

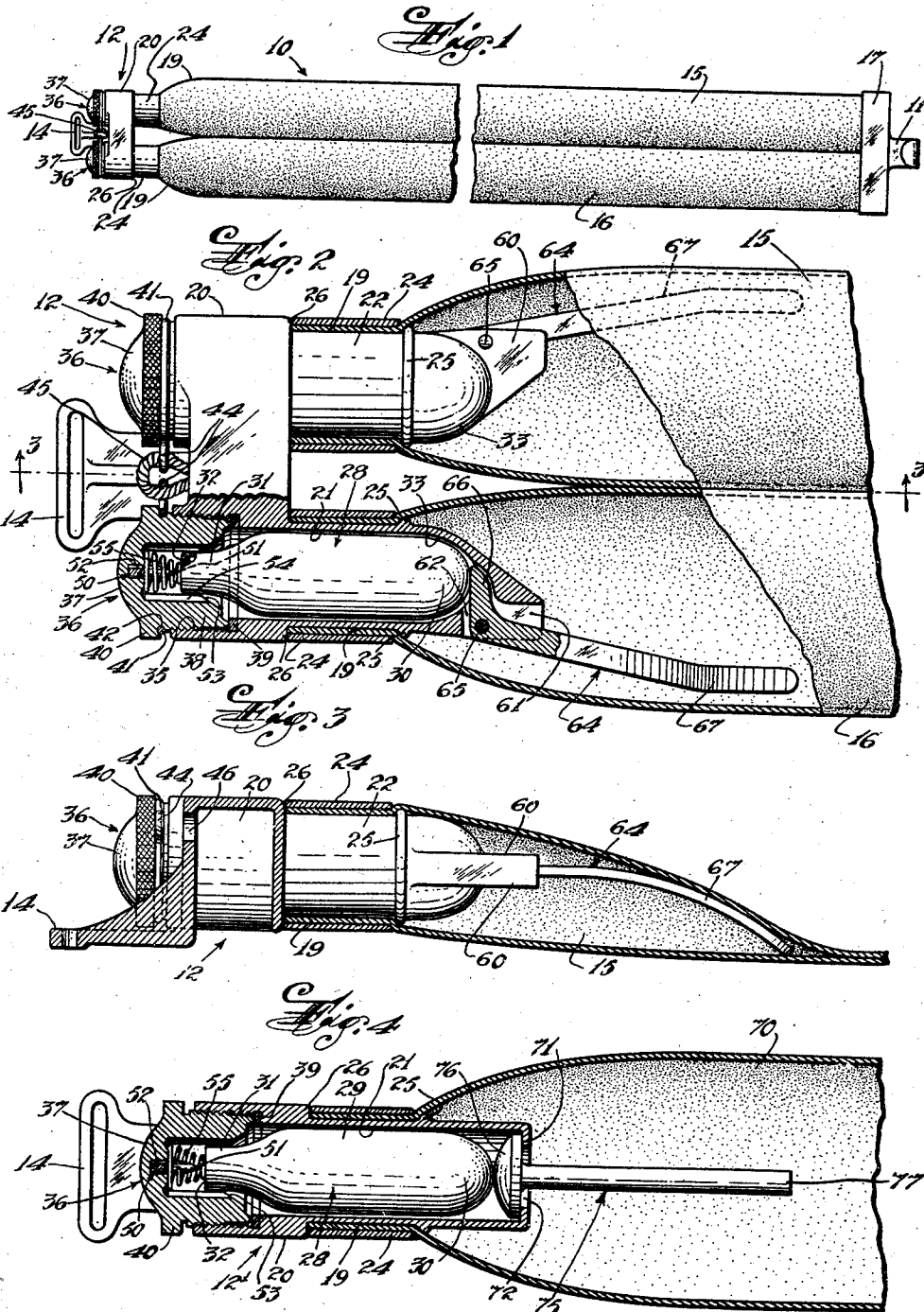
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INFLATABLE DEVICE

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INFLATABLE DEVICE

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This invention relates to inflatable devices; and more particularly to inflatable flotation devices, such as life belts, life vests, life rafts and similar life-saving or life-preserving apparatus, adapted to be inflated by a highly compressed medium, such as gaseous or liquid carbon dioxide.

An object of the present invention is to provide improved inflatable flotation devices.

Another object of the invention is to provide an inflatable flotation device having an improved unit associated therewith for introducing an inflation medium into the device.

Another object is to provide an inflatable flotation device which is compact in construction, light in weight, and can be economically manufactured.

Another object is to provide an inflatable life belt having an inflation medium dispensing unit attached thereto in a practical manner.

Another object is to provide an inflation medium dispensing unit which is readily operated at the will of the wearer but is so arranged that it will not be operated inadvertently.

Another object is to provide an inflation medium dispensing unit which can be readily charged, inspected and cleaned.

Another object is to provide an inflation medium dispensing unit for supplying the medium to a pair of compartments of an inflatable device.

Another object is to provide an inflation medium dispensing unit adapted to release simultaneously a pressure medium stored in a pair of cartridges.

A further object consists in the features of construction, combination of elements, and arrangement of parts, whereby the foregoing objects may be accomplished.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawing, forming a part of the specification, wherein:

Figure 1 is an elevational view of a life belt, with a portion thereof broken away, illustrating an embodiment of the invention.

Figure 2 is an enlarged fragmentary view, partly in section, illustrating, more particularly, an inflation medium dispensing unit associated with the belt.

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Figure 3 is a sectional view, taken along the line 3—3 on Figure 2.

Figure 4 is a fragmentary sectional view of an inflatable belt and an inflation medium dispensing unit, illustrating another embodiment of the invention.

Referring to the drawing, and more particularly to Figure 1, there is shown an inflatable life-belt 10, constructed of suitable material and adapted to be worn around the waist. One end of the belt has a suitable buckle member 11 or other fastening means secured thereto and the other end of the belt has an inflation medium dispensing unit 12 secured thereto. The unit is provided with a buckle member 14, or other fastening means adapted to cooperate with the buckle member 11 to attach the ends of the belt together.

The inflatable belt comprises a pair of lengthwise extending compartments 15 and 16 arranged side by side. One end of each compartment is closed and is secured to a clip or clamping device 17 which may be formed integral with or is secured to the buckle member 11. The other end of each compartment has a converging substantially tubular portion 19 providing an opening for receiving a portion of the inflation medium dispensing unit about to be described.

The inflation unit 12 and its arrangement with respect to the belt 10 are illustrated in detail in Figures 2 and 3. The unit may comprise a cartridge holder having a body portion 20 provided with a pair of cartridge receiving casings or chambers 21 arranged side by side and parallel to each other. A portion of the casings is provided in the body portion 20 of the holder and the remaining portion of the casings is provided by substantially tubular cylindrical portions 22 projecting from the body portion. Each of these substantially cylindrical portions 22 extends and fits snugly into the tubular openings of the respective inflatable compartments. Preferably, the casing portions 22 are adhesively secured within the tubular portions 19 of the compartments and may be further secured by a clamping ring or annular band 24 positioned intermediate an annular rib 25, or the like, extending about the casing portion adjacent the free end, and a shoulder 26 defined by the body portion 20 adjacent the other end of the casing portions.

The casings or chambers 21 are adapted to receive a cartridge 28 containing an inflation medium under pressure, such as carbon dioxide, air, oxygen, nitrogen or any other suitable gas. The cartridge may be of the conventional design and

may comprise a cylindrical body 29, a semi-spherical closed end 30, and a neck 31 at the other end having a puncturable sealing disc 32 secured therein. The cartridges are placed in the casings or chamber 21 with the ends 30 facing inwardly and the necks 31 facing outwardly. If desired, to accommodate the semi-spherical ends 30 more readily, the interior of the casing portions 22 may have a corresponding substantially semi-spherical surface 33, at the end extending into the compartments.

In order to insert, remove and replace the cartridges, the casings 21 are provided with an opening 35 at the end opposite the surface 33. These openings 35 are located in the body portion 20 and may be screw threaded to provide means for attaching a suitable removable screw closure 36. The closure may be a cap member, or the like, having a cover portion 37 and a tubular depending skirt 38 provided with screw threads adapted to mate with the threads of the opening 35. The casings, adjacent the threaded opening 35, are provided with an annular gasket 39 seated on a shoulder and adapted to be engaged by the free end of the skirt 38 of the cap, whereby the cap seals the casing opening 35. The cap may further be provided with a knurled, milled or corrugated shoulder 40 for facilitating manual engagement and rotation of the cap.

If desired, the caps may carry a split ring 41 seated, for relative rotation with respect to the cap, in an annular groove or recess 42 in the skirt adjacent the shoulder 40. Each of the rings 41 has an eyelet 44, or the like, adapted to receive a flexible cord, rope or wire loop 45 having its free ends extending through an aperture 46 in the body portion 20 and knotted or secured together to attach the loop to the body portion. The rings 41 and the connecting loop 45 prevent loss of the closure caps 36 when they are unscrewed.

The underside of the cover portion 37 of the cap has a centrally located puncturing member 50 secured thereto, which may be a pin having a pointed or sharp end 51 for piercing the sealing disc 32 of the cartridge and having a longitudinal groove 52 for conducting the inflation medium into the interior of the closure cap. The flow of the inflation medium from the cap to the casing may be facilitated by suitable spaced ribs 53 at the interior of the skirt 38 of the cap having intermediate slots or grooves 54 providing passages. The ribs 53 preferably extend substantially to the free end of the skirt and are arranged to receive the neck 31 of the cartridge, but will prevent the cap from being screwed on in the event the cartridge is placed into the casing with its closed end 30 facing outwardly.

A resilient conical or cylindrical helical spring 55 may be telescoped about the pin and may have one end thereof attached to the underside of the cover part or the skirt of the cap. The other end of the spring preferably extends forwardly of the point of the pin and engages the neck or sealing disc of the cartridge to normally hold the puncturable sealing disc out of contact with the pin to prevent inadvertent piercing of the disc. The spring further serves to urge the cartridge into the casing so that the end 30 bears against the means for effecting piercing of the disc, about to be described.

In order to effect piercing of the disc 32 and discharge of the inflation medium from the casing into the compartment, the end of each casing portion 22 extending into a compartment is pro-

vided with a pair of ears or lugs 60 spaced apart by a slot 61. The slot 61 terminates in an aperture 62 in the end wall 33 of the casing portion 22 for establishing communication between the casing and its inflatable compartment. The ears or lugs 60 also provide means for pivotally mounting a suitable lever for moving the cartridge in opposition to the spring 55 to cause the pin 50 to pierce the disc 32.

While any suitable lever mechanisms may be utilized, a lever device is illustrated herein which comprises a lever 54 having a portion thereof disposed in the slot 61 and pivotally mounted by a pin or rod 65 which extends therethrough and is secured to the lugs 60. One end of the lever has an arm or toe portion 66 which extends through the aperture 62 and has its free end in the casing in back of the semi-spherical end 30 of the cartridge. The other end of the lever has a somewhat curved elongated arm 67 serving as a handle or manual grip for rocking the lever to cause the arm 66 to force the cartridge toward the piercing pin. Preferably, the arms 67 are located within the inflatable compartments and are adjacent respective edges of the upper and lower walls of the belts, whereby grasping and squeezing the inflatable belt at portions adjacent the arms 67 will effect operation of the lever device.

The levers 54 are arranged for simultaneously effecting release of the inflation medium in the cartridges into both of the casings. As will be seen in Figure 2 of the drawings, this may be accomplished by mounting the levers for pivotal movement at the outer side of the casings so that the arm portions 66 extend toward each other. Thus, movement of the lever arms 67 toward each other will cause the arms 66 of each lever to move the cartridges toward the pins.

In operation, a cartridge 28 containing an inflation medium is placed into each casing or chamber 21 and the caps 36 are screwed into the casing openings 35. The spring 55 engages the neck or disc of the cartridge and urges the cartridge rearwardly into the casing whereby the end 30 of the cartridge bears against the lever arm 66 and pivots the lever to spread the lever arms apart and position them adjacent the walls of the respective compartments. After the belt has been attached around the waist by the wearer and it is desired to inflate the compartments, the edges of the upper and lower walls of the respective compartments are grasped and squeezed toward each other, whereby the lever arms 67 are pivoted toward each other. This causes the lever arms 66 to move inwardly with respect to their respective casing 21 and move the cartridges toward the piercing pins 50 in opposition to the springs 55. The pins are adapted to pierce the sealing discs 32 and release the inflation medium which flows from the cartridges to the compartments by way of the groove 52 in the pin, the slots 54 in the cap, the casing 21 and the aperture 62.

After the belt has been used it may be readily recharged and placed in condition for further use. This is accomplished by unscrewing the caps, removing the empty cartridges, inserting filled cartridges, and screwing the caps into place.

In Figure 4 a modified belt and inflation unit therefor are illustrated, which embody certain features of construction and operation of the preceding described embodiment. The belt shown in Figure 4 comprises a single inflatable compartment 70 having a tubular opening at one end into which the casing portion 22 of a cartridge holder

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12' is inserted and secured by an adhesive medium and by a clamping ring 24. The cartridge holder 12' has a single cartridge casing 21 and closure 36 therefor which are substantially similar to the corresponding parts illustrated in Figures 2 and 3, but differ slightly therefrom as will now be pointed out.

The end of the casing extending into the compartment 70 has an inwardly flanged end wall 71 provided with a central aperture 72 for establishing communication between the casing and the compartment. If desired, the flange 71 and aperture 72 may be provided by a cap or sleeve threaded to the end of the casing member. The cartridge in the casing is adapted to be forced against the piercing pin by a lever 75 having a dome-shaped head 76 at one end which engages the end 30 of the cartridge. The underside of the head 76 normally is seated on the flange 71. The lever 75 further comprises an arm or rod portion 77 extending through the aperture 72 and into the compartment 70. It will be understood that this modified lever device and cartridge casing could be used in connection with a unit comprising a pair of cartridge casings, as illustrated in Figure 2.

The arm 77 is adapted to be rocked or swung in any direction whereby the underside of the head 76 pivots about the flange 71 at the point it is contacted. The pivotal movement of the arm 77 causes the head 76 to cam the cartridge toward the piercing pin. Normally, the spring 55 in the cap urges the cartridge against the head 76 to maintain an annular contact zone between the underside of the head 76 and the flange 71, and maintain the arm or rod portion 77 in longitudinal axial alignment with respect to the casing and the compartment.

From the foregoing description it will be seen that the present invention provides an improved inflatable device and an inflation unit therefor. The inflation unit may be combined with a belt so that it will not interfere with the buckling or fastening of the belt. Also, the inflation cartridges may be readily removed and replaced without taking the belt construction apart. The devices for effecting release of the inflation medium are concealed within the compartments so that they cannot be operated inadvertently. The operating parts of the inflation units in accordance with the invention are sealed against moisture and will not corrode or be otherwise impaired. The units are rugged in construction and can withstand any rough usage to which they may be subjected. While the present invention has been illustrated in connection with a life belt adapted to fit around the waist, it will be understood that the features of construction and operation thereof may be applied to other inflatable flotation devices, such as life vests, rafts, boats, buoys and the like.

As various changes may be made in the form, construction and arrangement of the parts herein, without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

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I claim:

1. In an inflatable device, the combination of an inflatable member having a pair of compartments; a cartridge holder secured to said inflatable member having a pair of casings each adapted to receive a cartridge containing a pressure medium for inflating said inflatable member, one end of each casing having an opening for inserting and removing a cartridge and the other end of each casing extending into one of said compartments of said inflatable member and being provided with an aperture for establishing communication between each casing and the compartment into which it extends; a closure for the opening of each of said casings; a puncturing member attached to each closure adapted to pierce a cartridge in the casing to permit the pressure medium therein to flow into the casing and into the compartment in communication therewith; means in each of said compartments pivotally mounted on each casing at the end in communication with its compartments, said means being adapted to move a cartridge toward a puncturing member and effect release of the pressure medium in the cartridges; and resilient means associated with and attached to each of said closures for urging a cartridge in the casing against its means adapted to effect the release of the pressure medium in the cartridge.

2. In an inflatable device, the combination of an inflatable member having a pair of compartments; a cartridge holder secured to said inflatable member having a pair of casings each adapted to receive a cartridge containing a pressure medium for inflating said inflatable member, one end of each casing having an opening for inserting and removing a cartridge and the other end of each casing extending into one of said compartments of said inflatable member and being provided with an aperture for establishing communication between each casing and the compartment into which it extends; a closure for the opening of each of said casings; a puncturing member attached to each closure adapted to pierce a cartridge in the casing to permit the pressure medium therein to flow into the casing and into the compartment in communication therewith; and a lever operatively connected for pivotal movement to each of said casings adjacent the end in communication with said compartments and each extending into one of said compartments, said levers each having a portion adapted to engage and move a cartridge in the casing toward said puncturing member to cause the cartridge to be pierced and release the pressure medium.

3. In an inflatable device, the combination of an inflatable member having a pair of compartments; a cartridge holder secured to said inflatable member having a pair of casings each adapted to receive a cartridge containing a pressure medium for inflating said inflatable member, one end of each casing having an opening for inserting and removing a cartridge and the other end of each casing extending into one of said compartments of said inflatable member and being provided with an aperture for establishing communication between each casing and the compartment into which it extends; a closure for the opening of each of said casings; a puncturing member attached to each closure adapted to pierce a cartridge in the casing to permit the pressure medium therein to flow into the casing and into the compartment in communication therewith; and a lever pivotally connected to each

of said casings adjacent the end in communication with said compartments and each extending into one of said compartments, said levers having a portion adapted to engage and move a cartridge in the casing toward said puncturing member to cause the cartridge to be pierced and release the pressure medium, said levers being pivoted for movement toward each other and being adapted to be actuated by grasping and squeezing exterior portions of said compartments adjacent said levers toward each other.

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