

LIFE JACKET

FIELD

[0001] The present invention relates to a life preserver including a wearable device worn
5 around a target site of the body of a wearer and a floatation bag that inflates upon receiving a
gas supply in the deflated state.

BACKGROUND

[0002] An example of such a life preserver is described in Japanese Patent No. 3508930
10 (Patent Literature 1). The names and reference signs for the components shown in the
parentheses below correspond to those in Patent Literature 1.

[0003] When the life preserver in Patent Literature 1 is in a normal state with a floatation
bag (life jacket 3) deflated, the deflated floatation bag is folded and accommodated in a cover
(waist pouch 4). The cover (waist pouch 4) is attached to a wearable device (waist belt 5).
15 The floatation bag (life jacket 3) is coupled to the wearable device (waist belt 5) in the cover
(waist pouch 4) using a coupler (coupling belt 13). In an emergency such as when a wearer
falls into water, the floatation bag (life jacket 3) inflates with a gas supply from a gas supplier
(gas cylinder 2). The floatation bag (life jacket 3) is released from the waist pouch (4) to
expand. Thus, the wearer can wear the inflated floatation bag (life jacket 3) to keep the body
20 afloat.

CITATION LIST

PATENT LITERATURE

[0004] Patent Literature 1: Japanese Patent No. 3508930

BRIEF SUMMARY

TECHNICAL PROBLEM

[0005] Such a life preserver may release the inflated floatation bag (life jacket 3) on the
front of the wearer's body in an emergency with the floatation bag being inflated. As
described in paragraph 0020 in Patent Literature 1, the wearable device (waist belt 5) is
30 normally worn to have the cover (waist pouch 4) located at the front of the wearer's body.
However, the cover (waist pouch 4) located at the front of the wearer's body may normally
interfere with various operations of the wearer.

[0006] More specifically, to use the life preserver described Patent Literature 1, the wearer
wears the wearable device (waist belt 5) to have the cover (waist pouch 4) at a position at which
35 the floatation bag (life jacket 3) is to be inflated and released. Thus, the cover (waist pouch
4) may normally interfere with the actions of the wearer.

[0007] A life preserver is thus to be wearable with a floatation bag inflatable at an appropriate position for a wearer in an emergency with the floatation bag being inflated and with a cover located not to interfere with the actions of the wearer in a normal state with the floatation bag deflated.

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SOLUTION TO PROBLEM

[0008] In response to this, a life preserver includes a wearable device to be wound around a target site of a body of a wearer, a floatation bag inflatable upon receiving a gas supply in a deflated state, a coupler including a first fixer fixed to the wearable device and a second fixer
10 fixed to the floatation bag to couple the wearable device and the floatation bag, and a cover including a third fixer fixed to the wearable device and accommodating the floatation bag in the deflated state. The first fixer and the second fixer are spaced apart by a coupling distance for the coupler. The wearable device includes a coupler fixer to which the first fixer is fixed and a cover fixer to which the third fixer is fixed. The coupler fixer and the cover fixer are at
15 different positions in the wearable device in a winding direction in which the wearable device is wound around the target site, and a distance between the coupler fixer and the cover is smaller than or equal to the coupling distance.

[0009] In this structure, the coupler fixer and the cover fixer are at different positions in the wearable device in the winding direction, and thus the coupler fixer and the cover can be at
20 different positions on the target site of the wearer. The first fixer fixed to the wearable device and the second fixer fixed to the floatation bag are spaced apart by the coupling distance of the coupler. The coupler fixer and the cover are spaced by a distance smaller than or equal to the coupling distance. Thus, the deflated floatation bag can be appropriately accommodated in the cover fixed to the cover fixer spaced apart from the coupler fixer.

[0010] In this structure, when the floatation bag is inflated and released out of the cover, the position of the floatation bag with respect to the wearer is defined by the position of the coupler fixer rather than the position of the cover (cover fixer). More specifically, the cover (cover fixer) and the inflated floatation bag are at different positions. In an emergency with the floatation bag being inflated, the floatation bag inflates at a position appropriate for the
30 wearer, and the cover can be at a position different from the floatation bag. Thus, the life preserver can be worn by the wearer to have the cover located not to interfere with the actions of the wearer in a normal state with the floatation bag deflated.

[0011] Further aspects and features of the technique according to the present disclosure will be apparent from exemplary and nonlimiting embodiments described below with reference
35 to the drawings.

BRIEF DESCRIPTION OF DRAWINGS

[0012] FIG. 1 is a perspective view of a life preserver according to a first embodiment with a floatation bag inflated and released out of a cover.

FIG. 2 is a perspective view of the life preserver according to the first embodiment with the floatation bag deflated and accommodated in the cover.

FIG. 3 is an enlarged plan view of a wearable device and holders in the life preserver according to the first embodiment.

FIG. 4 is an enlarged plan view of a coupler in the life preserver according to the first embodiment.

FIG. 5 is a perspective view of a life preserver according to a second embodiment with a floatation bag deflated and accommodated in a cover.

FIG. 6 is a perspective view of the life preserver according to the second embodiment with the floatation bag inflated and released out of the cover.

DETAILED DESCRIPTION

[0013] A life preserver according to one or more embodiments will now be described with reference to the drawings.

1. First Embodiment

[0014] FIGs. 1 and 2 are perspective views of a life preserver 1 according to a first embodiment. As shown in these figures, the life preserver 1 includes a wearable device 10, a floatation bag 20, couplers 30, and a cover 40 as its main components. In the present embodiment, the life preserver 1 further includes holders 50, releasers 55, and a gas supplier 60.

[0015] A winding direction X herein refers to the direction in which the wearable device 10 is wound around a target site O, or more specifically, the direction in which the wearable device 10 extends when the wearable device 10 is wound around the target site O.

1-1. Wearable Device

[0016] The wearable device 10 is worn to be wound around the target site O of the body of a wearer P. The wearable device 10 is attachable to and detachable from the target site O. The target site O is a portion of the body of the wearer P around which the wearable device 10 is wound. When worn on the body of the wearer P, the wearable device 10 holds the life preserver 1 on the body. In the present embodiment, as shown in FIGs. 1 and 2, the target site O is a waist O1, and the wearable device 10 is a belt worn around the waist. The wearable device 10 includes coupler fixers 11 and a cover fixer 12. In the present embodiment, the wearable device 10 further includes a main part 13, a buckle 15, and holder fixers 16.

[0017] As shown in FIGs. 1 and 2, the main part 13 is a strip to be wound around the target

site O. The buckle 15 engages and disengages joints of the main part 13 wound around the target site O. The main part 13 in the wearable device 10 is attachable to and detachable from the target site O through engagement and disengagement of the buckle 15. The joints of the main part 13 refer to portions of the main part 13 that meet when the main part 13 is wound
5 around the target site O. The joints or the portions that meet include, in addition to the portions of the main part 13 that overlap when the main part 13 is wound around the target site O, ends of the main part 13 that face each other when the main part 13 is wound around the target site O. Engaging the main part 13 at the joints allows the wearable device 10 to be in a loop. The main part 13 wound around the target site O and formed into a loop is appropriately worn by
10 the target site O. In the present embodiment, the main part 13 is a strip wound around the target site O (or the waist in this example). In this example, the buckle 15 includes a female buckle 15a and a male buckle 15b attachable to and detachable from each other. The female buckle 15a is fixed to an end of the main part 13. The male buckle 15b is located opposite to the female buckle 15a in the winding direction X with the cover 40 (described later) in between.
15 In this example, the male buckle 15b includes a first adjuster 17 for adjusting the belt length of the main part 13. More specifically, the first adjuster 17 can change the position at which the male buckle 15b is engaged with the main part 13 in the direction in which the main part 13 extends. The wearer P winds the main part 13 around the target site O, engages the female buckle 15a with the male buckle 15b, and moves, using the first adjuster 17, the position at
20 which the male buckle 15b is engaged with the main part 13 to the joints. Thus, the belt length of the main part 13 can be adjusted to the perimeter of the target site O of the wearer P. Thus, the wearer P can appropriately wear the wearable device 10 on the target site O.

[0018] The coupler fixers 11 are portions to which first fixers 31 (described later) in the couplers 30 are fixed. More specifically, the coupler fixers 11 in the wearable device 10 fix
25 the couplers 30. The coupler fixers 11 are portions of the wearable device 10 to which the floatation bag 20 is coupled using the couplers 30. Thus, when the inflated floatation bag 20 is released out of the cover 40, the coupler fixers 11 serve as portions of the wearable device 10 to which the floatation bag 20 is coupled, or more specifically, to which the floatation bag 20 on the body of the wearer P is coupled. As shown in FIGs. 1 and 3, the coupler fixers 11 are
30 located on the outer surface (the surface opposite to the surface in contact with the body when worn) of the main part 13. The first fixers 31 in the couplers 30 overlap and are fixed to the coupler fixers 11. In the present embodiment, as shown in FIGs. 1 and 3, the coupler fixers 11 include a first coupler fixer 11a and a second coupler fixer 11b. The first coupler fixer 11a and the second coupler fixer 11b are aligned in the winding direction X in which the main part
35 13 is wound. Each of the first fixers 31 overlaps and is fixed to the corresponding first coupler fixer 11a or second coupler fixer 11b. In this example, each of the first coupler fixer 11a and

the second coupler fixer 11b and the corresponding first fixer 31 are sewed together.

[0019] The cover fixer 12 is a portion to which a third fixer 41 (described later) of the cover 40 is fixed. More specifically, the cover fixer 12 is a portion of the wearable device 10 to which the cover 40 is fixed. As shown in FIGs. 1 and 3, in the present embodiment, the cover 40 is fixed to the cover fixer 12 to cover the cover fixer 12. The cover fixer 12 is located on the outer surface of the main part 13 in the wearable device 10. The cover fixer 12 and the cover 40 overlap each other and are fixed together. In this example, the cover fixer 12 and the cover 40 are sewed together. The cover fixer 12 may be sized to match an overlapping portion in which the cover 40 and the wearable device 10 overlap. In this example, the cover fixer 12 has a rectangular shape sized to match the length of the overlapping portion in which the cover 40 and the wearable device 10 overlap in the winding direction X and the width of the main part 13 in the wearable device 10 in the width direction (direction perpendicular to the winding direction X and along the strip surface). Thus, the cover 40 is appropriately fixed to the wearable device 10.

[0020] As shown in FIG. 3, the coupler fixers 11 and the cover fixer 12 are at different positions in the winding direction X in the wearable device 10. In this example, the coupler fixers 11 (the first coupler fixer 11a and the second coupler fixer 11b) and the cover fixer 12 are spaced apart from each other in the winding direction X. Thus, a distance L (refer to FIG. 3) is left between the coupler fixers 11 in the wearable device 10 and the cover 40 fixed to the cover fixer 12. This structure can cause the position at which the cover 40 is fixed to the wearable device 10 to differ from the position at which the couplers 30 are fixed to the wearable device 10 when the wearer P wears the wearable device 10. When the floatation bag 20 is inflated and released out of the cover 40, the position of the floatation bag 20 with respect to the wearer P is defined by the positions of the coupler fixers 11 rather than the position of the cover 40. Thus, this structure can cause the position of the cover 40 to differ from the position of the floatation bag 20 released from the cover 40. In the present embodiment, as shown in FIG. 3, the first coupler fixer 11a, the second coupler fixer 11b, and the cover fixer 12 are arranged on the main part 13 in this order from where the female buckle 15a is located in the winding direction X. In this example, holder fixers 16 are located between the second coupler fixer 11b and the cover fixer 12.

[0021] In the present embodiment, the coupler fixers 11 in the wearable device 10 are located closer to the center in the width direction than the cover fixer 12 in the wearable device 10 at the front of the body of the wearer P when the wearable device 10 is worn on the target site O. This causes the cover fixer 12 to be farther from the center in the width direction than the coupler fixers 11 at the front of the body of the wearer P when the wearable device 10 is worn on the target site O. When the wearer P wears the belt around its body (e.g., the waist),

a fastener such as a buckle of the belt is often located close to the front of the body. Thus, the components in the present embodiment are positioned to cause the buckle 15 to be in a center area in the width direction at the front of the body of the wearer P when the wearable device 10 is worn on the target site O. More specifically, as shown in FIG. 1, the coupler fixers 11 (the first coupler fixer 11a and the second coupler fixer 11b) are located closer to the center in the width direction than the cover fixer 12 at the front of the body of the wearer P when the wearable device 10 is worn to have the buckle 15 located closer to the front of the body of the wearer P than to the side of the body.

[0022] More specifically, in this example, when the wearable device 10 is worn on the target site O (or the waist O1 in this example), the cover fixer 12 is located at the side of the body of the wearer P, and the coupler fixers 11 are located at the front of the body of the wearer P between the buckle 15 and the cover fixer 12. In the illustrated example, the cover fixer 12 is spaced apart from the female buckle 15a in the winding direction X to be located at the side of the waist O1 (the side of the body) of the wearer P. In this example, the coupler fixers 11 are located between the female buckle 15a and the holder fixers 16, and at the front of the body when the wearable device 10 is worn. In a normal state with the floatation bag 20 deflated, the floatation bag 20 can be accommodated in the cover 40 located at the side of the waist O1 not to interfere with the actions of the wearer P. In an emergency, the floatation bag 20 can be inflated at the front of the body of the wearer P.

[0023] The holder fixers 16 are portions of the main part 13 in the wearable device 10 including the holders 50 (described below) fixed to the wearable device 10. In the present embodiment, as shown in FIG. 3, the holder fixers 16 include a first holder fixer 16a and a second holder fixer 16b. The first holder fixer 16a and the second holder fixer 16b are aligned in the winding direction X of the main part 13. In this example, the first holder fixer 16a and the second holder fixer 16b are located between the second coupler fixer 11b and the cover fixer 12 in the winding direction X.

1-2. Floatation Bag

[0024] The floatation bag 20, which is an airtight bag, inflates upon receiving a gas supply in the deflated state. The floatation bag 20 is a sheet when deflated without gas inside. Thus, as shown in FIG. 2, the floatation bag 20 can be folded and accommodated in the cover 40 when deflated. When inflated with gas inside, the floatation bag 20 serves as a float that allows the body of the wearer P to float on or in water. As shown in FIG. 1, when inflated, the floatation bag 20 is released from the cover 40 and exposed outside.

[0025] As shown in FIG. 1, when inflated, the floatation bag 20 is worn on the body of the wearer P. The floatation bag 20 is a loop including a single discontinuous portion 28. In the present embodiment, the floatation bag 20 further includes a connector 21 that bridges the

discontinuous portion 28. The floatation bag 20 also includes floatation bag fixers 26 fixed to the couplers 30. The loop may be any shape that allows the floatation bag 20 to surround a gap. Thus, the loop includes one of various shapes, in addition to a U shape as shown in FIG. 1, such as an angular U shape, a V shape, an annular shape, and a polygonal loop shape. In this example, the floatation bag 20 is to be worn to extend, when inflated, from the back of the neck of the wearer P to the front of both sides of the chest. Thus, the floatation bag 20 includes a first float 24 to be on one arm of the wearer P when inflated, a second float 25 to be on the other arm of the wearer P when inflated, and a third float 27 to be at the back of the neck of the wearer P when inflated. The first float 24 and the second float 25 are connected with the third float 27 in between and are continuous with each other. The first float 24 and the second float 25 are discontinuous at the chest of the wearer P. The wearer P can easily wear the floatation bag 20 by placing the neck into the floatation bag 20 through the discontinuous portion 28.

[0026] The connector 21 bridges the discontinuous portion 28 of the floatation bag 20. Thus, as shown in FIG. 1, the connector 21 is located to correspond to the discontinuous portion 28 of the floatation bag 20. In the present embodiment, the connector 21 is located in an area of the floatation bag 20 corresponding to the chest of the wearer P. The connector 21 has separate portions on the first float 24 facing the second float 25 and on the second float 25 facing the first float 24. These portions of the connector 21 are connected to each other or detached from each other. In the present embodiment, as shown in FIG. 1, the connector 21 includes a second female buckle 21a and a second male buckle 22b. One of the second female buckle 21a and the second male buckle 22b is attached to the first float 24, and the other of these buckles is attached to the second float 25. In the illustrated example, the second female buckle 21a is attached to the first float 24, and the second male buckle 22b is attached to the second float 25.

[0027] The floatation bag fixers 26 are portions to which second fixers 32 (described later) in the couplers 30 are fixed. More specifically, the floatation bag fixers 26 allow the floatation bag 20 to be fixed to the couplers 30. In the present embodiment, the floatation bag fixers 26 include a first floatation bag fixer 26a and a second floatation bag fixer 26b. In this example, as shown in FIG. 1, the first floatation bag fixer 26a extends along the edge of the first float 24 facing the second float 25. The second floatation bag fixer 26b extends along the edge of the second float 25 facing the first float 24.

1-3. Couplers

[0028] The couplers 30 each include a first fixer 31 fixed to the wearable device 10 and a second fixer 32 fixed to the floatation bag 20 to couple the wearable device 10 and the floatation bag 20. In the present embodiment, the couplers 30 each further include a second adjuster 35. The couplers 30 tether the floatation bag 20 to the wearable device 10 to prevent the floatation

bag 20 from being away from the wearer P in an emergency with the floatation bag 20 being inflated in or on water. In the present embodiment, as shown in FIG. 1, the couplers 30 are strips separate from the wearable device 10. In this example, the couplers 30 include a first coupling belt 33 and a second coupling belt 34. The first coupling belt 33 couples the first
5 coupler fixer 11a in the wearable device 10 to the first floatation bag fixer 26a (first float 24) in the floatation bag 20. The second coupling belt 34 couples the second coupler fixer 11b in the wearable device 10 to the second floatation bag fixer 26b (second float 25) in the floatation bag 20.

[0029] In the present embodiment, the first fixers 31 are located at first ends of the first
10 coupling belt 33 and the second coupling belt 34 in the longitudinal direction. As described above, in the present embodiment, the first fixer 31 in the first coupling belt 33 and the first coupler fixer 11a in the wearable device 10 overlap and are fixed to each other. The first fixer 31 in the second coupling belt 34 and the second coupler fixer 11b in the wearable device 10 overlap and are fixed to each other. In this example, the fixers are sewed together.

[0030] In the present embodiment, the second fixers 32 are located at the ends of the first
15 coupling belt 33 and the second coupling belt 34 opposite to the ends on the first fixers 31. The second fixer 32 on the first coupling belt 33 and the first floatation bag fixer 26a in the floatation bag 20 overlap and are fixed to each other. The second fixer 32 on the second coupling belt 34 and the second floatation bag fixer 26b in the floatation bag 20 overlap and are
20 fixed to each other. In this example, the second fixer 32 on the first coupling belt 33 and the first floatation bag fixer 26a are sewed together. The second fixer 32 on the second coupling belt 34 and the second floatation bag fixer 26b are also sewed together.

[0031] The second adjusters 35 in the couplers 30 adjust a coupling distance R for the
25 couplers 30. More specifically, the second adjusters 35 adjust the coupling distance R for the couplers 30 between the first fixers 31 fixed to the wearable device 10 and the second fixers 32 fixed to the floatation bag 20. In the present embodiment, the second adjusters 35 are located on the first coupling belt 33 and the second coupling belt 34. The second adjusters 35 can adjust the coupling distance R to position the floatation bag 20 for the wearable device 10 as appropriate for, for example, the body size of the wearer P wearing the life preserver 1. In this
30 example, each second adjuster 35 includes a buckle that can adjust the length of the corresponding coupler 30 (the first coupling belt 33 or the second coupling belt 34). A known component is usable as the buckle.

[0032] As shown in FIG. 4, the first fixer 31 and the second fixer 32 are spaced apart by
35 the coupling distance R for each coupler 30. The coupling distance R indicates the distance between the first fixer 31 and the second fixer 32 along the coupler 30. More specifically, the couplers 30 (the first coupling belt 33 and the second coupling belt 34) are flexible strips.

Thus, the distance (direct distance) between the first fixer 31 and the second fixer 32 varies as each coupler 30 bends or deflects. The coupling distance R is defined by the length of the couplers 30 independently of the couplers 30 bending or deflecting. As shown in FIG. 4, the distance between the first fixer 31 and the second fixer 32 measured with the coupler 30 stretched linearly matches the coupling distance R. In this example, as described above, each coupler 30 includes the second adjuster 35. Thus, the coupling distance R in this example varies within a range adjustable by the second adjuster 35.

[0033] As shown in FIG. 3, the coupler fixers 11 (the first coupler fixer 11a and the second coupler fixer 11b) and the cover fixer 12 are spaced apart from each other in the winding direction X, and the distance L is left between the coupler fixers 11 in the wearable device 10 and the cover 40 fixed to the cover fixer 12 as described above. The distance L between the coupler fixers 11 in the wearable device 10 and the cover 40 is smaller than or equal to the coupling distance R ($R \geq L$). The distance L is a distance of an area in the wearable device 10 between the coupler fixers 11 and the cover 40 in the winding direction X. In this example, the coupler fixers 11 include the first coupler fixer 11a and the second coupler fixer 11b. Thus, the distance L is a distance between the cover 40 and the second coupler fixer 11b, which is closer to the cover 40 than the first coupler fixer 11a. In this structure, the distance L between the coupler fixers 11 and the cover 40 is smaller than or equal to the coupling distance R of the couplers 30 between the first fixer 31 fixed to the wearable device 10 and the second fixer 32 fixed to the floatation bag 20. Thus, the couplers 30 fixed to the coupler fixers 11 can extend in the winding direction X along the wearable device 10, and the floatation bag 20 can be in the cover 40 fixed to the cover fixer 12. Thus, the deflated floatation bag 20 can be appropriately accommodated in the cover 40 spaced apart from the coupler fixers 11.

1-4. Cover

[0034] As shown in FIGs. 1 to 3, the cover 40 includes a third fixer 41 fixed to the wearable device 10 to accommodate the deflated floatation bag 20. In the present embodiment, the cover 40 is a bag that can accommodate the deflated and folded floatation bag 20. In this example, as shown in FIG. 3, the cover 40 is a waist pouch extending vertically. As shown in FIGs. 1 and 2, in the present embodiment, the cover 40 includes the cover fixer 12 positioned to cause the cover 40 to be at the left or right of the waist of the body of the wearer P when the wearable device 10 is worn on the target site O (waist O1). Thus, the cover 40 is less likely to interfere with the actions of the wearer P than when being at the front of the body of the wearer P.

[0035] As shown in FIG. 2, the cover 40 includes an outlet 43 through which the floatation bag 20 is released outside in response to the floatation bag in the deflated state being inflated. In the present embodiment, the cover 40 has an opening in a portion of the outer periphery, and

the opening serves as the outlet 43. In this example, the outlet 43 is a slit. In the present embodiment, a fastener 42 for closing the outlet 43 is at the outlet 43. The fastener 42 can close the outlet 43 except when the floatation bag 20 is released outside, and can appropriately accommodate the floatation bag 20 in the cover 40. The fastener 42 is disengageable under pressure received from the floatation bag 20 when the floatation bag 20 in the deflated state is inflated. Thus, although the deflated floatation bag 20 is folded and accommodated in the cover 40 in a normal state with the floatation bag 20 deflated, the floatation bag 20 can be inflated and released out of the cover 40 in an emergency when the wearer P falls into water. More specifically, when the floatation bag 20 is inflated with a gas supply from a gas supplier 60 (described below) into the floatation bag 20 accommodated in the cover 40, the fastener 42 is disengaged under the pressure of the inflated floatation bag 20 to open the outlet 43. Thus, the inflated floatation bag 20 is released out of the cover 40 through the outlet 43. Thus, the wearer P can also appropriately use the floatation bag 20 in an emergency. The wearer P can also open and close the outlet 43 manually by connecting and disconnecting the fastener 42. More specifically, the cover 40 allows the deflated floatation bag 20 to be placed in and out. In the illustrated example, the fastener 42 is a hook-and-loop fastener attached along the surface facing the slit serving as the outlet 43. The hook-and-loop fastener as the fastener 42 can appropriately open the outlet 43 as the floatation bag 20 is inflated. Another engagement member such as snap buttons may be used in place of the hook-and-loop fastener.

1-5. Holder and Releaser

[0036] Holders 50 hold the couplers 30 in the winding direction X along the wearable device. The holders 50 allowing the couplers 30 to be held along the wearable device 10 in the winding direction X can reduce loosening of the couplers 30 outside the cover 40 when the deflated floatation bag 20 is accommodated in the cover 40. The holders 50 may tie the couplers 30 extending in the winding direction X to the wearable device 10. In this example, as shown in FIG. 3, the holders 50 are strips extending in the direction perpendicular to the winding direction X (extending in the width direction of the wearable device 10). The holders 50 are attached to the wearable device 10 to protrude from both edges of the wearable device 10 in the direction perpendicular to the winding direction X (in the width direction of the wearable device 10). The holders 50 and the wearable device 10 overlap each other to have overlapping portions and are fixed to each other in the overlapping portions. In this example, the holder 50 and the wearable device 10 are sewed together. In the present embodiment, as shown in FIG. 3, the holders 50 include a first strip 51 and a second strip 52. The first strip 51 and the second strip 52 are arranged in this order from where the female buckle 15a in the wearable device 10 is located in the winding direction X.

[0037] As shown in FIGs. 1 and 3, the releasers 55 release the couplers 30 held by the

holders 50. In the present embodiment, each releaser 55 includes engagement members that engage two ends of the corresponding holder 50. The two ends of each holder 50 are portions of the holder 50 protruding from both edges of the wearable device 10 in the direction perpendicular to the winding direction X (in the width direction of the wearable device 10).
5 In this example, hook-and-loop fasteners are used as an example of the engagement members serving as the releasers 55 (refer to FIGs. 1 and 3). Other engagement members such as snap buttons may be used in place of the hook-and-loop fasteners. In the present embodiment, the releasers 55 include first releasing members 55a on the first strip 51 and second releasing members 55b on the second strip 52. The first releasing members 55a are arranged on the two
10 ends of the first strip 51. The second strips 52 are arranged on the two ends of the second strip 52.

[0038] As described above, the holder fixers 16 are located between the second coupler fixer 11b and the cover fixer 12 in the winding direction X. Thus, the holders 50 are located between the coupler fixers 11 and the cover fixer 12 in the winding direction X. With the
15 deflated floatation bag 20 being accommodated in the cover 40, the couplers 30 (the first coupling belt 33 and the second coupling belt 34) can overlap the main part 13 in the wearable device 10 in the winding direction X. In this state, the holders 50 hold the couplers 30 along the wearable device 10. In this case, the first strip 51 and the second strip 52 tie the couplers 30 to the wearable device 10. More specifically, the first strip 51 wraps the couplers 30
20 through engagement of the hook-and-loop fasteners serving as the first releasing members 55a at the two ends of the first strip 51. Similarly, the second strip 52 wraps the couplers 30 through engagement of the hook-and-loop fasteners serving as the second releasing members 55b at the two ends of the second strip 52.

Thus, the first strip 51 and the second strip 52 in the holders 50 tie the couplers 30 to the
25 wearable device 10.

[0039] In an emergency with the floatation bag 20 being inflated, a force caused by the inflation of the floatation bag 20 and the release of the floatation bag 20 out of the cover 40 disengages the hook-and-loop fasteners on the first releasing member 55a and the second releasing member 55b. Thus, the portions of the couplers 30 other than portions at the coupler
30 fixers 11 are freely movable relative to the wearable device 10. Also, when manually removing the floatation bag 20 from the cover 40, the wearer P can release the couplers 30 held by the holders 50 by pulling the floatation bag 20 or the couplers 30 toward the coupler fixers 11.

1-6. Gas Supplier

35 [0040] As shown in FIG. 1, the gas supplier 60 automatically supplies gas into the floatation bag 20 upon detecting an entry into water. In the present embodiment, the gas

supplier 60 is attached to the floatation bag 20. The floatation bag 20 inflates upon receiving a gas supply from the gas supplier 60 in the deflated state. Any component with a known structure may be used as the gas supplier 60. In the present embodiment, the gas supplier 60 includes a cylinder 61 storing a compressed gas such as carbon dioxide, a supplying device that has a hole connecting to the inside of the floatation bag 20 and supplies the gas in the cylinder 61 into the floatation bag 20 when operated, an automatic operator that automatically operates the supplying device upon detecting an entry into water, and a manual operator that operates the supplying device in response to an operation on an operation cord 62. Although the gas supplier 60 may be at any position, the gas supplier 60 may be at a position not to interfere with the actions of the wearer P. In the above embodiment, the gas supplier 60 is on the surface of the second float 25 to be opposite to the surface facing the wearer P when the floatation bag 20 is inflated. In place of the automatic operator, the gas supplier 60 may include a manual supplying device that inflates the floatation bag 20 simply with a manual operation on the operation cord 62.

[0041] As shown in FIG. 1, a gas adjustment tube 8 is located on the floatation bag 20. In the present embodiment, the gas adjustment tube 8 includes a tube 8a connected to the inside of the floatation bag 20, a cap 8b fittable in an opening at an end of the tube 8a to cover the opening, and a check valve (not shown) located in the tube 8a close to the opening at the end to allow gas flowing into the floatation bag 20 alone to pass through it. When the floatation bag 20 is inflated insufficiently, the wearer P blows air into the gas adjustment tube 8. When the floatation bag 20 is inflated in excess, the wearer P opens the check valve to discharge the gas in the floatation bag 20. The wearer P can thus adjust inflation of the floatation bag 20. The gas adjustment tube 8 may be at a position that allows the wearer P to easily blow air. The gas adjustment tube 8 in the embodiment is located on the surface of the first float 24 opposite to the surface facing the wearer P when the floatation bag 20 is inflated.

2. Second Embodiment

[0042] A life preserver 1 according to a second embodiment will now be described with reference to FIGs. 5 and 6. In the first embodiment described above, the target site O is the waist O1 of the wearer P, and the wearable device 10 is a belt worn around the waist of the wearer P. The life preserver 1 according to the present embodiment differs from the life preserver 1 according to the first embodiment in that the target sites O correspond to left and right shoulders O2 of the wearer P, and the wearable device 10 includes a pair of shoulder belts 70 being strips. As shown in FIGs. 5 and 6, the life preserver 1 according to the present embodiment differs from the life preserver 1 according to the first embodiment in the shape of the wearable device 10, and thus differs in the positions of the coupler fixers 11 and the positions of the cover fixer 12 and the cover 40. The life preserver 1 according to the present

embodiment will be described below focusing on these differences from the life preserver 1 according to the first embodiment. The components not described herein are the same as those in the first embodiment.

[0043] In the present embodiment, the wearable device 10 further includes a waist belt 71 and a shoulder coupling belt 72 in addition to the pair of shoulder belts 70. The pair of shoulder belts 70 are worn around the left and right shoulders O2 of the wearer P serving as the target sites O. In this example, each of the shoulder belts 70 of the pair extends from the waist at the front of the wearer P over the chest, the shoulder, and the back to the waist at the back of the wearer P. Two ends of each shoulder belt 70 in the longitudinal direction are fixed to the waist belt 71. The waist belt 71 is a strip wound around the waist of the wearer P. The waist belt 71 receives the buckle 15 to be attachable to and detachable from the waist. The shoulder coupling belt 72 is a strip that extends in the width direction of the body of the wearer P to couple the shoulder belts 70 of the pair to each other. Two ends of the shoulder coupling belt 72 are fixed to the respective shoulder belts 70 of the pair.

[0044] In the present embodiment, the cover 40 is located at the back of the body of the wearer P. Thus, as shown in FIG. 5, when the pair of shoulder belts 70 are worn on the shoulders O2, the cover fixer 12 is located at the back of the body of the wearer P. The coupler fixers 11 to which the couplers 30 are fixed are located at the front of the body of the wearer P. In this structure, the cover 40 can be located at the back of the wearer P not to interfere with the actions of the wearer P. As described above, when the floatation bag 20 is inflated and released out of the cover 40, the position of the floatation bag 20 with respect to the wearer P is defined by the positions of the coupler fixers 11 rather than the position of the cover 40. Thus, with the coupler fixers 11 located at the front of the body of the wearer P, the floatation bag 20 can be released on the front of the body of the wearer P in an emergency with the floatation bag 20 being inflated. In this example, the cover fixer 12 is located at the rear of the neck at the back of the body of the wearer P. More specifically, the cover fixer 12 is located on the shoulder coupling belt 72. The coupler fixers 11 are in portions of the shoulder belts 70 of the pair at the front of the body of the wearer P. The coupler fixers 11 are thus separately located on the left and right of the chest of the wearer P when the wearable device 10 is worn. The holders 50 are located on the shoulder belts 70 of the pair above the pair of coupler fixers 11 in the winding direction X (upward in the figure, or between the chest and the shoulders of the wearer P).

8. Other Embodiments

[0045] A life preserver 1 according to other embodiments will now be described.

[0046] (1) In the above embodiments, the couplers 30 that couple the wearable device 10 and the floatation bag 20 include the first coupling belt 33 being a strip and the second coupling

belt 34. However, the coupler 30 may simply include one coupling belt (e.g., the second coupling belt 34). In some embodiments, the couplers 30 may include three or more coupling belts. The couplers 30 may have any shape other than a belt (strip). Thus, the couplers 30 may be formed from, for example, cords, wires, or chains.

5 [0047] (2) In the above embodiments, the holders 50 include the first strip 51 and the second strip 52, and the releasers 55 include the first releasing member 55a and the second releasing member 55b. The holder 50 may include one strip or three or more strips.

In some embodiments, the life preserver 1 may eliminate the holders 50 and the releasers 55.

10 [0048] (3) In the above embodiments, when the wearable device 10 is worn with the buckle 15 located closer to the front of the body of the wearer P than to the side of the body, the coupler fixers 11 are located closer to the center in the width direction than the cover fixer 12 at the front of the body of the wearer P.

This is not limitative. For example, the coupler fixers 11 in the wearable device 10 may be located closer to the center in the width direction than the cover fixer 12 in the wearable device 10 at the front of the body of the wearer P when the buckle 15 is at the back of the body of the wearer P. Independently of the position of the buckle 15, the coupler fixers 11 may be located as appropriate within a range not to overlap the cover fixer 12 and the cover 40 with a possible position and a possible orientation in which the wearable device 10 is worn.

20 [0049] (4) In the above embodiments, the slit in the bag-shaped cover 40 in a portion of the outer periphery serves as the outlet 43, and the fastener 42 being, for example, a hook-and-loop fastener is attached to the outlet 43. The cover 40 or the outlet 43 may have another structure. For example, the cover 40 may be a bifold sheet, and the fastener 42 may be an engagement member that is engageable with the edge of the cover 40 of the bifold sheet along the edge. In this case as well, for example, a hook-and-loop fastener or a snap button may be used as the fastener 42. With the cover 40 of the bifold sheet holding and accommodating the deflated floatation bag 20 and the fastener 42 engageable with the edge of the cover 40, the floatation bag 20 can be accommodated appropriately. In this structure, the edge with which the fastener 42 in the cover 40 of a bifold sheet is engaged serves as the outlet 43. In this structure as well, the pressure caused by inflation of the floatation bag 20 can appropriately release the floatation bag 20 outside the cover 40 through the outlet 43.

30 [0050] (5) In the above embodiments, the inflated floatation bag 20 is a loop including the single discontinuous portion 28. The floatation bag 20 may have another structure. For example, the floatation bag 20 may be a loop without the single discontinuous portion 28. In some embodiments, the floatation bag 20 may be a plate (e.g., a disk or a rectangular plate) with no gap at the center.

[0051] (6) In the above embodiments, the target site O is the waist O1 of the wearer P, and the wearable device 10 is worn around the waist. The target site may be the trunk of the wearer P, and the wearable device 10 may be worn around the trunk of the wearer P. The trunk includes the abdomen and the chest above the waist O1. The target site O may be any other
5 part of the body of the wearer P. For example, the target site O may be the legs or the arms of the wearer P.

[0052] (7) In the above embodiments, the cover fixer 12 is located at the side of the waist O1 of the wearer P when the wearable device 10 is worn by the wearer P. The cover fixer 12 may be located at the back of the waist O1 or the trunk of the wearer P. The cover fixer 12
10 may be appropriately located within the range not to overlap the coupler fixers 11 with a possible position and a possible orientation in which the wearable device 10 is worn.

[0053] (8) The structure described in each of the above embodiments may be combined with any other structures described in the other embodiments unless any contradiction arises. The embodiments described herein are merely illustrative in all respects and may be modified
15 variously as appropriate without departing from the spirit and scope of the present disclosure.

Overview of Embodiments

[0054] Hereafter, the life preserver will be described.

[0055] A life preserver according to an aspect includes a wearable device to be wound around a target site of a body of a wearer, a floatation bag inflatable upon receiving a gas supply
20 in a deflated state, a coupler including a first fixer fixed to the wearable device and a second fixer fixed to the floatation bag to couple the wearable device and the floatation bag, and a cover including a third fixer fixed to the wearable device and accommodating the floatation bag in the deflated state. The first fixer and the second fixer are spaced apart by a coupling distance for the coupler. The wearable device includes a coupler fixer to which the first fixer
25 is fixed and a cover fixer to which the third fixer is fixed. The coupler fixer and the cover fixer are at different positions in the wearable device in a winding direction in which the wearable device is wound around the target site, and a distance between the coupler fixer and the cover is smaller than or equal to the coupling distance.

[0056] In this structure, the coupler fixer and the cover fixer are at different positions in the
30 wearable device in the winding direction, and thus the coupler fixer and the cover can be at different positions in the target site of the wearer. The first fixer fixed to the wearable device and the second fixer fixed to the floatation bag are arranged on the coupler with the coupling distance apart from each other, and the distance between the coupler fixer and the cover is smaller than or equal to the coupling distance. Thus, the deflated floatation bag can be
35 appropriately accommodated in the cover fixed to the cover fixer spaced apart from the coupler fixer.

[0057] In this structure, when the floatation bag is inflated and released out of the cover, the position of the floatation bag with respect to the wearer is defined by the position of the coupler fixer rather than the position of the cover (cover fixer). More specifically, the cover (cover fixer) and the inflated floatation bag can be at different positions. Thus, in an emergency with the floatation bag being inflated, the floatation bag inflates at a position appropriate for the wearer, and the cover can be at a position different from the floatation bag. Thus, the life preserver can be worn with the cover located not to interfere with the actions of the wearer in a normal state with the floatation bag deflated.

[0058] The life preserver may further include a holder that holds the coupler in the winding direction along the wearable device, and a releaser that releases holding of the coupler by the holder.

[0059] In this structure, when the deflated floatation bag is accommodated in the cover, the holder can hold the coupler coupling the floatation bag and the coupler fixer on the wearable device along the wearable device without allowing the coupler to loosen and sag outside the cover. This structure can at least partially prevent the coupler loosening and sagging outside the cover from interfering with the actions of the wearer. This structure includes the releaser. Thus, when the floatation bag is inflated and released out of the cover, this structure releases the coupler held by the holder, not to restrict the coupler moving to position the floatation bag as appropriate for the wearer.

[0060] When the wearable device is worn on the target site, the coupler fixer in the wearable device may be located closer to a center in a width direction than the cover fixer in the wearable device at a front of the body of the wearer.

[0061] In this structure, the cover fixer is located farther from the center in the width direction than the coupler fixer at the front of the body of the wearer when the wearable device is worn on the target site.

The cover can thus be at a position away from the center in the width direction at the front of the body of the wearer with the floatation bag inflating close to the center in the width direction at the front of the body of the wearer in an emergency with the floatation bag being inflated. Thus, the cover can be easily located not to interfere with the actions of the wearer in a normal state with the floatation bag deflated.

[0062] The life preserver may further include a gas supplier that automatically supplies gas into the floatation bag upon detecting an entry into water. The cover may include an outlet to release the floatation bag outside in response to the floatation bag in the deflated state being inflated.

[0063] In this structure, when the wearer falls into water, the floatation bag in the deflated state automatically inflates, and is released on water through the outlet in the cover. Thus, the

wearer can easily use the life preserver without manually removing the floatation bag out of the cover or inflating the floatation bag.

[0064] The floatation bag being inflated may be wearable on the body of the wearer, may be a loop including a discontinuous portion, and may include a connector bridging the discontinuous portion.

[0065] In this structure, the wearer can place the body into the floatation bag through the discontinuous portion. Thus, the wearer can easily wear the floatation bag in water. After the wearer easily wears the floatation bag and bridges the discontinuous portion with the coupler, the floatation bag has a stable shape, and the wearer can easily float in a stable posture.

[0066] The target site may include a waist or a trunk of the wearer. The wearable device may include a main part being a strip and to be wound around the target site, and a buckle that engages and disengages joints in the main part wound around the target site. When the wearable device is worn on the target site, the cover fixer may be located at a side or a back of the body of the wearer. The coupler fixer may be located at a front of the body of the wearer between the buckle and the cover fixer.

[0067] In this structure, the joints of the wearable device being a strip are coupled to each other with the buckle. Thus, the wearable device can be appropriately held at the waist or the trunk of the wearer and can be easily detached. When the wearable device is worn on the target site, the coupler fixer is located between the buckle and the cover fixer at the front of the body of the wearer. The coupler fixer can thus be located not to obstruct the buckle and the cover, and the floatation bag can be inflated at the front of the body of the wearer in an emergency with the floatation bag being inflated. Thus, the inflated floatation bag can be at a position convenient for the wearer. When the wearable device is worn on the target site, the cover is located at the side or the back of the body of the wearer. Thus, the cover is less likely to interfere with the actions of the wearer in a normal state with the floatation bag being deflated.

[0068] The target site may include left and right shoulders of the wearer. The wearable device may include a pair of shoulder belts being strips. When the pair of shoulder belts are worn on the target site, the cover fixer may be located at a back of the body of the wearer, and the coupler fixer may be located at a front of the body of the wearer.

[0069] In this structure, the cover is located at the back of the wearer. Thus, the cover is less likely to interfere with the actions of the wearer in a normal state with the floatation bag deflated. In addition, the coupler fixer is located at the front of the body of the wearer. Thus, the floatation bag can be inflated at the front of the wearer body in an emergency with the floatation bag being inflated. Thus, the inflated floatation bag can be at a position convenient for the wearer.

INDUSTRIAL APPLICABILITY

[0070] The technique according to the embodiments of the present disclosure is applicable to a life preserver including a wearable device worn around a target site of the body of a wearer, and a floatation bag that inflates upon receiving a gas supply in a deflated state.

5

REFERENCE SIGNS LIST

[0071]

- 1 life preserver
- 10 wearable device
- 10 11 coupler fixer
- 12 cover fixer
- 20 floatation bag
- 30 coupler
- 31 first fixer
- 15 32 second fixer
- 40 cover
- 41 third fixer
- 50 holder
- 55 releaser
- 20 60 gas supplier
- 70 shoulder belt
- O target site
- P wearer
- R coupling distance
- 25 X winding direction

CLAIMS

1. A life preserver, comprising:
 - a wearable device to be wound around a target site of a body of a wearer;
 - a floatation bag inflatable upon receiving a gas supply in a deflated state;
 - 5 a coupler including a first fixer fixed to the wearable device and a second fixer fixed to the floatation bag, the coupler being configured to couple the wearable device and the floatation bag; and
 - a cover including a third fixer fixed to the wearable device, the cover accommodating the floatation bag in the deflated state,
 - 10 wherein the first fixer and the second fixer are spaced apart by a coupling distance for the coupler,
 - the wearable device includes a coupler fixer to which the first fixer is fixed and a cover fixer to which the third fixer is fixed, and
 - the coupler fixer and the cover fixer are at different positions in the wearable device in a
 - 15 winding direction in which the wearable device is wound around the target site, and a distance between the coupler fixer and the cover is smaller than or equal to the coupling distance.
2. The life preserver according to claim 1, further comprising:
 - a holder configured to hold the coupler in the winding direction along the wearable device;
 - and
 - 20 a releaser configured to release holding of the coupler by the holder.
3. The life preserver according to claim 1 or claim 2, wherein
 - when the wearable device is worn on the target site, the coupler fixer in the wearable device is located closer to a center in a width direction than the cover fixer in the wearable device at a

front of the body of the wearer.

4. The life preserver according to any one of claims 1 to 3, further comprising:

a gas supplier configured to automatically supply gas into the floatation bag upon detecting an entry into water,

5 wherein the cover includes an outlet to release the floatation bag outside in response to the floatation bag in the deflated state being inflated.

5. The life preserver according to any one of claims 1 to 4, wherein

the floatation bag being inflated is wearable on the body of the wearer, is a loop including a discontinuous portion, and includes a connector bridging the discontinuous portion.

10 6. The life preserver according to any one of claims 1 to 5, wherein

the target site includes a waist or a trunk of the wearer,

the wearable device includes

a main part being a strip and to be wound around the target site, and

a buckle configured to engage and disengage joints in the main part wound around the

15 target site, and

when the wearable device is worn on the target site, the cover fixer is located at a side or a back of the body of the wearer, and the coupler fixer is located at a front of the body of the wearer between the buckle and the cover fixer.

7. The life preserver according to any one of claims 1 to 5, wherein

20 the target site includes left and right shoulders of the wearer,

the wearable device includes a pair of shoulder belts being strips, and

when the pair of shoulder belts are worn on the target site, the cover fixer is located at a back of the body of the wearer, and the coupler fixer is located at a front of the body of the wearer.