



- (51) International Patent Classification:
A62B 35/00 (2006.01) A45F 5/02 (2006.01)
- (21) International Application Number:
PCT/US2016/036385
- (22) International Filing Date:
8 June 2016 (08.06.2016)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
62/173,823 10 June 2015 (10.06.2015) US
14/821,001 7 August 2015 (07.08.2015) US
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- (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, BN, 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, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, 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, 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, LI, 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).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

[Continued on next page]

(54) Title: TOOL CONNECTOR

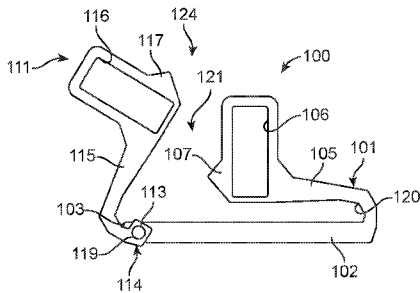


FIG. 6

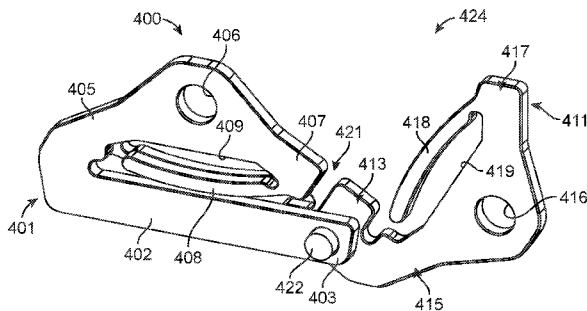


FIG. 17

(57) Abstract: A tool connector for connecting a tool to a safety harness comprises a bar portion interconnecting a first end and a second end. At least one of the first end and the second end is movable relative to another of the first end and the second end to move between an open position and a closed position. The bar portion is configured and arranged to engage one of the tool and the safety harness. The at least one of the first end and the second end form a receiver opening configured and arranged to receive another of the tool and the safety harness.



Published:

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

TOOL CONNECTOR

BACKGROUND OF THE INVENTION

[0001] Tools and tool pouches are commonly used by people who work at heights and don safety harnesses. To reduce the risk of dropping tools, the tools should be easily accessible and secured when not in use.

[0002] Tools may be attached to tethers, which interconnect the tools and the users. It may be difficult to find suitable connection points on the users' attire, and it may be difficult to store the tools when not in use.

[0003] Tool pouches allow tool and fastener carrying versatility, increased organization, and increased efficiency for people working at heights. A typical tool pouch includes a loop through which the safety harness's waist belt is positioned to connect the tool pouch to the user's harness. This provides added support and eliminates the possibility of releasing the tool pouch while working. When not in use, the tool pouch can easily be removed from the harness by sliding the waist belt out of the tool pouch's loop. Positioning the tool pouch proximate the user's waist and ergonomic hip pads helps distribute weight evenly on the user's shoulders and hips for maximum comfort that results in greater productivity. One drawback is that the position of the tool pouch on the user's waist belt could interfere with use of the side D-rings commonly used in work positioning and could make it difficult to access some of the tools or fasteners.

[0004] Therefore, there is a need for an improved tool connector for use with tools and tool pouches.

[0005] For the reasons stated above and for other reasons stated below, which will become apparent to those skilled in the art upon reading and understanding the present specification, there is a need in the art for a tool connector.

BRIEF SUMMARY OF THE INVENTION

[0006] The above-mentioned problems associated with prior devices are addressed by embodiments of the present invention and will be understood by reading and understanding the present specification. The following summary is made by way of example and not by way of limitation. It is merely provided to aid the reader in understanding some of the aspects of the invention.

[0007] In one embodiment, a tool connector for connecting a tool to a safety harness comprises a bar portion interconnecting a first end and a second end. At least one of the first end and the second end is movable relative to another of the first end and the second end to move between an open position and a closed position. The bar portion is configured and arranged to engage one of the tool and the safety harness. The at least one of the first end and the second end form a receiver opening configured and arranged to receive another of the tool and the safety harness.

[0008] In one embodiment, a tool connector for connecting a tool pouch to a safety harness having a waist pad assembly with a belt loop and a waist belt comprises a bar portion interconnecting a first end and a second end. The first end is moveable relative to the second end to move between an open position and a closed position. The bar portion is configured and arranged to engage the tool pouch. At least one of the first end and the second end form a receiver opening configured and arranged to receive the waist pad assembly.

[0009] In one embodiment, a tool connector for connecting a tool to a strap of a safety harness comprises a bar portion interconnecting a first end and a second end. The first end is moveable relative to the second end to move between an open position and a closed position. The bar portion is configured and arranged to engage the strap. At least one of the first end and the second end form a receiver opening configured and arranged to receive the tool.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The present invention can be more easily understood, and further advantages and uses thereof can be more readily apparent, when considered in view of the detailed description and the following Figures in which:

[0011] Figure 1 is a front view of a tool connector interconnecting a tool pouch and a safety harness donned by a user constructed in accordance with the principles of the present invention;

[0012] Figure 2 is a front view of the tool connector shown in Figure 1;

[0013] Figure 3 is a side view of the tool connector shown in Figure 2;

[0014] Figure 4 is a rear view of the tool connector shown in Figure 2;

[0015] Figure 5 is a top view of the tool connector shown in Figure 2;

[0016] Figure 6 is a front view of the tool connector shown in Figure 2 in an open position;

[0017] Figure 7 is a side view of the tool connector shown in Figure 6;

[0018] Figure 8 is a rear view of the tool connector shown in Figure 6;

[0019] Figure 9 is a top view of the tool connector shown in Figure 6;

[0020] Figure 10 is a front view of the tool connector shown in Figure 2 in an open position being inserted through a loop of a tool pouch;

[0021] Figure 11 is a front view of the tool connector shown in Figure 10 in a closed position being positioned on a belt loop of a safety harness;

[0022] Figure 12 is a front view of the tool connector shown in Figure 11 with a waist belt of the safety harness extending through the belt loop of the safety harness interconnecting the tool connector and the safety harness;

[0023] Figure 13 is a front view of another embodiment tool connector constructed in accordance with the principles of the present invention;

[0024] Figure 14 is a side view of the tool connector shown in Figure 13;

[0025] Figure 15 is a front view of another embodiment tool connector constructed in accordance with the principles of the present invention;

[0026] Figure 16 is a front perspective view of another embodiment tool connector constructed in accordance with the principles of the present invention;

[0027] Figure 17 is a front perspective view of the tool connector shown in Figure 16 in an open position; and

[0028] Figure 18 is a front perspective view of the tool connector shown in Figure 16 connected to a strap of a safety harness and to a carabiner.

[0029] In accordance with common practice, the various described features are not drawn to scale but are drawn to emphasize specific features relevant to the present invention.

Reference characters denote like elements throughout the Figures and the text.

DETAILED DESCRIPTION OF THE INVENTION

[0030] In the following detailed description, reference is made to the accompanying drawings, which form a part hereof, and in which is shown by way of illustration embodiments in which the inventions may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and mechanical changes may be made without departing from the spirit and scope of the present invention. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is defined only by the claims and equivalents thereof.

[0031] Embodiments of the present invention generally provide a tool connector for attaching a tool or a tool pouch to a user, for example via a safety harness donned by the user. Herein, the term tool could mean either a tool or a tool pouch in which tools are placed. The tool connector generally includes a bar portion interconnecting a first end and a second end. At least one of the first end and the second end is movable relative to another of the first end and the second end to move between an open position and a closed position. The bar portion is configured and arranged to engage the tool (or the tool pouch). The first end and the second end form a receiver opening configured and arranged to engage the safety harness.

[0032] One embodiment provides a connector including a hinge for moving the connector into open and closed positions. Two overlapping ends form a receiver opening that fits around a belt loop of a safety harness, and one end is pivoted to open the connector for insertion through a belt loop or channel of a tool pouch. After the end of the connector is inserted through the belt loop or channel of the tool pouch, the connector is moved into the

closed position. The receiver opening formed by the two ends fits around the belt loop of the harness, which is typically part of a waist pad assembly, and then the waist belt of the harness is inserted through the belt loop of the harness thereby attaching the connector to the harness. This allows the tool pouch to be connected to the harness without interfering with the side D-rings of the harness. It also allows the tool pouch to be positioned below the waist belt. Although this embodiment includes a hinge, for example a riveted pivot connection interconnecting two components, it is recognized that the connector could also have a relatively semi-rigid or rigid, unitary body with flexure in lieu of a hinge or that the connector could be made in part or in whole of a flexible material (e.g., webbing, rope, leather, and the like).

[0033] One embodiment provides a connector including a hinge for moving the connector into open and closed positions. Two overlapping ends form a receiver opening that receives a carabiner or other suitable connector and, when the carabiner is not inserted through the receiver opening, one end is pivoted to open the connector for insertion of a strap of a safety harness into an opening. After the strap is inserted into the opening, the connector is moved into the closed position. The receiver opening formed by the two ends receives the carabiner, which is connected to a tether or other suitable connecting member connected to a tool. This allows the tool to be connected to the harness in a desired location. Although this embodiment includes a hinge, for example a riveted pivot connection interconnecting two components, it is recognized that the connector could also have a relatively semi-rigid or rigid, unitary body with flexure in lieu of a hinge or that the connector could be made in part or in whole of a flexible material (e.g., webbing, rope, leather, and the like).

[0034] As shown in Figures 1-12, one embodiment provides a tool connector 100 including a first portion 101 and a second portion 111. The first portion 101 includes a bar portion 102 with an end 103 having an aperture 104. An arm 105 extends generally upward and inward from an opposing end of the bar portion 102. The distal end of the arm 105 forms an opening 106 and an end 107.

[0035] The second portion 111 includes an end 113 having an aperture 114. An arm 115 extends generally upward and inward from the end 113. The distal end of the arm 115 forms an opening 116 and an end 117. A fastener 119, such as a rivet or the like, extends through the apertures 104 and 114 to pivotally connect the ends 103 and 113.

[0036] The connector 100 is shown in the closed position 125 in Figures 2-5. In the closed position 125, the distal ends of the arms 105 and 115 overlap and the openings 106 and 116 align to form a receiver opening. An opening or a slot 120 is formed between the arms 105 and 115 and the bar portion 102. The connector 100 is shown in the open position 124 in Figures 6-9. In the open position 124, the distal ends of the arms 105 and 115 are separated and form an opening 121 that provides access to the slot 120.

[0037] To connect the connector 100 to a tool pouch 130, the connector 100 is positioned in the open position 124, the open end is inserted through a channel 131 of the tool pouch 130, the tool pouch 130 is positioned on the bar portion 102 of the connector 100, and the connector 100 is positioned in the closed position 125. Figure 10 shows the connector 100 being inserted through the channel 131 of the tool pouch 130. In the closed position 125, the ends of the connector 100 form the receiver opening. To connect the connector 100 to a waist pad assembly 136 of a safety harness 135, the receiver opening is positioned about a belt loop 137 of the waist pad assembly 136, and a waist belt 138 is inserted through the belt loop 137 of the waist pad assembly 136. Figure 11 shows the receiver opening positioned about the belt loop 137, and Figure 12 shows the waist belt 138 inserted through the belt loop 137 to connect the connector 100 to the waist pad assembly 136. The ends 107 and 117 and the corresponding shapes of the respective arms 105 and 115 provide additional surface area and strength in these areas.

[0038] The position of the tool pouch 130 below the user's waist belt 138 does not interfere with use of the side D-rings commonly used in work positioning. In addition, the lower position allows for easier access of the tools or fasteners stored in a variety of pockets and the like of the tool pouch 130. The connector 100 adds structure to the waist pad assembly 136 so the waist belt 138 does not sag and the tool pouch 130 is adequately supported.

[0039] Although any suitable material could be used, aluminum could be used because it is both strong and lightweight. Other examples of materials include, but are not limited to, polymers, steel, composites, and the like.

[0040] Other embodiments could include a belt or end loop as a receiver opening in one or both end portions. For example, as shown in Figures 13 and 14, one of the end portions 205 could include a belt or end loop 206 that extends through the opening 216 of the other

end portion 215 to form a channel 206a through which the waist belt of the waist pad assembly could be inserted to connect the connector 200 to the safety harness. The belt or end loop could be relatively wide or include two or more loops to help prevent the connector from rotating during use. This could allow different positions of the tool pouch along the waist belt and could allow use with other configurations of waist pad assemblies.

Alternatively, in another embodiment connector 300 shown in Figure 15, the end portions 305 and 315 could be spaced apart from one another rather than overlapping and both end portions 305 and 315 could include belt or end loops 306 and 316.

[0041] As shown in Figures 16-18, one embodiment provides a tool connector 400 including a first portion 401 and a second portion 411. The first portion 401 includes a bar portion 402 with an end 403 having an aperture 404. An arm 405 extends generally upward and inward from an opposing end of the bar portion 402. The distal end of the arm 405 forms an opening 406 and an end 407. A biasing member 408 extends inward from the end 407 and an opening 409 is formed between the biasing member 408 and the arm 405.

[0042] The second portion 411 includes an end 413 having an aperture (not shown). An arm 415 extends generally upward and inward from the end 413. The distal end of the arm 415 forms an opening 416 and an end 417. An optional biasing member 418 extends inward from the end 417 and an opening 419 is formed between the biasing member 418 and the arm 415. Although biasing member 418 is shown, this biasing member could be eliminated. A fastener 422, such as a rivet or the like, extends through the aperture 404 and the aperture in end 413 to pivotally connect the ends 403 and 413.

[0043] The connector 400 is shown in the closed position 425 in Figure 16. In the closed position 425, the distal ends of the arms 405 and 415 overlap and the openings 406 and 416 align to form a receiver opening. An opening or a slot 420 is formed between the biasing members 408 and 418 and the bar portion 402. The connector 400 is shown in the open position 424 in Figure 17. In the open position 424, the distal ends of the arms 405 and 415 are separated and form an opening 421 that provides access to the slot 420.

[0044] To connect the connector 400 to a strap 435 of a safety harness, the connector 400 is positioned in the open position 424, the strap 435 is inserted through the opening 421 and into the slot 420 so that it is positioned between the bar portion 402 and the biasing members 408 and 418. The biasing members 408 and 418 deflect and exert a biasing force on the strap

435 so that the connector 400 does not easily slide along the length of the strap 435. The connector 400 is positioned in the closed position 425, and a tool 438, such as a carabiner interconnecting a tether (not shown) and a tool (not shown), is inserted through the receiver opening. Figure 18 shows the connector 400 interconnecting the strap 435 and the tool 438. Although a carabiner is shown, it is recognized that a variety of different types of tools could be connected to the connector 400.

[0045] Although any suitable material could be used, aluminum could be used because it is both strong and lightweight. Other examples of materials include, but are not limited to, polymers, steel, composites, and the like.

[0046] It is recognized that features of the embodiments could be interchangeable and could be used with other embodiments.

[0047] The above specification, examples, and data provide a complete description of the manufacture and use of the composition of embodiments of the invention. Although specific embodiments have been illustrated and described herein, it will be appreciated by those of ordinary skill in the art that any arrangement, which is calculated to achieve the same purpose, may be substituted for the specific embodiment shown. This application is intended to cover any adaptations or variations of the invention. Therefore, it is manifestly intended that this invention be limited only by the claims and the equivalents thereof.

CLAIMS

1. A tool connector for connecting a tool to a safety harness, comprising:
 - a bar portion interconnecting a first end and a second end, at least one of the first end and the second end being movable relative to another of the first end and the second end to move between an open position and a closed position;
 - the bar portion being configured and arranged to engage one of the tool and the safety harness; and
 - at least one of the first end and the second end forming a receiver opening configured and arranged to receive another of the tool and the safety harness.
2. The tool connector of claim 1, wherein the first end is pivotally connected to the bar portion, the first end being pivotable between the open position and the closed position.
3. The tool connector of claim 1, wherein the first end forms a first opening and the second end forms a second opening, the first and second openings aligning to form the receiver opening.
4. The tool connector of claim 1, wherein the bar portion and the first and second ends form a slot therebetween.
5. The tool connector of claim 4, wherein the first and second ends form a slot opening in the open position providing access to the slot.
6. The tool connector of claim 4, wherein the slot receives one of the tool and a strap of the safety harness.
7. The tool connector of claim 6, further comprising at least one biasing member extending from at least one of the first end and the second end within the slot, the at least one biasing member placing a biasing force on the one of the tool and the strap.
8. The tool connector of claim 1, wherein the receiver opening is configured and arranged to receive one of a carabiner of the tool and a belt loop of the safety harness.
9. The tool connector of claim 1, wherein the receiver opening is an end loop configured and arranged to receive one of a carabiner of the tool and a waist belt of the safety harness.
10. A tool connector for connecting a tool pouch to a safety harness having a waist pad assembly with a belt loop and a waist belt, comprising:

a bar portion interconnecting a first end and a second end, the first end being moveable relative to the second end to move between an open position and a closed position; the bar portion being configured and arranged to engage the tool pouch; and at least one of the first end and the second end forming a receiver opening configured and arranged to receive the waist pad assembly.

11. The tool connector of claim 10, wherein the first end forms a first opening and the second end forms a second opening, the first and second openings aligning to form the receiver opening.
12. The tool connector of claim 10, wherein the bar portion and the first and second ends form a slot therebetween.
13. The tool connector of claim 12, wherein the first and second ends form a slot opening in the open position providing access to the slot.
14. The tool connector of claim 10, wherein the receiver opening is configured and arranged to receive the belt loop.
15. The tool connector of claim 10, wherein the receiver opening is an end loop configured and arranged to receive the waist belt.
16. A tool connector for connecting a tool to a strap of a safety harness, comprising:
a bar portion interconnecting a first end and a second end, the first end being moveable relative to the second end to move between an open position and a closed position; the bar portion being configured and arranged to engage the strap; and at least one of the first end and the second end forming a receiver opening configured and arranged to receive the tool.
17. The tool connector of claim 16, wherein the first end forms a first opening and the second end forms a second opening, the first and second openings aligning to form the receiver opening.
18. The tool connector of claim 16, wherein the bar portion and the first and second ends form a slot therebetween.
19. The tool connector of claim 18, wherein the first and second ends form a slot opening in the open position providing access to the slot.

20. The tool connector of claim 18, further comprising at least one biasing member extending from at least one of the first end and the second end within the slot, the at least one biasing member placing a biasing force on the strap.

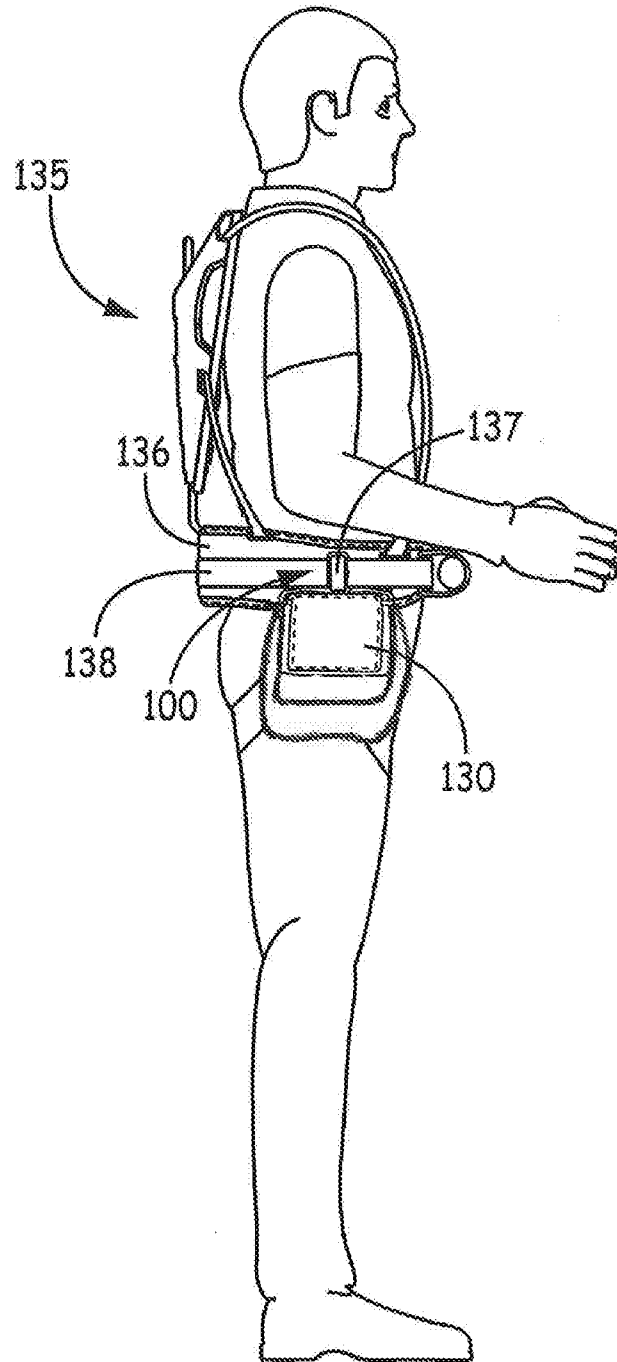


FIG. 1

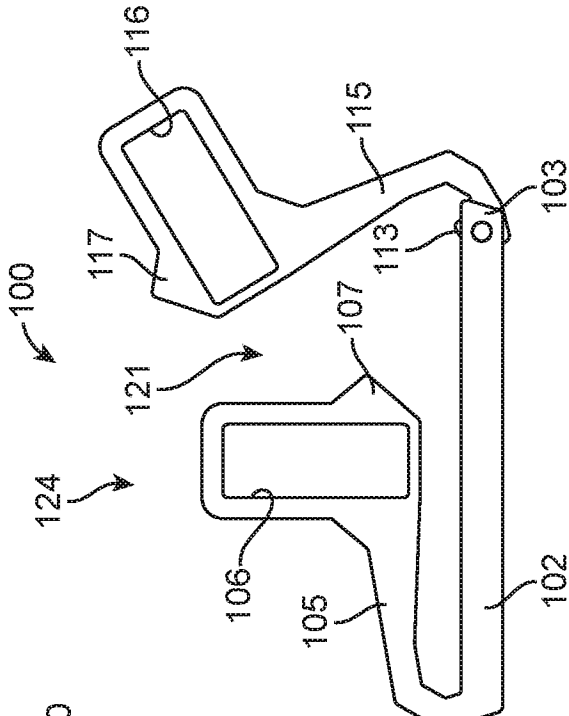


FIG. 6

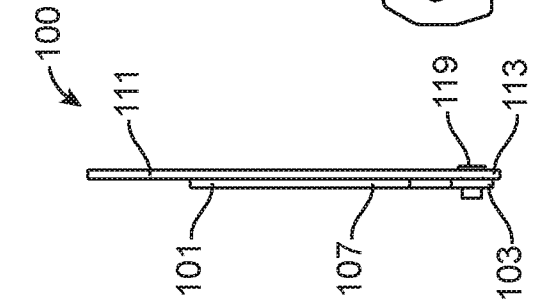


FIG. 7

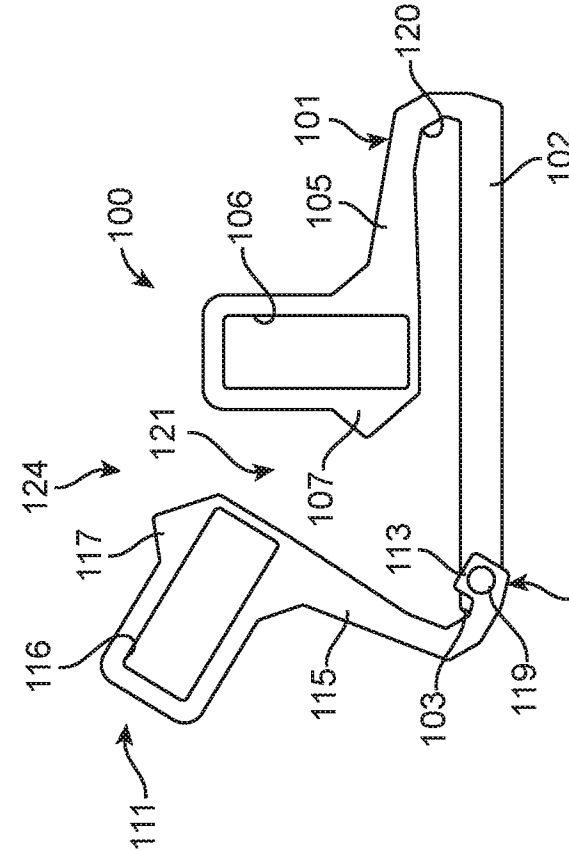


FIG. 8

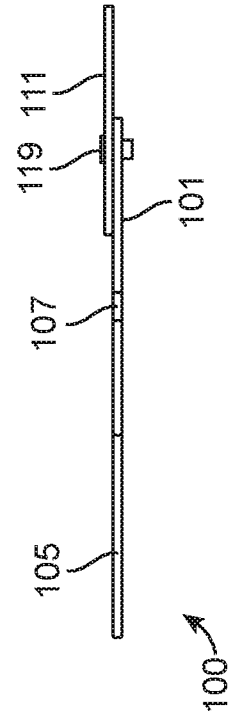


FIG. 9

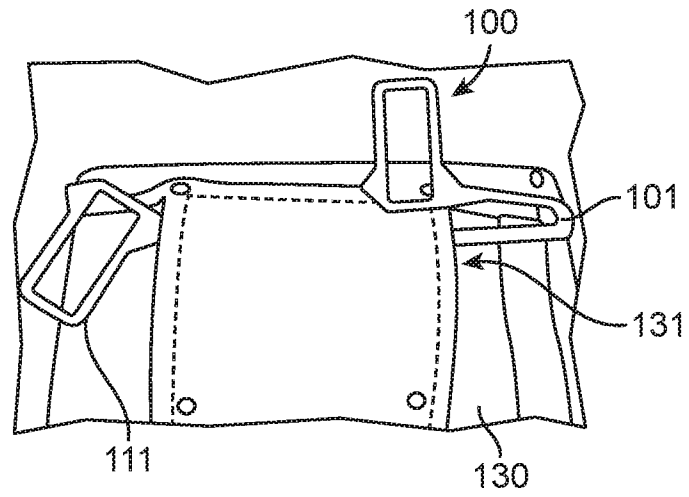


FIG. 10

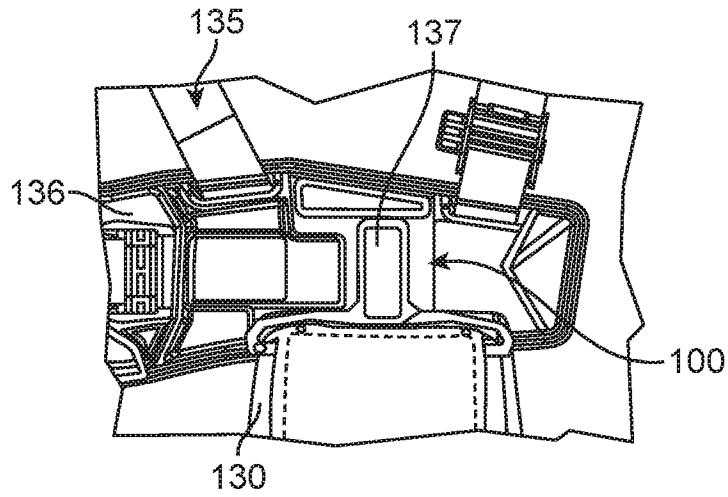


FIG. 11

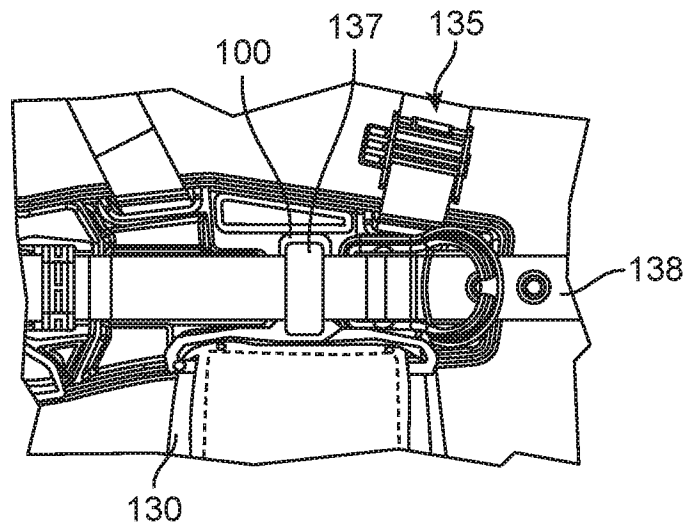


FIG. 12

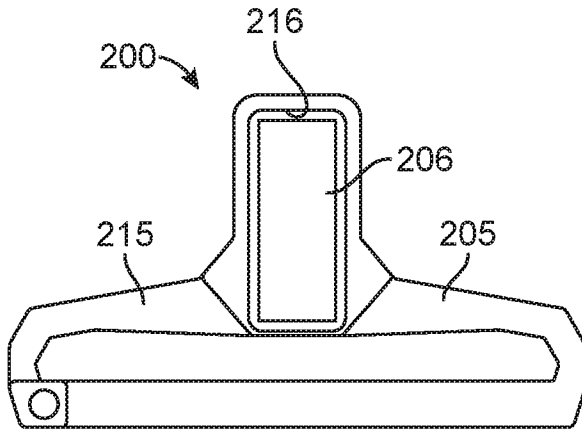


FIG. 13

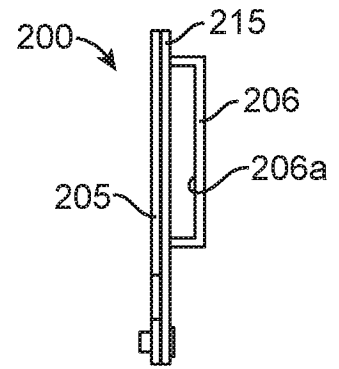


FIG. 14

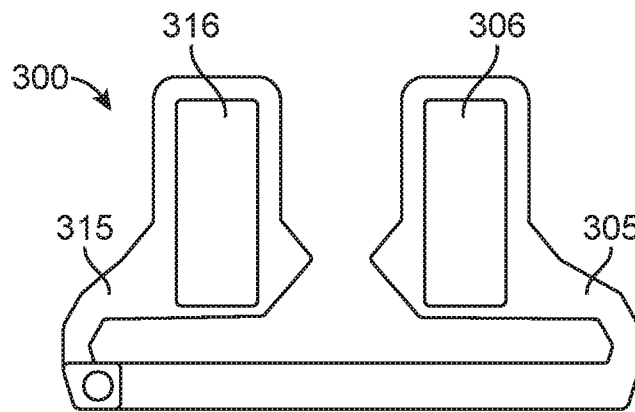


FIG. 15

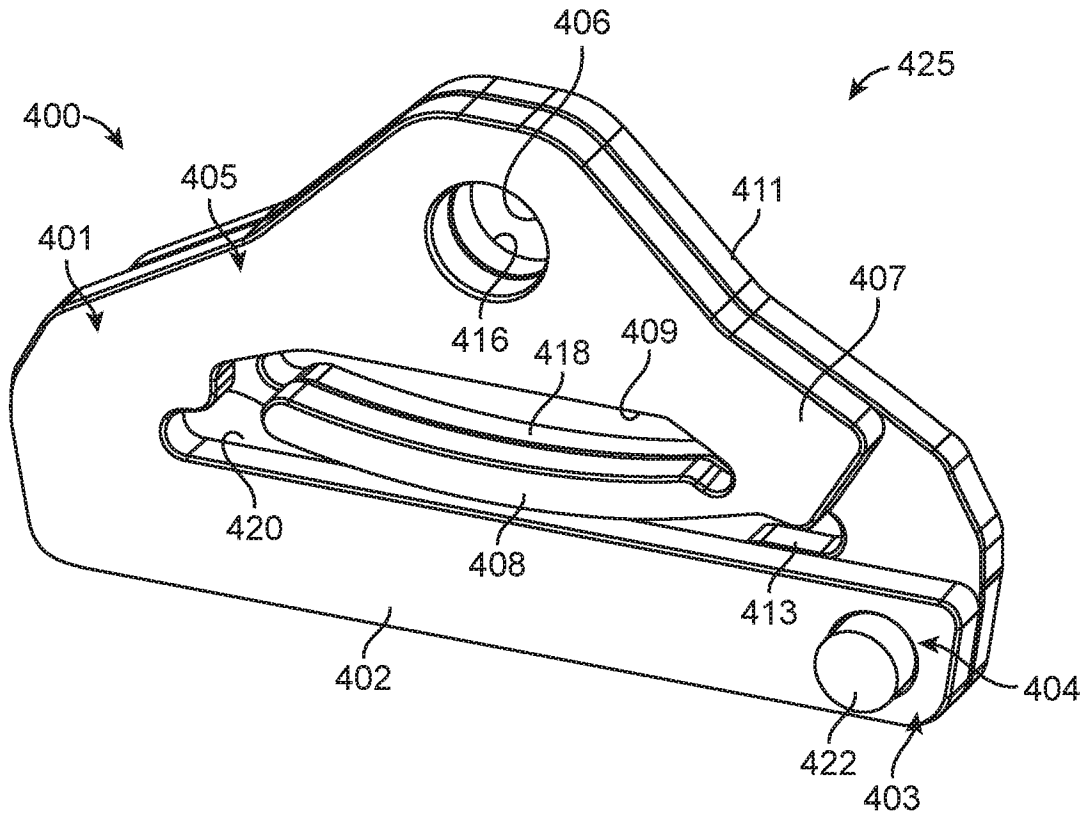


FIG. 16

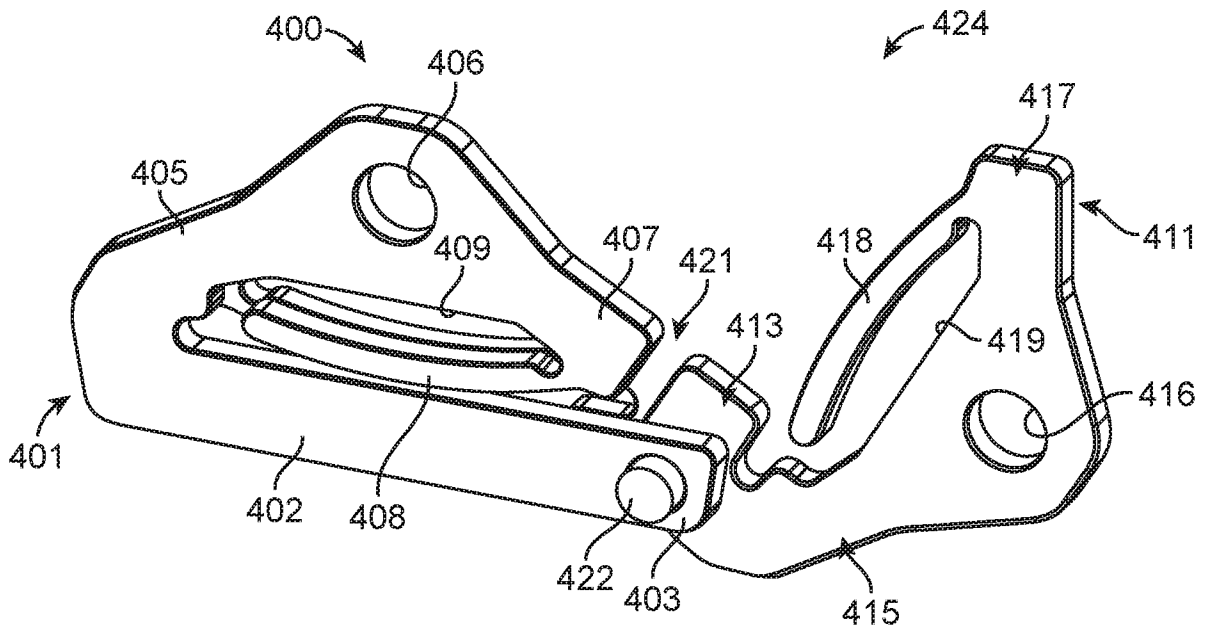


FIG. 17

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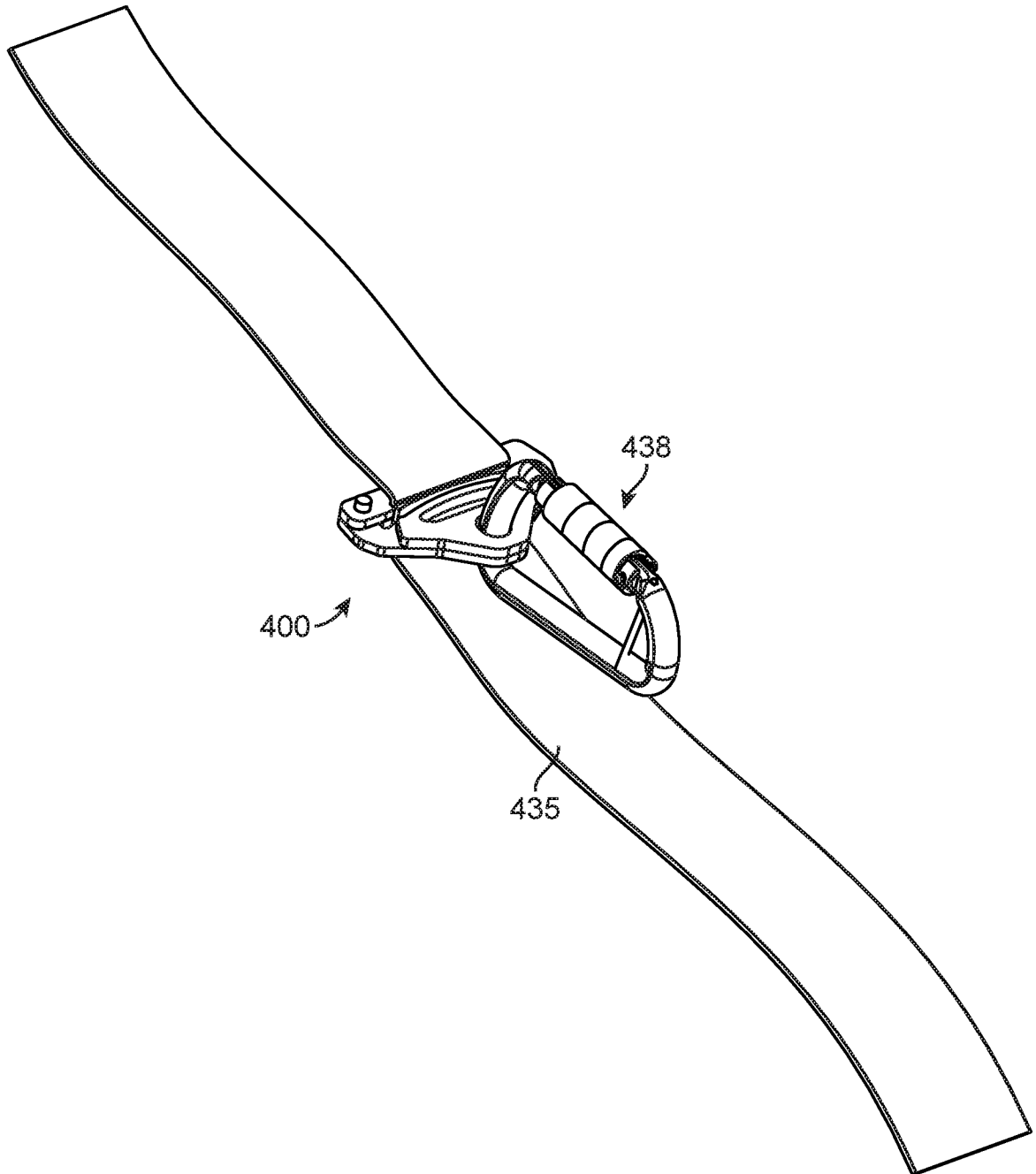


FIG. 18

INTERNATIONAL SEARCH REPORT

International application No PCT/US2016/036385

A. CLASSIFICATION OF SUBJECT MATTER INV. A62B35/00 A45F5/02 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) A62B A45F F16B				
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	GB 2 090 132 A (SUMNER ALAN) 7 July 1982 (1982-07-07) the whole document -----	1,2,4-6, 8-10, 12-16, 18,19		
X	GB 2 387 617 A (DONUT SAFELAND LTD [GB]) 22 October 2003 (2003-10-22) the whole document -----	1,2,4-6, 8-10, 12-16, 18,19		
X	US 4 094 047 A (CARLSSON GUNILLA A) 13 June 1978 (1978-06-13) claims; figures -----	1,2,4-6, 8-10, 12-16, 18,19		
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<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.				
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INTERNATIONAL SEARCH REPORT

International application No PCT/US2016/036385

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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