

Jan. 11, 1955

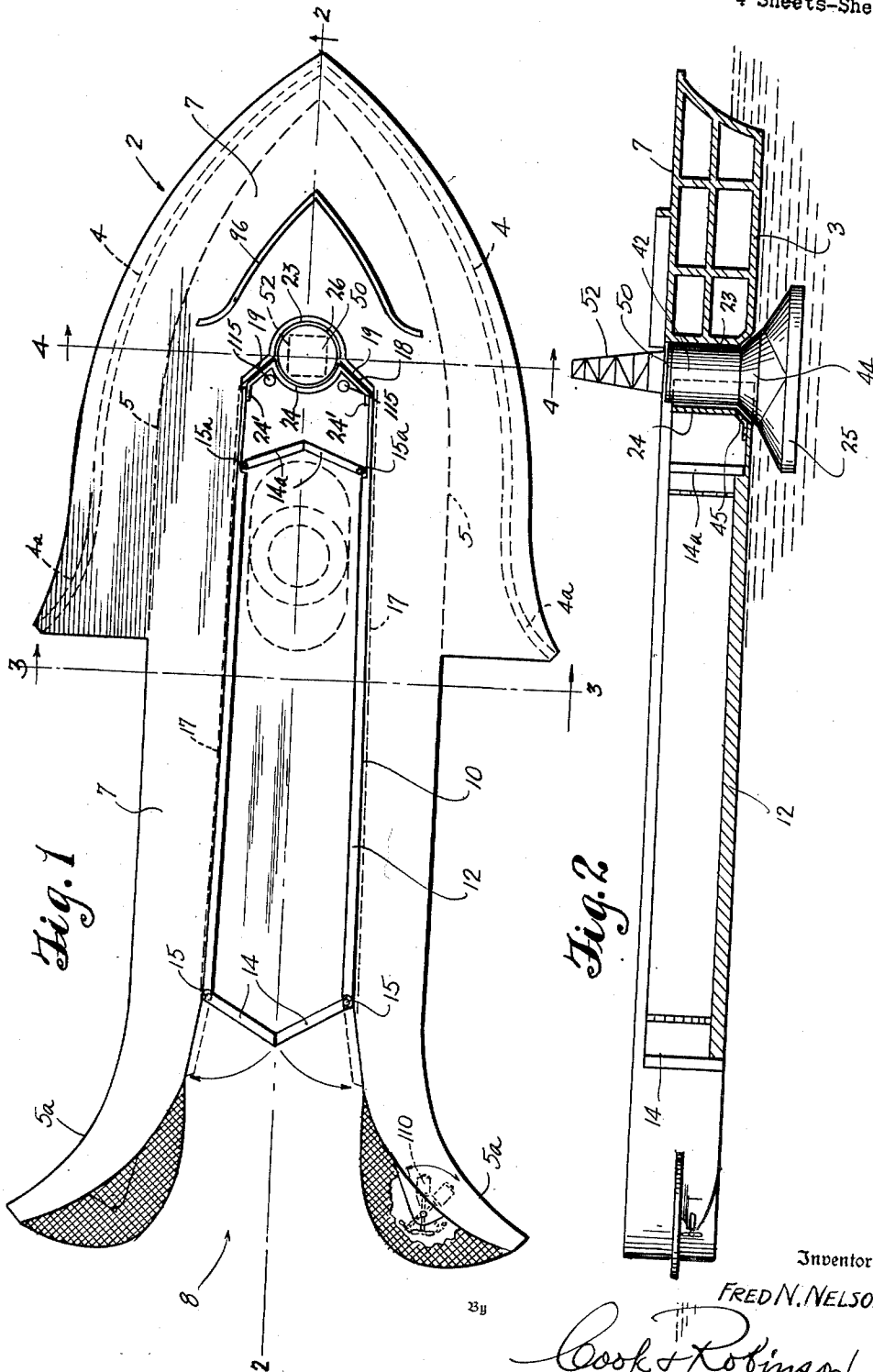
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2,699,321

DEEPWATER OIL DRILLING AND STORAGE CRAFT

Filed June 21, 1949

4 Sheets-Sheet 1



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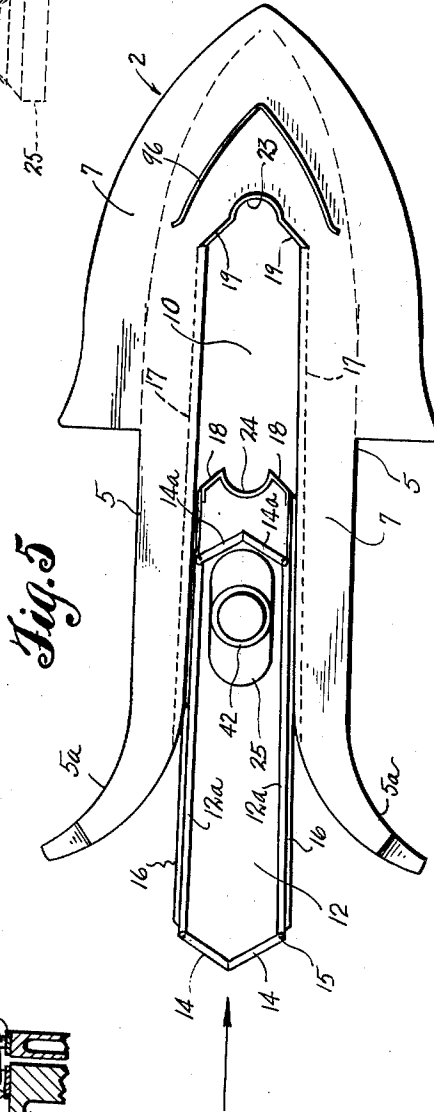
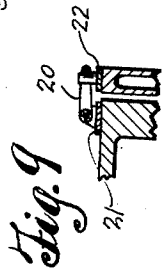
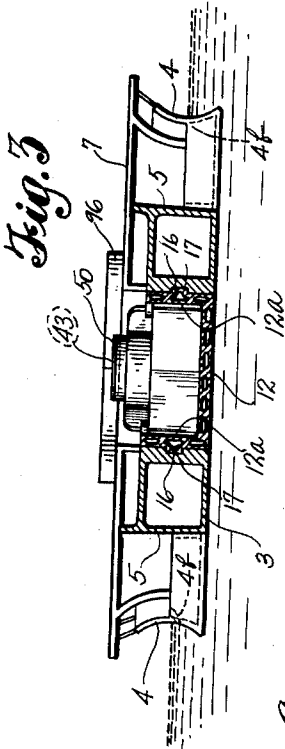
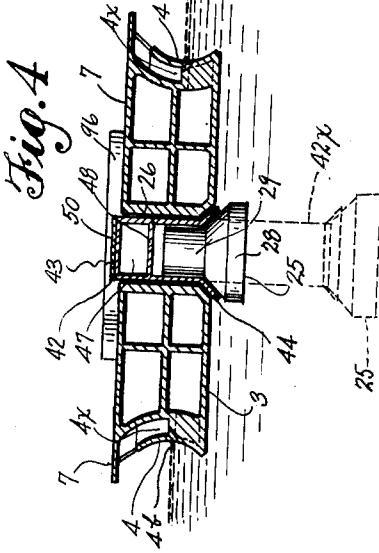
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DEEPWATER OIL DRILLING AND STORAGE CRAFT

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4 Sheets-Sheet 2



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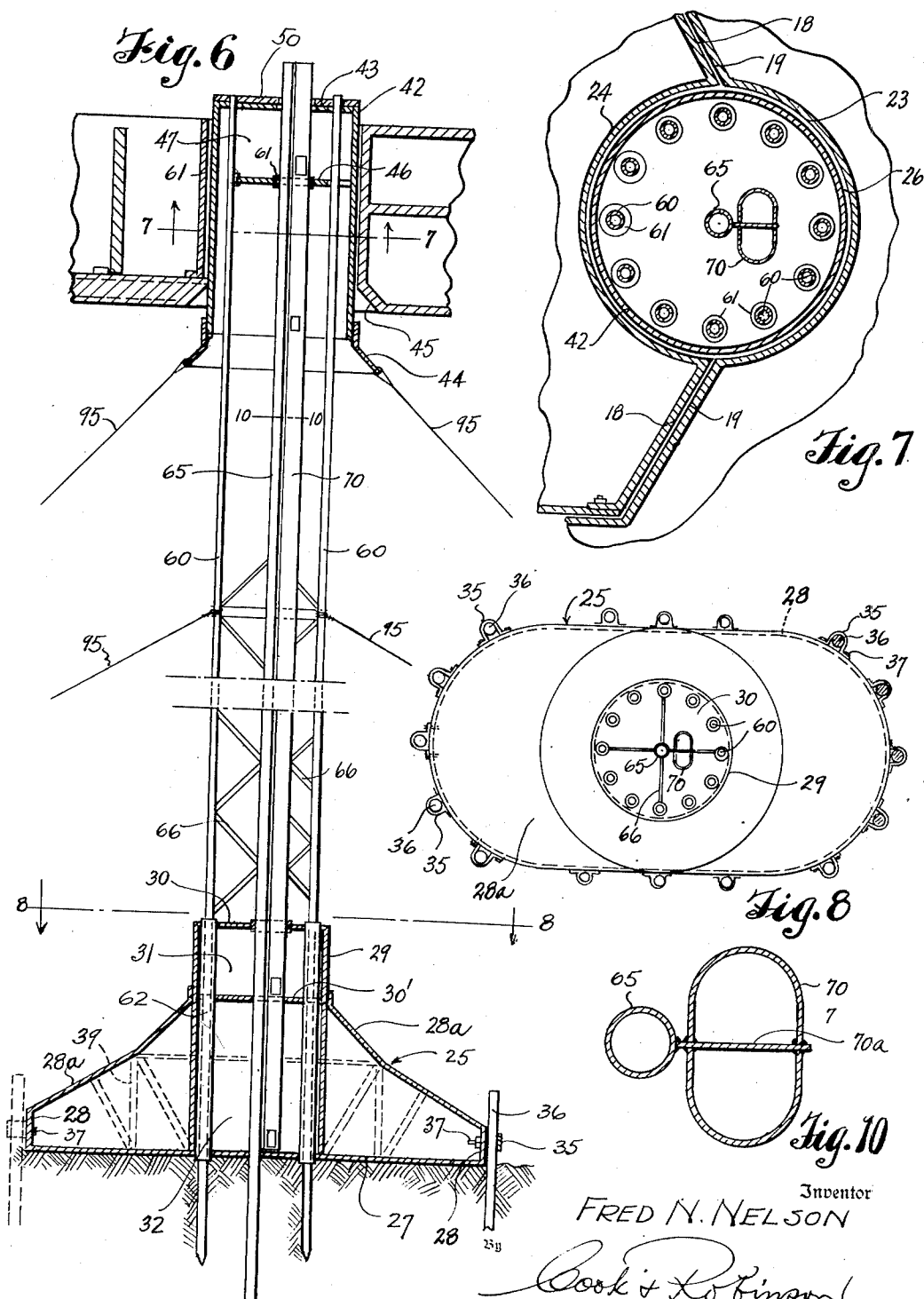
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DEEPWATER OIL DRILLING AND STORAGE CRAFT

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4 Sheets-Sheet 3



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DEEPWATER OIL DRILLING AND STORAGE CRAFT

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4 Sheets-Sheet 4

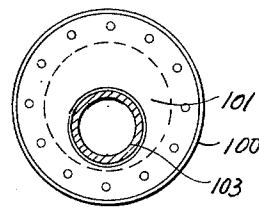
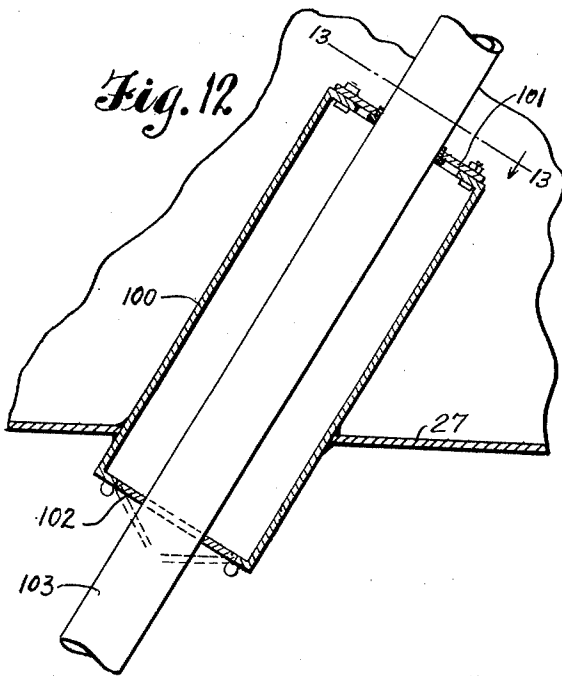
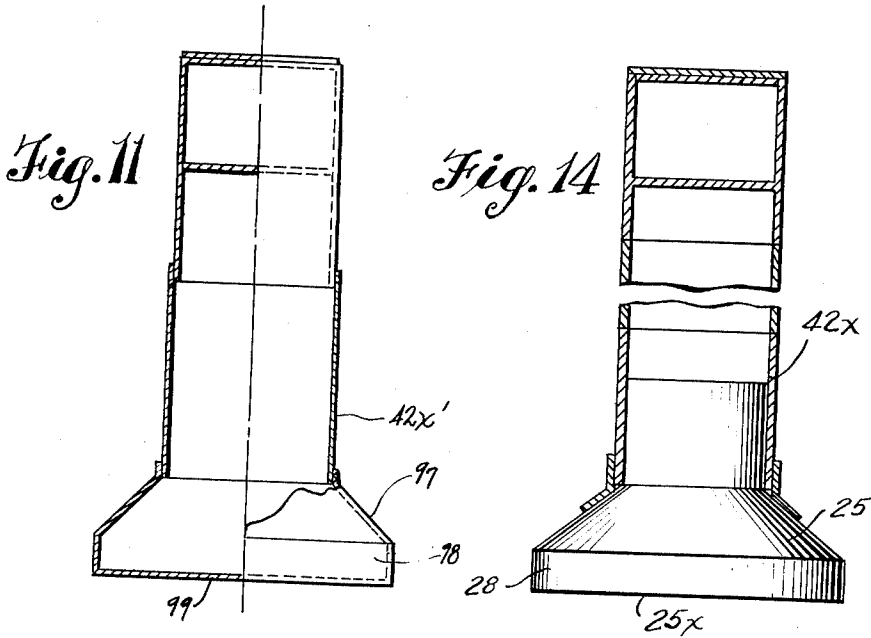


Fig. 13

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DEEPWATER OIL DRILLING AND STORAGE CRAFT

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Application June 21, 1949, Serial No. 100,433

13 Claims. (Cl. 255—2.5)

This invention relates to deep water oil-drilling and storage craft, whereby offshore, submerged lands, exemplified in part by the term "Continental Shelf," may be successfully drilled and the oil therefrom secured.

It is the principal object of the present invention to provide a means for deep water oil drilling that is practical for its intended use and comparatively economical; that can be used continuously under various conditions of weather, including storms; that comprises a rigid, firm and ground-supported base structure for the drilling platform and rig and an automatically adjustable, floating breakwater therefor which provides protection against the wind and waves, serving additionally for oil storage and for the housing of all utilities necessary for such an operation, including housing of workers, hospitalization facilities, equipment for the distillation of water as required for human consumption and all other facilities that are required for offshore, and especially deep water drilling operations.

It is also an object of the invention to provide means of the above stated kind comprising two main parts, viz., an anchor member and a floating breakwater, storage and utility vessel; the anchor member being in the nature of a vertical, tubular pivot of large diameter, rigidly constructed with a footing or base that may be settled upon and fixed securely to the ocean floor; the pivot being designed to extend above the water surface as a support for the drilling platform, derrick and rigging, and the floating vessel being equipped with means for propulsion, for movement to location and position control, and also having a vertical well therethrough within which the tubular pivot member is contained during a drilling operation to retain the vessel in functional relationship thereto, and on which pivot the floating structure is permitted to rise and fall with the tide and to turn or rotate about the anchor as may be required to maintain the breakwater portion of the vessel headed into the wind and waves, and when necessary, propulsion means may be utilized for this purpose, thus not only providing protection for the workers and rigging but also providing a protected harbor in the lee of the vessel for the accommodation of vessels associated with drilling operations, and as a harbor of refuge for distressed craft in stormy weather.

Another object of the invention is to provide oil-drilling and storage means of the above stated character, wherein the floating vessel may be used to transport the pivot or anchor member to the drilling location, and can be used also as a super pile-driver for settling the anchor means in place and, by reverse operation, can be used for lifting the anchor for transportation from one to another drilling location.

Yet another object of the invention is to provide oil drilling means of the above stated character that is especially applicable for deepwater drilling operations but not limited thereto; that permits drilling operations to be carried on through the tubular body of the pivot or anchor member and is provided with means associated with the pivot member whereby multiple directional drilling operations may be carried on to advantage.

Still another object of the invention is to provide a floating vessel, designed as a breakwater and utility housing and storage vessel, comprising a main hull with special bailing system and equipped with a longitudinal bay entering from the stern end and containing therein a floating drydock-barge that may be locked in the bay to

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serve as an integral part of the main hull, or may be released and floated out for various uses, or to permit the floating or otherwise handling of parts constituted in the anchor member.

It is also an object to provide means of the character stated which makes possible the carrying on of oil drilling operations, in any depth of water, from the minimum draft of the main hull to the depth of maximum resistance of the base section of the anchor pivot to the hydrostatic pressure of water at the greater depths, and including in the operations, directional drilling from the upper section of the anchor pivot in shallow water, and from the base section thereof in deep water.

Still further objects are to be found in the combination and general arrangement of parts embodied by the invention and in the mode of use thereof, as will hereinafter be fully described.

In accomplishing the above mentioned and other objects of the invention, I have provided the necessary details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein:

Fig. 1 is a plan view of an oil-drilling and storage means embodied by the present invention.

Fig. 2 is a central, longitudinal section of the same taken in the vertical plane of the line 2—2 in Fig. 1, and showing the base and upper sections of the anchor as assembled and contained in the hull for floating to a place of use.

Fig. 3 is a cross-section of the vessel on line 3—3 in Fig. 1, particularly showing the disposition of the drydock barge in the bay of the main hull.

Fig. 4 is a vertical cross-section, taken on line 4—4 in Fig. 1, and showing parts of the anchor member as assembled with the vessel, as for floating to place of use, and preparatory to settling the base or footing of the anchor member onto the ocean floor.

Fig. 5 is a plan view of the floating vessel, showing the drydock barge partially removed from the bay of the main hull.

Fig. 6 is an enlarged, vertical section along the bow portion of the floating breakwater, showing the anchor pivot, comprising the upper structure contained in the well of the vessel's hull; the footing or base, as settled on the ocean floor for deep-water drilling and the built-in intermediate truss structure joining the footing and upper structure.

Fig. 7 is an enlarged section taken substantially on the line 7—7 in Fig. 6.

Fig. 8 is a horizontal section on line 8—8 in Fig. 6.

Fig. 9 is a detail showing a type of locking dog for the securement of the drydock-barge in its bay.

Fig. 10 is an enlarged, horizontal section on line 10—10 in Fig. 6.

Fig. 11 is a view illustrating the application of a base and extension to the upper section of the anchor member.

Fig. 12 is a sectional view of an outlet tube for directional drilling operations.

Fig. 13 is a sectional view taken substantially along the plane of line 13—13 of Fig. 12.

Fig. 14 is a view of the modified form of shaft shown in Fig. 4.

Referring more in detail to the drawings:

The present structure, as was previously stated, comprises a rigid anchor member and a movable, floating structure. For a better understanding of the character of the floating structure, attention is directed to my U. S. Patent No. 2,408,871, issued on October 8, 1946, wherein I have illustrated and described a floating naval base adapted to travel, or be towed or propelled, to any specific location and there anchored. The size and weight of the vessel therein described is such as to insure it against yawing or any perceptible movement under action of wind or waves, and its design is such that it will serve as a floating breakwater, providing a sheltered harbor for the loading or unloading of vessels in the protected leeward side. It was stated in the specification of my above patent that "materials used in making such a structure, either as a unit or as separable sections, would be in accordance with best engineering practice."

It is to be understood that the present floating structure would embody, in the main, the teachings of the

above patent, with respect to its stability in the sea under all weather conditions, and in so far as the general features of construction are concerned that provide the breakwater, the protected harbor, storage space and housing for the various utilities required for the present operation. For better understanding of the character of the floating vessel, it is anticipated that it shall have an overall length of about 1000 feet, an extreme width at the amidships wings of about 250 feet, and a total height of about 70 feet, that is, 30 feet maximum draft and 40 feet freeboard.

By reference more particularly to Fig. 1, it will be understood that the floating vessel is of the character of a hull, here shown to be of unitary construction, but which may, if desired, be made in any number of individual sections, secured together as a unitary structure. This vessel, designated in its entirety by reference numeral 2, comprises a bottom 3 (see Figs. 2 and 4) and opposite side walls 4-4 which curve toward each other as they approach the bow to form a prow that is especially designed as a breakwater. These side walls, extending rearwardly from the prow, terminate about midway between stem and stern and, as noted in Fig. 4, they approach the bottom in an outward curve, thus to cause the waves and currents that engage them to be upwardly deflected rather than to be deflected downwardly and beneath the vessel. Other walls, 5-5, are arranged parallel with and inwardly spaced from the walls 4-4, and extend substantially to the full length of the vessel, as best shown in Fig. 1. These walls, together with the bottom 3, define the main hull of the vessel. This is equipped with top deck 7 that overhangs the walls 5-5 beyond the outboard limits of side walls 4-4, to catch the waves and spray, as noted in Fig. 3.

The present floating structure thus comprises the main hull portion which is defined by the bottom 3 and longitudinal walls 5-5 extending from prow to stern, and the outside or protective hull which forms the forward end portion and prow of the vessel and which is defined by the opposite side walls 4-4 which join with the bottom and terminate approximately amidships in out-turned wings 4a. The purpose of the out-turned wings 4a is to catch the waves followed by the waves following the breakwater, to throw them outwardly and to leave protected bays rearwardly of the wings for landing or loading purposes.

It is shown also in Fig. 1 that the side walls 5-5 of the main hull terminate at the stern of the vessel in outwardly curved wings 5a-5a, that give added width to the sheltered harbor provided by the vessel; it being understood that this harbor, designated at 8 in Fig. 1, is always protected from wind or waves by reason of the fact that the vessel, when anchored, automatically adjusts itself to head into the wind and waves, as will presently be apparent.

Between the walls 4-4 and 5-5 are work passages 4x noted in Figs. 3 and 4, and these are suitably drained of water, preferably of that kind shown in my U. S. Patent No. 2,408,871 and designated in Figs. 3 and 4 at 4b.

Formed in the vessel along its longitudinal center line and extending from the stern end, and well into the forward or breakwater portion, as best shown in Fig. 5, is a bay 10, within which an elongated, buoyant vessel 12 is normally locked.

This vessel 12 is in the form of a floating drydock-barge and is equipped at its opposite ends with gates 14-14 and 14a-14a, hinged thereto as at 15 and 15a to swing from closed to open positions for entry or leave of smaller vessels therefrom.

The vessel 12 is of buoyant construction and is designed to be floated into the bay 10, to serve after the fashion of a retaining key in a keyway, and it is designed to be contained with slight wedging effect in the bay and it is provided on its opposite side walls 12a-12a of its hull with horizontal keys 16-16, as shown in Fig. 3, adapted to be received in keyways 17-17 formed on the sides of the bay 10, thus to hold the vessel 12 in a definite relationship to the main vessel. At its forward end the vessel 12 has flat, inwardly and forwardly inclined surfaces 18-18 at opposite sides (see Fig. 5) adapted to engage against similarly inclined surfaces 19-19 at the closed end of the bay. When the drydock-barge 12 is in place in the main vessel, it is normally locked against displacement by suitable means

such, for example, as by use of dogs 20 hinged to pads 21 on the deck of the outer vessel to engage with or over holding plates 22 applied to the barge, as has been shown in Fig. 9.

When the locking dogs are disengaged, the drydock-barge may be floated and backed out of the bay 10. Removal of the vessel 12 from the bay 10, partially or entirely, is principally to provide for the floating and assembling of parts of the anchor structure into place at the forward end of the bay, as will presently be explained.

At the forward or closed end of the bay 10 there is formed a steel-plate, semi-cylindrical and vertically directed seat 23. Likewise, the forward end of the drydock-barge 12 is formed with a similarly shaped complementary and oppositely related semi-cylindrical seat 24; this being formed from steel plates and equipped with lateral wings 24' whereby it is bolted to the forward end of the barge. When the drydock-barge is locked in place in the bay 10, as in Fig. 1, the two seats, 23 and 24, together provide an open, cylindrical well 26 through the floating vessel 2, axially coinciding with the central longitudinal plane of the vessel, and adapted to contain therein the vertical pivot shaft of the anchor member.

For better understanding of the construction, purpose and use of the anchor member, it will here be stated that, for deep-water drilling, it comprises three main portions. These I will hereinafter refer to as the "base section," the "upper section" and the "intermediate section," the latter two being more or less variable in length, in accordance with depth of water in which the operation is to take place, and join the upper section with the base section.

For shallow water drilling, limited to the minimum draft of the floating main hull, the intermediate section and the base sections may be omitted and the upper section only used for the anchoring of the floating structure. The description immediately following will anticipate and describe the use of an anchor member involving all three parts as assembled for deep-water drilling. Later, the description of use of the upper section as an anchoring means will be included. For this description, attention is directed particularly to Figs. 6, 7 and 8.

The base section, designated in its entirety by numeral 25, comprises a large, hollow steel pontoon, preferably oval in plan, as seen in Fig. 8 to facilitate transportation, and formed with a flat bottom wall 27 with vertical marginal wall 28 and top wall 28a inclined upwardly from the marginal wall. At the top, the section is equipped with a cylindrical, vertically directed dome 29. This dome structure extends downwardly through the pontoon and to the bottom plating thereof. At its upper end the dome is closed by a deck 30 and there is a deck or partition 30' at a lower level setting off a workroom 31 in the upper end of the dome and another room 32 in the lower part thereof. Located at spaced intervals about the marginal wall 28, and attached thereto, at the outside, are collars 35 designed to receive anchor piles 36 therethrough. These collars are attached to the wall by bolts 37 that may be tightened from within the pontoon to clamp the collars about the piles. It is also the intent that this hollow base structure shall be adequately stiffened by internal bracing, as indicated at 39 in Fig. 6, to withstand external water pressure. It is also intended that it shall be provided with watertight compartments and also with means whereby the compartments may be flooded or pumped out when such is desired. The lower end of the cylindrical compartment formed by the downward extension of the dome encloses the work space 32, and provision has been made whereby directional drilling operations may be conducted from this or other compartments of the base structure through specially designed outlets presently to be described.

The upper section of the anchor member, designated in its entirety by reference numeral 42, comprises a cylindrical, vertically disposed housing adapted to be contained in the vertical well 26 provided through the hull of the main vessel 2, with sufficient clearance between them for easy rise and fall of the vessel relative to the part 42 when it is serving in its connection with the anchor member.

The cylindrical member 42 is of steel plate construction

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tion and is closed at its upper end by a deck 43. At its lower end it has a flared skirt portion 44 bolted thereto. This skirt portion, during transportation of parts as presently described, is adapted to be received in a conically tapered recess 45 formed in the bottom of the vessel's hull about the lower end of the wall 26. Intermediate its upper and lower ends, the cylinder 42 is closed by a horizontal deck 46, thus providing a workroom 47 in the upper end of the cylinder. A platform 50 is built on the upper end deck of the cylinder 42 and on this a derrick 52 of typical or suitable kind is erected for handling the drilling rigging and materials. The deck 43 and platform 50 do not project beyond the diametrical limits of the cylinder 42; thus they may, if necessary, pass down into the well 26 with the lift of the main vessel under influence of a rising tide.

The diameter of the lower end of the cylinder 42 is such that the cylindrical dome portion 29 of the base section may be received therein, as in Fig. 4, for a reason now to be explained: To transport the base section and upper section of the anchor member to a drilling location, the drydock-barge 12 may be released and floated out of the bay 10 of the main vessel. With this done, the base section 25, in its upright position, is then floated into the bay 10 and to the forward end thereof. The cylindrical upper section 42 is then assembled, through the use of cranes on the vessel, with the base 25 by applying its open lower portion over the dome 29. Then the assembled parts are floated into position against the seat 23 and the drydock-barge 12 is moved forward and locked in position, thus to enclose the upper section 42 in the well 26 of the vessel, as has been illustrated in Fig. 2. As thus assembled, the parts will retain this relationship because of their buoyancy. The vessel 2 may then be maneuvered to a deep-water drilling location and the upper and lower sections of the anchor thus transported therewith. At the drilling location, the anchor member may be completed by the building in of the intermediate section thereof to necessary length; such an extension being shown in Fig. 6.

The building of the intermediate section starts with the base 25 in the position of Fig. 4, and as it is progressively built up on the base structure, the latter is caused to be lowered, under control, by partly or wholly flooding selected compartments thereof. The manner of erecting or building the intermediate structure will now be described.

The intermediate structure is constructed mainly of tubular metal pilings 60; each pile is made up of tubular sections threaded one onto the other as the structure is built up and the base lowered. The pilings are arranged circularly, as in Figs. 7 and 8, and extended through water tight collars 61 that are applied to openings in the decks 43 and 46 of the upper section 42. The pilings continue downwardly and through metal tubes 62 welded into the base structure, passing through the upper deck 30 of the dome 29, through the deck 30' and finally through the bottom 27. After passing through these vertical tubes, the piles 60 may extend some distance below the bottom of the base to provide for added stability and rigidity. The pilings after being applied to the base structure are securely locked against endwise slippage relative thereto by suitable means, such as clamp collars or gripping dogs. As the pilings 60 are thus assembled and secured, the base section 25 is caused to be lowered, and additional sections of piling are threaded onto or otherwise attached to those already applied. This extending of the piling continues until the base 25 has been settled onto the ocean floor, and the anchor shaft has reached the necessary vertical length to support the upper end section 42 at proper distance above water level.

Using a drilling location at intermediate depth, for example, 250 feet, a preferred method of constructing the sections is as follows: With the building up of the shaft that is comprised by the circularly arranged pilings 60, there is also assembled therewith an axially located tubular shaft 65. Adjacent thereto and coextensive therewith is a tubular, vertically extending duct 70, oval in horizontal cross-section, divided into opposite halves from end to end. The duct 70 and pipe or shaft 65 are rigidly joined together and, in the completed structure, as in Fig. 6, they extend from above the top deck of the section 42 to the bottom plate 27 of the base 25. The duct 70 serves as a work shaft for the operation of elevators, also as a ventilator shaft and as escape and access

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trunks. Radiating from the parts 65 and 70 to the tubular pilings 60 are truss-like braces 66, shown only in the lower part of Fig. 6, but omitted from the remaining part to avoid confusion, whereby the parts of the structure are joined as a unitary, rigid anchor post which is fixed at its lower end in the base 25, and at its upper end carries the cylindrical section 42. It is preferred that the duct 70 be made as shown in Fig. 10 wherein it is noted that a plate 70a divides it vertically and the plate is welded along one edge to the pipe 65.

Instead of moving the assembled base and upper end sections to a drilling location while held by their own buoyancy in the well 26, these parts may, especially for purpose of long-distance transportation, be floated into the drydock-barge upon opening the stern gates, which are then closed. The vessel may be propeller or towed to a place of drilling and anchored. Then, to assemble these sections of the anchor member properly with the vessel, the drydock-barge 12 may be withdrawn partly from the bay 10, as in Fig. 5, the end plate 24 thereof detached and lifted from the forward end of the barge, the gates 14a—14a opened, and the base 25 with upper section 42, disposed thereon as in Fig. 4, floated into position against the semi-cylindrical seat 23 forming one side of the well 26. The end plate 24 is then replaced on the barge 12 and the latter moved into the bay and locked, thus securing the parts in the relationship shown in Fig. 2. The lowering of the base 25 to the ocean bed, and erection of the intermediate section might then proceed as before described.

It will here be mentioned that the vessel is to be equipped with all necessary traveling cranes, and the like, necessary for the above described operations where lifting and lowering of heavy objects is required.

After the base 25 has been brought to proper location and settled into place and the intermediate structure, as noted in Fig. 6, erected to the proper height for support of the upper cylindrical structure, the vessel 2 is released from all fixed connections with the cylinder 42 and it is allowed to rise and fall with the tide, and to turn with the change of wind to cause the breakwater to head into the waves at all times.

If it should be desirable or necessary to settle the base structure 25 and/or piling 60 into the ocean bed, for more adequate support or anchorage, the vessel 2 may be employed as a super pile-driver for this purpose by effecting a holding connection between the vessel and cylinder 42 and/or piling 60 at high tide, then allowing the weight of the vessel to be applied to the structure on falling tide. Holding connection for this purpose can be effected in various ways, for example, by equipping the cylinder with locking dogs to be engaged with the vessel. To add to the effectiveness of either or both the gravitational push or the pull by buoyancy, the structure 25 and cylinder 42 may be flooded or pumped out, as desired. Likewise, should it be desired to lift the base and anchor structure for change of drilling location, the vessel may be secured to the structure at low tide and the lift of the vessel under rising tide directly applied to lift the anchor.

It is further anticipated that the base portion 25 may be additionally anchored by the driving of piling about its peripheral edges, as at 36, and securing these piles to the base structure by straps 35 that may be tightened within the base.

Furthermore, guy cables, as at 95, may, if desired or required, be attached to the intermediate structure, or to the skirt of the upper structure 42, to resist the action of currents, tide or winds. These cables would be attached at their outer ends to any available material for anchors, and preferably extended through pulleys attached to the skirt or structure, and extended to the deck so that they can be tightened or lowered as required.

It is desirable also that the top deck of the breakwater section have formed thereon a protective bulkhead just forwardly of the well 26, to give added protection to workmen on the derrick supporting platform or adjacent thereto. Such a bulkhead is designated in Fig. 1 by numeral 96 and it is in the form of a forwardly directed V-shaped wall.

It is anticipated that in shallow water the base section 25 and upper section 42 may be used to anchor the vessel without requiring the building in of the intermediate section. In such case, parts 25 and 42, after being assembled with the vessel 2, and the latter brought

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to the drilling location, are settled onto the ocean bed and anchored as before described. The vessel 2 then may pivot about and rise and fall with the tide about the upper section 42, as would be apparent in Fig. 2.

If it becomes desirable or necessary to extend the length 5 of the section 42 to provide for greater vertical travel, or to provide a lower workroom, this can readily be accomplished by detachment of the bolted-on skirt portion 44, and adding the necessary plates to the cylindrical body where the skirt was detached. Such an added extension would be formed as indicated in dotted lines in Fig. 4, and as shown somewhat diagrammatically in full lines in Fig. 14 by numeral 42x. Of course, the usual pilings can be employed in the form shown in Fig. 14, for positive anchoring of the shaft to the sea bottom. The base 25 has a watertight bottom at 25x so that the work rooms can be provided therein.

It is further anticipated that in some instances both the base and intermediate sections may be eliminated and a footing or base applied to the lower end of section 42 as an extension thereof, as has been shown in Fig. 11, wherein the extension is designated at 42x'. This extension is formed with a flared skirt portion 97 with marginal vertical wall plate 98 and bottom 99. This form of construction is mainly to provide convenient work space and facilities for directional drilling within the area of comparatively shallow water where the base structure and intermediate structure are not needed. Thus, by the various structures above described, provision has been made for drilling in any depth of water from the minimum draft of the main hull to the maximum resistance of the base section to the hydrostatic pressure of the water at the greater depths.

To adapt the present means to directional drilling operations through the main vertical shaft 63, it is anticipated that the base section 25, or the extension member shown in Fig. 4 and 11, may be equipped as desired with outlets such as that designated in Fig. 12 and comprised by the tube 100, such tubes are set in the side or bottom walls of the section at the desired angle and welded in wall openings provided therefor. At its inner and outer ends, each tube is equipped with valves, such as at 101 and 102, of special design for the passage of a drill pipe 103 and/or casing therethrough, and to permit change in the angular direction of the drill pipe. The drilling apparatus itself may be of the kind or kinds ordinarily used or as modified to adapt it to the present means.

For its propulsion and control, it is proposed that the vessel 2 may be equipped with electric motors mounted for travel on geared tracks to swing about vertical axes; the motors being located in suitable housings in the lateral wing portions 5a—5a of the vessel 2. Propeller shafts extend from the motors, and by change in direction of the motor, the direction of thrust of the propeller is changed accordingly. In Fig. 1, a motor at starboard side is designated at 110, and it is to be understood that the motors in the wings at port and starboard sides of the vessel are synchronized in their directional movements.

It is further proposed that the vessel be equipped, either for use as the main propulsion units or as auxiliary units, with enlarged outboard motor type of propulsion units located at the most advantageous places for propulsion or for effecting quick direction changes of the vessel or if such is necessary or desirable to meet storm conditions. Such additional means may be used to assist in riding out storms and to ease the strain on the anchoring means.

It is desirable also that the floating breakwater and storage vessel be equipped with divers hatches, and all the necessary equipment to carry on whatever diving operations may be necessary or desirable. In the present instance, diving hatches are designated in Fig. 1 by numeral 115.

It is further anticipated that the work duct 70 will be equipped at the top with safety ventilators essentially like that shown in my U. S. Patent No. 2,397,684 and that safety ventilators, flush with decks or bulkheads, will also be used where required for ventilation of all parts of the structure, hull, tanks and compartments.

It is further to be explained that the present inventive concept is readily applicable for use in the building and anchoring of off-shore floating harbor installations, such as breakwaters, docks, etc., of the character of those described and illustrated in my U. S. Patent No. 2,408,871,

by providing the floating structures, as shown therein, with wells for containing anchor members or shafts, thus permitting the floating structures to rise and fall with the tide, while anchored at a definite location.

Means and methods of this kind will provide for the drilling of wells up to depths far beyond any possible by present day methods, and are especially adapted for oil drilling on the continental shelf of the Gulf of Mexico, the Caribbean Sea, the Persian Gulf, the offshore oil lands of California, the Indonesian Islands, and in many other places, it being understood that insofar as ordinary drilling procedure is concerned, this is carried on by the usual means, including the derrick 52 and rig that is erected upon the top deck 41 of the section 40. Drill shafts operate through the shaft 65 and the base pontoon 25, or upper cylinder 42, according to depth of water.

Having thus described my invention, what I claim as new therein and desire to secure by Letters Patent is:

1. A means for off-shore oil drilling operations comprising a vertical anchor and pivot shaft through which drilling can be effected and including a base section that is adapted to be settled on the ocean floor and fixed thereto, and an upper section fixed rigidly to said base section as an above water support for an oil drilling rig when the base is so fixed, an oil drilling rig on the said upper end section for conducting drilling operations through the shaft, and a floating breakwater and storage vessel anchored by and pivoted freely about said upper section, said base section of the anchor and pivot member being in the nature of a hollow pontoon having floodable compartments therein, pilings applied to the ocean bed about the exterior of the said base section and clamp collars fixed to the base section about the said pilings and means operable from within the base section for releasing or tightening the clamp collars.

2. A means for off-shore oil drilling operations, comprising, in combination, a vertical anchor member, means for fixing said member in an upright position on the ocean floor; said member comprising a base section of hollow pontoon type providing a work room therein through which drilling operations may be conducted when said base is settled onto the ocean floor, a shaft extending vertically upwardly from the base section and enclosed at its upper end with a vertically extending cylindrical housing that is fixed thereto for mounting an oil drilling rig thereon above ocean level, and through which shaft and base section, drilling operations may be conducted, a floating breakwater and storage vessel, formed with a well therethrough, said well being located on the longitudinal center line forwardly of the middle of the vessel, said well rotatably containing the cylindrical housing at the upper end of said shaft therein when the anchor member is fixed at location, for free turning of the vessel thereabout and for vertical sliding to automatically head into wind and waves and permitting rise and fall of the ship relative thereto with rise and fall of tides and an oil drilling rig mounted on the upper end of the said cylindrical housing.

3. A means for off-shore oil drilling operations comprising, in combination, an anchor and pivot member comprising a base section of hollow pontoon form adapted to be settled onto the ocean floor and to be anchored thereto, an upper section in the form of a vertical cylindrical housing adapted for mounting a drilling rig thereon, and an intermediate section joining the base section with the upper section for the upright support of the upper section; said intermediate section comprising a shaft made up of a plurality of piles arranged parallel to each other and circularly about a central axial drill tube and rigidly braced therefrom, a breakwater and storage vessel formed with a well therethrough for containing the upper section of the anchor member therein for free turning and rise and fall of the vessel on the same means on the said base section for rigidly securing the anchor and pivot member to the ocean floor, and a drilling rig mounted on the upper end of the said cylindrical housing and comprising means for use in conducting a drilling operation through the drill tube.

4. A means for off-shore oil drilling operations as recited in claim 3 wherein the said base section is equipped with vertical tubes therethrough for passage of the piling therethrough into the ocean floor and the said upper section is formed with openings for receiving the pilings therethrough in building up the intermediate sections.

5. In an off-shore oil drilling means, a vertical anchor and pivot member adapted to be settled onto and equipped with means whereby it is fixed to the ocean floor to extend vertically as a support for an above water oil drilling rig, and a breakwater and storage vessel, formed with a bay opening to the stern of the vessel and a floating dry dock barge removably fitted in the bay, the forward end of the bay and the forward end of the barge being formed with vertical, semi-cylindrical recesses in registration and forming a vertical wall through the vessel containing the anchor and pivot member therein for free turning and vertical sliding of the vessel on the pivot member.

6. An off-shore drilling means as recited in claim 5 wherein the bay extends centrally and longitudinally into the forward end portion of the vessel and is tapered toward its forward end, and has key ways along the opposite side walls thereof, and said barge is tapered to fit the taper of the bay and has keys at opposite sides to be received in said key ways, and means is provided to secure the barge in the bay.

7. A means for off-shore drilling operations according to claim 5 wherein said vessel is provided with propulsion means adapted to be adjustably secured thereto to aid in control and turning of the vessel.

8. An off-shore oil drilling means comprising an anchor and pivot member, including a buoyant base section, with pivot shaft thereon, fixed to the ocean floor to cause said shaft to extend vertically as a support for an above water oil drilling rig, and a breakwater and storage vessel, formed with a bay opening to the stern of the ship and a floating dry-dock-barge removably fitted in said bay the forward end of the barge and the forward end of the bay being formed with vertical, semi-circular recesses that are registered to form a vertical well through the vessel freely containing the anchor and pivot member therein for free turning and rise and fall of the vessel thereon; said dry-dock-barge being adapted to contain said anchor and pivot member therein and having its forward end wall removable for floating the said anchor and pivot member therefrom into the well.

9. A means for off-shore oil drilling operations comprising an anchor and pivot shaft having a hollow longitudinally thereof through which oil drilling operations can be conducted, means attached to the shaft for fixing it in upright position on the ocean floor; said shaft being of such length as to extend above the ocean level when fixed to the ocean floor, and having a water tight lower

end working compartment, an oil drilling rig mounted on the upper end of the shaft and including means for conducting drilling and pumping operations through the shaft and its lower end compartment, and a floating breakwater and storage vessel having a well provided therethrough pivotally and slidably containing the shaft therein and located forwardly of the center of the vessel for free rise and fall and turning of the vessel about the shaft.

10. A means for off-shore drilling operations according to claim 9 wherein said vessel is provided with propulsion means adapted to be adjustably secured thereto to aid in control and turning of the vessel.

11. A means for off-shore drilling operations according to claim 9 wherein the lower end compartment is provided with at least one valved outlet in a wall portion thereof for the passage of drill tubes for directional drilling operations.

12. A means for off-shore drilling operations according to claim 9 wherein said shaft includes a base section having a vertically directed cylindrical dome at its top and said shaft has a vertically extending housing at the top thereof which housing is open at its bottom and is of such diameter as to receive said dome portion therein.

13. A means for off-shore drilling according to claim 12 wherein said base section is equipped with vertical tubes therethrough for the passage of piling.

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