Jan. 30, 1962 R. T. SORRELL 3,018,752

PROJECTILE ANCHORS AND ANCHORING EMPLACING DEVICES

Filed June 24, 1959 3 Sheets-Sheet 1

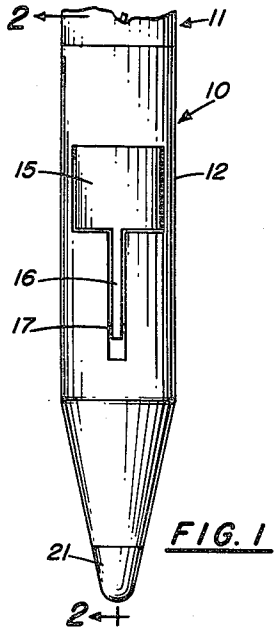


FIG. 1

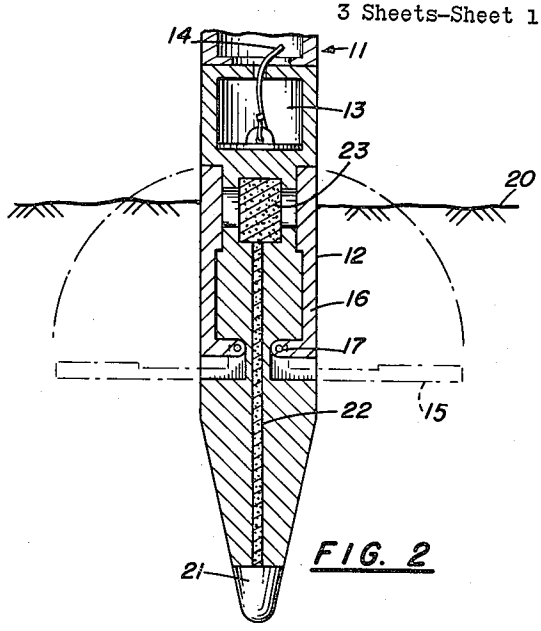


FIG. 2

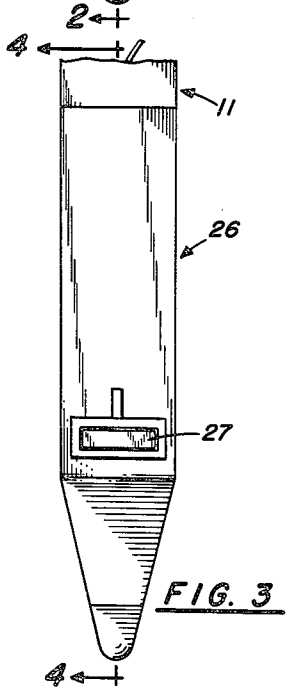


FIG. 3

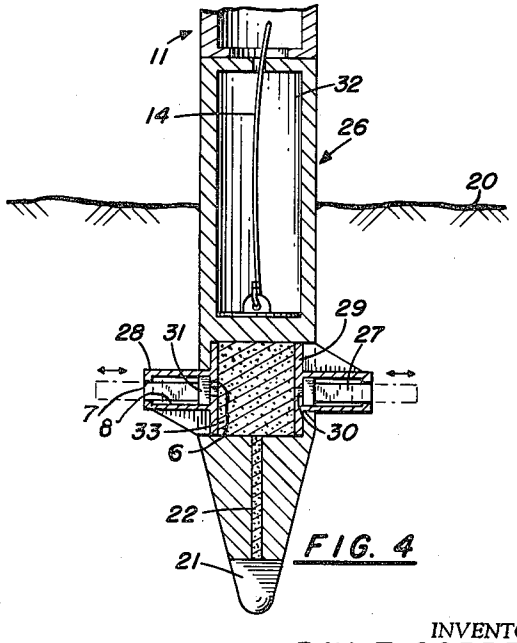


FIG. 4

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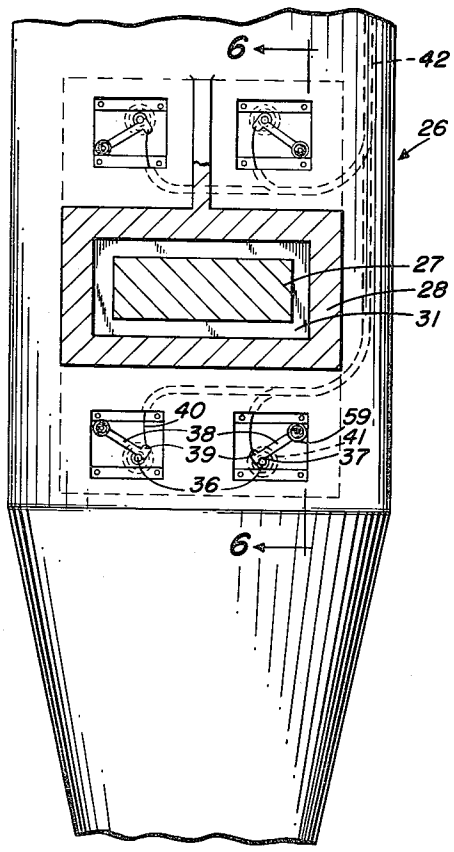


FIG. 5

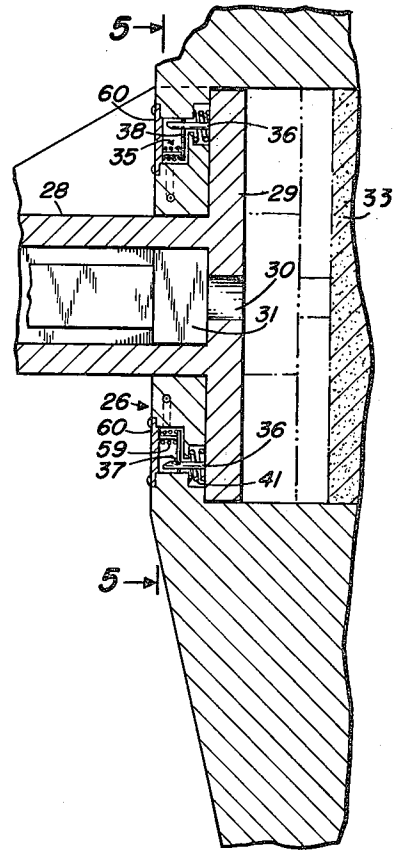


FIG. 6

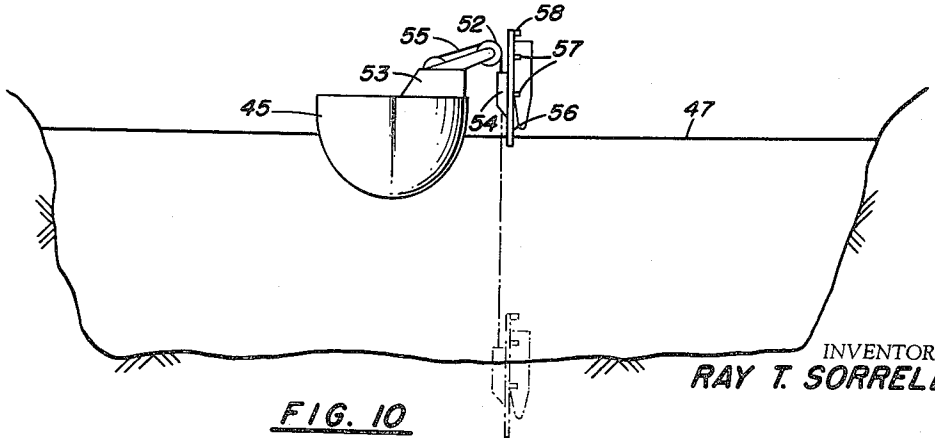


FIG. 10

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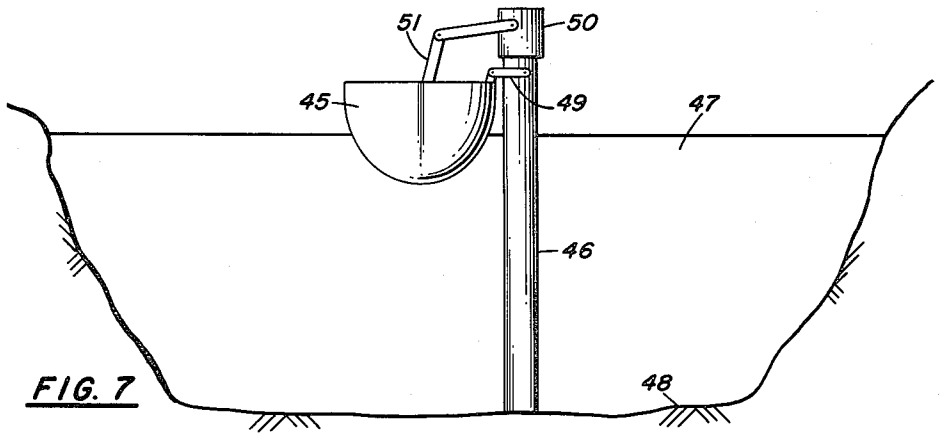


FIG. 7

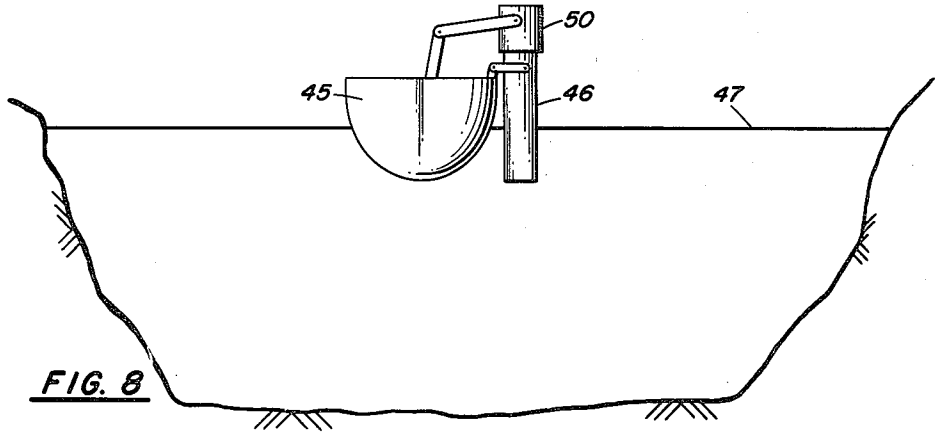


FIG. 8

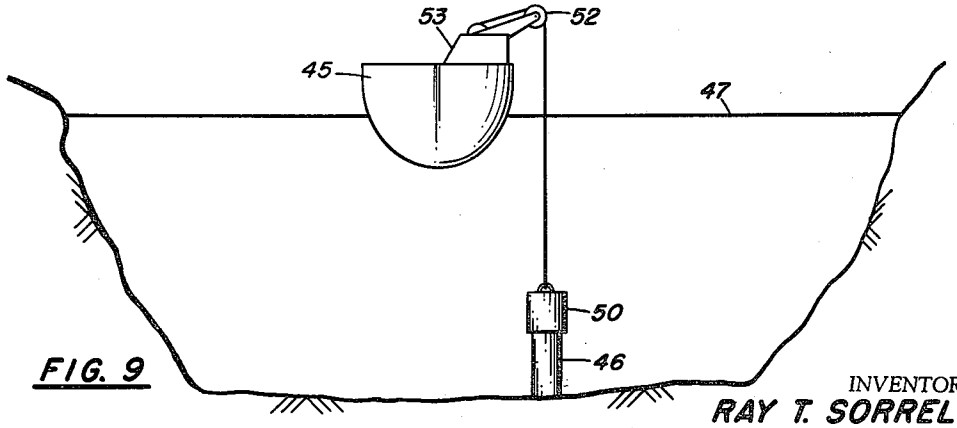


FIG. 9

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PROJECTILE ANCHORS AND ANCHORING EMPLACING DEVICES

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6 Claims. (Cl. 114—206)

The present invention relates to a projectile anchor and more particularly to anchors having rocket-fired engines for use in seaplanes.

In devices of this class heretofore devised, the preponderant weight of conventional anchors and anchor handling equipment cannot be tolerated by seaplanes nor can room be spared in the seaplane for the bulky size of conventional anchors. Moreover, such devices were not provided with feasible means for embedding an anchor deeply in soil and were therefore not entirely reliable.

The present invention is an anchor designed particularly for use with a seaplane and its related support equipment, i.e., beaching vehicles, rafts, docks, fuel caches, etc. The anchor is in the form of a projectile, with extendable vanes, and is fired from a seaplane or an anchor emplacing boat with a sufficiently high velocity to embed it deep enough in soil to obtain a desired holding power. By the use of a tube within the water, the propelled anchor is guided into any desired position for embedding it within the soil. The instant anchor and its guiding tube replace conventional anchoring equipment for seaplanes and may also be used to anchor any vehicle that travels on, under, or through the water, or any object placed in the water with expectations of having said object remain fixed in one position.

An object of the present invention is the provision of an anchor operative from a waterbase.

A further object of the invention is to provide an anchor with extendable vanes which may be extended after the anchor is embedded.

Another object is to provide an anchor of comparatively light weight for feasible transport in seaplanes.

A final object is the provision of an anchor in the form of a projectile which may be fired from a seaplane with sufficient velocity to embed the anchor in soil with a desired holding power.

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 shows a front view of an embodiment of the invention.

FIG. 2 illustrates a section of the device taken on the line 2—2 of FIG. 1 looking in the direction of the arrows with the vanes shown in phantom lines in extended position.

FIG. 3 shows a modification of the device.

FIG. 4 is a sectional view of the modified device taken on the line 4—4 of FIG. 3 looking in the direction of the arrows with the vanes shown in phantom lines in extended position.

FIG. 5 illustrates a sectional view, enlarged, of a modification to the device of FIG. 3 and taken along the line 5—5 of FIG. 6.

FIG. 6 is a sectional view of the modified device along the line 6—6 of FIG. 5.

FIGS. 7, 8, and 9 show various methods of emplacing a propelled anchor within the ocean floor and

FIG. 10 shows a method of placing a self-propelled anchor within the ocean floor.

Referring now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in FIG. 1 an anchor 10 designed to hold fast a seaplane or any vehicle that travels on, under or through a water media or any object placed in the water with expectations of having said object remain fixed in one limited area. The anchor 10 may be either self-propelled or propelled. The former type is characterized by the addition of rocket engines to the aft portion of the device so that the anchor may be emplaced in the soil with no external explosive charge. The propelled anchor, however, depends on an explosive charge for its propelling force. As shown in FIGS. 1 and 2, the anchor 10 is provided with a rocket engine 11 and preferably four vanes 12 which are normally folded flush with the anchor body during emplacement. A cable storage chamber 13 is provided in the after section of the anchor so as to permit rapid uncoiling of the cable 14 from the device. Each of the vanes 12 is comprised of a main portion 15 and an arm 16 with said arm being pivotally connected to a shaft 17. The anchor 10 is propelled or self-propelled into the ocean floor 20 by means to be described hereinafter. After the device has embedded itself, a time delay-contact detonating fuse 21, which is armed upon launching of the anchor, ignites explosive in a flash channel 22 placed within the midportion of the anchor and detonates the powder in storage chamber 23. This explosive charge partially opens the vanes 12 and a vertical pull on the cable 14 will then pull the vanes completely open into the position shown in phantom lines in FIG. 2, thus firmly setting the anchor in position. Although the anchor described above is primarily intended for permanent installation and designed to resist dynamic vertical forces, it can readily be seen that it could be retrieved by exerting a vertical force sufficient to break the vanes 12, if so desired.

FIGS. 3 and 4 disclose an anchor 26 modified so as to offer a comparatively high resistance to lateral forces in addition to resisting a vertical force with equal effectiveness. The anchor includes a plurality of vanes 27 each of said vanes being enclosed within a sleeve member 28. Sleeve member 28 being a rectangular member having an internal recess 8 with a forward aperture 7 which permits the vanes 27 to extend therethrough. Formed integrally with the sleeve members 28 are plate members 29 having apertures 30 therein extending to the base of said sleeves. The enclosure formed by plates 29 functions as a powder chamber upon placing of an explosive therein. The vanes 27 are rectangular in cross-section with an enlarged head 31 adjacent the plates 29 and extend for the length of the sleeve. A storage chamber 32 for the cable 14 is provided in the after portion of the anchor similar to that shown in FIGS. 1 and 2. Further, a time delay contact fuse 21 and flash chamber 22 are provided in the nose portion and midportion of the anchor respectively. The fuse 21 is armed as the anchor 26 leaves the launching device and is detonated as the anchor penetrates the soil 20. Due to the time delay feature in the fuse, the anchor will have ample time to reach the desired depth before the powder 33 between plates 29 is detonated. Upon ignition of powder 33, the gases which are formed exit via apertures 30 and act on the rearward face 6 of the vanes 27, and the vanes 27 are thereby extended laterally into the water bed and the anchor thereby resists both lateral and vertical forces. The anchor 26 is designed primarily

for permanent installation; however, modifications may be made so that the anchor may then be retrievable by the emplacing vessel.

Attention is directed to FIGS. 5 and 6 in which such a modification is achieved. The dotted lines in FIG. 6 show the position of the plate **29** before the powder charge is ignited. A plurality of spring assemblies **35** are provided with each vane and each assembly is fitted within a recess formed in the inner rim surface of the casing of anchor **26**. Mounted centrally within the recess is a pin **36** which is fixedly secured to the outer face of plate **29** having a slot **37** formed in an edge of one side of said pin for reception of a key member **38**. A coil spring **59** applies a torque to pin **36** and holds said pin in lock position. Forming a stop for the spring **59** to prevent its expansion is a removable plate **60** mounted flush with the outer surface of the anchor **26**. An aperture **39** is formed in the key **38** through which a cable **40** is passed. Surrounding the pin **36** and held in compressed condition by key **38** is a spring **41**. The pin **36**, in its lock position, is held in position by the torque applied by coil spring **59**. The spring **59** is the motivating force which insures that key member **38** will engage slot **37** in the pin **36** after vane **27** is fully extended. The pin **36** is shaped as an inclined plane in its forward part, and will therefore direct the key member **38** up and out of the way momentarily, so as to allow slot **37** to be positioned under key member **38** after sleeve member **28** and vane **27** is extended. Coil spring **59** then rotates key member **38** into slot **37** when sleeve member **28** and vane **27** is fully extended. Each of the cables **40** connected to their respective keys **38** is formed into a single cable positioned within a channel **42** leading to the cable storage chamber **32** of FIG. 4. A pull on the control cable **40** rotates keys **38** and allows the springs **41** to expand, thereby pushing the plates **29**, sleeves **28** and vanes **27** back into the anchor body to facilitate easy recovery of the anchor.

It is to be noted that both of the anchors shown in FIGS. 1 and 3 may be either propelled by an external source or self-propelled by the addition of rocket engines **11**. By the use of a rocket engine, it is possible to emplace the anchor with no external explosive charge, as is necessary in the propelled type of anchor.

For proper emplacement of a propelled anchor such as that described heretofore, it is required that suitable emplacing equipment be utilized. The vessel **45** such as a seaplane, shown in FIGS. 7, 8, and 9, transports a collapsible, telescoping tube **46** adapted to be extended vertically into the water **47** to the bed **48** of the water and is pivotally held in position by bracket means **49**. A breechblock **50** is positioned over the launching tube **46** and, by means of a mounting fixture comprised of pivotally connected arms **51**, the anchor is placed within the tube and fired into the bed of the water. In addition to holding the anchor in position for firing, the tube **46** also acts as a guide for the anchor's emplacement position.

As shown in FIG. 8, the tube **46** may be formed of lesser length and extend just below the surface of the water, if so desired, so as to permit free entry of the anchor. Another method of emplacing the anchor is shown in FIG. 9 and includes the positioning of a short launching tube **46** on the ocean floor with the anchor enclosed therein. By means of pulley system **52** and its associated support **53** the tube **46** and breechblock **50** are lowered into position. The latter method permits the anchor to be emplaced from a position near the bed of the water for greater accuracy.

In order to emplace anchors of the self-propelled type, the method shown in FIG. 10 is provided. The vessel **45** is equipped with a pulley system **52** and support **53** similar to that shown in FIG. 9. In addition, an attaching fixture **54** is secured to the cable **55** and is, in turn, affixed to the launcher pad **56**. By means of a plurality of clasps **57**, the anchor is connected to the launcher and is in proper position for firing. A power source (not shown) within the vessel **45** provides igniter mechanism **58** with energy to start the rocket engine. The anchor travels to the water bed carrying the cable **55** where it embeds itself and thereby holds fast the vessel **45**. In each of the methods shown in FIGS. 7 through 10, it is to be realized that a small explosive charge is ignited within the anchor after embedding so as to extend the vanes outwardly and thereby hold the anchor in position in the water bed.

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.

What is claimed is:

1. In an anchor having forward and after portions and a longitudinal axis, the combination of an anchor casing, a cable secured to said casing and initially stored in a chamber in the after portion of said casing, a time-delay fuse forming the nose of said anchor and adapted to ignite subsequent to launching of the anchor, an explosive charge within the casing adapted to be detonated by said fuse, a plurality of plate members abutting said charge, each of said plate members being provided with an aperture to permit the exit of gases, a plurality of sleeve members integrally connected to said plates and lying normal to the longitudinal axis of said anchor, a vane within each of said sleeves and adapted to be thrust laterally by the detonation of said charge and thereby secure said anchor against lateral and vertical forces.

2. The anchor of claim 1 and a rocket engine secured to the after portion of said anchor for propelling said anchor to a desired embedded position.

3. The anchor of claim 1 and means to retract said sleeve members and vanes to their initial position for free recovery of said anchor.

4. In an anchor adapted to be laid in the bed of a body of water, said anchor having a forward and after portion, an anchor casing having a plurality of vanes secured thereto, said vanes being seated in an initial position and susceptible of movement to a second position in which said vanes are adapted to support the anchor in a stabilized position in said bed, means effective to move the vanes to said second position, said means comprising an explosive charge, a time-delay fuse pre-set to ignite subsequent to the embedding of the anchor in said bed, said charge being detonated by said fuse to create an explosive force sufficient to effect movement of the vanes to said second position to hold the anchor in stable condition, and a rocket engine secured to said after portion of the anchor for propelling the anchor to a desired embedded position in the bed of the body of water.

5. In an anchor adapted to be launched from a water vessel into a bed of a body of water, an anchor casing having a longitudinal axis and forward and after portions, a plurality of vanes pivotally mounted on the casing and initially in flush relation with the outer surface of the casing, a cable initially stored within a chamber in the after portion of the casing, a time-delayed fuse forming the nose of the casing and ignitable subject to launching of the anchor, an explosive charge within the casing and detonated by said fuse for moving said vanes to a working position so that the vanes are pivoted to a position normal to said longitudinal axis of the casing to hold the anchor securely in place in the bed of the body of water, and a rocket engine carried by the after portion of the anchor for propelling the anchor to a desired embedded position.

6. An anchor adapted to be launched into a body of water comprising a casing having a recess formed therein, a cable initially stored within said recess and connected to said casing, a rocket engine secured to one end of the

casing for propelling the anchor through said body of water, a time-delay fuse secured to the other end of said casing and initiated subsequent to the launching of the anchor into the water, a plurality of vanes movably mounted on the casing and actuated in response to one explosive force applied thereto, and explosive means disposed within the casing in proximate relation with respect to said vanes and initiated by said time-delay fuse for applying said explosive to said vanes.

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