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VARIABLE BUOYANCY MESSENGER BUOY

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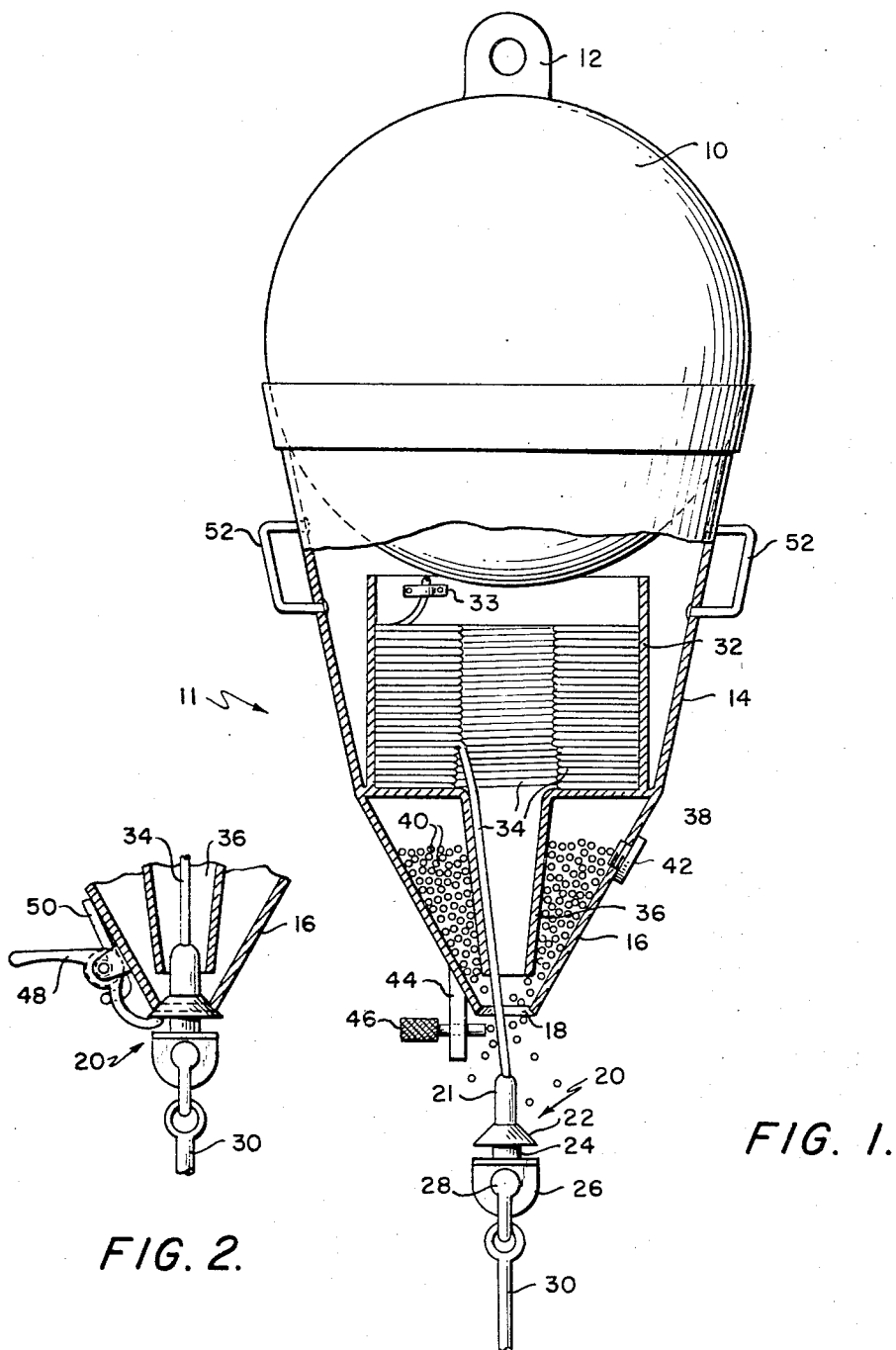


FIG. 1.

FIG. 2.

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VARIABLE BUOYANCY MESSENGER BUOY

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10 Claims. (Cl. 9—8)

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.

The invention relates generally to buoys and more particularly to variable buoyancy messenger type buoys which may be variably ballasted to obtain neutral buoyancy to provide for easy handling by a diver at depth, and to obtain positive buoyancy for ascension to the surface. Variable ballasting may be accomplished by providing the buoy with a container for lead shot and a plug therefor.

Many varieties of such buoys have been suggested, among them being types utilizing a deformable bladder which is normally carried by a diver in a deflated condition and which may be filled with a gas, as from a high pressure cartridge, and released on a messenger line when desired by the diver. These have the obvious disadvantage that the messenger line must be carried separately from the buoy and the buoy will not support much weight when submerged. Other varieties of messenger buoys are known which contain a coiled line within the buoy but these generally are not capable of variable buoyancy.

Salvaging of ship-wrecks is attended with many problems, one of which is the attachment of lifting-pads which may be done by either "hard-hat" or "scuba" divers. Because fatigue to the diver occurs rapidly at the depths involved, it is imperative to keep the man's work-load as light as possible to prevent undue strain and permit longer work-periods. It is, therefore, desirable that tools and other items that he is required to handle be neutrally buoyant. It is necessary, in particular with reference to messenger buoys, to have them neutrally buoyant while being handled around the submerged wreck, etc. by the diver but also to be positively buoyant to permit it to rise to the surface and pay out a messenger line while rising. The prior art has not suggested a solution to the problems.

The general purpose of this invention is to provide a messenger buoy which overcomes the aforesaid disadvantages of the prior art. To attain this, the present invention contemplates a buoy which is initially neutrally buoyant in sea-water, which may be made positively buoyant by varying the ballast when released at depth, and which contains its own messenger line and means for paying out the line during ascent to the surface of the sea.

Accordingly, an object of the present invention is to provide a messenger buoy capable of being variably ballasted.

Still another object is to provide a messenger buoy that may be variably ballasted to provide neutral buoyancy when attached to various loads.

A further object is to provide a messenger buoy that may be rendered either neutrally or positively buoyant.

Yet another object is to provide a messenger buoy that is easily handled by a dive underwater.

Other objects and features of the invention will become apparent to those skilled in the art as the disclosure is made in the following detailed description of a preferred embodiment of the invention as illustrated in the accompanying sheet of drawing in which:

FIG. 1 is a perspective view, partly in section of the messenger buoy;

FIG. 2 is a perspective view partly in section, of another embodiment of the latch and plug.

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Referring now to the drawing, there is shown in FIG. 1 a messenger buoy having a hollow buoyant metal sphere 10 which may be filled with air or, in the case of deep depth or high pressure applications, it may be filled with gasoline or other low specific-gravity liquids.

Attached and sealed to the periphery of the sphere is a compartment portion 11 having a first hollow cone 14 truncated at both the top and the bottom. Attached subjacent the first truncated cone is a second truncated hollow cone 16 having a greater taper angle than the first cone. The bottom is open forming a narrow spout 18 the edge of which is tapered upwardly and inwardly to form a seat for the tapered section 22 of plug 20.

At the intersection of the first and second truncated cones, there is attached therein a drum or messenger line tub 32 which when ready for use will contain the messenger line 34 attached at 33 to the tub and coiled in such a manner as to readily pay off the line from the center of the coil. Attached subjacent the tub is a third hollow truncated cone or line guide 36. It is to be understood that the bottom of the line guide 36 and the bottom of the second cone 16 are not attached.

The space enclosed by the bottom of the tub 32, the line guide 36, and the second truncated cone 16 is a chamber 38 which may be filled with steel or lead shot 40 or other particulate material heavier than water.

The connector-plug shown generally at 20 is multi-purpose. It provides for attachment to a lifting pad (not shown) which is secured to a sunken wreck by a diver through the universal-joint action of a shackle eye 26, a shackle 28 and the lift pendant 30. On the connector plug 20, immediately below the messenger line connection, there is formed an axial plug section 21 which when in place in the buoy effectively seals the line guide 36 and line tub 32 from the ingress of shot 40. The tapered plug section 22 forms a seal with the spout 18 of the second truncated cone precluding the release of shot 40 from the shot chamber 38.

The connector is held in place by a slide pin 46 in a pin guide 44 attached near the spout. As an alternative embodiment to the pin and guide, FIG. 2 shows a quick release latch 48, biased by spring 50, which may be utilized to hold the connector-plug in the spout. Either the pin 46 or latch 48 provide a convenient and easy release mechanism for operation by a diver under difficult deep depth situations.

The configuration of the connector-plug is suitable to engage the female connector of the main lifting cable that may be guided down by the messenger line from the surface of the water as disclosed in my copending application Ser. No. 483,908.

FIG. 1 also shows additional structure to facilitate convenient handling by a diver at depth. The messenger buoy is provided with at least two handles 52 attached to the buoy by any well known means as by welding or riveting. Attached at the top of the spherical float portion is an eye 12 which may be used by the surface salvage ship for engaging by a boat-hook and subsequent attachment of a lifting rig. Additionally, at the side of the second truncated cone there is a screw plug that permits access to the shot chamber for filling when the connector-plug 20 is in place. The shot ballast may be varied to obtain neutral buoyancy depending on whether the buoy is to be handled by the diver by itself or attached to a lifting pad.

In operation, the messenger buoy is prepared for use on board a surface vessel moored on station over a submerged wreck. The sphere 10 normally contains air, but if deep depths are anticipated, the air may be replaced by a non-compressible, low specific-gravity fluid such as gasoline through a port (not shown). A length of messenger line 34, depending on the depth anticipated, is coiled

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into the tub with the outer end secured to the tub and the connector end wound until the connector-plug 20 may be placed in the spout 18 without any slack. The latch 48 or pin 46 is then actuated to retain the connector-plug in spout 18. Now that the spout 18 and the mouth of the line-guide 36 are closed, lead or steel shot 40 may be poured into the chamber 38 after removal of the screw plug 42. Sufficient shot to render the messenger buoy neutrally buoyant is used, and the quantity depends on whether the buoy will be handled by itself or with a lifting pad attached to the pendant 30. The messenger buoy is now ready for deployment. It may be lowered down a previously placed cable near the wreck or carried down with the diver. Because the messenger buoy is neutrally buoyant, no impediment save inertia and water friction will occur, and the diver may freely move it into place over the wreck to be salvaged using the handles 52 and make the attachment of the lift-pad. All that is required now is to pull out the pin 46 or actuate the latch 48 which will allow the coiled messenger line 34 to pay out and the shot 40 to spill out the spout 18 thereby rendering the messenger buoy positively buoyant and permitting ascent to the surface. The salvage ship can pick up the buoy by a boat-hook hooked into the eye 12 and hoist it aboard. A female connector attached to a lifting cable according to the disclosure of my application Serial No. 483,908 may be slid down the messenger line 34 and automatically grip the connector plug 20.

It should be understood, of course, that the foregoing disclosure relates to only preferred embodiments of the invention and that numerous modifications and alterations may be made therein without departing from the spirit and the scope of the invention as set forth in the appended claims.

What is claimed is:

1. A messenger buoy for carrying a messenger line from a position on a submerged wreck to the surface, comprising:

- a buoyant portion;
- a messenger line;
- a first compartment portion for containing said messenger line attached to the buoyant portion;
- a quantity of particulate material heavier than water;
- a second compartment portion attached to the buoyant portion for containing said quantity of particulate material; and

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a connector-plug attached to said messenger line and removably secured to said second compartment for plugging both said first and second compartment portions to retain said particulate material.

2. The device of claim 1, wherein the first and second compartment portions are integrally connected to form a divided compartment.

3. The device of claim 2, wherein the first compartment is contained within the second compartment.

4. The device of claim 3 wherein the first compartment comprises:

- a cylindrical tub partially closed at the bottom; and
- a hollow tube attached at the bottom and communicating with the inside of the cylindrical tub to guide the messenger line.

5. The device of claim 4 wherein the second compartment portion is formed outside of the hollow line guide and below the cylindrical tub.

6. The device of claim 1 further comprising:

- a slide pin for retaining the connector-plug;
- a slide pin guide attached to the second compartment for guiding the slide pin.

7. The device of claim 1 further comprising:

- a latch for retaining the connector-plug pivotally attached to the second compartment;

a spring for biasing the latch to a retaining position.

8. The device of claim 1 wherein the particulate material is sand.

9. The device of claim 1 wherein the particulate material is lead shot.

10. The device of claim 1 further comprising:

- a plurality of handles attached to the messenger buoy for ease of handling by a diver; and
- an eye attached at the top of the messenger buoy for retrieving or lowering by a salvage ship.

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