



- (51) **International Patent Classification:**
H01R 33/76 (2006.01) *H01R 13/717* (2006.01)
H01R 33/945 (2006.01)
- (21) **International Application Number:**
PCT/US2012/038936
- (22) **International Filing Date:**
22 May 2012 (22.05.2012)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
13/113,381 23 May 2011 (23.05.2011) US
- (71) **Applicant (for all designated States except US):** **EATON CORPORATION** [US/US]; Eaton Center, 1111 Superior Avenue, Cleveland, OH 44114 (US).
- (72) **Inventors; and**
- (75) **Inventors/Applicants (for US only):** **LEE, Davin, Robert** [US/US]; 1322 Heritage Court, Watertown, WI 53098 (US). **PEREZ, Miguel, Angel** [US/US]; Estancias De Borinquen #57, Manati, PR 00674 (US).
- (74) **Agent:** **HINTON, Jennifer, Nock**; Kraguljac Law Group, LLC, 4700 Rockside Road, Summit One-Suite 510, Independence, OH 44131 (US).
- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) **Designated States (unless otherwise indicated, for every kind of regional protection available):** ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, 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, ML, MR, NE, SN, TD, TG).
- Declarations under Rule 4.17:**
- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
 - as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

[Continued on next page]

(54) **Title:** LEADED COMPONENT SOCKET WITH GUIDE

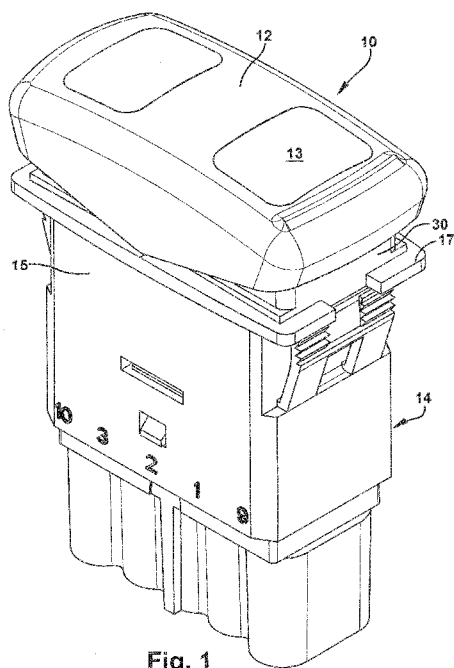


Fig. 1

(57) **Abstract:** A leaded device socket (110) includes a lead guide (120) that contacts and urges the leads (160) on an electrical component (40) into the correct position in the device when the component is pressed into the socket (110). The leaded device socket (110) may also include a receiver (115) for retaining a functional portion (160) of the electrical component in a predetermined position in the circuit. The lead guide (120) and receiver (115) may both be integrally molded with the socket (110).



Published:

— *with international search report (Art. 21(3))*

— *with amended claims (Art. 19(1))*

LEADED COMPONENT SOCKET WITH GUIDE

BACKGROUND

Standard electrical components are typically provided with leads with which they can be electrically connected in a circuit. The leads may be soldered or crimped to wires or traces to install the component in a circuit. As circuits are made smaller, space for installation of components is limited. This may require separate mounting components or additional manufacturing operations to manipulate the leads for connection in a crowded circuit. To shrink the amount of space required for installing a component, a component's leads may be customized for a particular circuit. Another space-saving technique is to use crimped connections instead of soldered connections. Of course, customized leads and crimp connectors multiply part numbers and increase component cost.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate various systems, methods, and other embodiments of the disclosure. It will be appreciated that the illustrated element boundaries (e.g., boxes, groups of boxes, or other shapes) in the figures represent one example of the boundaries. One of ordinary skill in the art will appreciate that in some examples one element may be designed as multiple elements or that multiple elements may be designed as one element. In some examples, an element shown as an internal component of another element may be implemented as an external component and vice versa. Furthermore, elements may not be drawn to scale.

Figure 1 is a perspective view of a rocker switch that includes a leaded component socket constructed in accordance with one embodiment of the present invention.

Figure 1A is an exploded view of the rocker switch of Figure 1.

5 Figure 2 is a perspective view of a leaded component socket constructed in accordance with one embodiment of the present invention.

Figure 3 is a perspective view of the leaded component socket of Figure 2 during installation of an LED.

10 Figure 4 is a cross section view of the leaded component socket of Figure 3.

Figure 5 is a perspective view of the leaded component socket of Figure 2A with the LED installed.

DETAILED DESCRIPTION

15 The leaded component socket and assembly methods described herein provide a low cost way to assemble, mount, and electrically connect an electrical component in a device. By way of example, a leaded LED used for lighting in a rocker switch is connected by its leads to terminals or other electrical components in the switch. Using state-of-the-art techniques, if the LED has a
20 standard configuration with straight leads, the leads are manually formed and positioned during assembly. In some instances, the LED is purchased with preformed leads specifically designed to contact the terminals when the LED is installed. Often a separate component is used to retain the LED and its leads in the correct position within the device.

The leaded component socket described herein includes lead guides that contact and urge standard configuration leads on an electrical component (e.g., an LED) into the correct position within a device when the component is pressed into the socket. This eliminates the need for specially shaped leads. In some embodiments, the leaded device socket also includes a receiver for retaining the LED in the correct position in the device. Thus, a separate retaining component may not be necessary. The receiver may also include integral features for supporting an o-ring used to seal around the leaded electrical component. In some embodiments, the lead guides and receiver are integrally molded with the socket.

Figure 1 illustrates a rocker switch 10 that contains a leaded component socket in constructed in accordance with one embodiment of the present invention. The rocker switch 10 includes a user-actuable rocker 12 that is moveable relative to a switch body 15 to select functions in a vehicle. As will be described in more detail below, one or more LEDs may be housed within the rocker switch 10 to enhance the visibility of the rocker 12 and in some cases to illuminate feature descriptors imprinted on the rocker 12. For example, the rocker may include one or more translucent panels 13 that are illuminated by an LED.

Figure 1A is an exploded view of the rocker switch 10. The main components of the switch 10 include the rocker 12, the switch body 15, a socket assembly, and a plug portion 18. The socket assembly 30 serves as mechanical mounting point for two LEDs 40 and also includes electrical connections between the rocker switch and a plurality of electrical terminals 20. The electrical terminals 20 are pressed into the plug portion 18, where a mating electrical

connector (not shown) is used to electrically connect the rocker switch 10 to a wiring harness.

The socket assembly 30 is housed within the switch body 15. The switch body 15 includes features that allow the rocker switch 10 to be mounted in a vehicle trim panel. The switch frame 15 also includes a face portion 17 that supports the rocker 12 and includes two LED locator features 16. The LED locator features 16 are sized to closely surround the LED 40 and also to squeeze an o-ring 45 between an underside of each locator feature 16 and an o-ring rim 31 on the socket assembly. This helps keep moisture out of the socket assembly 30, where it may corrode electrical connections. In some embodiments, the o-ring may not be used, however, the same socket assembly 30 can be used in either case.

Figure 2 illustrates, in more detail, the example embodiment of a socket assembly 30 shown in Figure 1. The socket assembly 30 includes a molded socket base 100 that includes two sockets 110, each of which serves as a mounting point for an LED 40. Each socket 110 includes a receiver 115 and two lead guides 120, one for each lead 163 of the LED 40. The receiver 115 is generally cup shaped to receive a functional portion 160 of the LED and to retain the functional portion 160 in place within the rocker switch. The receiver includes an o-ring rim 31 to support an o-ring 45 (Figure 1B) installed to seal around the functional portion 160.

The lead guide 120 includes a channel 125 that defines a curvilinear path between the receiver 115 and a connection point 130. The connection point 130 defines generally where an end of an LED lead 163a will be positioned when the LED is installed in the socket 110. The socket base 100 includes a crimp terminal mounting slot 135 into which a lamp terminal 28 is pressed. The lamp

terminal 28 includes a blade portion 282 sized to pass through the mounting slot 135 and a tapered end 286 to facilitate insertion. The lamp terminal 28 is retained within the mounting slot 135 with barbs 287 that provide frictional engagement with the slot. A crimp connector 284 is located at a head of the lamp terminal. When the lamp terminal 28 is installed in the socket base 100, the crimp connector is positioned at the connection point 130. As can be seen from Figure 2, the receiver 115 and lead guides 120 can be integrally molded as part of the socket base 110, reducing part complexity and cost.

Figure 3 illustrates the LED 40 partially installed in the socket 110. During installation, the LED 40 is pushed "down" in the direction indicated by the arrow. Ends 163a of the leads 163 have been inserted in the receiver 115. The slots 111 lead to a channel 125 that serves as the lead guide 120. The channel 125 is sized to loosely enclose the lead 163 and defines a curvilinear, downward sloping deformation path for the lead. The deformation path can be considered to be "obtuse", because it curves gently, without acute angles. This gentle curving facilitates sliding of the lead 163 within the channel 125 and tends to prevent the end 163a from lodging in the channel 125 during insertion. Downward motion of the LED 40 causes the lead 163 to contact the channel and deform to fit the channel 125.

While two channels 125 are shown per socket 110, any number of channels 125 can be used to correspond to the number of leads on an electrical component. Modifications to the configuration of the channel 125 may be made to define a deformation path that suits a particular device configuration. Figure 4 is a cross section of the socket 110 with the LED partially installed as shown in Figure 3. The leads 163 rest within the channels 125 and are being deformed by

the channels so that the ends will be positioned with the crimp connectors 284 (Figure 5).

Figure 5 illustrates the LED 40 fully installed in the socket 110. The functional portion 160 is seated in the receiver 115 in the final assembled position. The lead ends 163a are positioned at the connection point within the crimp connectors 284 so that a simple crimping operation will electrically connect the LED 40 to the lamp terminal 28. As can be seen from the foregoing description, the socket 110 with integral lead guides 120 allows easy installation and connection of an LED (or other electrical component). The leads 163 of the LED can be routed to a connection point 130 without manual manipulation, facilitating assembly. The socket 110 includes both lead routing features and retention for the LED, reducing part numbers. The rim 31 can support an o-ring, if one is installed, without modification to the socket 110.

References to "one embodiment", "an embodiment", "one example", "an example", and so on, indicate that the embodiment(s) or example(s) so described may include a particular feature, structure, characteristic, property, element, or limitation, but that not every embodiment or example necessarily includes that particular feature, structure, characteristic, property, element or limitation. Furthermore, repeated use of the phrase "in one embodiment" does not necessarily refer to the same embodiment, though it may.

While example systems, methods, and so on have been illustrated by describing examples, and while the examples have been described in considerable detail, it is not the intention of the applicants to restrict or in any way limit the scope of the appended claims to such detail. It is, of course, not possible to describe every conceivable combination of components or methodologies for purposes of describing the systems, methods, and so on

described herein. Therefore, the disclosure is not limited to the specific details, the representative apparatus, and illustrative examples shown and described. Thus, this application is intended to embrace alterations, modifications, and variations that fall within the scope of the appended claims.

- 5 To the extent that the term “includes” or “including” is employed in the detailed description or the claims, it is intended to be inclusive in a manner similar to the term “comprising” as that term is interpreted when employed as a transitional word in a claim.

CLAIMS

We claim:

1. An electrical component socket (110) for mounting an electrical component (40) in a circuit, wherein the electrical component includes a functional portion electrically connected to at least one lead (163), the socket (110) comprising:

a receiver (115) configured to support the functional portion in a predetermined position within the circuit;

at least one lead guide (120) that defines a deformation path for the at least one lead; and

wherein upon insertion of the electrical component into the socket (110) the lead guide (120) contacts the lead and urges the lead to a connection point (130) at which the electrical component is electrically connected to the circuit.

2. The electrical component socket (110) of claim 1 wherein the connection point (130) is in proximity to a crimp connector (284).

3. The electrical component socket of claim 1 wherein the lead guide (120) comprises a channel (125) configured to partially surround the lead (163), the lead guide (120) further comprising a guide surface that contacts the lead (163).

4. The electrical component socket (110) of claim 1 wherein the deformation path (125) is curvilinear and slopes downward from the receiver.

5. The electrical component socket (110) of claim 4 wherein when the lead (163) is installed in the lead guide, the lead (163) is curved without acute angles.

6. The electrical component socket (110) of claim 1 wherein the receiver (115) comprises a generally circular planar (16) surface configured to support an underside of an LED, the base further comprising an o-ring groove in the circular planar surface configured to retain an o-ring (45) to seal around the LED (40).

7. The electrical component socket of claim 1 wherein the receiver (115) and lead guide (120) are integrally molded with the socket (110).

8. The electrical component socket (110) of claim 1 wherein:

the receiver (115) comprises means for supporting the functional portion in the predetermined position within the circuit; and

the at least one lead guide (120) comprises means for contacting and urging the lead to the connection point.

9. An apparatus comprising:

a molded socket (110) configured to retain an electrical component (40) in a desired position in a device;

a receiver (115) integrally molded with the socket (110), the receiver (115) shaped to closely hold a functional portion of the electrical component (40) to retain the functional component (160) in a predetermined final position in the device; and

at least one guide channel (125) integrally molded with the socket (110), the at least one guide channel (125) defining an obtuse curvilinear deformation path from the receiver (115) to a connection point; the at least one guide channel (125) configured to urge, by contact, a lead of the electrical component (160) along the lead deformation path to the connection point (130) when the electrical component is installed in the socket (110).

10. The apparatus of claim 9 wherein the receiver (115) comprises an o-ring mounting feature (31) integrally molded with the socket (110) configured to contact the o-ring (45) to position the o-ring in a sealing position with respect to the functional portion (160).

11. The apparatus of claim 9 wherein the at least one lead guide (125) channel is configured to partially surround a lead, the lead guide channel further comprising a guide surface that contacts the lead.

12. The apparatus of claim 9 wherein the receiver (115) comprises a generally circular planar surface configured to support an underside of an LED (40), the socket (110) further comprising an o-ring groove (31) in the circular planar surface configured to retain an o-ring (45) to seal around the LED (40).

AMENDED CLAIMS
received by the International Bureau on
17 October 2012 (17.10.12)

CLAIMS

We claim:

1. An electrical component socket (110) for mounting an electrical component (40) in a circuit, wherein the electrical component includes a functional portion electrically connected to at least one lead (163), the socket (110) comprising:

a receiver (115) configured to support the functional portion in a predetermined position within the circuit;

at least one lead guide (120) that defines a deformation path for the at least one lead, where a first end of the at least one lead (120) guide is proximate to the receiver (115);

a terminal mounting slot (135) disposed at a second end of the at least one lead guide (120) and configured to retain a terminal configured to connect the electrical component to the circuit; and

wherein upon insertion of the electrical component into the electrical component socket (110) the lead guide (120) contacts the lead and urges the lead proximate to the terminal mounting slot (135).

2. The electrical component socket (110) of claim 1 wherein the terminal mounting slot (135) is configured to retain a crimp connector (284).

3. The electrical component socket of claim 1 wherein the lead guide (120) comprises a channel (125) configured to partially surround the lead (163), the lead guide (120) further comprising a guide surface that contacts the lead (163).

4. The electrical component socket (110) of claim 1 wherein the deformation path (125) is curvilinear and slopes downward from the receiver.

5. The electrical component socket (110) of claim 4 wherein when the lead (163) is installed in the lead guide, the lead (163) is curved without acute angles.

6. The electrical component socket (110) of claim 1 wherein the receiver (115) comprises a generally circular planar (16) surface configured to support an underside of an LED, the receiver further comprising an o-ring groove in the circular planar surface configured to retain an o-ring (45) to seal around the LED (40).

7. The electrical component socket of claim 1 wherein the receiver (115) and lead guide (120) are integrally molded with the socket (110).

8. The electrical component socket (110) of claim 1 wherein:

the receiver (115) comprises means for supporting the functional portion in the predetermined position within the circuit; and

the at least one lead guide (120) comprises means for contacting and urging the lead to the connection point.

9. An apparatus comprising:

a molded socket (110) configured to retain an electrical component (40) in a desired position in a device;

a receiver (115) integrally molded with the socket (110), the receiver (115) shaped to closely hold a functional portion of the electrical component (40) to retain the functional component (160) in a predetermined final position in the device; and

at least one guide channel (125) integrally molded with the socket (110), the at least one guide channel (125) defining an obtuse curvilinear deformation path from the receiver (115) to a connection point; the at least one guide channel (125) configured to urge, by contact, a lead of the electrical component (160) along the lead deformation path to the connection point (130) when the electrical component is installed in the socket (110).

10. The apparatus of claim 9 wherein the receiver (115) comprises an o-ring mounting feature (31) integrally molded with the socket (110) configured to contact the o-ring (45) to position the o-ring in a sealing position with respect to the functional portion (160).

11. The apparatus of claim 9 wherein the at least one lead guide (125) channel is configured to partially surround a lead, the lead guide channel further comprising a guide surface that contacts the lead.

12. The apparatus of claim 9 wherein the receiver (115) comprises a generally circular planar surface configured to support an underside of an LED (40), the receiver (115) further comprising an o-ring groove (31) in the circular planar surface configured to retain an o-ring (45) to seal around the LED (40).

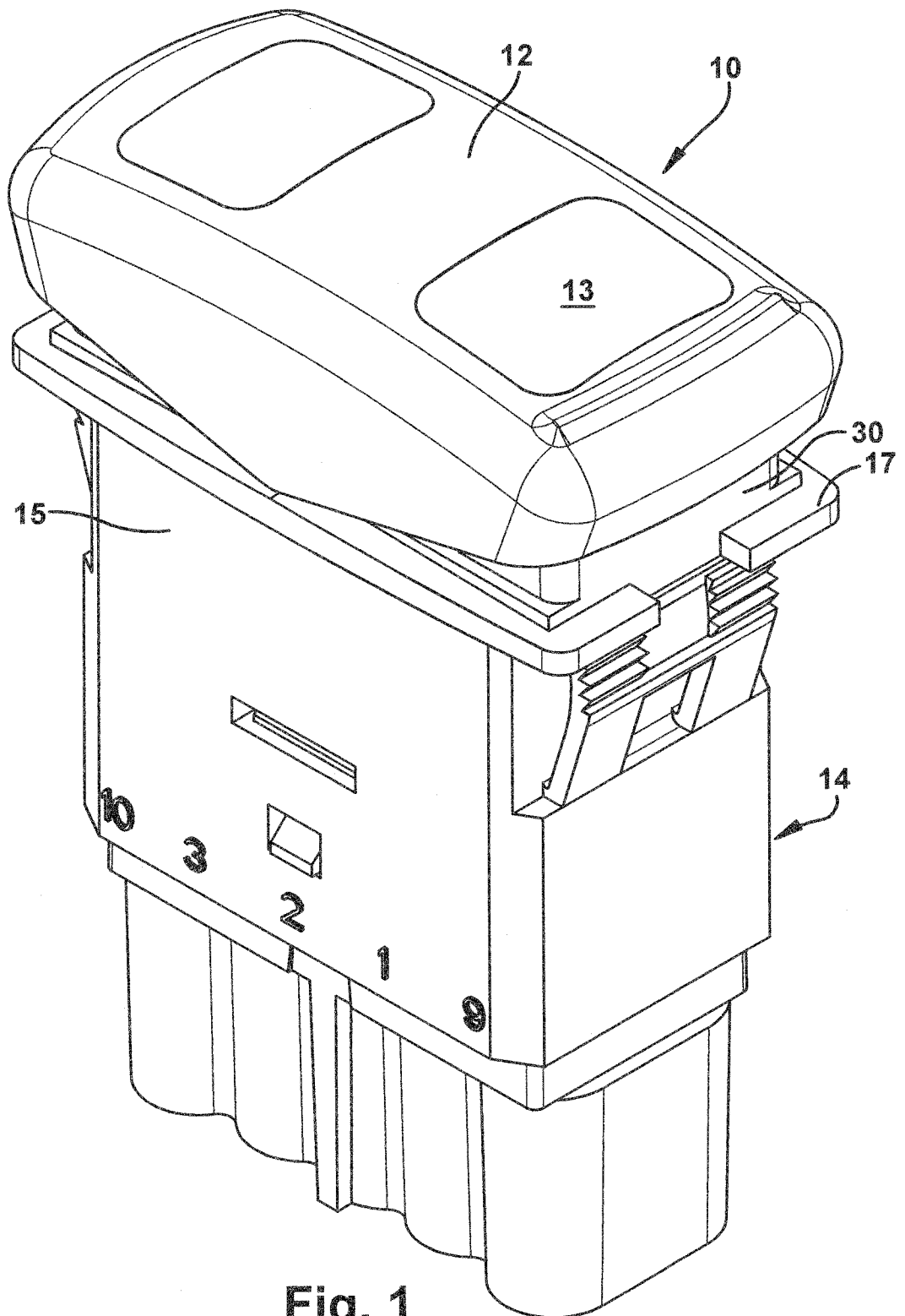


Fig. 1

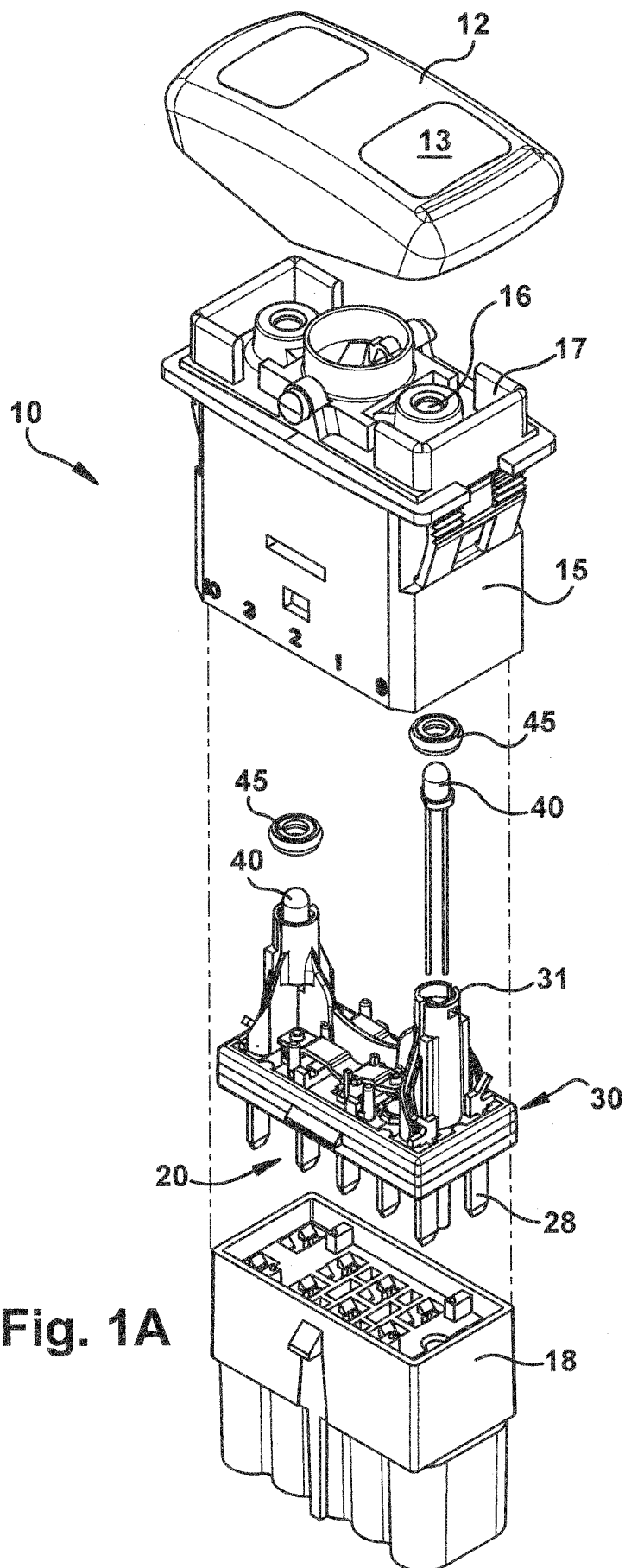


Fig. 1A

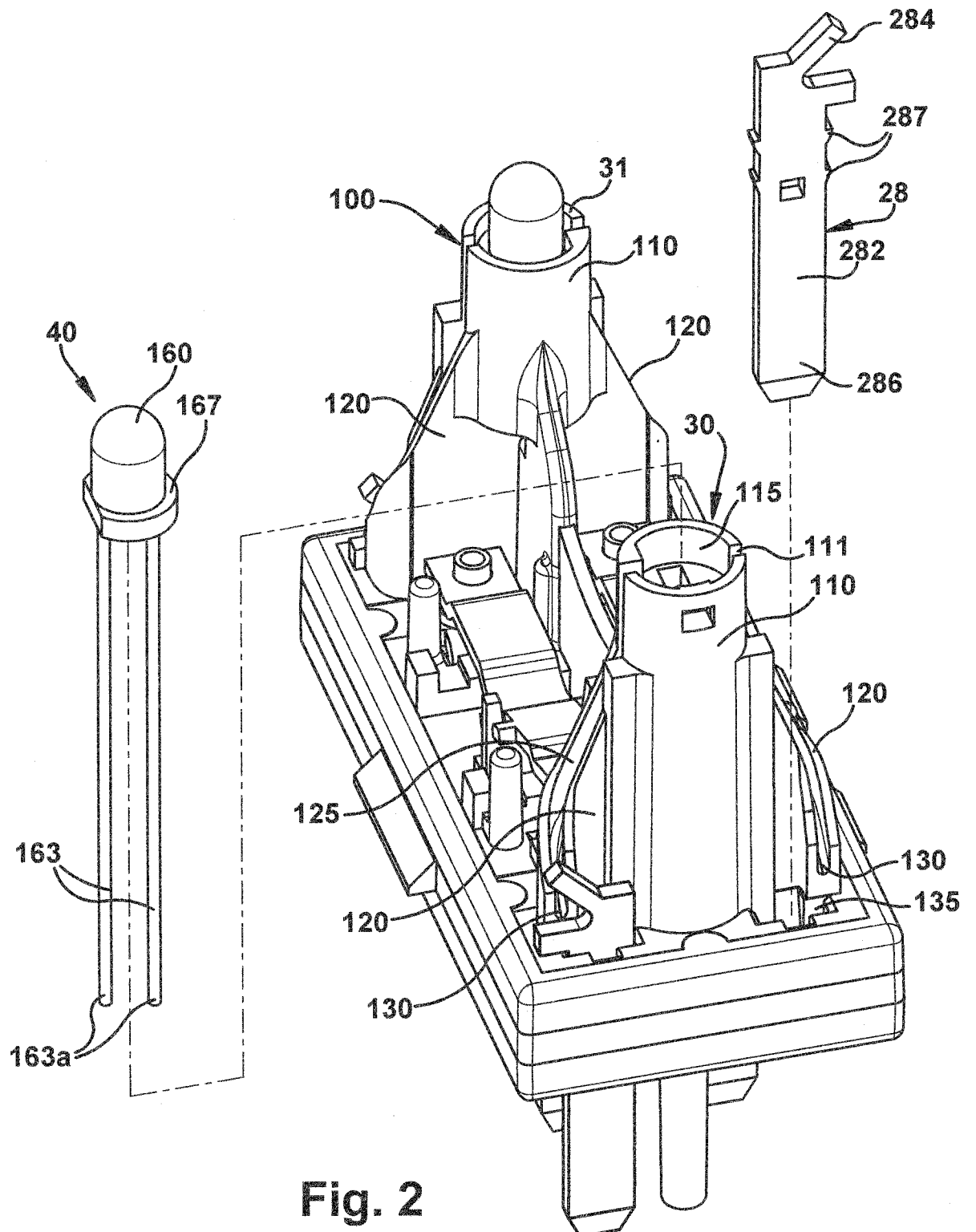


Fig. 2

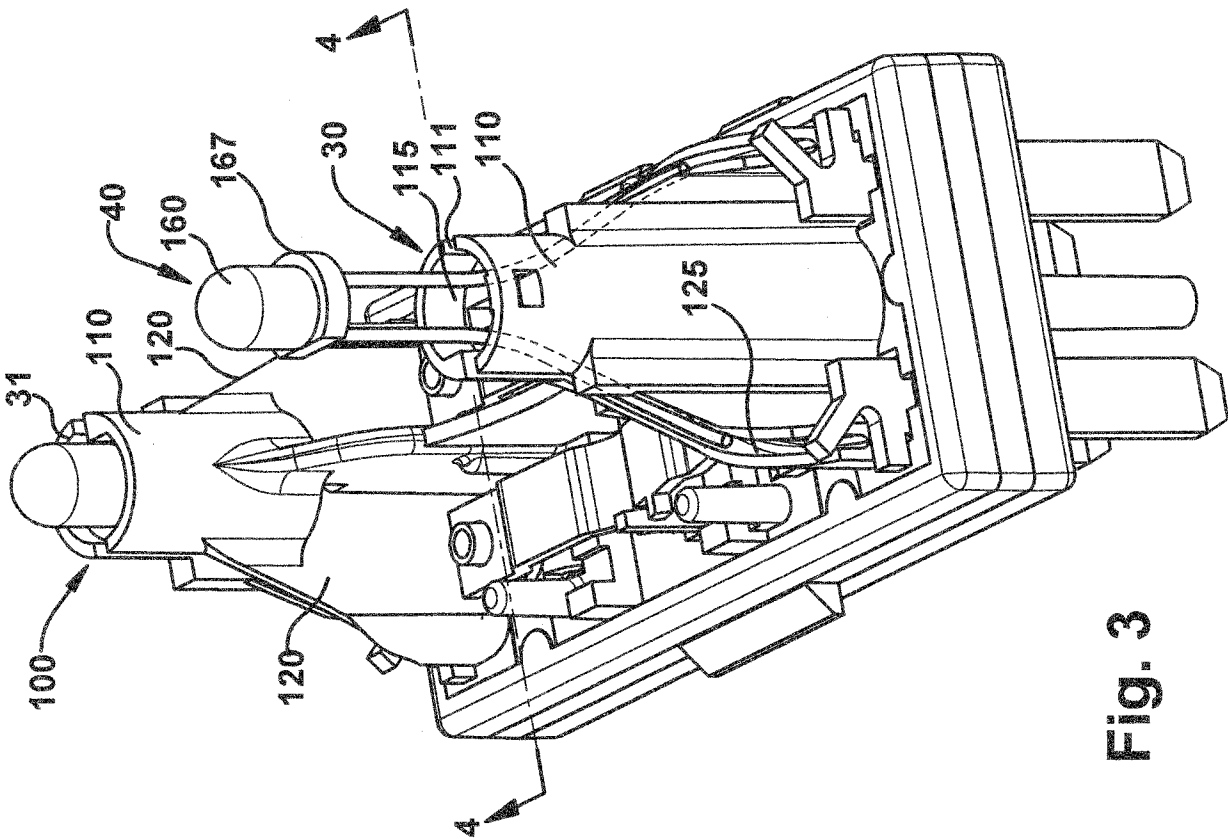


Fig. 3

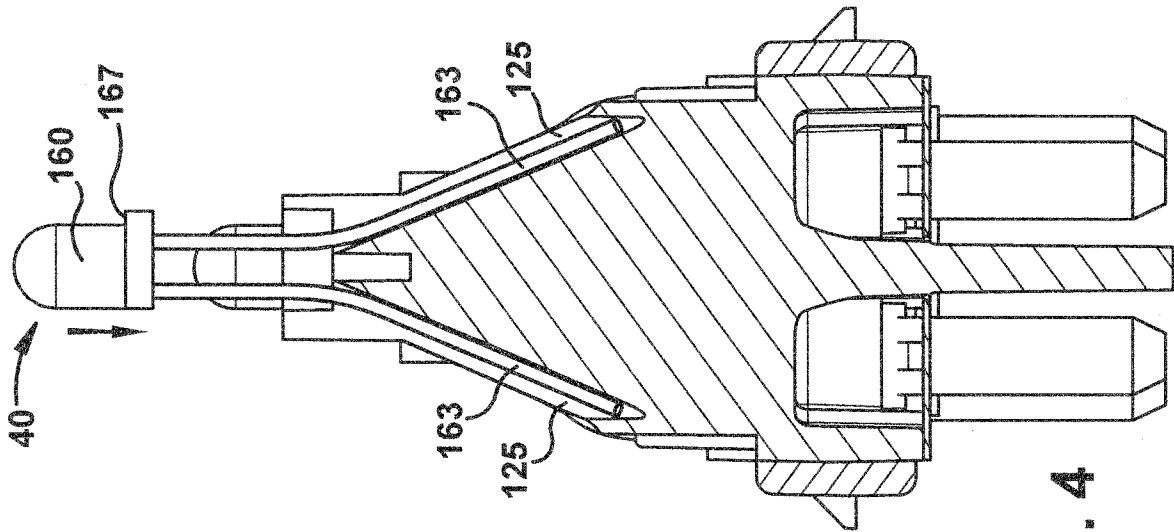


Fig. 4

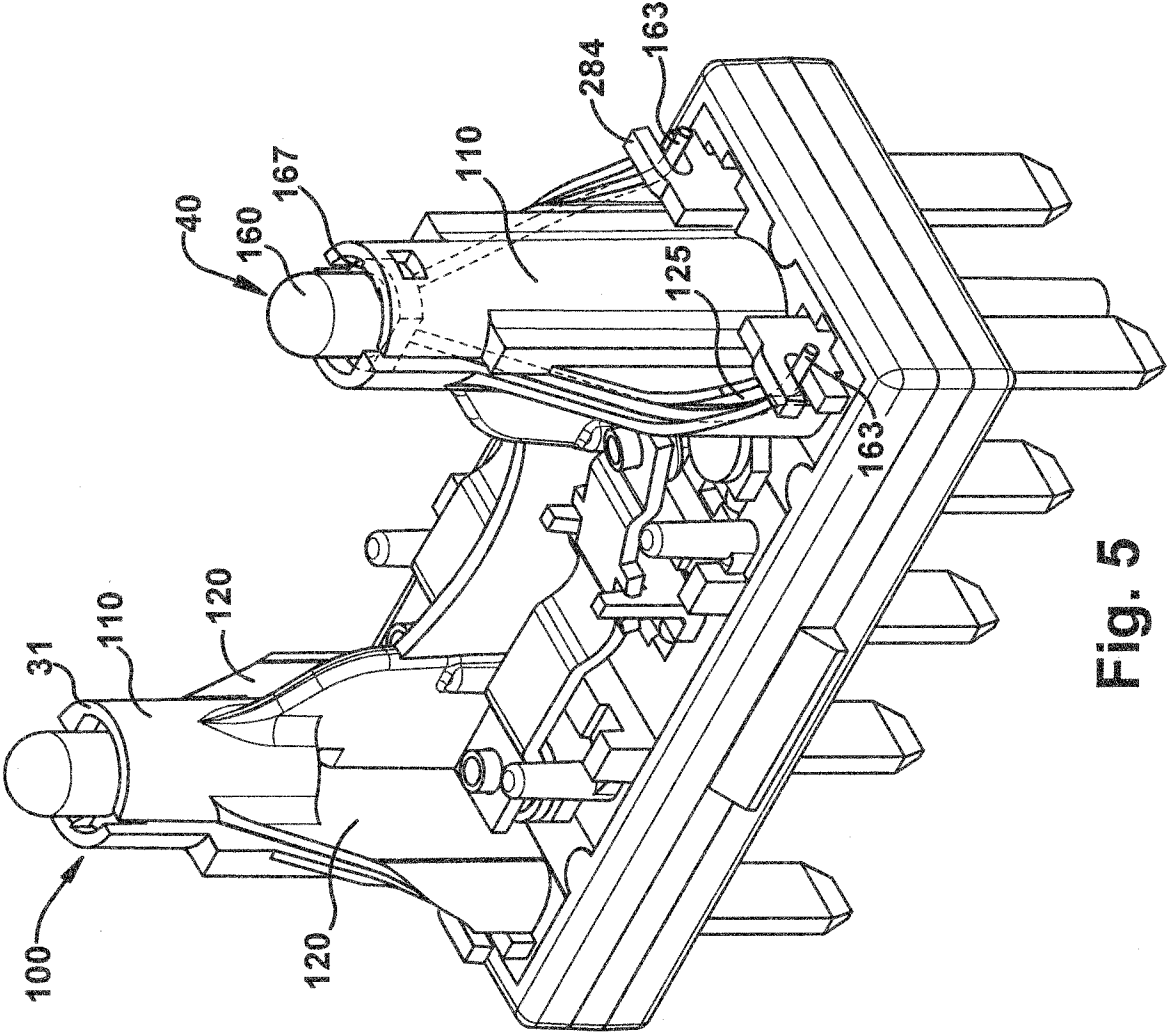


Fig. 5

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/038936

A. CLASSIFICATION OF SUBJECT MATTER

INV. H01R33/76 H01R33/945 H01R13/717
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)

H01R H01H 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)

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 A	US 2010/067242 A1 (FUNG RONALD KING YIU [HK]) 18 March 2010 (2010-03-18) paragraph [0013] paragraph [0036] figures 1,6,7 -----	1,3,4, 6-10,12 2,5,11
X	US 6 409 530 B1 (ZHAO QIJUN [CN] ET AL) 25 June 2002 (2002-06-25) the whole document -----	1,3-5, 7-9,11
X	US 2009/080195 A1 (HUANG KUO-HAO [TW]) 26 March 2009 (2009-03-26) figures 1,2 -----	1,3-5, 7-9,11
X	US 5 605 395 A (PENG JUEI-TANG [TW]) 25 February 1997 (1997-02-25) figure 3 ----- -/-	1,2



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

9 August 2012

Date of mailing of the international search report

20/08/2012

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Salojärvi, Kristiina

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/038936

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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A	figures 2,5 -----	2-12
A	FR 2 838 811 A3 (SHINING BLICK ENTERPRISES CO [TW]) 24 October 2003 (2003-10-24) figure 2 -----	6,10
A	US 2010/258418 A1 (YU TSUNG MOU [TW]) 14 October 2010 (2010-10-14) the whole document -----	1-12

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2012/038936

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