

UNDERWATER ACTIVATED LIFE JACKET INFLATION SYSTEM

FIELD OF INVENTION

- 5 Embodiments of the present invention relate to life jackets for marine applications. More particularly, the embodiments relate to auto-inflation systems for life jackets.

BACKGROUND

10 Current self activated life jacket systems are activated by contact with water. Water enters a spring loaded device and weakens a paper-type holding mechanism, thereby allowing the spring to "fire" a pin to strike a gas canister such that the gas inflates the life jacket.

15

Unfortunately, the present systems may inflate when a user is standing on the deck of a ship during heavy rain. Additionally, the system will inflate immediately if a user enters the water. This may be undesirable, as the user may be in no immediate danger of drowning. Once activated, the system must be replaced, which greatly
20 increases the cost of the system if the activation was unnecessary.

It would therefore be a great improvement in the art if a system could be developed which addresses one or more of the above mentioned problems.

25

SUMMARY

- Embodiments of the present invention allow the wearer of the device to be submerged underwater without triggering the device and inflating a life jacket. The device will only trigger at a depth preset either by the user or manufacturer. The device is configured
30 to turn on when it detects the presence of water. The depth settings may be done electronically. Depth sensing may be performed by a sensor.

BRIEF DESCRIPTION OF THE DRAWINGS

5 Embodiments of the invention will be better understood and readily apparent to one of ordinary skill in the art from the following written description, by way of example only, and in conjunction with the drawings, in which:

10 Figure 1 is a perspective view of one embodiment of a life jacket auto-inflation system according to the present invention;

Figure 2 is an exploded perspective view of some key components of the life jacket auto-inflation system of Figure 1;

15 Figure 3 is a perspective view of a portion of the system showing some possible electronic components of the life jacket auto-inflation system of Figures 1 and 2;

Figure 4 is a perspective view of a portion of the life jacket auto-inflation system of Figures 1-3;

20

Figure 5 is a perspective view of a portion of the life jacket auto-inflation system of Figures 1-4;

25 Figures 6A-6D illustrate various plan views of the life jacket auto-inflation system of Figures 1 and 2; and

Figure 7 illustrates a PCB that may be used in one embodiment of a sensor that may be used with the life jacket auto-inflation system of Figures 1-6.

30

DETAILED DESCRIPTION

Figure 1 is a perspective view of one embodiment of a life jacket auto-inflation system 100 according to the present invention. Figure 2 is an exploded perspective view of some key components of the life jacket auto-inflation system 100 of Figure 1. Figure 3 is a perspective view of a portion of the system 100 showing some possible electronic components of the life jacket auto-inflation system 100 of Figures 1 and 2. Figure 4 is a perspective view of a portion of the life jacket auto-inflation system 100 of Figures 1-3. Figure 5 is a perspective view of a portion of the life jacket auto-inflation system 100 of Figures 1-4. Figures 6A-6D illustrate various plan views of the life jacket auto-inflation system 100 of Figures 1 and 2. Figure 7 illustrates a PCB 122 which may form part of one embodiment of a sensor 120 that may be used with the life jacket auto-inflation system 100 of Figures 1-3.

With reference to Figures 1-7, the system 100 includes a housing A for the system 100. Component "B" of the system 100 is a CO₂ Cylinder which is used to inflate the life jacket "D". A Mounting bolt "C" provides an inflation orifice to the life jacket "D". A water sensing cartridge "E" is connected to the housing "A" and mounting bolt "D". In one embodiment, the sensing cartridge "E" may be a United Moulders Limited Mk5 Water Sensing Cartridge (Disposable). It is understood that other types of water sensing cartridges may also be used. An inflator body "G" may be connected to the mounting bolt "C". In addition, the system 100 may include an adapter "F" connected to the housing "A" which provides a connection between the water sensing cartridge "E" and the inflator body "G".

As best shown in Figures 2 and 4, the housing "A" may be formed from an injection moulded PC/ABS plastic housing 1. The housing may have an activating module "i", a Stored water reservoir "ii", an Encapsulated PCB "iii", a Pressure Sensor "iv", a display and LED indicator "v", one or more programming probes "vi", and a battery compartment "vii". In addition, the system 100 may include a rear cap 2 which may function as a battery compartment cover, an Adaptor body 3 which provides for Mounting the housing "A" to the water sensing cartridge "E". The system 100 may also include an Extension Striker 4 which may be used to translate the striking force from the Sensing Cartridge "E" to the inflator body "G". A locking latch 5 may be used to

attach the adapter body 3 to the housing "A". The system 100 may also have a mating area 6 adapted to receive the water sensing cartridge "E". An activating mechanism compartment 7 may be provided in the housing "A".

- 5 A plunger 8 may be used to pressure a stored water reservoir using a spring 9. In some embodiments, the spring 9 may be a 40mm long spring providing stored energy to 'shoot' the water into the Water Sensing Cartridge "E". It is understood that other sizes of spring may also be used. A grub screw 10 may be used to lock the spring 9 in place. A screw plate 11 may be used to prevent unauthorised access to the grub
10 screw 10.

In operation, the system 100 covers the entrance of the current off the shelf self activating life jacket device "E", thus preventing water from entering and triggering unintentional inflation of the life jacket "D". On entering the water, the depth sensor
15 turns on via, for example, the hydrostatic sensor iv. The depth sensor then monitors the water pressure affecting the system 100. When the depth sensor detects, for example, a preset underwater pressure, the system 100 electrically activates an internal valve 19 to release water from the stored reservoir 24 into the off the shelf activating device "E" along a flow path 20, 21. The water then weakens a paper type
20 holding mechanism (not shown) in the activating device "E", thereby allowing a spring (not shown) within the striker device 4 to "fire" a pin to strike the gas canister "B". The gas canister "B" then releases the gas to inflate the life jacket "D".

As best shown in Figure 3, various electronic components may be accessible from the
25 housing "A". By way of example and not limitation,, the electronic components may include a ground probe 12. The Ground Probe 12 may be activated when pressed by fingers of the user during a firmware programming mode. A display 13/14 may be provided. The display 13 may be used to show a Firmware status of the system 100, various programming modes, error codes, depth, etc. An LED indicator 15 may also
30 be provided to show the Firmware status, alarms, warnings, etc. A pressure sensor orifice 16 may be provided in the housing "A". Water contacts with the pressure sensor via this orifice 16. A first select probe 17 may be provided to allow a user to

toggle, select and set various firmware modes. An additional select probe 18 may also be provided.

PROGRAMMING

- 5 The activation depth of the system 100 can be preset when the batteries are loaded and/or by a sequence setting on the programming probe. For example, the activation depth of the system 100 may be preset when the batteries are loaded using, for example, a sequence of finger strokes on the programming probes 17, 18. The probes 17, 18 may be activated, for example, when the batteries are loaded. The probes 17, 18 will begin to sense for static electricity associated with finger contact which, in a sequence which may be programmed into the firmware, sets the device 100 into programming mode, pressure sensing mode and/or depth setting mode.

- 15 As shown in Figures 4 and 5, when the preset pressure is met (36), the electronic firmware sends a signal to a valve 19. In some embodiments, the valve 19 may be a LEE COMPANY-LHD Valve Plug in Manifold. It is understood that other types of valves may also be used. The valve 19 'opens' and allows the stored water in a reservoir 25 to shoot via a channel 21 to 20 into the Water Sensing Cartridge "E" thereby activating the sensing cartridge "E" and inflating the life jacket "D".

- 20 In some embodiments, the stored water in the reservoir 25 may be pressurized by a rubber bung 24 which is in-turn pushed by a plunger 22 and compressed spring 23. The spring 23 may be held in place by the plunger 22 on one end and the grub screw 21 on the other end. This mechanism is the basis for the 'shooting' of the water jet through the channels 20, 21.
- 25

POST-ACTIVATION

- After the system 100 is activated, the stored water reservoir is reduced 26 due to the water 'shooting' out via path 20 and 21. The spring 23 is relaxed and no longer in the compressed position. The plunger 22, rubber bung 24 have moved towards the valve 19.
- 30

An Encapsulated PCB 38 may be provided to hold all electronic components. A buzzer 32 may be provided to sound an alarm when the system 100 is activated. One or more batteries 33 may be provided. It is understood that various types and voltages of batteries 33 may be used. A 7 segment display 34 may be provided to show the depth of activation after activation has commenced. An LED indicator 35 may show red until the system 100 is reset.

The system 100 can be preset for depths of up to, by way of example and not limitation, 10 meters under water, without triggering inflation of the life jacket "D". It is understood that other depth limits may also be used. In further embodiments, the system 100 may be set such that a depth must be reached for a period of time before the system 100 activates. In alternate embodiments, the system 100 may also be mounted on boats activating a larger floatation device to prevent a boat from sinking further.

When loaded with batteries, the system 100 will begin pressure sensing once in contact with water. As the user goes deeper underwater, the sensor records and compares the current pressure with the pre-programmed set pressure. On reaching/matching the pre-programmed set pressure, the firmware will 'Open' the valve 19. With the stored water reservoir being 'pressured' by a spring the water will 'shoot' out when the valve 19 opens. The water travels through the channel 20, 21 and into the activating device, which in-turn "fires" the gas canister "B" to inflate the life jacket "D".

It will be appreciated by a person skilled in the art that numerous variations and/or modifications may be made to the present invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects to be illustrative and not restrictive.

CLAIMS

1. An automatic inflation system for a life jacket, the system comprising:
A depth sensor configured to activate a pressure source to inflate said life
5 jacket; wherein said depth sensor activates said pressure source at a preset
depth.