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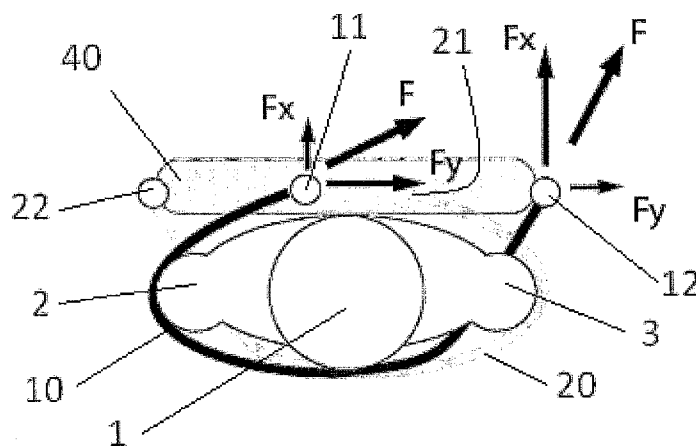
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(54) Title: SAFETY BELT

**Fig. 2**

(57) **Abstract:** A safety belt for securing personnel (1) in free-fall lifeboats and the like, comprising one or more lap belts (31) and upper body belts. A first (10) upper body belt is fastened to a seat structure (40) at a first point (11) behind the person's back and extends across the chest to a second point of attachment (12) on the seat structure (40) beyond the body, so that the first upper body belt (10) sits snugly against one side (2) of the upper body but not against the other side (3). A second upper body belt (20) is fastened to the seat structure (40) at a third point of attachment (21) behind the back and extends across the upper body from the opposite side (3) of the body to a fourth (22) point of attachment in the seat structure by or beyond the body on the other side (2) of the body, so that the second upper body belt (20) sits snugly against the other side (2) of the upper body but not the first side. The belts prevent acceleration sideways and in a forward direction.

Safety belt

The invention relates to a safety belt for use in free-fall lifeboats according to the preamble of claim 1.

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Background

Free-fall lifeboats are used in the evacuation of offshore platforms. Examples of such free-fall lifeboats are found in, for example, NO Patent Application 20090671 and NO Patent 325263. The lifeboats are mounted along the edge of the platform in such
10 manner that they are easy to board in an evacuation situation. When the persons to be evacuated are in place inside the lifeboat, they put on safety belts to secure themselves to their seat. When the lifeboat is ready, an operator will release the attachment to the platform so that the boat falls controllably into the sea. Although lifeboat designers aim for as gentle and efficient contact with the sea surface as possible, the boat will
15 nevertheless be subjected to great deceleration forces, both in the direction of motion and laterally.

Conventional safety belts are typically made in the form of a transverse lap belt that is fastened to the seat structure at seat height and a transverse chest belt fastened in a similar way as the lap belt. Another variant is a three point harness where a shoulder
20 belt is passed down from each side of the shoulder and fastened at one point to the lap belt.

Such conventional belts will effectively take up forces acting along the seating direction, but have however the drawback that forces arising laterally from, for example, heavy seas, are not taken up as effectively. In more detail, forces which act
25 laterally will result in the body of a person sitting strapped in place in the lifeboat being moved some way sideways before the motion is stopped by the belts. In such a situation, the head will not follow at the same speed, and these persons may sustain a serious neck injury.

An example of known belt constructions can be found in US patent document
30 no. 2008/0018156, which describes a seat structure for a vehicle fitted with a lap belt and two shoulder belts passed over the top of the shoulders. However, such a design will not adequately take up movements transverse to the direction of motion.

US patent document no. 2006/0090946 describes a vehicle safety system where collision sensors combined with an arrangement for tensioning the belts are intended to
35 prevent the person from being thrown sideways against the side of the vehicle in the event of a collision from the side. This design is also not capable of preventing sideways movement of the person during the launching of a free-fall lifeboat.

Other examples of the prior art can be found in GB Patent 2 315 011 and US 202/0089163. These devices are also not capable of preventing sideways motion of a person during the launching of a free-fall lifeboat

5 **Object of the invention**

The object of the present invention is to provide a safety belt which overcomes the problem described above, and which can provide a safe securement of persons without any danger of injury even though the boat is subjected to substantial lateral forces.

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The invention

This object is obtained with a safety belt according to the characterising clause of claim 1. Further advantageous features are set forth in the associated dependent claims.

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The invention relates to a safety belt for securing personnel in free-fall lifeboats and the like. The belts comprise one or more lap belts and upper body belts fastened to a seat structure or the like.

According to the invention the belt comprises

- a first upper body belt fastened to a seat structure at a first point behind the
20 person's back, and which extends across the front of the upper body to a second attachment point on the seat structure close to or beyond the body, so that the first upper body belt sits snugly against one side of the upper body but not the other side; and
- a second upper body belt fastened to the seat structure at a third point of attachment behind the back and which extends across the front of the upper body from
25 the opposite side of the body to a fourth attachment point in the seat structure by or beyond the body on the other side of the body, so that the second upper body belt sits snugly against the other side of the body but not the first side.

Detailed description

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The invention is described below in more detail in the form of an exemplary embodiment with reference to the figures, wherein

Figure 1 illustrates, in front view, a person who is strapped to a seat by means of belts according to the invention;

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Figure 2 is a schematic top view illustrating the belt construction according to the invention; and

Figure 3 contains schematic figures showing examples of known safety belts.

Figure 3 shows two examples of prior art safety belts or harnesses. In the figure on the left the person 1 is secured in the seat 40 by lap belts 31 and a chest belt 32 which has been extended over the person's chest. In the figure to the right, the person is secured by a lap belt and two shoulders belts 33a and 33b fastened to a seat structure 40 or the like. These and similar belt constructions will, in ideal conditions, prevent the body from accelerating forwards as the lifeboat hits the surface of the sea and prevent the person from being injured. In real conditions, however, there will be heavy seas and strong wind and, during launching, the lifeboat will therefore also be subjected to substantial lateral forces as it hits the surface. The known belt constructions will however not be as capable of taking up acceleration which acts sideways on the body, and the secured persons will thus be thrown some way sideways with a great risk of sustaining neck injuries.

Figure 1 shows an example of a belt construction according to the invention. A person 1 is secured to a seat structure 40 or another fixed part of the hull by means of a lap belt or strap and two upper body belts 10 and 20 passed around the upper body. The first upper body belt 10 is fastened to the seat structure 40 at a point (not shown) behind the neck 4 of the person 1 and is passed around the outside of the upper arm on a first side 2, diagonally down along the chest and under the upper arm on the opposite side 3 of the person to a second point of attachment (not shown) on the seat structure 40. The second upper body belt 20 is, in a similar way, fastened to the seat structure 40 at a point (not shown) behind the neck 4 of the person, and is passed around the outside of the other shoulder 3 diagonally down along the chest and under the upper arm on the first side 2 of the person 1 to a point (not shown) on the seat structure 40.

Figure 2 shows the same as Figure 1, but in top view. The first upper body belt 10 is, in this embodiment, fastened to the seat back at a first point of attachment 11, and is passed around the outside of the shoulder on the first side 2 of the body and then along the upper body of the person 1 and under the upper arm on the other side 3 of the body to a second point of attachment 12 in the seat back 40. Whilst the first point of attachment 11 is arranged behind the back of the person 1, the second point of attachment 12 is arranged some way beyond the body of the person 1. The second upper body belt 20 is, in a similar way, fastened to the seat back at a third point of attachment 21, and is passed around the outside of the shoulder on the other side 3 of the body and then along the upper body of the person 1 and under the upper arm on the first side 2 of the body to a fourth attachment point 22 in the seat back 40. Whilst the third point of attachment 21 is arranged behind the back of the person 1 like the first point of attachment 11 for the first upper body belt 10, the fourth point of attachment 22 is arranged some way beyond the body of the person 1.

Figure 2 also shows the components of force which act on the person 1 as the lifeboat hits the water surface. The axial (with respect to the lifeboat) component of force, which is presumed to be the largest component of force, is indicated by F_x , whilst the presumably smaller lateral component of force is indicated by F_y , and the resultant force is indicated by F . The components of force are for the sake of simplicity only indicated at the points of attachment for the first upper body belt 10, but similar components of force exist at the points of attachment for the second upper body belt 20, but where the lateral component of force acts in the opposite direction.

As can be seen in particular from Figure 2, the arrangement of the first upper body belt 10 will prevent the person 1 from being forced to his right side by the action of lateral forces. Similarly, the second upper body belt 20 will prevent the person 1 from being forced to his left side by the action of lateral forces. And last, but not least, the belts 10 and 20 together will prevent the person 1 from accelerating forwards as the lifeboat hits the sea surface. The combination of the first upper body belt 10 and the second upper body belt 20 will, in other words, restrain the body in both sideways directions and in the forward direction.

The harness construction according to the invention will thus prevent the body from accelerating significantly in any direction as the lifeboat hits the sea surface, and will thus strongly reduce or even eliminate the danger of neck injury.

The location of the points of attachment for the respective belts is important in order to obtain optimal securement. One of the points of attachment should therefore be located behind the back of the person, for example, behind his spine or between his spine and shoulder, whilst the other point of attachment should be located beyond the (other) side of the person, thereby forming a kind of asymmetrical loop. The respective points of attachment for the second belt should be arranged in the opposite way and form a corresponding asymmetrical loop. Such an asymmetrical orientation, where the respective belts, when tightened, exert tension against the sides of the body towards the centre of the body and against the upper part of the body in the direction of the seat back, establishes a restraint of personnel in a free-fall lifeboat which solves a well-known problem in this area.

Whilst the belt construction is illustrated in an embodiment where the first upper body belt is passed from the first point of attachment 11 on the outside of the shoulder on the first side 2 of the person 1, it is clear that the invention is not limited to this. The belt may be passed under the arm on the first side 2 of the person 1 and on the outside of the upper arm on the other side 3 of the person, or even on the underside of the same. It is, however, an advantage that the part of the belt that is to take up sideways acceleration is passed on the outside of the upper arm in order to reduce the danger of

injury to the ribs. The belts are advantageously in a known way per se fastened adjustably (not shown) to the seat structure or the hull of the lifeboat to provide adjustment of the safety belts to the body size in question.

Claims

1. A safety belt for securing personnel (1) in free-fall lifeboats and the like, comprising one or more lap belts (31) and upper body belts, **characterised in** that the belt comprises:
- a first (10) upper body belt fastened to a seat structure (40) at a first point (11) behind the person's back, and which extends across the front of the upper body to a second point of attachment (12) on the seat structure (40) close to or beyond the body, so that the first belt (10) sits snugly against one side (2) of the upper body but not against the other side (3); and
 - a second upper body belt (20) fastened to the seat structure (40) at a third point of attachment (21) behind the back, and which extends across the front of the upper body from the opposite side (3) of the body to a fourth (22) point of attachment in the seat structure by or beyond the body on the other side (2) of the body, so that the second belt (20) sits snugly against the other side (2) of the upper body but not the first.
2. A safety belt according to claim 1, **characterised in** that the first point of attachment (11) for the first upper body belt (10) is arranged so that the belt is locked to the seat structure (40) at a point behind the neck (4) of the person and that the belt extends on the outside of the person's upper arm (2) and then snugly against the chest diagonally downwards and under the person's arm on the opposite side (3) of the body to the second point of attachment (12) at a level lower than the first point of attachment (11).
3. A safety belt according to claim 1 or 2, **characterised in** that the third point of attachment (21) for the second upper body belt (20) is arranged so that the belt is locked to the seat structure (40) at a point behind the neck (4) of the person and that the belt extends on the outside of the person's upper arm (3) and then snugly against the chest diagonally downwards and under the person's arm on the opposite side (2) of the body to the fourth point of attachment (22) at a level lower than the first point of attachment (21).
4. A safety belt according to claims 1 to 3, **characterised in** that the belts are fastened to the seat structure so that they can be adjusted in the height direction.

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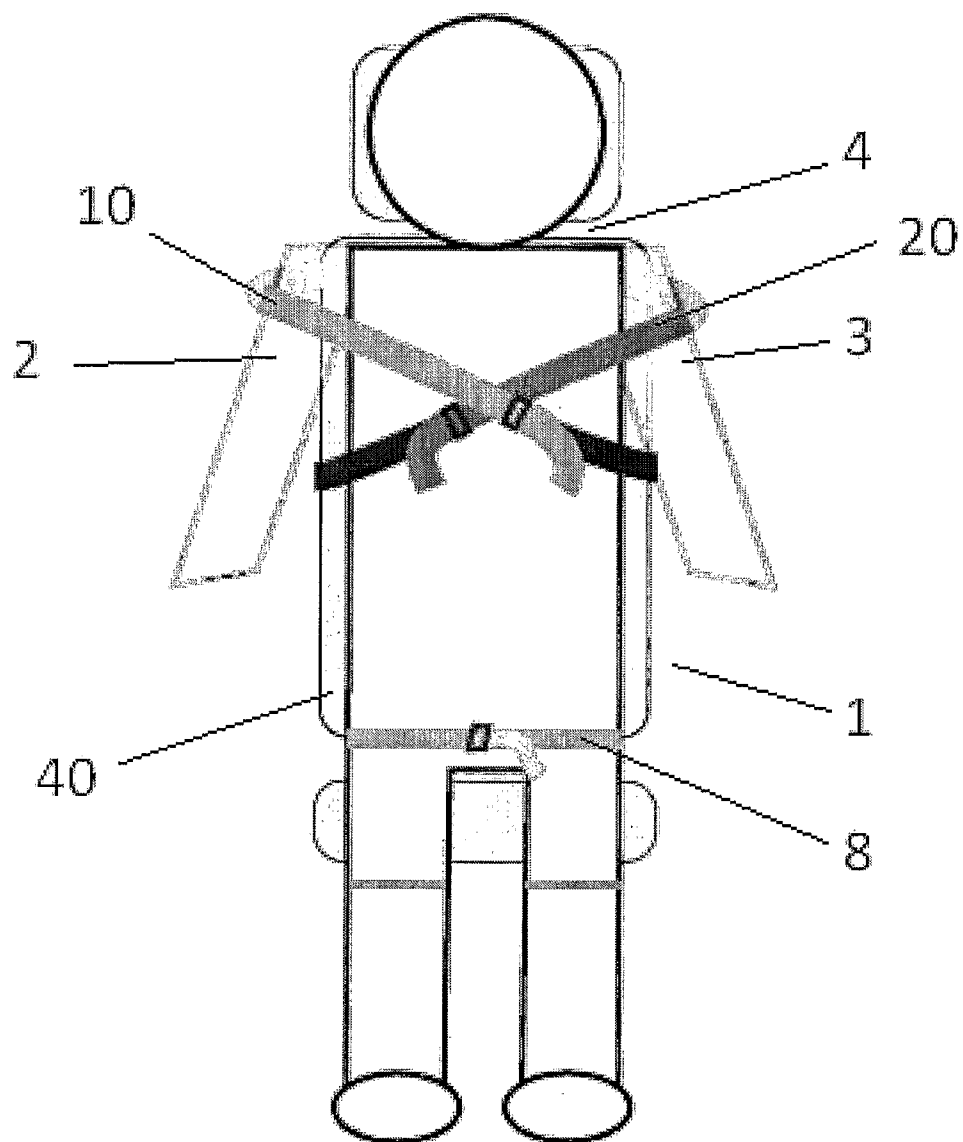
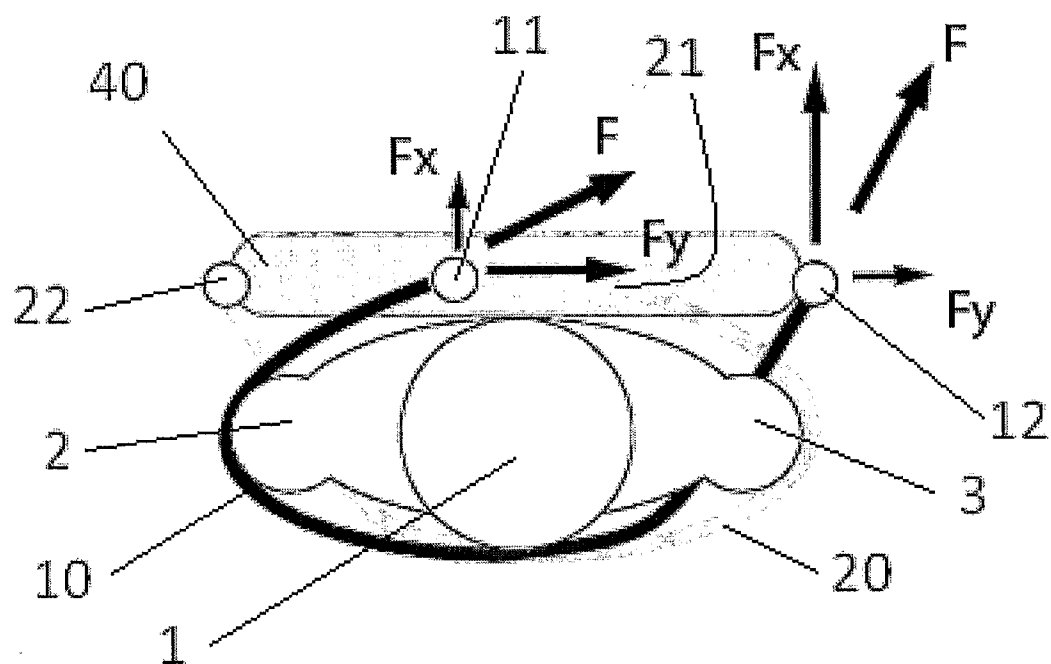
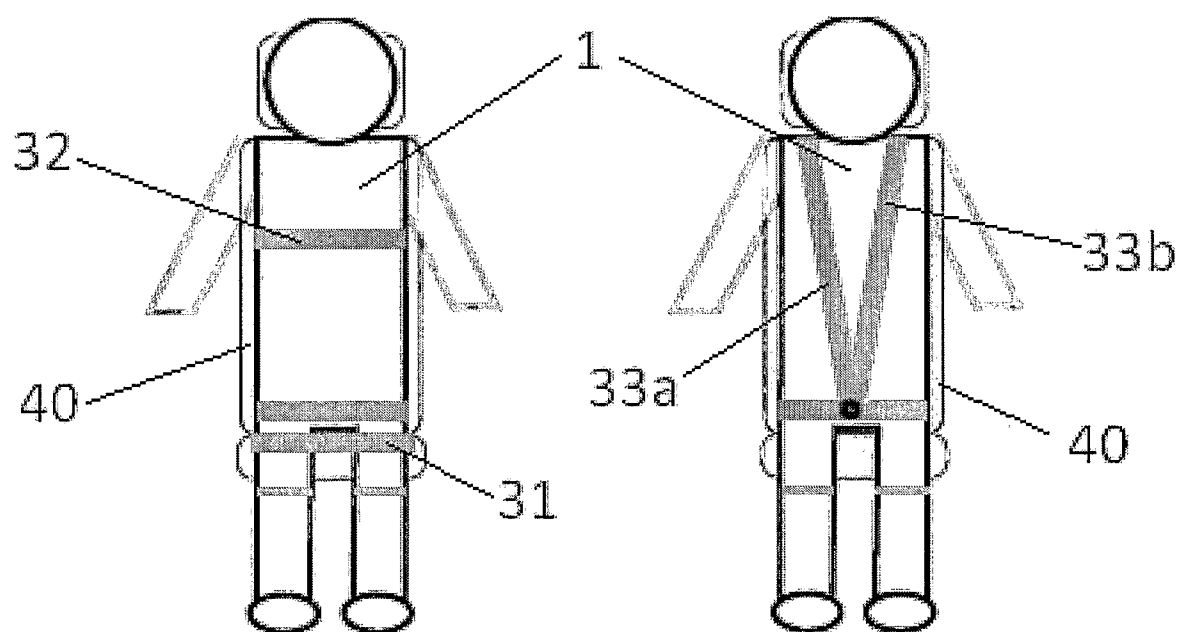


Fig. 1

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**Fig. 2****Fig. 3**

INTERNATIONAL SEARCH REPORT

International application No.

PCT/NO2010/000070

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

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)

IPC: A62B, A63G, B60R, B63B, B63C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1880894 A2 (GLOBAL SEATING SYSTEMS LLC), 23 January 2008 (23.01.2008), figures 1-5, paragraphs (0011),(0014)	1
Y	--	4
X	US 5513897 A (LEMMEN), 7 May 1996 (07.05.1996), column 2, line 18 - line 34; column 3, line 47 - column 4, line 23, figures 1,2, abstract	1-3
Y	--	4

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Date of the actual completion of the international search

13 July 2010

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 20020089163 A1 (BEDEWI ET AL), 11 July 2002 (11.07.2002), figure 2, abstract	1
Y	--	4
Y	US 5806891 A (POKHIS), 15 Sept 1998 (15.09.1998), column 2, line 27 - line 36, figures 1,3, claims 1, 4	4
A	--	1-3
A	US 20060090946 A1 (ZHAO ET AL), 4 May 2006 (04.05.2006), whole document	1-4
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/NO2010/000070

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