Dec. 5, 1967 B. M. McGROARTY 3,355,751

AUTOMATICALLY INFLATABLE OBJECTS

Filed Dec. 27, 1965 3 Sheets-Sheet 1

FIG. 1

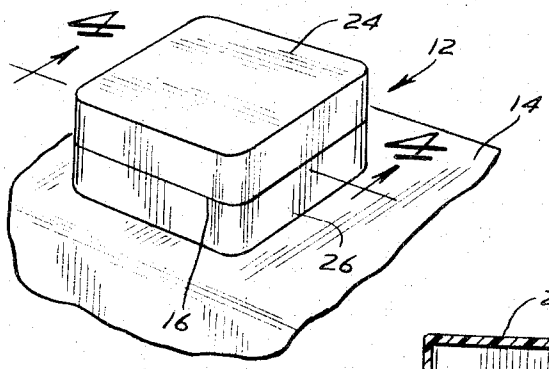


FIG. 2

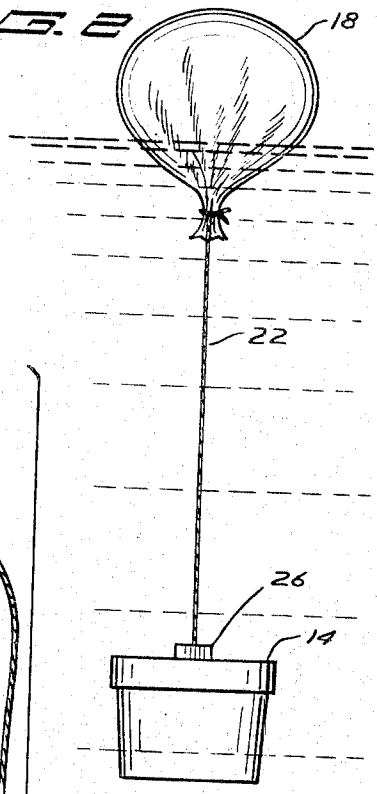


FIG. 3

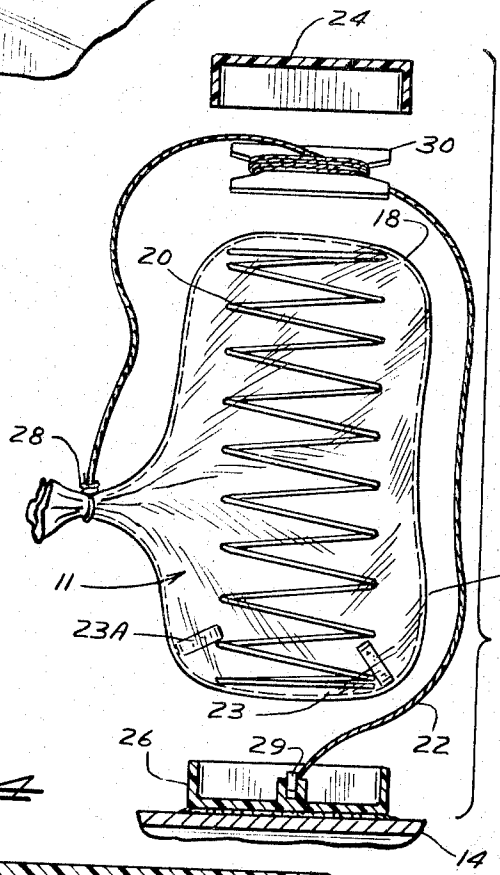
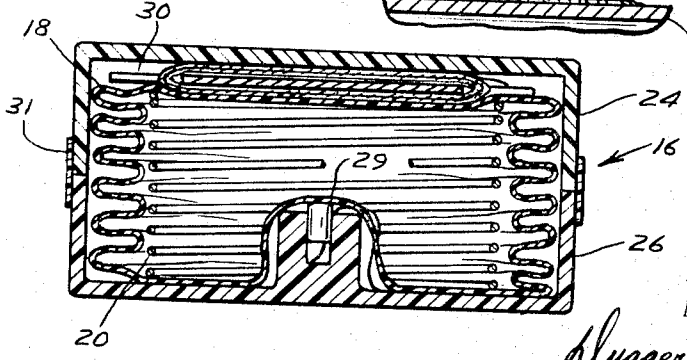


FIG. 4



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AUTOMATICALLY INFLATABLE OBJECTS

Filed Dec. 27, 1965 3 Sheets-Sheet 2

FIG. 5

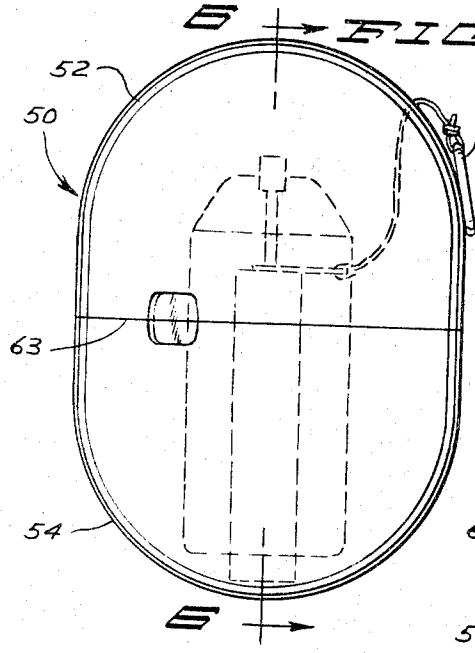


FIG. 6

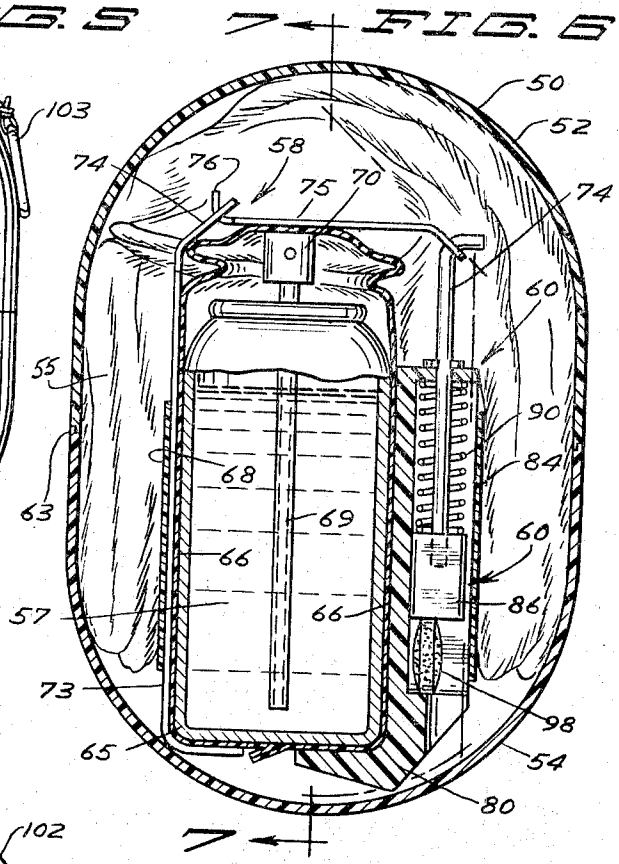


FIG. 7

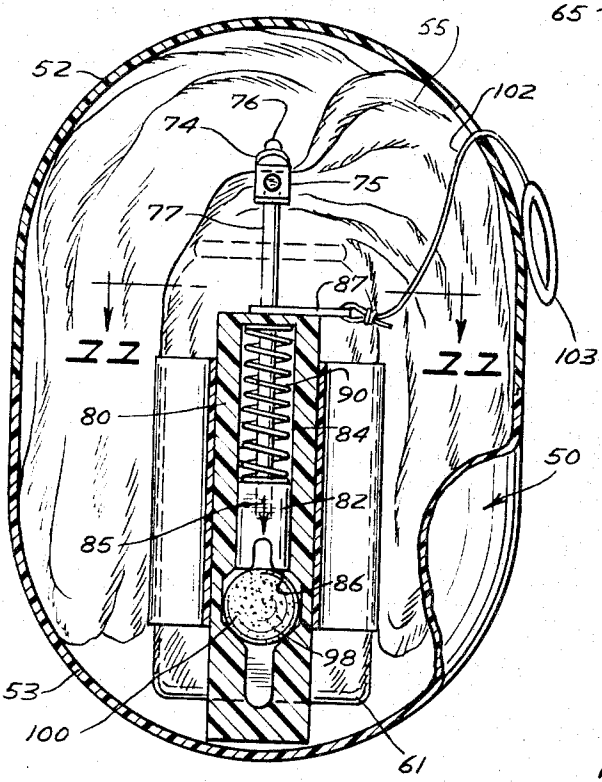
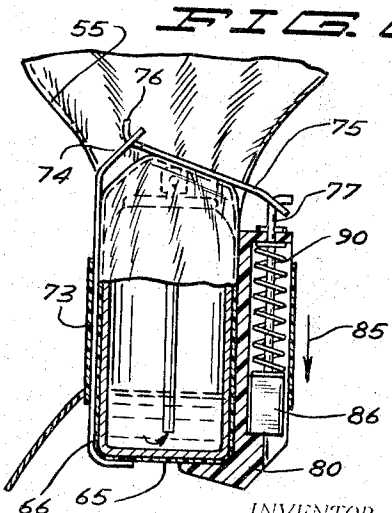


FIG. 8



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Filed Dec. 27, 1965 3 Sheets-Sheet 3

FIG. 9

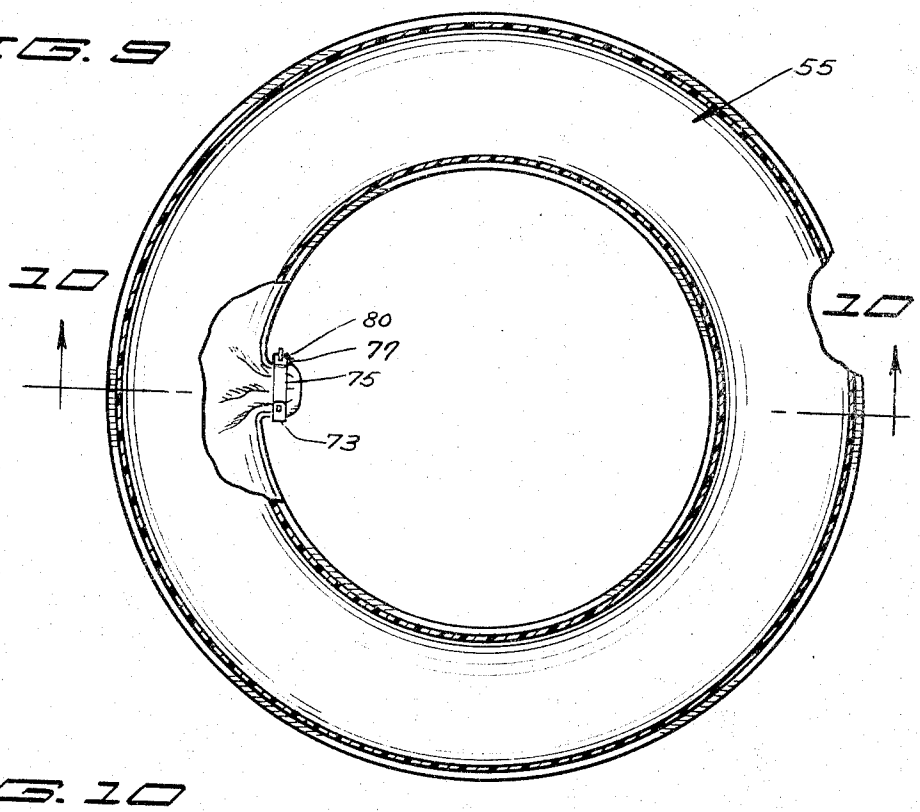

FIG. 10

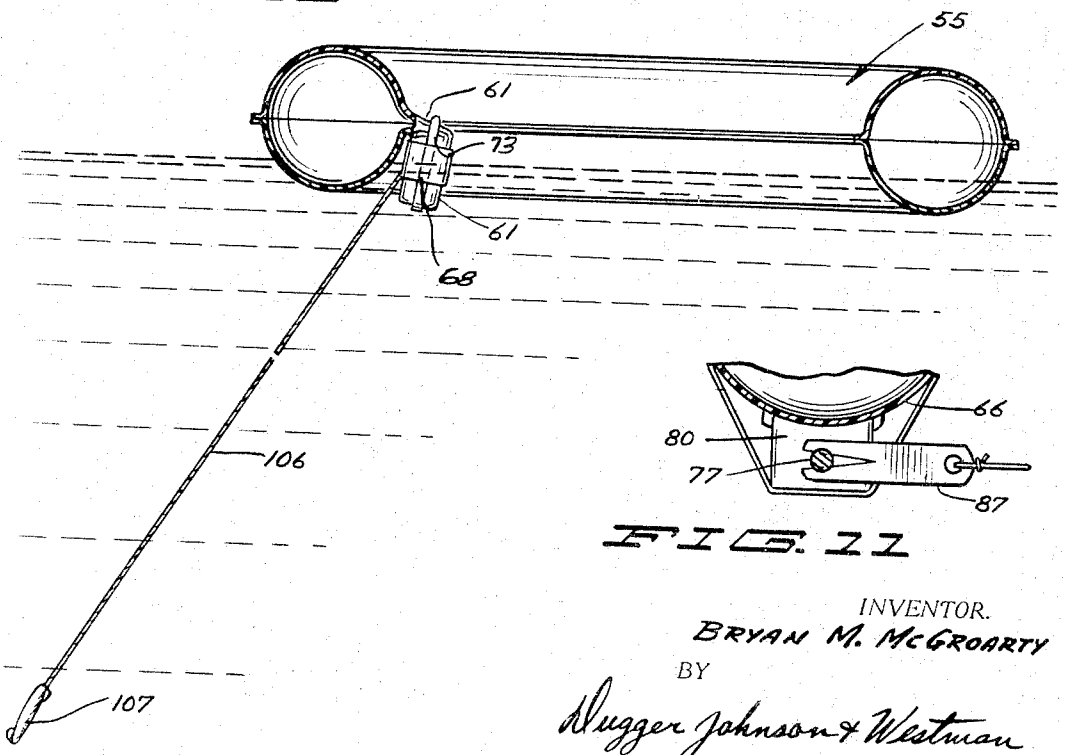

FIG. 11

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AUTOMATICALLY INFLATABLE OBJECTS

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Filed Dec. 27, 1965, Ser. No. 516,443
5 Claims. (Cl. 9—323)

ABSTRACT OF THE DISCLOSURE

The present disclosure relates to automatically inflatable devices which comprise two specific forms. The first form is a small box that can be mounted onto a motor or other object that might be lost in water, and when the object on which the box is mounted falls into the water, the box comes apart and automatically inflates a plastic bag or bladder that will rise to the surface and marks the spot where the device sank. The bag or bladder is attached to one part of the box through the use of a string, and the one part in turn is fastened to the object.

The second specific device disclosed comprises a life-saver or preserver including an inflatable ring that is collapsed and stored inside a hard outer casing. The casing is of a size so that it can be easily and accurately thrown by hand substantial distances. When the device is to be used, a safety latch is pulled, the casing is thrown in the direction of the need of the life preserver and when the unit hits the water, the casing separates, a disintegratable tablet disintegrates to release a valve, which in turn controls a flow of gas for inflating the life preserver. A small anchor member can be attached to the life preserver to retard its movement as it floats so that the person being saved can grasp the preserver easily.

This invention relates to devices which are automatically inflatable upon contact with water so as to be particularly useful as marking buoys and life preservers.

It is an object of this invention to provide a marking buoy which will automatically inflate upon contact with water and which is particularly suited for use in retrieving valuable articles which are accidentally dropped into the water.

It is another object of this invention to provide a self-inflating marking buoy which is simple, relatively inexpensive, yet reliable.

Yet another object of this invention is to provide a self-inflating marking buoy which provides the utmost in compactness.

A still further object of this invention resides in the provision of a self-inflating life preserver which employs a novel triggering mechanism that is actuated by contact with the water.

Another object of this invention is to provide a self-inflating life preserver which is self-contained within a small lightweight casing which is especially suited for throwing to a person in distress.

It is a further object of this invention to provide a self-inflating life preserver which employs a triggering mechanism adapted to be actuated at ambient temperatures and pressures.

Yet another object of this invention is to provide a self-inflating preserver which will not inflate prematurely.

Other objects of this invention will become apparent as the description proceeds.

In the drawings,

FIGURE 1 is a partial perspective view showing the self-inflating marking buoy in its collapsed position and mounted on a "valuable" or article which is desired to be retrieved in the event it is lost;

FIGURE 2 is a side elevation showing the invention in its fully inflated condition;

FIGURE 3 is a detailed side elevational view showin the relationship of the parts of the device shortly afte contact with the water;

FIGURE 4 is a view taken on the line 4—4 of FIG URE 1;

FIGURE 5 is a sectional elevation of a second forn of the invention which comprises a self-inflating life pre server;

FIGURE 6 is an enlarged view taken on the line 6— of FIGURE 5;

FIGURE 7 is a view taken on the line 7—7 of FIG URE 6;

FIGURE 8 is a view similar to FIGURE 6 but in re duced scale and with parts removed, showing the trigger ing mechanism of the invention in its released positior shortly after contact with the water;

FIGURE 9 is a plan view of the self-inflating life pre server showing the preserver in its fully inflated condition on the surface of the water;

FIGURE 10 is a view taken on the line 10—10 of FIG URE 9; and

FIGURE 11 is a fragmentary section view showing a safety catch for the device of FIGURE 5.

Marking buoy

Referring to the drawings, and particularly to FIGURES 1 through 4, the self-inflating marking buoy 12 is shown mounted on the top surface 14 of the "valuable" or article which is to be retrieved in the event it is accidentally dropped into the water. The marking buoy 12 is secured to whatever article it is desired to protect from being lost in the water and thus surface 14 could represent any number of articles, such as a camera, binocular case, fishing tackle, outboard motor, etc. In the event the particular article is accidentally dropped into the water, the marking buoy of the present invention is adapted to be automatically inflated upon contact with the water, and will be buoyed to a position on the water surface. The marking buoy is always anchored to the lost article and accordingly there is provided means for retrieving the lost article by merely retrieving the buoy.

To aid the understanding of the invention, certain terminology will be set forth. The term "rest position" contemplates the condition of the marking buoy prior to its contact with the water, i.e. when it is in its fully collapsed position and retained within the casing or housing. This is shown by FIGURES 1 and 4. The use of the term "ejected position" contemplates the device shortly after it has made contact with the water and the parts have started to dissassemble. FIGURE 3 shows this. The term "inflated" is used with reference to the final condition or phase of the device, namely, when the marking buoy is fully inflated and has assumed a position on the surface of the water. This condition is illustrated by FIGURE 2.

The main components of the marking buoy 12 include the outer thin-walled housing 16, an inflatable bag member 18, coil spring 20, anchor cord 22, and two tablets 23 and 23A. The housing 16 is shown comprised of top and bottom sections 24 and 26. As best seen in FIGURE 4, the top and bottom sections 24 and 26 are generally rectangular in shape and cooperate to define a hollow interior chamber for storage of the remaining components of the device, namely, the inflatable member 18, coil spring 20, the cord 22 and the tablets 23 and 23A. The housing 16 is composed of a plastic which forms a casing of durable yet lightweight construction. It should be pointed out that the overall size of the housing 16 will primarily depend upon the size of the inflatable member which it must accommodate. However, the housing 16 is normally not large, i.e. it may be about one inch square or even smaller. In this manner, the device is readily

dapted to be secured to any number of "valuables" and resents a very neat installation.

The bag member 18 may be composed of a thin polyhylene or other such similar plastic material which has ood tear resistance and is lightweight. The preferred ickness of the plastic is in the range of 1 to 2 mils. The nflatable member 18 is tied at its neck 28 by the terminal nd of the anchor cord 22. The bag has an opening suffiient to permit a small amount of water to enter at the eck. The opposite end of the anchor cord is secured at 9 to the bottom section 26 of the housing 16. A small rapping card 30 is provided to facilitate storing the nchor cord 22.

As clearly shown in the drawings, the coil spring 20 s mounted entirely within the inflatable bag member 18. The spring 20 is also relatively lightweight and very resilient.

The two tablets 23 and 23A are designed to react when ontacted by water to give off gases of sufficient volume o inflate the plastic bag. Usually the tablets will be one acid and one base. Carbonates and a dry acid are usable as these will form CO_2. The selection of the material to generate the gas is well known in the art. An example used is a tablet of bicarbonate of soda and a tablet of sulfamic acid. An acid tablet and aluminum chips could also be used to generate hydrogen in the presence of water, if desired.

FIGURE 4 shows the components described above in their rest or snugly packed condition prior to ejectment. In this position, the coil spring 20 is fully compressed and the inflatable bag member 18 which encloses the same is neatly folded in the manner shown, i.e. a series of accordion-type folds are formed at the outer edges of the inflatable member. The card 30 and the cord 22 which is wrapped thereon rest on the top of the folded inflatable member 18. With these parts packed within the casing 16, the top and bottom sections 24 and 26 are mated and sealed with a water soluble plastic tape 31, such as methyl pyrrolidene. The tape 31 thus forms a closure means between the sections 24 and 26 of the housing 16. A water soluble adhesive could also be used between the housing halves, if desired.

Assuming the valuable article 14 has been accidentally dropped into the water, the following sequential steps will occur in the operation of the device 12.

(1) The water soluble tape 31 will begin to disintegrate and after a short time will break loose and allow the device to assume its ejected position of FIGURE 3. Note that the compressed coil spring 20 will tend to separate the two sections 24 and 26 of the housing 16.

(2) With the sections 24 and 26 separated, the action of the spring 20 is sufficient to separate the inflatable member 18 from the bottom section 26 and the chemical tablets 23 and 23A will react with water entering the plastic bag to form gas so as to inflate the member 18. The spring evacuates the bag to tend to draw water in. The amount of time required to inflate the member 18 can be short.

(3) The inflatable member 18 becomes inflated and is buoyed to the surface of the water. As this is happening, the anchor cord 22 is being unwound from the card 30. The cord 22 is wrapped on card 30 as a bi-filar winding, and the card flops around to permit the unwinding. The neck remains below the surface of the water so the gas does not escape through the opening. The cord on the neck becomes taut to hold the neck down because the member 18 will drift until this happens.

(4) With the member 18 fully inflated on the top surface of the water, retrieval of the article 14 is accomplished by retrieving the member 18. Since the member 18 is anchored to the bottom section 26 of the housing 16, and the section 26 is in turn secured to the surface 14 of the article, retrieval of the article is accomplished by merely retrieving the inflatable member 18. If the line 22 is too light to lift the object, the member 18 serves as a marker for divers to retrieve the lost object.

Self-inflating life preserver

The second form of the invention is illustrated in FIGS. 5 through 10 and is shown broadly comprising an outer thin walled housing 50 formed of upper and lower sections 52 and 54 which cooperate to define an oval-shaped hollow interior chamber for storing the remaining components of the device, namely, an inflatable bag 55, a fluid pressure source 56, outlet valve means 58, and a firing mechanism 60. Each of these main components will now be described in detail.

The inflatable bag 55 is shown in FIGS. 5, 6 and 7 in its collapsed condition within the housing 50. Although in this instance the inflatable bag 55 represents the life preserver which is to be inflated, it may take on a number of forms such as a marking buoy.

FIGS. 9 and 10 show the inflatable bag or life preserver in its fully inflated condition wherein it assumes a generally doughnut shaped configuration. The life preserver 55 is preferably constructed of two sheets of vinyl plastic which are double sealed along its edges. A preferred thickness of the plastic sheets is in the range of 6 to 10 mils. The numeral 61 designates the valve portion of the life preserver and this portion serves as a supporting structure for certain components of the invention, as will be subsequently described.

As clearly shown in the drawings, the outer thin walled housing 50 is eliptoid or oval in shape and is formed by the sections 52 and 54 which meet at the parting line 63. Housing 50 is preferably composed of suitable plastic so as to be relatively lightweight and durable. The oval shape is also a matter of choice and is preferred because it presents a pleasing overall design and also provides an object which is conducive to throwing, i.e. it is in the form of a projectile and is adapted to be grasped in one hand. Also, the exterior surface of the housing 50 may be colored brightly so as to be readily visible.

Fluid pressure source

The fluid pressure source 56 includes the can 65 containing liquid Freon, the latter being designated by the numeral 57. Can 65 is a metal can which has an outlet valve assembly just like the well known aerosol cans in general use. The can 65 is shown encased within the walls 66 of the valve portion 61 of the inflatable bag 55. As shown, the walls 66 are snugly wrapped around the exterior of the can 65 and their bottom edges are sealed at 68 so as to form a complete enclosure on the sides and the bottom of the can 65.

A fluid discharge tube 69 is shown inside the can in communication with the liquid Freon, and extends upwardly through the aerosol valve or fluid stop means 70. The valve 70 has an opening 72 that discharges into the interior of the bag 55.

Valve actuator means

The valve actuator means 58 which operates aerosal valve 70 to release fluid under pressure and inflate the life preserver has linkage positioned on the outside of the valve portion 61.

The valve actuator means works in combination with the firing mechanism which will be explained subsequently.

The actuator means has an arm 73 with an offset portion that fits against the bottom of the can 65, with the plastic film or sheet forming the valve portion 61 between the bottom of the can and the offset portion of the arm 73. (The can 65 is sealed inside the valve portion 61.) The arm 73 extends upwardly alongside of the plastic forming the valve portion in the direction of the axis of the can 65 and has an upper inclined end portion 74 adjacent the valve 70 of the can 65. Again, the arm 73 is positioned on the outside of the plastic while the

can 65 is inside the valve member 61. An actuator trigger 75 has a small lug 76 that fits through a provided opening in the end member 74 of the arm 73 and then extends transversely across the top of the valve 70, again with the thickness of plastic between the trigger and the top of the valve. The outer end of the trigger 75 has a provided opening therein through which a plunger finger 77 of the firing mechanism 60 is passed. A connection between the end portion 74 of arm 73 and the lug 76 of the trigger 75 is a pivoting connection to permit the trigger to pivot up and down in relation to the up and down axis of can 65. In other words, the trigger can be moved downwardly to actuate the valve 70 on the can 65. This is just like the push button valves on the aerosol cans. The arm 73 can be held around the valve member 61 and consequently, the can 65 inside the valve member with suitable adhesive or pressure sensitive tape 68. A couple of wraps of a strong reinforced pressure sensitive tape will hold the unit together.

Firing mechanism

The firing mechanism 60 is designed to actuate the valve actuator means 58 and thereby open valve 70 to fluid discharge through the tube 69 so as to inflate the bag or life preserver 55. The firing mechanism is normally activated upon contact with a liquid such as water. The component parts of the firing mechanism include a support housing 80 located adjacent the valve portion 61 of the inflatable bag 55. The support housing 80 is formed from plastic and has a bottom shelf that fits against the bottom of the can to properly position the unit. The housing also mounts a spring loaded piston 82 which is slidable within a piston chamber 84 defined within the support housing 80. Piston 82 includes an inner head end 86 and an opposite outer end 88 which is attached to the finger 77. A coil spring 90 is positioned between the piston and an end wall of the piston chamber and urges the head end 86 of the piston in the direction as indicated by arrow. Interposed between the piston head 86 and the bottom of the chamber 84 is shown a water soluble tablet 98. Tablet 98 could be of any material which will disintegrate upon contact with water. In practice a headache tablet sold under the trademark "Bufferin" has been found satisfactory. The table 98 has sufficient rigidity to support piston end 86 as shown against the action of spring 90.

A safety lock tab pin 87 may optionally be utilized to secure the finger and piston head in a locked rest position so as not to bear excessively on the tablet 98. As shown, the tab 87 has a small V-groove in one end that slips over the finger and fits into a notch in the finger. The tab rests on an end wall of housing 80 and when in place prevents the finger from moving in direction as indicated by arrow 85.

The bottom portion of the tablet 98 is shown seated in a tablet supporting receptacle 100 which retains the tablet 98 in its proper position. The tablet 98 is not enclosed so water can contact it when the unit is thrown into the water. Two tablets 98 can be used, if desired.

The safety tab 87 has a string 102 attached to its free end, and the string passes through the shell and is attached to a pull ring 103. The unit can be activated for use by pulling the ring 103 to release the safety.

Operation

In operation, the unit will be stored in a hermetically sealed outer plastic bag (not shown) to prevent moisture from entering the unit and disintegrating the tablets 98 and inadvertently causing a premature firing of the unit. The outer bag is made of thin polyethylene or other suitable plastic that can be easily ripped open, and the entire assembly as shown in FIGURE 5, removed from the package. The pull ring 103 is then yanked and string 102 will pull the tab 87 away from the finger 77, thus freeing the finger from mechanical stops. The full force of the spring 90 is then exerted against the piston 82 and down onto the tablets 98.

The unit can then be thrown like a baseball or grenade quite a distance and toward the person in distress.

As soon as the unit hits the water, the weight of the can 65 will cause this end of the unit to go downwardly in the water and water will contact the water soluble tape or cement joining the two halves of the outer shell. In addition, water will enter the unit through the opening for the string 102 and will contact the tablet 98 causing it to soften and disintegrate. The spring 90 will push downwardly and at the same time pull on finger 77, thereby exerting a force on the arm or trigger 75 which will push down on the valve 70, releasing the fluid under pressure in the can 65 into the interior of the flotation member or bag 55. The flotation member will inflate, the two halves of the housing 50 will part and drop off, and the person in trouble will have a life preserver to help him.

The arrangement of the arm 73 and trigger 75 gives a good leverage for actuating of the valve 70 so that there is no malfunction. The Freon (or other suitable gas) under pressure will expand greatly, causing the bag 55 to inflate. The housing 50 is shaped so that it can be thrown accurately and can be thrown a great distance.

If desired, an additional string 106 can be attached to the bag 55 in any suitable location and a weight 107 for providing a small sea anchor can be used. If desired, the string could be fastened to one of the halves of the housing 50 and this would also provide a sea anchor.

In both forms of the invention, the units inflate automatically upon contact with the water. In the second form, the action utilizes an independent source of a fluid under pressure for inflating the housing or bag.

What is claimed is:

1. In combination with an inflatable body, an outer housing forming upper and lower sections, said sections cooperating to define a hollow interior chamber for storing said inflatable body in its collapsed condition and being of a size to be manually thrown, water releasable closure means holding said sections together, a fluid pressure source mounted inside said housing in fluid communication relation with the interior of said inflatable body, fluid stop means adapted to normally interrupt the fluid communication between said fluid pressure source and said inflatable body, a firing mechanism normally activated upon contact with a liquid such as water and being adapted to release said fluid stop means to thereby inflate said inflatable body, said firing mechanism including: a support member located adjacent a valve portion of said inflatable body, said support member defining an interior piston chamber, a spring loaded piston slidable within said piston chamber and having inner and outer ends, said outer end of said piston being operatively connected to said fluid stop means, a moisture distintegratable body normally positioned at one end of said piston chamber and restraining the piston from movement under its spring load until moisture contacts said distintegratable body, and a manually releasable stop means releasable from the exterior of said housing restraining said piston from movement independent of said moisture distintegratable body.

2. The device of claim 1 wherein the fluid pressure source comprises a self-contained can of a fluid under pressure and said fluid stop means comprise valve means at one end of said can.

3. The device of claim 1 wherein the fluid pressure source comprises a can of fluid under pressure and the fluid stop means comprise valve means actuable by being depressed in axial direction of said cartridge, a valve trigger, means to pivotally mount said trigger at one end in position overlying the valve means, a finger attached to said piston, said trigger also being pivotally attached at its opposite end to said finger, and said piston being oriented so as to cause the trigger to depress said valve

ieans when the piston moves to its valve actuating posi-
on.

4. The device of claim 3 wherein said can is mounted
ompletely within said inflatable body, and wherein the
rigger and firing mechanism are mounted on the ex-
erior of said inflatable body, and supported on said can
hrough said body, said means to pivotally mount said
rigger at said one end comprising an arm having two
egments forming an L-shape on the exterior of said in-
latable body and mounted so one segment of the L-
haped arm bears against a bottom of the can through
a wall of the inflatable body, and the other segment of
he L-shaped arm extends upwardly along a wall of the
an to position adjacent the valve at the opposite end of
the can.

5. The combination as specified in claim 4 and means for mounting said firing mechanism and said arm to the inflatable body comprising a strip of pressure sensitive tape wrapped around said firing mechanism, said arm and the portion of said inflatable body surrounding said can.

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