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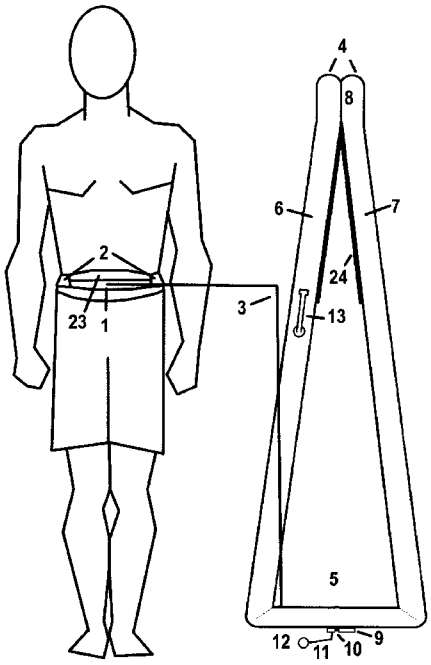

Figure 1

(57) Abstract: A marker and recovery device comprising: an enclosure adapted to be secured to a wearer; a bladder configured to fit within the enclosure in an uninflated state, the bladder comprising: an elongate tube; a first upper tube fluidly connected to the elongate tube at a first end of the elongate tube; and a second upper tube fluidly connected to the elongate tube at a second end of the elongate tube; and an inflation mechanism to inflate the bladder to extend the bladder from the uninflated state to a deployed state in which the first upper tube and second upper tube join to form a handle portion at the end of the elongate tube.

MARKER, RECOVERY, AND FLOTATION DEVICE

FIELD OF THE DISCLOSURE

[0001] The present disclosure relates to a personal marker, recovery, and flotation device for waterborne activities.

BACKGROUND

[0002] When engaged in waterborne activities, such as boating, there is a constant risk of unintentionally falling into the water and being separated from the vessel. To mitigate the risk of drowning, personal flotation devices (PFDs), otherwise known as life jackets, are in widespread use and are responsible for saving countless lives from drowning. The PFDs come in many different configurations but essentially all provide a vest-like structure that fits over the upper torso. The vest is secured by a harness, in the simplest form tie straps, so that the vest is retained on the upper torso. The vest is buoyant and is effective to maintain the user afloat and face-up in water.

[0003] The vest may be naturally buoyant, such as when made with a closed-cell foam, or may be inflatable to achieve the requisite buoyancy. Inflation may come from a small pressurized gas cylinder and/or a manual inflation valve. When properly utilized, the vest is capable of supporting the user and maintaining them afloat in a stable condition indefinitely.

[0004] However, although the PFD supports the user, the prompt recovery of the user is important due to the exposure to adverse conditions, such as the water temperature and loss of body heat.

[0005] Whilst the vests are made from a high visibility material, such as a day glow orange or other fluorescent material, the rescue of the user does depend upon the user being visually locatable. In even a relatively small body of calm water, the user may not be readily discernable from the general surrounding environment, and, if the user is unconscious, is not able to attract attention to rescuers through waving and/or

shouting. This problem is exacerbated when there is any degree of wave motion and spotting an individual from an aircraft is extremely difficult.

[0006] Additionally, while the PFD keeps the user's head out of flat water, the user is still floating low in the water and the user's head can become completely submerged in waves. This can become a serious problem if the user is in the water for an extended amount of time.

[0007] Various proposals have been made to enhance the visibility to facilitate rescue.

[0008] US Patent 5,800,227 shows a PFD with a folded marker device on the back of the PFD. The marker device may be released. This device however is relatively bulky.

[0009] US Patent 3,638,258 discloses a PFD in which an elongate bar is attached to the PFD. The bar may be inflated so that a wand is provided that enhances visibility. The wand however does nothing to raise the user's face further above the flat water level.

SUMMARY

[0010] According to the present disclosure a marker, flotation, and recovery device includes an open or enclosed means of containment, including but not limited to, a pouch, tube, or other similar means of containment to be secured to a user. A deployable bladder is contained in a stored position at the place of containment. The bladder is extendable from a stored condition to a deployed condition in which the bladder may be unconnected to the user, or connected by one or more tethers or other means of connection to the user.

[0011] The bladder forms a closed figure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Embodiments of the invention will now be described by way of example only with reference to the accompanying drawings in which:

[0013] Figure 1 is a front elevation of the marker, recovery, and flotation device in a deployed condition attached to the user with a tether;

[0014] Figure 2 is a side elevation showing the marker, recovery and flotation device in a deployed condition, with the user sitting on its lower crossbar;

[0015] Figure 3 is a side elevation showing the marker, recovery and flotation device in a deployed condition, with the device's lower crossbar behind the user's back;

[0016] Figure 4 is a cross-sectional view of one example of the stored bladder of the marker, recovery, and flotation device;

[0017] Figure 5 is a front elevation of the marker, recovery, and flotation device in a deployed condition, with links between the left and right tubes and handles on the left and right tubes;

[0018] Figure 6 is a side elevation showing the marker, recovery, and flotation device in a deployed condition, with the user lying on the floating device in a face-up position; and

[0019] Figure 7 is a cross-sectional view of the stored bladder of the marker, recovery and flotation device in another configuration.

DETAILED DESCRIPTION

[0020] The present disclosure provides a marker and recovery device comprising: an enclosure secured to a wearer; a bladder configured to fit within the enclosure in an uninflated state, the bladder comprising: an elongate tube; a first upper tube fluidly connected to the elongate tube at a distal end of the elongate tube; and a second upper tube fluidly connected to the elongate tube at the other distal end of the elongate tube; and an inflation mechanism to inflate the bladder to extend the bladder from the uninflated

state to a deployed state in which the first upper tube and second upper tube join to form a handle portion at the end of the elongate tube.

[0021] Reference is now made to the drawings, in which similar reference numerals are provided between the drawings. Referring therefore to **Figure 1**, a marker, recovery, and flotation device has a means of containment or an enclosure**1** worn by the user. It will be appreciated that the marker and recovery device will be sized according to the typical dimensions of a user and may take many different forms depending on the intended application and the severity of the environment in which the marker and recovery device is to be utilized.

[0022] In the embodiment illustrated in **Figure 1**, the enclosure **1** is secured to a belt **2** that passes about the torso of the user. The belt **2** may be buoyant to provide some enhanced buoyancy for the user, or may be a simple non-buoyant belt, or may contain an inflatable bladder **30** itself, using a separate inflation mechanism **29**.

[0023] A deployable bladder **4**, comprising a deployable elongate tube **5** which connects at a first end to a first upper tube **6** and at a second end to a second upper tube**7**, and is attached to the enclosure **1** with a connecting link **3**.

[0024] In one embodiment, the first upper tube **6** and the second upper tube **7** are linked to form a closed loop.

[0025] In other embodiments, the first upper tube **6** and the second upper tube **7** may be separated from the elongate tube **5** by impermeable barriers **27** and **28** and have inflation system **25** for the first upper tube **6**, and inflation system **26** for the second upper tube **7**. The location of impermeable barriers **27** and **28** are merely provided for illustration in the embodiment of **Figure 5**, and the number and location of such barriers could vary based on various criteria.

[0026] The link **8** between the top of the first upper tube **6** and the top of the second upper tube **7** can be a direct joining of the first and second upper tubes **6** and **7**, or the link **8** can be a separate link between the top portions of the first and second upper tubes **6** and **7**. The separate link can be composed of the same material as that of the deployable tubes, or it can be composed of some other material such as webbing, cord or netting.

[0027] In one embodiment, link **8** may be a direct link and allow a fluid connection between the deployment tubes.

[0028] In other embodiments, a link **8** may be a combination link. For example, a direct connection may exist between the second upper tube **7** and first upper tube **6**, and further webbing **24** may optionally be located directly below this direct connection to provide reinforcement, for example for a rescue situation in which the user is lifted using the connection.

[0029] Webbing may also be attached to any portion of the bladder **4**.

[0030] It will also be appreciated that one or more additional links of any material between first and second upper tubes **6** and **7** can be optionally placed at any location along, above or below the upper tubes **6** and **7**. This enhances recoverability by preventing the bladder from slipping loose from the user when the bladder is being hoisted out of the water

[0031] For example, as can be seen in **Figure 5**, one or more additional links can be located between first and second upper tubes **6** and **7** and above elongate tube **5**, as with link **14**, or located below elongate tube **5**, as with link **15**, or located above first and second upper tubes **6** and **7**, as with link **16**.

[0032] Additional links **14**, **15** or **16** can be adjustable or include a buckle in some cases.

[0033] Other examples of a connection between the first and second upper tubes **6** and **7** are also possible.

[0034] In the embodiment illustrated in **Figure 1**, the deployable bladder **4** is deployed using expanding pressurized gas released from a cylinder **9** or using oral inflation. Deploying bladder **4** causes an inflation mechanism to inflate the bladder to extend the bladder from the uninflated state to a deployed state in which the first upper tube and second upper tube join to form a handle portion at the end of the elongate tube.

[0035] It will be appreciated that the enclosure **1** can also attach to a personal flotation device or to a harness or other device worn by the user instead of to the belt **2**. The enclosure **1** can be attached to any type of clothing or survival suit such as a floater suit, or may be attached to a belt, strap, wristband, armband, leg band, or other similar attachment mechanism.

[0036] It will also be appreciated that the enclosure**1** can also attach to the user at any location, such as a wrist, leg or arm. The enclosure**1** can also be attached to the user's legs by means of leg straps.

[0037] As can be seen in the embodiment of **Figure 4**, the bladder **4** may be stored in an uninflated state at the enclosure **1**. The bladder **4**, in one embodiment, is connected to an inflator **10**, which is fed by a gas cylinder **9**. The gas cylinder may be activated either manually or automatically upon contact with the water to supply pressurized gas into the bladder **4**. Additionally, an oral-inflation valve **13**, as seen in **Figure 1**, may be incorporated on the bladder in some cases to allow oral inflation of the bladder in the event that the pressurized cylinder **9** fails to inflate the bladders adequately, or if the user chooses to not expend a pressurized gas cylinder. The oral inflator can include a pressure relief valve to prevent an over-pressurized bladder.

[0038] The bladder **4** is typically made from a flaccid, impermeable material such as thermoplastic polyurethane (TPU) or PVC coated nylon fabric. The deployable tubes comprising the bladder **4** can be of any length. Enhanced visibility and recoverability may be obtained by increasing the lengths of the deployable tubes. Vertical height above the

water would enable people aboard vessels with higher freeboard to more easily reach and secure the marker, recovery, and flotation device.

[0039] While the embodiments provided herein provide a triangular shaped marker, the present disclosure is not limited to this shape and the triangular shape is provided merely for illustration purposes. For example, in one embodiment the marker may be shaped like a teardrop. In other examples, the marker may be rectangular. In other examples, the marker may be oval. Other shapes could equally be used with the embodiments described herein.

[0040] As can be seen in **Figure 4** and in **Figure 7**, the bladder **4**, when stored, is folded back on itself one or more times, or rolled up or otherwise packed, so that it is contained in a secure package. The bladder **4** can be covered by a detachable panel**23** so that it is securely stored at the means of containment 1 when not in use. The detachable panel is typically a flap of material attached to the enclosure 1 and using hook and loop fastener, referred to as Velcro^{TM}, tabs that locate the panel and maintain it *in situ*, or burst zipper, or similar.

[0041] As can also be seen from **Figure 4**, if deployment of the bladder **4** is desired, the pressurized gas contained within gas cylinder **9** is released by pulling cord **11** using handle **12**, causing the bladder **4** to inflate. This may occur prior to immersion in the water or subsequent to immersion in the water depending upon when the user chooses to deploy the bladder **4**.

[0042] Activation of the inflator**10** supplies pressurized gas to the interior of the bladder **4** causing the bladder **4** to begin inflation. If inflation is initiated while the bladder **4** is stored at the enclosure **1**, initial inflation of the bladder **4** causes any covering panel to be released and the bladder **4** to extend outward. Continued inflation of the bladder **4** moves the top of bladder **4** progressively outward until it attains a deployed condition where it is fully pressurized and extends outward from the enclosure **1**.

[0043] If necessary, additional inflation can be provided from the oral inflation valve **13** to ensure that the bladder **4** is fully inflated.

[0044] Alternatively, inflation may be initiated while the bladder **4** is not at the enclosure **1**.

[0045] Further, in one alternative embodiment, rather than using cord **11**, automatic inflation may be initiated based on a water sensor within enclosure **1**.

[0046] Deflation of the bladder **4** may be accomplished using the oral inflation valve **13**.

[0047] **Figure 2** illustrates the user sitting atop elongate tube **5** of bladder **4**, with first and second tubes **6** and **7** of bladder **4** rising along the right and left sides of the user. This raises the user's head above its position when not sitting atop elongate tube **5** of bladder **4**, and increases the likelihood of waves passing under the user's head instead of over the user's head. The user is able to grasp first and second tubes **6** and **7** for stability in the water. The portion of bladder **4** above the water level also acts as a location marker.

[0048] **Figure 3** illustrates the user floating in water, with tube **5** of bladder **4** along the user's back. In this configuration, the submerged portion of bladder **4** provides the buoyancy function of a PFD, with the remaining portion of bladder **4** acting as a location marker. The bladder **4** may also act as a partial breakwater, helping to deflect or diffuse oncoming waves.

[0049] **Figure 6** illustrates the user being partly supported by the buoyancy of the deployed bladder **4**, reducing the effects of hypothermia. This configuration of the deployed bladder, with the user either facing upwards or facing downwards, also allows the user to float over hazards such as coral reefs without injury in some situations where floating without the deployed bladder could cause injury. The bladder **4** may also be used as a swimming aid by users learning to swim, by physically disabled users, or by other users for any reason, in recreational or other settings.

[0050] Recovery of the user is facilitated by the link **8** which enables the user to be bodily lifted from the water. A rope, hook, or other lifting object may be attached to the closed loop formed by inflatable first and second upper tubes **6** and **7** and by link **8**. Alternatively, link **16** may be used in place of link **8**.

[0051] Thereafter the user, while having the bladder located around the user's torso, may be hoisted from the water and secured on board the rescue vessel, which could be a boat, helicopter or other vehicle. The hook, rope, or other means of hoisting could be lowered and secured to the bladder **4** without requiring a person from the rescue vessel to enter the water. Additionally, the first and second upper tubes **6** and **7** can form a ladder-like arrangement with elongate tube **5** and any additional links between tubes **6** and **7**, and can be used as a ladder to board a nearby vessel or other structure such as a dock or non-marine structure.

[0052] **Figure 5** illustrates handles **17** and **18** on the bladder **4**. Such handles may be optionally provided in some embodiments. Handles **17** and **18** may be used to grasp or control the bladder **4**, or could be used as attachment points to pull or lift the bladder **4**.

[0053] Various alternative arrangements may be utilized with the bladder **4**. If necessary, a passive inflation device, such as a foam rubber, coil spring or mechanical linkage could be utilized.

[0054] Gas inflation may be through a pressurized gas inflator, for example using a carbon dioxide cylinder, a pressure reduction fitting attached to a Scuba air tank, or by other means.

[0055] The bladder **4** of the marker, recovery, and flotation device may be permanently attached to the enclosure**1**, or be made to be fully detachable by providing releasable connectors, such as quick-release buckles, on the connection between the bladder **4** and the belt, harness or personal flotation device it is attached to. In this way an existing PFD

may be retrofitted with the marker and recovery device, or the marker and recovery device replaced if necessary.

[0056] The bladder **4** may be left unattached to the user at any time including at inflation, or have one or more attachments of any length or means to the user. Other possible attachment locations include but are not limited to the user's arm, illustrated in **Figure 5** by enclosure **19** and connecting link **20**, and the user's leg, illustrated by enclosure **21** and connecting link **22**.

[0057] The bladder **4** can also be attached to two or more users simultaneously. It can also be attached to one or more points on the bladder **4**. Two or more bladders could be connected in order to keep several users together.

[0058] Unattached or attached deployed bladders could be used by persons other than the person wearing the enclosure, in situations such as life guards rescuing swimmers.

[0059] Deployed or undeployed bladders could be thrown to persons in distress.

[0060] It will also be appreciated that ancillary equipment such as whistles, reflective tape and lights, and pouches for equipment such as cell phones and radios, may be incorporated into the marker, recovery, and flotation device. Radar-reflective shapes and materials may also be incorporated inside and outside the bladder.

[0061] It will also be appreciated that the bladder may be of any color or combination of colors, and of any size.

[0062] It will also be appreciated that the marker, recovery, and flotation device may be attached to any person, animal or object that may require marking and recovery, such as pet animals that fall into the water, or cargo containers that are swept into the water.

[0063] It will also be appreciated that the marker, recovery, and flotation device may be used in non-marine applications where visibility and rescue are needed, such as rescue from deep forests or from high rise balconies, rooftops or other locations. The device can be attached to a rope or line in order for the user to rappel up or down buildings, sides of ships or other natural or manmade objects.

[0064] It will also be appreciated that the marker, recovery, and flotation device may be worn in its undeployed condition by individuals in hazardous activities such as ice rescue or firefighting, to be deployed if prompt location identification and rescue of the user were to be needed.

[0065] In some embodiments, the diameter of elongate tube **5** may differ from first upper tube **6** and second upper tube **7**. Thus the diameter of elongate tube **5** may be larger than tubes **6** or **7** to provide additional buoyancy in some cases, or may be smaller than tubes **6** or **7**, for example to provide a more compact device in other cases.

[0066] The tubes may also have variable diameters or taper, for example a taper along tubes **6** and **7** to provide maximum buoyancy in the portions of tubes **6** and **7** near elongate tube **5**, while saving mass and volume in the portions of tubes **6** and **7** that are more distal from tube **5**.

[0067] Further, the cross section of tubes **5**, **6** or **7** could be round in some embodiments, but may also be oval, obround, lenticular, semi-round, semi-oval, triangular, among other options.

[0068] The embodiments described herein are examples of structures, systems or methods having elements corresponding to elements of the techniques of this application. This written description may enable those skilled in the art to make and use embodiments having alternative elements that likewise correspond to the elements of the techniques of this application. The intended scope of the techniques of this application thus includes other structures, systems or methods that do not differ from the techniques of this

application as described herein, and further includes other structures, systems or methods with insubstantial differences from the techniques of this application as described herein.

[0069] Also, techniques, systems, subsystems, and methods described and illustrated in the various implementations as discrete or separate may be combined or integrated with other systems, modules, techniques, or methods. Other items shown or discussed as coupled or directly coupled or communicating with each other may be indirectly coupled or communicating through some interface, device, or intermediate component, whether mechanically, or otherwise. Other examples of changes, substitutions, and alterations are ascertainable by one skilled in the art and may be made.

[0070] While the above detailed description has shown, described, and pointed out the fundamental novel features of the disclosure as applied to various implementations, it will be understood that various omissions, substitutions, and changes in the form and details of the system illustrated may be made by those skilled in the art.

CLAIMS

1. A marker and recovery device comprising:

an enclosure adapted to be secured to a wearer;

a bladder configured to fit within the enclosure in an uninflated state, the bladder comprising:

an elongate tube;

a first upper tube fluidly connected to the elongate tube at a first end of the elongate tube; and

a second upper tube fluidly connected to the elongate tube at a second end of the elongate tube; and

an inflation mechanism to inflate the bladder to extend the bladder from the uninflated state to a deployed state in which the first upper tube and second upper tube join to form a handle portion at the end of the elongate tube.

2. The device according to claim 1, further comprising a link between the first upper tube and second upper tube.

3. The device according to claim 2, wherein the link fluidly connects the first upper tube and second upper tube.

4. The device according to claim 2, wherein the link is comprised of a rope or webbing between the first upper tube and second upper tube.

5. The device according to claim 1, wherein the enclosure is adapted to be worn on the front of the torso of the wearer.

6. The device according to claim 1, wherein the enclosure is adapted t be worn on the rear of the torso of the wearer.

7. The device according to claim 1, wherein the enclosure is adapted to be worn on an arm of the wearer.

8. The device according to claim 1, wherein the enclosure is adapted to be worn on a leg of the wearer.

9. The device according to claim 1, wherein the inflation mechanism comprises a canister containing a compressed fluid.

10. The device according to claim 1, wherein the enclosure is part of a belt.

11. The device according to claim 1, wherein the enclosure is part of a flotation device.

12. The device according to claim 1, wherein said bladder is stored in an uninflated state using a detachable panel.

13. The device according to claim 1, wherein said bladder is formed from a flaccid, impermeable material.

14. The device according to claim 13, wherein said material is a thermoplastic polyurethane or PVC coated nylon fabric.

15. The device according to claim 1, wherein said bladder is attached to the enclosure by a connecting link.

16. The device according to claim 1, wherein said bladder contains several air chambers.

17. The device according to claim 16, wherein each air chamber is fluidly connected to an inflation mechanism.

AMENDED CLAIMS
received by the International Bureau on
21 August 2018 (21.08.2018)

1. A marker and recovery device comprising:

an enclosure adapted to be secured to a wearer;

a bladder configured to fit within the enclosure in an uninflated state, the bladder comprising:

an elongate tube;

a first upper tube fluidly connected to the elongate tube at a first end of the elongate tube; and

a second upper tube fluidly connected to the elongate tube at a second end of the elongate tube;

an inflation mechanism to inflate the bladder to extend the bladder from the uninflated state to a deployed state in which the first upper tube and second upper tube join to form a handle portion at the end of the elongate tube; and

a connecting link attaching the bladder to the enclosure,

wherein the bladder is detachable from the enclosure except for the connecting link.

2. The device according to claim 1, further comprising a link between the first upper tube and second upper tube.

3. The device according to claim 2, wherein the link fluidly connects the first upper tube and second upper tube.

4. The device according to claim 2, wherein the link is comprised of a rope or webbing between the first upper tube and second upper tube.

5. The device according to claim 1, wherein the enclosure is adapted to be worn on the front of the torso of the wearer.

6. The device according to claim 1, wherein the enclosure is adapted to be worn on the rear of the torso of the wearer.

7. The device according to claim 1, wherein the enclosure is adapted to be worn on an arm of the wearer.

8. The device according to claim 1, wherein the enclosure is adapted to be worn on a leg of the wearer.

9. The device according to claim 1, wherein the inflation mechanism comprises a canister containing a compressed fluid.

10. The device according to claim 1, wherein the enclosure is part of a belt.

11. The device according to claim 1, wherein the enclosure is part of a flotation device.

12. The device according to claim 1, wherein said bladder is stored in an uninflated state using a detachable panel.

13. The device according to claim 1, wherein said bladder is formed from a flaccid, impermeable material.

14. The device according to claim 13, wherein said material is a thermoplastic polyurethane or PVC coated nylon fabric.

15. The device according to claim 1, wherein said bladder contains several air chambers.

16. The device according to claim 15, wherein each air chamber is fluidly connected to an inflation mechanism.

17. The device according to claim 1, wherein the first end of the elongate tube is distal to the second end of the elongate tube

Statement under Article 19(1)

The International Search Report objects that claims 1 to 6 and 9 to 15 lack novelty based on US publication number 2016167751 to Darroch (D1).

Without necessarily agreeing with the International Search Report, the applicant has amended claim 1 to include at the subject matter of claim 15. The applicant has further amended claim 1 to indicate "wherein the bladder is detachable from the enclosure except for the connecting link".

The applicant respectfully submits that this amendment further distinguishes the claims from the D1 reference. In particular, as seen in figures 4, 5, 6, 7, 8 and 9 of D1, the bladder in that reference is affixed to the enclosure. There is no teaching in the reference that the bladder may be detached from the enclosure except for the connecting link. At best, D1 teaches that to the enclosure itself may be detached from a belt or PFD, as taught for example in paragraph 48 of the D1 reference. This is distinct from the amended claim 1 which now teaches the bladder being detachable from the enclosure except for the connecting link.

As will be appreciated by the Examiner, such configuration allows for the embodiments of figures 2, 3 and 6, which allow the user to float atop the bladder or to sit or lie on the elongate tube, among other options. Such functionality would not be possible in the configuration of D1.

Claim 1 further teaches that the first upper tube is fluidly connected to the elongate tube at a first end of the elongate tube and that a second upper tube is fluidly connected to the elongate tube at a second end of the elongate tube. The applicant has added claim 17 which indicates that the second end is distal from the first end. The applicant respectfully submits that this also distinguishes from the D1 reference, since the first tube and second to both extend from the same end of the elongate tube as seen in figure 6 of that reference.

For the above reasons, the applicant respectfully submits that that the claims as amended are distinct from the cited references.

Respectfully submitted,

MOFFAT & CO.

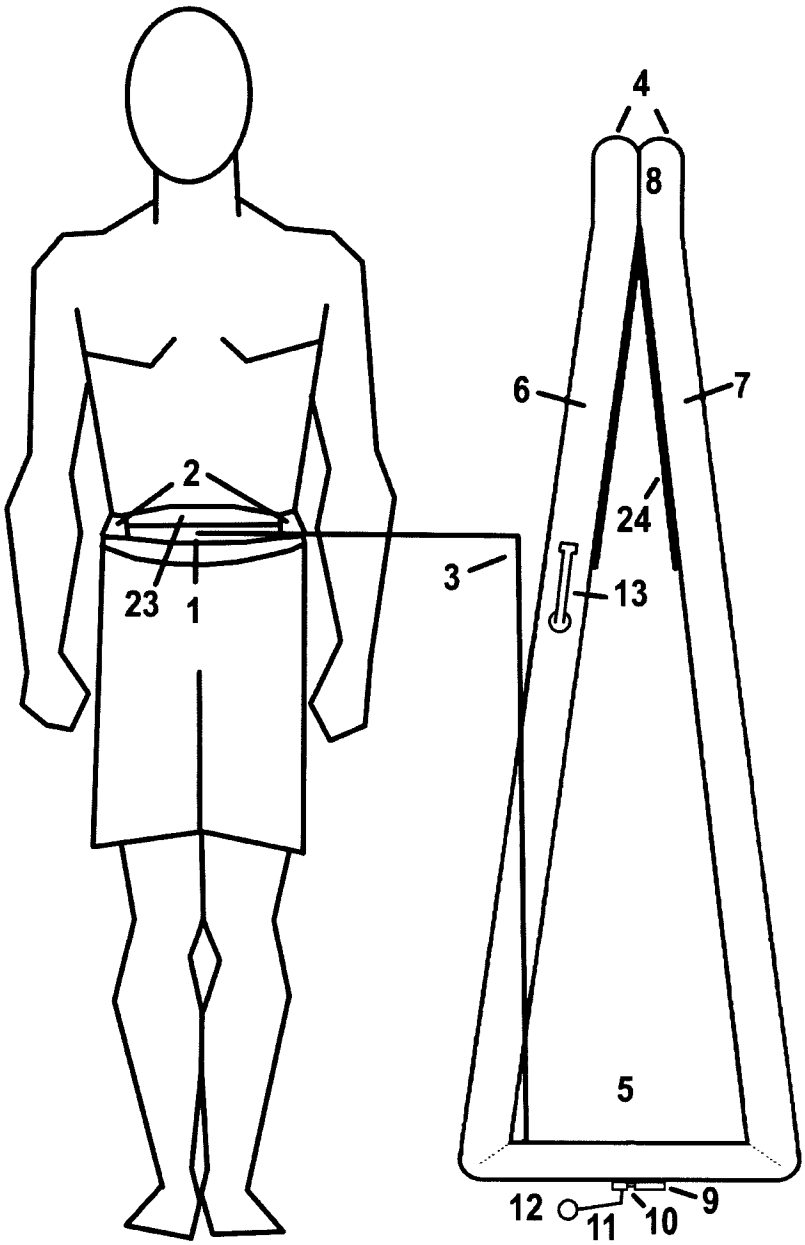

Figure 1

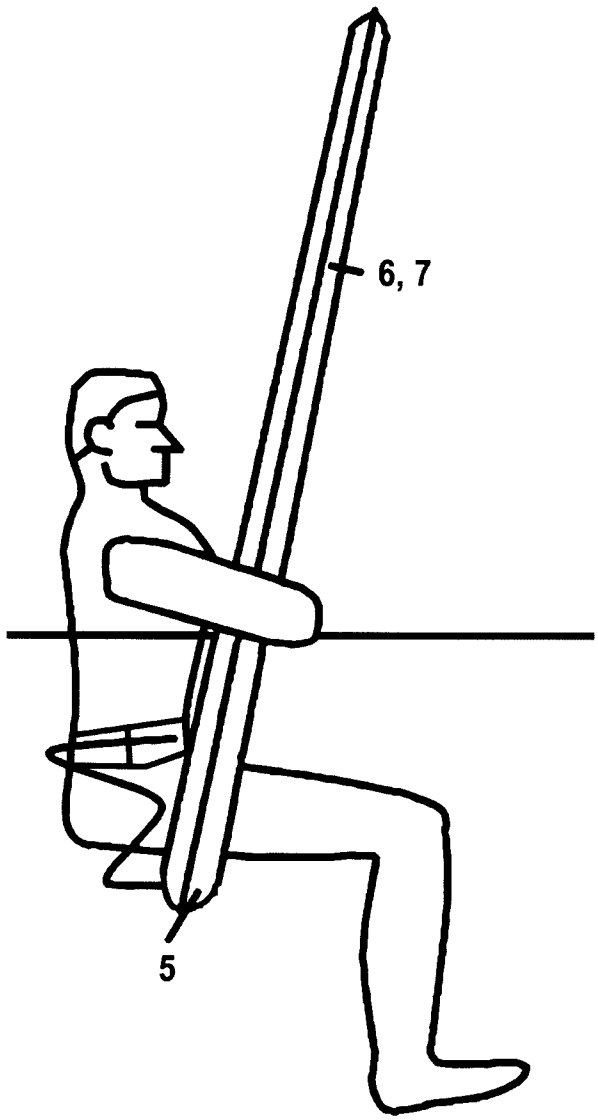

Figure 2

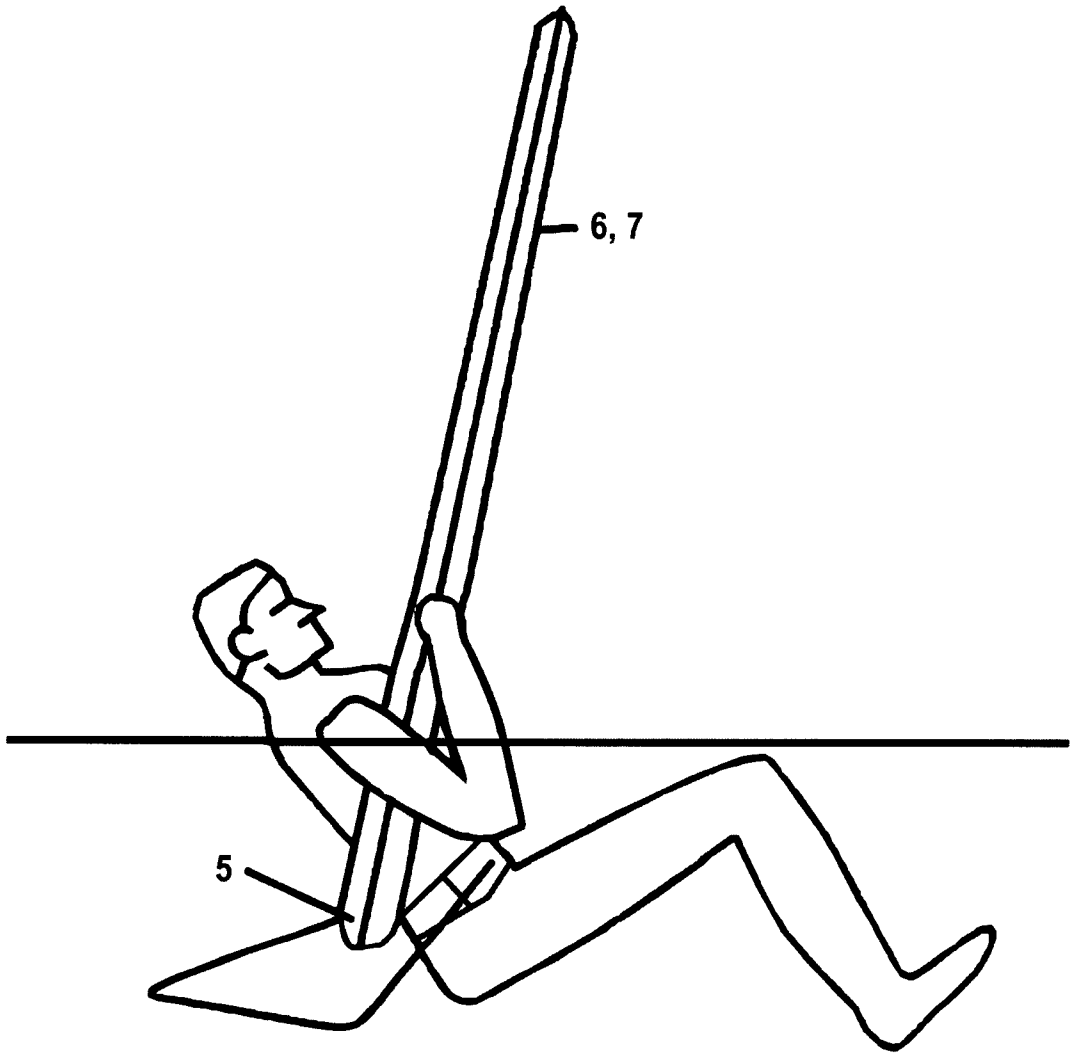

Figure 3

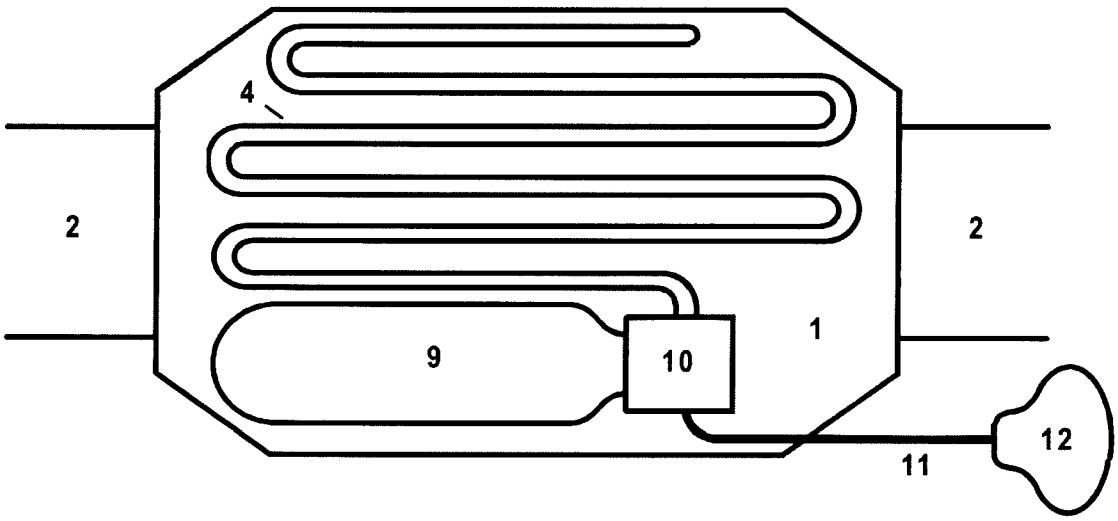

Figure 4

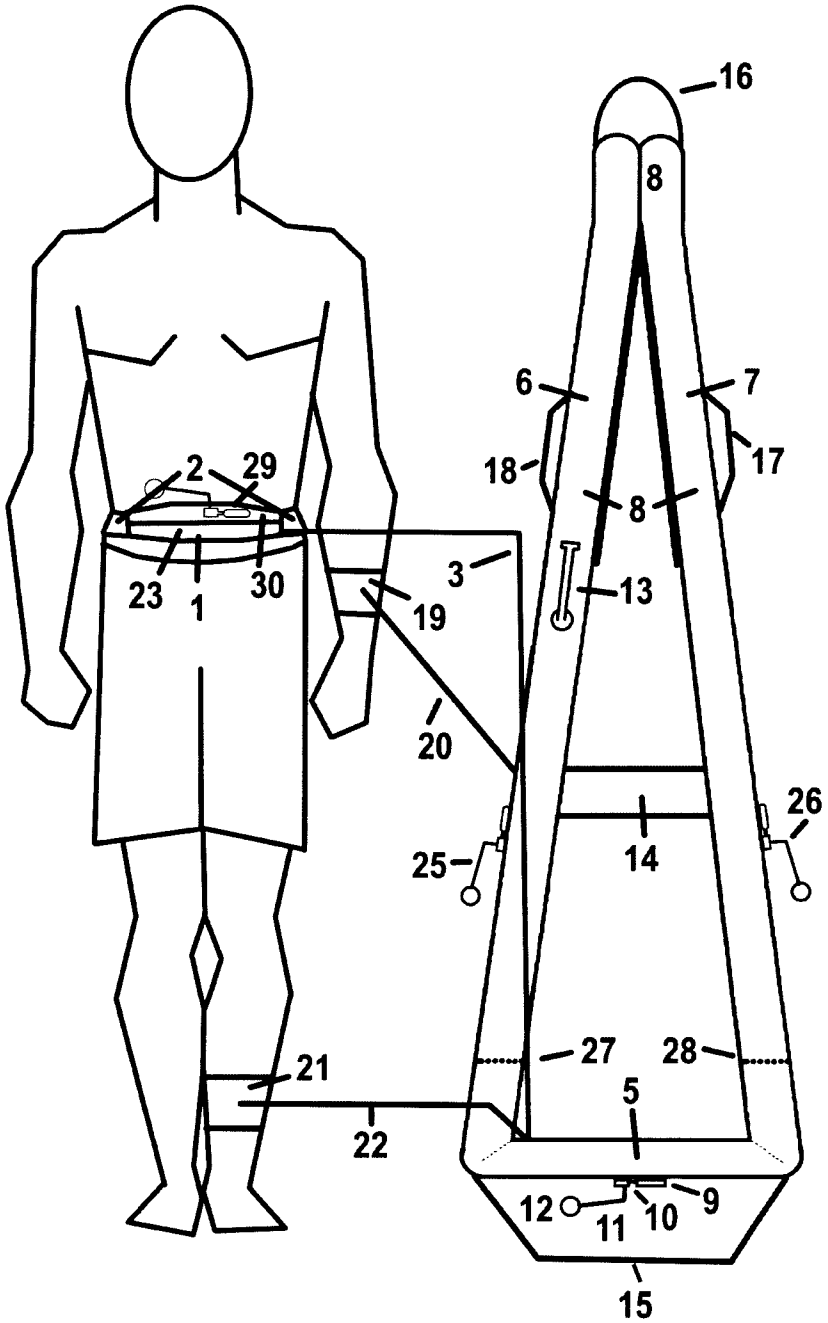

Figure 5

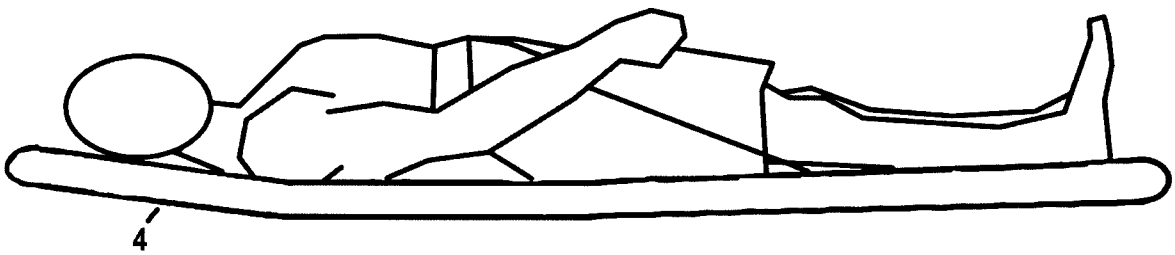

Figure 6

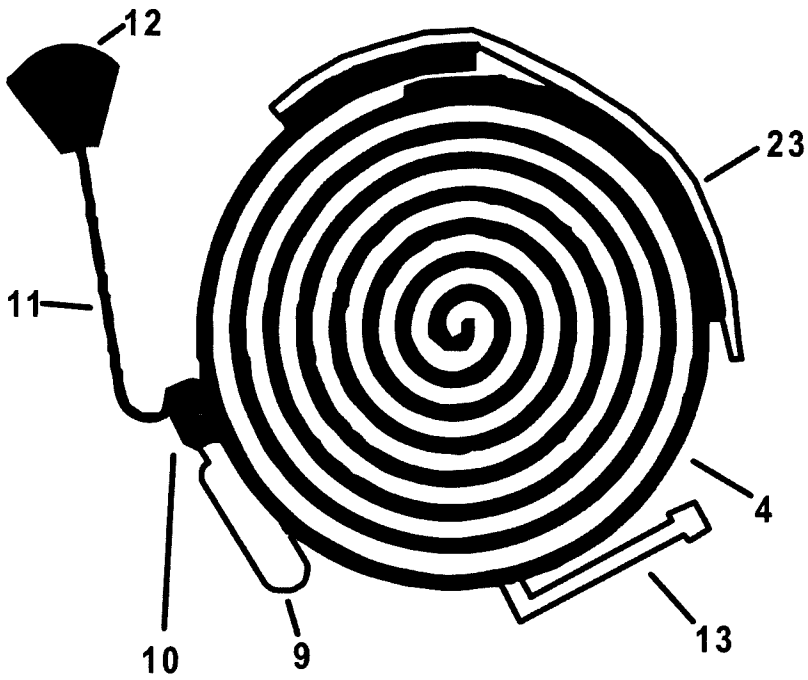

Figure 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2018/050387

A. CLASSIFICATION OF SUBJECT MATTER
IPC: ***B63C 9/15*** (2006.01), ***B63B 35/78*** (2006.01), ***B63C 9/125*** (2006.01), ***B63C 9/18*** (2006.01), ***B63C 9/22*** (2006.01)

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: B63C 9/15 (2006.01), B63B 35/78 (2006.01), B63C 9/125 (2006.01), B63C 9/18 (2006.01), B63C 9/22 (2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
none

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)
Database: Questel Orbit
Keywords: inflat*, triang*, tub*, marker*

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US2016167751A1 (DARROCH) 16 June 2016 (16-06-2016) *[0028]; [0030]; [0034]; [0035]; [0048]; Figures 2, 3 and 9*	1-17
A	US3877096A (SCESNEY) 15 April 1975 (15-04-1975) *whole document*	1-17
A	GB2254296A (GRANT) 07 October 1992 (07-10-1992) *whole document*	1-17
A	WO9941143A1 (CHRISTIE) 19 August 1999 (19-08-1999) *whole document*	1-17

☐ Further documents are listed in the continuation of Box C.

☑ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier application or patent but published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 01 June 2018 (01-06-2018)	Date of mailing of the international search report 14 June 2018 (14-06-2018)
Name and mailing address of the ISA/CA Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 819-953-2476	Authorized officer Bethany Seaman (819) 963-9765

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2018/050387

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
US2016167751A1	16 June 2016 (16-06-2016)	None	
US3877096A	15 April 1975 (15-04-1975)	None	
GB2254296A	07 October 1992 (07-10-1992)	GB9107191D0	22 May 1991 (22-05-1991)
		GB2254296B	03 May 1995 (03-05-1995)
WO9941143A1	19 August 1999 (19-08-1999)	AU2526999A	30 August 1999 (30-08-1999)
		GB9903043D0	31 March 1999 (31-03-1999)
		GB2336134A	13 October 1999 (13-10-1999)
		GB9802788D0	08 April 1998 (08-04-1998)
		GB9823105D0	16 December 1998 (16-12-1998)