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(54) Title: BUCKLE BENDER TOOL

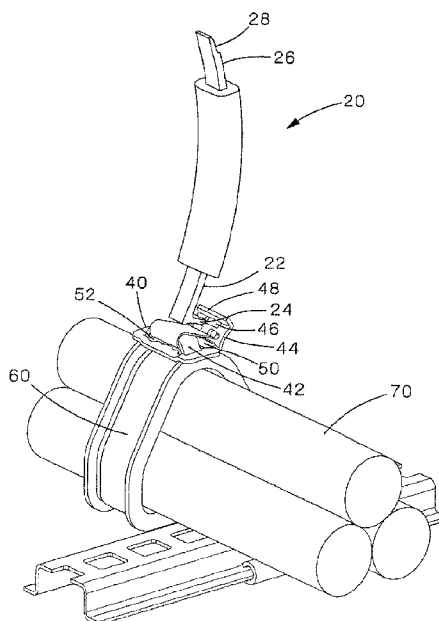


FIG. 1

(57) Abstract: The present invention is directed to a buckle bender tool that secures a strap in a metal buckle. The buckle bender tool has a main body with a first end and a second end. The tool has a bent edge at a distal end of the first end of the main body. The bent edge forms an acute angle with respect to the main body of the tool. The tool has straight edge at a distal end of the second end of the main body. The buckle bender tool positions a cut-off strap end within a buckle and deforms the buckle to secure the strap therein.



BUCKLE BENDER TOOL

Field of the Invention

[0001] The present invention relates to a tool for installing a buckle, and more particularly to a tool for closing a metal buckle and securing a strap within the metal buckle.

Background of the Invention

[0002] Metal buckles, as opposed to buckles made of other material, such as plastic, are characterized by desirable properties, such as high tensile strength, high and low temperature resistance, abrasion resistance, corrosion resistance, and radiation resistance. A variety of buckles, such as Panduit® Pan-Steel® buckles and Band-it® Ear-Lokt buckles are known. The Panduit® Pan-Steel® buckles are related to U.S. Patent Nos. 4,866,817; 7,171,729; and 7,329,570, which are incorporated by reference in their entireties.

[0003] Typically, as illustrated in commonly owned U.S. Patent No. 8,793,841, metal buckles are secured to metal straps or ties by hand and with a screw driver. The cut end of the metal strap is bent by hand into the metal buckle. Next, the flat edge of a screw driver is used to push the metal buckle over the cut end of the metal strap. This process is time consuming and difficult in small areas. As result, there is a need for a tool that easily positions the metal strap and bends the metal buckle over the strap to secure the strap and the buckle even in a confined area.

Summary of the Invention

[0004] The present invention is directed to a buckle bender tool that secures a strap in a metal buckle. The metal buckle has a strap entrance end, a strap exit end, and a deformable retainer. The deformable retainer of the buckle has a tab at a distal end and an opening adjacent the tab. The buckle bender tool has a main body with a first end and a second end. The tool has a bent edge at a distal end of the first end of the main body. The bent edge forms an acute angle with respect to the main body of the tool. The tool also has a straight edge at a distal end of the second end of the main body. The buckle bender tool positions the cut end of the strap in the buckle and bends the

deformable retainer of the buckle to position the buckle over the cut-off end of the strap thereby securing the strap and the buckle.

Brief Description of the Drawings

[0005] FIG. 1 is a perspective view of the buckle bender tool of the present invention positioned to secure the metal buckle.

[0006] FIG. 2 is a side view of the buckle bender tool of FIG. 1 positioned to install the cut end of the metal strap in the metal buckle.

[0007] FIG. 3 is a side view of the buckle bender tool of FIG. 2 engaging the metal strap and the metal buckle.

[0008] FIG. 4 is an enlarged view of one end of the buckle bender tool of FIG. 3 engaging the metal strap and the metal buckle.

[0009] FIG. 5 is a side view of the buckle bender tool of FIG. 4 pushing the metal strap into the metal buckle.

[0010] FIG. 6 is a side view of the buckle bender tool of FIG. 4 with the metal strap positioned on the metal buckle.

[0011] FIG. 7 is a side view of the buckle bender tool of FIG. 6 positioned to close the metal buckle.

[0012] FIG. 8 is an enlarged view of one end of the buckle bender tool of FIG. 7 positioned to close the metal buckle.

[0013] FIG. 9 is a side view of the buckle bender tool of FIG. 8 positioned in the closed metal buckle.

[0014] FIG. 10 is a perspective view of the closed metal buckle of FIG. 9, with the tool removed.

[0015] FIG. 11 is an enlarged perspective view of the closed metal buckle of FIG. 10.

[0016] FIG. 12 is a side view of the buckle bender tool of FIG. 1 positioned to close an adjacent metal buckle.

Detailed Description

[0017] FIGS. 1 and 2 illustrate the buckle bender tool 20 of the present invention positioned to be installed in a metal buckle 40. An example of the metal buckle 40 is described in commonly owned U.S. Patent No. 8,793,841, herein incorporated by reference in its entirety. The buckle 40 includes a bridge 42, a deformable retainer 44 with an opening 46 and a retainer tab 48, a strap entrance passageway 50 and a strap exit passageway 52.

[0018] The buckle bender tool 20 includes a curved main body with a first end 22 and a second end 26. The first end 22 of the tool 20 includes a bent edge 24. The bent edge forms an acute angle with respect to the main body of the tool. The second end 26 of the tool 20 includes a straight edge 28. The tool 20 may also be manufactured as a straight tool, if desired.

[0019] As illustrated in FIGS. 1 and 2, the metal strap 60 is installed around a cable bundle 70. The metal strap 60 has been tensioned and cut-off by an installation tool. FIGS. 1 and 2 illustrate the buckle bender tool 20 positioned to be installed in the opening 46 in the buckle 40 and over the strap cut end 62.

[0020] FIGS. 3 and 4 illustrate the first end 22 of the buckle bender tool 20 positioned in the opening 46 of the metal buckle 40. The first end 22 of the buckle bender tool 20 also engages the cut-off end 62 of the metal strap 60.

[0021] Once the buckle bender tool 20 is positioned in the metal buckle 40, the tool 20 is pulled. As illustrated in FIGS. 5 and 6, as the buckle bender tool 20 pulls the deformable retainer 44 of the buckle 40, the bent edge 24 of the tool 20 pushes the cut end 62 of the metal strap 60 downwards towards the buckle 40. As illustrated in FIG. 6, the metal strap cut end 62 is bent and is positioned on the buckle 40. As the buckle bender tool 20 pulls the buckle 40, the deformable retainer 44 is bent over the cut-off end 62 of the strap 60 approximately 30 degrees.

[0022] Next, the straight end 28 of the buckle bender tool 20 is installed in the opening 46 of the buckle 40 from the opposite side. The tool can be used in either direction with the curved portion

facing upwards or downwards. As illustrated in FIGS. 7 and 8, the straight end 28 of the buckle bender tool 20 is positioned through the opening 46 and over the bent cut-off end 62 of the strap 60. Next, the buckle bender tool 20 is pulled thereby deforming the retainer 44 and positioning the retainer 44 over the cut-off end 62 of the strap 60, as illustrated in FIG. 9. Once the deformable retainer 44 has been positioned over the cut-off end 62 of the strap 60, the buckle bender tool 20 is removed.

[0023] As illustrated in FIGS. 10 and 11, the deformable retainer 44 and retainer tab 48 of the buckle 40 secure the cut-off end 62 of the strap 60 and the cable bundle 70.

[0024] Often multiple bundles are positioned adjacent each other along the ladder rung. The buckle bender tool of the present invention facilitates the closure of metal buckles positioned in close proximity to each other. FIG. 12 illustrates the buckle bender tool positioned to close a metal buckle positioned adjacent to a second metal buckle. The curved tool can be used with the curved portion facing upwards, as illustrated in FIG. 12, to provide extra clearance when the bundles are positioned in close proximity. As a result, the buckle bender tool of the present invention easily secures a metal buckle in a confined or restricted space.

[0025] Furthermore, while the particular preferred embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from the teaching of the invention. The matter set forth in the foregoing description and accompanying drawings is offered by way of illustration only and not as limitation. The actual scope of the invention is intended to be defined in the following claims when viewed in their proper perspective based on the prior art.

Claims

1. A tool for securing a strap in a metal buckle, wherein the metal buckle having a strap entrance end, a strap exit end, and a deformable retainer with a tab at a distal end and an opening adjacent the tab, the tool comprising:
 - a main body having a first end and a second end;
 - a bent edge at a distal end of the first end of the main body, wherein the bent edge forms an acute angle with respect to the main body of the tool; and
 - a straight edge at a distal end of the second end of the main body.
2. The tool of claim 1, wherein the bent edge of the tool bends a cut end of the strap towards the buckle.
3. The tool of claim 1, wherein the straight edge of the tool bends the deformable retainer of the buckle over the cut end of the strap.
4. The tool of claim 1, wherein the tool has a curved portion extending from the first end to the second end, whereby the curved tool provides clearance for enabling installation of adjacent buckles.
5. The tool of claim 4, wherein the tool secures the strap in the metal buckle with the curved portion facing upwards.
6. The tool of claim 4, wherein the tool secures the strap in the metal buckle with the curved portion facing downwards.

7. A method of securing a metal strap to a metal buckle using a buckle bender tool, wherein the metal buckle having a strap entrance end, a strap exit end, and a deformable retainer with a tab at a distal end and an opening adjacent the tab, the method comprising the steps of:

positioning a bent edge at a first end of the buckle bender tool in the opening in the buckle with the bent edge of the buckle bender tool positioned over a cut off end of the strap;

engaging the cut off end of the strap with the bent edge of the buckle bender tool; pushing the cut off end of the strap downwards with the bent edge of the buckle bender tool until the cut off end of the strap is positioned on the buckle; and

pulling the buckle bender tool to bend the deformable retainer of the buckle 30 degrees over the cut-off end of the strap.

8. The method of claim 7, further comprising the step of positioning the second end of the buckle bender tool in the opening of the buckle and over the bent cut-off end of the strap;

pulling the buckle bender tool to further deform the retainer and position the retainer over the cut-off end of the strap; and

removing the buckle bender tool.

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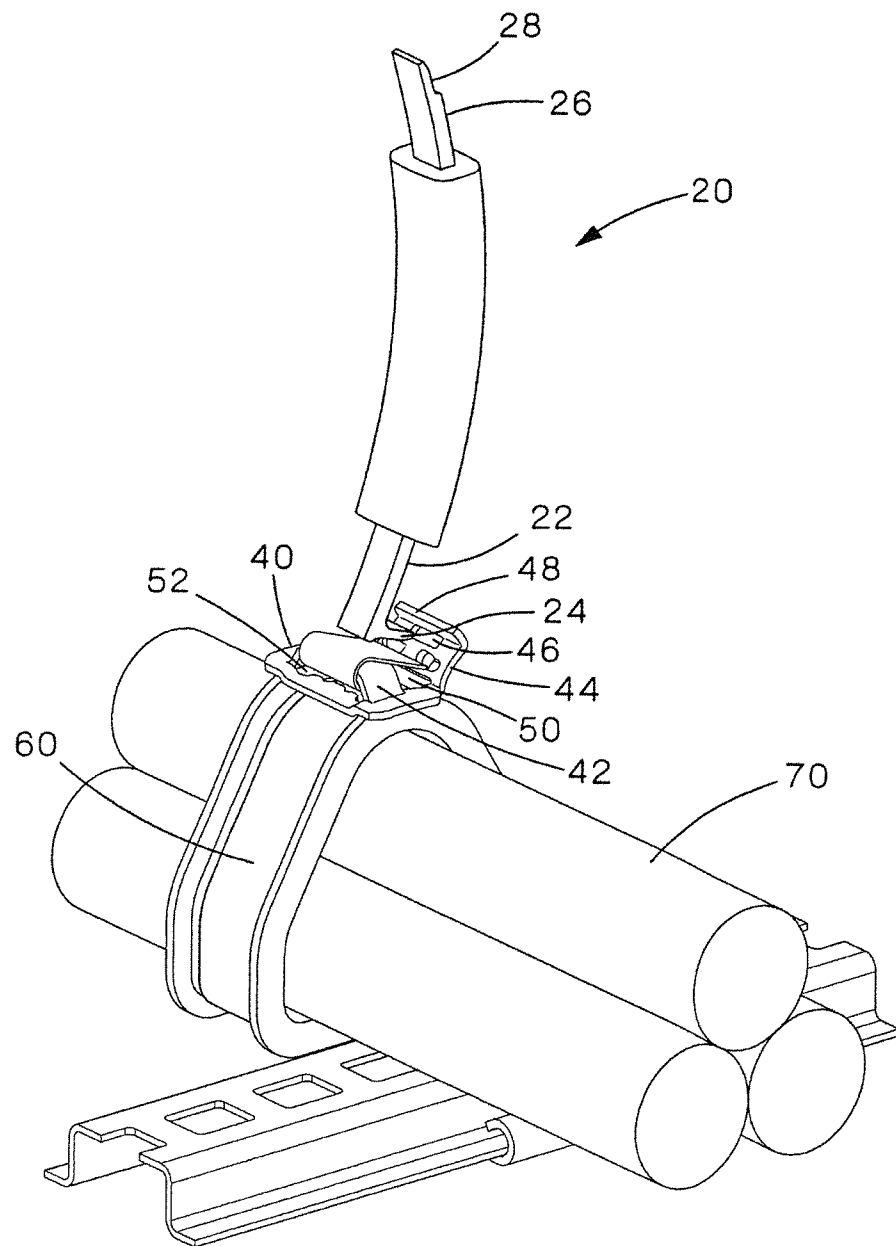


FIG.1

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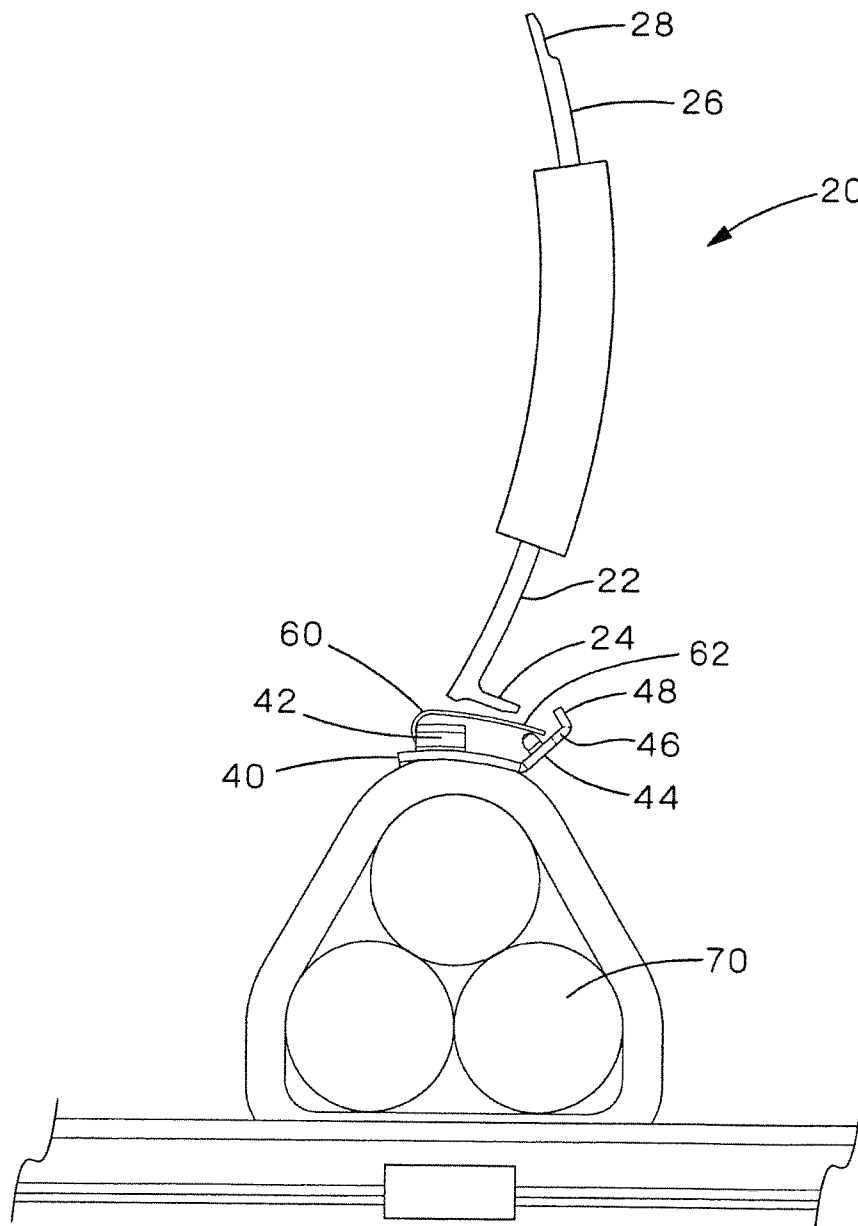


FIG.2

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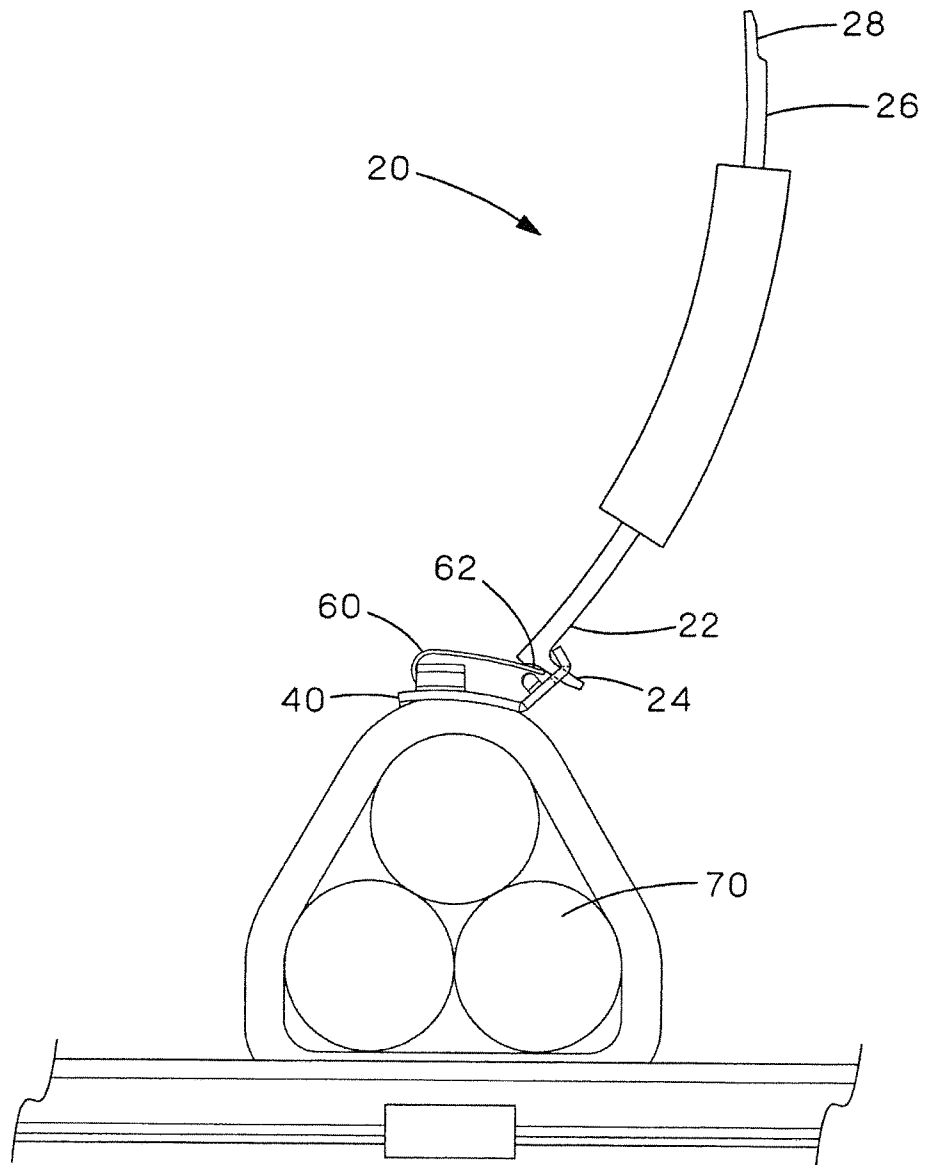


FIG.3

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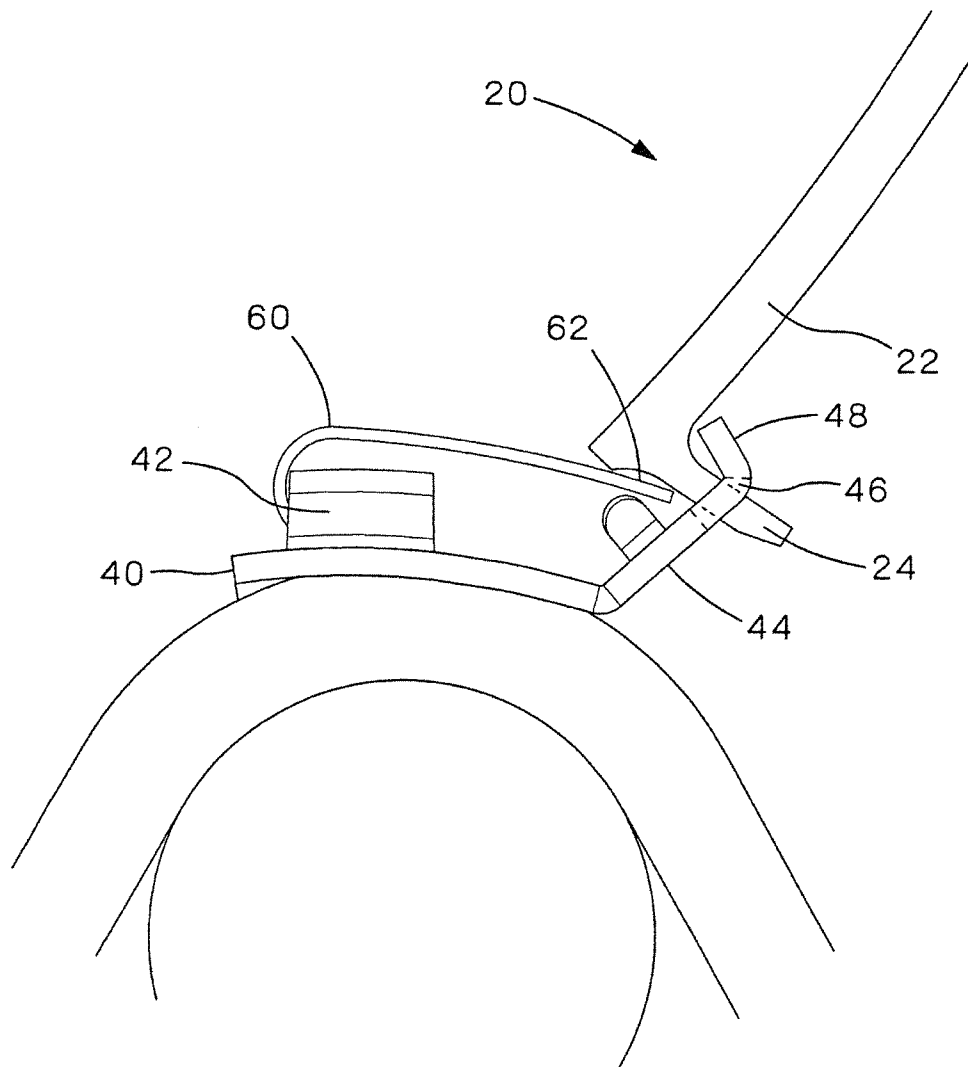


FIG. 4

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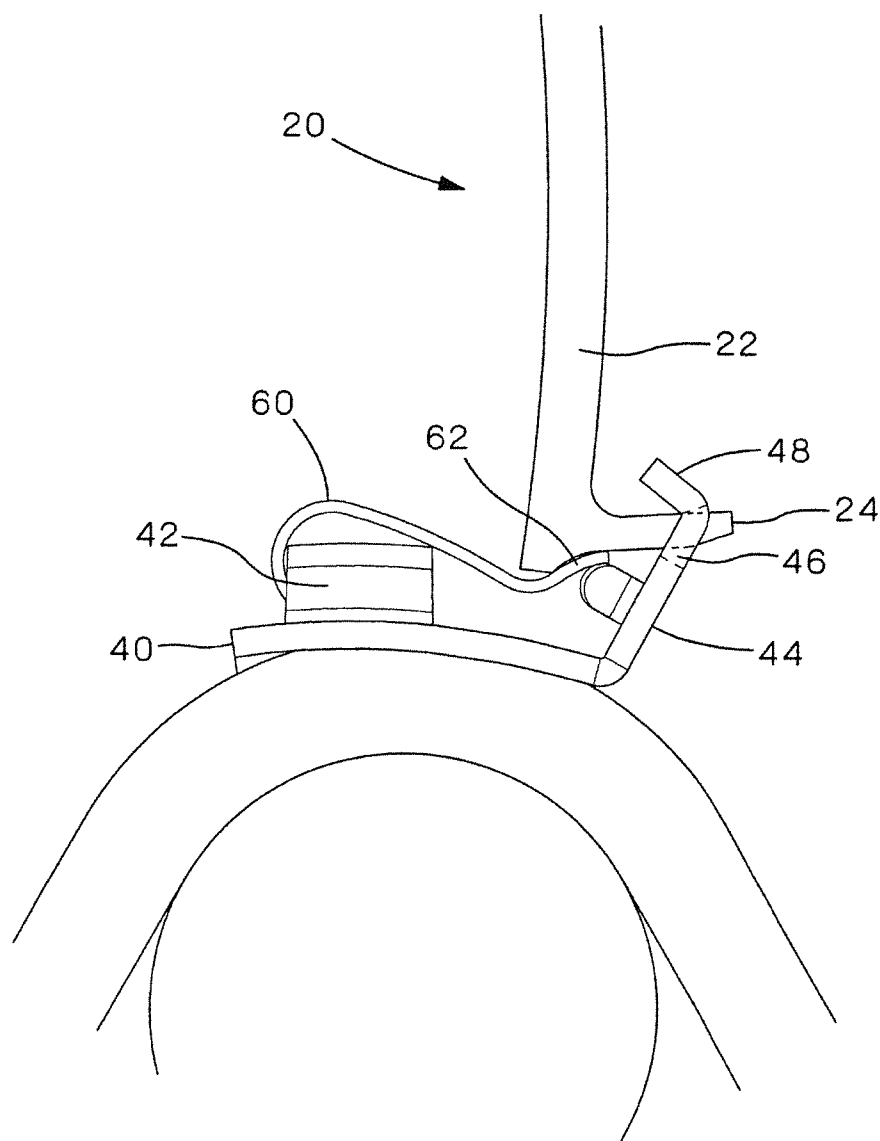


FIG.5

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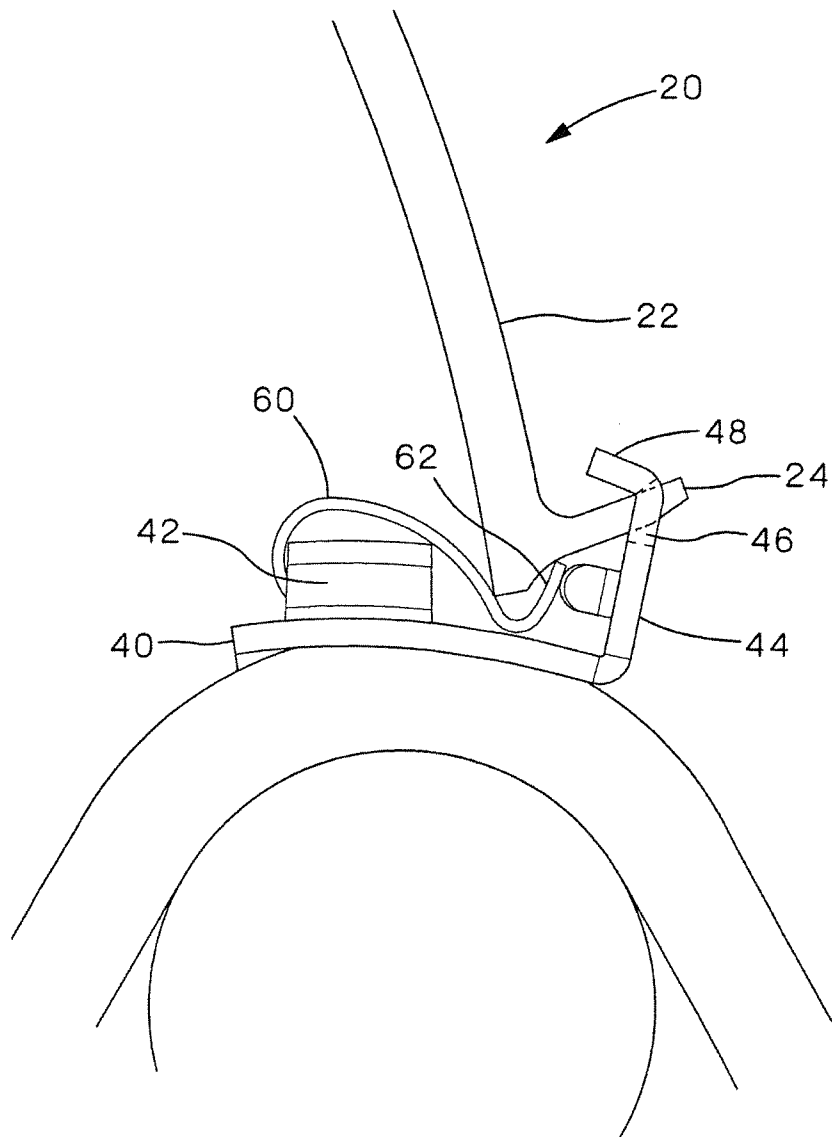


FIG.6

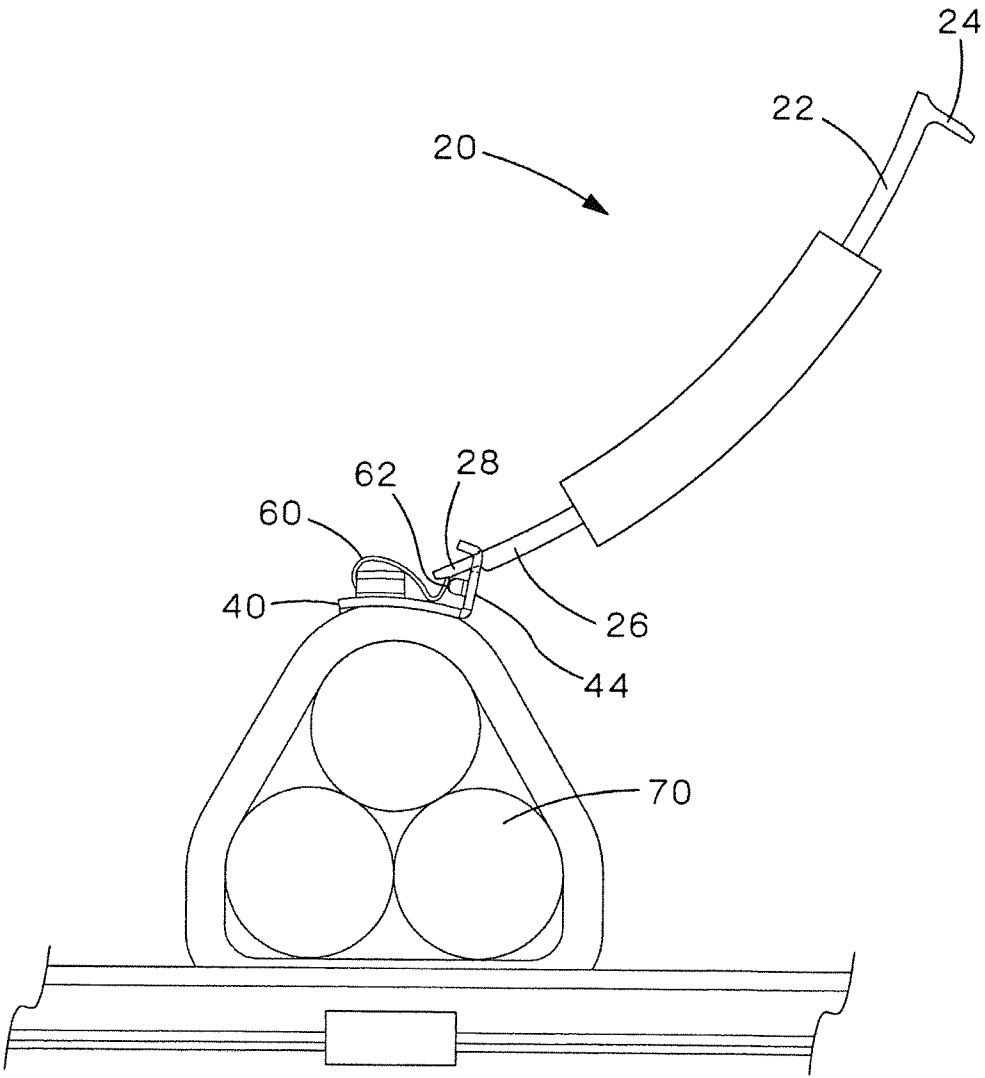


FIG. 7

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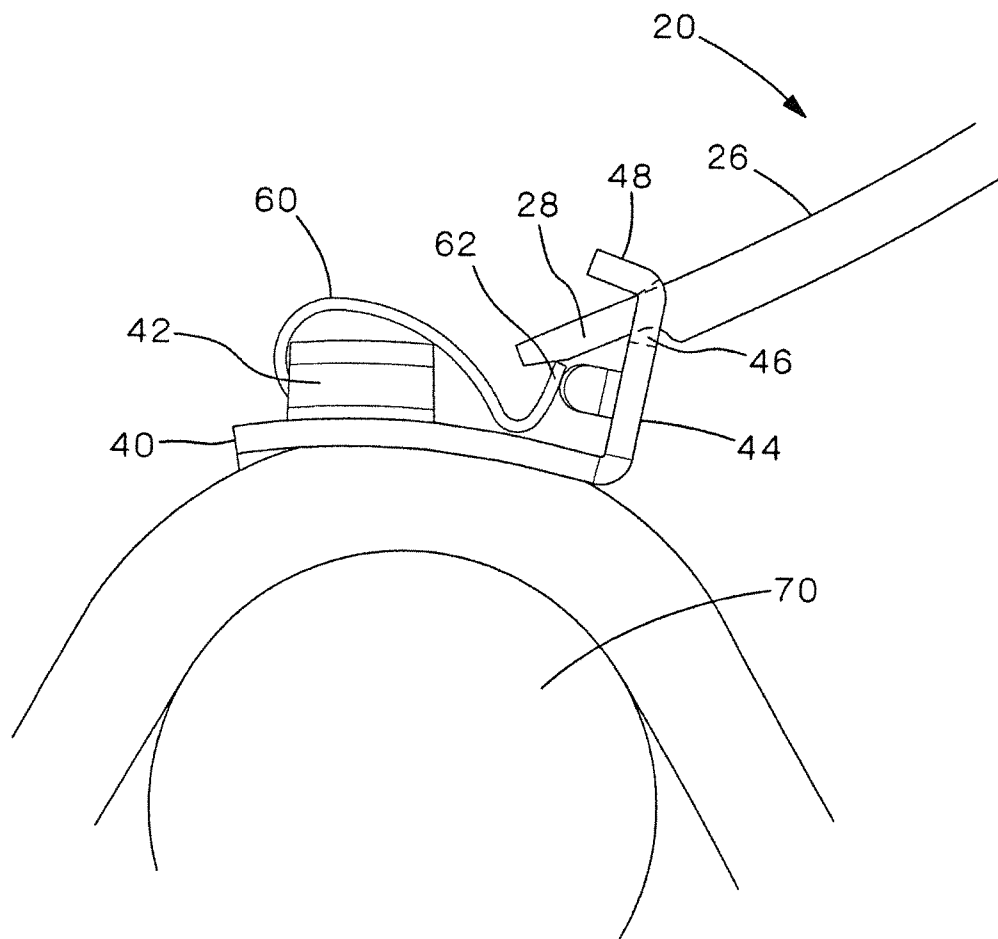


FIG.8

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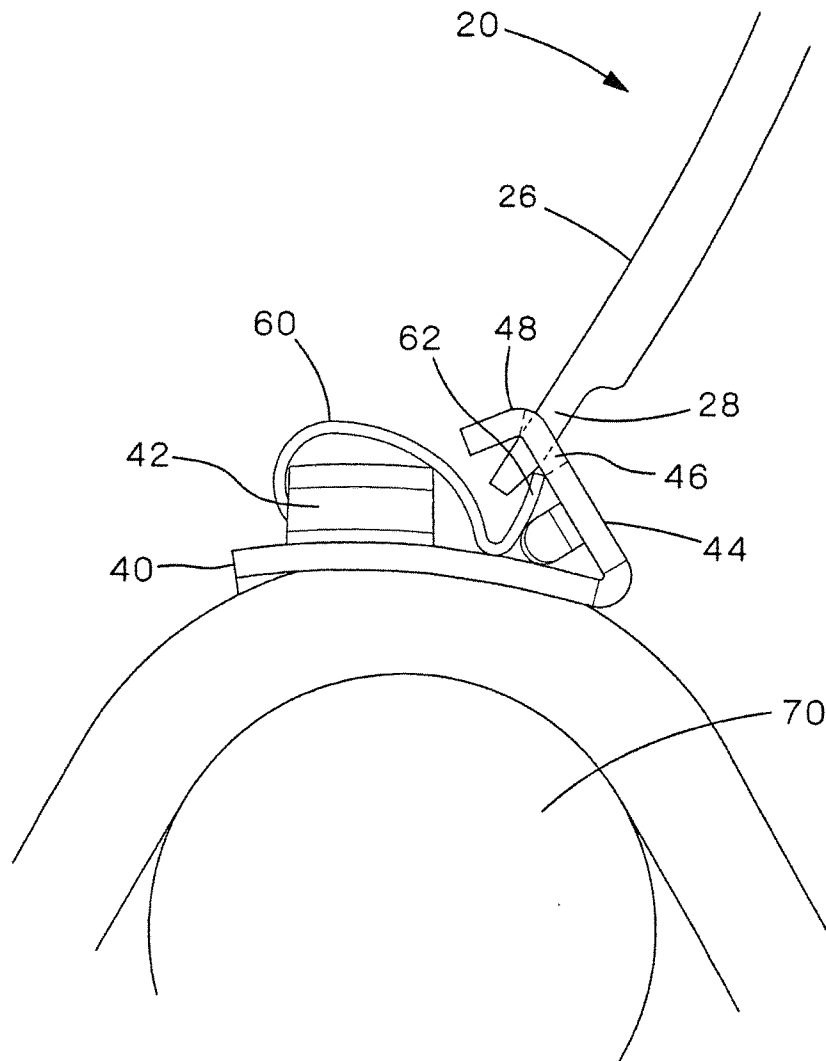


FIG.9

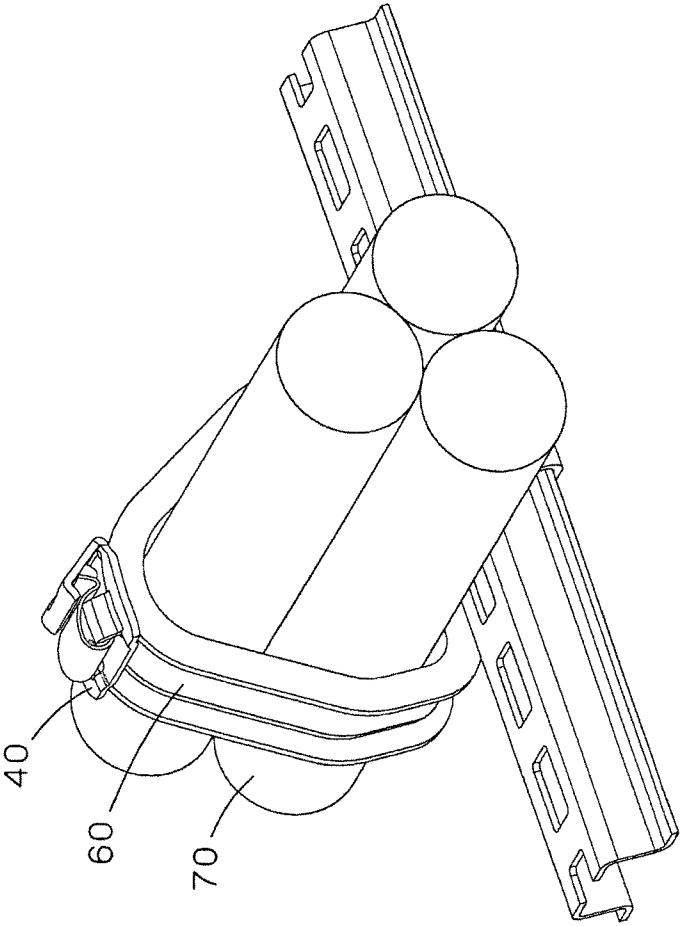


FIG.10

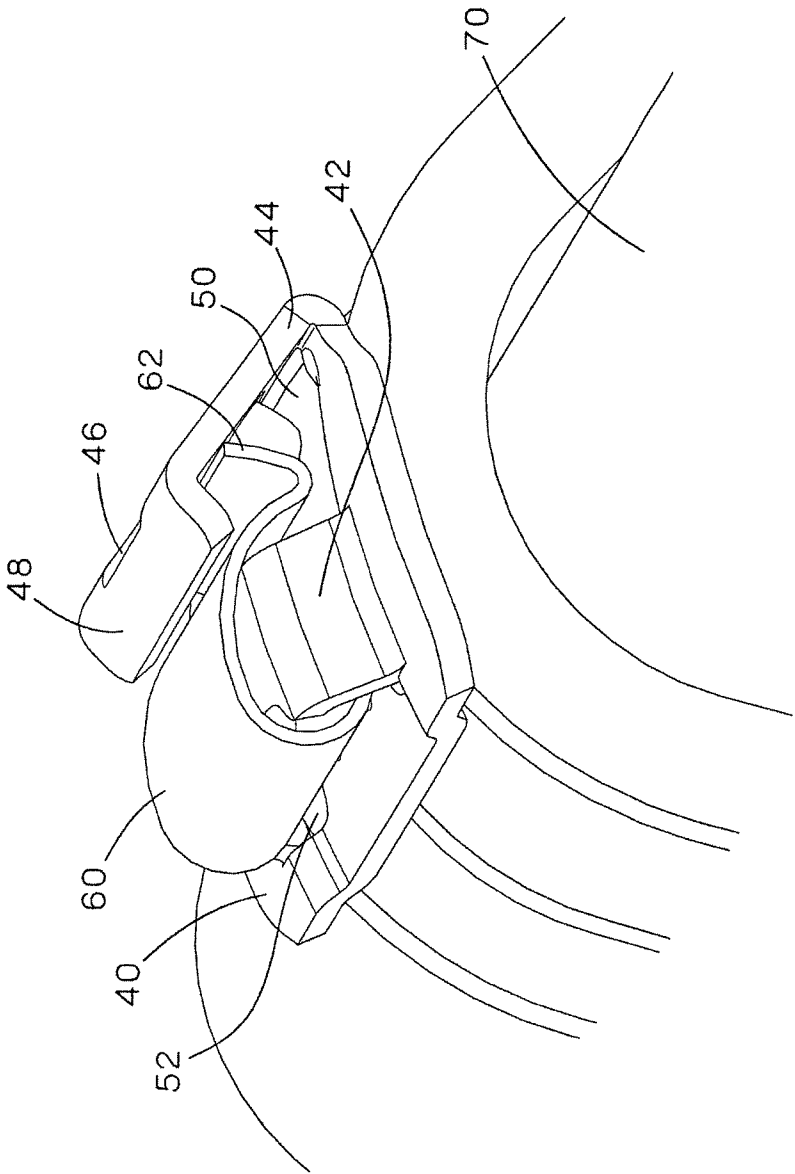


FIG. 11

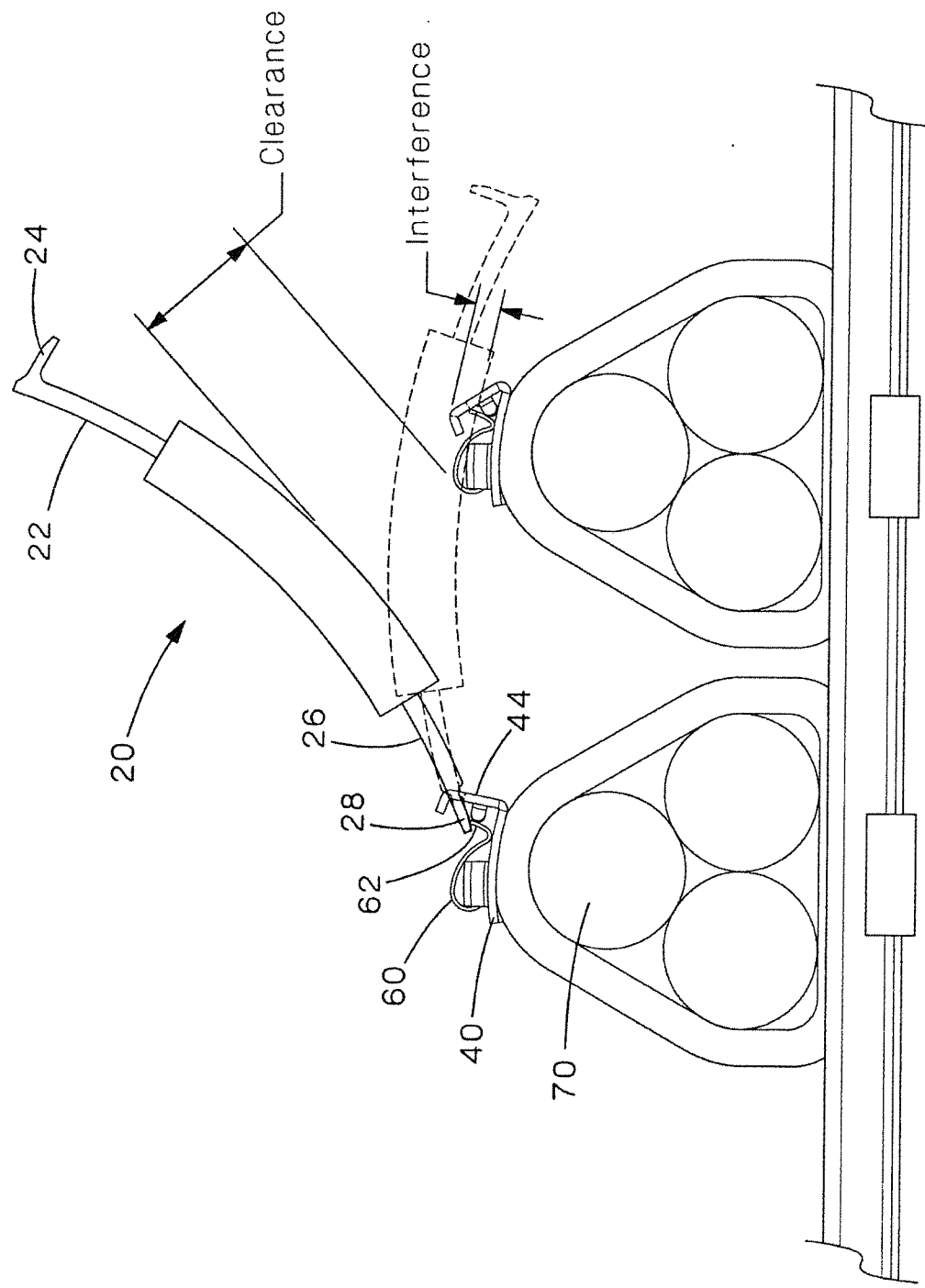


FIG.12

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/049861

A. CLASSIFICATION OF SUBJECT MATTER

INV. B65B13/02 A44B11/12 B25C11/00 B65B13/18 B65B13/34
B65D63/08 B65D63/16

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)

B65B A44B B25C B65D

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 663 083 B1 (SMITH VIRGIL [US]) 16 December 2003 (2003-12-16)	1-6
Y	figures	7,8

X	US 2003/030044 A1 (YOUNGREN ROBERT HAROLD [US] ET AL) 13 February 2003 (2003-02-13) figures	1-6

X	Anonymous: "Viewing gallery for crowbar tools", Galleryhip.com , pages 1-2, XP002729901, Retrieved from the Internet: URL:http://galleryhip.com/crowbar-tool.htm 1 [retrieved on 2014-09-18] the whole document	1

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Further documents are listed in the continuation of Box C.



See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search

19 September 2014

Date of mailing of the international search report

09/10/2014

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/049861

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2012/054991 A1 (DEBERRY EARL J [US] ET AL) 8 March 2012 (2012-03-08)	7,8
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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