

Nov. 17, 1964

B. B. BROOKS

3,156,933

MARKER BUOY

Filed July 11, 1961

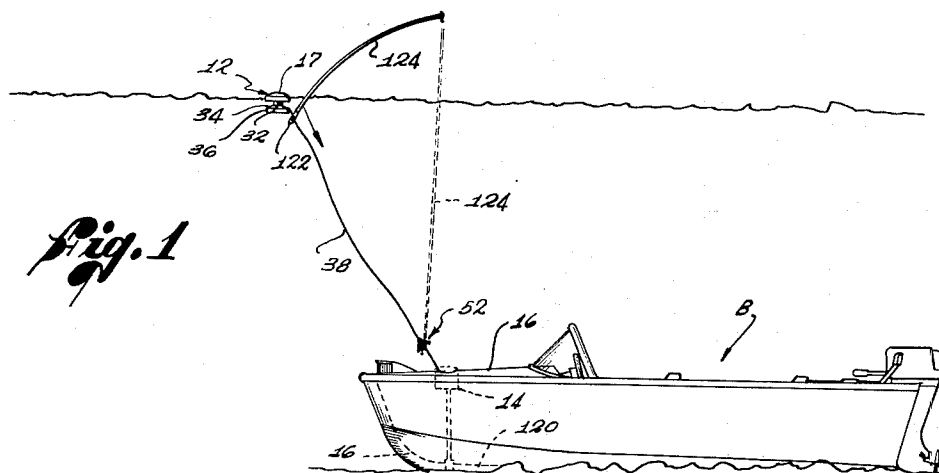


Fig. 1

Fig. 2

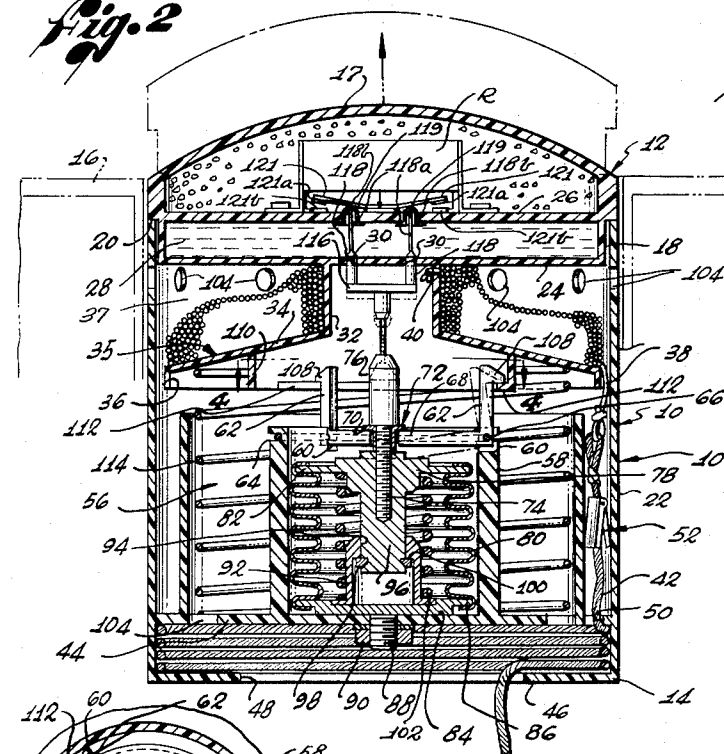


Fig. 4

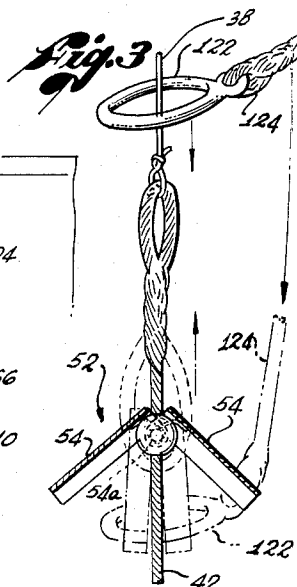
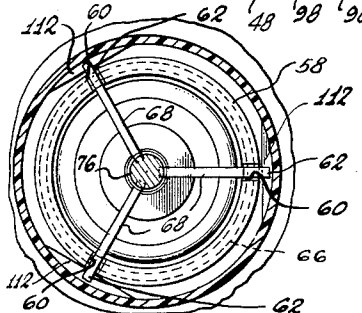


Fig. 3

INVENTOR.
BERT B. BROOKS
BY *Lilly & Nyhagen*
Attorneys

1

3,156,933

MARKER BUOY

Bert B. Brooks, Los Angeles, Calif.
(2609 Madison, Long Beach 10, Calif.)
Filed July 11, 1961, Ser. No. 123,154
7 Claims. (Cl. 9-9)

This invention relates generally to a marker buoy for indicating the position of a submerged article and has for its primary object to provide an improved marker buoy of the type equipped with a float which is released from the submerged article by water pressure and then rises to the surface on the end of a line attached to the article for indicating the position of the article.

Another object of the invention is to provide a marker buoy of the character described embodying a new and unique pressure-responsive latch means for releasing the float in response to water pressure.

Another object of the invention is to provide a marker buoy of the character described which enables retrieving of the submerged article.

Another object of the invention is to provide a marker buoy of the character described in which the float contains a supply of marker dye that is released from the float as the latter floats at the water surface for producing a patch of color in the water indicating the presence of the float.

Other objects, advantages, and features of the invention will become readily apparent as the description proceeds.

Briefly, the objects of the invention are attained by providing a marker buoy equipped with a base to be attached to the article whose submerged position is to be located, a float, a thin cable attaching the float to the base, and pressure released latch means connecting the base and the float. These latch means are of unique design and include three equally spaced latch members which assure positive locking of the float to the base until the latch means are released by water pressure and positive release of the float from the base upon release of the latch means.

A highly important feature of the present marker buoy resides in the fact that it is uniquely designed to enable attachment of a salvage cable to the submerged article from the surface for recovering the article.

The invention will be better understood from the following detailed description thereof, taken in connection with the annexed drawing, wherein:

FIG. 1 illustrates the float of the present marker buoy at the surface of a body of water and connected to a boat submerged in the water;

FIG. 2 is an enlarged, longitudinal section through the marker buoy of this invention before release of the marker float;

FIG. 3 is an enlarged detail illustrating the manner in which a salvage cable is used to retrieve the submerged article; and

FIG. 4 is a section taken along line 4-4 in FIG. 2.

Referring first to FIG. 2 of this drawing, the present marker buoy will be seen to comprise a base 10 and a float 12. Base 10 comprises a cylindrical body 14 which may be recessed in the deck 16 of a boat with just the top surface of the float exposed, as indicated in FIGS. 1 and 2. In this case, the cylindrical housing is secured to the boat in some suitable manner.

2

Float 12 comprises a hollow, cylindrical member closed at its upper end by a dome-shaped wall 17. The float is externally relieved at 18 so as to have a loose fit in the open, upper end of the base housing 14. The relief 18 forms an annular shoulder 20 on the float for seating on the upper edge of the cylindrical wall 22 of the base housing 14. Opposite the dome lower wall 17 is a wall 24 on the float. Disposed within the float in spaced parallel relationship to the wall 24 is a partition 26. Partitions 24 and 26 define therebetween a reservoir for containing a supply of marker dye 28. Formed in the float wall 24 are two holes 30 through which the dye leaks when the float is at the surface. While the float is attached to the housing 14, these holes are closed, in a manner to be shortly described.

Rigid on and extending coaxially from the underside of the lower float wall 24 is a cylindrical hub 32, rigid on the lower end of which, in turn, is a radially outwardly extending conical flange 34. This flange terminates in a downwardly directed cylindrical flange 36 which is somewhat smaller in its outside diameter than the internal diameter of the base housing 14. Float wall 24, hub 32, and conical flange 34 define a spool or reel 37 on which is wound a long length of a fine line 38, such as a monofilament line. One end of this line is secured to the hub of the reel, as indicated at 40. The other end of line 38 is attached to a metal cable 42.

Extending across the inside of the housing 14, at a position spaced a distance from the lower end of the cylindrical housing wall 22 and secured to this wall, is a partition 44. Joined to the extreme lower end of the cylindrical wall 22 is an internal annular flange 46 having a central opening 48. Cable 42 passes through an opening 50 in partition 44 and several turns of the cable are wound within the annular space between the wall 44 and flange 46. The end of cable 42 extends through the flange opening 48 for connection to the boat B, in the manner to be presently described. Attached to the cable 42, adjacent the connection of the cable to the line 38, is a grapple head 52. This grapple head is equipped with a plurality of hinged fingers 54, for reasons to be presently seen.

From the description thus far, we see that when the marker buoy base 10 is attached to the submerged boat B and the float 12 is released from the base, the float rises to the surface, the line 38 unwinding from the reel 37 as the float rises. The line 38 is made of a length somewhat greater than the anticipated depth to which the boat may submerge.

Generally denoted by the numeral 56 are the present latch means for releasably locking the float 12 to the housing 14. This latch means comprises an upstanding cylindrical support 58 concentric with the housing 14 and joined at its lower end to the housing partition 44. The upper edge of this cylindrical support is provided with three notches 60, spaced 120° apart. The lower ends of three upstanding latch members 62 engage in these slots, respectively. Adjacent its upper end, the cylindrical support 58 is formed with an external groove 64 in a plane approximately bisecting the slots 60. Within the groove 64 is a snap ring 66 which passes through the lower ends of the latch members 62, as shown best in FIG. 2. Each latch member is rotatably mounted on the snap ring so that it can pivot in its respective slot, as indicated in phantom lines for the right-hand latch member 62 in FIG. 2.

3

Extending laterally from the lower end of each latch member 62 and radially inwardly from the cylindrical support 58 is an arm 68. The inner ends of arms 68 rockably engage under the head 70 of a tubular latch-operating member 72 fitted on a threaded stem 74. On the upper end of this stem is an enlarged head 76. The stem 74 itself is threaded into a spool 78 within and fixed to the upper end of a bellows 80. The latch-operating member 72 is tightly gripped between the stem head 76 and the upper face of the spool 78. Spool 78 has a radial flange 82 at its upper end which fits between and is bonded to the upper end folds in the bellows 80. The lower end of the bellows is closed by an end plate member 84 having a peripheral flange which fits within and is bonded to the lower end folds of the bellows. The bellows 80 is, therefore, hermetically sealed and is evacuated. Lower end closure plate 84 of the bellows mounts, at its center, a depending threaded stem 88. This stem passes through a central hole in the lower housing partition 44, and a nut 90 is tightly threaded on stem 88 to firmly secure the bellows 80 to the partition 44.

Rigidly and coaxially joined to the lower end plate 84 of the bellows is a cylindrical stop member 92. The upper end of this stop member has an axial bore 94 through which slidably extends the lower reduced end 96 of the spool 78. A stop ring 98, fixed to the lower end of the spool 78, within the stop member 92, engages a downwardly facing shoulder 100 on the stop member 92 for limiting upward movement of the spool 78. A coil spring 102 is contained within the bellows and acts to axially expand the bellows to the extent limited by engagement of the spool stop ring 98 with the stop shoulder 100.

In the cylindrical wall 22 of the housing 14 and in the lower housing partition 44 are a plurality of holes 104. When the marker buoy is submerged in water, the latter floods the housing 14 through the holes 104. The bellows 80, which is initially extended to its limit by its internal spring 102, is axially compressed by the water pressure. It is evident that when the bellows is axially compressed, the latch-operating member 72 moves downwardly and thereby rocks the upper ends of the latch members inwardly, as indicated in phantom lines at the right-hand latch member in FIG. 2. At atmospheric pressure, the bellows 80 is extended to its limit, by the action of its spring 102, with resultant upward movement of the latch-operating member 72 and outward swinging of the upper ends of the latch members 62.

At their upper ends, the latch members 62 are formed with outwardly extending, hook-like projections 108. Integrally joined to the underside of the float wall 34 is a downwardly extending ring 110. On the inside of this ring are three coplanar, inwardly extending shoulders 112 over which the latch hooks 108 engage, when the bellows 80 is fully extended, to lock the float 12 to the housing 14. Acting between the lower housing partition 44 and the inclined float wall 34 is a coil spring 114 which urges the float out from the housing. This outward movement of the float is normally prevented by the latch members 62.

On the upper end of the stem head 76 is a fork 116 having prongs 118 which plug the dye escape holes 30 in the spool. When the spool is released, the prongs 118 are withdrawn from the holes 30 to allow the dye to escape from its reservoir.

In use of the marker buoy, the housing 14 is secured within a well in the deck 16 of the boat B, as already noted. The lower end of the cable 42, which extends through the bottom opening 48 of the housing 14, is then anchored to some rigid part of the boat, such as its keel 120, as shown in FIG. 1. Should the boat sink to the bottom, water floods the interior of the housing 14 through the holes 104 to compress the bellows 80, as already noted. As the bellows is compressed, the upper ends of the latch members 62 are moved inwardly to disengage the latch hooks 108 from the latch-engaging

4

float shoulders 112. The float 12 is then expelled from the housing by the spring 114. Since the float is buoyant, it floats to the surface, the line 38 unwinding from the reel 37 as the float rises. Eventually, the float reaches the surface and floats there. The dye escapes from the holes 30 in the float partition 24 to create a color dye patch on the surface of the water which is readily noticeable from a distance. The location of the submerged boat is thus marked.

As a preferred additional feature, of very material importance in some applications of the invention, the prongs 118 carry reduced upwardly extending pins 118a, which protrude normally through apertures 118b in partition 26, distending rubber sealing grommets 119, as seen in FIG. 1. In the described protruding position, the pins 118a engage and deflect upwards the two ends of a resilient strip 121 carrying electrical contacts 121a. When the pins are withdrawn downwards, the strip 121 flexes downwards so that the contacts 121a make contact with contacts 121b mounted on partition 26. The contacts thus described are in the conventional control circuit, not shown, of a small high frequency radio transmitter R, and when closed, condition the transmitter R to broadcast a signal on a predetermined frequency band. Preferably, the transmitter R includes or is equipped with a timer, of conventional type, not shown, adapted to cause the transmitter to broadcast a signal for a given time interval after a predetermined elapse of time following closure of the described control circuit contacts. The timer preferably provides for repetition of the broadcast signal at predetermined time intervals. Receivers tuned to the frequency of the transmitter pick up the signals, and by radio-compass triangulation, the approximate location of the submerged article can be ascertained. In addition, and as a still further preferred feature, the space between dome 17 and partition 26 preferably contains a radioactive isotope, preferably a radioactive salt, capable to radiating emissions which are not dangerous to personnel, but which can be picked up by radiation detection equipment. Thus, the approximate location of the underwater article having been ascertained by means of radio, as described above, and the recovery team having arrived at such location, the exact location of the article can be found, between the times of radio broadcasts, if need be, by use of a radiation detector.

The boat or other article may be retrieved as follows: First, a tension is taken in line 38, so as to draw a length of the cable 42 out of housing 14. This brings the grapple head 52 outside and above the housing 14, and permitting the grapple arms 54 to swing apart. Then, a metal ring 122, attached to a lifting cable 124, is passed over the line 28 at the surface and lowered along the line to the marker buoy cable 42. Upon reaching the marker buoy cable 42, the ring 122 passes over the grappelling head 52, the arms 54 of the head swinging inwardly under the weight of the hook and lifting cables to permit the ring to move past the grapple head. The grapple arms 54 are then urged outwardly by spring 54a.

Now, when an upward strain is taken on the lifting cable 124, the ring 122 is pulled upwardly to the grapple head which catches the ring to form a rigid connection between the lifting cable 124 and the marker buoy cable 42. The lifting cable is now raised, the cables become taut, and the submerged boat lifted to the surface.

The advantage of the triple latch arrangement 62 of the marker buoy is that the three latch members accurately position the float within the housing 14 and release the float in a uniform fashion so that there is no possibility of wedging of the float in the housing 14 which would prevent release of the float from the housing. If only one or two latch members were used, for example, the buoyant force on the float and the action of the float expelling spring 114 on the float could cause canting and, therefore, possible wedging of the float in the hous-

5

ing 14. Only one latch member may be used, however, if desired.

It is evident that the present marker buoy is not limited to use on boats. It may be used on motors and other objects which are used on the water and, therefore, subject to loss in water as well as on aircraft, for example, or missiles to permit location thereof. These two last-mentioned uses dictate the use of the evacuated bellows 89 with its interior biasing spring 102. That is to say, if the bellows were air filled, the low pressures encountered in the flight of an air plane or missile might result in rupturing of the bellows. Hence, the use of the evacuated bellows in the present marker buoy in which the internal bellows spring replaces the action of air in air-filled bellows.

Clearly, the invention herein described and illustrated is fully capable of attaining the objects and advantages preliminarily set forth. While a presently preferred embodiment of the invention has been described and illustrated for illustrative purposes, numerous modifications in the design and arrangement of parts of the invention are possible within the spirit and scope of the following claims.

What is claimed is:

1. A marker buoy comprising a hollow, cylindrical base open at one end and having a transverse internal wall adjacent its other end, a hollow, circular float loosely fitted in said open end of said base, a bellows approximately coaxial with the central axis of said base and secured at one end to said transverse wall, a coaxial, cylindrical wall about said bellows secured at one end to said transverse wall and having in its other end a plurality of angularly spaced slots in planes including said axis, a plurality of latch members extending approximately parallel to said axis and loosely fitted at one end in said slots, respectively, means pivotally supporting said one end of said latch members on said cylindrical wall for swinging in said planes, respectively, said float including latch shoulder means extending about said other ends of said latch members, shoulders on said other ends of said latch members engageable over said latch shoulders for locking said float to said base, each latch member having a transverse arm at said one end extending over the other end of said bellows, means connecting said arms to said bellows so that said latch members are rocked to disengage their shoulders from said shoulder means upon axial contraction of said bellows under the action of a predetermined water pressure, and a long line joining said float and base.

2. A marker buoy comprising a hollow, elongate base having an end wall at one end and a chamber extending into the other end of the base along a given axis of the base, a float releasably positioned in said open end of the base, said float including shoulder means within and located in a first plane transverse to said axis, a plurality of bell crank-shaped latch members pivotally mounted within said chamber in uniformly angularly spaced planes containing said axis, the pivot axes of said latch members extending approximately parallel to said first plane and being located between the latter plane and said end wall, first arms of said latch members extending toward said first plane and terminating in shoulders, said shoulder means on said float encircling and extending inwardly toward said arms, whereby the latch shoulders on the arms are engageable with said shoulder means on said float to lock the latter to said base by outward swinging of the arms, the other arms of said latch members extending radially in toward said axis, and a bellows coaxially mounted on said wall of said base including means extending coaxially from an end wall of the bellows and operatively connected to said other arms of said latch members for swinging the latter to release said float in response to water pressure on said bellows.

3. A marker buoy comprising a hollow, elongate base

6

having a chamber extending into one end thereof along a given axis of the base, a float releasably positioned in said chamber, said float including a plurality of shoulders located within said chamber, said shoulders being spaced about and located in a plane transverse to said axis, a plurality of latch members pivotally mounted within said base, said latch members including shoulders releasably engaging said float shoulders, respectively, to lock said float to said base, pressure-responsive means mounted within said base and operatively connected to said latch members to swing the latter out of engagement with said float shoulders in response to water pressure on said pressure-responsive means, and there being spaces between said float shoulders, whereby said float is manually releasable from said base by rotation of the float with respect to the base to a position wherein said shoulders of the latch members are aligned with said spaces between said float shoulders.

4. A marker buoy comprising a hollow, elongate base open at one end, a float releasably positioned in said open end of the base including a chamber containing a marker dye and a lower wall facing the interior of said base and having an opening through which dye may escape from said chamber to the exterior of said float, a valve member mounted on said base and releasably sealing said opening, pressure-responsive means for locking said float to said base and releasing the float from said base in response to water pressure on said pressure-responsive means, said valve member being disengageable from said opening upon movement of said float from said base after release of said pressure-responsive means, and a long line securing said float to said base.

5. A marker buoy comprising a hollow, elongate base open at one end, a float releasably positioned in said open end of the base including a chamber for containing a marker dye and a wall opening in the float through which the marker dye can escape from said chamber, means including a bellows for locking said float to said base and releasing said float in response to water pressure on said bellows, a valve member releasably sealing said opening and operatively connected to said bellows to open said opening in response to deflection of said bellows by water pressure, and a long line connecting said float to said base.

6. A marker buoy comprising a hollow, elongate base open at one end, a float releasably positioned in said open end of the base including a radio transmitter and a normally closed, flexible electrical spring leaf contact accessible through an opening in the wall of the float and spring biased to a normally closed position for normally energizing said transmitter, a member operatively connected to said base and extending through said float opening into direct contact with said leaf to retain the latter open against the spring action thereof, said member being retracted from said opening to release said leaf for movement to closed position by spring action upon movement of said float from said base, and pressure-responsive means for locking said float to said base and releasing said float in response to water pressure on said pressure-responsive means.

7. A marker buoy comprising a hollow, elongate base open at one end, a float releasably positioned in said open end of the base including a radio transmitter and a normally closed, flexible electrical spring leaf contact for normally energizing said transmitter, means including a bellows mounted within said base for locking said float to said base and releasing said float from said base in response to water pressure on said bellows, a member operatively connected with said bellows and directly engaging said leaf through a hole in the wall of said float to hold the leaf, and said member being disengaged from said leaf for releasing the latter to energize said

transmitter in response to deflection of said bellows by water pressure.

References Cited in the file of this patent

UNITED STATES PATENTS

1,636,447	Standish	July 19, 1927
2,192,450	Miller	Mar. 5, 1940
2,559,918	Grieb	July 10, 1951
2,569,977	Dickinson	Oct. 2, 1951

5

2,752,615
2,754,525
2,818,586
2,820,971
2,825,803
3,049,091

Parker	July 3, 1956
Johnson	July 17, 1956
Daver	Jan. 7, 1958
Welsh et al.	Jan. 28, 1958
Newbrough	Mar. 4, 1958
Carroll	Aug. 14, 1962

FOREIGN PATENTS

33,230	Switzerland	Apr. 17, 1905
--------	-------------	---------------