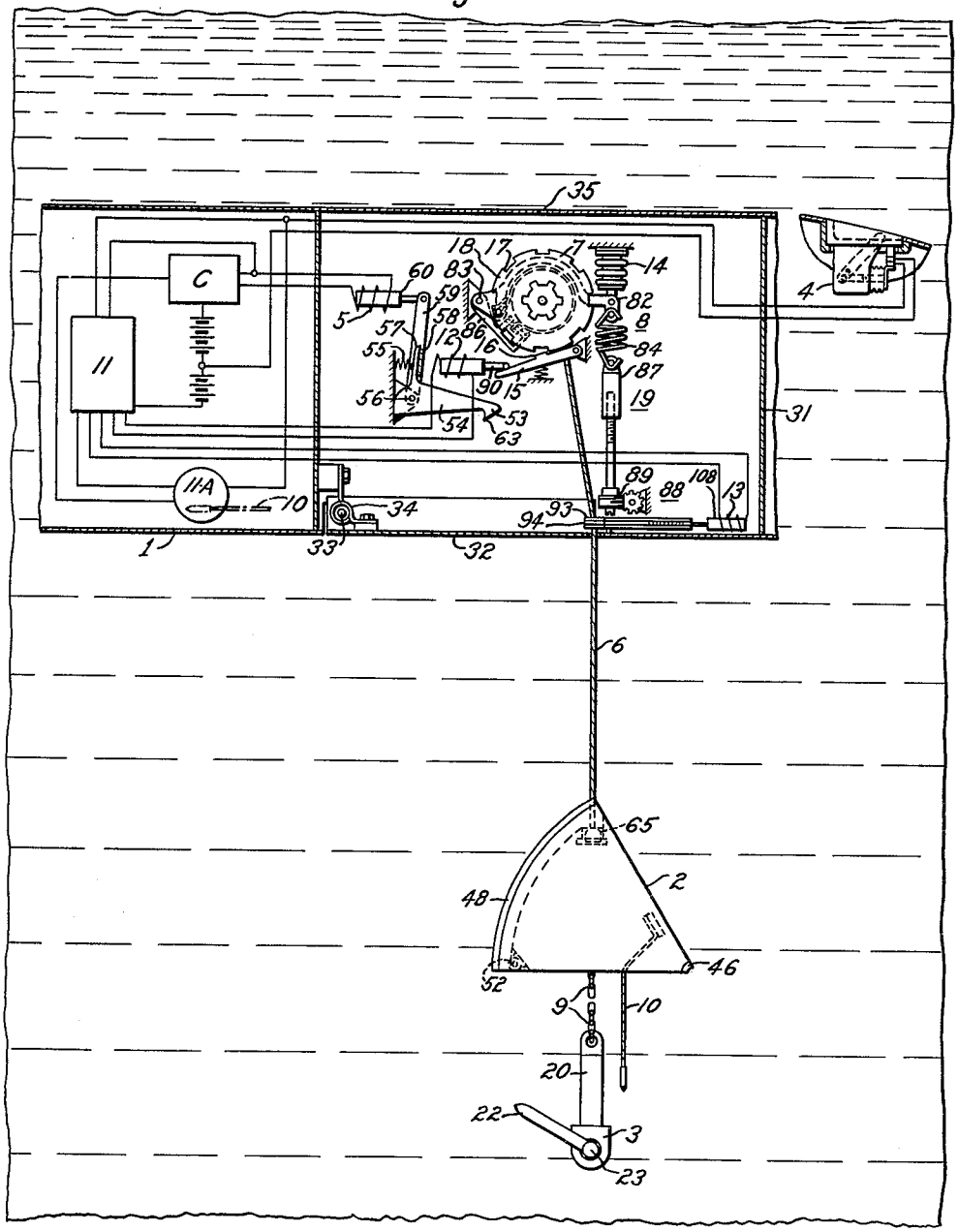
Nov. 5, 1963 W. B. ELMER ET AL 3,109,370

DEPTH REGULATION DEVICE

Filed March 17, 1945 5 Sheets-Sheet 1

Fig. 1.



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DEPTH REGULATION DEVICE

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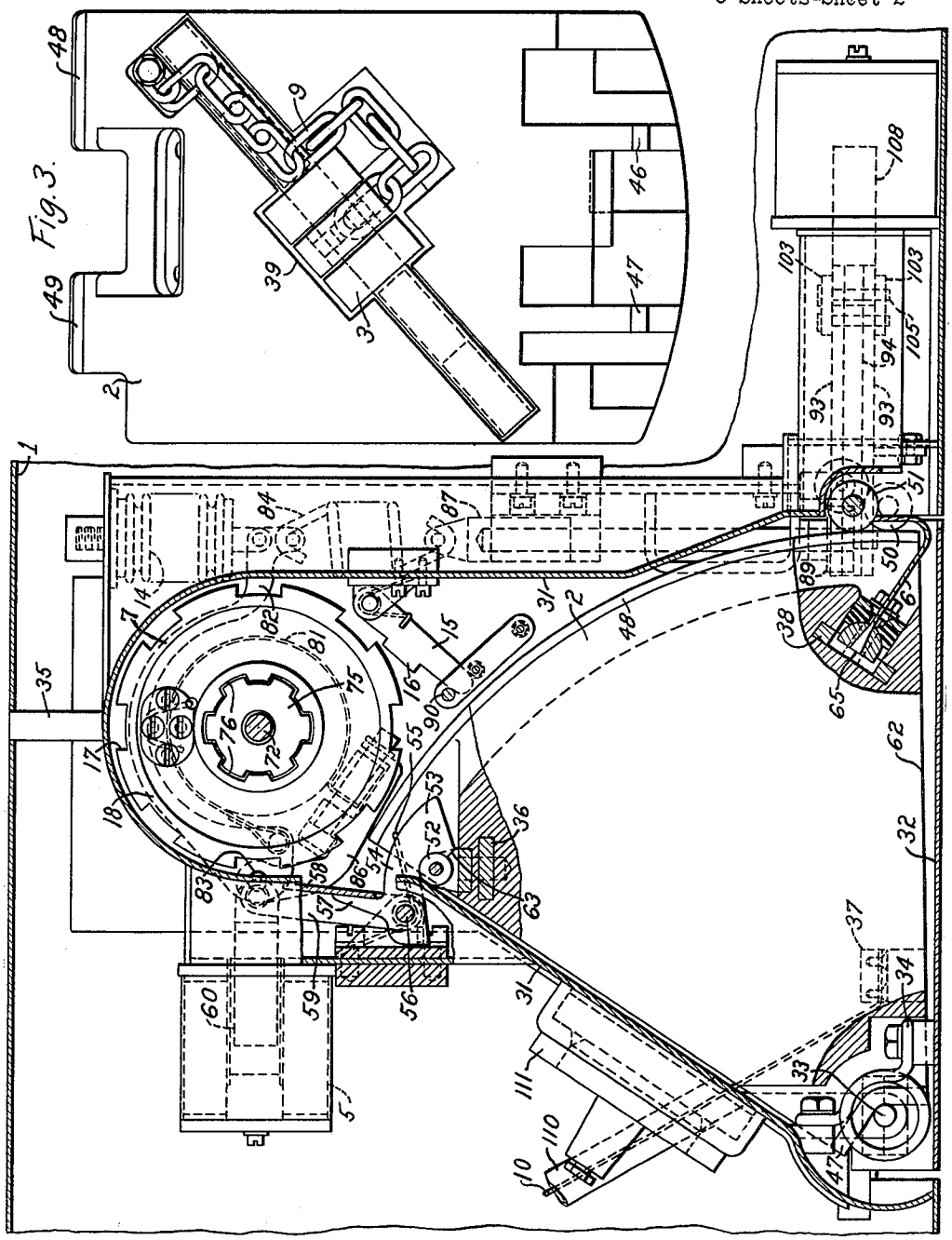


Fig. 2.

Fig. 3.

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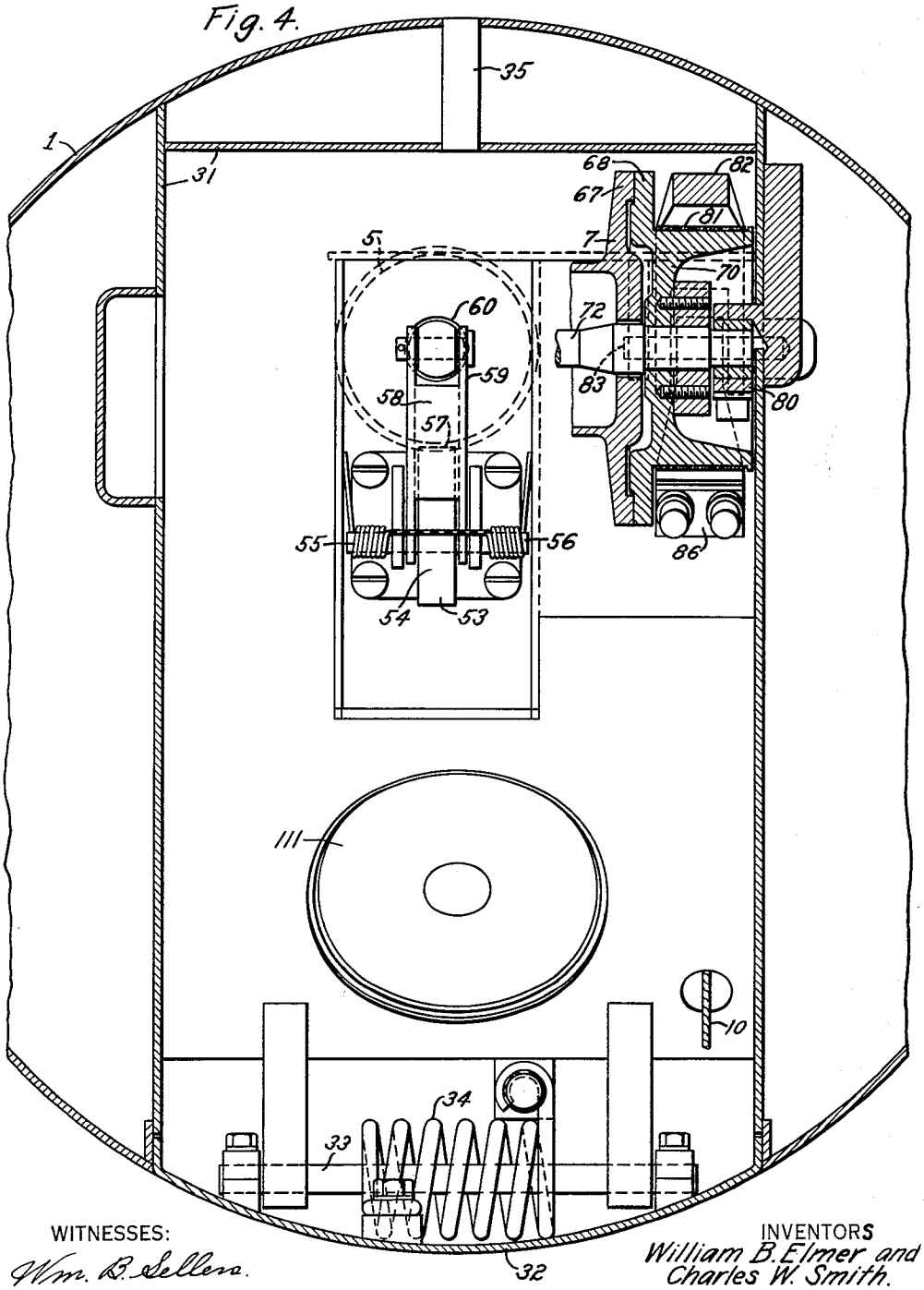
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DEPTH REGULATION DEVICE

Filed March 17, 1945 5 Sheets-Sheet 3

Fig. 4.



WITNESSES:
Wm. B. Sellers.

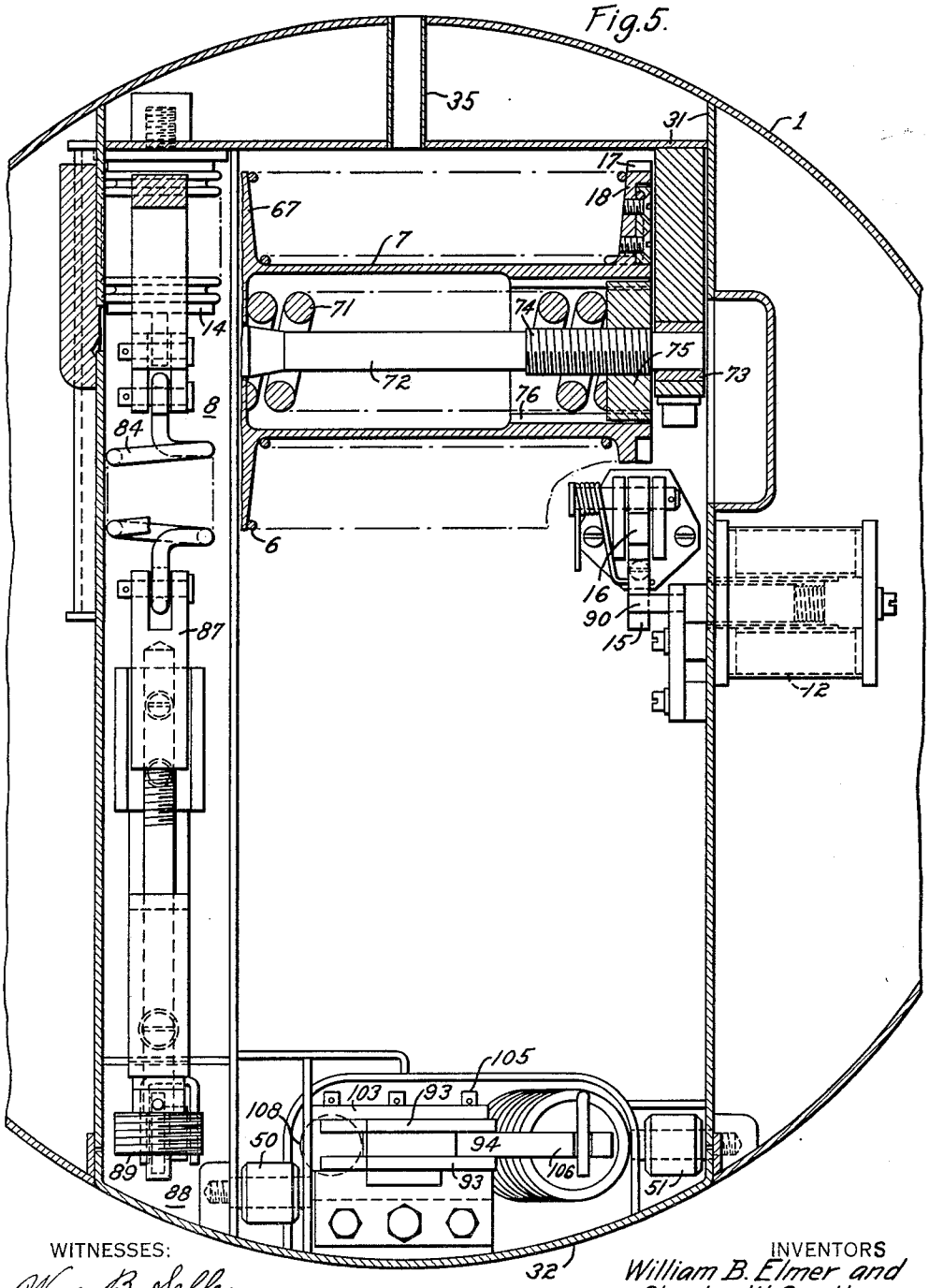
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DEPTH REGULATION DEVICE

Filed March 17, 1945 5 Sheets-Sheet 4

Fig.5.



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DEPTH REGULATION DEVICE

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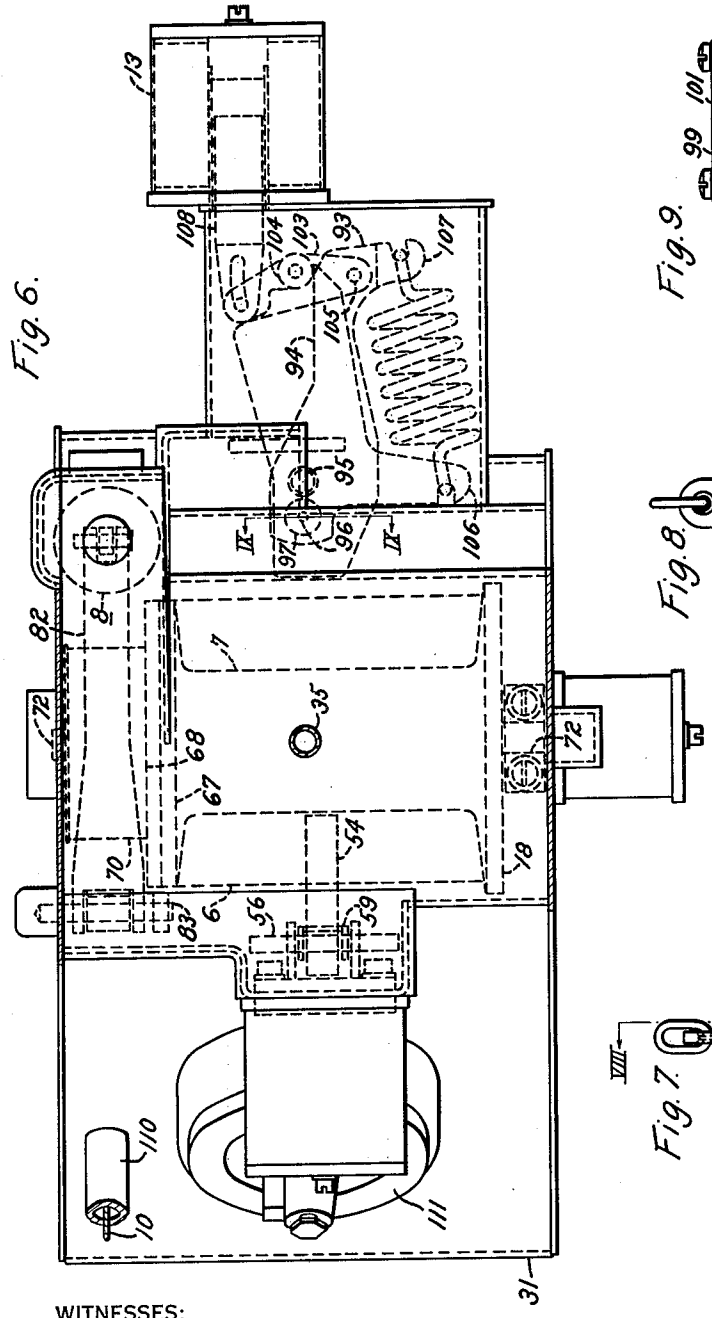


Fig. 6.

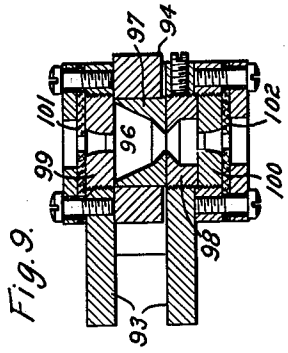


Fig. 9.

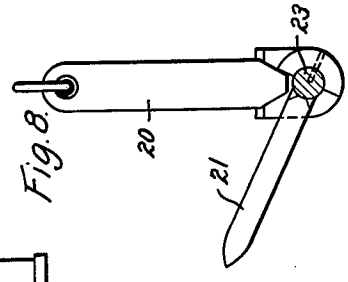


Fig. 8.

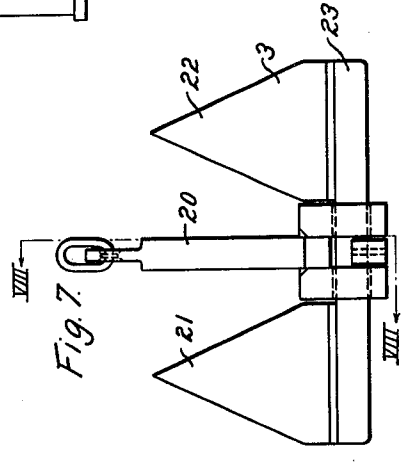


Fig. 7

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United States Patent Office

3,109,370
Patented Nov. 5, 1963

3,109,370

DEPTH REGULATION DEVICE

William B. Elmer, Lakewood, Ohio, and Charles W. Smith, Sharon, Pa., assignors, by mesne assignments, to the United States of America as represented by the Secretary of the Navy

Filed Mar. 17, 1945, Ser. No. 583,324
16 Claims. (Cl. 102—14)

Our invention relates to mooring devices and more particularly to devices for mooring detonators.

The use of moored detonators is a regular procedure of modern warfare but it is not often an easy matter to lay magnetic mines and contact mines in enemy waters without being detected by the enemy. Submarines while submerged are not subject to detection by radar equipment. The use of torpedoes as detonators in enemy waters has therefore been proposed.

A torpedo is an excellent detonator and has the advantage that it has considerable freedom of motion and can be designed to seek its target once the target comes within a given range of the location of the torpedo, namely, the moored position of the torpedo.

One broad object of our invention is the provision for automatically mooring a torpedo after the torpedo is launched in some manner, as from a submarine firing tube.

A more specific object of our invention is the provision for automatically mooring a torpedo at a predetermined depth in the water at the position the torpedo is launched and from which moored position it later releases itself under specified conditions.

Another object of our invention is to provide for so mooring a detonator that its position is not altered by tidal currents or other currents in the sea.

Another more specific object of our invention is to moor a torpedo at a given depth in the water, prevent its shifting from the moored position, and release the torpedo from its mooring when the target detecting equipment "sights" a target within a given range of the moored torpedo.

Other objects and advantages will become more apparent from a study of the following specification and the drawings accompanying the specification. In the drawings,

FIGURE 1 is a somewhat schematic showing of our mooring device;

FIG. 2 is a longitudinal sectional view of a portion of a torpedo showing a side view of our mooring device with parts broken away to improve the showing;

FIG. 3 is a plan view of the main anchor and auxiliary anchor in position in the main anchor;

FIG. 4 is a transverse sectional view to a larger scale of the anchor cavity—anchor not in place—looking forward;

FIG. 5 is a transverse sectional view to a larger scale of the anchor cavity—anchor not in place—looking aft;

FIG. 6 is a plan view of the housing for the mooring equipment with parts broken away to show some details;

FIG. 7 is a side view of the auxiliary anchor;

FIG. 8 is a view of the auxiliary anchor taken along section lines VIII—VIII of FIG. 7; and

FIG. 9 is an enlarged sectional view of the combined cable-guide and shear construction taken along section lines IX—IX of FIG. 6.

In FIG. 1, which is a showing to a large extent schematic and where 1 designates the torpedo body, the cavity or housing 31 for storing the anchors 2 and 3 is not shown in proper contour, to facilitate a discussion of the general theory of operation. To better understand the

details of construction and functions of our device, a general discussion will first be given.

To moor the torpedo, the anchors 2 and 3 are provided. The torpedo itself, minus the weight of the two anchors, is quite buoyant, that is, has positive buoyance, but the weight relation between anchors and torpedo is such that with the anchors in the torpedo it has a considerable negative buoyance. The anchors once resting on the sea bottom will, with the aid of our control, hold the torpedo at a given depth in the water.

In practice, the torpedo is launched from a submarine at a lesser depth than it will occupy during its moored period. As the torpedo is launched, a trigger switch 4 is operated. This trigger switch through intermediate control device C including time limit means sets up a circuit for the latch release solenoid 5. Energization of this solenoid 5 releases the anchors 2 and 3 and these anchors, as a unit, drop out of the torpedo.

The main anchor 2 is secured to the outer end of the cable 6, which is wound over the payout reel 7, and the inner end of the cable is securely attached to the payout reel 7.

The initial drop of the anchors is substantially unrestrained and as they descend a restraining force is gradually built up as will be described hereinafter. After the anchors have dropped some twenty-five feet, namely, a distance equal to, but preferably somewhat greater than the length of the torpedo, the braking mechanisms 8 restrains further descent of the anchors provided the torpedo is above its set depth. The main anchor 2, if not already in the position shown in FIG. 1, will thus positively take the position shown in FIG. 1 so that the auxiliary, or fluke, anchor 3 will drop out of its cavity in the main anchor. The auxiliary anchor will thus, on the descent of the torpedo and anchors, hang below the anchor a distance dependent upon the length of chain 9. The end of the flexible arming cable 10 in the stored position of the anchors in the torpedo engages the depth-actuated arming device 11–A in locking relation. As the anchors drop out of the torpedo, the pull on this arming cable unlocks the depth actuated arming drive 11–A. Electric switch means in and actuated by arming device 11–A when the torpedo is at or below a predetermined depth, in combination with closure of trigger switch 4, places control system 11 in operation. Control system 11 includes timing means, target detecting devices, circuit interrupting devices and circuits for the later energization of solenoids 12 and 13 at appropriate times. These components in themselves form no part of our invention and will not be described in detail. As soon as these devices have thus been set in operation by the withdrawal of the bayonet end of cable 10, said cable hangs from the anchor in the water and thereafter has no further utility.

The braking device 8 is responsive to the hydrostatic head of the water above the torpedo. The braking device restrains the payout reel against further rotation, after the initial free fall of the anchors, and the payout reel remains thus locked in position until the anchors have pulled the torpedo to the depth at which it is desired to moor the torpedo. The hydrostatic elements 14 of brake means 8 then sufficiently releases the brake so that the anchor cable 6 is payed out while the torpedo remains at substantially the desired mooring depth.

After a predetermined time, which is selected to be ample to permit the anchors to reach sea bottom for the mooring position selected, the solenoid 12 is automatically energized to release the spring actuated latch 15. The lug 16 on this latch 15 engages one of the notches 17 in the flange 18 on the payout reel. The length of the anchor cable payed out is maintained at a fixed length determined by the distance, at the time of locking the

payout reel, between the anchors at the sea bottom and the selected mooring depth of the torpedo.

After the torpedo is moored tidal currents and other currents of the sea will apply forces to the torpedo that tend to move the torpedo. Vertical components of these forces may lift the main anchor temporarily off the sea bottom. As this takes place, the natural tendency would be to set the main anchor down at a different point. The anchor would thus "walk" about with the result that the torpedo does not "stay put."

The auxiliary anchor, by reason of its construction and also from the fact that the pull on the chain **9** will be nearly always substantially parallel to the sea bottom, will dig itself deeper and deeper in the soft or hard sea bottom. The main anchor **2** which thus serves mainly to oppose the buoyancy of the torpedo, is by the anchor **3** caused to stay within a given radius of the anchor **3**. Shifting of the torpedo from its moored position is thus prevented.

After the target detecting device detects a target, the control devices are set and caused to operate so that the torpedo when released may proceed toward the target. At this time, the solenoid **13** is energized so as to release the latch for the spring actuated shear. The anchor cable is sheared at a point immediately adjacent to the body surface, and the propulsion equipment is started and the torpedo speeds on its way toward the target.

For the details of the construction of our device, reference may be had to FIGS. 2, 3, 4, 5, 6, 7, 8 and 9. In FIG. 1 the torpedo shell **1** is shown provided with a water-tight anchor housing, or compartment, **31**. This compartment houses the main and auxiliary anchors, the payout reel **7** and the depth control devices **19** and some other devices hereinafter discussed. The housing **31** is provided with a door **32** hinged on the bearing pin **33** and biased to its closed position, as shown in FIGS. 1 and 2, by a heavy spring **34** which is at one end secured to the wall of the housing and at its other end secured to the door. The stress of the spring is so selected as to firmly hold the door against suitable stops, not shown, to be flush with the body of the torpedo. The upper portion of the housing is provided with an air discharge opening or tube **35** so as to permit the ready discharge of the air from the housing after the torpedo is launched and the sea-water begins to enter at the peripheral edges of the door.

The main anchor is generally sector shape and is welded about a steel frame, not shown, to which the steel inserts **36**, **37** and **38** are secured. The anchor is provided with a suitable recess **39** shaped to receive the auxiliary anchor **3**. This auxiliary anchor has a stem portion **20** and two anchor flukes **21** and **22** which are welded to a pivot pin or shaft secured to the stem portion **20** mounted for rotation on the stem portion **20**. The arrangement of the anchor flukes on the bearing shaft **23** is such that the anchor flukes can take a 60° position with reference to the stem portion **20**. The stem portion **20** is secured to the main anchor **2** by the chain **9** having a suitable lentgh, as from three to six feet.

At the forward lower edge of the sector shaped anchor, it is provided with steel bearing shoes **46** and **47** which engage the bearing pin **33** of the door. These steel inserts prevent the anchor, which is made of lead and is thus comparatively soft, from being deformed during storage or transport so that its operation might not be impaired. The arcuate portion of the anchor is provided with steel rails **48** and **49** having rolling engagement with rollers **50** and **51** during pivotal movement of the anchor out of the anchor chamber after the torpedo is launched.

At the upper end or edge of the anchor, a suitable roller **52** is shown connected to the steel insert **36**. This roller engages the hook portion **53** of the latch **54** biased to rotate in a clockwise direction by the spring **55**. This

latch member **54** is pivoted on a pin **56** and has an upwardly directed projection **57** engaging the cross arm **58** of the link **59**. At its lower end this link **59** is also pivoted on bearing pin **56**. At its upper end, link **59** is secured to the armature **60** for the solenoid **5**. In operation, the solenoid **5** is energized a relatively short predetermined interval of time after the torpedo is launched, whereupon the hook portion **53** of the latch **54** is moved counterclockwise to thus release the roller **52**. The weight of the anchor will immediately cause the entire anchor, including the roller **52**, to move clockwise on the bearing pin **33** by an amount determined by the angle between the lower arcuate surface **62** of the anchor and the door **32**. This angular space between the door **32** and the lower surface **62** is so chosen that in the event the door is prevented from immediate opening by possible momentary contact with the sea bottom in case of shallow launching, the anchor will, nevertheless, have moved a sufficient amount in a clockwise direction that the roller **52** will pass under the surface **63** of the hook **53**. It is thus apparent that even if the solenoid **5** is immediately thereafter deenergized, the anchor will not again be relatched to its upper firm position in the housing for the anchor. As soon as the torpedo clears the bottom, the anchor will move on bearing pin **33** as a pivot to open the door **32** and thus slip out of the housing. At the lower aft edge, the anchor is secured to the mooring cable **6** by means of a suitably designed swivel joint **65** of electric insulation to prevent electrolytic corrosion of the cable by the sea water. As the anchors move out of their housing, the cable is pulled out and the payout reel **7** is immediately caused to rotate to pay out the amount of cable needed for a free drop of the anchor equal to about the lentgh of the torpedo.

Before the anchor is released, there is substantially no frictional engagement between the flange **67** of the payout reel **7** and the flange **68** of the brake drum. The payout reel will thus rotate quite freely, even though the brake mechanism **8** is set, thereby permitting the anchor to drop freely out of its housing.

As best apparent from FIGS. 4 and 5, the payout reel **7** consists of a hollow drum having suitable side flanges **18** and **67**. The flange **67** is designed to have frictional engagement with the flange **68** of the brake drum **70**.

Disposed within the hollow drum is a helical spring **71** surrounding the reel shaft **72**. The shaft **72** at the extreme right, as seen in FIG. 5, is journalled in a suitable bearing **73**. To the left of the bearing, the shaft is provided with threads **74** upon which the nut **75** is threaded. This nut has splined engagement with splines **76** disposed on the internal surface of the hollow drum.

At the brake drum end, the shaft **72** is rigidly secured to the brake drum **70** and disposed in a suitable outer bearing **80**. During the initial stages of the descent of the anchor, the brake band **81** firmly grips the brake drum with the result that the shaft **72** is prevented from rotating. The payout reel **7** rotates freely, however, and in so doing, the nut **75** is caused to move toward the middle of the drum to compress the spring **71**.

Since the spring **71** is disposed between the nut **75** and the inwardly directed flange **67'**, the payout reel is forced toward the brake drum. The spring compression and initial position of nut **75** is so chosen that locking engagement takes place between flanges **67** and **68** as soon as the anchor has completed its free drop of from twenty-one to twenty-five feet. Thereafter, the entire assembly sinks together until the hydrostatic devices release the brake mechanism.

The brake mechanism comprises an arcuate member **82** pivoted at one end on bearing pin **83** and at its other end secured to the upper end of tension spring **84** and to the lower end of the hydrostatic element or pressure-responsive bellows **14**.

The left end (as seen in FIG. 2) of the arcuate member **82** is secured to the right of bearing pin **83** to the

upper end of the brake band **81**. The lower end of the brake band is adjustably secured to the arm **86** also pivoted on bearing pin **83**. Counterclockwise rotation of arcuate member **82** will thus release the brake band and thus permit rotation of the payout reel. This operation is accomplished by the combined action of the bellows and the spring **84**.

The lower end of spring **84** is secured to the link **87**. This link is adjustable in length as shown, and may be pulled vertically to adjust the tension of the spring **84** by the mooring depth adjuster **88**. This mooring depth adjuster comprises a worm and worm wheel transmission **89**, or any other type of transmission, graduated in fathoms or feet depth for vertically moving the link **87** to adjust the pull of spring **84** on the hydrostatic bellows **14**.

The spring **84** and hydrostatic device **14** act in opposition to each other and both together determine the angular movement of arcuate member **82**. As long as the spring force predominates, as will be the case as long as the torpedo is at a lesser depth than selected by the adjustment of the mooring depth adjuster, the brake band will lock the brake drum against rotation. As soon as the torpedo is at the desired depth, the bellows **14** will be compressed and thus effect the release of the payout reel. The anchor cable is thus payed out until the anchors are on bottom. A short time thereafter, solenoid **12** is energized to withdraw the pin **90** from the spring biased latch **15**. This arm moves clockwise, as seen in FIG. 2, and the lug **16** engages one of the notches **17** on the flange **18**. Thereafter, no more rotation of the payout reel can take place and the torpedo remains moored at the desired depth.

The torpedo remains in the moored position until a target is sighted by the acoustic or other type devices on the torpedo whereupon the cable shear is operated, the motor started, and the torpedo automatically sets its course on the target.

The shear comprises a structure **93** of two plates rigidly mounted in the housing at the bottom near the door **32**, and a movable cable shearing element **94** disposed between them. This element **94** is pivoted at **95** on member **93** and has an opening at **96** designed to firmly hold a sharp circular cutting die **97** of suitable metal for cutting the steel cable **6**.

The lower plate of the structure **93** is provided with an adjustable nut **98**, also including a circular cable cutting edge. The nut is adjusted to be firmly against the die, as shown in FIG. 9. Above and below the die **97** and nut **98** are a pair of cable guiding nuts **99** and **100**. These nuts not only guide the cable through the shears to prevent rubbing of the cutting edges by the cable but also hold the die **97** and nut **98** in firmer relation to each other.

All the operating mechanism in the housing **31** are amply supplied with a grease non-reactive with sea water. To prevent grease from being lost during the mooring operation, the shears are provided with the wipers **101** and **102** as shown.

To prevent the shears from operating except when desired, a link **103** having the roller **104** is pivoted on structure **93** at **105**. The disposition of the roller **104** is such that it is in the path of element **94** at the right as seen in FIG. 6.

A heavy spring under some considerable tension is hooked over the projecting hooks **106** and **107** on elements **94** and **93**, respectively. The upper end of link **103** is operatively connected to the armature **108** of the solenoid **13**.

When the anchor cable is to be sheared, the solenoid **13** is energized to operate the link, or lever, **103** in a clockwise direction to thereby move the roller **104** out of the path of the element **94**. The full loading of the spring is then applied to the projection **106** with the result that die **97** moves relative the nut **98** to cut the anchor cable **6** with a snap action.

The tube **110** through which arming cable **10** is threaded also serves to transmit hydrostatic pressure to the target detecting device. The device **111** is merely a detonating device for blowing an opening into the torpedo proper at the housing **31**, when under certain desired conditions, the torpedo should be self-destructive.

We claim as our invention:

1. In a device for mooring a normally buoyant detonator at a predetermined depth in the sea after the detonator is placed in the sea, in combination, a housing in the detonator, an anchor in the housing, said anchor having a weight sufficient in magnitude to cause the normally buoyant detonator to sink to the sea bottom as long as the anchor is in the housing, latching means for normally latching the anchor in the housing, said latching means being operable a short time after the detonator is placed in the sea to release the anchor, a payout reel, a cable wound on the reel and having one end connected to the anchor, means responsive to a selected hydrostatic pressure for controlling the operation of the payout reel so that the descent of the anchor from the detonator to sea bottom is controlled as a function of the hydrostatic head of the sea water above the detonator, and a fluke anchor, having anchor hooks, flexibly connected to the first anchor to prevent shifting of the detonator from its moored position.

2. In a device for mooring a normally buoyant detonator at a selected depth in the sea after the detonator is placed in the sea, in combination, a cable payout reel rotatobly mounted on the detonator, a cable one end secured to the payout reel and wound on the payout reel, an anchor secured to the outer end of the cable, and means responsive to the hydrostatic pressure of the sea at a given depth for controlling the rotation of the payout reel so as to maintain the detonator at a given depth in the sea while the anchor sinks to the sea bottom, a fluke anchor, a relatively short flexible connection between the fluke anchor and the first mentioned anchor.

3. In a device for mooring a normally buoyant detonator at a selected depth in the sea after the detonator is placed in the sea, in combination, a cable payout reel rotatably mounted on the detonator, a cable one end secured to the payout reel and wound on the payout reel, an anchor secured to the outer end of the cable, means responsive to the hydrostatic pressure of the sea at a given depth for controlling the rotation of the payout reel so as to maintain the detonator as a given depth in the sea while the anchor sinks to the sea bottom, and means for locking the payout reel against rotation after the anchor is on the bottom of the sea to thus thereafter maintain a given cable length between the anchor and detonator.

4. In a device for mooring a normally buoyant detonator at a selected depth in the sea after the detonator is placed in the sea, in combination, a cable payout reel rotatably mounted on the detonator, a cable one end secured to the payout reel and wound on the payout reel, an anchor secured to the outer end of the cable, means responsive to the hydrostatic pressure of the sea at a given depth for controlling the rotation of the payout reel so as to maintain the detonator at a given depth in the sea while the anchor sinks to the sea bottom, a fluke anchor, a relatively short flexible connection between the fluke anchor and the first mentioned anchor, and means for locking the payout reel against rotation after the anchor is on the bottom of the sea to thus thereafter maintain a given cable length between the anchor and detonator.

5. In a device for mooring a normally buoyant detonator at a selected depth in the sea after the detonator is placed in the sea, in combination, a cable payout reel rotatably mounted on the detonator, a cable one end secured to the payout reel and wound on the payout reel, an anchor secured to the outer end of the cable, means responsive to the hydrostatic pressure of the sea at a given depth for controlling the rotation of the payout reel

so as to maintain the detonator at a given depth in the sea while the anchor sinks to the sea bottom, and means for severing the cable connection between anchor and detonator when a target for the detonator is within the detection range of the detonator.

6. In a device for mooring a normally buoyant detonator at a selected depth in the sea after the detonator is placed in the sea, in combination, a cable payout reel rotatably mounted on the detonator, a cable one end secured to the payout reel and wound on the payout reel, an anchor secured to the outer end of the cable, means responsive to the hydrostatic pressure of the sea at a given depth for controlling the rotation of the payout reel so as to maintain the detonator at a given depth in the sea while the anchor sinks to the sea bottom, a fluke anchor, a relatively short flexible connection between the fluke anchor and the first mentioned anchor, and means for severing the cable connection between anchor and detonator when a target for the detonator is within the detection range of the detonator.

7. In a device for mooring a normally buoyant detonator at a selected depth in the sea after the detonator is placed in the sea, in combination, a cable payout reel rotatably mounted on the detonator, a cable one end secured to the payout reel and wound on the payout reel, an anchor secured to the outer end of the cable, means responsive to the hydrostatic pressure of the sea at a given depth for controlling the rotation of the payout reel so as to maintain the detonator at a given depth in the sea while the anchor sinks to the sea bottom, means for locking the payout reel against rotation after the anchor is on the bottom of the sea to thus thereafter maintain a given cable length between the anchor and detonator, and means for severing the cable connection between anchor and detonator when a target for the detonator is within the detection range of the detonator.

8. In a device for mooring a normally buoyant detonator at a selected depth in the sea after the detonator is placed in the sea, in combination, a cable payout reel rotatably mounted on the detonator, a cable one end secured to the payout reel and wound on the payout reel, an anchor secured to the outer end of the cable, means responsive to the hydrostatic pressure of the sea at a given depth for controlling the rotation of the payout reel so as to maintain the detonator at a given depth in the sea while the anchor sinks to the sea bottom, a fluke anchor, a relatively short flexible connection between the fluke anchor and the first mentioned anchor, means for locking the payout reel against rotation after the anchor is on the bottom of the sea to thus thereafter maintain a given cable length between the anchor and detonator, and means for severing the cable connection between anchor and detonator when a target for the detonator is within the detection range of the detonator.

9. In a device for mooring a normally buoyant torpedo at a selected depth in the sea after the torpedo is launched, in combination, a housing in the torpedo, a cable payout reel rotatably mounted in the housing, a cable at one end connected to the payout reel and wound on the reel, a sector shaped relatively heavy anchor weight pivotally mounted in the housing, the other, or outer, end of the cable being connected to the weight, a latch for holding the weight in position on its pivot in the housing, a fluke anchor mounted within the weight, a relatively short flexible connection between the weight and fluke anchor, braking means for the payout reel for holding the payout reel against rotation, means for releasing the latch for the anchor weight operable a relatively short time interval after the torpedo is launched whereby the anchor weight and fluke anchor, by rotary action on its pivot, drops out of the housing, and hydrostatic means operable when the torpedo has sunk to a given depth to control said braking means to permit the payout reel to pay out cable, while the torpedo remains at a given depth, till the weight and fluke anchor are at sea bottom.

10. In a device for mooring a normally buoyant torpedo at a selected depth in the sea after the torpedo is launched, in combination, a housing in the torpedo, a cable payout reel rotatably mounted in the housing, a cable at one end connected to the payout reel and wound on the reel, a sector shaped relatively heavy anchor weight pivotally mounted in the housing, the other, or outer, end of the cable being connected to the weight, a latch for holding the weight in position on its pivot in the housing, a fluke anchor mounted within the weight, a relatively short flexible connection between the weight and fluke anchor, braking means adapted to hold the payout reel against rotation under one operating condition and for controlling the rotation of the payout reel under another operating condition, means for releasing the latch for the anchor weight, said latch releasing means being operable a relatively short time interval after the torpedo is launched whereby the anchor weight with the fluke anchor housed within it by rotary action on its pivot drops out of the housing, means responsive to a predetermined distance of a relatively free drop of the anchor weight from the torpedo for firmly connecting the payout reel to the braking means to hold the payout against rotation and hydrostatic means operable when the torpedo has sunk to a given depth to control said braking means to control the rotation of the payout reel to pay out cable, while the torpedo remains at the given depth, till the weight and fluke anchor are at sea bottom, and means for locking the payout reel against rotation after the weight and fluke anchor are at sea bottom to thus maintain a given cable length between the weight and the torpedo.

11. In a device for mooring a normally buoyant torpedo at a selected depth in the sea after the torpedo is launched, in combination, a housing in the torpedo, a cable payout reel rotatably mounted in the housing, a cable at one end connected to the payout reel and wound on the reel, a sector shaped relatively heavy anchor weight pivotally mounted in the housing, the other, or outer, end of the cable being connected to the weight, a latch for holding the weight in position on its pivot in the housing, a fluke anchor mounted within the weight, a relatively short flexible connection between the weight and fluke anchor, braking means for the payout reel for holding the payout reel against rotation, means for releasing the latch for the anchor weight operable a relatively short time interval after the torpedo is launched whereby the anchor weight and fluke anchor, by rotary action on its pivot, drops out of the housing, and hydrostatic means operable when the torpedo has sunk to a given depth to control said braking means to permit the payout reel to pay out cable, while the torpedo remains at a given depth, till the weight and fluke anchor are at sea bottom, and means for locking the payout reel against rotation after the weight and fluke anchor are at sea bottom to thus maintain a given cable length between the weight and the torpedo.

12. In a device for mooring a normally buoyant torpedo at a selected depth in the sea after the torpedo is launched, in combination, a housing in the torpedo, a cable payout reel rotatably mounted in the housing, a cable at one end connected to the payout reel and wound on the reel, a sector shaped relatively heavy anchor weight pivotally mounted in the housing, the other, or outer, end of the cable being connected to the weight, a latch for holding the weight in position on its pivot in the housing, a fluke anchor mounted within the weight, a relatively short flexible connection between the weight and fluke anchor, braking means for the payout reel for holding the payout reel against rotation, means for releasing the latch for the anchor weight operable a relatively short time interval after the torpedo is launched whereby the anchor weight and fluke anchor, by rotary action on its pivot, drops out of the housing, and hydro-

static means operable when the torpedo has sunk to a given depth to control said braking means to permit the payout reel to pay out cable, while the torpedo remains at a given depth, till the weight and fluke anchor are at sea bottom, and means for severing the cable between the weight and torpedo when a target ship for the torpedo is within detection range of the torpedo.

13. In a device for mooring a normally buoyant torpedo at a selected depth in the sea after the torpedo is launched, in combination, a housing in the torpedo, a cable payout reel rotatably mounted in the housing, a cable at one end connected to the payout reel and wound on the reel, a sector shaped relatively heavy anchor weight pivotally mounted in the housing, the other, or outer, end of the cable being connected to the weight, a latch for holding the weight in position on its pivot in the housing, a fluke anchor mounted within the weight, a relatively short flexible connection between the weight and fluke anchor, braking means for the payout reel for holding the payout reel against rotation, means for releasing the latch for the anchor weight operable a relatively short time interval after the torpedo is launched whereby the anchor weight and fluke anchor, by rotary action on its pivot, drops out of the housing, and hydrostatic means operable when the torpedo has sunk to a given depth to control said braking means to permit the payout reel to pay out cable, while the torpedo remains at a given depth, till the weight and fluke anchor are at sea bottom, means for locking the payout reel against rotation after the weight and fluke anchor are at sea bottom to thus maintain a given cable length between the weight and the torpedo, and means for severing the cable between the weight and torpedo when a target ship for the torpedo is within detection range of the torpedo.

14. In a device for mooring a normally buoyant torpedo at a selected depth in the sea after the torpedo is launched, in combination, a housing in the torpedo, a cable payout reel rotatably mounted in the housing, a cable at one end connected to the payout reel and wound on the reel, a sector shaped relatively heavy anchor weight pivotally mounted in the housing, the other, or outer, end of the cable being connected to the weight, a latch for holding the weight in position on its pivot in the housing, a fluke anchor mounted within the weight, a relatively short flexible connection between the weight and fluke anchor, braking means adapted to hold the payout reel against rotation under one operationg condition and for controlling the rotation of the payout reel under another operating condition, means for releasing the latch for the anchor weight, said latch releasing means being operable a relatively short time interval after the torpedo is launched whereby the anchor weight with the fluke anchor housed within it by rotary action on its pivot drops out of the housing, means responsive to a predetermined distance of a relatively free drop of the anchor weight from the torpedo for firmly connecting the payout reel to the braking means to hold the payout against rotation and hydrostatic means operable when the torpedo has sunk to a given depth to control said braking means to control the rotation of the payout reel to pay out cable, while the torpedo remains at the given depth, till the weight and fluke anchor are at sea bottom.

15. In a device for mooring a normally buoyant torpedo at a selected depth in the sea after the torpedo is launched, in combination, a housing in the torpedo, a cable payout reel rotatably mounted in the housing, a cable at one end connected to the payout reel and wound on the reel, a sector shaped relatively heavy anchor weight pivotally mounted in the housing, the other, or outer, end of the cable being connected to the weight, a latch for holding the weight in position on its pivot in the housing, a fluke anchor mounted within the weight, a relatively short flexible connection between the weight and fluke anchor, braking means adapted to hold the payout reel against rotation under one operating condition and for controlling the rotation of the payout reel under another operating condition, means for releasing the latch for the anchor weight, said latch releasing means being operable a relatively short time interval after the torpedo is launched whereby the anchor weight with the fluke anchor housed within it by rotary action on its pivot drops out of the housing, means responsive to a predetermined distance of a relatively free drop of the anchor weight from the torpedo for firmly connecting the payout reel to the braking means to hold the payout against rotation and hydrostatic means operable when the torpedo has sunk to a given depth to control said braking means to control the rotation of the payout reel to pay out cable, while the torpedo remains at the given depth, till the weight and fluke anchor are at sea bottom, and means for severing the cable between the weight and torpedo when a target ship for the torpedo is within detection range of the torpedo.

16. In a device for mooring a normally buoyant torpedo at a selected depth in the sea after the torpedo is launched, in combination, a housing in the torpedo, a cable payout reel rotatably mounted in the housing, a cable at one end connected to the payout reel and wound on the reel, a sector shaped relatively heavy anchor weight pivotally mounted in the housing, the other, or outer, end of the cable being connected to the weight, a latch for holding the weight in position on its pivot in the housing, a fluke anchor mounted within the weight, a relatively short flexible connection between the weight and fluke anchor, braking means adapted to hold the payout reel against rotation under one operating condition and for controlling the rotation of the payout reel under another operating condition, means for releasing the latch for the anchor weight, said latch releasing means being operable a relatively short time interval after the torpedo is launched whereby the anchor weight with the fluke anchor housed on its pivot drops out of the housing, means responsive to a predetermined distance of a relatively free drop of the anchor weight from the torpedo for firmly connecting the payout reel to the braking means to hold the payout against rotation and hydrostatic means operable when the torpedo has sunk to a given depth to control said braking means to control the rotation of the payout reel to pay out cable, while the torpedo remains at the given depth, till the weight and fluke anchor are at seat bottom, means for locking the payout reel against rotation after the weight and fluke anchor are at sea bottom to thus maintain a given cable length between the weight and the torpedo, and means for severing the cable between the weight and torpedo when a target ship for the torpedo is within detection range of the torpedo.

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