Sept. 18, 1962 A. F. MOELLER 3,054,123

BUOY WITH EXPLOSIVE ANCHOR

Filed Oct. 2, 1961 2 Sheets-Sheet 1

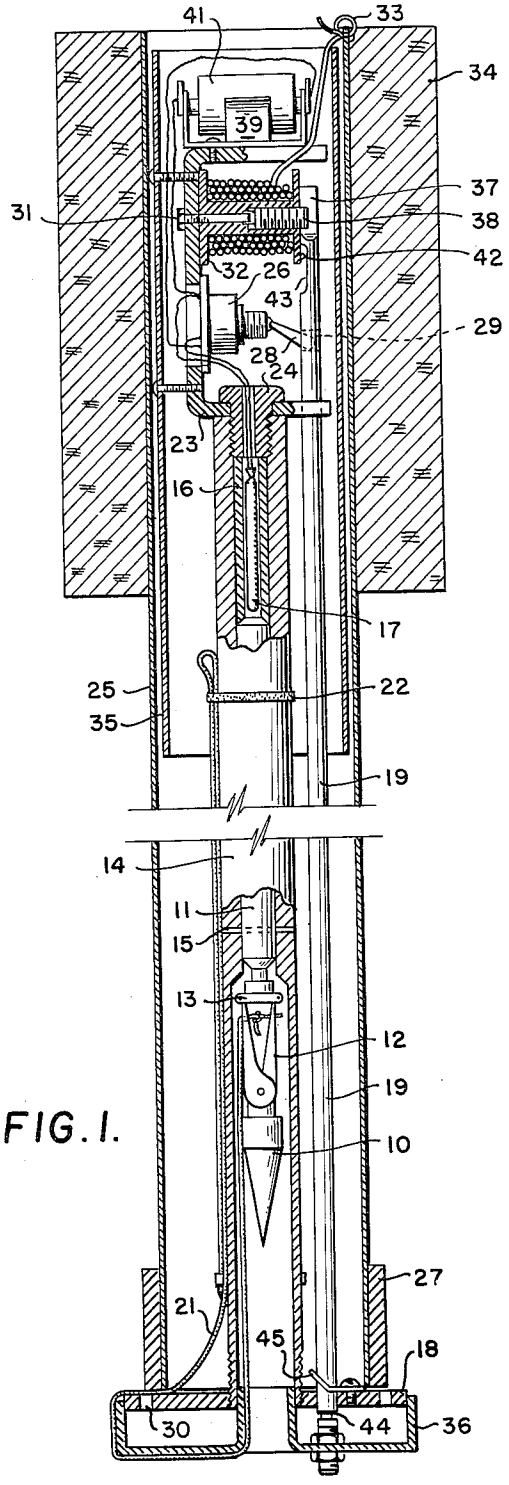


FIG. 1.

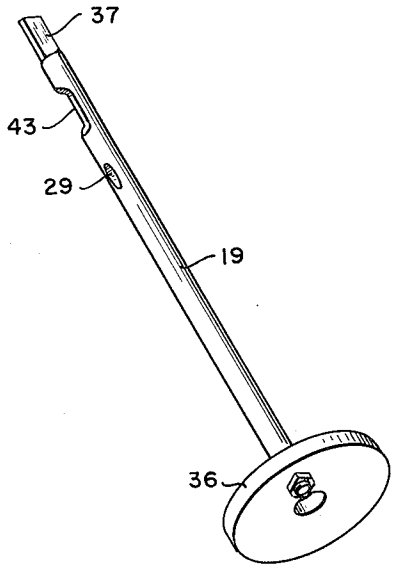


FIG. 2.

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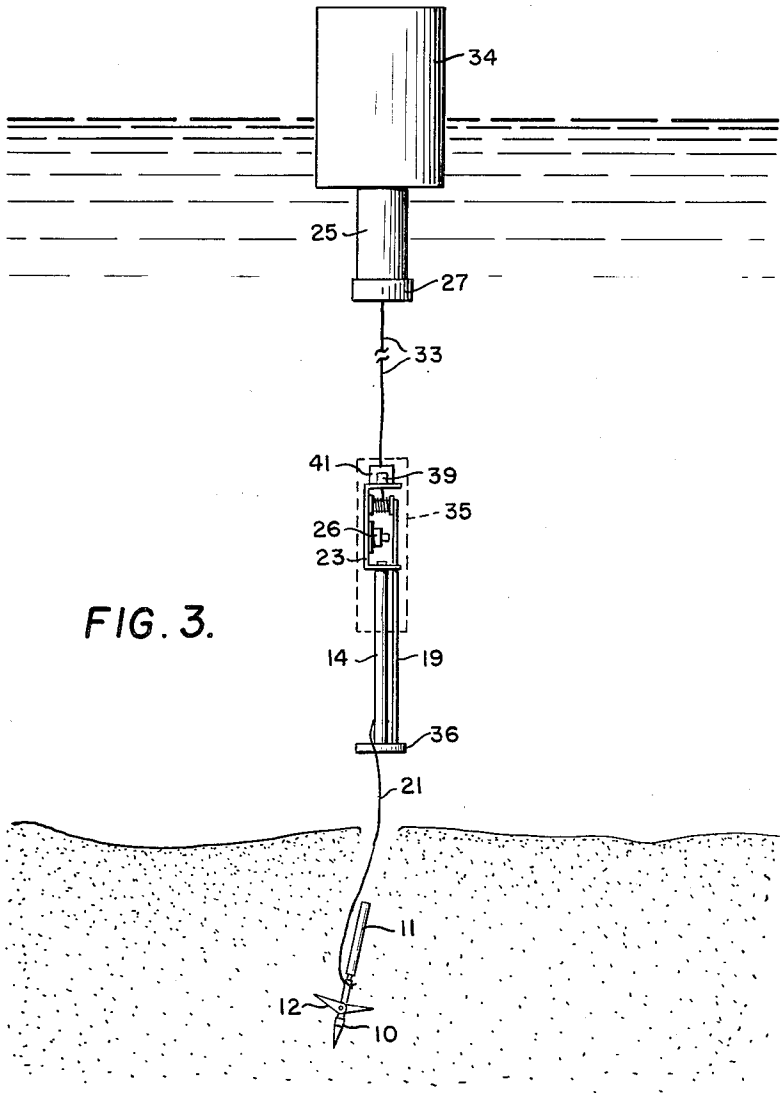


FIG. 3.

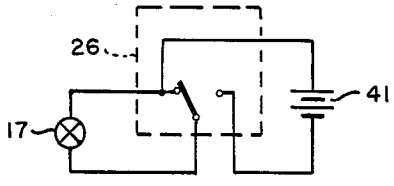


FIG. 4.

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BUOY WITH EXPLOSIVE ANCHOR

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3 Claims. (Cl. 9—9)
(Granted under Title 35, U.S. Code (1952), sec. 266)

This 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 present invention relates to buoys and, more particularly, to buoys suitable for use as temporary aids to navigation and for marking, at the surface, the position of underwater objects.

Standard Navy dan buoys are cumbersome to handle, bulky to store, and generally employ concrete clumps and mooring wire for anchorage.

An object of the present invention is to provide a compactly packaged expendable marker buoy of relatively light weight.

Another object of the invention is to provide a marker buoy so moored as to minimize walking due to wave action.

A further object of the invention is to provide a buoy having an explosive driven anchor.

Other objects, as well as advantages, of the invention will be apparent from the following description when read in connection with the accompanying drawing in which:

FIG. 1 is a side view in section of a buoy ready to be launched;

FIG. 2 is a view in perspective of a firing rod employed in anchoring the buoy;

FIG. 3 is a view in elevation of a buoy performing its intended terminal function; and

FIG. 4 is a schematic wiring diagram of a circuit arrangement suitable for firing the anchor-driving explosive.

An anchor buoy incorporating the invention is shown in FIG. 1 utilizing an anchor **10** which may be a commercially available spear gun point used by skin divers. The anchor **10** includes a shaft **11** and flukes **12** held folded against the shaft **11** by a retaining ring **13** which is movable axially of the shaft **11** to permit spreading of the flukes **12**. The anchor shaft **11** is mounted in a barrel **14** and retained therein by a shear pin **15**. The proximal end of the barrel **14** is provided with a bushing **16** adapted to contain a squib charge **17** which when fired, as hereinafter described, ejects the anchor shaft **11** from the barrel **14** with considerable force. The distal end of the barrel **14** has an enlarged bore to accommodate the anchor **10** and has suitably secured thereto a flanged end plate **18** provided with an aperture for a firing rod **19**. An anchor cable **21** is secured at opposite ends to the barrel **14** and the anchor shaft **11** with its excess length faked along the barrel **14** and secured thereto by a readily rupturable fastening, such as by electricians' tape **22**. The proximal end of the barrel **14** is secured to a bracket member **23** by a threaded plug **24**. A single pole double throw switch **26** is secured to the bracket **23** and has its toggle lever **28** extending into a detent **29** in the firing rod **19**. An axle **31** mounted on the bracket **23** rotatably supports a flanged reel **32** on which is wound a mooring line **33**, the free end of which is secured to a float member **34** which is preferably made of plastic foam secured to a metal tube **25** having a weighted end **27**. As here shown, the metal tube **25** carrying the float member **34** extends to the end plate **18** and surrounds the reel and switch assembly carried by the bracket **23** as well as a

housing **35** surrounding this assembly. The firing rod **19** extends parallel to the barrel **14** and through the barrel end flange **18** and is provided with an annular end cap **36**. This firing rod **19** also extends through an arm of the bracket **23** where it terminates in a flattened portions **37** shouldered against a slotted threaded stud **38** protruding from the internally threaded core of the reel **32** and with the flat portion **37** extending into the slot of the stud **38** for holding the stud against rotation. Thus, when the mooring line **33** starts to unwind from the reel **32**, the stud **38** is withdrawn into the reel **32**, leaving the firing rod **19** free to move upward as viewed in FIG. 1. At some convenient location, such as on the remote arm of the bracket **23**, a battery clip **39** is mounted for the reception of a battery or batteries **41** for firing the squib charge **17** when the toggle lever **28** is moved from its position shown in FIGS. 1 and 4 to its other position to include the battery **41** in series with the squib charge **17**. The electrical circuit is indicated in FIG. 4. As was above pointed out, the toggle lever **28** extends into the firing rod detent **29** so that, when the enlarged distal end **36** of the firing rod **19** strikes the ocean floor, it is retracted to actuate the toggle lever **28** which fires the squib charge **17** and to move its flattened end **37** into the path of a pin **42** protruding from a flange of the reel **32** to thereby prevent further rotation of the reel **32**. In order that the reel **32** may rotate freely until the firing rod **19** is retracted, a flat **43** is ground on the rod **19** to provide clearance for the pin **42**.

When a position at sea is to be marked, the battery **41** is inserted in the battery clip **39**; a tape, if used, holding the float member **34** to the housing **35** is removed and the buoy dropped overboard. When in the water, the float member **34** with its weighted tube **25** remains on the surface while the remainder of the assembly sinks paying out line from the reel **32** which, after a few turns, causes the retraction of the stud **38** from blocking position for the firing rod **19**, thereby permitting the firing rod **19** to actuate the toggle lever **28** when striking the bottom. It is pointed out that this temporary blocking action performed by the slotted stud **38** is to prevent premature firing as upon impacting the water or otherwise. When bottom contact has actuated the toggle lever **28**, the squib charge **17** fires to drive the anchor **10** into the bottom, during which time the ring **13** is moved from its retaining position to permit the flukes **12** to pivot to expanded position, the tape **22** holding the faked anchor cable **21** is ruptured leaving the buoy anchored as shown in FIG. 3. The anchor-carrying assembly and the area of the end plate **18** provide sufficient reaction so that most of the movement resulting from the firing of the squib **17** is imparted to the anchor **10**. In order to assure that the firing rod **19** remains in blocking position for the flange pin **42** and thereby prevent walking of the float member **34**, a notch **44** may be provided in the rod **19** to be engaged by a spring **45** carried by the end plate **18**.

The weighted end **27** of the metal tube **25** assures an upright orientation of the float **34**. Visibility of the marker buoy may be increased by inserting in the tube **25** the shaft of a flag or other signal device. The barrel **14**, the bracket **23**, and the housing **35** are made of aluminum or other relatively light material whereas the end flange is relatively massive to aid in causing the anchor assembly to sink in the desired upright position. Provision is made to permit flushing of water from the volume enclosed by the flange **18** and the end cap **36** such as by perforations **30** in the flange **18**.

It will be noted from FIG. 4 that the electrical circuit employed provides a short across the terminals of the squib **17** in accordance with accepted practice and that this short is not removed until the switch **26** connects the

battery **41** across the terminals of the squib **17**. It has been found that the low voltage battery, e.g., 1.5 volts, utilized makes it feasible to permit free flooding of the several electrical components which results in the considerable advantage of not requiring a water-tight compartment for housing such components.

The enlarged end **36** of the firing rod **19** may be quite small when the anchor is to be employed on relatively hard bottoms. Where soft bottoms are involved, it is desirable to provide the greater impact area illustrated.

While, for the purpose of disclosing the invention, a preferred embodiment thereof has been described in detail, it is to be understood that the invention is not limited thereto but is of the scope of the appended claims.

What is claimed is:

1. A buoy for marking a preselected position in a body of water comprising:
- a buoyant member and
- an anchoring assembly,
- a reel supported rotatably on the anchoring assembly and having a length of mooring line wound thereon,
- the free end of said line being attached to the buoyant member so that line is withdrawn from the reel as the anchoring assembly sinks to the bottom,
- said anchoring assembly including
- an anchor member,
- an explosive charge for driving the anchor member into the bottom, and
- means for exploding said charge,
- said charge exploding means comprising a battery,
- a switch movable to connect the battery in circuit with said charge, and
- bottom contacting means movable for actuating said switch only after sufficient line has been drawn from said reel to rotate said reel a preselected small number of revolutions.

2. A buoy in accordance with claim 1 wherein the switch actuating movement of the bottom-contacting means blocks rotation of said reel.

3. A buoy for marking a position in a body of water and adapted to be dropped into the water including:
- a buoyant member comprising a tube having buoyant means secured to one of its ends and its other end weighted so that, in its normal floating position, it provides a vertically oriented socket, and
- a nonbuoyant anchoring assembly releasably contained in said tube so that it submerges to the bottom when the buoy is dropped in a body of water,
- said anchoring assembly including:
- an explosive charge for anchoring the assembly,
- an electric battery for detonating said charge,
- a switch connected across said charge and movable by the impact of the assembly on the bottom to connect the battery to said charge,
- a reel supported rotatably on said assembly and having a length of mooring line wound thereon and attached to the buoyant member so that the line is withdrawn from the reel as the assembly sinks to the bottom, and
- means on said assembly for automatically locking the reel against rotation when said switch moves to connect the battery to said charge.

References Cited in the file of this patent

UNITED STATES PATENTS

2,831,967	Bayze	Apr. 22, 1958
2,993,461	Feiler	July 25, 1961

FOREIGN PATENTS

225,013	Germany	Aug. 6, 1910