

[54] **MESSENGER BUOY RECOVERY DEVICE**

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[73] Assignee: **The United States of America as represented by the Secretary of the Navy**

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[51] Int. Cl. **B63c 7/02, B63c 7/26**

[58] Field of Search **114/51, 54, 50; 9/8, 9; 43/43.11**

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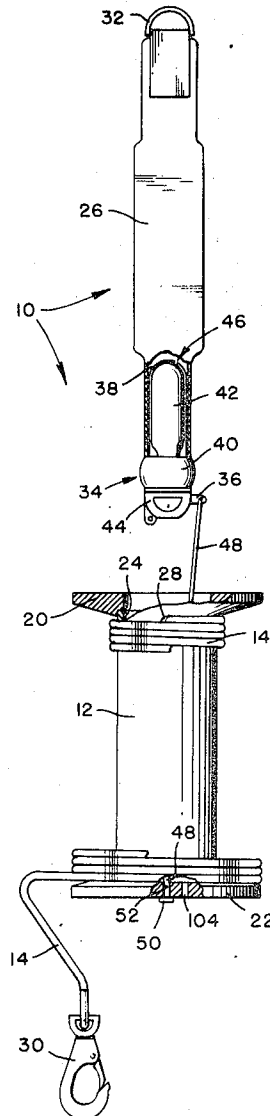
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[57] **ABSTRACT**

A messenger buoy recovery device which can be attached by a diver to a submerged object including a spool for exteriorly winding recovery cable, the spool having an interior receptacle; an inflatable float which is adapted to be received within said receptacle; means for retaining the float in the receptacle in a deflated condition; and the float having means for manually pulling the float from the receptacle. The float may be retained within the receptacle by friction between the float and the wall of the receptacle, and means may be provided for automatically inflating the buoy when the buoy is pulled from the receptacle. The recovery device may further include a winding assembly which has a winding spindle which is adapted to be received by the spool receptacle, and means may be provided for retaining the spool to the winding spindle.

10 Claims, 7 Drawing Figures



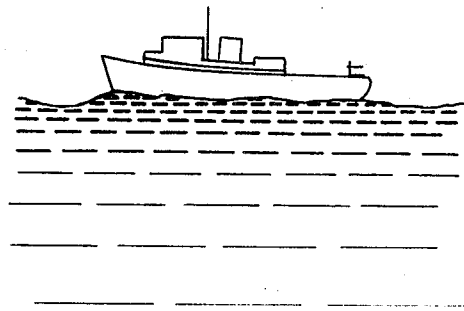


FIG. 1.

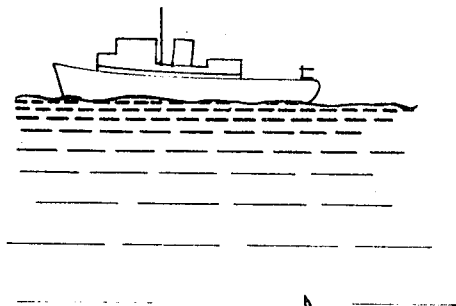


FIG. 2.

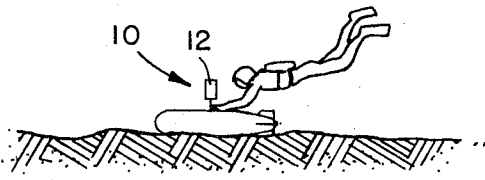
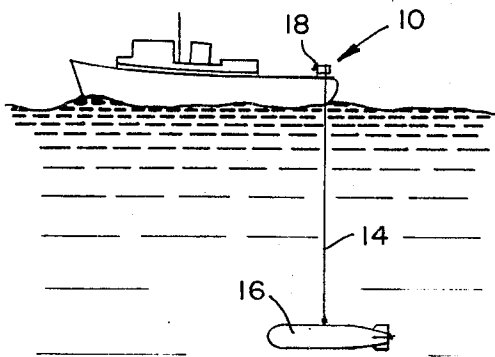
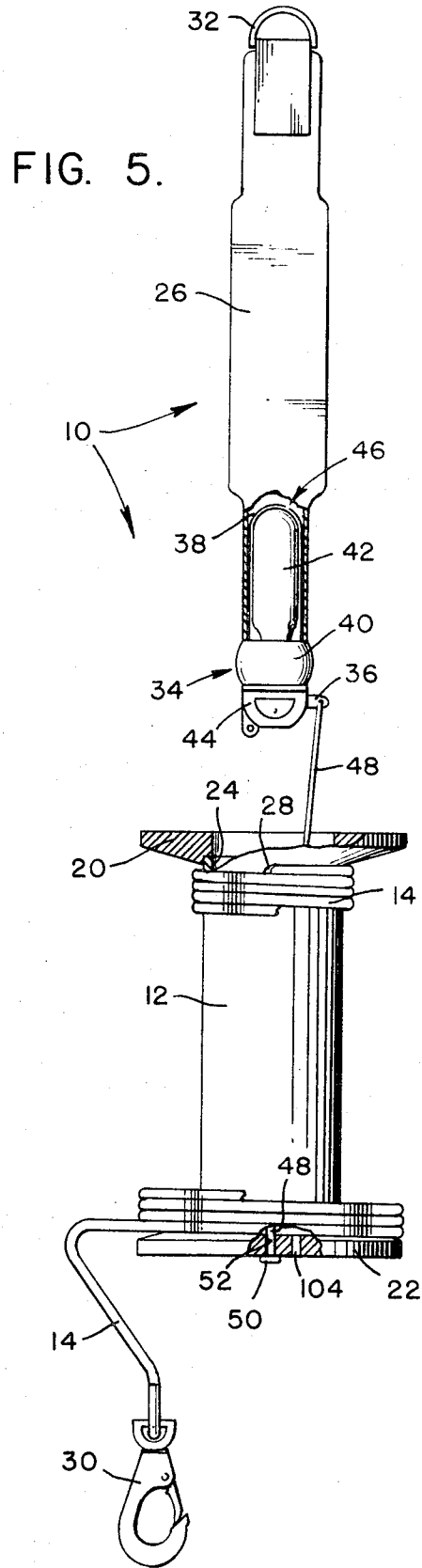
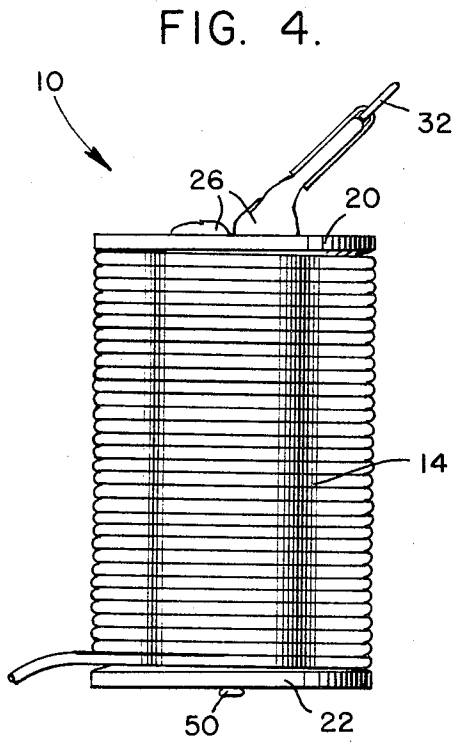


FIG. 3.



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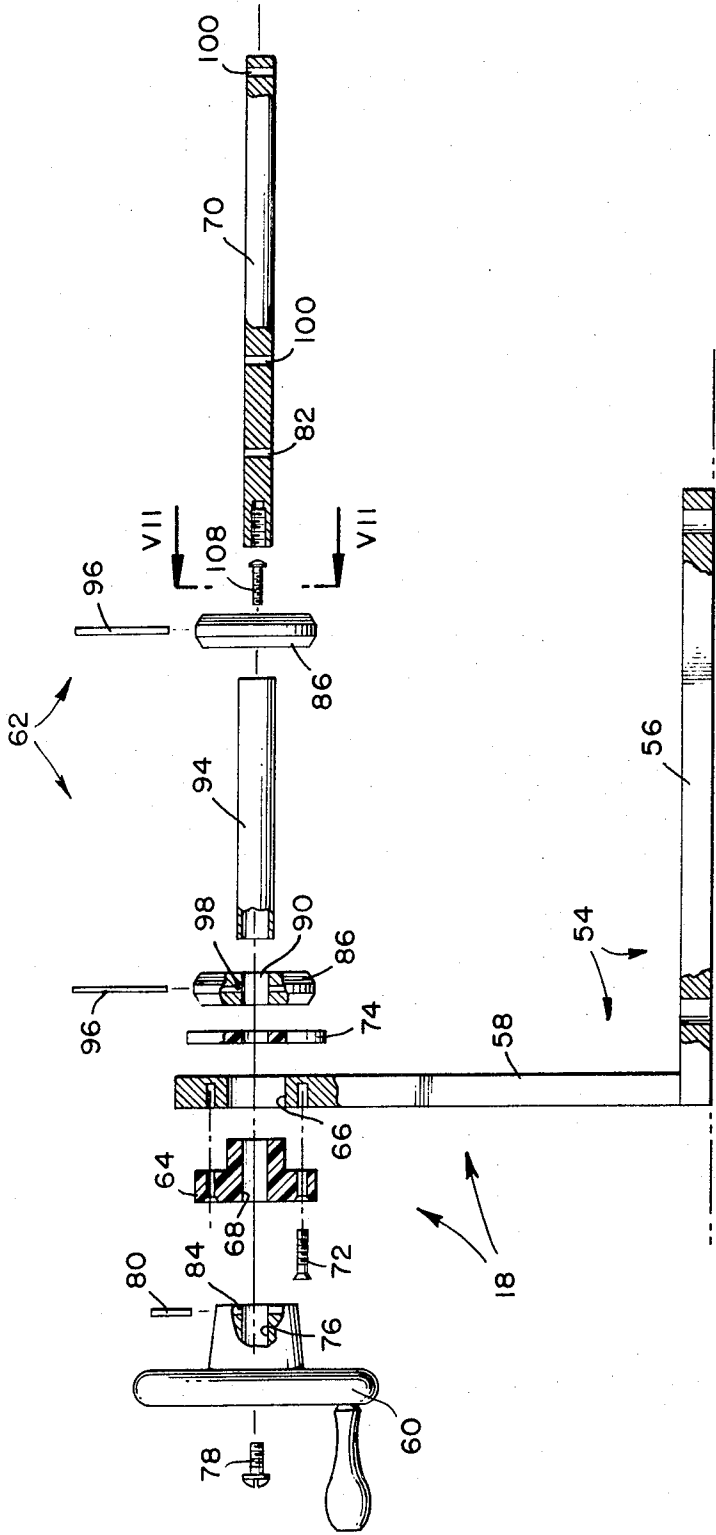


FIG. 6.

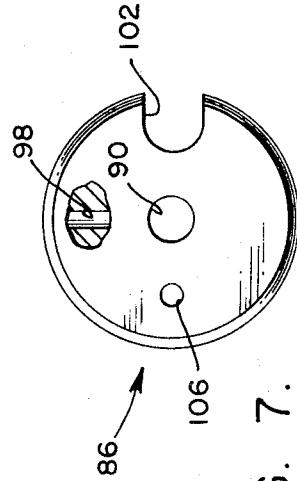


FIG. 7.

MESSENGER BUOY RECOVERY DEVICE

STATEMENT OF GOVERNMENT INTEREST

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

Divers are often employed in retrieving objects from the ocean floor. While a diver may swim the object to the surface of the water this approach is very time consuming and requires much physical exertion. More often the diver will attach a recovery device to the submerged object which will enable easy retrieval by a surface vessel. Some of these recovery devices utilize floats which will either float the object to the surface of the water or carry a cable connected marker buoy to the surface after which the object can be retrieved by the surface vessel. Recovery devices which float the submerged object to the surface of the water are limited in the range of payload weights which may be retrieved for a particular size buoy, and further there is a risk of impacting the object with the bottom of the vessel. Some recovery devices float a marker buoy and attached cable to the surface of the water so that retrieval of the submerged object can be accomplished by hauling in on the cable. In the past these devices have been difficult to manipulate and operate by the diver. Further, these devices often float the full length of the cable through the water, which becomes a serious drag problem. Also the cable retrieved on the surface vessel must be wound in a subsequent step for reuse when another retrieval operation is desired.

SUMMARY OF THE INVENTION

The present invention overcomes the aforementioned problems associated with prior art recovery devices by providing a novel messenger buoy recovery device which can be easily handled, attached, and operated by a diver. This has been accomplished by providing a spool which exteriorly winds a recovery cable. The spool has an interior receptacle which is adapted to receive an inflatable float in its deflated condition. The float may be retained in the spool receptacle by frictional engagement and means, such as a handle, may be attached to the float for manually pulling the float from the receptacle. The present recovery device may further include means for automatically inflating the float when the float is pulled from the receptacle. With such an arrangement the diver simply attaches the cable to the object to be retrieved and pulls the float from the receptacle, whereupon the float is automatically inflated. The float ascends the spool and cable to the surface of the water after which the object may be pulled to a surface vessel. The recovery device may further include a winding assembly which has a winding spindle. The spool receptacle may be adapted to receive the winding spindle and means may be provided for retaining the spool to the winding spindle so that upon operating the winding assembly this one step operation retrieves the submerged object and winds the cable on the spool for another retrieval operation.

STATEMENT OF THE OBJECTS OF THE INVENTION

An object of the present invention is to overcome the aforementioned problems associated with prior art ocean recovery devices.

Another object is to provide a submerged object recovery device which can be easily handled, connected to the submerged object, and actuated by a diver in the water.

A further object is to provide a messenger buoy recovery device which is inexpensive to construct, efficient to operate, and minimizes risk of damage to the submerged object upon recovery.

Still another object is to provide a messenger buoy recovery device which, upon retrieval of a submerged object, is readied for another retrieval operation.

Other objects and many of the attendant advantages of this invention will be readily appreciated as it becomes better understood by reference to the description and accompanying drawings which follow.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an ocean view of a diver connecting the present recovery device to a submerged object.

FIG. 2 is an ocean view of the recovery device ascending to the surface of the ocean.

FIG. 3 is an ocean view of the surface vessel retrieving the submerged object.

FIG. 4 is a side view of the recovery device with the inflatable float disposed within the spool receptacle.

FIG. 5 is a side view of the recovery device with the float extended from the spool.

FIG. 6 is an exploded view of a winding assembly for use on the surface vessel to retrieve the submerged object.

FIG. 7 is a view taken along plane VII—VII of FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings wherein like reference numerals designate like or similar parts throughout the several views there is shown in FIGS. 1, 2, and 3 a messenger buoy recovery device 10 which may include a spool 12 which is adapted to exteriorly wind a lifting cable 14. The cable 14 is connected to a submerged object 16 which is to be retrieved by the surface vessel. The recovery device 10 may further include a winding mechanism 18 on the surface vessel, which is adapted to receive the spool 12 and wind the cable 14 back on the spool as the submerged object is retrieved.

As illustrated in FIG. 5, the spool 12 may have a pair of oppositely disposed flanges 20 and 22 between which there is wound the lifting cable 14. The spool 12 has an interior receptacle 24 which is open at the top of the spool and which is adapted to receive an inflatable float 26 in a deflated condition. One end of the cable 14 may be connected to the spool 12 by tying a knot (not shown) inside the spool receptacle 24 through an aperture 28 in the spool drum. The other end of the cable 14 may be provided with a swivel hook 30 for connection to an eye on the submerged object. The lifting cable 14 may be constructed of braided nylon or polyethylene which is substantially neutrally buoyant in ocean water.

The float 26 is a commercially available safety float which may be procured from Dacor. As shown in FIG. 5, this float is elongated in its deflated condition and may have a handle 32 at its top for manually pulling the float from the receptacle 24. At the bottom end of the float 26 there is an automatic means 34 for inflating the float when a lever 36 is pulled in a downward direction. The inflation means includes a container 38 which is retained within the float 26 by a resilient band 40 and which is adapted to receive a CO₂ bottle 42. A cap 44 is threaded within the top of the container 38 and contains a firing pin (not shown) which punctures the CO₂ bottle 42 when the lever 36 is pulled in a downward direction. Pressurized gas released from the CO₂ bottle 42 inflates the float 26 through an aperture 46 in the container 42. The float 26 is automatically inflated when the float is pulled from the receptacle by a flexible cord or line 48 which is connected at one end to the lever 36 and is connected at its other end to the spool 12. The connection of the flexible line 48 to the spool 12 may be accomplished by providing the spool with a substantially closed flange end 22 and tying a knot 50 in the line 48 through an aperture 52 in the spool end 22. It is highly desirable that the float 26 remain deflated until it is substantially clear of the receptacle 24. This has been accomplished by making the flexible line 48 of such a length (slightly longer than the spool 12 for the embodiment shown) so as to restrain the lever 36 for downward movement only after the float 26 has been pulled substantially clear of the receptacle 24. With such an arrangement the diver simply pulls the float 26 upward beyond the top of the spool 12 whereupon the float 26 is automatically inflated.

In order to facilitate the handling of the recovery device 10 by the diver the float 26 is received within the receptacle 24 of the spool 12. This arrangement keeps the float 26 out of the way until its use is required. In order to facilitate easy withdrawal of the float 26 from the receptacle 24 the float may be frictionally retained within the receptacle 24 by appropriate engagement of the float 26 with the wall of the receptacle 24. In the embodiment illustrated the float 26 is folded over in a deflated condition in the receptacle 24 in order to make the desired frictional engagement for retention purposes. If desired, the receptacle 24 could be elongated and provided with a smaller diameter so as to frictionally retain the float 26 in an unfolded deflated condition.

The recovery device may further include the winding assembly 18 which is illustrated in detail in FIG. 6. The winding assembly 18 may include a stand 54 which has a base 56 and an upstanding flange 58. A handcrank 60 and winding spindle means 62 may be rotatably mounted to the upstanding flange 58. The spindle means 62, which will be described in more detail hereinbelow, is adapted to be received by the spool receptacle 24. A flanged bearing 64 may be received within an opening 66 within the flange 54 and may have a central bore 68 for slidably receiving a shaft 70 of the spindle means 62. The flanged bearing 64 may be retained to the upstanding flange 58 of the stand by bolts 72. The shaft 70 may extend through a washer 74, the flange 64, and a central bore 76 within the handcrank 60. The shaft 70 may be longitudinally retained in the crank 60 by a bolt 78 which is threaded into the end of the shaft. The shaft 70 may be retained axially to the crank by a pin 80 which extends through an aperture 82 in the shaft and which is received within a keyway-like depression 84 in the end of the crank 60. In addition to the shaft 70 the spindle means 62 may further include a pair of spaced-apart discs 86 which have apertures 90 for slidably receiving the shaft 70. The discs 86 may be spaced on the shaft 70 by a tubular spacer 94 and may be retained axially on the shaft 70 by pins 96 which extend through respective disc apertures 98 and shaft apertures 100.

The discs 86 are adapted to be received (preferably slidably) by the spool receptacle 24. As illustrated in FIG. 7, the discs 86 may be provided with a peripheral notch 102 so as to allow the passage of the lifting line knot (not shown) which is tied within the receptacle 24 through the aperture 28 (see FIG. 5). In order to retain the spool 12 on the spindle means 62 the flange end 22 of the spool may be provided with an aperture 104 (see FIG. 5) and the outermost disc 86 may be provided with a threaded aperture 106 (see FIGS. 6 and 7). A bolt 108 extending through the spool aperture 104 and threaded into the disc aperture 106 will retain the spool axially on the spindle means 62 so that the spool will act as a drum for winding the cable 14 thereon at the surface vessel. Normally the cable 14 will first be received by a shipboard capstan (not shown) so that there is little tension on the cable as it is being wound by the spindle means 62.

In the method and operation of recovering the submerged object 16 from the bottom of the ocean the diver will first attach the end of the lifting cable 14 to the submerged object by connecting the swivel hook 30 to an eye mounted on the submerged object. The diver then simply pulls on the float handle 32 to frictionally pull the float 26 from the spool receptacle 24. Upon continuing the upward pulling movement the flexible line 48 pulls the lever 36 downwardly to puncture the CO₂ bottle 42 and inflate the buoy 26. The inflated buoy 26 ascends the spool 12 toward the surface of the water and the cable 14 progressively unwinds therefrom. When the float 26 reaches the surface of the water it provides a marker for personnel on the surface ship to retrieve the float, spool 12, and the top bitter end of the cable 14. The cap 44 is then unscrewed from the float 26 and the spool 12 is inserted on the spindle means 62 of the winding assembly 18. The bolt 108 is then screwed into position for retaining the assembly and the cable 14 is wrapped around a shipboard capstan for lifting the submerged object. Personnel on the surface ship then operate

the handcrank 60 to wind the cable 14 back on the spool 12 and the submerged object 16 is retrieved. After the cable 14 is disconnected from the object 16 the spool 12 is ready for another retrieval operation without a separate winding step.

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 claims the invention may be practiced otherwise than as specifically described.

I claim:

1. A messenger buoy recovery device comprising:
 - a spool for exteriorly winding a lifting cable;
 - said spool having an interior receptacle;
 - an inflatable float which is adapted to be received within said receptacle;
 - means for retaining the float in the receptacle in a deflated condition;
 - the float having means for manually pulling the float from the receptacle, and being capable upon inflation, of floating the spool with said lifting cable toward the surface of the water; and
 - means connecting the float to the spool for pulling the spool upwardly in the water with the longitudinal axis of the spool substantially vertical,
 - whereby the lifting cable unwinds from the spool which is in a nonrotative state as the spool and float ascend in the water.
2. A combination as claimed in claim 1 comprising:
 - said means for retaining the float in the receptacle including the float in the deflated condition frictionally engaging the wall of the receptacle.
3. A combination as claimed in claim 1 comprising:
 - a winding assembly which includes a winding spindle means;
 - said receptacle being adapted to receive the winding spindle means; and
 - means for retaining the spool to the winding spindle means.
4. A combination as claimed in claim 1 comprising:
 - means for automatically inflating the float when the float is pulled from the receptacle.
5. A combination as claimed in claim 4 comprising:
 - the automatic inflating means including;
 - said float having a lever actuatable CO₂ firing mechanism means; and said lever being connected to the spool.
6. A combination as claimed in claim 5 comprising:
 - said lever being connected to the spool by a flexible line which is of such a length to restrain the lever for actuation of the firing mechanism after the float has been pulled substantially clear of the receptacle.
7. A combination as claimed in claim 6 comprising:
 - said spool having a substantially closed end which forms the bottom of the receptacle; and
 - one end of the flexible line being connected to the bottom of the receptacle and the other end of the line being connected to said lever.
8. A combination as claimed in claim 7 comprising:
 - the float being elongated in a deflated condition;
 - said firing mechanism being connected to one end of the float; and
 - the manual pulling means including a handle which is connected to the other end of the float.
9. A combination as claimed in claim 8 comprising:
 - said means for retaining the float in the receptacle including the float in the deflated condition frictionally engaging the wall of the receptacle.
10. A combination as claimed in claim 9 comprising:
 - a winding assembly including:
 - a stand; and
 - a crank and winding spindle means rotatably mounted to the stand;
 - said receptacle being adapted to receive the winding spindle means; and
 - means for retaining the spool to the winding spindle means.

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