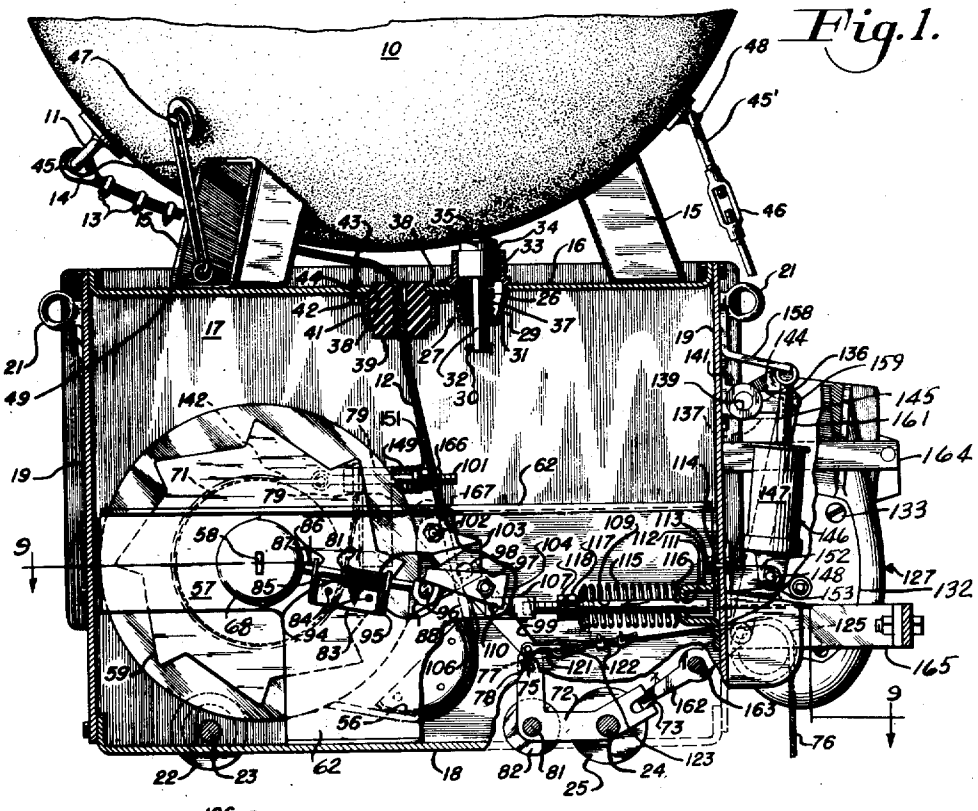
Aug. 6, 1957 H. W. SEMON 2,801,429

BUOY ANCHOR

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Fig. 1.



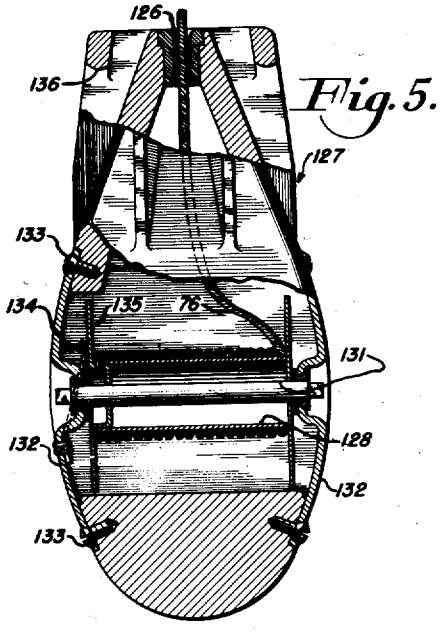
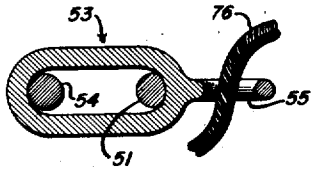


Fig. 5.

Fig. 4.



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BUOY ANCHOR

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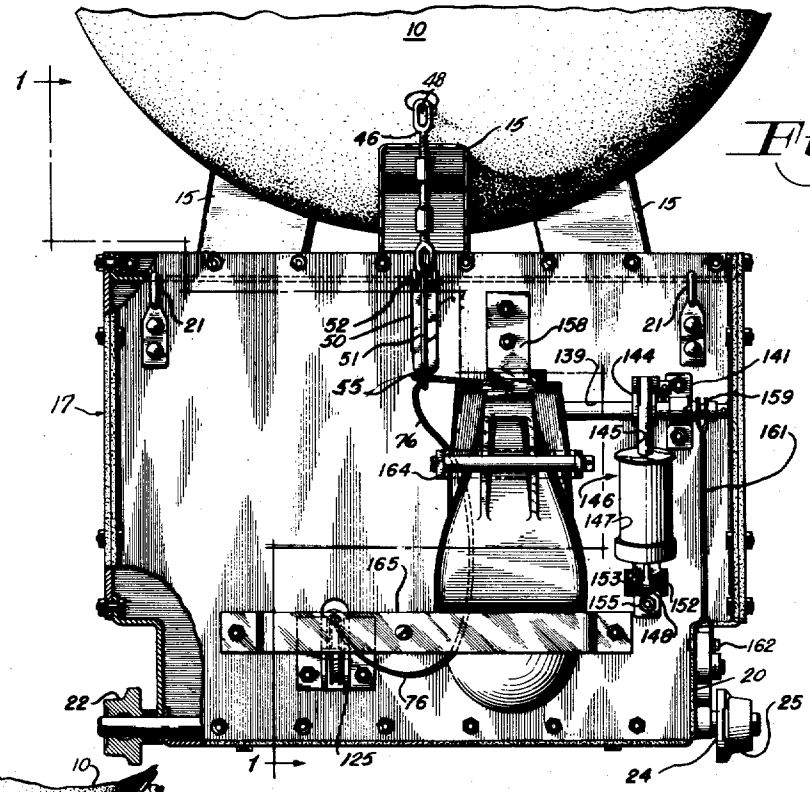



Fig. 2.

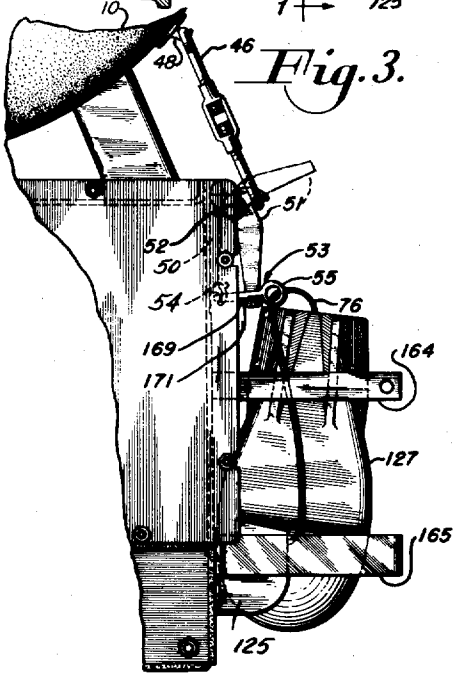
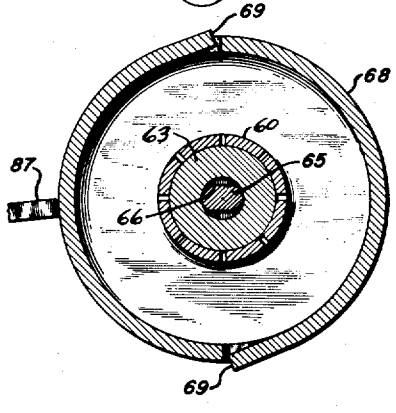



Fig. 3.

Fig. 7.




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BUOY ANCHOR

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Fig. 6.

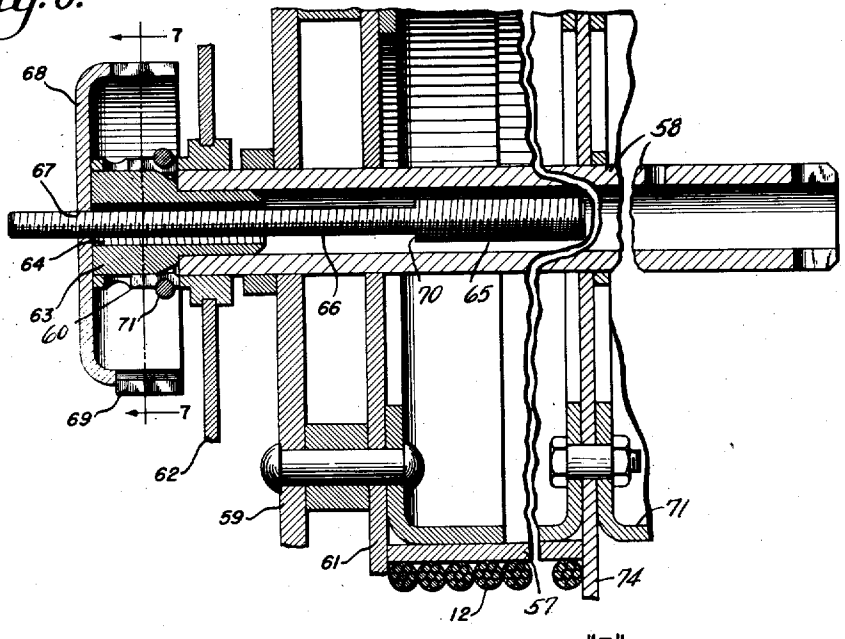
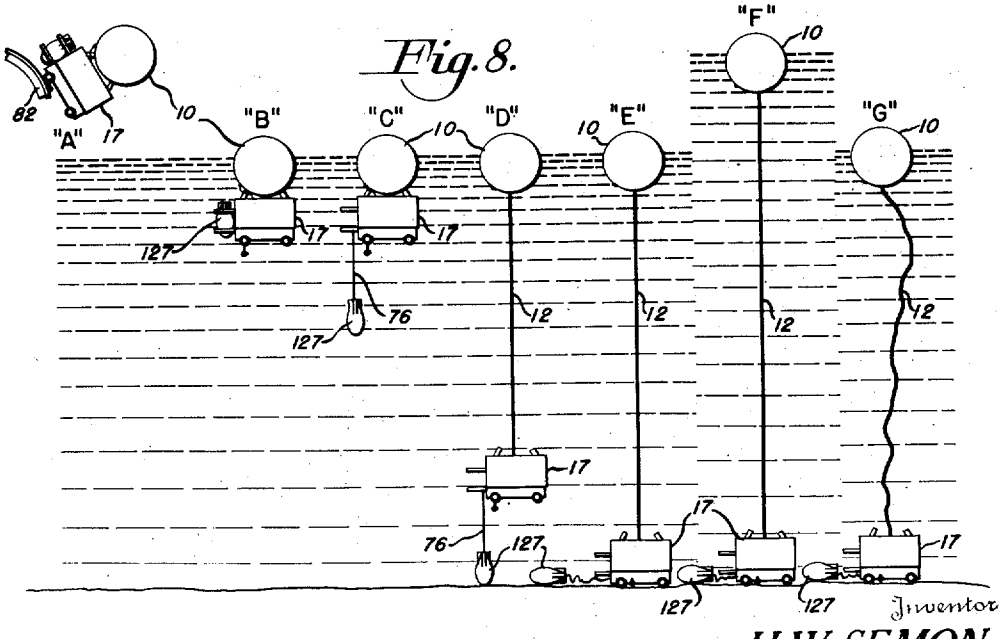



Fig. 8.




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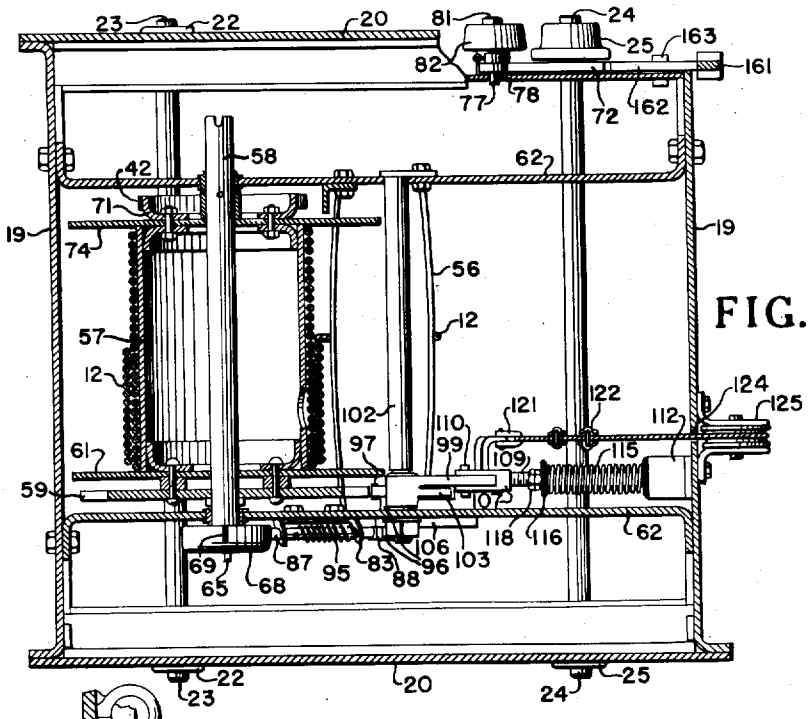



FIG.9.

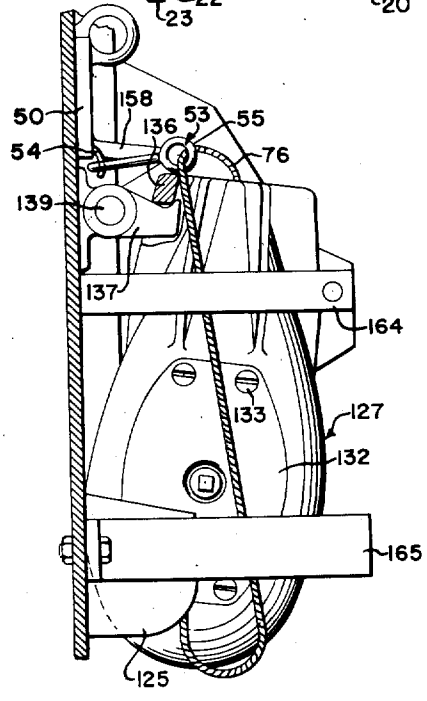



FIG.10.

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2,801,429

# BUOY ANCHOR

Howard W. Semon, Washington, D. C.

Application September 7, 1949, Serial No. 114,445

7 Claims. (Cl. 9—8)

(Granted under Title 35, U. S. Code (1952), sec. 266)

This invention relates to a marking buoy which may be launched from the mine tracks at the stern of a mine layer and moor the buoy on the surface of the water to mark a safe passageway for surface vessels into harbors and inlets. More particularly the invention relates to a device for automatically paying out a sufficient length of cable from the buoy anchor to provide a predetermined length of slack in the mooring cable so that the buoy secured to the cable will not be drawn below the surface of the water as the depth of the water increases at high tide.

An object of the present invention is to provide a marker buoy which may be launched from the mine tracks at the stern of a mine layer to mark a safe passageway for surface vessels into harbors and inlets.

Another object of the present invention is to provide an automatic means for paying out sufficient mooring cable to reach from the buoy on the surface to the buoy on the bed of a harbor and provide a predetermined amount of slack in the cable so that the buoy will remain on the surface of the water as the depth is increased at high tide.

Another object is to provide a buoy which will moor itself on the surface with a predetermined quantity of slack cable in any depth of water within limits determined by the length of cable on the anchor drum.

A further object is to provide an anchor for a moored marker buoy having provision for paying out an additional preselected length of cable as the depth of the water increases with rising tide after the buoy has surfaced whereby the buoy may be maintained at the surface regardless of the rise in the tide.

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 vertical sectional view of the anchor taken substantially along the line 1—1 of Fig. 2, parts being broken away to illustrate certain portions of the mechanism not on the plane of the section, the parts being in the position assumed thereby prior to launching the buoy and anchor into the water;

Fig. 2 is an end view of the buoy and anchor shown in Fig. 1;

Fig. 3 is a fragmentary side elevation of one end of the anchor;

Fig. 4 is a sectional view through the control link, the release arm and the supporting hook therefor;

Fig. 5 is an elevational view of the plummet per se, parts being broken away;

Fig. 6 is a fragmentary horizontal sectional view through the anchor cable drum and illustrating the arrangement of parts for paying out a predetermined amount of slack cable after the anchor has come to rest on the bed of a body of water;

Fig. 7 is a sectional view taken along line 7—7 of Fig. 6;



Fig. 8 illustrates in diagrammatic form several positions respectively assumed by the various parts from the time of launching the buoy and anchor until the buoy is finally anchored with a predetermined amount of slack cable payed out;

Fig. 9 is a horizontal sectional view taken through the anchor casing of an anchor cable drum generally along the line 9—9 of Fig. 1 and showing the associated mechanism; and

Fig. 10 is a fragmentary sectional view of the anchor casing and showing the plummet and the supporting hook therefor.

Referring now more particularly to Fig. 1 there is shown thereon the buoy 10 formed in the shape of a hollow buoyant sphere which is adapted to float on the surface of the water to mark a safe lane into harbors for passing vessels. The buoy is preferably painted a characteristic color such, for example, as yellow or, if desired, may be provided with an upstanding flag for ready identification. The buoy 10 is provided with an eye bolt 11 having a mooring cable 12 threaded therethrough which is secured to the eye bolt by cable clamps 13, a thimble 14 being interposed between the cable and eye to prevent wear therebetween. The buoy 10 is supported on suitable brackets 15 secured to the top plate 16 of the anchor 17. The anchor 17 comprises a bottom plate 18, top plate 16, end plates 19 and side plates 20 bolted together in the form of a box. End plates 19 are provided with lifting eyes 21 secured thereto and side plates 20 have journals for axles 23 and 24 upon which are rotatably mounted pairs of flanged wheels 22 and 25 respectively which extend through bottom plate 18 to fit the mine tracks at the stern of a mine layer. Axle 24 is provided with a lever 72 rotatably mounted thereon, the lever having a bifurcated projection 73 on one end thereof and a lateral bore 75 through the other end. A pin 77 disposed within bore 75 and aligned with bore 78 through side plate 20 is provided to position lever 72 as shown in solid lines in Fig. 1 prior to placing the wheels 25 on the mine tracks of the launching vessel. The lever 72 has an axle 81 secured thereto on which is mounted for rotation thereon wheel 82 which is also adapted to engage the mine tracks prior to launching the anchor.

Top plate 16 is provided with a circular opening 26 into which is fitted valve housing 27 which is held to the top plate by a pair of bolts and nuts (not shown). Valve housing 27 is provided with side openings 29 and an inturned flange portion 31 extending into the interior of the anchor 17, flange portion 31 forming a circular opening into which is slideably arranged valve rod 32. Valve housing 27 is provided with a cylindrical portion 33 into which is slideably arranged valve piston 34. The valve piston 34 has a cylindrical projection 35 extending from the top of the piston with which the valve rod 32 is connected in threaded engagement with the bottom of the piston. The valve rod 32 has a diametrical bore therethrough into which is secured cotter pin 30 for limiting the vertical movement of the valve rod.

Compression spring 37, sleeved about valve rod 32, is interposed between valve piston 34 and inturned flange portion 31 to urge the valve piston outwardly of the cylindrical portion 33. When the buoy 10 is supported on brackets 15, the buoy compresses spring 37 to force piston 34 into the cylinder 33 thereby to close openings 29, and as the buoy separates from the anchor 17 when released from the launching vessel, spring 37 forces piston 34 out of cylinder 33 to allow the surrounding water to enter the interior of the anchor by way of the cylinder 33 and side openings 29.

Top plate 16 also is provided with a circular opening 38 having an apertured fairlead 39 disposed therein for passing the mooring cable from the buoy 10 to the interior

of the anchor 17. The fairlead 39 is secured to the top plate 16 by an apertured cup shaped support 41 secured to the plate as by bolts 42, nuts 43, and washers 44.

Prior to launching, the buoy 10 is releasably supported on brackets 15 by link members 45—45' and turnbuckle 46 which engage the hooks 47 and 48 respectively secured to the buoy.

Member 45 engages eye bolt 49 secured to the top plate 16 and member 46 engages release arm 51 which is pivotally secured at 52 to bracket 50 on the end plate 19 and is releasably maintained in the position shown in solid outline in Fig. 3 by reason of control link 53 which engages the end of release arm 51 and hook 54 secured to side plate 19, the ends of the arm 51 and hook 54 being disposed at opposite ends within control link 53. Release arm 51 is provided with a washer 169 slideably arranged about the end of the arm with shear pin 171 disposed within a suitable bore through the arm for releasably locking the control link 53 to the end of the arm. Control link 53 is provided with an eye 55 laterally extending therefrom for threading the plummet cable 76 therethrough. The release arm 51 is adapted to release the buoy 10 from locked engagement with the anchor 17 as the control link 53 is pulled downwardly by cable 76 to free the release arm 51 as the plummet 127 drops from the anchor, the arm 51 moving to the released position a predetermined interval after the buoy has been released from the launching craft, as will hereinafter be more fully described.

The mooring cable 12 is passed through the fairlead 39, and over the cable guide 56 secured to the casing of the anchor 17 in any suitable manner, the guide having a surface thereon adapted to guide the cable as it leaves the cable drum 57, Fig. 6. The mooring cable 12 is wrapped about the drum 57 and secured thereto in any suitable manner.

As best seen in Fig. 6, cable drum 57 is secured to tubular shaft 58 and a ratchet 59 and brake drum 71 are secured to flanges 61 and 74 respectively of the cable drum. Drum shaft 58 is journalled in a pair of vertical plates 62, the vertical plates being secured to bottom plate 18 and side plates 19 by bolting the parts together.

The brake drum 71 is engaged by a friction brake band 142, Fig. 1, one end of which is fixed to supporting bracket 79 while the other end is connected to an adjusting screw 101 which is attached to the supporting bracket and has its holding tension regulated by compression spring 149, spring collar 151 and adjusting nuts 166. Supporting bracket 79 is secured to side plate 19 by a pair of bolts 167 and nuts (not shown).

The drum shaft 58, extending outwardly of plate 62, has shaft end 63 pressed within the drum shaft so that the drum shaft and shaft end turn as a unit as the cable is unwound from the drum. Shaft end 63 is provided with a threaded bore 64 therethrough which is adapted to engage threaded rod 65 for moving the rod outwardly of the bore 64 as the drum shaft is rotated about the rod. Rod 65 is provided with a pair of parallel flat portions 66 a portion of the length of the rod, with one of the flat surfaces stamped with equally spaced numbered graduations along the length of the flat portion. Flat portions 66 are slideably arranged within slot 67 axially formed through the hub of drum 68. Drum 68 is provided with a pair of upstanding portions 69 projecting radially from the rim of the drum. The hub 60 of drum 68 is split to snap over the shaft end 63 with spring collar 71 disposed about the hub to secure the parts together.

Plate 62 is provided with bracket 83 which is secured to the plate by a pair of bolts 84, the bracket having parallel upstanding portions 85 having aligned bores 86 into which is slideably arranged rod 87. Rod 87 is provided with a hooked end 88 and a diametrical bore therethrough into which is disposed a cotter pin 91. A metallic washer 94 sleeved about rod 87 provides a seat for one end of spring 95 also sleeved about the rod, the other end of the spring being urged into engagement with one of the upstanding portions 85. Hooked end 88 engages pin 96 which extends through an opening 93 through plate 62. Pin 96 extends laterally from pawl 97 which is mounted for limited rotation on pin 98 secured to pawl lever 99. Cam plate 104 secured to plate 62, is provided with a cam surface 106 engaged by pin 96 which extends through opening 93 in side plate 62. The pawl 97 is adapted to lock the cable drum 57 to prevent the drum from rotating further when the pawl engages ratchet 59 as will hereinafter be more fully described. Pawl lever 99 is rotatably mounted on shaft 102 which is secured to plate 62.



Stop plate 103, welded to pawl lever 99, is engaged by pawl 97 to limit the rotation of the pawl about pin 98.

Pawl lever 99 has pinned thereto by a pin 100*a* fork member 107 which is secured to threaded spring rod 109.

The spring rod 109 is slideably arranged in circular opening 111 formed in mounting bracket 112 which is secured to side plate 19 by bolts 113.

Compression spring 115, sleeved about spring rod 109, is interposed under compression between spring seats 116 and 117 for urging the pawl 97 into engagement with ratchet 59.

A pair of lock nuts 118, in threaded engagement with spring rod 109, are provided for adjusting the tension on spring 115.

The end of pawl lever 99 is provided with an eye 121 having the plummet cable 76 secured thereto by cable clamps 122, a thimble 123 being interposed between the cable and eye to prevent excessive wear between the parts. The plummet cable 76 is passed through opening 124 through side plate 19, over cable guide 125 secured to the side plate 19, the guide having an arcuate surface thereon for guiding the cable. The plummet cable 76 is then passed through eye 55, Fig. 10, of the control link 53, through opening 126, Fig. 5, provided in plummet 127, wrapped about the plummet drum 128 and secured to the drum in any well known manner. As seen in Fig. 5, plummet drum 128 is mounted on plummet shaft 131 which is supported in suitable journals provided in side plates 132 secured to the plummet 127 by screws 133. Leaf spring 134 riveted to side plate 132 and urged into engagement with flange 135 of the plummet drum 128 acts as a friction brake to prevent the drum from overriding the cable 76 as the cable is payed out from the drum. Plummet 127 is provided with an eye 136 into which is disposed supporting hook 137 for supporting the plummet thereon prior to launching the buoy.

Supporting hook 137 is secured to shaft 139, Fig. 1, which is journalled in brackets 141 bolted to side plate 19. Shaft 139 has secured thereto connecting rod 144 on the end of which is journalled piston rod 145 of dash pot indicated generally by the numeral 146. The dash pot cylinder 147 is rotatably mounted on rod 148 which is secured to the bifurcated bracket 152 by a pair of cotter pins 153 disposed through rod 148. Bracket 152 is secured to side plate 19 by bolts 155, Fig. 2.

Stop bracket 158 which is riveted to side plate 19 engages the top of plummet 127 as the parts are assembled on the anchor prior to launching.

The dash pot 146 and the associated linkages are provided for retarding the rotation of the shaft 139 in a clockwise direction as viewed in Fig. 1 until supporting hook 137 is moved out of engagement with eye 136 to release the plummet 127 from the supporting hook a predetermined interval such, for example, as 8 seconds, after the anchor 17 has been released from the launching craft in a manner more fully hereinafter described.

Shaft 139 has secured thereto crank arm 159 on the

end of which is pinned the upper end of connecting rod **161**. The lower end of connecting rod **161** is pinned to one end of lever **162**, the other end of the lever **162** engaging the bifurcated end of lever **72** prior to releasing the anchor from a launching craft. Lever **162** is pivotally supported on pivot pin **163** which is secured to plates **19** and **62**.

Bolted to side plate **19** are a pair of guide brackets **164** and **165** which surround the plummet **127** to protect the plummet against damage during handling and shipping.

The operation of the buoy anchor of the present invention will now be described with reference to Figs. 1 and 2 of the drawings.

The wheels **22**, **82**, and **25** are placed on the tracks at the stern of the launching craft and pin **77** is removed from the anchor to free the lever **72**.

As the anchor is launched from the tracks, as shown at A in Fig. 8, lever **72** is rotated about axle **24** by the weight of plummet **127** through hook **137**, shaft **139**, and rod **161** to release lever **162**, the releasing action being retarded by dashpot **146** and buoy **10** supports the anchor **17** at the surface of the water as shown at B in Fig. 8. The weight of the plummet **127** retarded by dash pot **146** will slowly rotate shaft **139** clockwise as viewed in Fig. 1 to move the supporting hook **137** out of engagement with eye **136** to allow the plummet **127** to sink through the water as the plummet cable **76** is payed out from the plummet drum **128**, as shown at C in Fig. 8. When all the plummet cable is unwound, the plummet stops with a jerk on the plummet cable **76** sufficient to pull control link **53** free of release arm **51** to allow the release arm to rotate counterclockwise about pivot pin **52** to the position shown in dash lines of Fig. 3 to release the buoy **10** from the anchor **17** as shown at C in Fig. 8. The tension on plummet cable **76** holds pin **96** beneath cam surface **106**, rod **87** is held out of engagement with the periphery of drum **68** and as the mooring cable **12** is unwound from cable drum **57**, drum shaft **58**, threaded rod **65** and drum **68** rotate as a unit.

As the plummet **127** strikes the bed of the water the tension on the plummet cable **76** is slackened, as shown at D in Fig. 8, spring **115** will urge rod **109** to the left as viewed in Fig. 1, pivoting lever **99** on shaft **102** moving pin **96** of pawl **97** and thus permitting rod **87** to move into engagement with drum **68**, one of upstanding portions **69** engaging rod **87** to prevent drum **68** from turning further. When this occurs drum shaft **58** and shaft end **63** are rotated as a unit about threaded rod **65** to cause the rod **65** to be moved outwardly of shaft **58** as additional mooring cable is pulled from cable drum **57** as the anchor continues downward movement and comes to rest on the bottom, as shown at E in Fig. 8, the amount the measuring rod **65** is moved outwardly of drum shaft **85** corresponding to the payed out length of the mooring cable. As the tide rises, additional mooring cable **12** is pulled from the drum **57**, as shown at F in Fig. 8, and the counting rod is moved an additional amount outwardly of drum shaft **58** until the shoulder **70** formed between flat portions **66** and rod **65** moves into engagement with the shoulder formed by slot **67**. As the drum **57** is additionally rotated, drum **68** is forced outwardly by the counting rod until the drum **68** is disengaged from the rod **87**. As the rod **87** is moved to the left, Fig. 1, by spring **95**, pin **96** slips off the end of cam surface **106** to free hooked end **88** from pin **96** as pawl **97** engages one of the teeth of ratchet **59** to lock the drum **57** against further rotation, the pawl pivoting on pin **98** to engage the left end of stop plate **103** which prevents further rotation of pawl **97**. Sufficient slack in the mooring cable has now been payed out to prevent complete submersion of the marker buoy **10** at high tide.

Thus it will be clearly apparent that the length of slack in cable **12** will be determined by the amount the threaded rod **65** initially engages the shaft end **63**, the greater the length of engagement of the threaded rod, the greater number of turns of cable drum **57** will be required to force drum **68** out of engagement with rod **87**. The extent of engagement of the threaded rod into the shaft end **63** may be adjusted prior to launching with a high degree of accuracy by reason the scale markings thereon as aforesaid. The rate at which the slack cable is pulled off the cable drum **57** is dependent upon the rate of movement of the buoy **10** away from the anchor **17** after the anchor has come to rest on the bottom.

Thus a new and improved channel marker has been provided wherein the channel marker may be launched from the mine tracks at the stern of a mine layer, in any depth of water within limits determined by the length of mooring cable wound on the cable drum which will moor a marker buoy on the surface of the water with a preselected length of slack in the mooring cable sufficient to prevent complete submersion of the moored buoy at high tide.

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.

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.

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

1. A channel marker comprising an anchor, a float chamber initially mounted on said anchor, drum means including a length of mooring cable for connecting said anchor to said float chamber, said float chamber being separated from said anchor after launching said buoy in a body of water, a movable member serving as a stop for said drum means, a plummet secured to said movable member for holding said member out of stop position as the anchor and plummet sink to the bottom, and cable measuring means associated with said drum means for retaining said member out of stop position until the drum means has measured a predetermined amount of slack cable after the anchor has come to rest on the bottom.

2. A channel marker of the character disclosed comprising, an anchor, a buoy releasably secured to said anchor, a supply of reeled mooring cable connecting the buoy to the anchor, a plummet releasably secured to the anchor, a supply of reeled cable connecting the plummet to the anchor, means effective as the anchor is launched into a body of water for releasing the plummet from the anchor thereby to pay out said supply of plummet cable and lower the plummet with respect to the anchor, means responsive to the jerk on the plummet cable as the plummet cable becomes fully paid out for releasing said buoy from the anchor thereby to pay out said mooring cable as the anchor and plummet cable descend together within the water with respect to the buoy, means settable at will for measuring a predetermined length of mooring cable in response to the pull of a running tide on the buoy and means responsive to the decrease in tension on the plummet cable as the plummet engages the bed of the body of water for initiating operation of said measuring means thereby to provide a predetermined slack in the mooring cable when the tide has subsided.

3. A mechanism of the character disclosed which may be launched from the mine tracks at the stern of a mine layer and moor a buoy on the surface of the water with a predetermined amount of slack cable comprising, a buoyant chamber, an anchor initially in releasable locking engagement with said chamber, a mooring cable connected to said chamber, a winch drum mounted for rotation in said anchor and carrying a length of mooring cable wrapped thereon, a releasable lock member for releasably locking said drum against rotation, a plummet releasably

secured to said anchor, a paying out gear including a length of plummet cable mounted in the plummet and connected to said lock member, means effective as the anchor is launched into a body of water from the mine tracks at the stern of a mine layer for releasing the plummet from the anchor thereby to pay out the length of plummet cable from the plummet and lower the plummet with respect to the anchor, means responsive to the jerk on the plummet cable as the plummet cable becomes fully payed out for releasing said lock member from said winch drum thereby to pay out a length of mooring cable from the anchor as the anchor and plummet descend together through the water with respect to said buoy, means settable at will for measuring a preselected length of mooring cable in response to the pull of a running tide on the buoy, and means responsive to the decrease in tension on the plummet cable as the plummet engages the bed of the body of water for setting the mooring cable measuring means in operation thereby to pay out a preselected slack in the mooring cable when the tide reaches its low period.

4. A harbor marking device of the character disclosed comprising, in combination, an anchor, a buoy releasably locked to said anchor, releasing means for releasing said buoy from said anchor as the device is launched within a body of water, a length of mooring cable, a drum rotatably mounted in said anchor and having said cable wound thereabout for unwinding a predetermined length of the cable as the anchor is released from said buoy and sinks to a predetermined depth of submergence, means including a threaded rod settable at will and movable by said drum a predetermined amount for measuring an additional length of cable from the drum as the buoy is moved with respect to the anchor by the tide after the anchor has come to rest on the bed of the body of water, and locking means operated by said threaded rod for locking the drum against further rotation after said additional length of cable has been payed out and the threaded rod has been moved said predetermined amount.

5. A channel marker comprising, in combination, a buoy, an anchor releasably locked to said buoy, releasing means for releasing said buoy from the anchor as the device is launched within a body of water, a rotatable drum mounted in the anchor, shaft means for rotatably mounting said drum within the anchor, a mooring cable wound about said drum and connecting the buoy to the drum and having a predetermined length thereof payed out when the anchor is released from the buoy and the drum is rotated a predetermined amount as the anchor sinks within the water, adjustable means including a threaded rod operatively connected to said shaft means and movable thereby a predetermined amount for measuring an additional length of cable from said drum after the anchor has come to rest on the bed of the body of water, and locking means



operated by said threaded rod for locking the drum against further rotation after said additional length of cable has been payed out and said threaded rod has been moved said predetermined amount.

6. A channel marking device of the character disclosed comprising, in combination, a flotation chamber, an anchor releasably locked to said flotation chamber, releasing means for releasing said chamber from said anchor as the marker is launched within a body of water, rotatable drum means mounted in said anchor, a length of mooring cable coiled about said drum means and secured to said flotation chamber and the drum, stop means for said drum means, plummet means for holding said stop means out of locking engagement with said drum means as the anchor and plummet means sink to a predetermined depth within the water whereby a predetermined amount of cable is payed out from said drum means, means including a threaded rod movable by said drum means for retaining the stop means out of engagement with said drum means until the drum means has made a predetermined number of revolutions and said predetermined amount of cable has been payed out sufficiently to cause the plummet means to come to rest on the bed of the body of water.

7. A harbor marking device comprising a buoy, an anchor normally locked to said buoy, a mooring cable connecting said buoy to the anchor, a rotatable drum having a length of said mooring cable wound thereon, a ratchet fixed to said drum for rotation therewith, a pawl for preventing rotation of the drum after a predetermined length of cable has been payed out from said drum, means including a plummet connected to said pawl for holding the pawl out of locking engagement with said ratchet as the anchor and plummet sink to the bed of the body of water and said predetermined length of cable is payed out, cable measuring means including a threaded rod driven by the drum for measuring an additional length of cable from the drum as said buoy is moved with respect to the anchor, means controlled by said plummet as the plummet strikes the bed of the body of water for actuating said measuring means, and means actuated by said threaded rod for moving said pawl into locking engagement with said ratchet after said additional length of cable has been payed out.

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