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3,098,441

WEAPON RECOVERY SYSTEM

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2 Sheets-Sheet 1

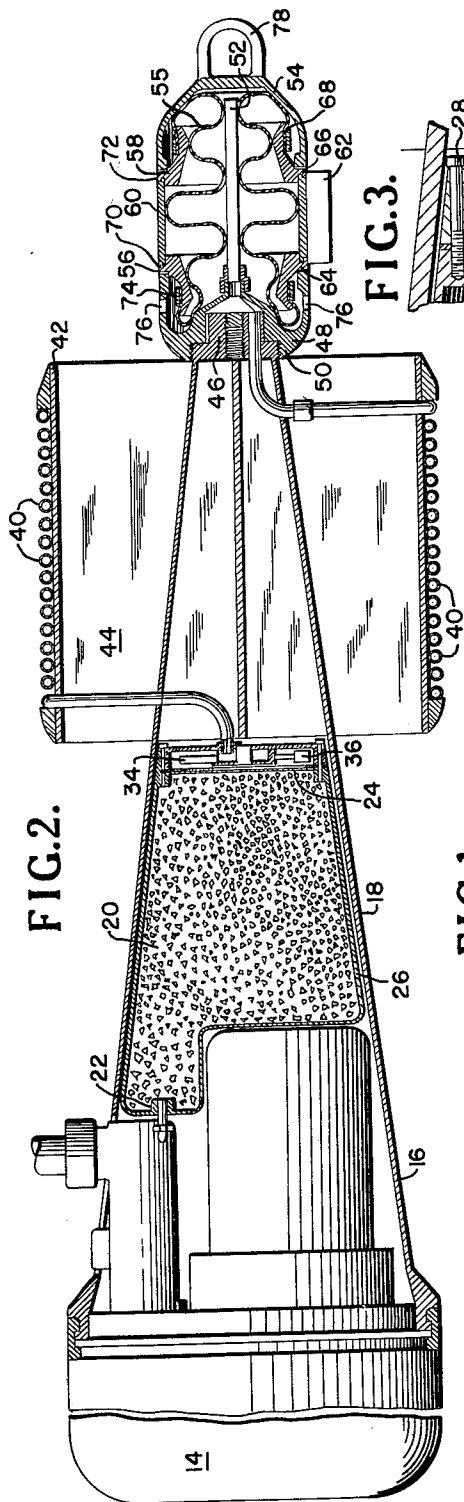


FIG.2.

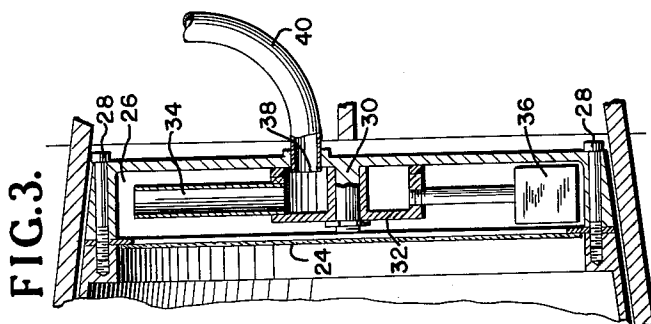


FIG. 3.

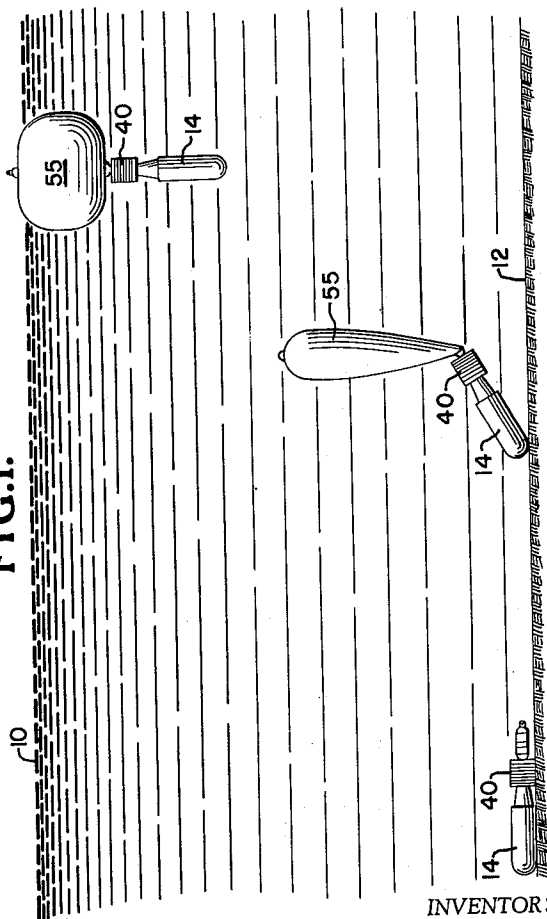


FIG.1.

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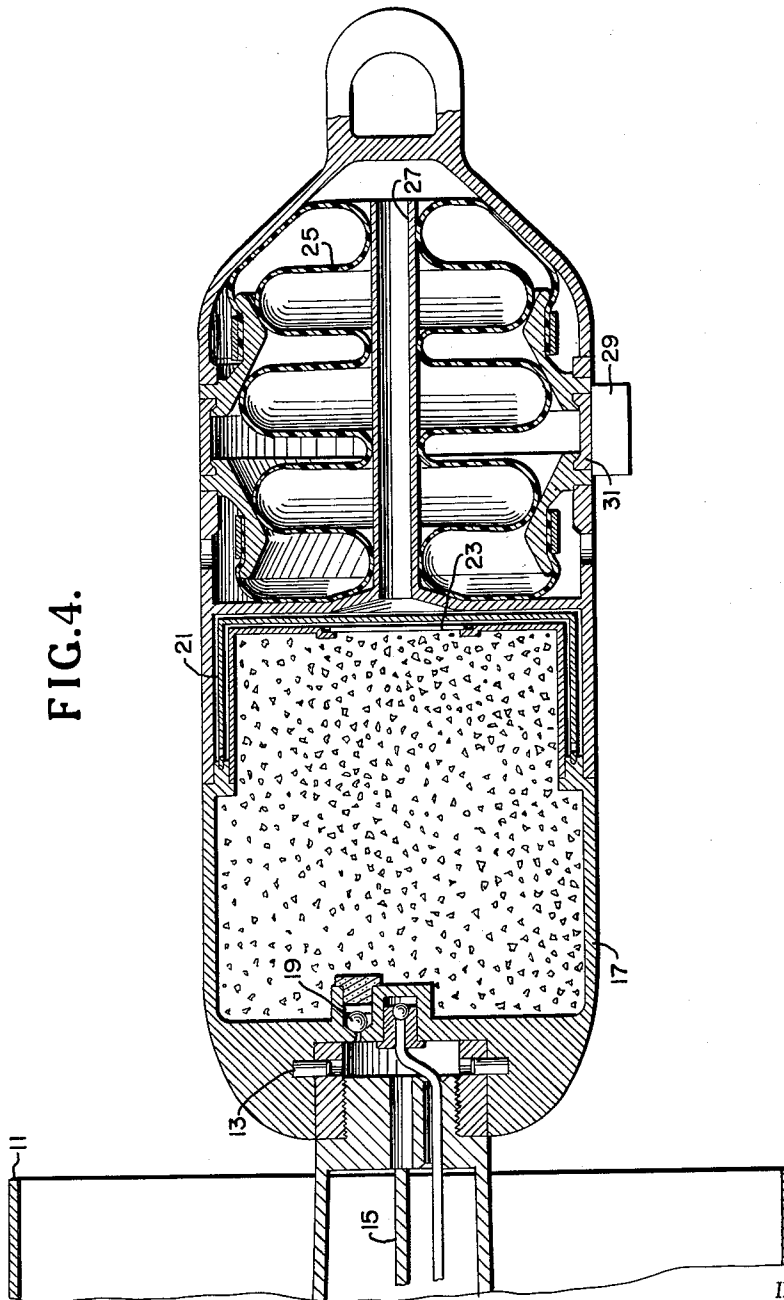
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FIG. 4.



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WEAPON RECOVERY SYSTEM

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1 Claim. (Cl. 102-13)

This invention relates to apparatus for the recovery of weapons from the sea, particularly drill mines, and other underwater practice devices which may be reused and which are generally recovered by divers or surface workers with grapples.

To develop the necessary skill in the laying of mines either from boats or airplanes there must be much practice. This is generally carried out with full size mines or other weapons, omitting the explosive charge. These weapons are costly and contain many devices and equipment which would be expensive to reproduce, both as to time and money, and would also necessitate a constant supply of new weapons just for practice drills unless they were recovered. The weapons often sink to depths at which divers cannot work and recovery is time consuming and in some cases impossible.

An object of the present invention is to provide a weapon attached recovery means which will automatically bring the weapon to the surface.

Another object of the invention is the provision of a weapon attached inflatable bag which will automatically function to bring the weapon to the surface.

Still another object of the invention is the provision within the weapon casing of a collapsed bag, a means for generating a gas and means for filling the bag with the gas to lift the weapon from the floor of the sea to the surface.

A further object of the invention is the provision of a hydrostatic pressure operated release device which will release the confined bag.

A still further object is the provision of a chemical which upon mixing with sea water will generate a gas to fill the bag.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a schematic drawing showing the steps in the rising of the weapon;

FIG. 2 is a longitudinal sectional view of that part of the weapon containing the recovery apparatus;

FIG. 3 is a cross sectional view of the gas collecting tube; and

FIG. 4 is a similar view of a modified form of the recovery apparatus.

With reference to the drawings, wherein like parts are designated by like numerals throughout the several views, and particularly to FIG. 1, the dashed line 10 represents the surface of the water in which the weapon is planted, while the line 12 represents the bottom or floor of the sea. A weapon, here shown as a mine, rests in position 1, upon the floor of the body of water within which it has been planted by a surface vessel or by plane. A release device, operated by the pressure of the water at a predetermined depth, or by a time operated release device, will release the clamp holding the confined bag. Upon release of the bag and the opening of a valve admitting sea water, the gas generated will inflate the bag and raise the weapon, eventually reaching the surface as shown in the other positions shown in FIG. 1.

Referring now to FIG. 2, a drill mine 14 is formed with an afterbody 16 which houses a gas generator 18 carry-

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ing a quantity of lithium hydride 20 and a water inlet check valve 22. The afterbody tapers from the mine to the bag carrying receptacle and houses the gas generator adjacent the mine. At the smaller end of the generator compartment a screen 24 is located.

The screen 24 forms one side of an annular compartment 26 which is secured to the gas generating chamber by bolts 28, FIG. 3. The compartment 26 is formed with an integral central hub 30 rotatively supporting a hollow drum 32. Carried at diagonally opposite positions on the drum are a gas intake tube 34 and a weight 36. Communicating with the interior of the hollow drum is one end 38 of a cooling tube 40 through which the gas is forced.

The cooling tube is coiled about a cylindrical support 42 which is supported by brackets 44 connected to the afterbody 16. The tube 40 discharges through a boss 46 which is integral with the afterbody 16 and communicates with an end cap 48, threaded onto the boss at 50.

The end cap 48, which is the end cap for the afterbody, is one end of a bag housing receptacle and extending centrally from the cap 48 is a discharge tube 52 which terminates within a second cap 54. Between the caps an inflatable bag 55, formed of plastic or the like, is confined.

The bag confining section is made up of the two end caps 48 and 54 which are affixed respectively to opposite ends of the bag, a pair of bag supporting collars 56 and 58 which are secured to the respective end caps, and a central annular sleeve or band 60. Attached to the sleeve or band 60 is a release mechanism 62 which is automatically actuated to release the band from the bag confining section. This release mechanism may be pressure actuated or actuated by time controlled mechanism or by some other means such as remote controlled sonar signals. The collars 56 and 58 are permanently attached to the cap ends 48 and 54 respectively at their ends 64 and 66 respectively. These ends are formed with grooves 68 which receive and retain the band which holds the bag carrying caps together.

The bag 55 is of circular form and secured to the outer flared ends 70 and 72 respectively of the collars 56 and 58. The bag ends are brought through the flared ends of the collar, doubled back on the outside of the collar and securely clamped in position by clamping bands 74. The end caps 48 and 54 thus become a permanent part of the bag, the cap 54 sealing one end of the bag while the cap 48 is formed with two openings 76 which permit excess gas to escape.

The apparatus will function automatically with the actuation of the release mechanism 62. When the mine is planted, the water will enter the openings 76, fill the bag, pass into the cooling coil until the compressed air in the tube and generator equals the pressure caused by the depth to which the mine has sunk. At some predetermined pressure or at initial contact with the water the water check valve 22 will open and water will enter the chamber containing the lithium hydride. Hydrogen gas will be generated during the reaction of the lithium hydride into the water in which much heat is liberated. The screen 24 prevents the particles of lithium hydride from entering the cooling tube and the rotatable gas inlet tube 34, being always uppermost, insures against the entrance of water. Hydrogen gas passes through the cooling tube and into the plastic bag, forcing water out through the openings 76 and because the released bag is extended under greater pressure than the outside pressure of the water, the bag is filled with hydrogen. Immediately, the end cap 54, formed with an integral eye 78 is lifted which pulls the bag and the mine to a vertical position with the eye 78 uppermost. The still generating hydrogen gas fills the bag and floats the mine, excess gas escaping through the openings 76 which prevent bursting of the bag when it reaches the surface and is relieved of the pressure of the

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water. The bag will hold the mine surfaced until it can be detected and secured, by the eye 78, to a lifting cable.

Referring to FIG. 4 a modified form of the apparatus is shown. The recovery apparatus is composed of a gas generator and a bag compartment with a gas screening and cooling unit between them. The whole is attached to the mine 11 by a pair of retractable pins 13 and by a cable 15 which is carried within the mine or a drum (not shown). The pins are actuated by a pin release mechanism which may be any acceptable mechanism operated by water pressure, time delay mechanism or sonar signal responsive element and when withdrawn the gradually filling bag and generator unit will approach the surface drawing the mine upwards at the length of the cable.

The generator 17 filled with lithium hydride starts operating upon its entrance into the water, when the water inlet check valve 19 opens to admit water to the generator. The gas liberated from the reaction of lithium hydride with sea water generates heat so that a cooling passage 21 is included between the generator and the bag. A screen 23 at the entrance to the cooling passage prevents the small particles of lithium hydride from entering the bag, as they might cause damage to the plastic material. The bag 25 is preferably the same as the bag on the above described apparatus, receiving the gas from the tube 27 which is attached to the cooling passage and the bag is released by a release mechanism 29 removing the clamping band 31. The bag will fill sufficiently during the downward movement of the mine to slow the descent thereof and prevent the mine from sinking into a muddy bottom.

The weapon recovery apparatus functions to recover those weapons which are dropped from planes or planted from surface vessels and eliminates hours of diving and

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grappling. Also it brings up weapons from depths to which a diver could not descend.

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 within the scope of the appended claim the invention may be practiced otherwise than as specifically described.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

A drill mine recovery apparatus for automatically surfacing a mine comprising a gas generator attached to the mine and having a quantity of material therein for generating a gas upon immersion in water, an inflatable bag of sufficient size to render the apparatus positively buoyant when inflated, a conduit for conducting the generated gas from said generator to said bag to inflate said bag, said conduit being exposed to the ambient water when the mine is immersed whereby the gas is cooled prior to entry into said bag, a rotatably mounted gas intake tube coupled to one end of said conduit and in communication with the interior of said generator, and means for automatically orienting the intake end of said intake tube away from water lying within said generator to preclude the generated gas from forcing water from said generator into said conduit.

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