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AUTOMATIC INFLATING DEVICE FOR LIFE PRESERVERS

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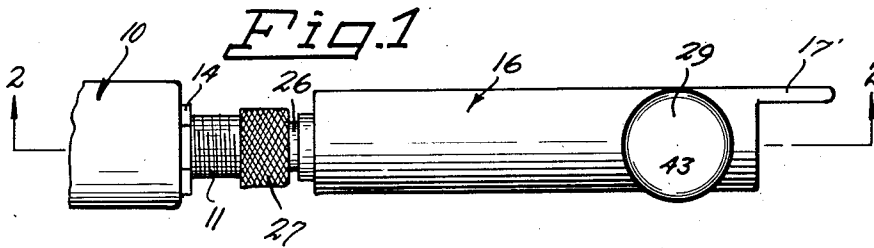
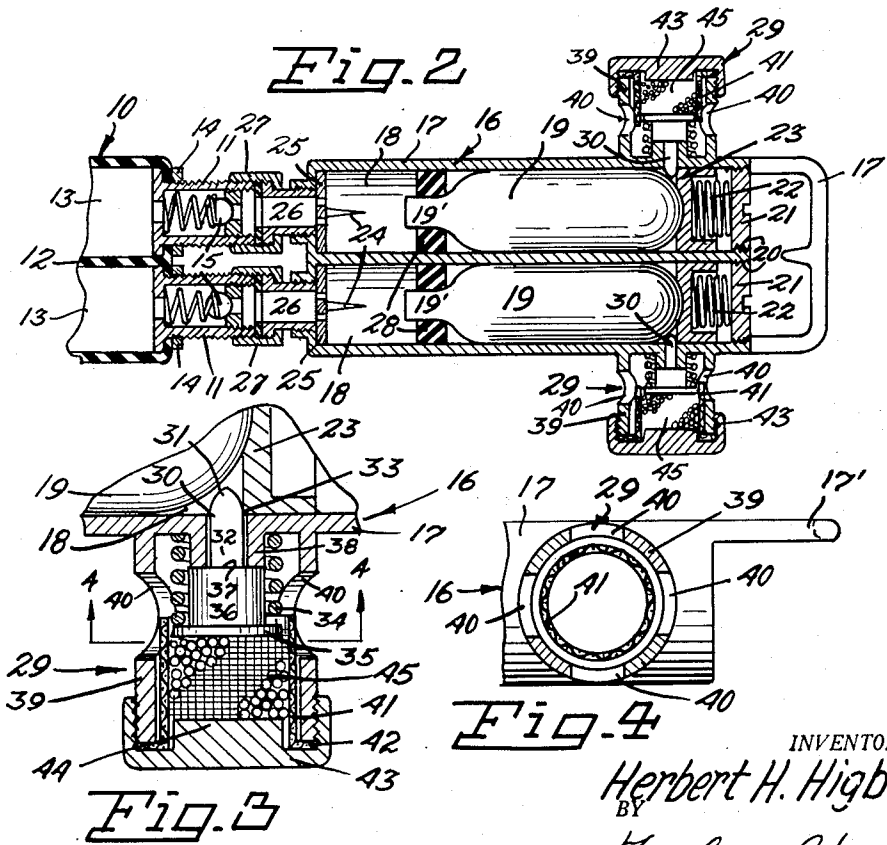


Fig. 4

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AUTOMATIC INFLATING DEVICE FOR LIFE PRESERVERS

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The present invention relates to gas filled life preservers, and more particularly to an inflating device to be employed for inflating life preservers and like inflatable members.

An object of the present invention is to provide an inflating device wherein a carbon dioxide cartridge is adapted to be punctured by relative movement between the cartridge and a puncturing needle, one of which is actuated by resiliently biased means initially held in the compressed position by a keeper adapted to transmit the bias of the said means directly to the casing of the inflating device, said keeper being supported in its securing position by means of a soluble substance.

I am aware that the prior art discloses carbon dioxide cartridge containing inflating devices which are actuated upon contact with water, which devices employ a water soluble pill for holding the means adapted to shift the carbon dioxide cartridge onto a puncturing needle to release the gas and inflate the associated member. In actual practice this has proven to be unsatisfactory due to the fact that the relatively large pressure required to hold the means for shifting the carbon dioxide cartridges is sufficient so that any substantial jar to the device, such as when it is dropped, will cause the water soluble pill to be crushed or disintegrate and release the mechanism.

A further disadvantage of the prior art construction is that the time required for the dissolution of the soluble pill operates against the practical use of the life preserver since the pill must be compressed to an extremely hard condition to be capable of holding the firing means, and therefore is practical for use only upon one who is sufficiently skilled in swimming to maintain his head above water a sufficient length of time to permit the pill to dissolve and release the firing mechanism.

It is therefore another object of this invention to provide a detachable inflating device for an inflatable member which, for all practical purposes, operates instantaneously upon contact with water.

Various other objects and advantages of my invention will become apparent during the course of the following description when taken in conjunction with the accompanying drawings which clearly disclose a preferred embodiment of the present invention and are supplied for the purpose of illustration only and not for limitation in construing the scope of the appended claims.

In the accompanying drawings, wherein like numerals are employed to designate like parts:

Figure 1 is a plan view of a preferred embodiment of my present invention detachably secured to an inflatable member;

Figure 2 is a longitudinal cross section on a plane defined by line 2-2 of Figure 1;

Figure 3 is an enlarged fragmentary view on the plane of line 2-2 of Figure 1 and showing the keeper means and associated parts; and

Figure 4 is a longitudinal cross section taken on the plane indicated at line 4-4 of Figure 3.

Referring now more particularly to the drawing, it

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will be seen that I have indicated a rubber or similar material air tight inflatable member 10, which may be shaped in any form desired, preferably that of a belt to be worn about the waist of a person, and at one end thereof the inflatable member 10 is provided with a pair of metallic tubular inlets 11-11 which communicate with the interior of the inflatable member 10. It will be seen in Figure 2 that the inflatable member 10 is provided with a dividing web 12 which defines two air-tight chambers 13 within the member 10.

The member 10 is hermetically sealed to the inlets 11 by means of nuts 14 which cooperate with the externally threaded peripheral faces of the tubes 11. Within the tubes 11 I provide spring biased check valves 15 which permit ingress of gas under pressure but prevent egress thereof in a manner similar to that of a conventional tire valve.

The inflating device 16 is provided with a hollow casing 17 which has a pair of air-tight bores 18 of a size and cross section adapting them to receive a cartridge 19 of compressed gas. The present construction is disclosed to receive the conventional carbon dioxide cartridges which may be purchased on the open market.

The bores 18 are somewhat longer than the cartridges 19, and permit the cartridges to be disposed at one end thereof. At their outer ends the bores 18 are internally threaded at 20 to threadedly receive the closure plugs 21 which hermetically seal the outer ends of the bores 18 and provide a base against which expansion springs 22 are compressed. Inwardly of expansion springs 22 are presser feet 23 slidable in the bores and which are provided to bear against the cartridges 19 and shift them inwardly by means of the bias of springs 22.

At its inner end, the casing 17 supports a pair of puncturing needles 24, one in each bore, disposed at the axes of the cartridges 19 so that when the cartridges 19 are shifted inwardly, the needles enter the mouths of the cartridges to puncture them, permitting escape of the compressed gas. The needles are supported on perforated plates 25 which are welded, applied by pressed fit, or otherwise secured in the inner ends of the bores 18. The perforations of the plates 25 communicate with tubular conduits 26 having rotatable internally threaded collars 27 at their outer ends which cooperate with the sleeves 11 to secure and communicate the bores 18 with the inflatable member 10.

Surrounding the necks 19' of the cartridge 19, I provide sealing gaskets 28 which by means of the presser feet 23 may freely slide within the bores 18 and are of sufficient thickness so that when the gas released from the cartridges 19 creates a pressure ahead of the gaskets 28, the gaskets are warped or deformed and their inwardly presented annular edges or corners seal against the internal face of the bores 18 and prevent leakage of gas about the cartridges 19. The gaskets also prevent unwanted movements of the cartridges when the device is dropped or shaken severely.

It is to be understood that the spring pressure 22 is sufficient to drive the cartridges 19 inwardly, causing the mouths to be punctured by the needles 24 and to maintain the cartridges in the forward position against the gas pressure created ahead thereof. However, it is not required that the cartridges remain in the forward position, for once they have been punctured they may return to the position shown in Figure 2 and the gas may still escape and pass through the conduit 26 of sleeve 11 into the inflatable member 10. Obviously, the cartridges 19 are interchangeable by removing the plugs 21, springs 22, and presser feet 23 from the outer ends of the bores 18, whereupon the cartridges may be removed and new cartridges replaced.

Radially extending from each bore 18, I provide keeper

means 29 which are specifically designed and adapted to transmit the bias of springs 22 through presser feet 23 directly to the casing 17 when in the securing position, as shown in Figures 2 and 3. Each keeper constitutes a radially disposed pin 30 which has a crowned or cam-shaped inner end 31 and extends a sufficient distance into its respective bore 18 so that a portion of its straight side face 32 contacts the marginal edge portion of its respective presser foot 23 at 33, as seen in Figure 3. It will thus be seen that the bias of the presser foot 23 is transmitted through the pin 30 directly to the casing 17, and since the straight side face is not removed from the bore 18 when in the position shown in Figure 3, no longitudinal pressure is applied on the pin 30, excepting that supplied by the bias of spring 34 which bears against the casing 17 at one end and against a flange 35 formed on the outer end of the pin 30.

Intermediate the pin 30 and the flange 35 is an enlarged portion 36 which defines a shoulder 37 adapted to bear against the annular collar 38 formed on the casings 17 and provide a gauge or stop to limit inward movement of the pin 30 into the bore 18.

Encircling the stop 38 is an apertured sleeve 39 externally threaded at its outer end and provided with a plurality of apertures 40 in its side walls. The apertures 40 are provided to permit free flow of water into and out of the sleeve 39. A reticulate sleeve 41 is disposed within the sleeve 39 and is of sufficient diameter to encircle the flange 35 of the keeper mechanism 29. The sleeve 41 is provided with an annular outwardly disposed flange 42 adapted to bear upon the outer edge face of the sleeve 39, and when the cap 43 is threaded onto the sleeve 39, the flange 42 is gripped between the cap 43 and the edge of the sleeve 39 and is thereby held in place.

It will be noted that the cap 43 is provided with a boss 44 which extends inwardly into the sleeve 39, and is provided for the purpose of compressing the granular or physically similar water soluble substance 45.

The granular soluble substance 45, which presently is found to be most effective, is sodium acetyl salicylate, commonly marketed under the trade name "Alka-Seltzer." However, other soluble substances may be employed, the important feature being that they maintain sufficient body strength to support the pin 30 against the expansion bias of spring 34. By tests I have proven that the granular soluble substance 45 will react in from two to five seconds sufficiently to permit spring 34 to remove the pin 30 from the bore 18, so that presser foot 23 by action of the spring 22 may force the compressed gas cartridge 19 inwardly onto the puncturing needle 24, where it is opened, and the gas pressure is great enough to overcome the spring pressure of valve 15 and fill the inflatable member.

The inflatable member is compartmented as disclosed, so that in the event one compartment is punctured the other will still act as a float to preserve the life of one wearing the device.

It will be noted that the casing 17 is provided with a buckle 17', and this is for the purpose of cooperating with the opposed end (not shown) of the inflatable member 10, so that the member may be buckled around the waist of a person as a belt in its deflated condition where it is

out of the way and comfortable to wear. Obviously it may be worn under the clothing if desired.

Having thus described my invention, I claim:

1. In an inflatable life preserver, a detachable inflating device adapted to communicate therewith comprising a hollow casing reciprocally containing an interchangeable compressed gas cartridge; a puncturing needle fixed in said casing; resiliently biased means including a reciprocal presser foot adapted for shifting said cartridge onto said needle to puncture said cartridge and release said gas; keeper means operably associated with said resiliently biased means alternately movable to keeping and releasing position with relation to said presser foot; said keeper means being adapted to transmit the bias of said resilient means directly to said casing and being urged toward said releasing position; and a water soluble substance disposed externally of said casing and adapted to preclude movement of said keeper toward the releasing position prior to dissolution of said substance.

2. In an inflatable life preserver, a detachable inflating device adapted to communicate therewith comprising a hollow casing reciprocally containing an interchangeable compressed gas cartridge; a puncturing needle fixed within said casing; resiliently biased means including a reciprocal presser foot adapted for shifting said cartridge onto said needle to puncture said cartridge and release said gas; a keeper pin reciprocally extending into said casing and alternately movable to keeping and releasing positions with respect to said presser foot; said keeper pin transmitting the bias of said pressure foot directly to said casing; means urging said keeper pin toward a releasing position; and a water soluble substance disposed externally of said casing and adapted to preclude movement of said keeper pin to the releasing position prior to dissolution of said substance.

3. In an inflatable life preserver, a detachable inflating device adapted to communicate therewith comprising a hollow casing containing at least one interchangeable compressed gas cartridge; puncturing needles, one for each cartridge, fixed in said casing; a spring biased presser foot for each cartridge and adapted to effect movement thereof to puncture said cartridges on said needles and release said gas; a keeper for each said presser foot alternately movable to keeping and releasing positions; each said keeper constituting a pin disposed at right angles to the movement of said presser foot and extending into the casing in advance of said presser foot and adapted to transmit its bias directly to said casing; spring means urging said keeper pin toward said releasing position; and a water soluble granular substance disposed externally of said casing and adapted to preclude movement of said keepers to the releasing position prior to dissolution of said substance.

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