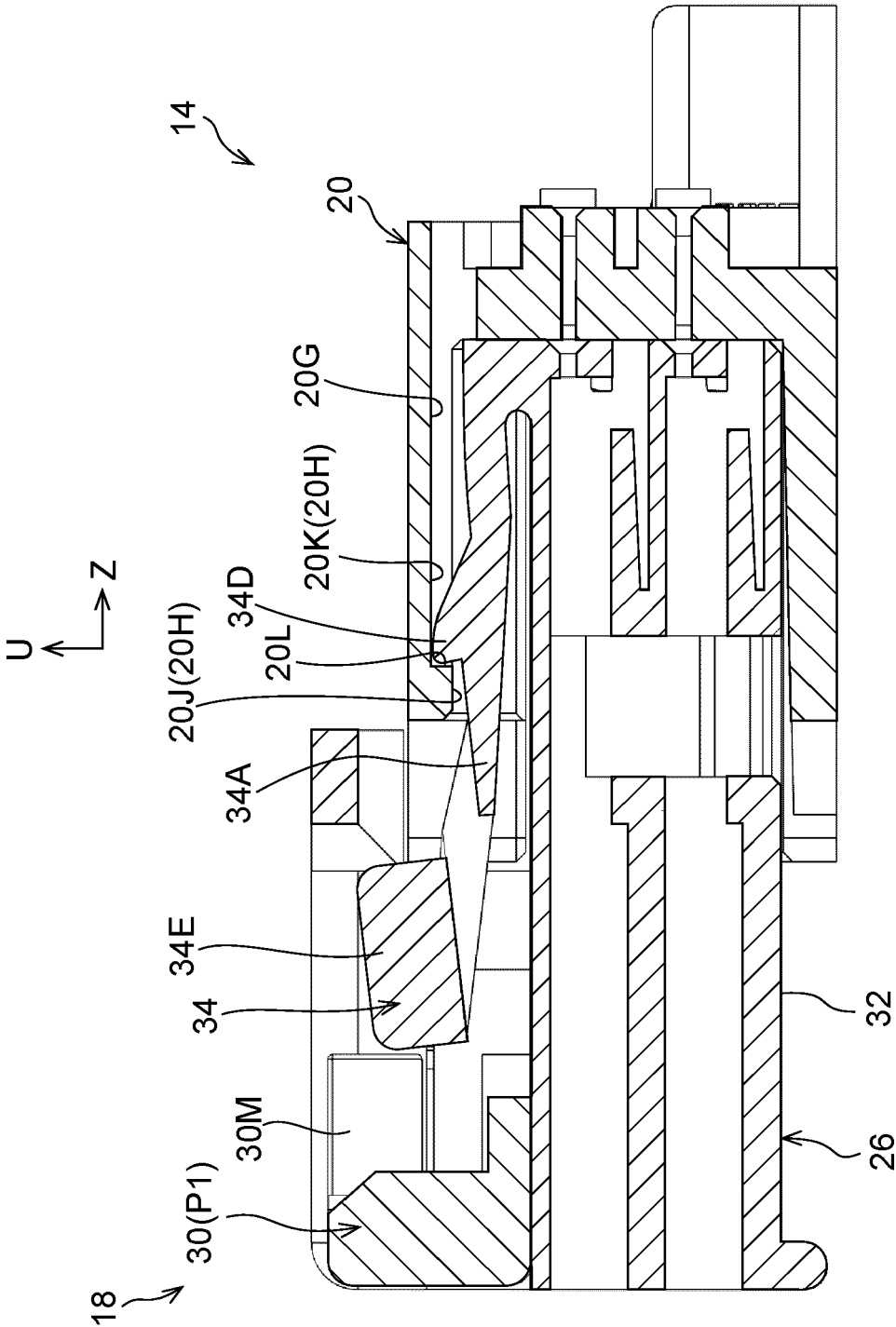


FIG. 14B

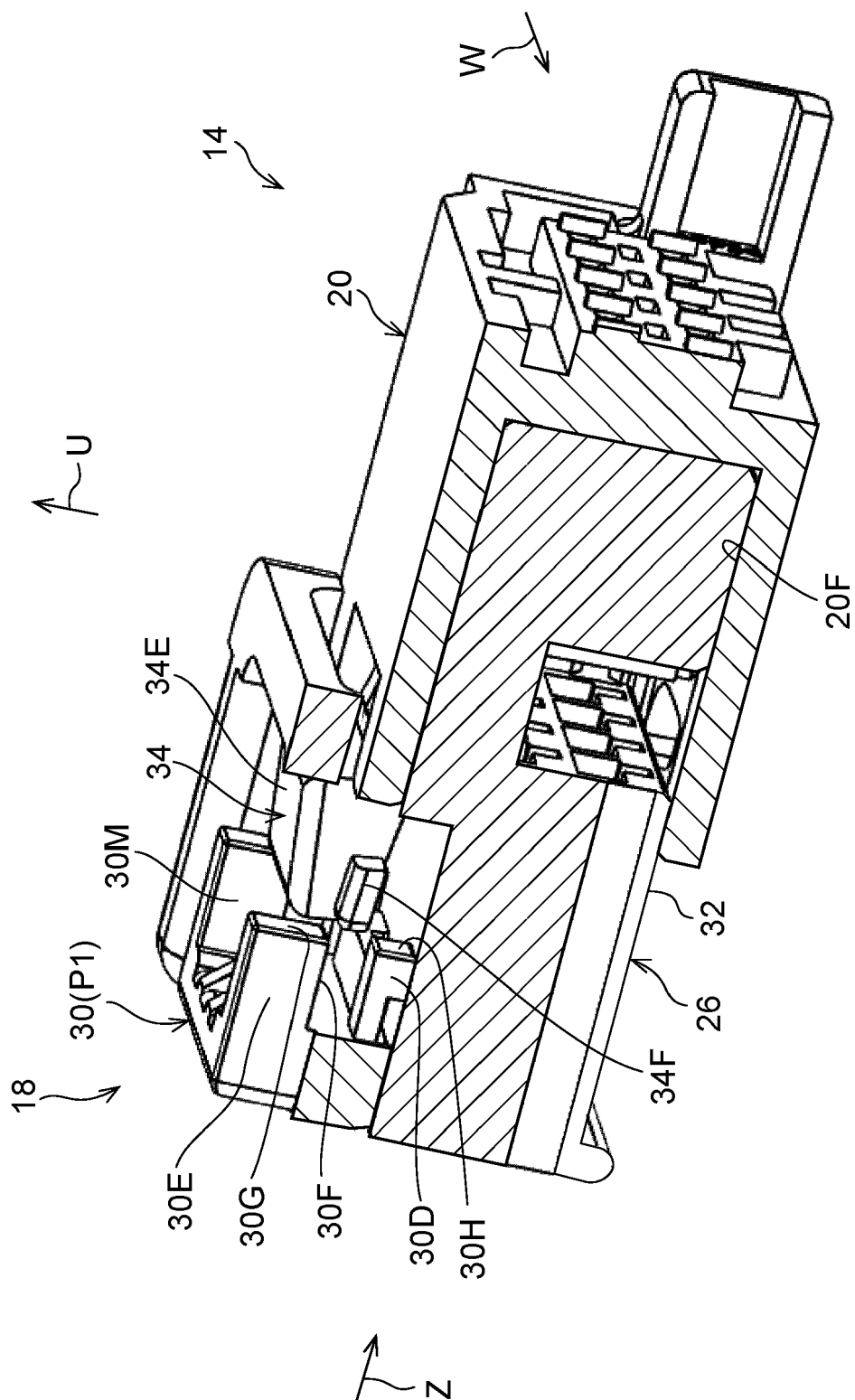
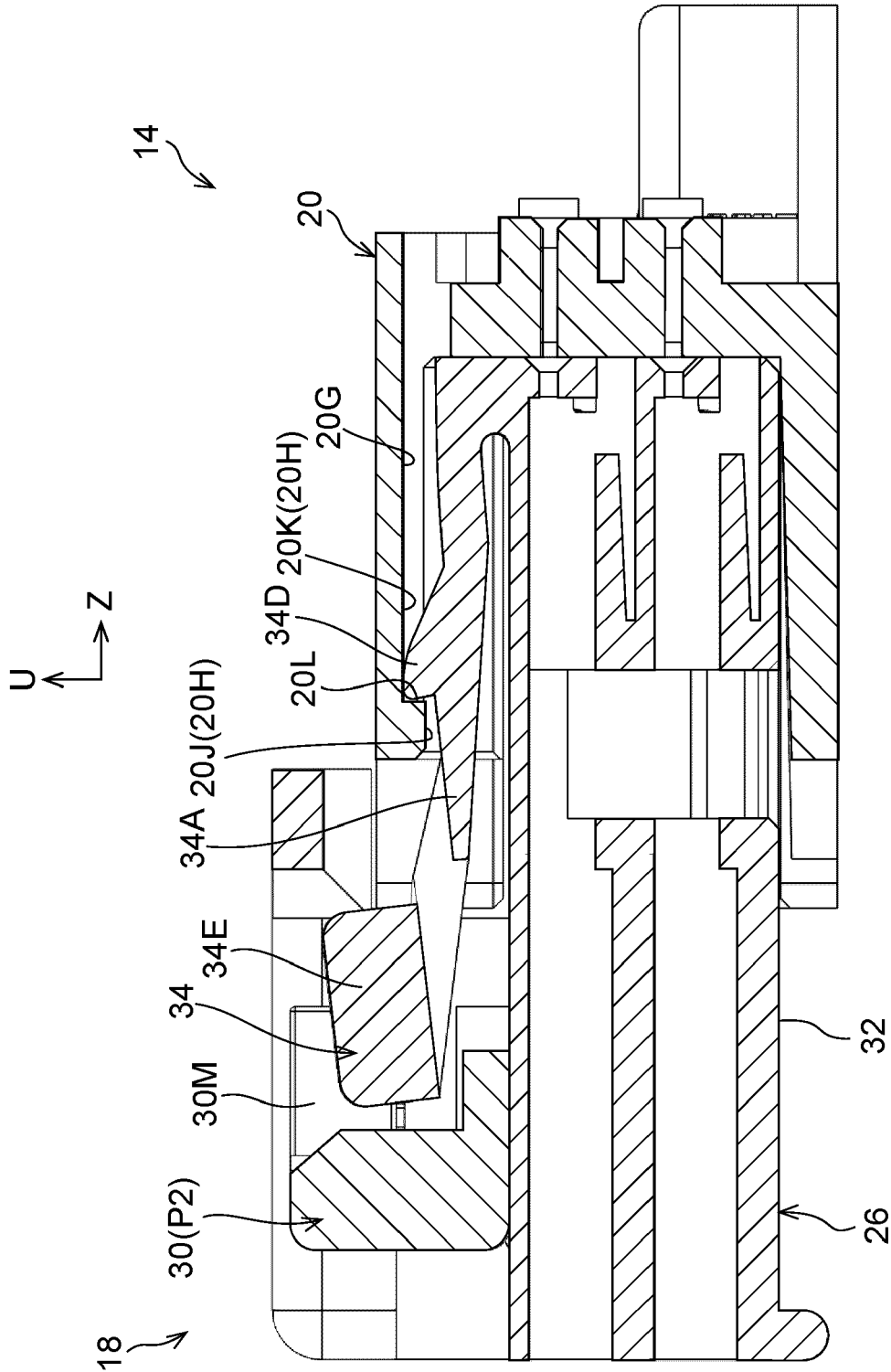


FIG.15A



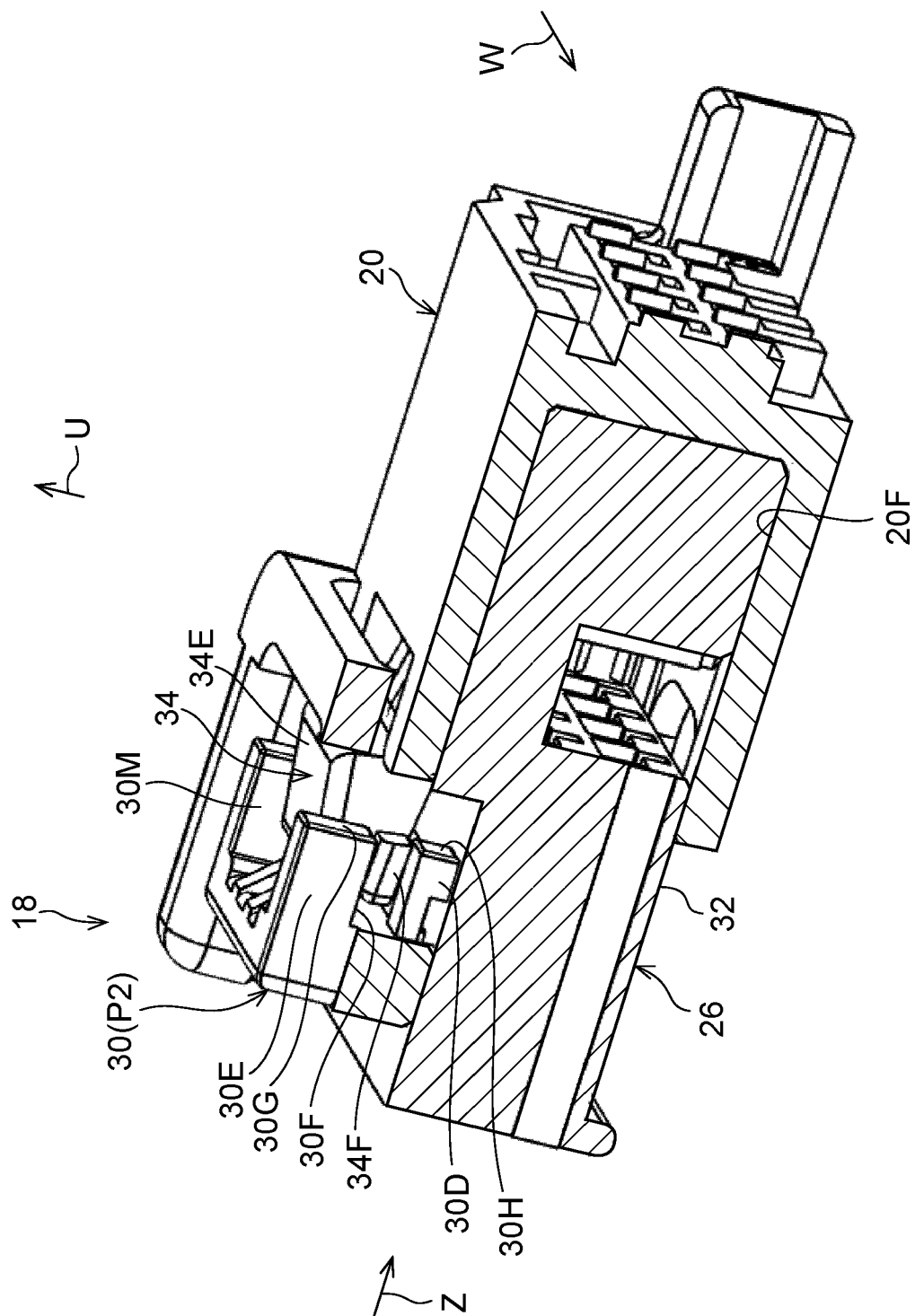


FIG. 15B



EUROPEAN SEARCH REPORT

Application Number

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
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X	US 2021/210900 A1 (CHIANG CHIH-HSIEN [TW] ET AL) 8 July 2021 (2021-07-08) * the whole document *	1-7	INV. H01R13/639 H01R13/641
X	US 5 947 763 A (ALAKSIN PAUL H [US]) 7 September 1999 (1999-09-07) * the whole document *	1-7	ADD. H01R12/72 H01R13/627
X	CN 107 069 334 A (SHENZHEN WOER HEAT-SHRINKABLE MAT CO LTD ET AL.) 18 August 2017 (2017-08-18) * the whole document *	1-7	
			TECHNICAL FIELDS SEARCHED (IPC)
			H01R
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 21 February 2023	Examiner Gomes Sirenkov E M.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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ON EUROPEAN PATENT APPLICATION NO.**

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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21-02-2023

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CN 107069334 A	18-08-2017	NONE	

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