

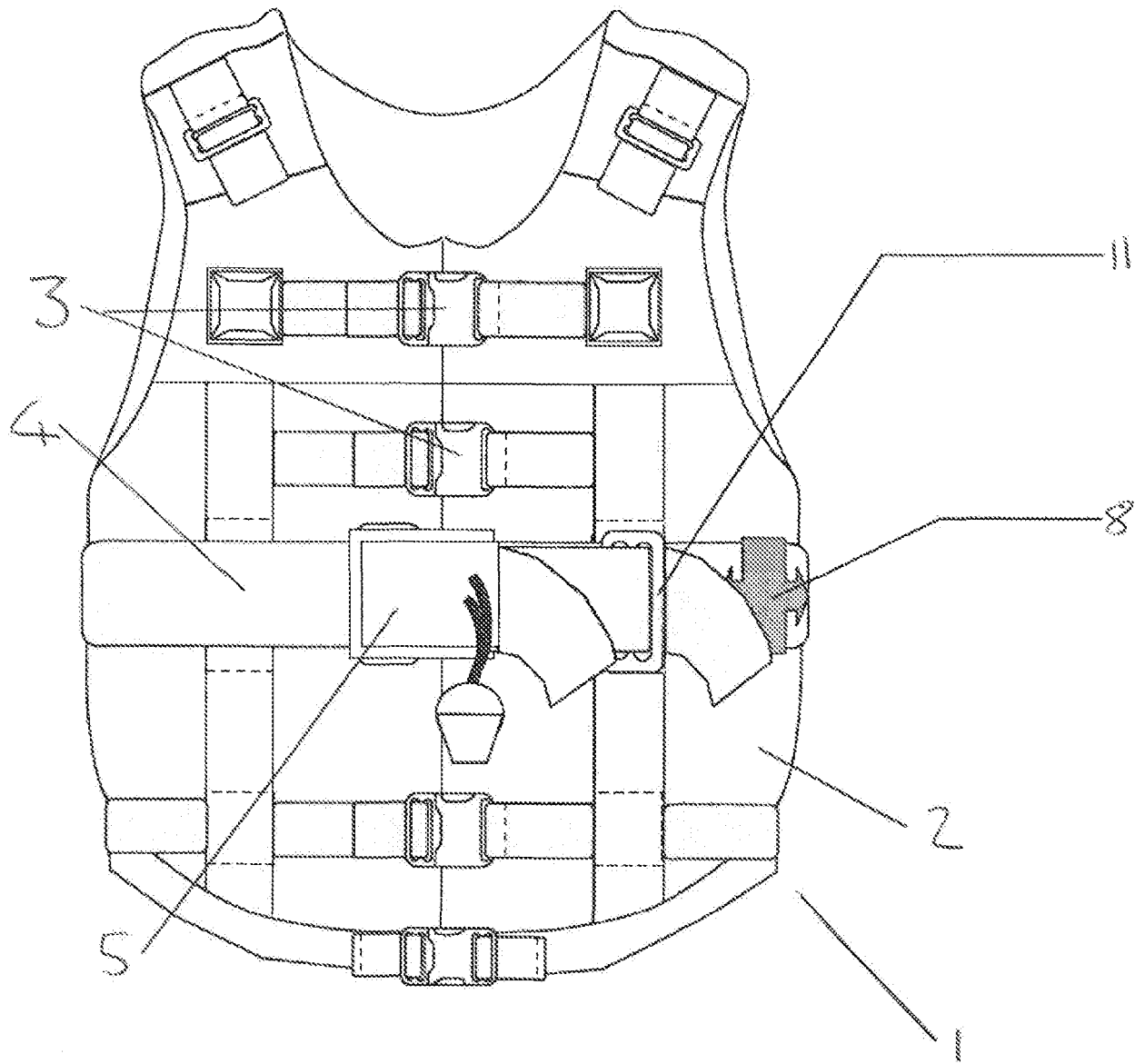


Figure 1

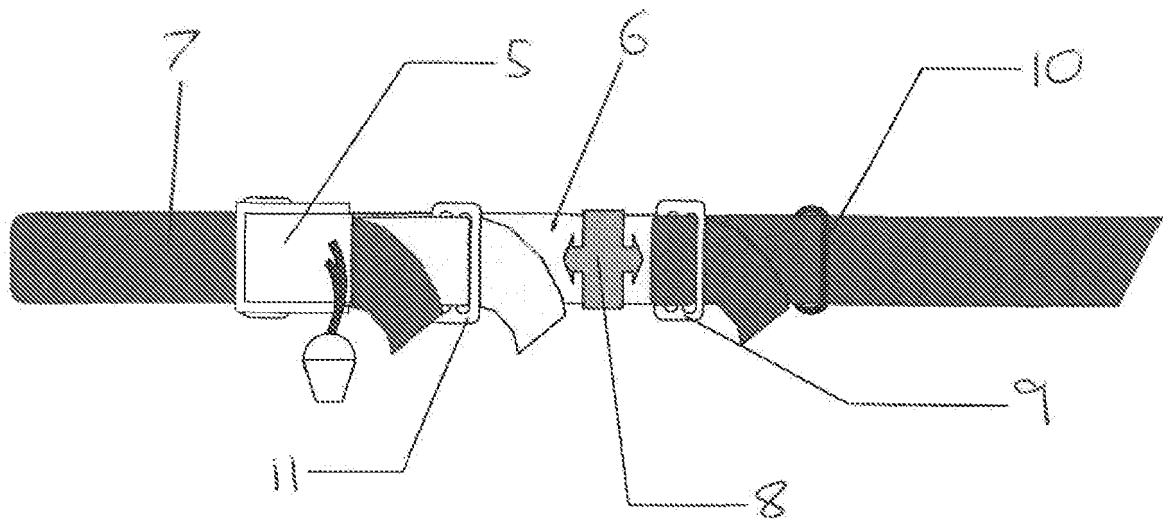


Figure 2

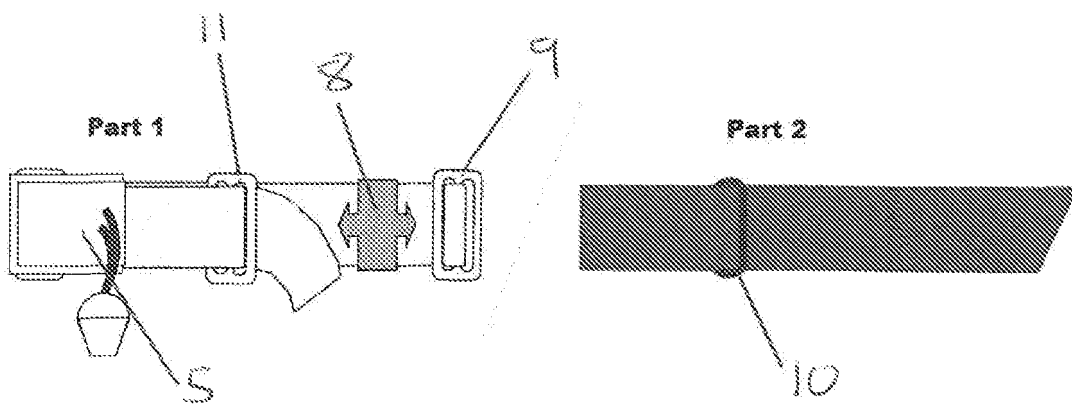


Figure 3

SAFETY BELT

The present invention relates to safety belts. Some embodiment of the present invention are in the area of safety harnesses, particularly safety harnesses for use in life-saving activity. In particular, although not exclusively, embodiments of the invention relate to safety harnesses for use in life-saving activity in water based situations.

BACKGROUND

Typically, a life-saver's safety harness comprises one or more buoyant members, generally constituted from either a naturally buoyant, foamed material or made buoyant through inflation. These buoyant members are often integrally formed into some kind of vest or jacket to be worn by the life-saver.

In addition to the buoyancy of the safety harness, there is generally also provided a webbing structure around the outside of the buoyant material, said webbing being in place to perform multiple functions. Other, peripheral life saving devices (mirrors, whistles etc...) may be attached to the webbing, meaning they are presented in a convenient position for use in what is invariably a highly stressful situation. The webbing also generally introduces structure to the buoyant portions, in as much as different buoyant portions are often joined via the webbing, such that in certain instances, rather than a single jacket/vest it would be more accurate to describe a set of webbing with buoyant portions attached thereto. Obviously, the preceding describes the two extremes and it is arguably more common for life-savers' safety harnesses to fall somewhere in the middle.

The final function regularly performed by the webbing is to provide an anchor point for a life-line or safety lanyard. Typically, one end of a lanyard will be attached to a base point (belayed by a rescuer or secured to a point on the bank etc...) with the opposite end being attached to a releasably attached portion of the webbing, the releasable attachment being such that the wearer can release it with a minimal effort, thereby leaving the wearer with their buoyancy aid, but no longer being attached to the base point.

US 4,973,277 (KHANAMIRIAN) discloses a 'Safety Belt Harness System' of the type previously mentioned, incorporating a release mechanism to allow detachment of the safety line, which will be described below. The basic life saving jacket comprises an open fronted vest design, constructed with a plurality of buoyant panels (a foamed material in this instance). The life-saving jacket is secured on the wearer via a frontal zipper, with an additional, thin securing strap to restrain the front of the vest in the event of zipper failure.

The jacket is further provided with a "safety belt harness system". The safety belt of the safety belt harness system is threaded through loops on the life vest and is secured to the vest with a quick release, cam-type buckle. Removably attached to the back of the vest is a metal D-ring. The safety harness is threaded through the D-ring. A rope acting as a life-line may be attached to the D-ring.

The rope connected to the D-ring of the life vest will be tensioned, for instance, when entering the water during a rescue attempt. If the person wearing the life vest with the D-ring should get into trouble and need to immediately be detached from the rope to which they are connected, the person can unbuckle the cam-type buckle of the safety strap which, due to the tensioning of the rope connected to the D-ring, will pull the D-ring away from its VELCRO (RTM)-type connection on the rear of the vest. Since the safety belt has become unbuckled, the free end of the belt will unthread out of the D-ring and the D-ring will be pulled away from the vest leaving only the D-ring attached to the loose end of the rope. Unwanted release of the D-ring from the vest is prevented by the secure fastening of the safety belt by the cam-type buckle.

Whilst the exact mechanisms employed to provide a quick/emergency release do vary between life saving jackets, all are based on the concept of the securing rope/safety lanyard remaining under tension during operation, a situation which cannot be guaranteed in a real-life rescue situation in fast flowing water, let alone when the water is not flowing and thereby offers no assistance in maintaining tension in the safety line.

Recent tests of this type of life jacket have revealed some worrying issues with the release of the jacket from the safety lanyard, particularly in situations where the water from which a victim is being rescued is not fast flowing. The cause of these

problems is that in static/standing water it is particularly challenging to maintain tension in the safety lanyard whilst allowing the rescuer enough freedom of movement to perform his rescue function. The rope in these situations must not be tensioned at all; this prevents the release from working effectively. Tests have demonstrated failure rates in excess of 25% when attempting release in slow flowing or standing water, clearly a situation which can threaten the lives not only of people trapped in a flood situation (or otherwise requiring a water rescue), but also of the rescuers themselves.

A number of other prior art life jackets are variously described in US 5,326,297 (LOUGHLIN); US 5,429,539 (GLASA); US D260,162; US 4,721,487 (COCHRAN); US 5,452,487 (LEGGETT) and US 5,230,645 (CHENG). All, however, suffer from the same shortcomings as those discussed above.

It has been discovered that the reason for the majority of release failures in standing or slow flowing water situations is due to a lack of tension in the safety line/lanyard and jamming of excess tape in the release mechanism. Traditional means of maintaining tension in the lanyard have proved to be unsuccessful and the problems associated therewith tend to become more exacerbated the greater the length of lanyard and tape in the system.

It is an object of the present invention to provide a safety harness arrangement, which, while functioning properly in high-tension environments has a reduced risk of low-tension release failure.

SUMMARY OF THE INVENTION

Embodiments of the present invention relate to a safety belt comprising one or more tensioning elements.

Embodiments of the present invention provide an integral harness comprising securing means for securing said harness about the person of a user; a safety belt releasably attached to said harness via a release mechanism; wherein said safety belt comprises one or more tensioning elements.

Preferably, wherein said one or more tensioning elements comprise an elasticated material, and said one or more tensioning elements may have a maximum extension. Said harness may further comprise a non-extendable element in communication with said tensioning element to limit said maximum extension.

- 5 In a preferred embodiment, said safety belt further comprises two discrete belt portions. Preferably wherein said first and second portions are connected at a first end via a secure buckle attachment and at a second end via said release mechanism.

- 10 In a further preferred embodiment of the present invention said first belt portion comprises said one or more tensioning elements and said release mechanism. Said second portion of said safety belt may substantially longer than said first portion and said release mechanism preferably comprises a quick release buckle.

Preferably said integral harness further comprises one or more body sections, wherein said one or more body sections may be buoyant body sections.

15 **BRIEF DESCRIPTION OF THE DRAWINGS**

Embodiments of the invention will now be described by way of example only, with reference to the accompanying figures, in which:

Figure 1 shows a front view of a low tension safety harness according to an embodiment of the present invention.

- 20 Figure 2 shows a two part safety belt, according to an embodiment of the present invention, in its assembled state.

Figure 3 shows a two part safety belt, according to an embodiment of the present invention, in its disassembled state.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

- 25 For the purpose of clarity, the following terms should be taken to have the respective meanings outlined below:

An “integral harness” should be taken to mean any form of harness system with an integral safety belt system.

The term “body section” should be read in its broadest context such that a panel of a coat, a strap, a buoyancy aid, etc... should all be taken to be referred to by the use of the term.

An embodiment of the present invention is shown in Figure 1. A safety harness according to the present invention includes a life jacket 1. Although the present invention is described with reference to a life jacket 1, it will be realised that embodiments of the invention may be envisaged which do not include a life jacket.

The life jacket 1 comprises one or more buoyant sections 2, a securing means in the form of buckles 3 for securing said buoyant sections 2 about the body (torso) of the user. The life jacket 1 may be formed into a sleeveless jacket shape as shown in figure 1. The securing means 3 may alternatively take the form of a zipper or similar; if the body section(s) 2 are formed such that the device is pulled over the head of the user, said securing means could take the form of ties, cords etc., suffice to say, the form of said securing means is, at least in part, defined/dictated by the form chosen for the body section(s) 2.

The safety harness further comprises safety belt 4 according to an embodiment of the invention which is shown in Figures 2 and 3 in greater detail. The safety belt 4 includes a dorsally positioned ring 10 for attaching the safety belt to a lanyard. The safety belt may be releaseably attached to the life jacket 1 via a complimentary pair of Velcro (RTM) pads (not shown) on an inward-facing surface of the safety belt for attaching to corresponding pads on the life jacket 1. The safety belt 4 is attached to the life jacket 1 to prevent unwanted movement of the belt 4 about the life jacket in use, but the fastening means should require only a minimal force to separate the belt 4 from the life jacket 1 when desired by the user i.e. when the safety belt 4 is released by the user.

The safety belt 4 includes a release mechanism comprising a quick release buckle 5 which is activatable by a user. The buckle 5 fastens the safety belt 4 around the user in a fastened position and may be activated by the user to release the user from the safety belt 4 by decoupling first and second ends of the safety belt 4 in an open

position. The release buckle 5 may have a toggle for grasping by the user to cause the buckle 5 to move from the fastened position to the open position, thereby releasing the first and second ends of the safety belt 4. If the safety belt 4 has sufficient tension applied via the lanyard, the belt 4 is easily pulled from around the user when the buckle is in the open position. However, as will be explained, embodiments of the invention are useful in low-tension environments where relatively low tension is applied via the lanyard.

The safety belt 4 comprises a first portion 6 and a second portion 7, said first and second portions 6, 7 preferably being connected at a first end via a secure buckle 9, although it will be realised that the first and second portions 6,7 may be connected at the first end in other ways, such as by stitching. The secure buckle 9 is a figure of 8 buckle through which ends of the first and second portions 6,7 may be threaded to securely but adjustably engage together. The first and second portions 6, 7 are connectable at a second end by the quick release buckle 5. The first portion 6 may be securely attached to said release buckle 5 via a second secure buckle 11, although, again, it will be realised that the first portion 6 may be connected to the quick release buckle 5 in other ways, such as by stitching. The secure buckle 11 attaches a loose end of the first portion 6 to itself at an intermediate point to form a looped end-section of the first portion 6 which retains the quick release buckle 5. The said second portion 7 is releasably attached to said release buckle 5 via the buckle's release mechanism, such as by a cam system of the quick release buckle 5 which grasps the second portion, such as via internal teeth.

The use of a two part safety belt 4 allows the wearer to adjust the girth of the belt, as shown in Figure 3, whilst ensuring that only a small section of said second portion 7 of said safety belt has to pass through said release mechanism 5, thereby reducing the likelihood of jamming occurring at this point and consequently reducing the risk of the system as a whole failing upon activation. The girth of the belt 4 may be adjusted at the secure buckle 9, as shown.

Said first portion 6 of said safety belt 4 further comprises a resiliently extendable section 8 in order to pre-tension said safety belt 4. The resiliently extendable section 8 may be formed from an elastic material, such as an elasticised fabric, or may include a spring mechanism or the like. It will be realised that the absolute form of

said resiliently extendable section may be chosen suitable for the application of the belt 4. The resiliently extendable section 8 exerts tension to have an effect of tensioning the portion of the belt 4 proximal to the quick release buckle 5, regardless of the degree of tension in the belt 4 as a whole i.e. introduced via the lanyard.

5 Advantageously, failure of the release mechanism discussed with reference to the prior art life jackets is reduced or substantially obviated.

The resiliently extendable section 8 may be partially constrained, such that the maximum degree of extension available is limited, not by the elastic properties of the resiliently extendable section 8 itself, but is controlled via additional extension control
10 means. Said extension control means may be as formed by attaching two points of the safety belt 4 together with an inelastic material, such that the elastic material, in its relaxed state, is of shorter length than the distance between said attachment points on said safety belt 4, whilst the maximum extension of said elastic material is greater than said distance, such that under no tension, the effective length of the
15 relevant section of safety belt is determined by the relaxed length of said elastic material, whereas under maximum tension, the effective length of the relevant section is the actual length of said section of safety belt, which is less than the maximum extended length of said elastic material.

In order to operate the release mechanism 5, the wearer of the safety belt activates
20 the quick release buckle 5; the end of said second portion 7 of said safety belt 4 is thereby freed from said quick release buckle 5. The resiliently extendable section 8 of said first portion 6 of said safety belt 4, currently under tension, then contracts to its shorter, untensioned length, pulling said quick release buckle 5 free from said end of said second portion of said safety belt 4. Subsequently, said safety belt 4 is then
25 pulled free from said safety harness through a combination of movement of the wearer and the latent/inherent tension in the lanyard to which it is attached. Embodiments of the invention may be specifically of advantage when the flow rate of water around the user is such that tension from the life-line/safety lanyard attached to the harness cannot be guaranteed.

30 It should be noted that whilst the bulk of the description following is based around a buoyant, life saving safety harness, the same technological development to the harness is much more widely applicable, with potential application in fields as

diverse as rucksack manufacture, mountaineering equipment, parachute harnesses and a host more. Hence the description herein should not be taken to be limiting the scope of the present invention purely to safety harnesses used within waterborne life saving activities.

- 5 All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

- 10 Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

- 15 The invention is not restricted to the details of any foregoing embodiments. The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed. The claims should not be construed to cover merely the foregoing embodiments, but also any embodiments which fall within the scope of the
20 claims.

CLAIMS

1. A safety belt, comprising:

one or more tensioning elements for exerting tension between first and second ends of the belt;
- 5 a quick release fastening means attached to a first end of the belt for releaseably retaining the second end of the belt around a user.
2. The safety belt of claim 1, wherein the tensioning element includes a resiliently extendable portion of the belt.
3. The safety belt of claim 2, wherein the resiliently extendable portion of the belt
10 is formed by an elasticated material.
4. The safety belt of claim 1, 2 or 3, wherein the one or more tensioning elements are arranged proximal to the first end of the belt.
5. The safety belt of any preceding claim, comprising an attachment means for attaching a lanyard to the belt.
- 15 6. The safety belt of any preceding claim, wherein the belt is formed by first and second adjustably connected portions of the belt.
7. The safety belt according to claim 6, wherein said first and second portions are two discrete belt portions connected via an adjustable buckle.
8. The safety belt of any preceding claim, wherein the quick release fastening
20 means is arranged to grasp the second end of the belt in a fastened position and to release the second end of the belt in response to actuation by a user.
9. A safety belt according to any preceding claim, wherein said one or more tensioning elements has a maximum extension.
10. A safety belt according to claim 9, comprising a non-extendable element in
25 communication with said tensioning element to limit said maximum extension.

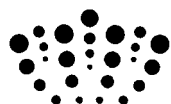
11. A safety harness comprising securing means for securing said harness about the person of a user; and a safety belt according to any preceding claim.

12. A safety harness according to claim 11, further comprising one or more body sections.

5 13. A safety harness according to claim 12, wherein said one or more body sections are buoyant body sections.

14. A safety belt substantially as hereinbefore described with reference to the specification and attached drawings.

10 15. A safety harness substantially as hereinbefore described with reference to the specification and attached drawings.



Application No: GB1110383.5

Examiner: Dr Matthew Parker

Claims searched: 1-14

Date of search: 7 October 2011

Patents Act 1977

Corrected Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-13	US2005/0039980 A1 (DIGGLE), see elasticated segment 24
X	1-13	US2003/0101946 A1 (COX), see elasticated harness
X	1-13	GB2310586 A (ZUAZA), see elasticated segment 8
X	1-13	US4479267 A (RADOWSKY), see elasticated segment 21
X	1-13	GB1506926 A (MACKENZIE), see elasticated segment 10
X	1-13	FR2606650 A (PELTIER), see elasticated segment 6
A	1	US4973277 A (KHANAMIRIAN),

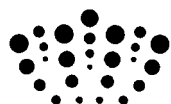
Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X:

Worldwide search of patent documents classified in the following areas of the IPC



The following online and other databases have been used in the preparation of this search report

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International Classification:

Subclass	Subgroup	Valid From
A62B	0035/00	01/01/2006