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DYNAMIC ANCHOR

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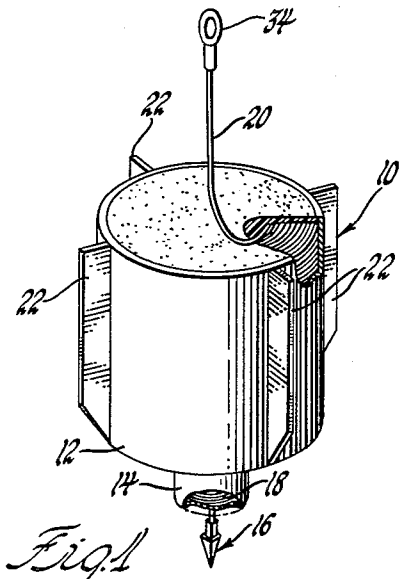

Fig. 1

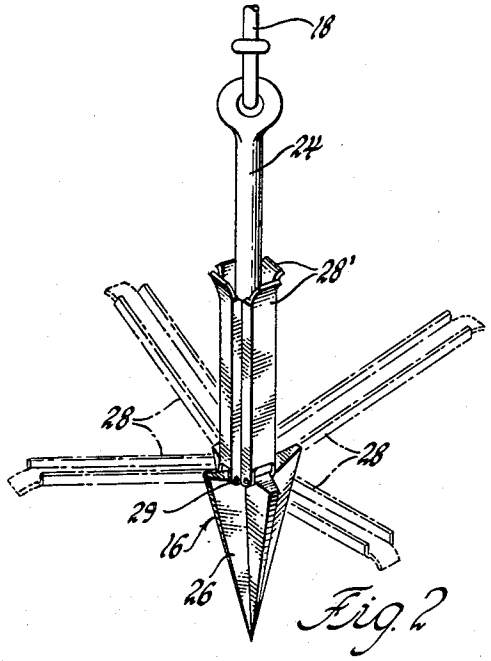

Fig. 2

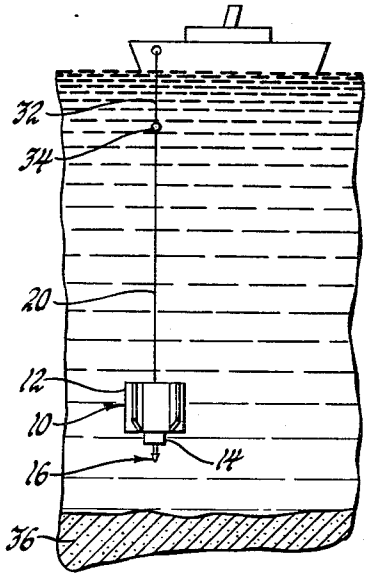

Fig. 3

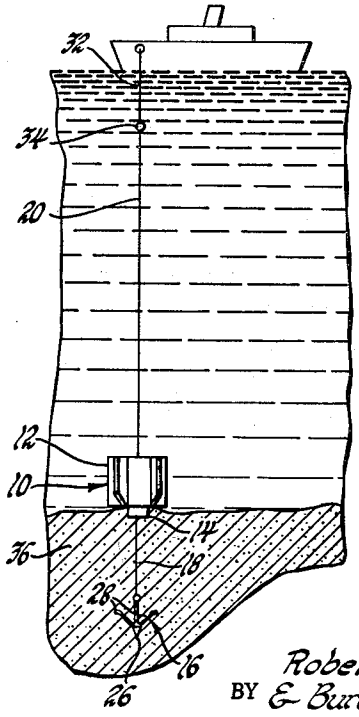

Fig. 4

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This invention relates to anchoring mechanisms and, more particularly, to a system that is especially adapted for use at great depths.

Conventional anchoring systems employ an anchor at the end of a chain which is contained on a ship-mounted winding mechanism. Therefore, the speed of descent of the anchor is determined by the ability of the winding mechanism to pay out the anchor and chain, the weight of the anchor and payed-out chain, and the water resistance operating against the anchor and payed-out chain as it descends through the water. The resistance caused by the winding mechanism itself can be avoided by throwing the whole length of chain into the water at once, but the water resistance will still operate against the anchor and chain as it descends through the water. Therefore, it is seen that the biggest factor in determining the speed of descent of the anchor is the resistance of the water against the payed-out chain as it descends through the water. This resistance amounts to a sizable force on the long chains that are needed for depth anchoring. As a result, the speed of descent and the penetrating thrust of a conventional depth anchor are very small values and the anchor may fail to penetrate the anchoring surface when it accomplished contact with it.

The subject invention presents a novel depth anchoring system in that the connecting means between the anchoring structure and the ship is carried with the anchor and fed therefrom as the structure descends through the water. Thus, the water resistance has no effect on the connecting means, as the connecting means remains stationary when it is payed out into the water. In other words, the connecting means undergoes no motion in a vertical direction in the water once it has left the descending anchor structure. As a result, the anchor can attain a high velocity during descent which will enable it to penetrate anchoring surfaces at great depths.

Thus, it is an object of this invention to provide an anchoring system with a high speed of descent.

It is another object of this invention to provide an anchoring system in which the connecting means between the anchoring structure and the ship is wound within the anchoring system itself to descend therewith thereby reducing the effect of the water resistance on the payed-out connecting means and resulting in an increased velocity for the anchoring structure.

It is a further object to provide an anchoring system which will develop a high thrust force such as to enable it to penetrate an anchoring surface at great depths, thereby making secure anchoring at great depths feasible.

Other objects, features and advantages will become apparent upon reference to the succeeding detailed description and the drawings depicting the preferred embodiment thereof, wherein:

FIGURE 1 is a perspective view of the anchoring system;

FIGURE 2 is an enlarged perspective view of the anchoring shaft portion of the anchoring system;

FIGURE 3 is a schematic sketch showing the anchoring system during its descent from a ship; and

FIGURE 4 is a schematic sketch of the anchoring system after it has reached the anchoring surface and the anchoring shaft has penetrated the anchoring surface.

More particularly, FIGURE 1 shows the anchoring

system 10. It is seen that the main portion of the anchoring system consists of a large upper housing member 12 and a small lower housing member 14 attached together. Located adjacent to the bottom of the lower housing 14 is the anchoring shaft structure 16. The anchoring shaft structure 16 is attached to the lower housing member 14 by a connecting cable 18 which is wound within the lower housing 14. Wound within the upper housing 12 is the connecting cable 20, which connects the anchoring system with an upper reference point, usually a ship. The top portion of the upper housing 12 is completely open to allow for the free and easy unwinding of the connecting cable 20. It is to be noted that all void spaces in the wind pattern of the connecting cable 20 in the upper housing member 12 are filled with a foam substance, and that the upper surface of the upper housing member 12 will also be formed by this foam substance. This, then, forms a foam encapsulation to restrict the pay-out of the connecting cable 20 from the upper housing member 12 during its descent. This foam substance will be a known type, such as styrofoam.

The connecting cable 20 is twisted as it is wound into the upper housing 12 so that it will pay out in a neutral or unkinked pattern. Thus the cable 20 pays out in a straight line thereby further reducing the effect of the water resistance and enables the housing to attain a high velocity. The upper housing member 12 is further provided with flanged members 22 which provide the anchoring system with stability as it descends through the water. A further function of the foam substance, then, is to maintain the connecting cable 20 in the prestressed position, so that it pays out in the aforementioned neutral or straight pattern.

The anchoring shaft structure 16 is shown in an enlarged detailed view in FIGURE 2. The structure consists of a shaft 24 with a spearhead 26 at its lower extremity. The structure is also seen to have four foldable arms 28 pivoted at 29 which are shown in the open or anchored position. The arms 28 are shown in the closed or descending position at 28'.

As seen in FIGURE 3 the subject anchoring system may be attached to the end of the ship's normal anchoring cable 32 and released from the deck. This form of attachment allows the ship's normal anchoring system to provide an initial length of cable which can vary according to the anchoring depth length of cable in the drum 12. It should be realized that the subject anchoring system is auxiliary to the normal shallow depth system. A suitable connecting means 34 is provided at the upper extremity of the connecting cable 20 to effect this purpose.

It is seen from the preceding description that when anchoring is desired and the subject anchoring system is thrown overboard, regardless of whether it is attached to the ship itself or to the end of the ship's normal anchoring means, the whole anchoring system 10 will descend into the water. Now, as the system descends through the water, connecting cable 20 is payed out from the top of the upper housing member 12. Thus, as it is payed out, the connecting cable 20 does not move in a vertical direction through the water, and, therefore, is not affected by the resistance of the water. As seen in FIGURE 3, the anchoring shaft structure remains attached to the anchoring system as it descends through the water. But, as seen in FIGURE 4, when the anchoring system reaches the anchoring surface 36, the anchoring shaft structure 16 will become disengaged from the lower housing 14 and with the thrust imparted to it by the high velocity of the anchoring system it will penetrate the anchoring surface 36. As this penetration occurs the lower connecting cable 18 unwinds through the lower surface of the lower housing member 14, much the same as the connecting cable

20 unwinds from the upper housing member 12. After the anchoring shaft structure 16 has reached its maximum depth within the anchoring surface 36 any upward thrust on it caused by movement of the ship or raising of the cable will cause the arm members 28 to fold down to their open position. Thus, the anchoring structure will be secured at the maximum depth possible.

Therefore, it can be seen that the subject anchoring system provides an anchoring device which will attain the maximum velocity and maximum thrust possible for a given depth. And as a result, it will enable the maximum penetration into the anchoring surface at that given depth. Thus, it is seen that the subject device will have special use when the anchoring surface is of such a substance that a regular anchoring device has difficulty entering, because the subject device with its higher thrust will have a better chance of penetrating such a surface. This same thrust force will also enable the anchor to attain the deepest penetration possible thereby affording the most substantial anchoring condition available. Because of this the subject invention will have special application for anchoring in very deep water where the maximum releasing forces will occur.

While the invention has been illustrated with respect to its use as an anchor for a ship it should be obvious to those skilled in the art to which the invention pertains that it would have use in any application where a high speed anchoring device is necessary and that many changes and modifications may be made thereto without departing from the scope of the invention.

We claim:

1. A free-fall high velocity depth anchor assembly for a ship comprising, in combination:
upper and lower attached droppable housing members;
a first connecting cable received in said upper housing member and secured at one end thereto and at the other end to said ship, said first cable being unreeved from said upper housing member by said securement to said ship as said upper housing member descends on dropping thereof;
an anchoring shaft having one end adjacent to said lower housing member and terminating at the other end thereof in a spearhead, said anchoring shaft being adapted to penetrate the sea bottom due to the free-fall velocity of said assembly when said housing reaches said sea bottom;
a second connecting cable received in said lower housing member and secured at one end thereto and at the other end to said anchoring shaft, said second cable being unreeved from said lower housing member as said anchoring shaft penetrates said sea bottom;
a foam substance in said upper and lower housing members enveloping the wind pattern of said cables and lightly binding the cables to the housings thus allowing unreeving of the cables with a low resistance thereto but restraining the wound cables against bulk discharge from said housings;
and a plurality of arm members pivotally attached to said anchoring shaft, said arm members being extendable from said anchoring shaft when said anchoring shaft reaches maximum penetration and any upward thrust caused by movement of said ship or raising of said cable acts on said anchoring shaft.

2. A free-fall high velocity depth anchor assembly for a ship comprising:
a droppable housing;
a connecting cable received in said housing and secured at one end thereto and at the other end to said ship, said cable being unreeved from said housing by said securement to said ship as said housing descends on dropping thereof;
an anchoring means attached to said housing and adapted to penetrate the sea bottom due to the free-fall velocity of said assembly when said housing reaches said sea bottom;

and an impositive connection between said anchoring means and said housing securing said anchoring means to said housing during the descent thereof and allowing said anchoring means to continue its descent upon abrupt deceleration of said housing means.

3. A free-fall high velocity depth anchor assembly for a ship comprising:
a droppable housing;
a connecting cable received in said housing and secured at one end thereto and at the other end to said ship, said cable being unreeved from said housing by said securement to said ship as said housing descents on dropping thereof;
a foam substance contained in the housing enveloping the wind pattern of said cable and lightly binding the cable to the housing thus allowing unreeving of the cable with a low resistance thereto but restraining the wound cable against bulk discharge from said housing;
an anchoring means attached to said housing and adapted to penetrate the sea bottom due to the free-fall velocity of said assembly when said housing reaches said sea bottom;
and an impositive connection between said anchoring means and said housing securing said anchoring means to said housing during the descent thereof and allowing said anchoring means to continue its descent upon abrupt deceleration of said housing means.

4. A free-fall high velocity depth anchor assembly for a ship comprising:
a droppable housing;
a connecting cable received in said housing and secured at one end thereto and at the other end to said ship, said cable being unreeved from said housing by said securement to said ship as said housing descends on dropping thereof;
an anchoring means attached to said housing and adapted to penetrate the sea bottom due to the free-fall velocity of said assembly when said housing reaches said sea bottom;
an impositive connection between said anchoring means and said housing securing said anchoring means to said housing during the descent thereof and allowing said anchoring means to continue its descent upon abrupt deceleration of said housing means;
and a plurality of extendable arm members attached to said anchoring means, said arm members being extendable from said anchoring means when said anchoring means reach maximum penetration.

5. A free-fall high velocity depth anchor assembly for a ship comprising:
a droppable housing;
a connecting cable received in said housing and secured at one end thereto and at the other end to said ship, said cable being unreeved from said housing by said securement to said ship as said housing descends on dropping thereof;
a foam substance contained in the housing enveloping the wind pattern of said cable and lightly binding the cable to the housing thus allowing unreeving of the cable with a low resistance thereto but restraining the wound cable against bulk discharge from said housing;
an anchoring means attached to said housing and adapted to penetrate the sea bottom due to the free-fall velocity of said assembly when said housing reaches said sea bottom;
an impositive connection between said anchoring means and said housing securing said anchoring means to said housing during the descent thereof and allowing said anchoring means to continue its descent upon abrupt deceleration of said housing means;
and a plurality of extendable arm members attached to said anchoring means, said arm members being ex-

tendable from said anchoring means when said anchoring means reaches maximum penetration.

6. A free-fall high velocity depth anchor assembly for a ship comprising, in combination:

upper and lower attached droppable housing members;

a first connecting cable received in said upper housing member and secured at one end thereto and at the other end to said ship, said first cable being unreeved from said upper housing by said securement to said ship as said upper housing member descends on dropping thereof;

an anchoring shaft having one end adjacent to said lower housing member and terminating at the other end thereof in a spearhead, said anchoring shaft being adapted to penetrate the sea bottom due to the free-fall velocity of said assembly when said housing reaches said sea bottom;

a second connecting cable received in said lower housing member and secured at one end thereto and at the other end to said anchoring shaft, said second cable being unreeved from said lower housing member as said anchoring shaft penetrates said sea bottom;

and an impositive holding means securing said second cable within said lower housing during the descent of said housing and anchoring means and releasing said second cable upon abrupt deceleration of said housing, thereby allowing said anchoring shaft to continue its descent into said sea bottom.

7. A free-fall high velocity depth anchor assembly for a ship comprising, in combination:

upper and lower attached droppable housing members;

a first connecting cable received in said upper housing member and secured at one end thereto and at the other end to said ship, said first cable being unreeved from said upper housing by said securement to said ship as said upper housing member descends on dropping thereof;

an anchoring shaft having one end adjacent to said lower housing member and terminating at the other end thereof in a spearhead, said anchoring shaft being adapted to penetrate the sea bottom due to the free-fall velocity of said assembly when said housing reaches said sea bottom;

a second connecting cable received in said lower housing member and secured at one end thereto and at the other end to said anchoring shaft, said second cable being unreeved from said lower housing member as said anchoring shaft penetrates said sea bottom;

a foam substance in said upper and lower housing members enveloping the wind pattern of said cables and lightly bending the cables to the housing thus allowing unreeving of the cables with a low resistance thereto but restraining the wound cables against the bulk discharge from said housings, said foam creating an impositive connection between said second cable and said lower housing securing said cable within said housing during the descent of said housing and said anchoring shaft and releasing said cable upon abrupt deceleration of said housing, thereby allowing said anchoring shaft to continue its descent into said sea bottom.

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