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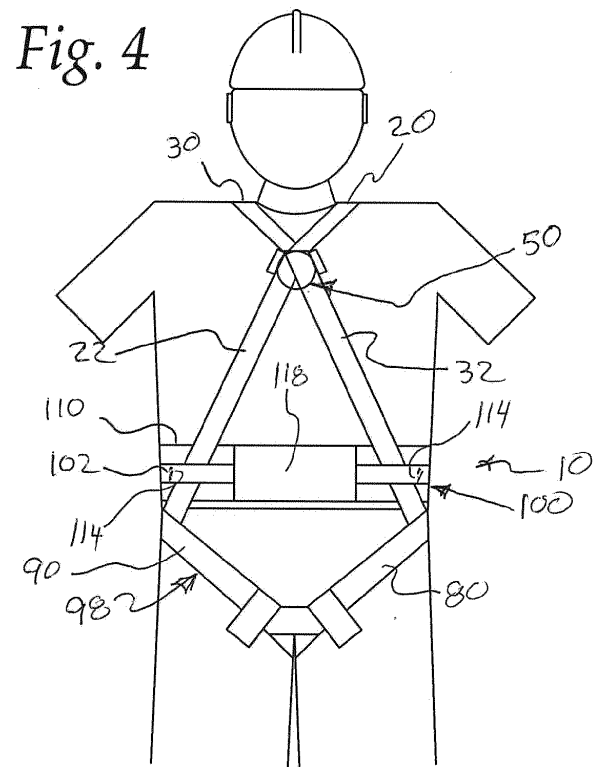
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(54) **Safety harness with vertically adjustable belt**

(57) A safety harness (10) is provided to be worn by a person for fall protection. The safety harness includes an upper leg portion (98) adapted to secure the harness (10) to the upper legs of a person wearing the harness (10), an upper torso portion (12) operatively connected to the upper leg portion (98) and adapted to secure the harness (10) to the upper torso of a person wearing the harness (10). The upper torso portion (12) includes at least one anchor connection component (50,56,58) for receiving a connector that is attached to an anchor for fall protection, and a belt (100) adapted to secure the harness (10) around the waist of a person wearing the harness (10). The belt (100) is mounted on the upper torso portion (12) for vertical translation relative to the at least one anchor connection component (50,56,58) after the upper leg and upper torso portions (98,12) are secured to a person.



Description**CROSS-REFERENCE TO RELATED APPLICATIONS**

[0001] Not Applicable.

FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not Applicable.

MICROFICHE/COPYRIGHT REFERENCE

[0003] Not Applicable.

FIELD

[0004] This disclosure relates to safety equipment and harnesses, and in more particular applications, to fall protection equipment in the form of full body safety harnesses that are worn by people who are at risk of falling from an elevated location.

BACKGROUND

[0005] Safety harnesses are commonly used as part of a fall protection system for persons subjected to the potential of a fall from a height. In the workplace, full-body safety harnesses are generally used. Such harnesses, which typically include both an upper torso portion (having, for example, shoulder straps) and a lower torso portion (having, for example seat straps and leg straps), can be designed in many alternative manners.

[0006] Many currently available full-body safety harnesses are manufactured from relatively inelastic, woven webbing materials such as nylon or polyester. A flexible and elastic harness, as described in U.S. Pat. No. 6,006,700, has been introduced that greatly improves the comfort of the user during normal use of the safety harness. A safety harness with blunted edges for further increasing the comfort of the user is disclosed in U.S. Pat. No. 6,739,427. These documents can be referenced for an understanding of the materials and constructions of some examples of harness with which the features disclosed herein can be employed.

[0007] Although the comfort of safety harnesses during normal use and even during a fall arrest has been greatly improved in the above-described harnesses, the underlying design of currently available safety harnesses still leads to a number of problems including, for example, comfort problems and adjustment problems.

[0008] As one example, for purposes of comfort, some people occasionally desire to alter the position of the belt portion of a full body safety harness on their body after they have donned the safety harness and worn it for a period of time. This can create problems because it is important for any anchor connection on the harness (typically a D-ring) to be properly located on a user's body,

but the anchor connection(s) can be moved from the proper location(s) when the position of the belt of a safety harness is altered after the harness has been properly donned.

SUMMARY

[0009] In accordance with one feature of this disclosure, a safety harness is provided to be worn by a person for fall protection. The safety harness includes an upper leg portion adapted to secure the harness to the upper legs of a person wearing the harness, an upper torso portion operatively connected to the upper leg portion and adapted to secure the harness to the upper torso of a person wearing the harness, the upper torso portion including at least one anchor connection component for receiving a connector that is attached to an anchor for fall protection, and a belt adapted to secure the harness around the waist of a person wearing the harness, the belt mounted on the upper torso portion for vertical translation relative to the at least one anchor connection component after the upper leg and upper torso portions are secured to a person.

[0010] As one feature, the belt is mounted on the upper torso portion for vertical translation relative to the upper torso portion after the upper leg and upper torso portions are secured to a person.

[0011] In one feature, the upper leg portion includes a pair of leg straps each adapted to encircle a corresponding leg of a person wearing the harness.

[0012] According to one feature, the upper torso portion includes a pair of shoulder straps operatively connected to the upper leg portion, each of the shoulder straps configured to extend over a corresponding shoulder of a person wearing the strap.

[0013] As one feature, the upper torso portion includes a chest strap configured to extend horizontally across the upper chest of a person wearing the safety harness.

[0014] In one feature, the at least one anchor connection component is a D-ring.

[0015] According to one feature, the at least one anchor connection component is a D-ring fixed to the upper torso portion so that the D-ring is located on the upper back of a person wearing the safety harness.

[0016] As one feature, the upper torso portion includes a pair of shoulder straps operatively connected to the upper leg portion, each of the shoulder straps configured to extend over a corresponding shoulder of a person wearing the strap, the shoulder straps crossing each other so that one strap overlies the other at a location that corresponds to the upper back of a person wearing the safety harness; and the at least one anchor connection component is a D-ring fixed to the upper torso portion at the location where the shoulder straps cross.

[0017] In one feature, the belt includes an elongate waist strap configured to encircle the waist of a person wearing the safety harness and to be tightened around the waist to secure the belt to the person, and an elongate

load distributing member underlying the waist strap and extending along a length of the waist strap to distribute forces transferred between the waist strap and a person wearing the safety harness, the load distributing member located so that it extends across the back of a person wearing the harness.

[0018] According to one feature, the elongate waist strap is fixed to the load distributing member at locations spaced along the length of the waist strap.

[0019] As one feature, the waist strap is fixed to the load distributing member by stitching.

[0020] In one feature, a securing member overlies the waist strap at a central location along the length of the waist strap, the securing member fixed to at least the load distributing member with the waist strap sandwiched between the securing member and the load distributing member.

[0021] According to one feature, part of the belt is mounted to the upper torso portion by part of the upper torso portion extending between the waist strap and the load distributing member so that the part is sandwiched between the waist strap and the load distributing member while being free to translate relative to the waist strap and the load distributing member.

[0022] As one feature, the upper torso portion includes a pair of shoulder straps operatively connected to the upper leg portion, each of the shoulder straps configured to extend over a corresponding shoulder of a person wearing the strap, and the part of the upper torso portion includes lengths of the shoulder straps. In a further feature, the elongate waist strap is fixed to the load distributing member on opposite sides of each of the lengths of the shoulder straps so that the lengths are sandwiched between the waist strap and the load distributing member allowing the belt to translate relative the lengths along the lengths.

[0023] Other features and advantages will become apparent from a review of the entire specification, including the appended claims and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024]

Fig. 1 is a somewhat diagrammatic, front view of a person wearing a portion of a safety harness according to this disclosure;

Fig. 2 is a back view of the person and portion of the safety harness shown in Fig. 1;

Fig. 3 is a view similar to Fig. 1 but showing the addition of a belt of the safety harness according to this invention;

Fig. 4 is a back view of the safety harness including the belt of Fig. 3;

Figs. 5 and 6 are views similar to Figs. 3 and 4, but showing the belt in a higher vertical position on the person; and

Fig. 7 is a somewhat diagrammatic, enlarged plan view of the belt shown in Figs. 2-5.

DETAILED DESCRIPTION

[0025] Referring to Figs. 1 and 2, an embodiment of a full-body safety harness 10 of the present disclosure is shown, with a belt component of the safety harness 10 removed for purposes of illustration in Figs. 1 and 2. The overall structural design of the safety harness 10 components shown in Figs. 1 and 2 corresponds generally, for example, to the DURAFLEX ULTRA Model safety harness, model E650QC-UGN, available from Miller By Honeywell. Safety harness 10 includes an upper torso portion 12 comprising first and second shoulder straps 20 and 30 for extending over the shoulders of the user and a chest strap 40 for extending over an upper portion of the chest of the user to secure the harness 10 to the upper torso of the user.

[0026] As illustrated in Fig. 2, a first end of each of the shoulder straps 20 and 30 extends down over the back of the user to form first and second generally longitudinal back straps 22 and 32, respectively. Longitudinal back straps 22 and 32 of shoulder straps 20 and 30 cross through and connect to an anchor connection component illustrated in the form of a typical D-ring 50 as known in the art. As is known and typical, D-ring 50 includes a harness connection portion 52 and an anchor portion 54. Harness connection portion 52 enables fastening of D-ring 50 to the safety harness 10 via longitudinal back straps 22 and 32. Anchor portion 54 is adapted to be connected to a nylon rope, a chain, webbing carabineer or other connector which may be used to anchor a user wearing safety harness 10. As shown in Fig. 1, the harness 10 may include anchor connection components 56 and 58, which can also be provided in the form of a typical D-ring or other suitable and known structures.

[0027] Those skilled in the art will appreciate that the location of the anchor connection component 50 (and the anchor connection components 56 and 58, if provided) are very important for the safety of the user wearing the safety harness 10, and that because of this, it is important for a user to properly adjust the harness 10 on their body in order to provide the proper locations of any anchor components 50, 56 and 58. In this regard, for many conventional full body safety harnesses, it is desirable for an anchor component such as the anchor component 50 to be located on the upper back of the user, just below the neckline and between the shoulder blades. Similarly, if provided, it is typically desired that the anchor connections 56 and 58 be located in the upper chest region of the user adjacent or overlying the pectoral muscles of the user.

[0028] A second end of each of shoulder straps 20 and

30 extends downward over the front of the user as illustrated in Fig. 1 to from generally longitudinal first and second front straps 24 and 34, respectively. As best seen in Fig. 3, a first chest strap portion 42 is preferably attached to front strap 24 and a second chest strap portion 44 is attached to front strap 34. Each of first and second chest straps 42 and 44 have cooperating fastening members 46 and 48 on the ends thereof to enable attachment of first and second chest strap portions 42 and 44 to form chest strap 40, with at least one of the fastening members 46 and 48 allowing adjustment of the length of the corresponding chest strap portions 42 and 44. It should be understood that there are many known and suitable types of fastening members 46 and 48, all of which are considered to be within the scope of the safety harness 10 disclosed herein.

[0029] First and second front straps 24 and 34 extend further downward and preferably include adjustment members 26 and 36 (for example, adjustable buckles) as known in the art for adjustment of the fit of safety harness 10 on the upper torso of the user. Again, it should be understood that there are many known and suitable types of adjustment members/buckles that can be used for the adjustment members 26 and 36, all of which are considered to be within the scope of the safety harness 10 disclosed herein.

[0030] As shown in the illustrated embodiment, attached to and extending from the shoulder straps 20 and 30 are a first and a second leg strap 80 and 90, respectively. Each of first and second leg straps 80 and 90 pass around the upper leg or thigh of a corresponding leg of the user to be attached to the distal ends of shoulder straps 20 and 30, respectively. Each of first and second leg straps 80 and 90 preferably include fastening members 82 and 84, and 92 and 94, respectively such as adjusting buckle members as are known in the art, again, with any suitable and known form being contemplated within the scope of this disclosure.

[0031] It will be appreciated by those skilled in the art that, in the illustrated embodiment, the straps 20, 22, 24, 30, 32, 34 and 40 define an upper torso portion 12 of the harness 10 that secures the harness 10 to the upper torso of a person, while the straps 80 and 90 define an upper leg portion 98 of the harness 10 that secures the harness 10 to the upper legs or thighs of a person. Typically, all of the straps of the harness 10 will be fixed to each other using any suitable means, such as, for example, lines of stitching and/or rivets. Typically, all of the straps for the harness will be made from a suitable webbing material, many of which are known. However, the straps of the harness 10 can be made from any other suitable material, such as, for example, leather strapping.

[0032] Referring to Figs. 3 and 4, the safety harness 10 is shown in its complete form as including a belt 100 that is adapted to secure the harness 10 around the waist of a user wearing the harness 10. The belt 100 is mounted on the upper torso portion 12 for vertical translation relative to the anchor connection 50 (and the anchor con-

nections 56 and 58, if provided) after the upper leg and upper torso portions 98 and 12 have been secured to a user. In this regard, in the illustrated embodiment, the belt 100 is mounted on the upper torso portion 12 for vertical translation relative to the entire upper torso portion 12 after the upper leg and upper torso portions 98 and 12 are secured to a user, with any anchor connections 50, 56 and 58 being properly located on the user's body.

[0033] In the illustrated embodiment, the belt 100 includes an elongate waist strap 102 configured to encircle the waist of a user wearing the safety harness 10 and to be tightened around the waist to secure the belt 100 to the user. In this regard, adjustable fastener buckles 104 and 106 of any suitable and known type can be included on the ends of the waist strap 102. The belt 100 further includes an elongate load distributing member 110 underlying the waist strap 102 and extending along a length of the waist strap 102 to distribute forces transferred between the waist strap 102 and the person wearing the safety harness 10. As best seen in Fig. 4, the load distributing member 110 is located so that it extends across the back of a user wearing the harness 10. The elongate load distributing member 110 can be made of any suitable material, many of which are known, and can further include padding as required for the comfort of a user. In this regard, safety harness belts are known and include waist straps and load distributing members, such as the waist strap 102 and the load distributing member 110, and this disclosure contemplates that any of the known materials for the known belts can be utilized for the belt construction 100.

[0034] As best seen in Fig. 7, the elongate waist strap 102 is fixed to the load distributing member 110 at locations 112 spaced along the length of the waist strap 102. In this regard, any suitable means can be fixed to use the waist strap 102 to the load distributing member 110, such as the illustrated stitching 114. The belt 100 further includes a securing member 118 overlying the waist strap 102 at a central location along the length of the waist strap 102. The securing member 118 is fixed to at least the load distributing member 110 with the waist strap 102 sandwiched between the securing member 116 and the load distributing member 110. In this regard, the securing member 118 may be fixed to the load distributing member 110 using any suitable means, such as via the stitching 120 shown in the illustrated embodiment and, although not illustrated, may also be fixed via stitching or other suitable means to the waist strap 102.

[0035] As best seen in Fig. 4, the belt 100 is mounted to the upper torso portion 12 by part of the upper torso portion extending between the waist strap 102 and the load distributing member 110 so that the part is sandwiched between the waist strap 102 and the load distributing member 110 while being free to translate relative to the waist strap 102 and the load distributing member 110. In this regard, in the illustrated embodiment, it is the back straps 22 and 32 of the upper torso portion 12 that

extend between the waist strap 102 and the load distributing member 110 and that are sandwiched between the waist strap 102 and the load distributing member 110 while allowing the belt 100 to translate freely along the length of the straps 22 and 32 so that the belt 100 can translate vertically relative to the upper portion 12, including any anchor connections 50, 56 and 58, after the upper portion 12 and the upper leg portion 98 have been properly secured to a user. This vertical translation is illustrated by a comparison between the position of the belt 100 shown in Figures 3 and 4 and the higher vertical position of the belt shown in Figures 5 and 6, with the remainder of the harness 10 maintaining their proper locations in Figs. 3-6. As best seen in Fig. 4, the waist belt 102 is fixed to the load distributing member 110 via the securing member 118 and the stitching 114 located on opposite sides of each of the back straps 22 and 32 to ensure that the back straps 22 and 32 remain sandwiched between the waist strap 102 and the load distributing member 110 while allowing the belt 100 to translate relative to the lengths of the back straps 22 and 32.

[0036] As best seen in Figure 7, the belt 100 may optionally include anchor connections 130 and 132 (typical D-rings), material attachment rings 134 and material attachment strap 136, with some of the attachment rings 134A being fixed along the length of the waist strap 102 and other of the attachment rings 134b being translatable along the length of the waist strap 102.

[0037] It should be understood that while specific embodiments of the harness 10 have been illustrated and described herein, this disclosure contemplates other configurations and forms within the scope of this disclosure. For example, either in addition to, or in replacement of, the front straps 24 and 34 may be sandwiched between portions of the waist strap 102 and load distributing member 110 to allow vertical translation of the belt 100 relative to the anchor connections 50, 56 and 58 and the upper portion 12 after the upper leg and upper torso portions 98 and 12 have been properly secured to a user.

Claims

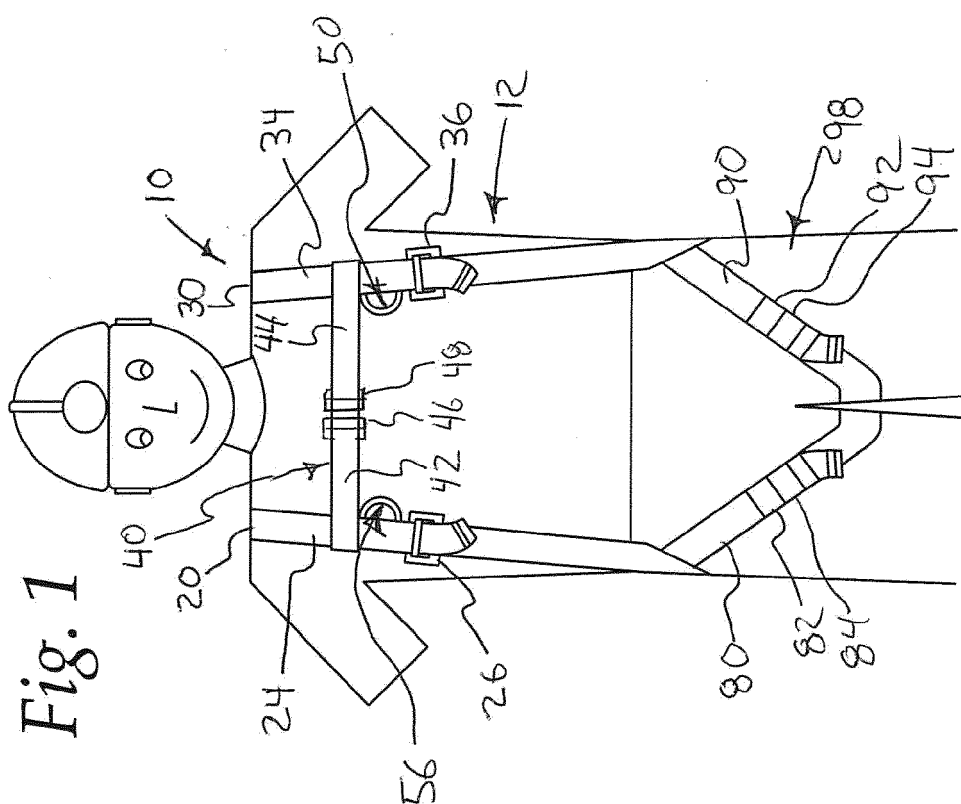
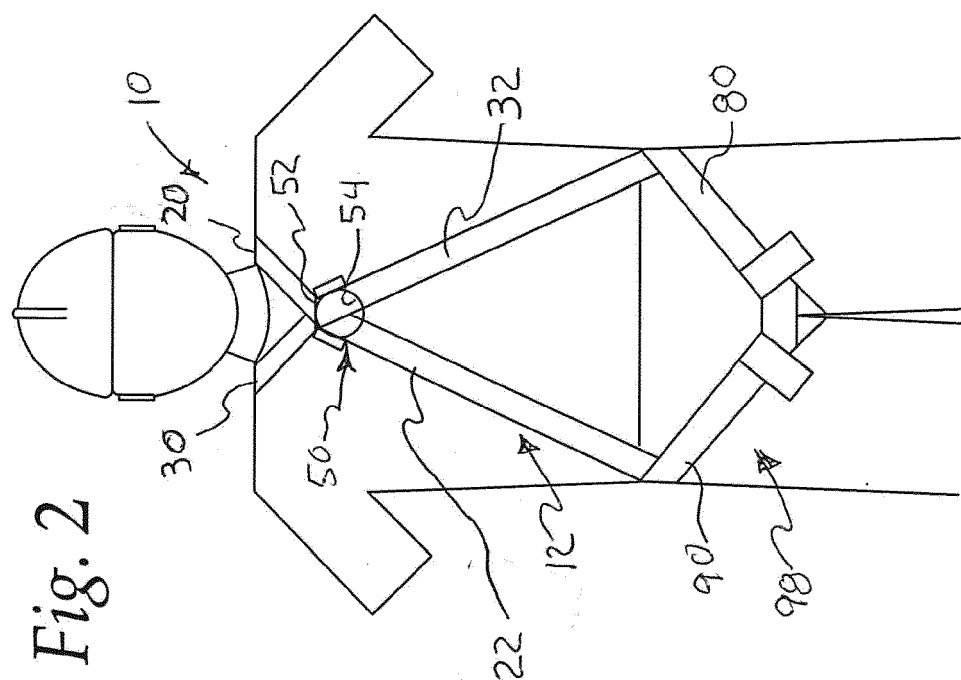
1. A safety harness (10) to be worn by a person, the safety harness (10) comprising;
 - an upper leg portion (98) adapted to secure the harness (10) to the upper legs of a person wearing the harness (10);
 - an upper torso portion (12) operatively connected to the upper leg portion (98) and adapted to secure the harness (10) to the upper torso of a person wearing the harness (10), the upper torso portion (12) comprising at least one anchor connection component (50,56,58) for receiving a connector that is attached to an anchor for fall protection; and
 - a belt (100) adapted to secure the harness (10) around the waist of a person wearing the harness (10), the belt (100) mounted on the upper torso por-

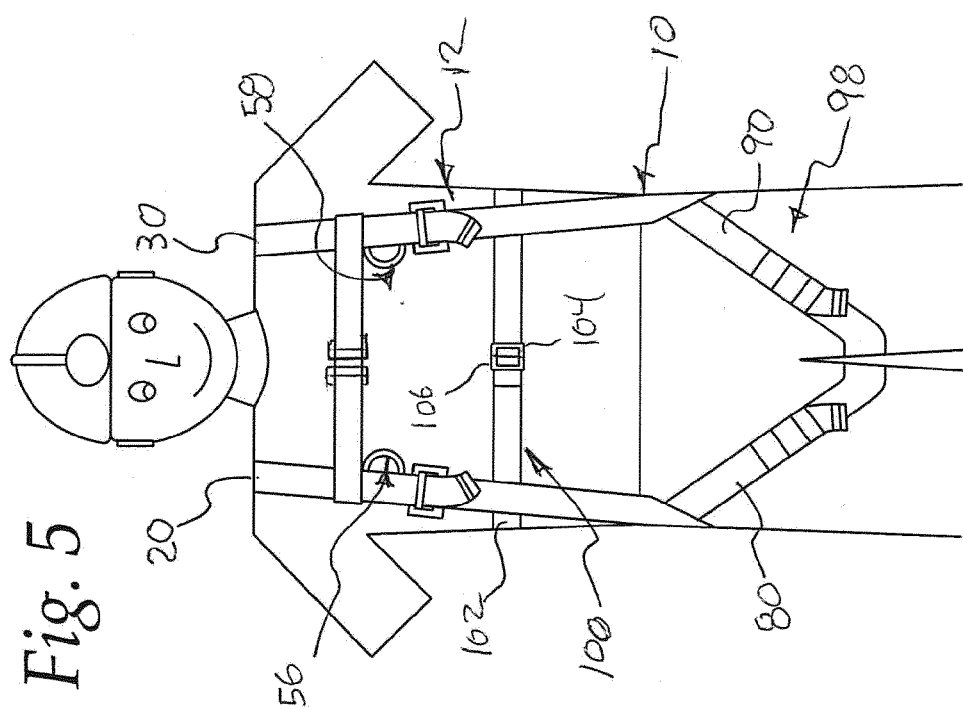
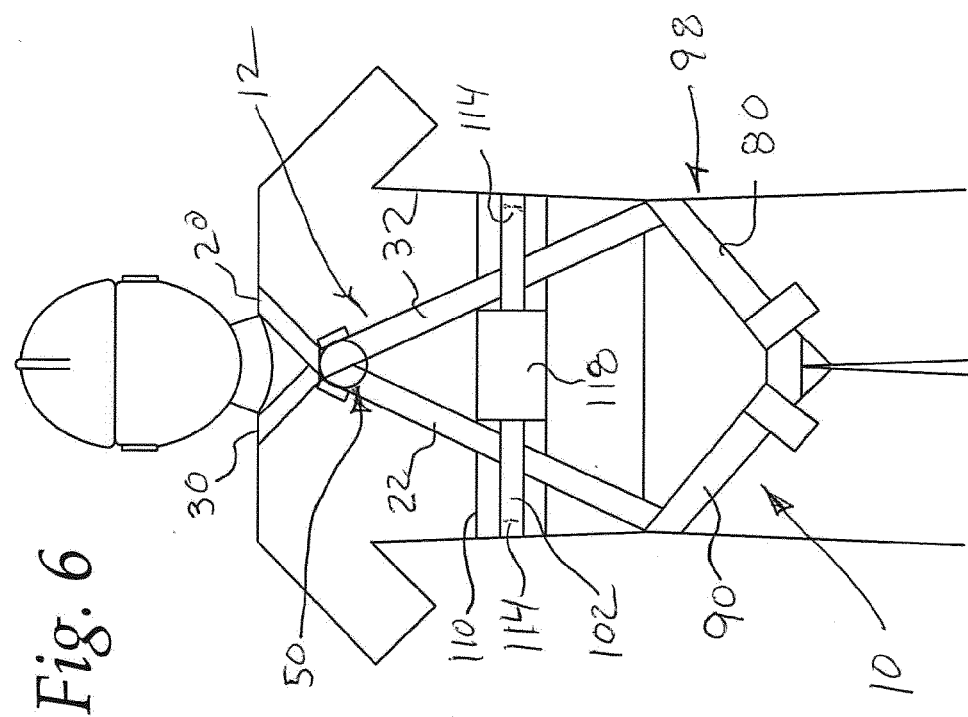
tion (12) for vertical translation relative to the at least one anchor connection component (50,56,58) after the upper leg and upper torso portions (98,12) are secured to a person.

2. The safety harness (10) of claim 1 wherein the belt (100) is mounted on the upper torso portion (12) for vertical translation relative to the upper torso portion (12) after the upper leg and upper torso portions are secured to a person.
3. The safety harness (10) of any preceding claim wherein the upper leg portion (98) comprises a pair of leg straps (80,90) each adapted to encircle a corresponding leg of a person wearing the harness (10).
4. The safety harness (10) of any preceding claim wherein the upper torso portion (12) comprises a pair of shoulder straps (20,30) operatively connected to the upper leg portion (98), each of the shoulder straps (20,30) configured to extend over a corresponding shoulder of a person wearing the harness (10).
5. The safety harness (10) of any preceding claim wherein the upper torso portion (12) comprises a chest strap (40) configured to extend horizontally across the upper chest of a person wearing the safety harness (10).
6. The safety harness (10) of any preceding claim wherein the at least one anchor connection component (50,56,58) is a D-ring (50,56,58).
7. The safety harness (10) of any preceding claim wherein the at least one anchor connection component (50,56,58) is a D-ring (50,56,58) fixed to the upper torso portion (12) so that the D-ring (50,56,58) is located on the upper back of a person wearing the safety harness (10).
8. The safety harness (10) of any preceding claim wherein the upper torso portion (12) comprises a pair of shoulder straps (20,30) operatively connected to the upper leg portion (98), each of the shoulder straps (20,30) configured to extend over a corresponding shoulder of a person wearing the strap, the shoulder straps (20,30) crossing each other so that one strap overlies the other at a location that corresponds to the upper back of a person wearing the safety harness (10), and the at least one anchor connection component (50,56,58) is a D-ring (50,56,58) fixed to the upper torso portion (12) at the location where the shoulder straps (20,30) cross.
9. The safety harness (10) of any preceding claim wherein the belt (100) comprises:

an elongate waist strap (102) configured to encircle the waist of a person wearing the safety harness (10) and to be tightened around the waist to secure the belt (100) to the person; and an elongate load distributing member (110) underlying the waist strap (102) and extending along a length of the waist strap (102) to distribute forces transferred between the waist strap (102) and a person wearing the safety harness (10), the load distributing member (110) located so that it extends across the back of a person wearing the harness (10).

10. The safety harness (10) of claim 9 wherein the elongate waist strap (102) is fixed to the load distributing member (110) at locations (112) spaced along the length of the waist strap (102).
11. The safety harness (10) of claim 10 wherein the waist strap (102) is fixed to the load distributing member (110) by stitching (114).
12. The safety harness (10) of claim 10 further comprising a securing member (118) overlying the waist strap (102) at a central location along the length of the waist strap (102), the securing member (118) fixed to at least the load distributing member (110) with the waist strap (102) sandwiched between the securing member (118) and the load distributing member (110).
13. The safety harness (10) of claim 9 wherein part of the belt (100) is mounted to the upper torso portion (12) by part of the upper torso portion (12) extending between the waist strap (102) and the load distributing member (110) so that the part of the upper torso portion (12) is sandwiched between the waist strap (102) and the load distributing member (110) while being free to translate relative to the waist strap (102) and the load distributing member (110).
14. The safety harness (10) of claim 13 wherein the upper torso portion (12) comprises a pair of shoulder straps (20,30) operatively connected to the upper leg portion (98), each of the shoulder straps (20,30) configured to extend over a corresponding shoulder of a person wearing the strap, and the part of the upper torso portion (12) comprises lengths (22,32) of the shoulder straps (20,30).
15. The safety harness (10) of claim 14 wherein the elongate waist strap (102) is fixed to the load distributing member (110) on opposite sides of each of the lengths (22,32) of the shoulder straps (20,30) so that the lengths (22,32) are sandwiched between the waist strap (102) and the load distributing member (110) allowing the belt (100) to translate relative to the lengths (22,32) of the shoulder straps (20,30).





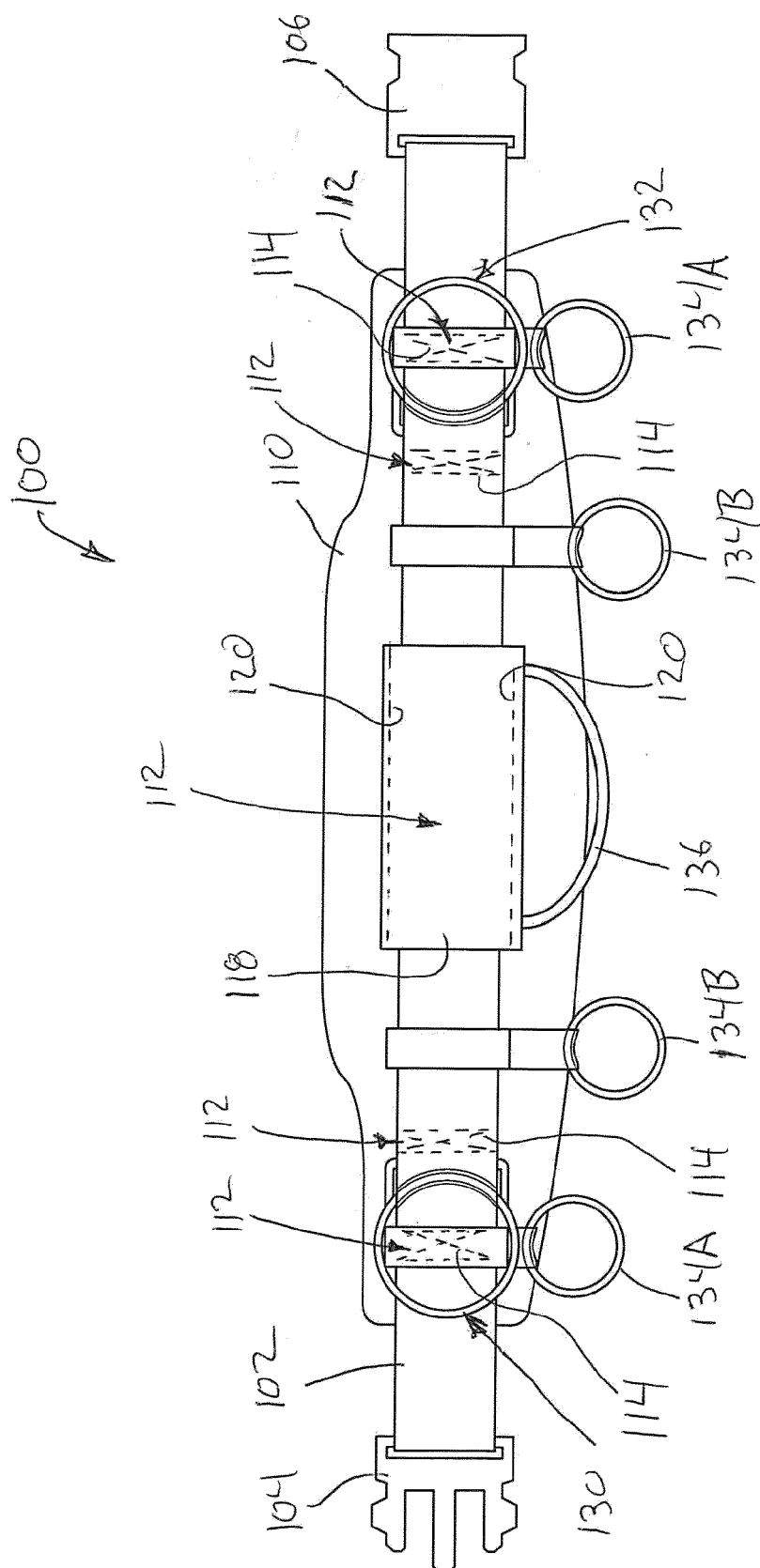


Fig. 7



EUROPEAN SEARCH REPORT

Application Number
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X	US 2011/017546 A1 (NICHOLS JR STEVEN C [US]) 27 January 2011 (2011-01-27) * paragraph [0042] - paragraph [0059]; figures *	1-15	INV. A62B35/00
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 26 May 2015	Examiner Vervenne, Koen
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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