

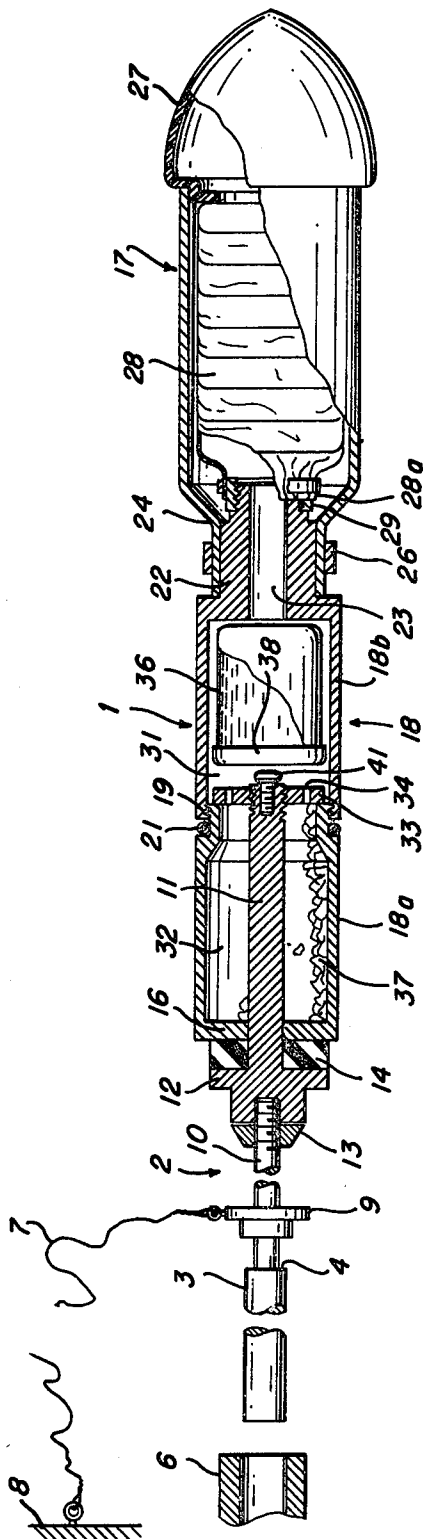
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INFLATABLE AND RECOVERABLE LIFESAVING PROJECTILE APPARATUS

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INFLATABLE AND RECOVERABLE LIFESAVING PROJECTILE APPARATUS

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ABSTRACT OF THE DISCLOSURE

The projectile carries an inflatable life preserving balloon or the like from a ship to an individual afloat in the water. Also, it is secured to a line permitting recovery of the apparatus as well as maneuvering of the inflated balloon into close proximity with the individual. Inflation is produced by gas generated by a liquid-chemical reaction, the liquid being carried in a breakable container and the chemical in a separate chamber. The firing of the projectile gun breaks the bottle permitting the reaction to commence during the flight trajectory.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

BACKGROUND OF THE INVENTION

The invention relates to life preservers and, in particular, to automatically-inflatable preservers capable of being thrown to or dropped near the target individual.

Men lost overboard at sea are recovered either by maneuvering the ship into a position in which they can be reached or, in some instances, by launching small boats. Both operations are relatively slow as well as dangerous, particularly in heavy seas in which the maneuvering becomes difficult or the launching of small boats hazardous.

To facilitate these life-saving recoveries, attempts have been made to provide projectiles containing inflatable life belts or the like, although, as far as presently is known, the apparatus so provided is relatively complex, expensive, and unreliable. For example, it has been customary to use CO₂ bottles to provide the inflating gas and, obviously, some force is needed to pierce the bottle to permit the inflation. Usually this force is provided by the concussion produced when the projectile hits the water, and although, under most circumstances, the force is adequate, the piercing mechanism all too often fails to operate particularly when the projectile strikes the water at an unusual angle due either to the trajectory or to rough sea conditions. Reliability also is reduced by the complexity of the arrangements which usually require special concussion caps, sleeves, levers, springs, piercing pins and other elements that must cooperate one with the other to produce the desired result.

Another difficulty which reduces the effectiveness and increases the expense of the prior devices is that they have been regarded as expendable and no means provided either to permit recovery. Further, their effectiveness has depended entirely upon the accuracy of the trajectory since the life preservers could not be maneuvered after they hit the water.

OBJECTS OF THE PRESENT INVENTION

It is therefore an object of the present invention to provide an inflatable and recoverable life-belt carrying projectile capable of being launched in an accurate path toward the target.

Another object is to provide a projectile in which the life belt is automatically inflated by a gas which is produced in response to the forward thrust of the launcher.

Another object is to produce a projectile capable of use with conventional shipboard launching equipment, the apparatus being relatively simple, inexpensive and reliable.

A still further object is to produce a projectile of the type under present consideration, the inflation of the life preserver being accomplished by a gas produced by a chemical reaction between a gas producing material and a liquid both of which are carried by the projectile.

Other objects and their attendant advantages will become more apparent in the detailed description which is to follow.

SUMMARY OF THE INVENTION

The present apparatus is formed of a shell-like body portion secured at its rear end to a rigid thrust-receiving member adapted to fit the launcher which, preferably, is a line throwing gun having a barrel into which the rigid member is inserted. A recovery line is secured at one end to the apparatus and at the other to a structural member aboard a ship or other launching platform, the line being of sufficient length to accommodate the intended trajectory of the projectile. The body portion of the projectile carries the life belt which most suitably is a balloon member, and it also carries the gas producing components. The body portion is formed of a front casing member sized to receive a deflated and folded balloon and the balloon is secured in this member preferably by having a mouth portion fitted over a nozzle. The rear casing member most suitably carries a perforated partition wall dividing this member into front and rear chambers, one of these chambers carrying a breakable liquid container and the other carrying a gas-producing material of a type capable of producing gas when combined with the liquid of the container. Means, such as an outwardly projecting stud carried by the partition wall, is provided to break the container when the projectile is subjected to the forward thrust of its launching gun. The liquid then can pass through the perforations of the partition wall to contact the gas producing material, and the gas then moves through a passageway between the front and rear casing members into the nozzle and on into the balloon. Inflation forces the balloon out of the forward casing member which, most suitably, is open-ended to permit the escape. For aero-dynamic purposes, the open end may be temporarily closed by a nose cone that also is forced off by the inflating balloon. Other features also include a special shock absorber, as well as the specific arrangement of the various components which, as will be described, increases the accuracy and range of the projectile and materially improves its reliability.

BRIEF DESCRIPTION OF THE DRAWING

A preferred embodiment of the invention is illustrated in the accompanied drawing which shows the projectile apparatus in section and also shows a fragmentary portion of its launching gun.

PREFERRED EMBODIMENT

Referring to the drawing, the projectile apparatus is formed of two major components, these being a shell like, cylindrical body portion 1 and a rigid, rod-like thrust-receiving member 2. Member 2 has a radically enlarged rear portion 3 providing a radial flange 4 and portion 3 is sized to fit into the bore of a launcher which, as presently contemplated, can be a conventional, shipboard line throwing gun. Most ships of the U.S. Navy are provided with line throwing guns identified as Mark 1 Mod 1 .45 caliber guns, these being provided primarily

to throw a line to another ship to initiate a replenishment-at-sea operation such as fueling or the transfer of ordnance equipment. Guns of this type can propel a projectile, such as the present apparatus, a distance of well over 100 yards with considerable accuracy, and, as will be described the present gun is utilized to propel the projectile of the present invention from the ship to the target which may be a man who has been washed overboard.

One of the features is that the projectile apparatus is recoverable, this recovery being permitted by securing a line 7 between a structural member 8 carried aboard the ship and thrust member 2 of the apparatus. This line may be the same line used for the replenishment-at-sea operations which is of sufficient length to accommodate the intended trajectory of the projectile. Most suitably, it is secured to a sliding sleeve 9 mounted on reduced diameter portion 10 of the thrust member. Sleeve 9 can move freely on portion 10 between the limits provided by radial flange 4 and the body portion of the projectile.

Body portion 1 of the projectile is secured to thrust member 2 by a piston-like rod 11 which has a radially-enlarged rear portion 12 formed with a threaded opening for receiving the threaded end of member 2. A lock nut 13 secures the engagement of member 2 with rod 11 which, as also may be noted, extends axially through body portion 1 for a particular purpose which will be described. A resilient shock absorbing member 14 is disposed between radially-enlarged portion 12 of the rod and an end wall 16 of body portion 2, member 14 being provided to absorb a portion of the initial thrust of the launcher or gun 6.

Shell-like body portion 1, generally, is formed of front and rear casing members 17 and 18. Structurally considered, rear casing member 18 is formed of two cylinders 18a and 18b, cylinder 18a having the previously mentioned end wall 16 and also having its forward end reduced in diameter and provided with external threads 19 by means of which it is detachably coupled to forward cylinder 18b. A seal, such as O-ring 21 prevents leakage through the threaded joint. The forward portion of cylinder 18b also is reduced in diameter to provide a thickened neck portion 22 formed with a bore or a passage 23 that communicates cylinder 18b with front casing member 17. Front casing member 17 has its rear portion reduced in diameter to provide a sleeve 24 closely fitted over neck portion 22 and secured by a circular clamp 26.

Front casing member 17 otherwise is open-ended and, preferably, the open end is closed by a relatively loosely fitting nose cone 27 which is conical in shape to minimize the air resistance of the projectile as it is traveling to the target.

Another feature of the present invention is that a balloon-like life preserver 28 is carried by the projectile to the target and, as will be seen, balloon 28, in its deflated and folded position, is fitted into forward casing member 17. Further, the balloon is secured within this casing member by having its mouth portion 28a fitted over the outer end of neck portion 22 of cylinder 18b. As a result, the interior cavity of the balloon is in communication with the interior of cylinder 18b through passage 23. To facilitate the attachment of the balloon, sleeve 29 is threadably mounted on the end of neck portion 22.

Rear casing member 18 is divided into front and rear chambers 31 and 32 by a partition wall 33 which, as may be noted, is formed with a plurality of perforations 34 intercommunicating the two chambers. The apparatus for inflating balloon 28 is carried by these two chambers, this apparatus including a breakable glass container or bottle 36 closely fitted into front chamber 31 and a gas-producing material 37 carried in rear chamber 32. Most suitably, the gas-producing material is a chemical composition such as lithium hydride in the form of crystals which, when contacted by water produces hydrogen gas to inflate the balloon. The water is carried by glass container 36 which, as stated, is designed to be easily broken

so as to permit the water to traverse perforations 34 and contact lithium hydride crystals 37. Breakage of container 36 can be assured by forming the container with a cap or a lid portion 38 formed of an easily fracturable material.

The means for breaking glass container 36 is provided by a stud 41 threaded into the end wall of piston-like rod 11. When gun 6 is loaded with the present projectile and fired, the explosive thrust is transmitted to stud 41 by thrust-receiving member 2 and piston-like member 11, these members being axially aligned to assure a balanced forward movement of the stud into the glass container.

The operation of the present apparatus should be somewhat apparent from the foregoing description. The projectile is loaded into gun 6 by inserting its radially enlarged end portion 3 into the barrel of the gun, and inflatable balloon 28 is folded and secured in front casing member 17 with nose cone 27 in place. Firing of gun 6 fractures glass container 36 permitting its liquid to contact lithium hydride crystals 37 to produce the hydrogen gas which then can bubble through perforations 34 and through passage 23 into the cavity of the balloon which then is inflated. The use of shock absorbing member 14 is important to prevent damage and provide a smooth translation of the forward thrust.

The projectile, propelled by the explosive force of gun 6, travels in a desired trajectory to the target and during this travel, the hydrogen gas is being produced and entering the balloon. However, it is important to select a chemical that produces gas at such a rate that the balloon is not appreciably inflated until the interval of time has expired to permit the desired trajectory. Most gas producing chemicals will be found entirely suitable for this purpose. After the projectile reaches the target, the gas completes the inflation of balloon 28. The expansion force is sufficient to unseat nose cone 27 and permit the balloon to escape from front casing 17 to provide a buoyant object that can be grasped by the individual being rescued.

It also is of considerable importance to ensure that the gas does not escape from the balloon once it has become inflated and the present apparatus accommodates this requirement since chambers 31 and 32 provide a pressure chamber or reservoir which is adequately air tight.

After the projectile apparatus has served its rescue purposes, it can be recovered by reeling in recovery line 7. Another feature of considerable significance is that the use of recovery lines 7 permits the inflated balloon to be maneuvered into close proximity to the individual being rescued. For example, gun 6 can be so directed or aimed that any error in its trajectory will be on the long side and also be-up-current from the individual. The current then will tend to float the inflated balloon toward the individual and also recovery line 7 can be reeled in to compensate for any over-shooting of the target.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that the invention may be practiced otherwise than as specifically stated.

What is claimed is:

1. Recoverable projectile apparatus for carrying an inflatable life-preserving balloon to a selected target, said apparatus being adapted to be trained and forcefully propelled by a launcher, the projectile apparatus comprising:
 - a rigid member formed to be operatively mounted on said launcher for receiving its forward thrust,
 - a shell-like body portion carried by said thrust-receiving member and formed with rigidly coupled front and rear casing members and with a passage intercommunicating said coupled members,
 - said front casing member being open-ended for receiving said balloon in its deflated condition and for permitting said balloon to escape when inflated, said front casing member further being provided with

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means for so securing said balloon that its interior cavity is in communication with said passage, a perforated partition wall dividing said rear casing member into front and rear chambers, a liquid-filled breakable container carried by one of said chambers and a gas-producing material carried by the other, said material being of a type capable of producing gas when contacted by said liquid, means carried by said projectile for attaching a projectile-recovery line, and means responsive to said forward thrust of said launcher for breaking said container and permitting its liquid to contact said gas-producing material whereupon said gas passes through said passage and inflates said balloon,

said chambers being substantially gas-tight for providing a pressure reservoir for said inflated balloon.

2. The apparatus of claim 1 wherein said gas producing material is characterized by the fact that the production of gas requires an interval of time sufficient to permit said balloon to remain in its open-ended front casing member until arrival at said target.

3. The apparatus of claim 1 wherein said material is formed of lithium hydride crystals and said fluid is water.

4. The apparatus of claim 1 wherein said fluid container is mounted in said front chamber and said material in said rear chamber.

5. The apparatus of claim 4 further including a resilient member disposed between said rigid member and said shell-like body portion for initially absorbing part of said forward thrust.

6. The apparatus of claim 5 wherein said rigid thrust receiving member is a rod sized to be received in a gun barrel, and said means for attaching said recovery

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line is slidably mounted on said rod, said rod having a flange limiting the rearward movement of said slidable means.

7. The apparatus of claim 5 wherein said means for securing said balloon is a threaded nozzle, and said means for breaking said container is a stud carrier by said partition wall and projecting into said front chamber.

8. The apparatus of claim 5 wherein said body portion is cylindrical,

10 said apparatus further including a nose cone releasably mounted on said open end of the front casing member, said mounting permitting release of the nose cone in response to pressure exerted by said inflation.

15 9. The apparatus of claim 5 further including: a recovery line secured to said line-attaching means, said line being of a length at least equal to the trajectory distance of said target.

20 10. The apparatus of claim 7 further including an inflatable balloon having a mouth portion secured to said threaded nozzle.

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