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kind of national protection available*): AE, AG, AL, AM,
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[Continued on next page]

(54) Title: POWER DISTRIBUTION UNIT WITH ANGLED CABLE EXIT

(57) Abstract: A power distribution unit (PDU) includes an elongate housing having a cable exit face disposed at an end of the elongate housing and at an oblique angle with respect to a major axis of the housing and a plurality of power outlets disposed on a face of the housing parallel to the major axis. The PDU may further include a power cable extending from the cable exit face. In some embodiments, the cable exit face may be inclined about 45 degrees with respect to the major axis.

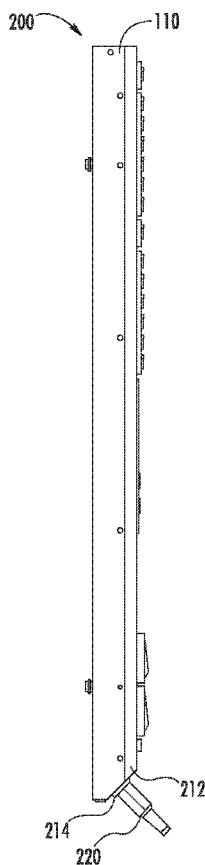


FIG. 5A





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GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

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POWER DISTRIBUTION UNIT WITH ANGLED CABLE EXIT

[0001] The inventive subject matter relates to power supply systems and, more particularly, to power distribution units.

[0002] In some applications, an equipment rack used in a data center may have a power strip type power distribution unit (PDU) mounted therein. The PDU may have a power input connected to an AC power source, which may be provided to the rack using an underfloor or overhead power distribution system. In some applications, the power input of such a PDU may be fed by an uninterruptible power supply (UPS) mounted in the same rack. Computers and other electronic equipment mounted in the rack may be plugged into power outlets of the PDU.

SUMMARY OF THE INVENTION

[0003] According to some embodiments, a power distribution unit (PDU) includes an elongate housing having a cable exit face disposed at an end of the elongate housing and at an oblique angle with respect to a major axis of the housing and a plurality of power outlets disposed on a face of the housing parallel to the major axis. The PDU may further include a power cable extending from the cable exit face. In some embodiments, the cable exit face may be inclined about 45 degrees with respect to the major axis. The PDU may include a power connector positioned at the cable exit face. For example, the power connector may include a male connector configured to mate with a female connector of a power cable.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] FIG. 1 is a front view of a power distribution unit (PDU) according to some embodiments of the inventive subject matter.

[0005] FIGs. 2A and 2B are side views of the PDU of FIG. 1.

[0006] FIGs. 3 and 4 are detailed side and front views, respectively, of the PDU of FIGs. 1, 2A and 2B.

[0007] FIGs. 5A-5C are front, right side and left side views, respectively, of a PDU according to further embodiments.

[0008] FIGs. 6A and 6B are detailed side and front views, respective of the PDU of FIGs. 5A-5C.

DETAILED DESCRIPTION

[0009] Specific exemplary embodiments of the inventive subject matter now will be described with reference to the accompanying drawings. This inventive subject matter may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the inventive subject matter to those skilled in the art. In the drawings, like numbers refer to like elements. It will be understood that when an element is referred to as being "connected" or "coupled" to another element, it can be directly connected or coupled to the other element or intervening elements may be present. As used herein the term "and/or" includes any and all combinations of one or more of the associated listed items.

[0010] The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the inventive subject matter. As used herein, the singular forms "a", "an" and "the" are intended to include the plural forms as well, unless expressly stated otherwise. It will be further understood that the terms "includes," "comprises," "including" and/or "comprising," when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

[0011] Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this inventive subject matter belongs. It will be further understood that terms, such as those defined in commonly used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the specification and the relevant art and will not be interpreted in an idealized or overly formal sense unless expressly so defined herein.

[0012] FIGs. 1, 2A-2B, 3 and 4 illustrate a power distribution unit (PDU) 100. The PDU 100 is a power strip that includes an elongate housing 110 configured to support a plurality of power outlets 120. As further shown, the PDU 100 may also include an electronics unit 130, which may include, for example, a display 132 and communications outlets 134. Power is provide to the PDU 100 via a power cable 152, which may have a power connector 152 attached thereto. The power cable 150 enters the housing 110 proximate an end thereof through an angled housing face 112. As shown, the housing 110

may be constructed from sheet metal and the power cable 150 may enter the housing 110 via a bushing 140 mounted at the angle face 112.

[0013] The angled face 112 may be oriented at an angle of, for example, 45 degrees with respect to a direction x of a major axis of the housing, which can provide a more useful bend range for the cable 150 in comparison to conventional PDUs that have front or end cable exit points. As shown in FIGs. 2A and 2B, this orientation allows the power cable 150 to extend parallel to or perpendicular to the axis x without undue strain on the cable 150 and without requiring a complex pivoting mechanism. Thus, the PDU 100 can be effectively used, for example, in raised floor applications in which the cable 150 may be oriented as shown in FIG. 2B or overhead installations in which the orientation shown in FIG. 2A may be desired. FIGs. 3 and 4 provided detailed views of the angle cable exit.

[0014] According to further embodiments, an angled cable exit may be implemented using a connector structure provided at an angle cable exit face of a PDU. FIGs. 5A-5C illustrate a PDU having an elongate housing 110 with outlets 120 along the lines described above. An angled cable exit face 212 is provided at an end of the housing 110. A recessed male plug 214 is mounted at the cable exit face 212 and is configured to mate with a female socket cable connector 214. FIGs. 6A and 6B provide details of the angled cable exit.

[0015] In the drawings and specification, there have been disclosed exemplary embodiments of the inventive subject matter. Although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the inventive subject matter being defined by the following claims.

That which is claimed is:

1. A power distribution unit (PDU) comprising:
an elongate housing having a cable exit face disposed at an end of the elongate housing and at an oblique angle with respect to a major axis of the housing; and
a plurality of power outlets disposed on a face of the housing parallel to the major axis.
2. The PDU of claim 1, further comprising a power cable extending from the cable exit face.
3. The PDU of claim 2, wherein the power cable is flexible.
4. The PDU of claim 2, further comprising a plug at a distal end of the power cable.
5. The PDU of claim 2, further comprising a bushing mounted at the cable exit face and wherein the power cable exits the housing through the bushing.
6. The PDU of claim 1, wherein the cable exit face is inclined about 45 degrees with respect to the major axis.
7. The PDU of claim 1, further comprising a power connector positioned at the cable exit face.
8. The PDU of claim 7, wherein the power connector comprises a male connector configured to mate with a female connector of a power cable.
9. A power strip having a cable exit face at an end thereof that is inclined at an oblique angle with respect to a major axis of the power strip and a flexible power cable extending from the cable exit face.
10. The power strip of claim 9, wherein the cable exit face is inclined about 45 degrees with respect to the major axis.

11. The power strip of claim 9, further comprising a power connector positioned at the cable exit face.

12. The power strip of claim 11, wherein the power connector comprises a male connector configured to mate with a female connector of a power cable.

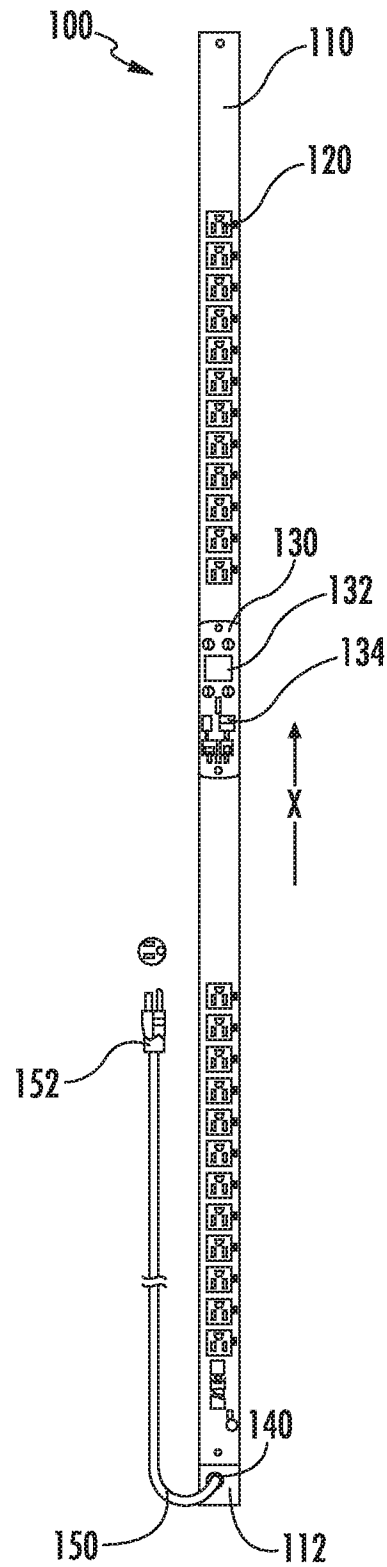
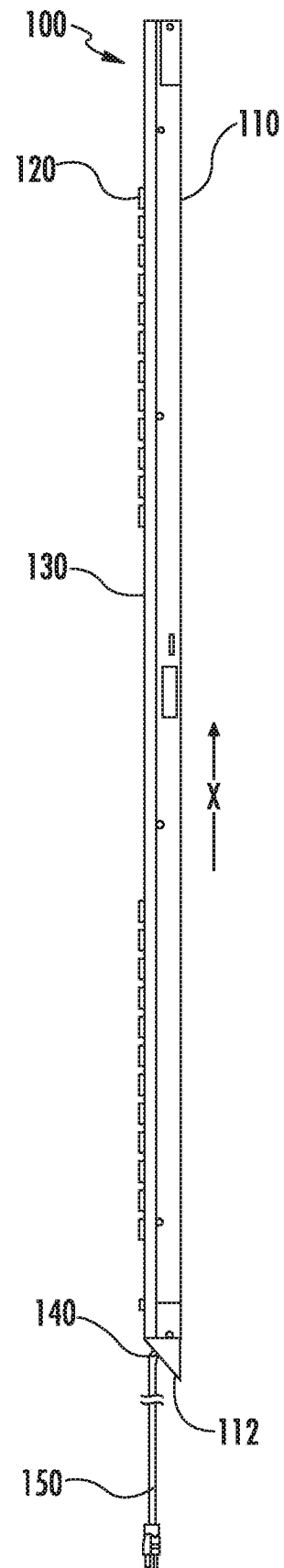
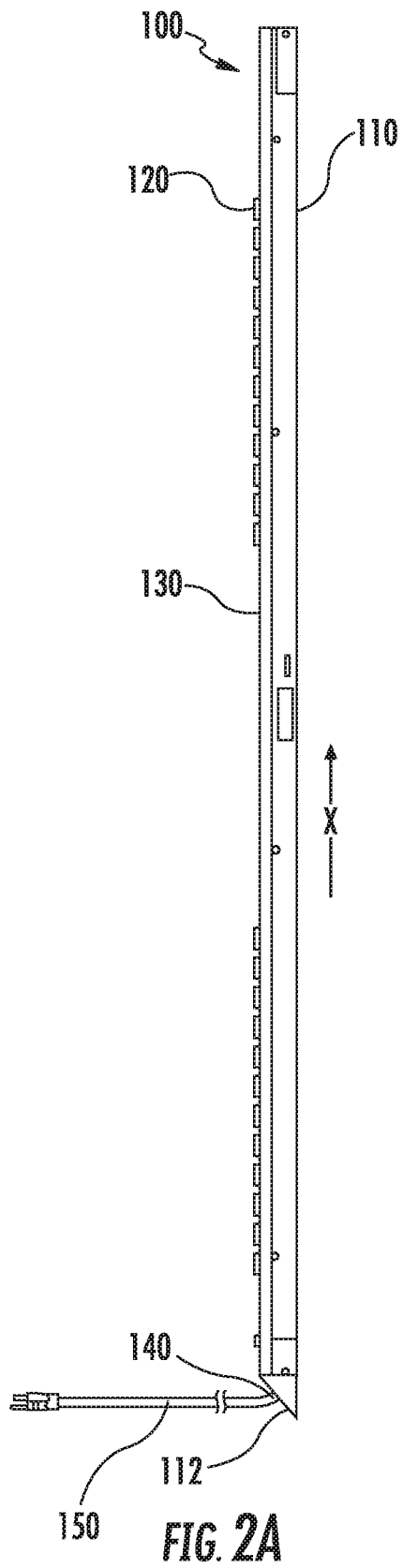


FIG. 1



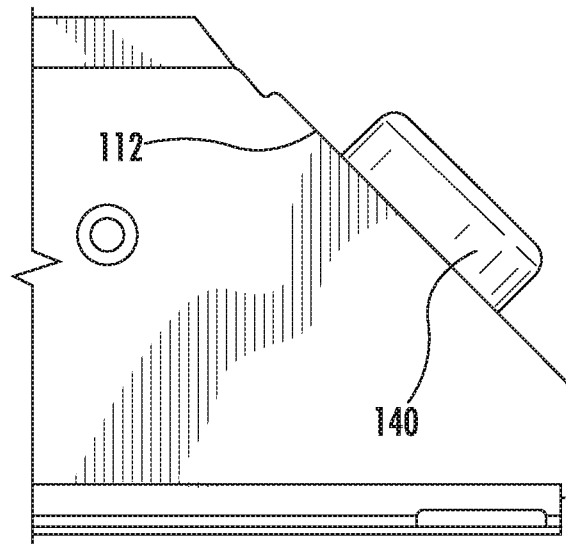


FIG. 3

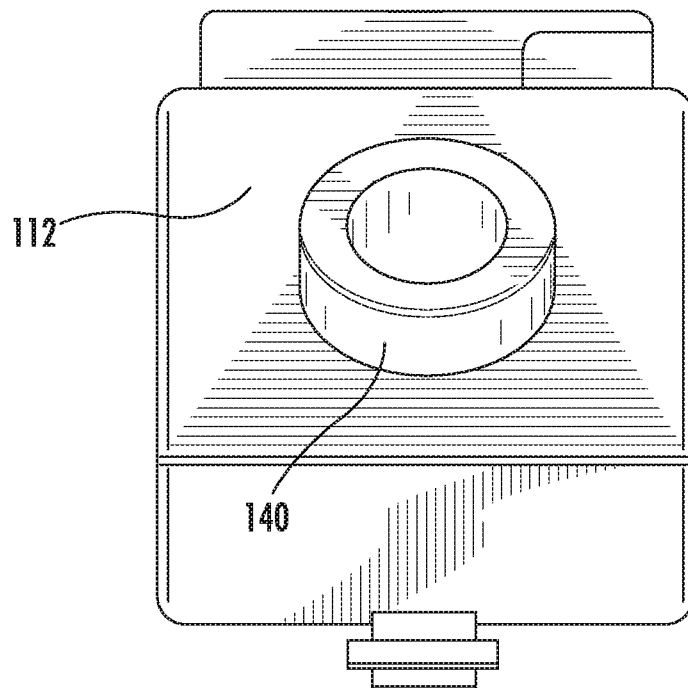


FIG. 4

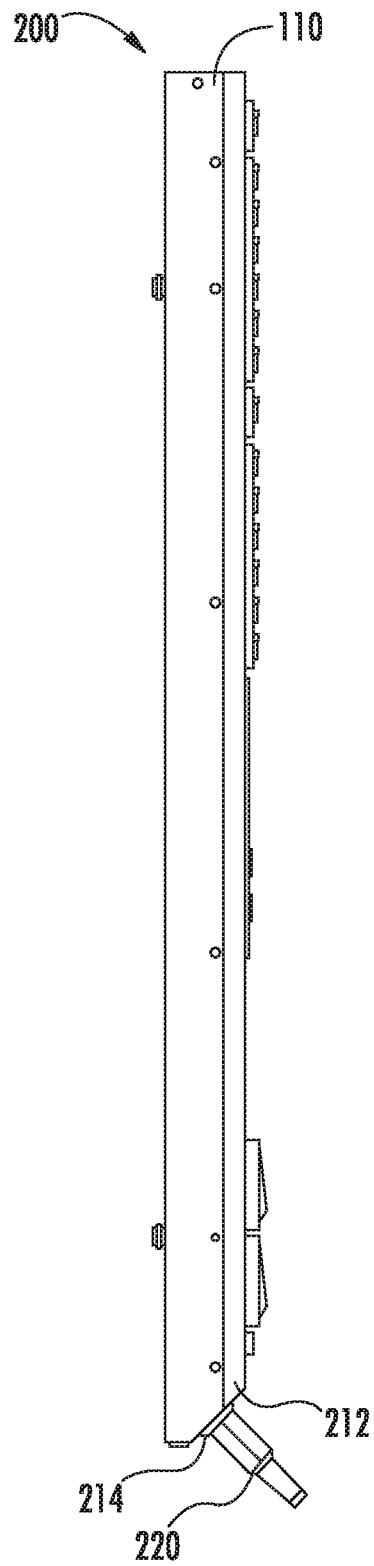


FIG. 5A

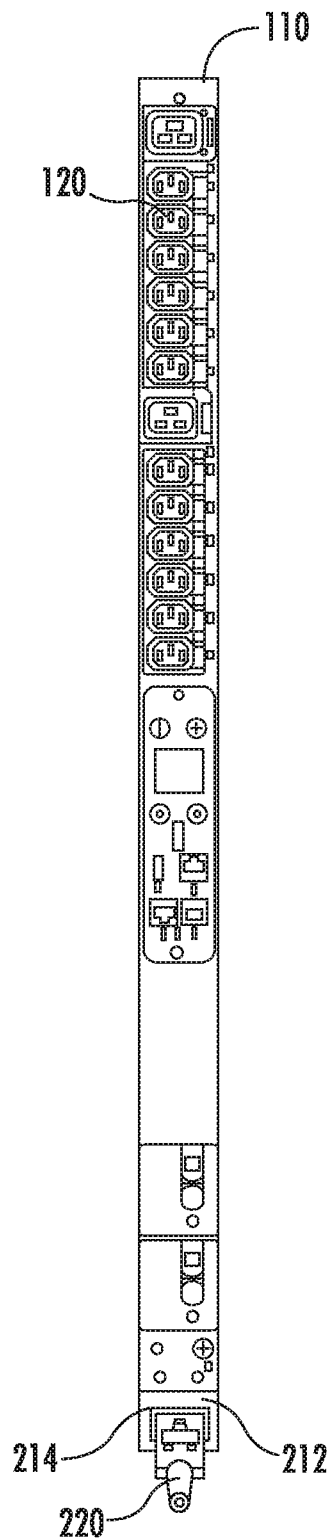


FIG. 5B

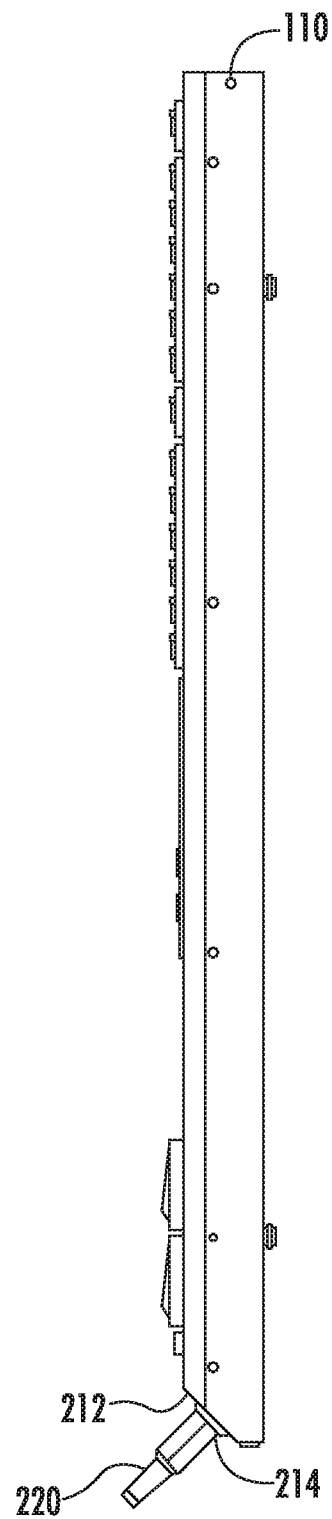


FIG. 5C

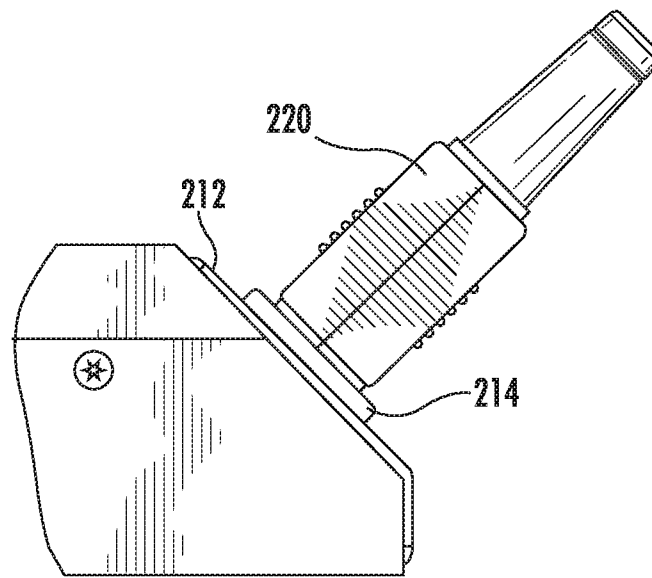


FIG. 6A

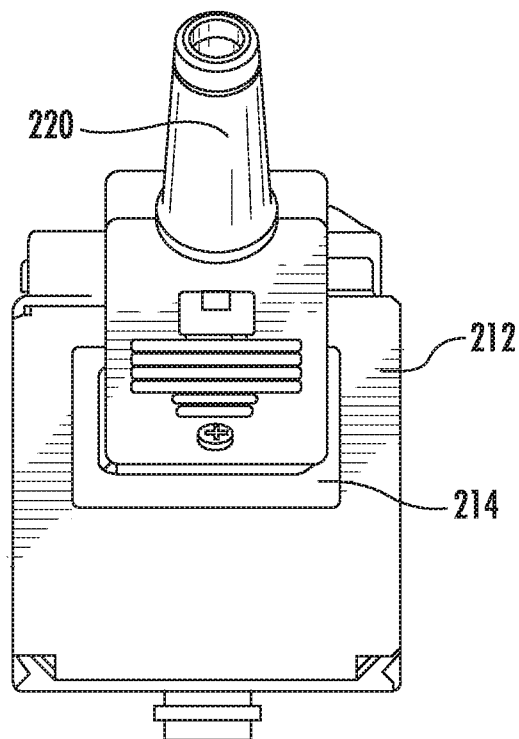


FIG. 6B

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2015/066302

A. CLASSIFICATION OF SUBJECT MATTER

INV. H01R25/00 H05K7/14
ADD. H01R9/24 H01R13/58 H01R13/66

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)

H01R H05K

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)

EP0-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	EP 2 806 717 A1 (KNÜRR GMBH [DE]) 26 November 2014 (2014-11-26) figures 1-10 -----	1-12
X	WO 2014/018901 A2 (SERVER TECH INC [US]; IRONS TRAVIS [US]; RAMSEY MARK [US]; CONNOLLY CH) 30 January 2014 (2014-01-30) figures 1-9 -----	1-12
X	WO 2004/107509 A1 (DESIGN RES AND DEV CORP [US]) 9 December 2004 (2004-12-09) figure 13 -----	1-12
A	US 6 476 729 B1 (LIU DANIEL [TW]) 5 November 2002 (2002-11-05) figure 3 -----	1-12

☐ 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

1 March 2016

Date of mailing of the international search report

10/03/2016

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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