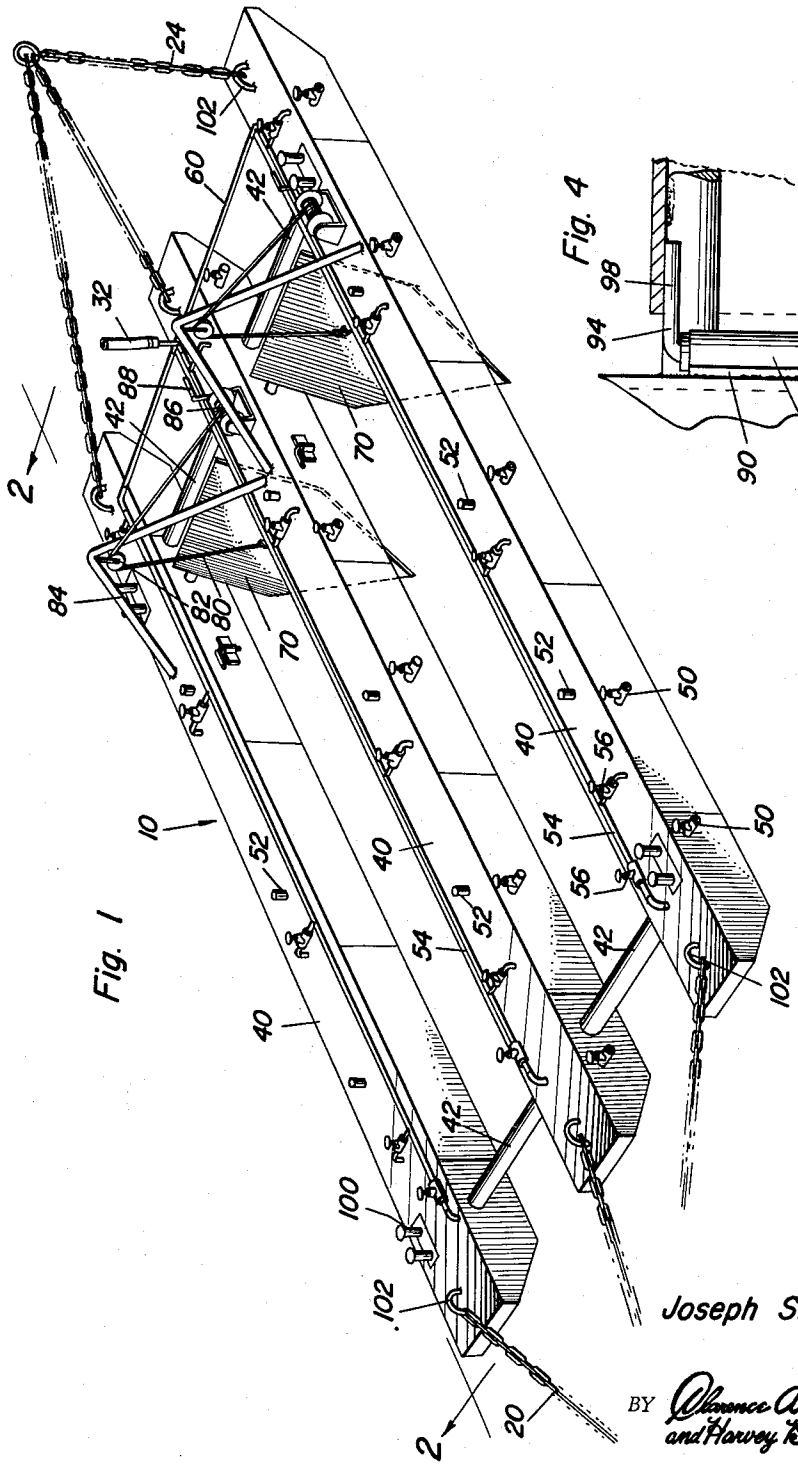
Jan. 21, 1964 J. S. SAWYER 3,118,416

HEAVY DUTY SUBMARINE TYPE ANCHOR

Filed July 25, 1961 3 Sheets-Sheet 1



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HEAVY DUTY SUBMARINE TYPE ANCHOR

Filed July 25, 1961 3 Sheets-Sheet 2

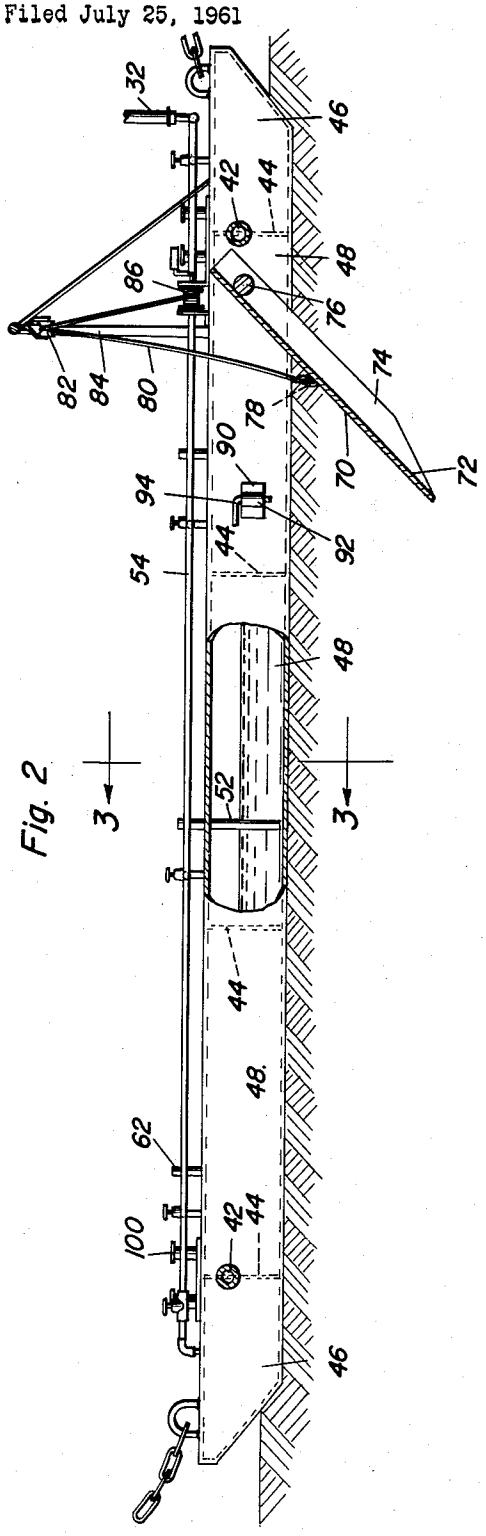


Fig. 2

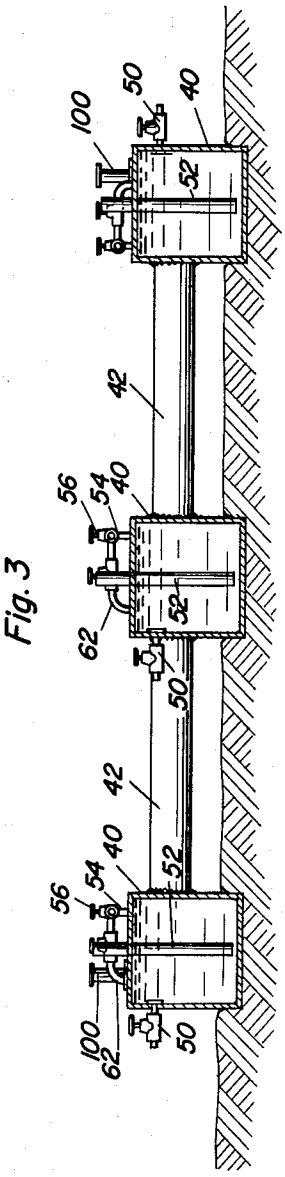


Fig. 3

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HEAVY DUTY SUBMARINE TYPE ANCHOR

Filed July 25, 1961 3 Sheets-Sheet 3

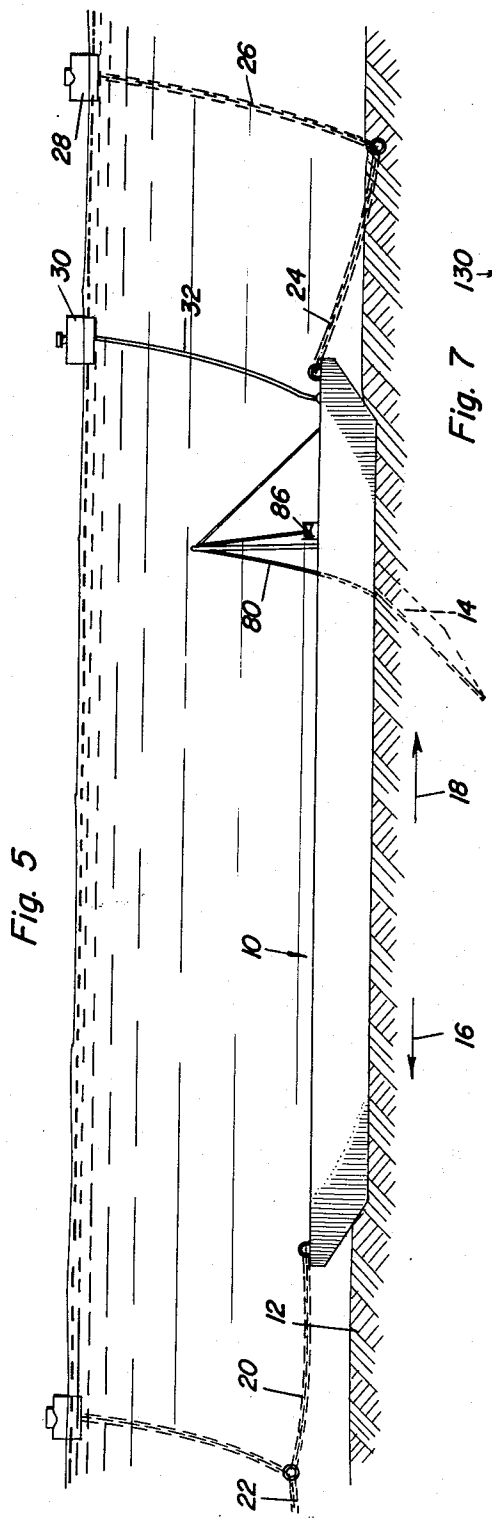


Fig. 5

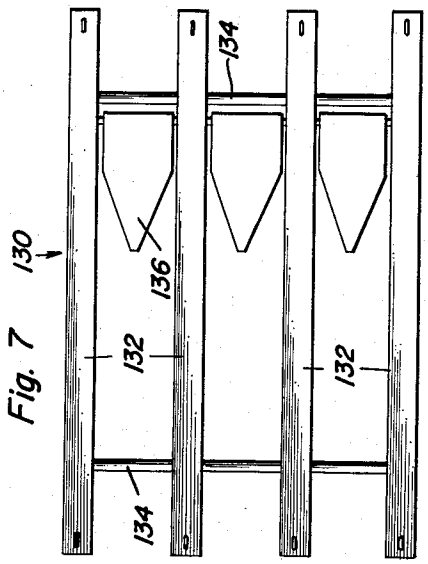


Fig. 7

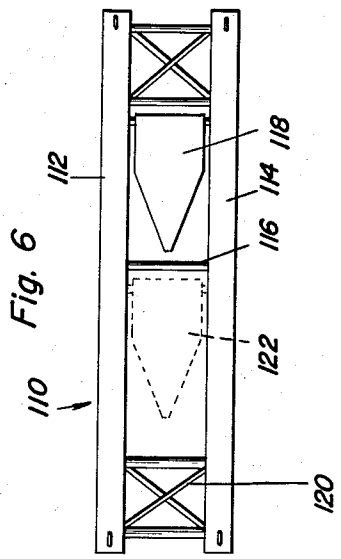


Fig. 6

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3,118,416

HEAVY DUTY SUBMARINE TYPE ANCHOR

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7 Claims. (Cl. 114—206)

This invention comprises a novel and useful heavy duty submarine type anchor and more particularly pertains to an anchoring device of sufficient mass to afford a very strong and heavy duty anchor especially adapted for the mooring of off-shore drilling barges or other devices in which the anchoring force required is relatively enormous.

A further object of the invention is to provide a heavy duty anchor which is rendered maneuverable and mobile by rendering the anchor selectively floatable or submersible.

Another object of the invention is to provide an anchor construction in accordance with the foregoing objects which may be readily made in any desired size and having any desired anchoring capacity by merely adding thereto further unitary components.

A still further important object of the invention is to provide a submersible anchor which will have a maximum resistance to movement in one direction to afford the maximum anchoring power, and shall have a minimum resistance to move in the other direction to thereby enable the anchor to be withdrawn from its anchoring position with ease.

Still another important object of the invention is to provide a submarine anchor which when rendered buoyant may be readily maneuvered upon the surface with a minimum interference of obstructions outside of its body, and may be easily submerged to the bottom or rendered buoyant to lift the same from the bottom as desired.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a perspective view of a preferred embodiment of heavy duty submarine anchor in accordance with this invention, the flukes or palms of the anchor being shown in their operative anchoring position;

FIGURE 2 is a vertical longitudinal sectional view taken substantially upon the plane indicated by section line 2—2 of FIGURE 1 and showing in elevation one of the pontoon components of the anchor with parts being broken away and shown in vertical section, the anchor being shown on the sea bottom and with the fluke in its anchoring position;

FIGURE 3 is a vertical transverse sectional detail view taken substantially upon the plane indicated by section line 3—3 of FIGURE 2 and showing all of the pontoon components of the anchor in anchoring position upon the sea bottom;

FIGURE 4 is a detail view of the means by which the anchor flukes may be locked in their raised or inoperative position;

FIGURE 5 is a view in elevation showing the manner in which the anchor is positioned for operation together with the manner in which surface vessels or objects are secured to the anchor;

FIGURE 6 is a somewhat diagrammatic view in top plan of a modified construction of anchor in its simplest form, an additional fluke member being shown in dotted lines therein;

FIGURE 7 is a view in top plan of still another embodiment of anchor incorporating therein four pontoons with three flukes.

Reference is made first to the embodiment of the submarine anchor disclosed in FIGURES 1–5 of the drawings. In FIGURE 5, the anchor indicated generally by the numeral 10 is shown resting upon the sea bottom 12 in operative position and with its flukes 14 embedded in the sea bottom to provide a maximum resistance to a pull in the direction indicated by the arrow 16, while affording a minimum resistance to movement in a direction indicated by the arrow 18. With the anchor submerged upon the bottom, a bridle 20 connects to the anchor, anchor lines 22 so that the objects to which these lines are attached may have maximum resistance opposed to movement in the direction indicated by the arrow 16. A further bridle 24 secured to the other end of the anchor is connected to a line or chain 26 carried by a surface vessel 28 and by means of which the anchor may be moved in the direction indicated by the arrow 18 to disengage the flukes of the anchor. Shown at 30 is a surface vessel containing pumps and other equipment for supplying compressed air as by a conduit 32 into the various tanks formed within the anchor 10 in order to vary its buoyancy, its trim and the like.

Referring next primarily to FIGURE 1 in conjunction with FIGURES 2 and 3 it will be observed that the anchor 10 consists of an open framework or catamaran type of hull, being formed of a plurality of longitudinally extending pontoons each indicated by the numeral 40 and which are rigidly connected together in side-by-side spaced relation as by combined spacing and bracing struts 42. In the embodiment illustrated these struts are formed at the front and rear end only of the pontoon but it will be understood that any desired number of the struts may be provided depending upon the forces to be applied to the anchor and the uses for which the anchor is intended.

The pontoons 40 are hollow elongated hull components and are divided longitudinally into a plurality of separated compartments or tanks by suitable bulk heads shown in dotted lines at 44 in FIGURE 2. Preferably the arrangement is such that there are provided compartments 46 at the two ends of each pontoon which comprise trim tanks by which the trim of the pontoon and thus of the entire anchor may be accurately controlled and adjusted. The mid-portion of the pontoons comprise a plurality of ballast tanks 48, any desired number of these tanks being provided. As will be appreciated, the trim tanks and the ballast tanks of each of the components 40 of the anchor may be individually regulated.

Each compartment of each pontoon, whether comprising a trim tank or a ballast tank, is provided with a valve controlled combination vent and seacock 50 which may be manually operated. In addition there may be provided a seacock in each compartment disposed in the bottom thereof, not shown, and which may be manually operated as by a reach rod to enable flooding of any desired compartment.

A vent pipe 52 is also provided for each compartment of the ballast tanks and has its lower end terminating closely

adjacent the bottom wall of its compartment. These vent pipes equalize the pressure between the sea water and the interior of the ballast tanks and serve to discharge the ballast when the ballast tanks are blown.

An air pressure line **54** extends along the length of the top surface of each pontoon and has individual control valves **56** whereby pressure air may be supplied to each compartment to blow the ballast or adjust the trim. A manifold line **60** communicates with each pressure line **54** and in turn communicates with the flexible conduit whereby compressed air from the surface equipment may be supplied to the various pontoon compartments.

Through the conduit pipes **62** compressed air may be supplied from the control valves **56** to the selected compartment to blow ballast therefrom or to vent the compartment to the air during flooding, either by directly venting the valve **56** to the atmosphere or by reversal of flow through the flexible conduit **32**.

As so far described, it will now be apparent that when the ballast is blown from the ballast tanks there will be sufficient buoyancy to cause the entire anchor to buoyantly float at the surface, where it can be maneuvered in the same manner as a barge or other powerless marine vessel. When it is desired to submerge the anchor as for example when the anchor has been towed to the proper position where its services will be required, it is merely necessary to open the seacocks **50** and valve controlled air vents **62** on the top surface of each of the tanks whereupon ballast will be taken into the tanks and the anchor will settle to the sea bottom. When it is desired to raise the anchor, this may be effected either by applying a force to the bridle **24** in the direction indicated by the arrow **18** of FIGURE 5 thereby releasing the flukes and also lifting the anchor, or by blowing the ballast from the tanks whereupon the inherent buoyancy of anchor will cause the same to float to the surface.

Between each of the pontoons there is provided a fluke **70** which is adapted to engage into the sea bottom and thus securely anchor the device against movement in a direction indicated by the arrow **16**. As will be more readily apparent from FIGURE 2, in conjunction with FIGURE 1, each fluke consists of an elongated plate-like member having a pointed lower extremity **72** adapted to penetrate the sea bottom to a considerable depth. Along its opposite sides the plate-like body of the fluke has stiffening downturned flanges **74** and at the upper end of the fluke a transverse axle **76** extending from pontoon to pontoon forms a hinge or pivot means for pivoting movement of the fluke. The weight of the anchor fluke is sufficient to cause the same to drop to its lowered operative position. In order to raise the fluke there is secured upon its top surface a lifting eye **78** to which a cable **80** is attached, this cable passing over a pulley **82** carried by a derrick **84** which straddles the space between two adjacent pontoons. The cable **80** after passing over the pulley **82** is engaged with a winch **86** which may be manually operated as indicated by the handle **88**. In this manner each of the flukes may be individually raised as desired, so that they will be disposed completely between adjacent pontoons and also positioned between the top and bottom surfaces of the latter to offer no hindrance to navigation by the anchor assembly which now can operate as a floating platform or barge.

In order to retain the anchor flukes in their raised position, suitable brackets **90** are secured to the adjacent sides of adjacent pontoons which brackets have sleeves **92** therein adapted to receive locking pins **94**. As shown in a detail view of FIGURE 4 each of these locking pins is L-shaped having a stem portion **96** rotatably received in the cylindrical portion **92** of the bracket and a horizontally extending arm **98** which is adapted to engage with the anchor fluke **70** to retain the same in its raised position.

The usual towing bits **100** and the like are provided upon the pontoons as are eyebolts **102** to which the anchor and towing bridles **20** and **24** are connected.

It will be appreciated that the pontoons may be formed of any desired size and length in order to afford the necessary over-all strength and anchoring ability for the assembly. Further, although but one fluke is shown between each adjacent pair of pontoons, it is to be understood that any desired number of such flukes may be used along the length of the pontoons where desired.

Although three pontoons with two flukes therebetween form a very satisfactory arrangement, it will be understood that in some instances the submarine anchor may consist of but a single pair of pontoons with one or more flukes disposed therebetween. Such a modified construction is shown in FIGURE 6 wherein the numeral **110** designates generally the submarine anchor therein having the pontoons **112** and **114** with brace struts **116** therebetween and having flukes **118**. Additional cross bracing **120** can be provided in this construction or any other constructions disclosed herein in order to provide any necessary rigidity. Also shown in FIGURE 6 in dotted lines is a further additional fluke **122**. It will be understood that any desired number of such flukes may be employed as may be found desirable. Inasmuch as the construction of the pontoons, the trim and ballast tanks thereof and the ballast control means as well as the fluke mounting and locking structures is identical to that previously described a further description is deemed to be unnecessary.

Although three pontoons are a preferred construction, any desired number of pontoons may be enclosed in side by side relation when it is desired to increase the capacity of the anchor assembly. Thus, as shown in FIGURE 7, the numeral **130** indicates a modified construction having four pontoons **132** which are rigidly connected together by braces or trusses **134** in the manner previously described and are provided with flukes **136**. As previously stated, any desired number of such flukes may be provided inasmuch as the structures of the flukes their operating means and mounting means, the ballast tank and the air pressure supply means for the same is identical to that previously described a further description is thought to be unnecessary.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A submarine anchor comprising an open-work assembly consisting of a plurality of elongated pontoons rigidly connected together in spaced side-by-side arrangements to provide a seaworthy hull, a flat, plate-like fluke disposed between each pair of adjacent pontoons, horizontal pivot means mounting each fluke between the pair of adjacent pontoons for vertical swinging movement about an axis transverse to said pontoons and between an operative, downwardly inclined position projecting below said pontoons and a raised, substantially horizontal position between said pontoons, all of said flukes in their operative positions being inclined in the same direction whereby to provide an increased resistance to movement of the assembly in said direction, and means on said platform for raising and lowering said flukes.

2. The combination of claim 1 wherein said raising and lowering means consists of a derrick, cable and winch for each fluke said cable being connected to a fluke.

3. The combination of claim 1 including lock means carried by said pontoons on the sides thereof and engageable with said flukes for retaining the latter in their raised positions.

4. The combination of claim 1 including anchor bridles and towing bridles secured to opposite ends of said assembly.

5. The combination of claim 1 wherein said pontoons

have trim and ballast tanks therein for regulating the trim and buoyancy of said assembly and means for supplying air under pressure to said ballast tanks for blowing the ballast therefrom to render said assembly buoyant.

6. The combination of claim 1 wherein said pontoons have trim and ballast tanks therein for regulating the trim and buoyancy of said assembly, an air line mounted upon and extending longitudinally of each pontoon, valved connections independently communicating said line with each ballast tank in its pontoon.

7. The combination of claim 6 including pressure equalizing means establishing communication between the interior of one of said tanks and the sea water.

References Cited in the file of this patent

UNITED STATES PATENTS

458,473	MacDonald	Aug. 25, 1891
2,551,375	Hayward	May 1, 1951
2,960,832	Hayward	Nov. 22, 1960
3,005,438	Muldowney	Oct. 24, 1961