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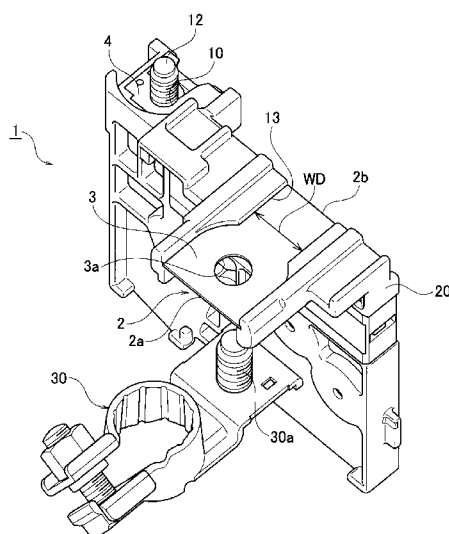
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(54) Title: FUSE UNIT

[Fig. 2]



(57) Abstract: A fuse unit (1) includes a bus bar (2) and an insulating protection portion (20). The bus bar (2) has a power supply connection portion (3), an output connection portion (4, 5), and a terminal installation recess (13) provided around the power supply connection portion (3). The insulating protection portion (20) is disposed on an outer surface of the bus bar (2) so that portions of a surface of the bus bar (2) in the power supply connection portion (3), the output connection portion (4, 5), and the terminal installation recess (13) are exposed from the insulating protection portion (20).

Description

Title of Invention: FUSE UNIT

Technical Field

[0001] The present invention relates to a fuse unit.

Background Art

[0002] Various fuse units of a type in which the fuse unit is directly connected to a battery have been conventionally proposed (see Patent Literature 1 and Patent Literature 2). An example of such type of fuse unit is shown in Fig. 1.

[0003] In Fig. 1, a fuse unit 100 is fixed to a battery post (not illustrated) of a battery (not illustrated) via a battery terminal 130. The fuse unit 100 includes a bus bar 110 being a conductive metal plate and an insulating protection portion 120 provided on an outer surface of the bus bar 110 by insert resin molding.

[0004] The bus bar 110 has: a power supply connection portion 111 to which the battery terminal 130 is connected and to which the power is supplied from the battery post (not illustrated); multiple output connection portions 112 (not all are illustrated) to which load-side terminals are connected; and fuse portions (not illustrated) which are each disposed between the power supply connection portion 111 and a corresponding one of the output connection portions 112 (not all are illustrated).

[0005] The insulating protection portion 120 is disposed on the outer periphery of the bus bar 110 except for the portions of the power supply connection portion 111, the output connection portions 112 (not all are illustrated), and the fuse portions (not illustrated). This arrangement aims to achieve an increase in strength of the fuse unit 100, and the like. Moreover, a connector housing 121 for the output connection portions (not illustrated) is formed by the insulating protection portion 120.

[0006] In the power supply connection portion 111, the front and back surfaces of the bus bar 110 are not covered with the insulating protection portion 120 and are exposed, including one end surface 110a of the bus bar 110. A bolt insertion hole 111a is formed in the power supply connection portion 111.

[0007] In the power supply connection portion 111, the battery terminal 130 is set to protrude from the exposed one end surface 110a of the bus bar 110. Then, the battery terminal 130 thus set and the power supply connection portion 111 are fastened to each other with a nut (not illustrated) and a bolt 130a inserted into the bolt insertion hole 111a. The battery terminal 130 is connected to the exposed surface of the bus bar 110 while being in tight contact therewith.

Citation List

Patent Literature

- [0008] [PTL 1] Japanese Unexamined Patent Application Publication No. 2010-73516
[PTL 2] Japanese Unexamined Patent Application Publication No. 2010-277985

Summary of Invention

- [0009] As shown in Fig. 1, there is a case where a connection terminal 131 connected to a wire W is fastened together with the battery terminal 130. In the related art described above, the battery terminal 130 is disposed on a front side of the power supply connection portion 111 while the insulating protection portion 120 (a portion denoted by reference numeral 120a in the drawing) is disposed on a rear side of the power supply connection portion 111. Accordingly, only a space below and a space above the power supply connection portion 111 can be used as a space for installing the connection terminal 131 and for leading out the wire W. Because of this restriction, there is no way but to use an L-shaped terminal as the connection terminal 131 and lead out the wire W to the space below the power supply connection portion 111 (shown in solid lines in Fig. 1) or to the space above the power supply connection portion 111 (shown in imaginary lines in Fig. 1). Due to the reason described above, a degree of freedom in installation pattern of the connection terminal 131 and a degree of freedom in lead-out direction of the wire W are small.
- [0010] An object of the present invention is to provide a fuse unit in which a connection terminal of a wire is connected to a power supply connection portion together with a battery terminal, the fuse unit having a large degree of freedom in installation pattern of the connection terminal and a large degree of freedom in lead-out direction of the wire.
- [0011] An aspect of the present invention is a fuse unit comprising: a bus bar having a power supply connection portion, an output connection portion, and a terminal installation recess provided around the power supply connection portion; and an insulating protection portion disposed on an outer surface of the bus bar so that portions of a surface of the bus bar in the power supply connection portion, the output connection portion, and the terminal installation recess are exposed from the insulating protection portion.
- [0012] A width of an exposed portion of the surface of the bus bar in the terminal installation recess may be smaller than a width of an exposed portion of the surface bus bar in the power supply connection portion.
- [0013] The power supply connection portion may be provided in a portion of the bus bar on one side of a bent portion at which the bus bar is bent, and the terminal installation recess may be provided to extend to a position of the bent portion of the bus bar.
- [0014] The power supply connection portion and the output connection portion may be connected to each other via a fuse portion.

[0015] According to the configuration described above, the connection terminal can be installed by using the terminal installation recess in addition to the space above and the space below the power supply connection portion. Thus, the degree of freedom in the installation pattern of the connection terminal and the degree of freedom in the lead-out direction of the wire are large.

Brief Description of Drawings

[0016] [fig.1]Fig. 1 is a perspective view of a fuse unit of a related art.

[fig.2]Fig. 2 is a perspective view of a fuse unit of an embodiment of the present invention.

[fig.3]Fig. 3 is a perspective view of the fuse unit of the embodiment of the present invention which shows a configuration of a battery terminal and a connection terminal when a wire is led out downward.

[fig.4]Fig. 4 is a perspective view of the fuse unit of the embodiment of the present invention which shows a configuration of the battery terminal when the wire is led out upward or rearward (away from the battery).

[fig.5]Fig. 5 is a perspective view of the fuse unit of the embodiment of the present invention which shows a configuration of the battery terminal and the connection terminal when the wire is led out upward.

[fig.6]Fig. 6 is a perspective view of the fuse unit of the embodiment of the present invention which shows a configuration of the battery terminal when the wire is led out rearward (away from the battery).

Description of Embodiments

[0017] An embodiment of the present invention is described below based on the drawings.

[0018] Figs. 2 to 6 show the embodiment of the present invention. As shown in Fig. 2, a fuse unit 1 includes a bus bar 2 formed from a conductive metal plate to have a predetermined shape and an insulating protection portion 20 disposed on an outer surface of the bus bar 2.

[0019] A power supply connection portion 3, a first output connection portion 4, four second output connection portions 5 (shown in Figs. 4 to 6), and fuse portions (not illustrated) are formed in the bus bar 2. The power supply connection portion 3 is fixed to a battery post (not illustrated) via a battery terminal 30. Each of the fuse portions is disposed between the power supply connection portion 3 and a corresponding one of the first and second output connection portions 4 and 5 and connects the two to each other. The bus bar 2 is bent at right angles at a bent portion 2b and is formed to have an L-shape. The power supply connection portion 3 and the first output connection portion 4 are disposed in a portion of the bus bar 2 on one side of the bent portion and the fuse portions (not illustrated) and the second output connection portions 5 are disposed in a

portion of the bus bar 2 on the other side of the bent portion.

[0020] A bolt insertion hole 3a is formed in the power supply connection portion 3. The battery terminal 30 is connected by using the bolt insertion hole 3a.

[0021] A bolt press-fit groove 10 is formed in the first output connection portion 4. A bolt screw hole 11 is formed in each of the second output connection portions 5. A bolt 12 is inserted into each of the bolt press-fit groove 10 and the bolt screw holes 11. Head portions of the respective bolts 12 are fixed by the insulting protection portion 20. Mating terminals (not illustrated) are fastened and connected respectively to the first output connection portion 4 and the second output connection portions 5 by using the bolts 12.

[0022] The insulating protection portion 20 is formed by insert molding with the bus bar 2 and the bolts 12 being inserted parts, the bolts 12 temporarily fixed to the bus bar 2. The insulating protection portion 20 is disposed to basically cover an outer periphery of the bus bar 2 except for portions of the power supply connection portion 3, the first output connection portion 4, the second output connection portions 5, and the fuse portions (not illustrated). In the power supply connection portion 3, the front and back surfaces of the bus bar 2 are not covered with the insulating protection portion 20 and are exposed, including one end surface 2a of the bus bar 2. A terminal installation recess 13 is provided in the surrounding of the power supply connection portion 3 by disposing no insulating protection portion 20 and thus exposing the surface of the bus bar 2. An exposure width WD of the bus bar 2 in the terminal installation recess 13 is smaller than that in the power supply connection portion 3 and is set to a width slightly larger than the width of a connection terminal 31C shown in Fig. 6. The terminal installation recess 13 is provided to extend to the position of the bent portion 2b of the bus bar 2. The bent portion 2b of the bus bar 2 is thereby exposed.

[0023] Next, descriptions are given of an installation pattern of connection terminals 31A to 31C to be fastened to the power supply connection portion 3 together with the battery terminal 30. First, descriptions are given of the case where a wire W is installed to be led out toward a space below the power supply connection portion 3. As shown in Fig. 3, a terminal (LA terminal) having such an L-shape form that the terminal is bent substantially at right angles at a portion between a terminal pressure-bonding portion 31a and a wire crimp portion 31b is used as the connection terminal 31A. The connection terminal 31A has a fixing bolt 30a of the battery terminal 30 inserted therein with the wire W led out in a downward direction. Then, the fixing bolt 30a is inserted into the bolt insertion hole 3a of the power supply connection portion 3. Thereafter, the fixing bolt 30a and a nut 32 are fastened to each other. The connection terminal 31A is installed by using the space below the power supply connection portion 3.

[0024] Next, descriptions are given of the case where the wire W is installed to be led out

toward a space above the power supply connection portion 3. As shown in Fig. 4, the fixing bolt 30a of the battery terminal 30 is inserted into the bolt insertion hole 3a of the power supply connection portion 3 from below. Then, as shown in Fig. 5, a terminal (LA terminal) having such an L-shape form that the terminal is bent substantially at right angles at a portion between the terminal pressure-bonding portion 31a and the wire crimp portion 31b is used as a connection terminal 31B. The connection terminal 31B has the fixing bolt 30a of the battery terminal 30 inserted therein with the wire W led out in an upward direction, and the fixing bolt 30a and the nut 32 are fastened to each other. The connection terminal 31B is installed by using the space above the power supply connection portion 3. Moreover, a terminal is used as the connection terminal 31B, the terminal having such an L-shape form that the terminal is bent substantially at right angles at the portion between the terminal pressure-bonding portion 31a and the wire crimp portion 31b, the terminal pressure-bonding portion 31a having a long length. Moreover, the wire W can be also led out downward from a rear side (side away from the battery) of the power supply connection portion 3 by disposing the terminal pressure bonding portion 31a along the exposed surface of the bus bar 2 in the power supply connection portion 3 and the terminal installation recess 13 and by disposing the wire crimp portion 31b downward.

[0025] Next, descriptions are given of the case where the wire W is installed to be horizontally led out toward a space rearward (on a side away from the battery) of the power supply connection portion 3. As shown in Fig. 4, the fixing bolt 30a of the battery terminal 30 is inserted into the bolt insertion hole 3a of the power supply connection portion 3 from below. Then, as shown in Fig. 6, a terminal (LA terminal) having such a straight form that the terminal pressure-bonding portion 31a and the wire crimp portion 31b are linear is used as the terminal 31C. The connection terminal 31C has the fixing bolt 30a of the battery terminal 30 inserted therein with the wire W led out in a direction toward the space rearward (on a side away from the battery) of the power supply connection portion 3. Thereafter, the fixing bolt 30a and the nut 32 are fastened to each other. The connection terminal 31C is installed along the exposed surface of the bus bar 2 in the power supply connection portion 3 and the terminal installation recess 13.

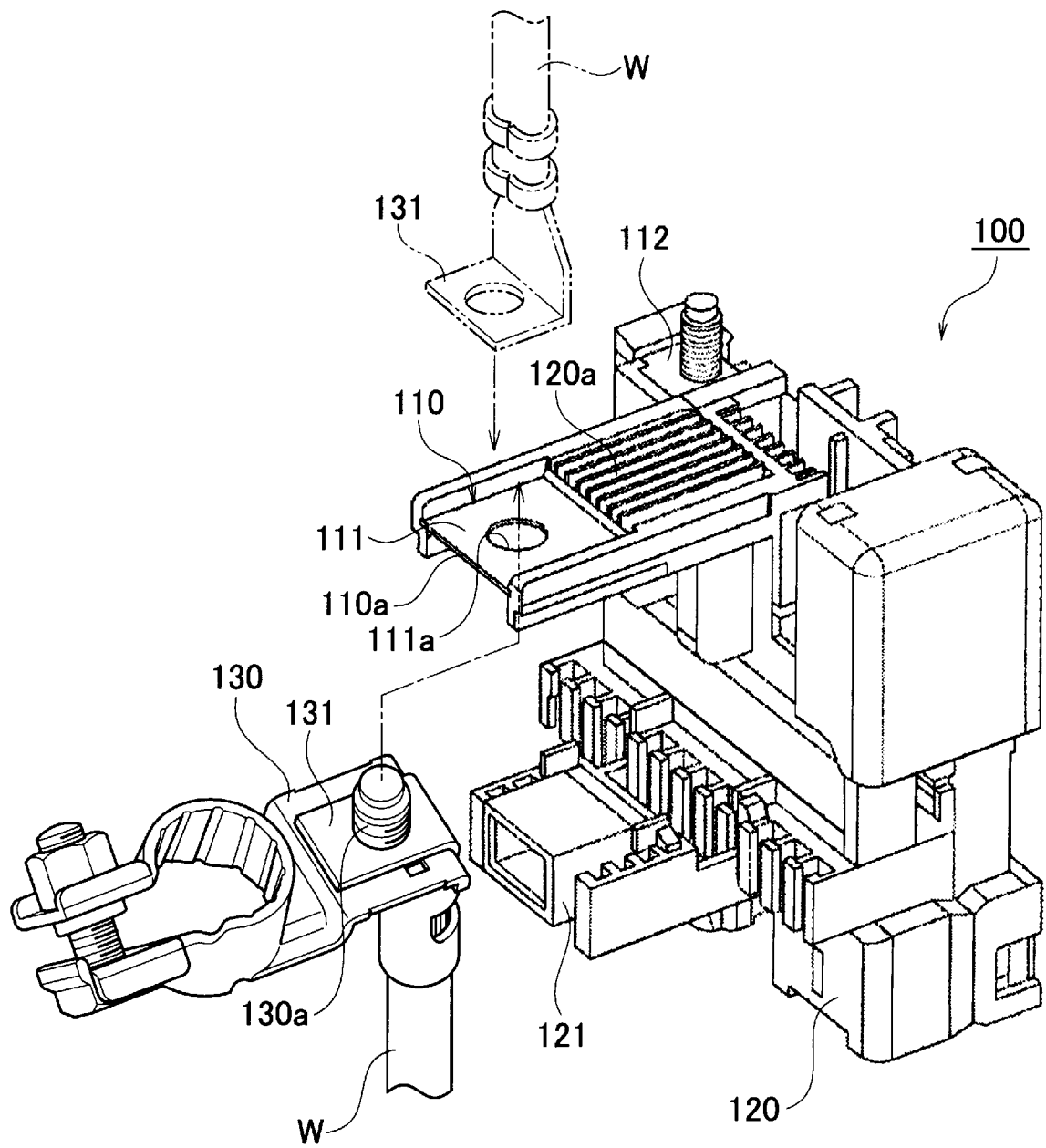
[0026] As described above, the terminal installation recess 13 is provided in the surrounding of the power supply connection portion 3 by disposing no insulating protection portion 20 and thus exposing the surface of the bus bar 2. Accordingly, the connection terminals 31A to 31C can be installed by using the terminal installation recess 13 in addition to the space above and the space below the power supply connection portion 3. Thus, the degree of freedom in installation pattern of the connection terminals 31A to 31C and the degree of freedom in lead-out direction of the wire W are improved.

- [0027] The exposure width WD of the bus bar 2 in the terminal installation recess 13 is smaller than that in the power supply connection portion 3. Thus, the terminal installation recess 13 prevents rotation of the connection terminal 31C during the fastening of the bolt 30a and the nut 32. Moreover, the exposed area of the bus bar 2 is made as small as possible and the reduction in strength is thereby suppressed.
- [0028] The power supply connection portion 3 is disposed in a portion of the bus bar 2 on one side of the bent portion 2b at which the bus bar 2 is bent and the terminal installation recess 13 is provided to extend to the position of the bent portion 2b of the bus bar 2. Accordingly, the wire W can be led out to protrude outward of the bent portion 2b of the bus bar 2. Thus, a space on the outer side of the bent portion 2b of the bus bar 2 can be effectively used.
- [0029] The fuse unit 1 has been described above based on the embodiment illustrated in the drawings. However, the invention is not limited to the embodiment and the configuration of parts can be replaced with any configuration having a similar function.

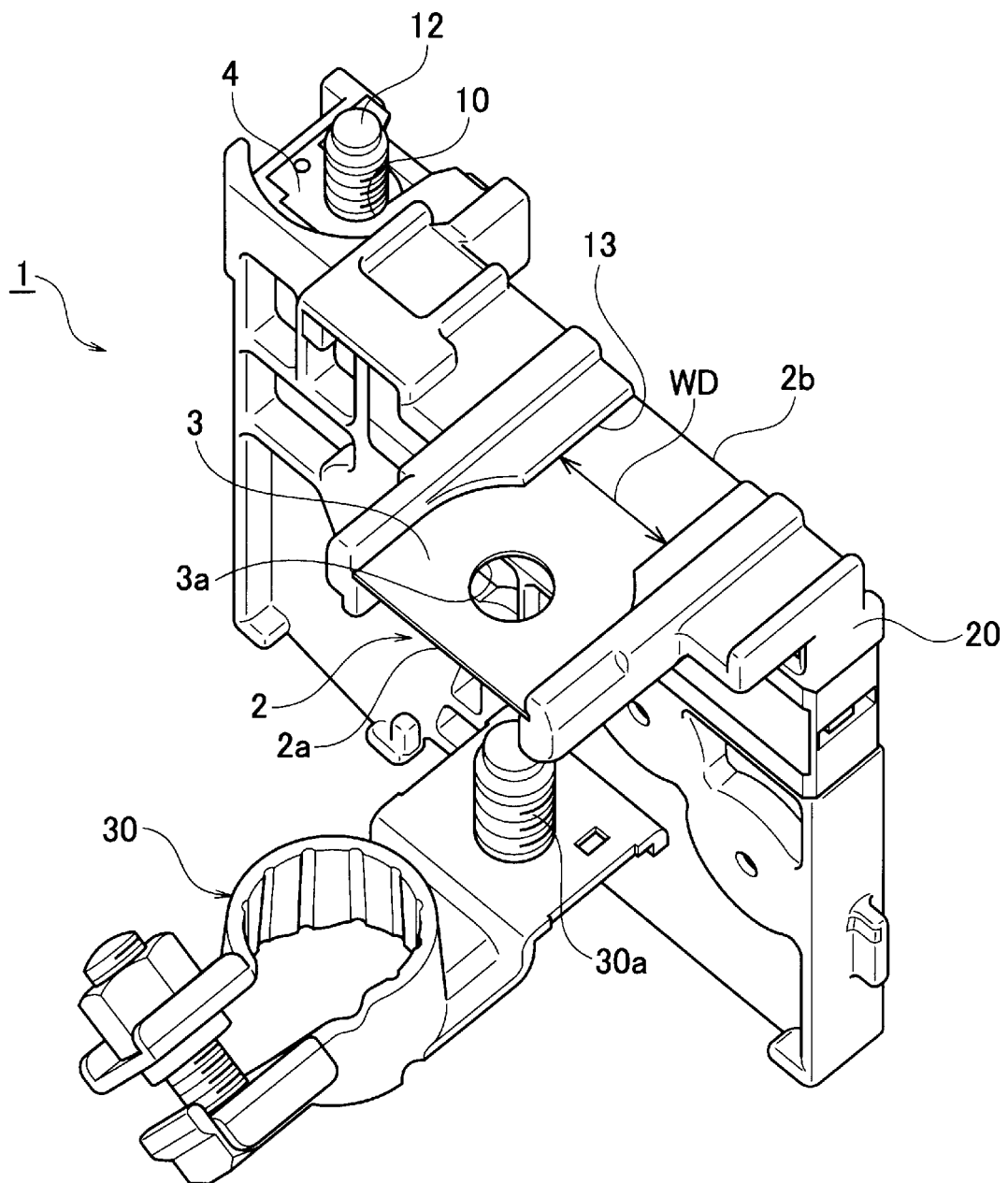
Claims

- [Claim 1] A fuse unit comprising:
a bus bar having a power supply connection portion, an output connection portion, and a terminal installation recess provided around the power supply connection portion; and
an insulating protection portion disposed on an outer surface of the bus bar so that portions of a surface of the bus bar in the power supply connection portion, the output connection portion, and the terminal installation recess are exposed from the insulating protection portion.
- [Claim 2] The fuse unit according to claim 1, wherein a width of an exposed portion of the surface of the bus bar in the terminal installation recess is smaller than a width of an exposed portion of the surface bus bar in the power supply connection portion.
- [Claim 3] The fuse unit according to claim 1, wherein
the power supply connection portion is provided in a portion of the bus bar on one side of a bent portion at which the bus bar is bent, and
the terminal installation recess is provided to extend to a position of the bent portion of the bus bar.
- [Claim 4] The fuse unit according to claim 1, wherein the power supply connection portion and the output connection portion are connected to each other via a fuse portion.

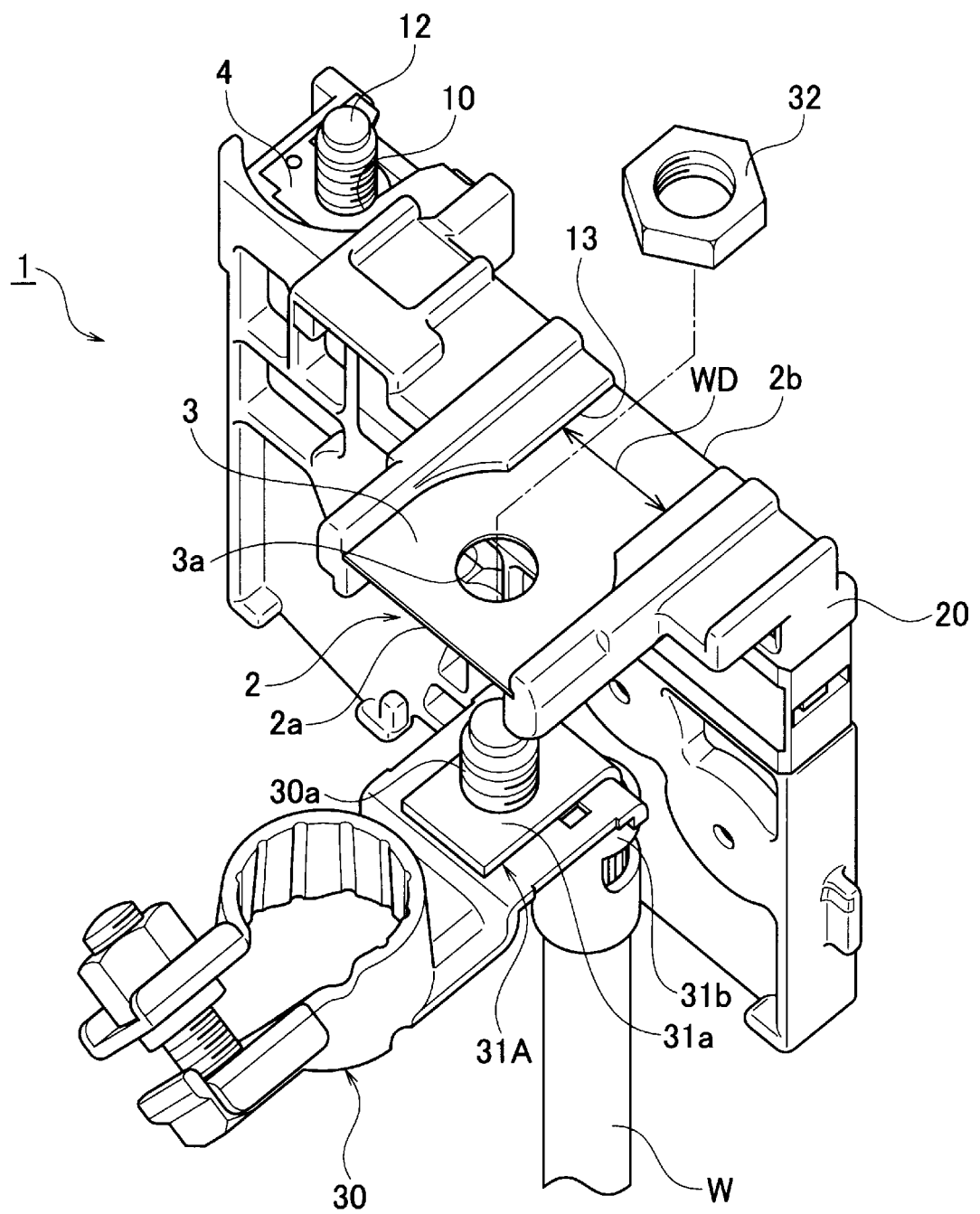
[Fig. 1]



[Fig. 2]



[Fig. 3]



[Fig. 4]

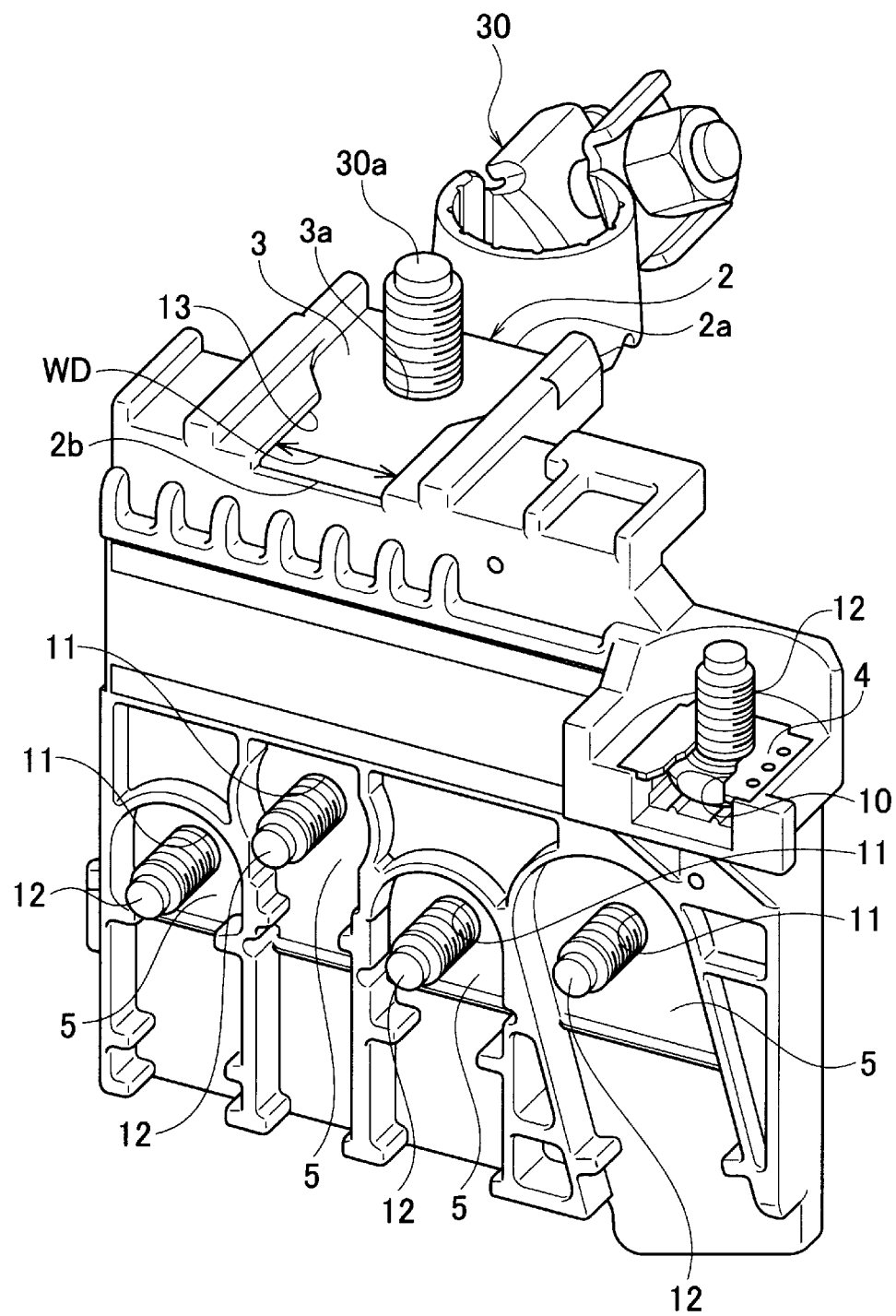


Fig. 1 is a perspective view of a mechanical assembly 10. The assembly includes a base 2 with a top plate 2a and a bottom plate 2b. A central shaft 3 is mounted on the base, with a nut 32 being tightened onto it. A lever 4 is pivoted to the base and is connected to a rod 5. The rod 5 is connected to a series of rollers 11 and 12. A spring 13 is also shown. A label 'W' points to a specific part of the assembly.

INTERNATIONAL SEARCH REPORT

International application No

PCT/JP2012/001199

A. CLASSIFICATION OF SUBJECT MATTER

INV. H01H85/044 H01H85/175 H01H85/20 H01R11/28
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H01H H01R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	WO 2011/096451 A1 (YAZAKI CORP [JP]; KIBUSHI HIDENORI; MATSUMOTO YUSUKE; MASUDA TOSHIKO) 11 August 2011 (2011-08-11) the whole document	1-4
X	----- EP 1 124 246 A2 (YAZAKI CORP [JP]) 16 August 2001 (2001-08-16) figures 3,8 paragraph [0049] paragraph [0056] paragraph [0062] - paragraph [0064]	1,2,4
X	----- US 6 576 838 B2 (MATSUMURA NORIO [JP]) 10 June 2003 (2003-06-10) paragraph [0081] - paragraph [0087] figure 6 ----- -/-	1,3,4



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No

PCT/JP2012/001199

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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