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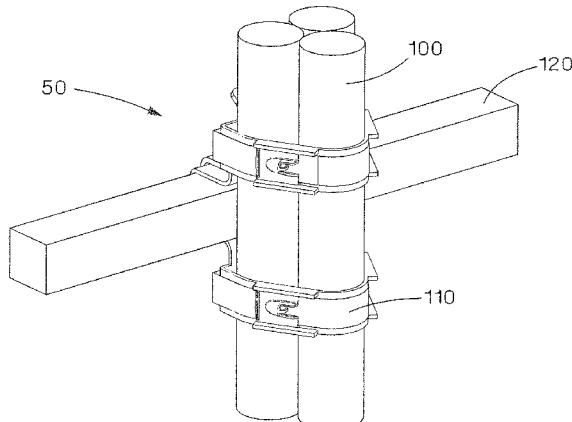
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[Continued on next page]

(54) Title: LADDER RUNG BRACKET ASSEMBLY



(57) Abstract: A bracket assembly is disclosed to secure a cable bundle to a ladder rung. The bracket assembly includes a metal bracket and protective grommets. The metal bracket has a first member, side walls and second members. The first member of the metal bracket is parallel to the second members of the metal bracket. The protective grommets are secured to the metal bracket. The protective grommets have a base member, sleeves extending from the base member, a side member and a bottom member. The assembled metal bracket and protective grommets receive the ladder rung and the sleeves of the protective grommets wrap around the cable bundle positioned on the ladder rung to secure the cable bundle.

FIG.1



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

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

LADDER RUNG BRACKET ASSEMBLY

Cross-Reference to Related Applications

[0001] This application claims priority to U.S. Provisional Application No. 61/769,983, filed February 27, 2013, the subject matter of which is hereby incorporated by reference in its entirety.

Field of the Invention

[0002] The present invention relates to ladder rungs, and more particularly, to a bracket assembly for securing cable bundles to a ladder rung.

Background of the Invention

[0003] It is known to secure a bundle of cables to a support member, such as a rung of a ladder rack, with a cable tie or a strap and buckle. Typically a cushion sleeve is used with the cable tie or strap to protect the bundle of cables from being damaged by the cable tie or strap. However, it is difficult to install cable ties or straps with a cushion sleeve because of the variations in rung design, as well as the proximity of other obstructions near the cable bundle and the ladder rack.

[0004] It is also well known to use cable cleats to install cable bundles to cable ladder racks. For example, existing cable cleats, such as Ellis Patents' Vulcan and Emperor Cable Cleats, provide an alternative to cable ties or straps and cushion sleeves. However, cable cleats are expensive and difficult to install because cable cleats typically require additional mounting hardware that has been configured for a specific cable routing system.

[0005] Thus, it is desirable to provide an improved bracket assembly for attaching cable bundles to a ladder rung.

Summary of the Invention

[0006] The present invention is directed to a bracket assembly that secures cables to a ladder rung. The bracket assembly includes a metal bracket and at least one protective grommet. The metal bracket has a first member, side walls and second members. The first member of the metal bracket is parallel to the second members of the metal bracket. The protective grommets are secured to the

metal bracket. Each protective grommet has a base member and sleeves extending from the base member. The protective grommet may also have a side member and a bottom member. The assembled metal bracket and protective grommets receive the ladder rung. The sleeves of the protective grommets wrap around a cable bundle positioned on the ladder rung. The sleeves overlap to secure the cable bundle to the ladder rung.

Brief Description of the Drawings

[0007] FIG. 1 is a perspective view of a ladder rung bracket assembly securing cable bundles to a ladder rung.

[0008] FIG. 2 is a perspective view of a metal bracket of the ladder rung bracket assembly of FIG. 1.

[0009] FIG. 3 is a perspective view of one of the protective grommets of the ladder rung bracket assembly of FIG. 1.

[0010] FIG. 4 is a side view of the metal bracket and protective grommet positioned to be assembled to form the ladder rung bracket of FIG. 1.

[0011] FIG. 5 is a front perspective view of the assembled metal bracket and protective grommet of FIG. 4.

[0012] FIG. 6 is a rear perspective view of the assembled metal bracket and protective grommet of FIG. 5.

[0013] FIG. 7 is a perspective view of the metal bracket and protective grommet of FIG. 5 positioned to be installed on a ladder rung.

[0014] FIG. 8 is a perspective view of the metal bracket and protective grommet of FIG. 7 positioned on the ladder rung.

[0015] FIG. 9 is a perspective view of the metal bracket and protective grommet of FIG. 8 with the sleeves of the protective grommet wrapped around the cable bundle and metal ties positioned to be installed around the protective grommet.

[0016] FIG. 10 is a side view of the ladder rung bracket assembly of FIG. 1.

[0017] FIG. 11 is a perspective view of an alternative ladder rung bracket assembly securing cable bundles to a ladder rung.

[0018] FIG. 12 is a perspective view of a metal bracket of the ladder rung bracket assembly of FIG. 11.

[0019] FIG. 13 is a perspective view of a grommet of the ladder rung bracket assembly of FIG. 11.

[0020] FIG. 14 is a side view of the metal bracket and grommet positioned to be assembled to form the ladder rung bracket of FIG. 11.

[0021] FIG. 15 is a front perspective view of the assembled metal bracket and grommet of FIG. 14.

[0022] FIG. 16 is a rear perspective view of the assembled metal bracket and grommet of FIG. 15.

[0023] FIG. 17 is a side view of the metal bracket and grommet of FIG. 15 positioned to be installed on a ladder rung.

[0024] FIG. 18 is a perspective view of the metal bracket and grommet of FIG. 17 positioned on the ladder rung.

[0025] FIG. 19 is a perspective view of the metal bracket and grommet of FIG. 18 with the sleeves of the grommet wrapped around the cable bundle and a strap and buckle positioned to be installed around the grommet.

[0026] FIG. 20 is a side view of the ladder rung bracket assembly of FIG. 11.

Detailed Description

[0027] FIGS. 1-10 illustrate a ladder rung bracket assembly 50 designed to be used with a slotted or un-slotted ladder rungs. As illustrated in FIG. 1, the ladder rung bracket assembly 50 of the present invention secures a cable bundle 100 to a ladder rung 120 using metal ties 110. The ladder rung bracket may also secure the cable bundle 100 to a ladder rung 120 using a strap and buckle.

[0028] As illustrated in FIGS. 2-6, the ladder rung bracket assembly 50 includes a metal bracket 60 and two protective grommets 80. FIG. 2 illustrates the metal bracket 60. The metal bracket 60 includes a first member 62, side walls 66, and second members 68. The side walls 66 extend from

the first member 62 to the second members 68. The first member 62 is parallel to the second members 68. The first and second members 62, 68 include holes 64, 70, respectively, for receiving the locking features 94, 96 of the protective grommets 80 (see FIG. 4). The distal end of each second member 68 includes an outwardly extending flange 72.

[0029] FIG. 3 illustrates one of the protective grommets 80. The protective grommets 80 are identical pieces that interlock with each other as illustrated in FIG. 5. Each protective grommet 80 includes a base member 82 with sleeves 84, a side member 86, and a bottom member 88 with fingers 90. The plurality of fingers 90 of each protective grommet 80 interlock to secure the protective grommets 80 to each other. The interlocked fingers 90 of the bottom members 88 create a channel for receiving the ladder rung 120. The side member 86 and the bottom member 88 include a crown feature 92 to help accommodate different rung dimensions and to increase resistance to movement when the ladder rung bracket assembly 50 is installed on a ladder rung 120.

[0030] As illustrated in FIGS. 4 and 6, the backside of the bottom member 88 includes locking features 94 and the backside of the base member 82 includes locking features 96. The locking features 94, 96, such as a pin, rivet or snap, enable the protective grommet 80 to be locked into position when the protective grommet 80 is pressed onto the metal bracket 60. The protective grommet 80 also includes flanges 98 extending from the backside of the sleeves 84. The flanges 98 are interlocking features that receive the metal ties 110 during installation (see FIG. 1). The flanges 98 eliminate the need for the installer to hold the sleeve 84 in position while applying the metal tie 110 during the final installation of the ladder rung bracket assembly 50.

[0031] FIGS. 7-10 illustrate assembled metal bracket 60 and protective grommet 80 being installed on the ladder rung 120. As illustrated in FIG. 7, the metal bracket 60 and protective grommet 80 slide onto the ladder rung 120 from the backside. Next, the sleeves 84 of the base member 82 of the protective grommets 80 are wrapped around the cable bundle 100, overlapped and locked into place (see FIGS. 8 and 9). Metal ties 110 are wrapped underneath one end of the metal bracket 60 and

sleeve 84 of the protective grommet 80 to secure the cable bundle 100 to the ladder rung 120 (see FIGS. 9 and 10). Finally, a tool would tighten the metal ties 110 to complete installation of the ladder rung bracket assembly 50.

[0032] The ladder rung bracket assembly 50 is an improvement over prior ladder rung brackets. The protective grommet 80 of the present invention controls the lateral movement and the axial movement of the cable bundle 100. The interlocking protective grommet 80 also provides a hands free installation. The ladder rung bracket assembly 50 also provides short circuit protection, abrasion protection, greater cable diameter flexibility, and greater rung type flexibility.

[0033] FIGS. 11-20 illustrate an alternative ladder rung bracket assembly 150 that is designed to be used with roll formed ladder rungs 220. As illustrated in FIG. 11, the ladder rung bracket assembly 150 secures a cable bundle 200 to a ladder rung 220 using a strap 210 and a buckle 212. The ladder rung bracket may also secure the cable bundle 200 to a ladder rung 220 using a metal tie.

[0034] As illustrated in FIGS. 12-16, the ladder rung bracket assembly 150 includes a metal bracket 160 and a grommet 180. As illustrated in FIG. 12, the metal bracket 160 includes a first member 162, a side wall 168, and a second member 174. The distal end of the first member 162 includes a curved flange 164. The first member 162 also includes contact points 166. The sidewall 168 extends between the first member 162 and the second member 174. The sidewall 168 includes an opening 170 with a projection 172 (see FIGS. 14-15). The distal end of the second member 174 includes a flange 176.

[0035] As illustrated in FIGS. 13-16, the grommet 180 includes a base member 182 with sleeves 184. The backside of the grommet 180 includes a locking feature 186 (see FIG. 14). The locking feature includes two L-shaped flanges positioned to create a channel therebetween. The locking feature locks the grommet 180 into position when pressed onto the metal bracket 160. The backside of the sleeves 184 of the grommet 180 include flanges 188 for receiving a strap 210 and a buckle 212

(see FIG. 11). The flanges 188 eliminate the need for an installer to hold the sleeves 184 in position while applying the strap 210 and buckle 212 during final installation.

[0036] FIGS. 17-20 illustrate the installation of the ladder rung bracket assembly 150 onto the ladder rung 220. As illustrated in FIG. 17, the curved flange 164 of the metal bracket 160 hooks around a flange 222 of the ladder rung 220. Next, the assembled metal bracket 160 and grommet 180 is rotated to engage the opposing flange 222 of the ladder rung 220 to clip the assembled metal bracket 160 and grommet 180 onto the ladder rung 220. As illustrated in FIGS. 18-19, the grommet sleeves 184 are wrapped around the cable bundle 200, overlapped, and locked into place. A strap 210 is wrapped underneath the metal bracket 160 and around the grommet sleeves 184 to secure the cable bundle 200 to the ladder rung 220 (see FIGS. 19-20). Finally, a tool tensions the strap 210 to complete the installation of the ladder rung bracket assembly 150.

[0037] The ladder rung bracket assembly 150 is also an improvement over prior art ladder rung brackets. The grommet 180 of the ladder rung bracket assembly 150 controls the lateral movement and the axial movement of the cable bundle 200. The interlocking flanges 188 of the grommet 180 provide a hands free installation. The ladder rung bracket assembly 150 also provides short circuit protection, abrasion protection, lower installation time, and greater cable diameter flexibility.

[0038] 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 bracket assembly for securing a cable bundle to a ladder rung, the bracket assembly comprising:
 - a metal bracket having a first member, side walls and second members, wherein the first member is parallel to the second members; and
 - protective grommets secured to the metal bracket, wherein each protective grommet having a base member, sleeves extending from the base member, a side member and a bottom member; whereby the assembled metal bracket and protective grommets receive the ladder rung and the sleeves of the protective grommets wrap around the cable bundle positioned on the ladder rung, wherein the sleeves overlap to secure the cable bundle.
2. The bracket assembly of claim 1, wherein the first member and the second members of the metal bracket having holes for receiving locking features of the protective grommet.
3. The bracket assembly of claim 1, wherein a back side of each bottom member includes a locking feature and the back side of each base member includes a locking feature, whereby the locking features of the protective grommets are received in holes in the first and second members of the metal bracket.
4. The bracket assembly of claim 1, wherein the protective grommets are identical grommets that are interlocked with each other.
5. The bracket assembly of claim 1, wherein the bottom members of the protective grommet include a plurality of fingers.

6. The bracket assembly of claim 5, wherein the plurality of fingers of each protective grommet interlock to secure the protective grommets to each other.

7. The bracket assembly of claim 6, wherein the interlocked fingers of the bottom members create a channel for receiving the ladder rung.

8. The bracket assembly of claim 1, wherein the side members and the bottom members of the protective grommets include a crown feature for accommodating different rung dimensions and increasing resistance to movement when the bracket assembly is installed on the ladder rung.

9. The bracket assembly of claim 1, wherein the protective grommet further comprising flanges extending from the back side of the sleeves, whereby the flanges receive metal locking ties when the sleeves of the protective grommets are positioned around the cable bundle.

10. A bracket assembly for securing a cable bundle to a ladder rung, the bracket assembly comprising:

a metal bracket having a first member, a side wall and a second member, wherein the side wall extends between the first member and the second member and the first member is parallel to the second member; and

a protective grommet secured to the metal bracket, wherein the protective grommet having a base member and sleeves extending from the base member;

whereby the assembled metal bracket and protective grommet receive the ladder rung and the sleeves of the protective grommet wrap around the cable bundle positioned on the ladder rung, wherein the sleeves overlap to secure the cable bundle.

11. The bracket assembly of claim 10, wherein the first member of the metal bracket having a distal end with a curved flange for engaging a flange of the ladder rung to secure the bracket assembly to the ladder rung.

12. The bracket assembly of claim 10, wherein the first member of the metal bracket having contact points for engaging the ladder rung.

13. The bracket assembly of claim 10, wherein the side wall of the metal bracket includes an opening with a projection.

14. The bracket assembly of claim 10, wherein the second member of the metal bracket having a distal end with an outwardly extending flange.

15. The bracket assembly of claim 10, wherein the protective grommet further comprising a locking feature extending from a backside of the base member of the grommet, the locking feature engages the metal bracket to secure the bracket assembly.

16. The bracket assembly of claim 15, wherein the locking feature comprising two L shaped flanges that create a channel for receiving the second member of the metal bracket.

17. The bracket assembly of claim 10, wherein the protective grommet further comprising flanges extending from the back side of the sleeves, whereby the flanges receive metal locking ties when the sleeves of the protective grommets are positioned around the cable bundle.

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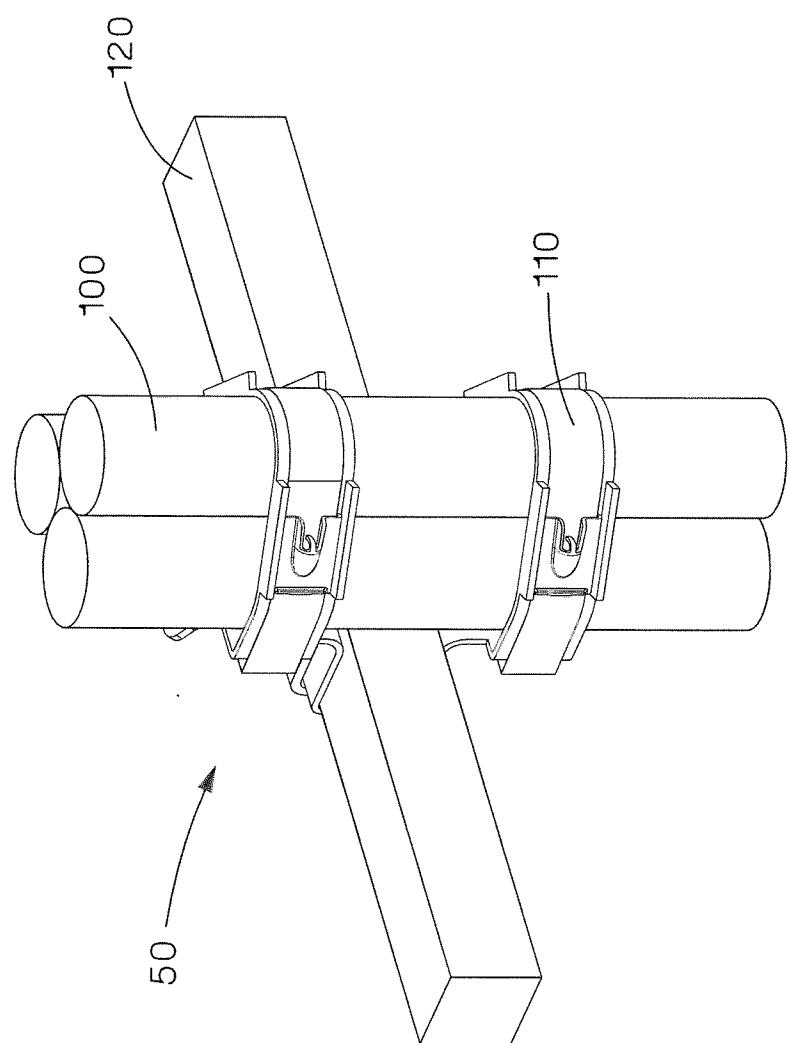


FIG. 1

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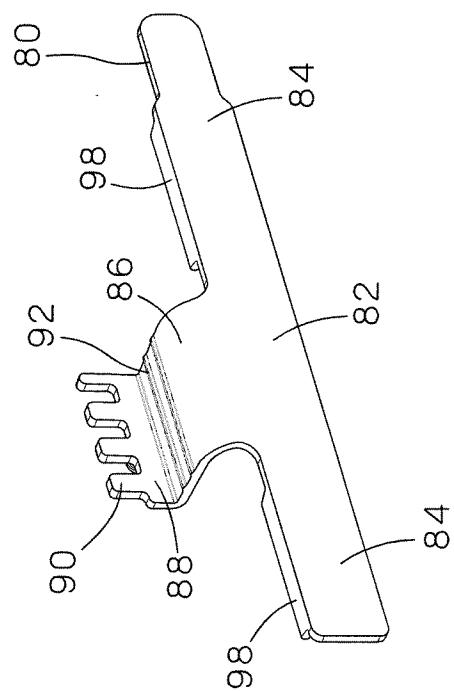


FIG. 3

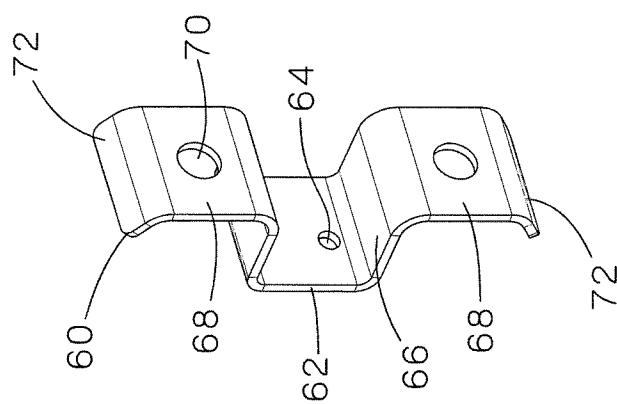


FIG. 2

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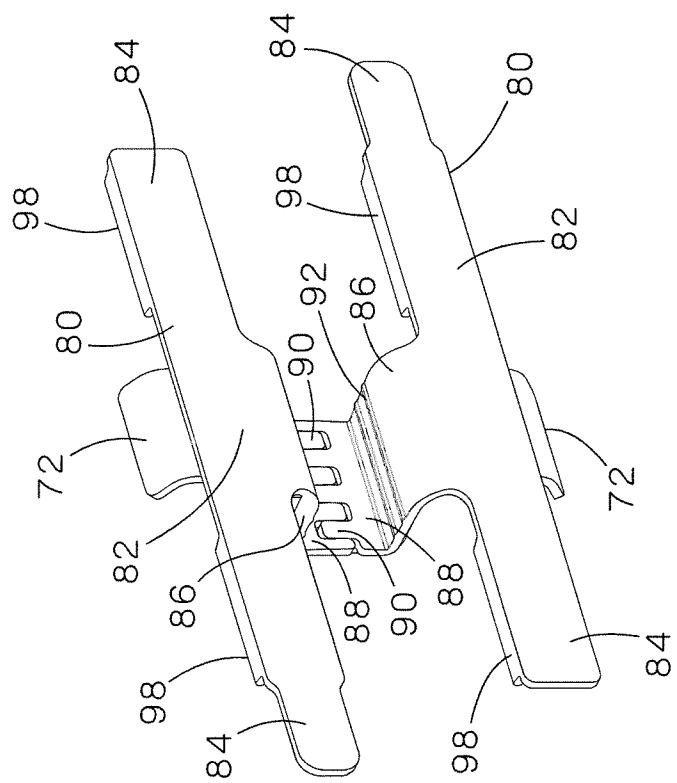


FIG. 5

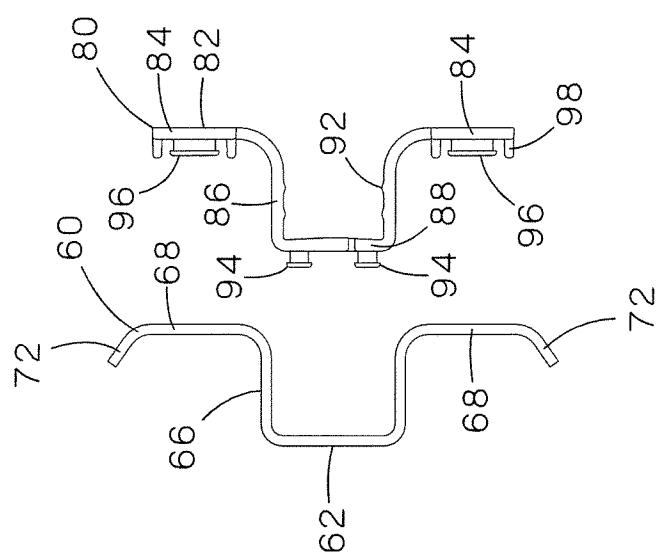


FIG. 4

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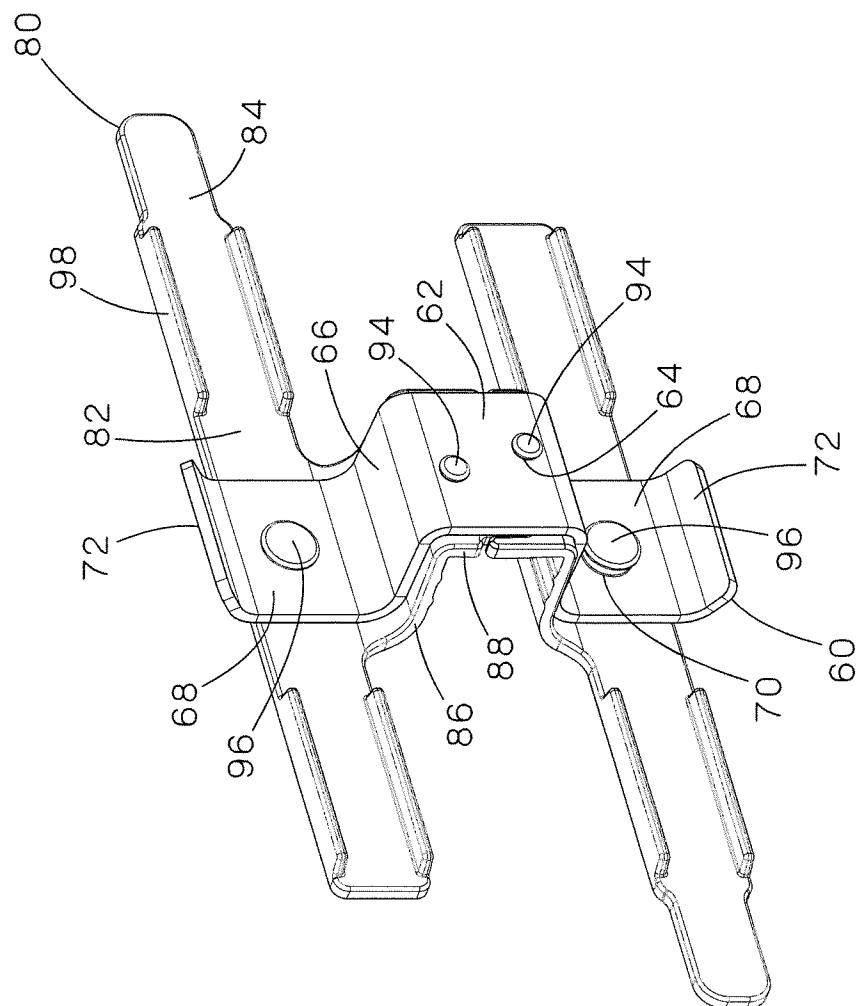


FIG. 6

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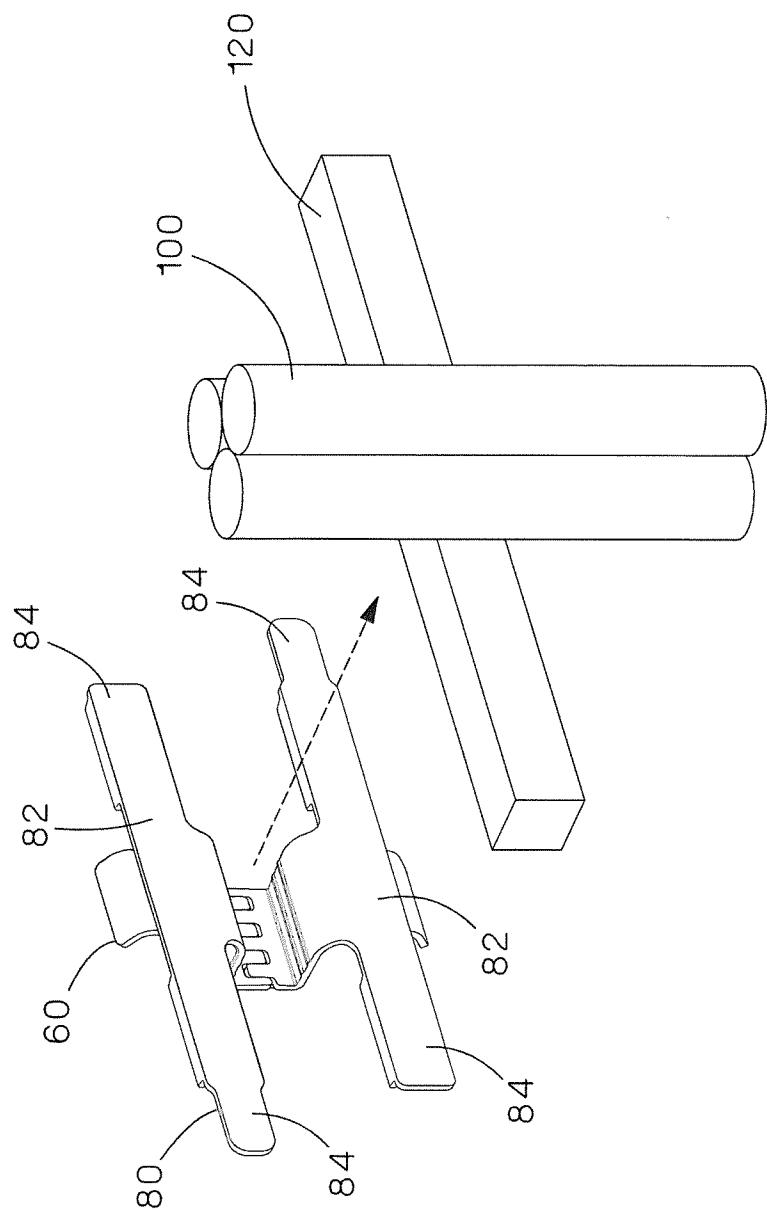


FIG. 7

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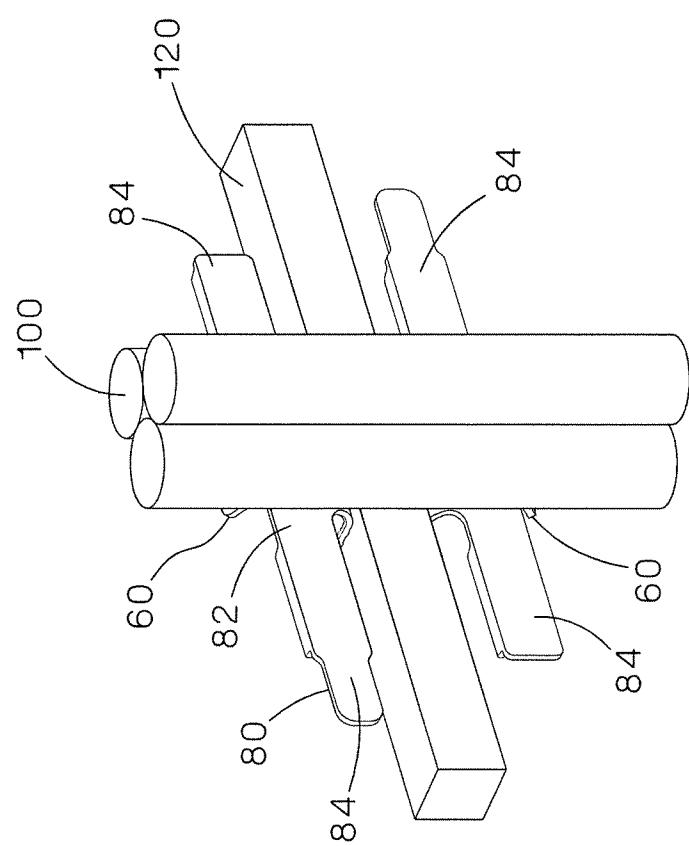


FIG.8

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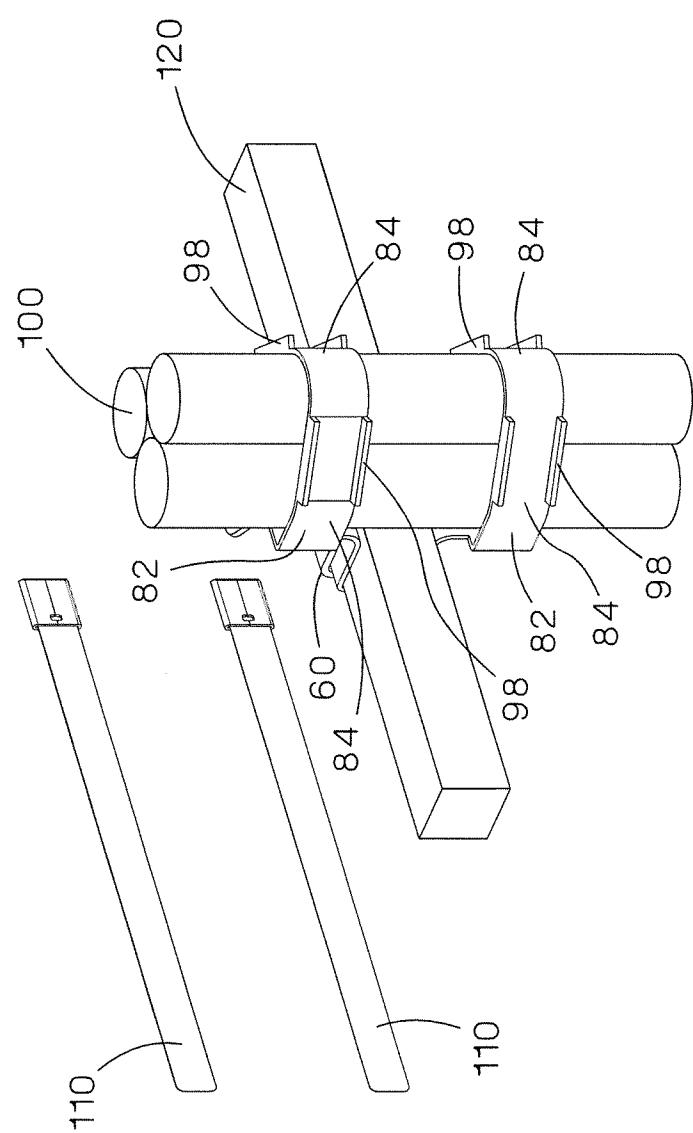


FIG. 9

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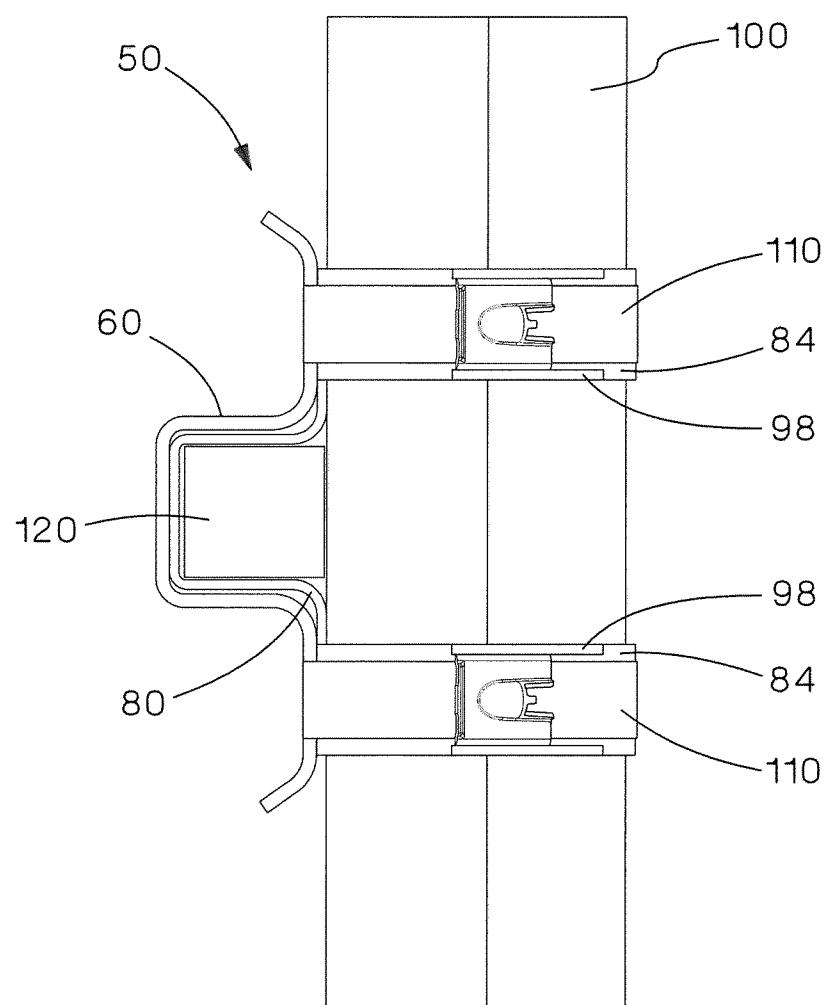


FIG.10

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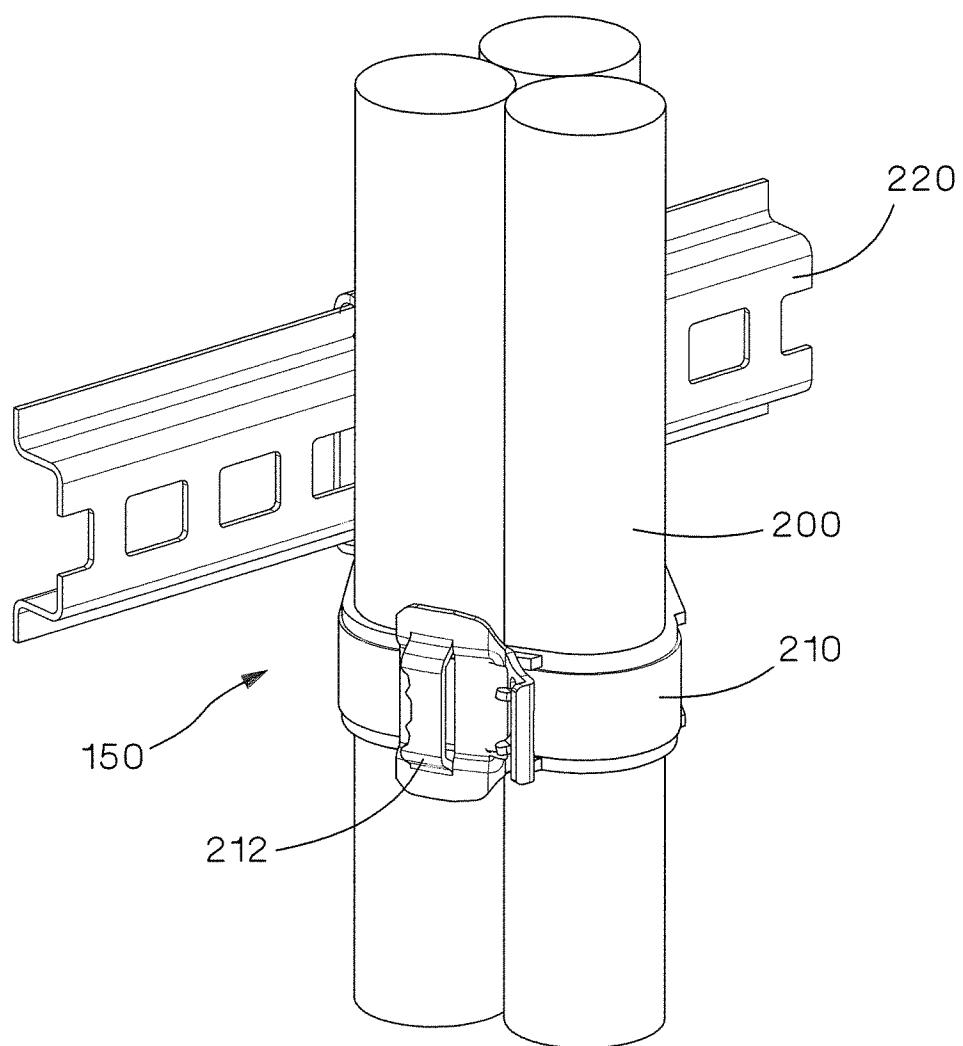


FIG.11

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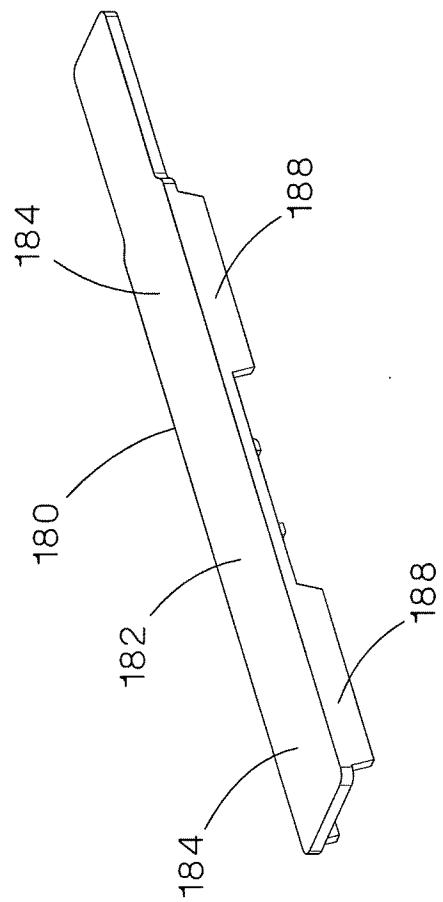


FIG. 13

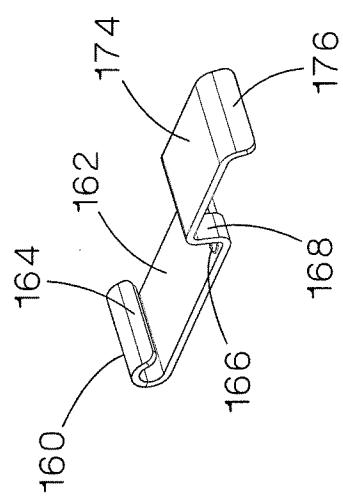
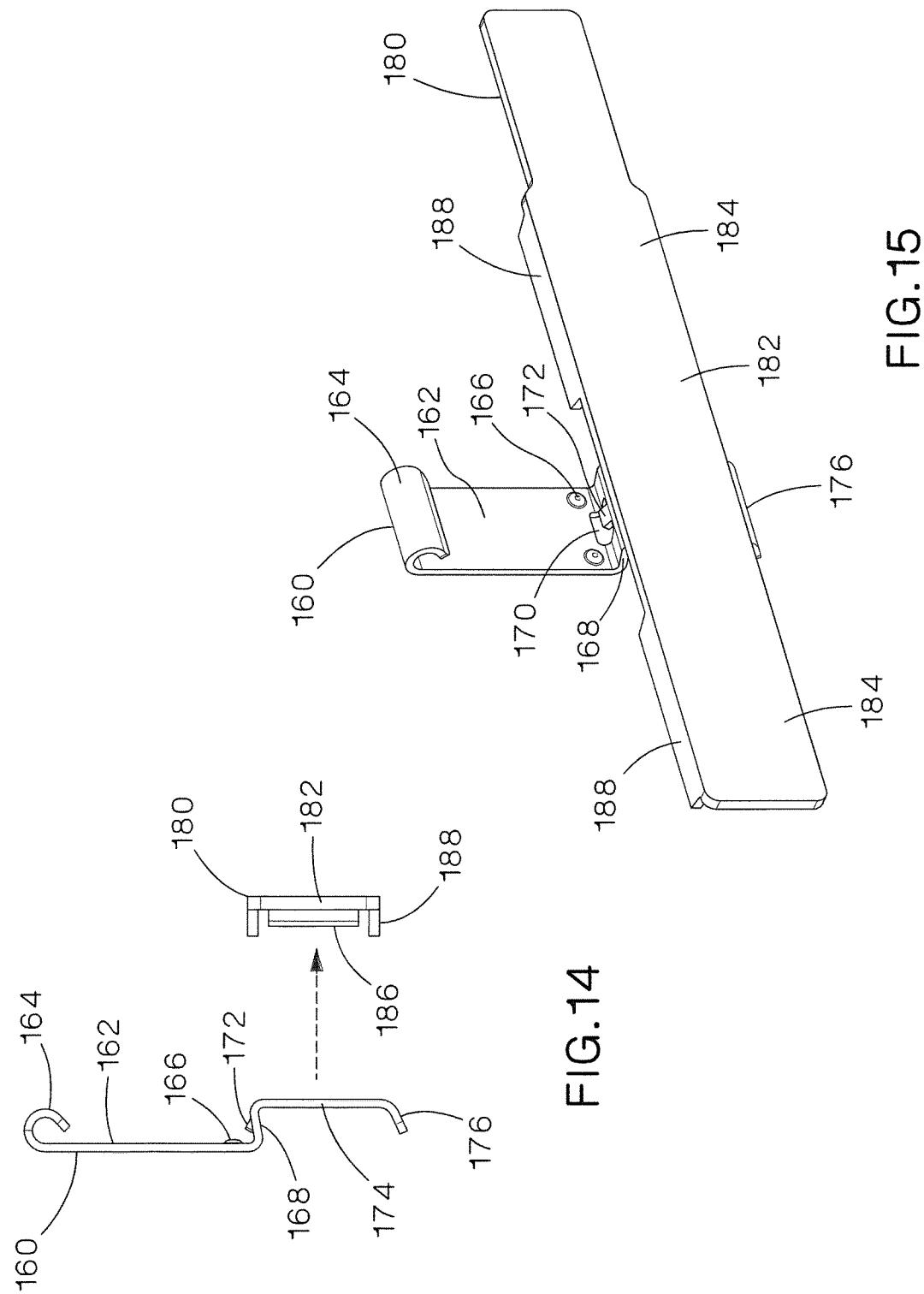


FIG. 12

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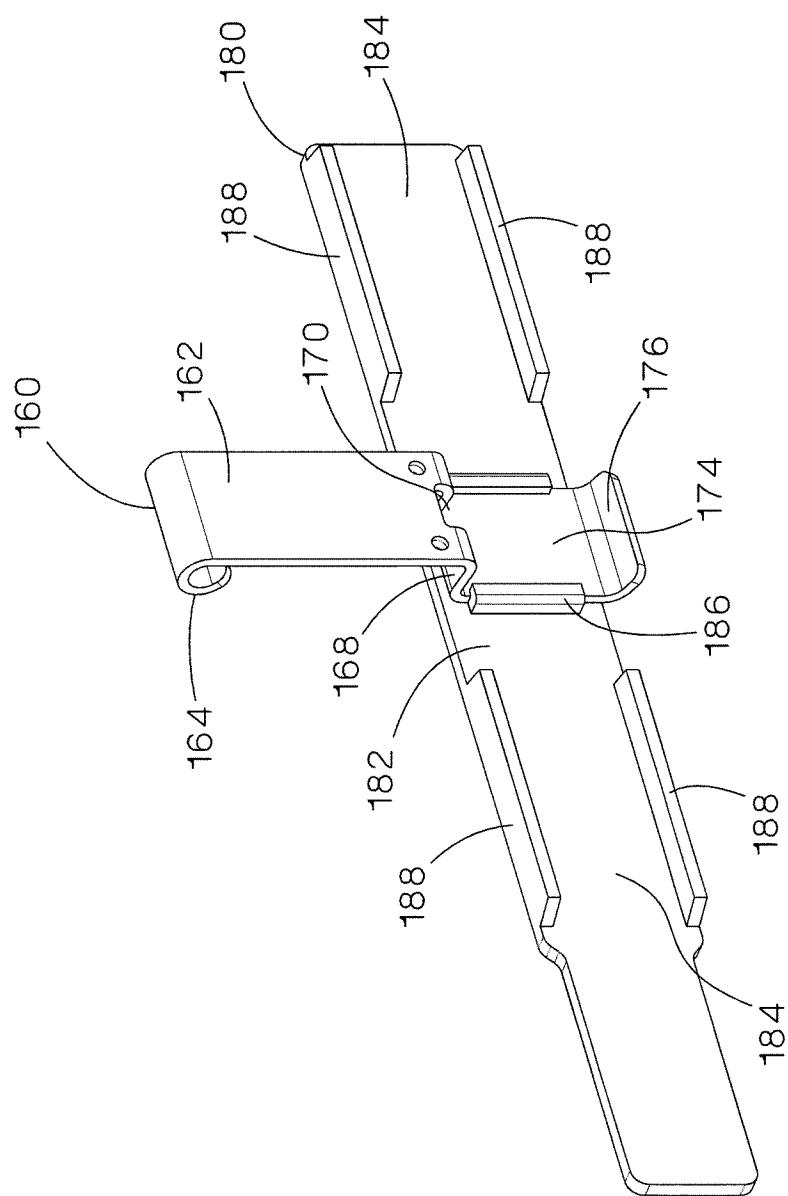


FIG. 16

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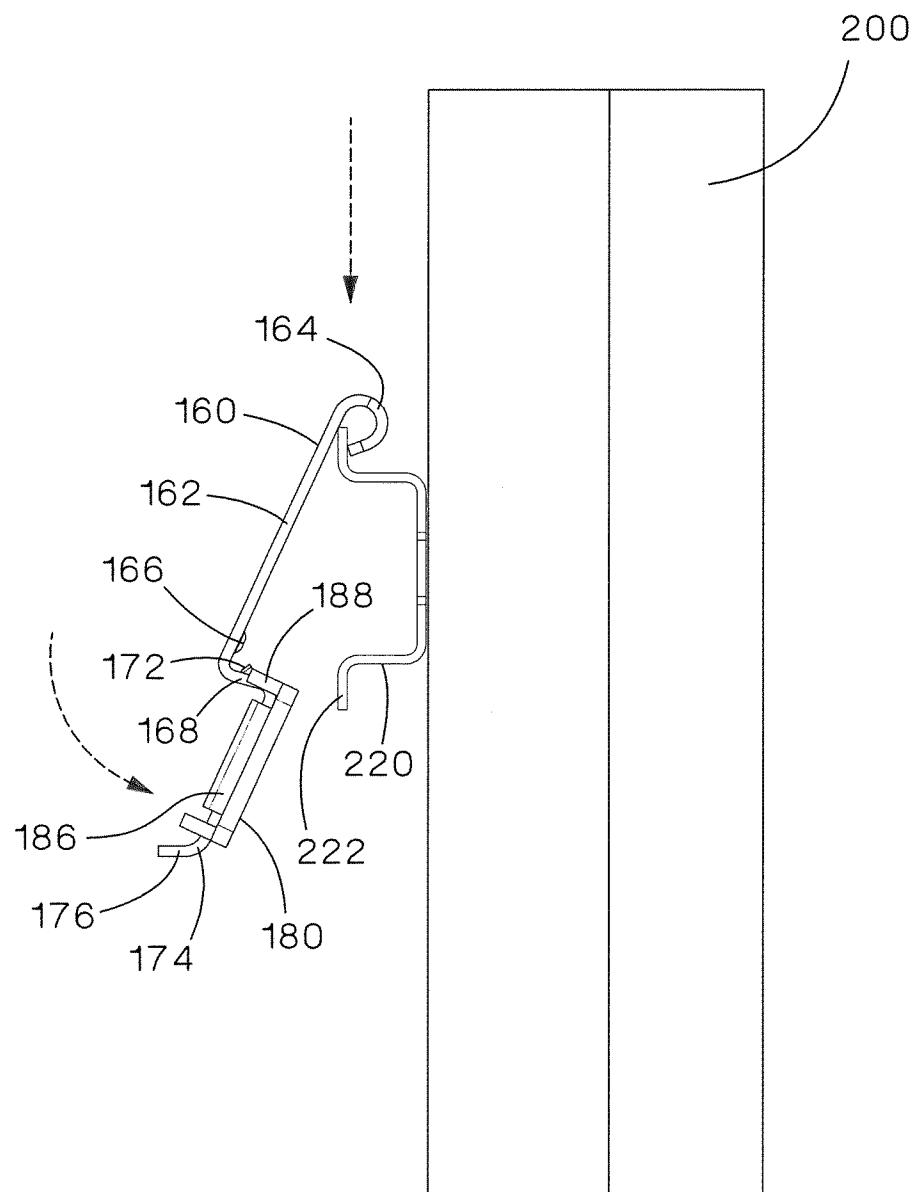


FIG.17

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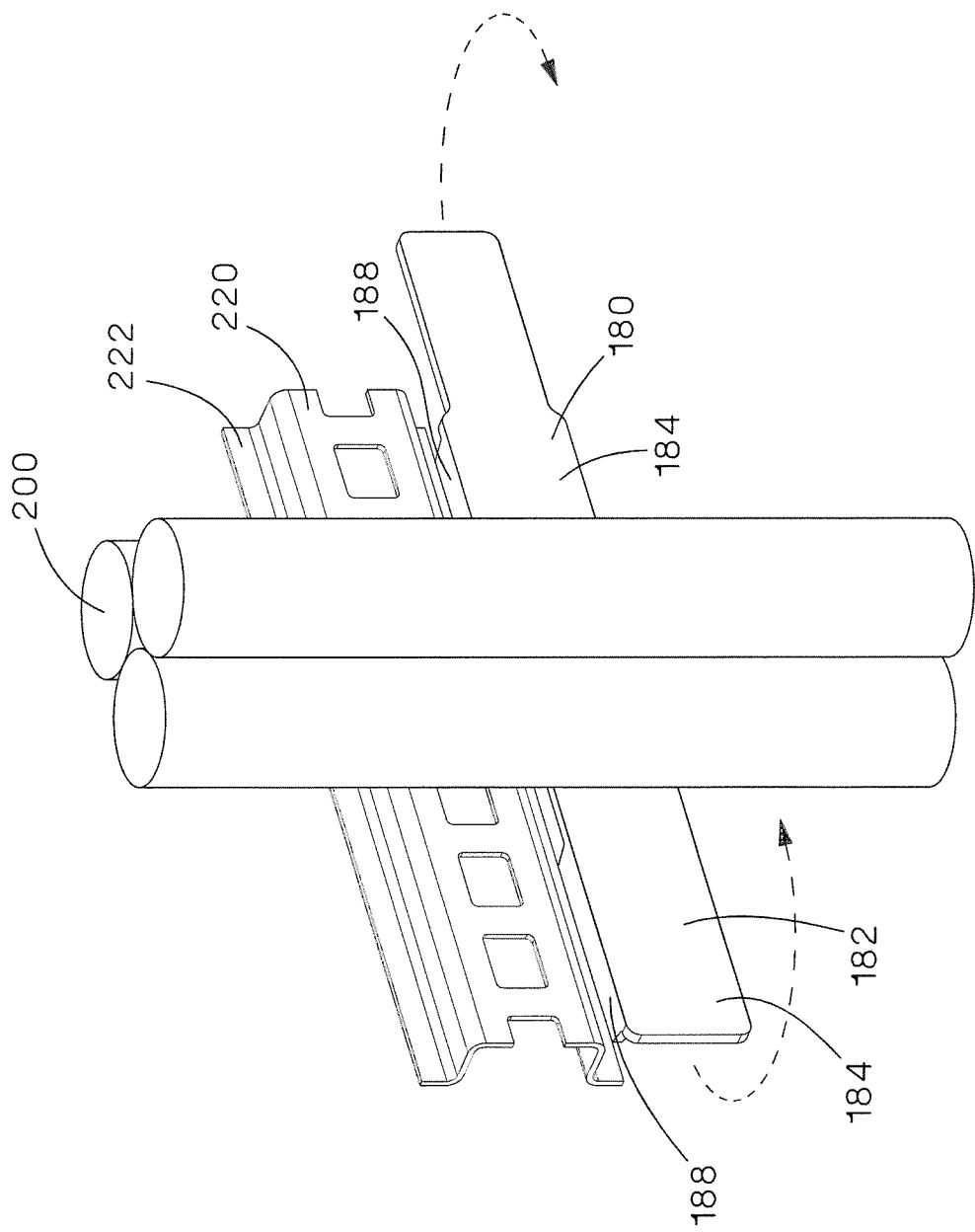


FIG. 18

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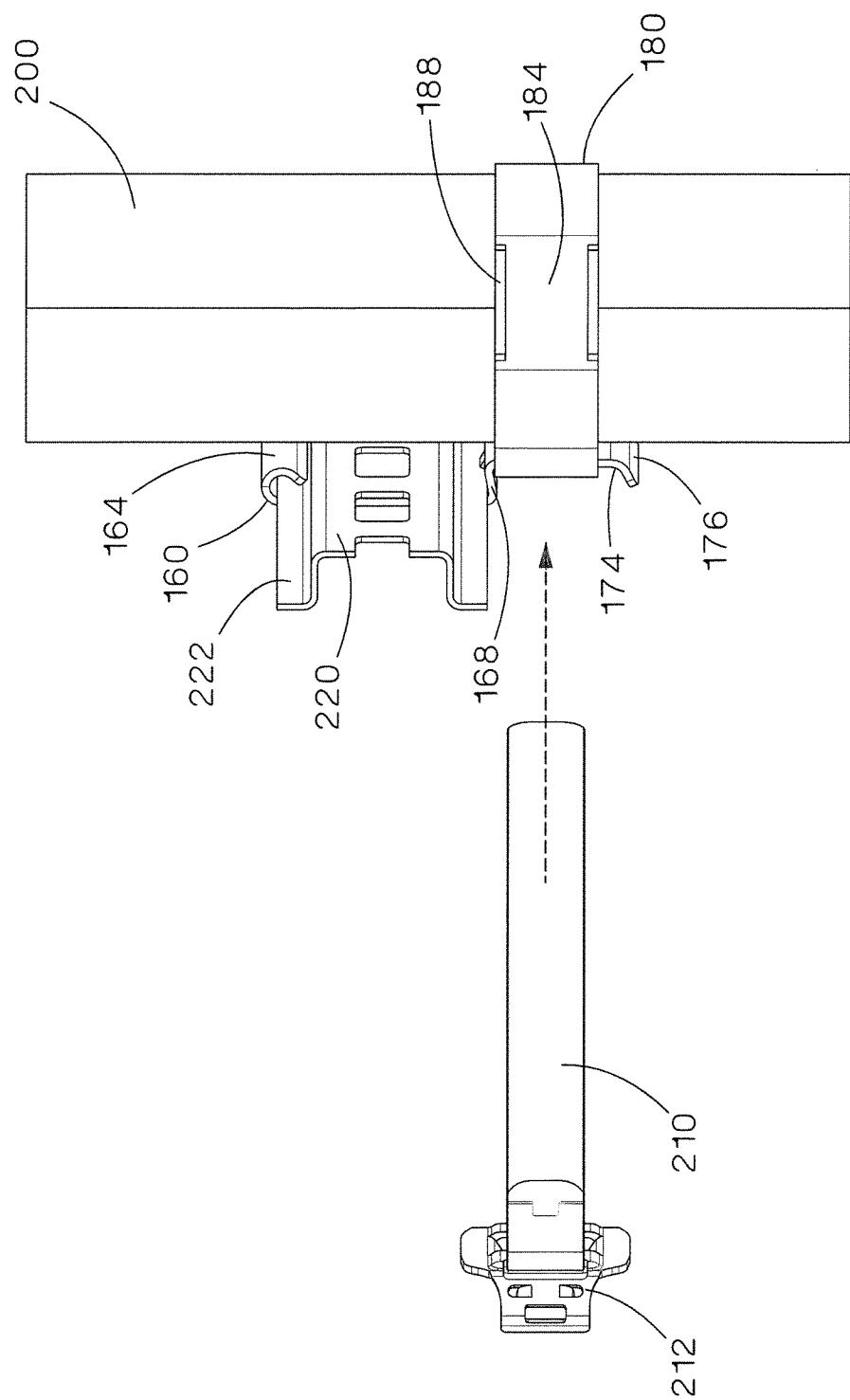


FIG.19

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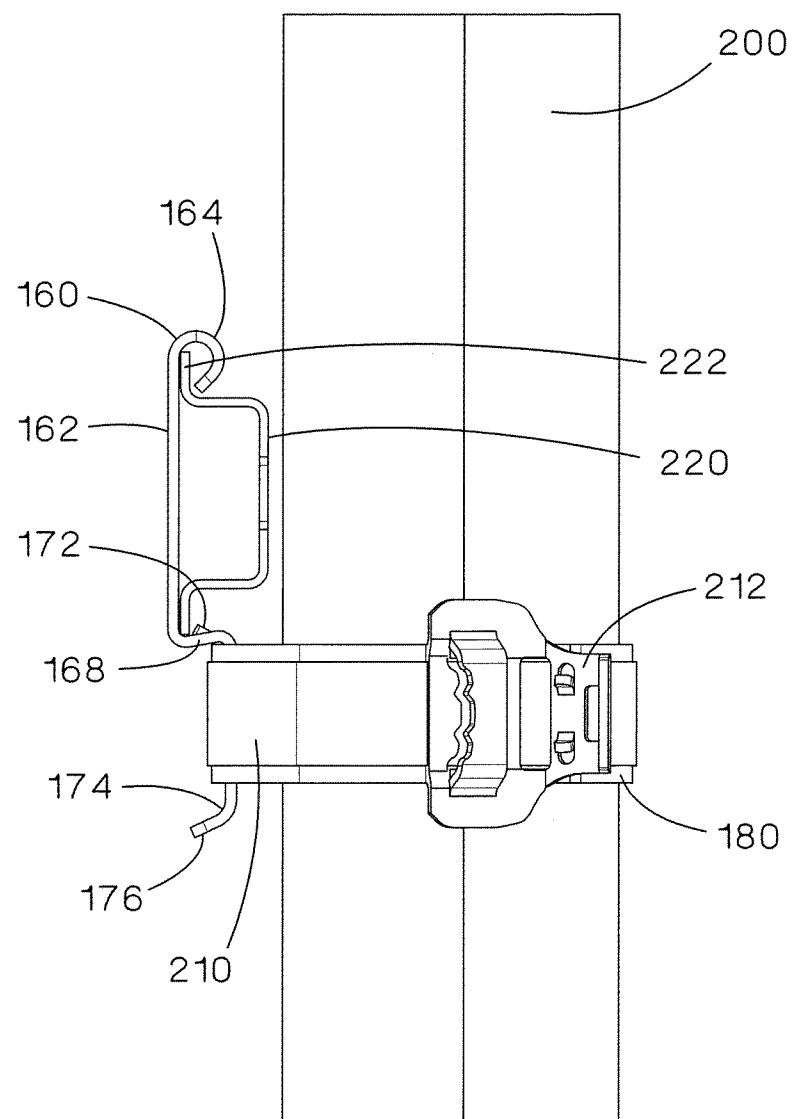


FIG.20

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/017920

A. CLASSIFICATION OF SUBJECT MATTER
INV. H02G3/04 H02G3/32
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)
H02G

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	DE 10 2008 020894 A1 (ITW AUTOMOTIVE PROD GMBH & CO [DE]) 3 December 2009 (2009-12-03) paragraphs [0019] - [0025] -----	1-17
Y	DE 103 53 706 A1 (VOLKSWAGEN AG [DE]) 16 June 2005 (2005-06-16) paragraph [0015] - paragraph [0018]; figures 2,3 -----	1-17
Y	FR 2 719 167 A1 (LEGRAND SA [FR]; LEGRAND SNC) 27 October 1995 (1995-10-27) abstract; figures 1-2 -----	1-17
A	EP 1 201 980 A2 (FRAMATOME CONNECTORS INT [FR]) 2 May 2002 (2002-05-02) abstract -----	1,10-12, 14

Further documents are listed in the continuation of Box C.

See patent family annex.

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Date of mailing of the international search report

4 July 2014

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 102008020894 A1	03-12-2009	NONE	
DE 10353706 A1	16-06-2005	NONE	
FR 2719167 A1	27-10-1995	NONE	
EP 1201980 A2	02-05-2002	AU 6962200 A 02-05-2002 BR 0105695 A 17-09-2002 CA 2360141 A1 30-04-2002 EP 1201980 A2 02-05-2002 JP 2002233024 A 16-08-2002 NZ 515065 A 01-03-2002 SG 97210 A1 18-07-2003 US 2003006347 A1 09-01-2003	