

April 8, 1941.

W. J. CRITES ET AL

2,237,387

DRILLING BARGE

Filed June 28, 1939

4 Sheets-Sheet 1

FIG. 4

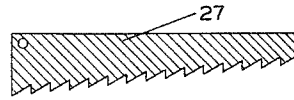
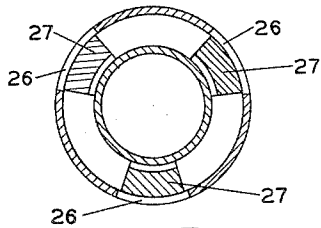


FIG. 6

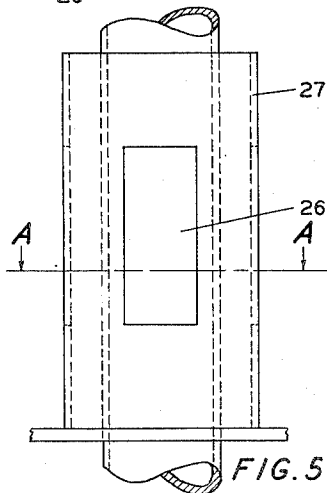


FIG. 5

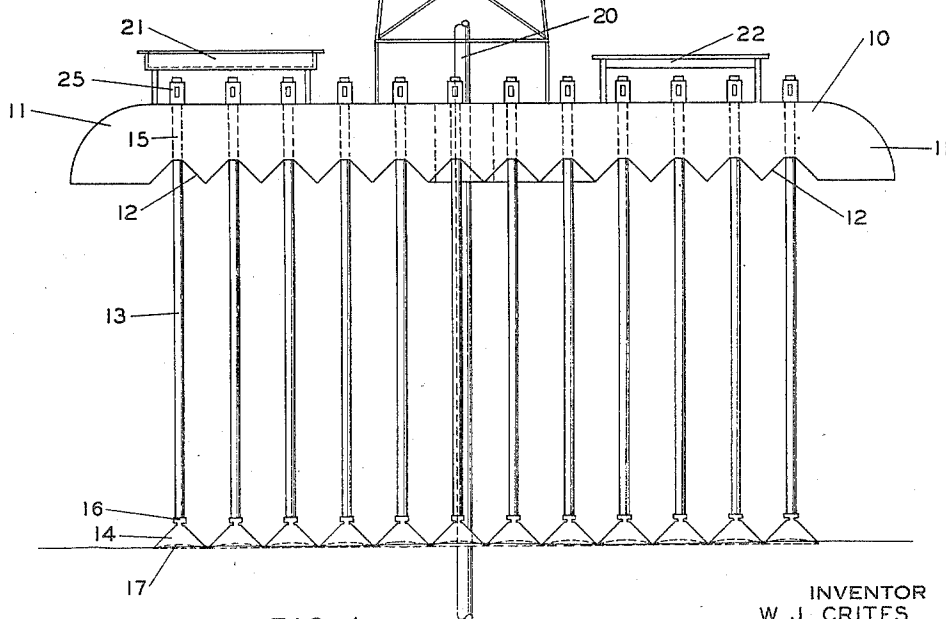


FIG. 1

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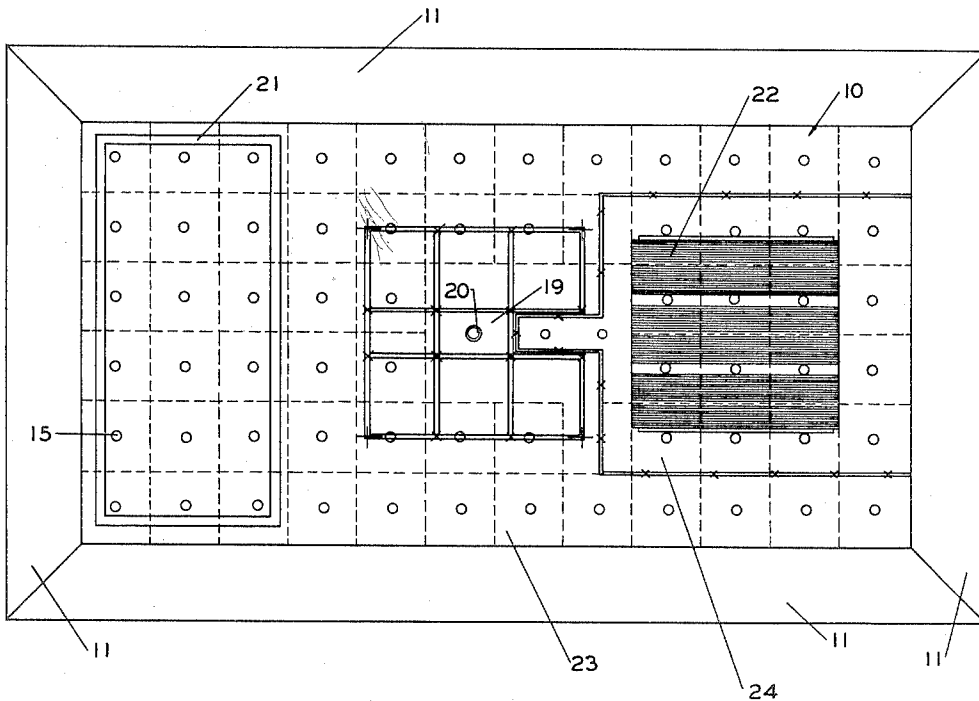


FIG. 2

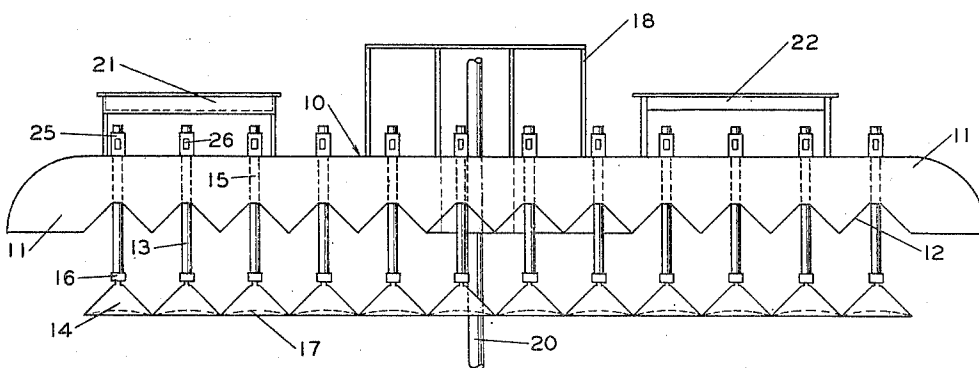


FIG. 3

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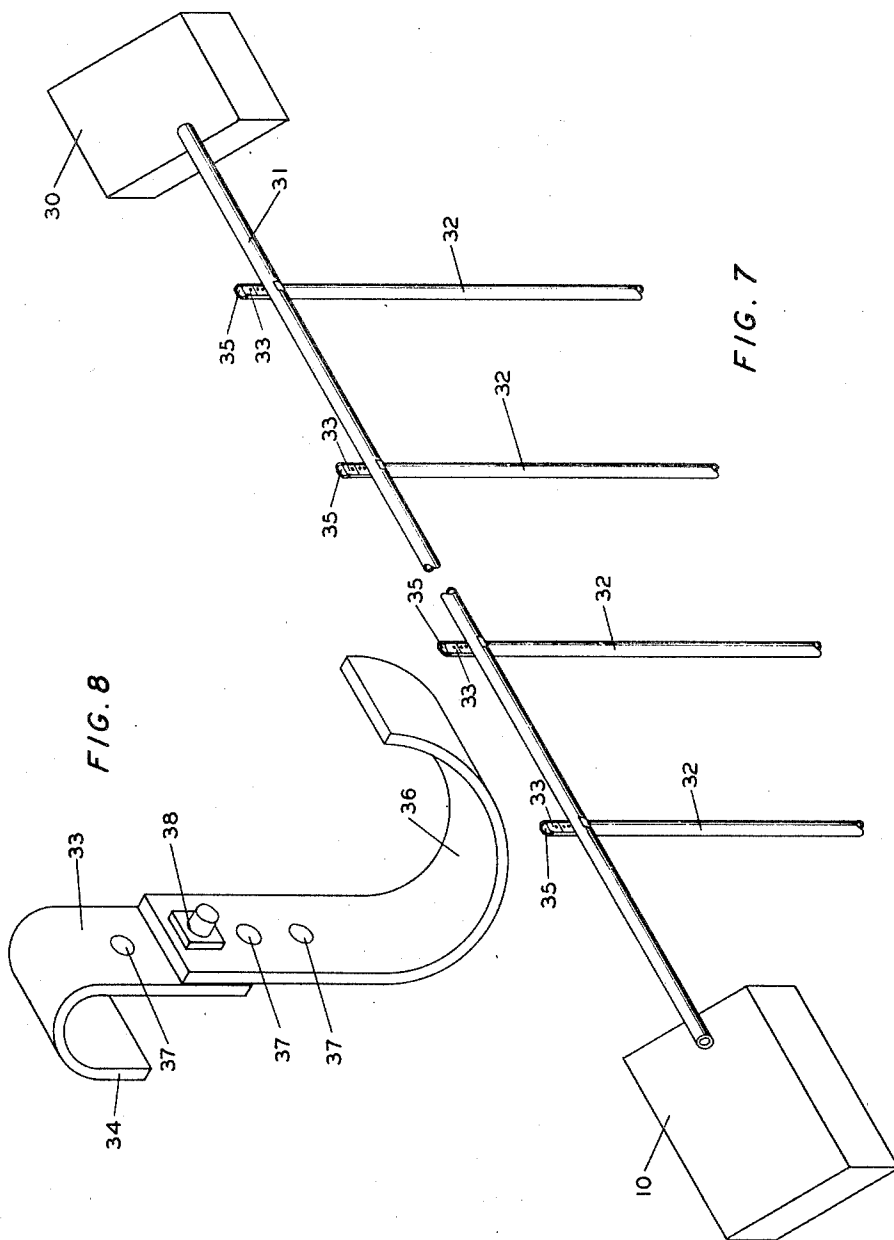
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DRILLING BARGE

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4 Sheets-Sheet 3



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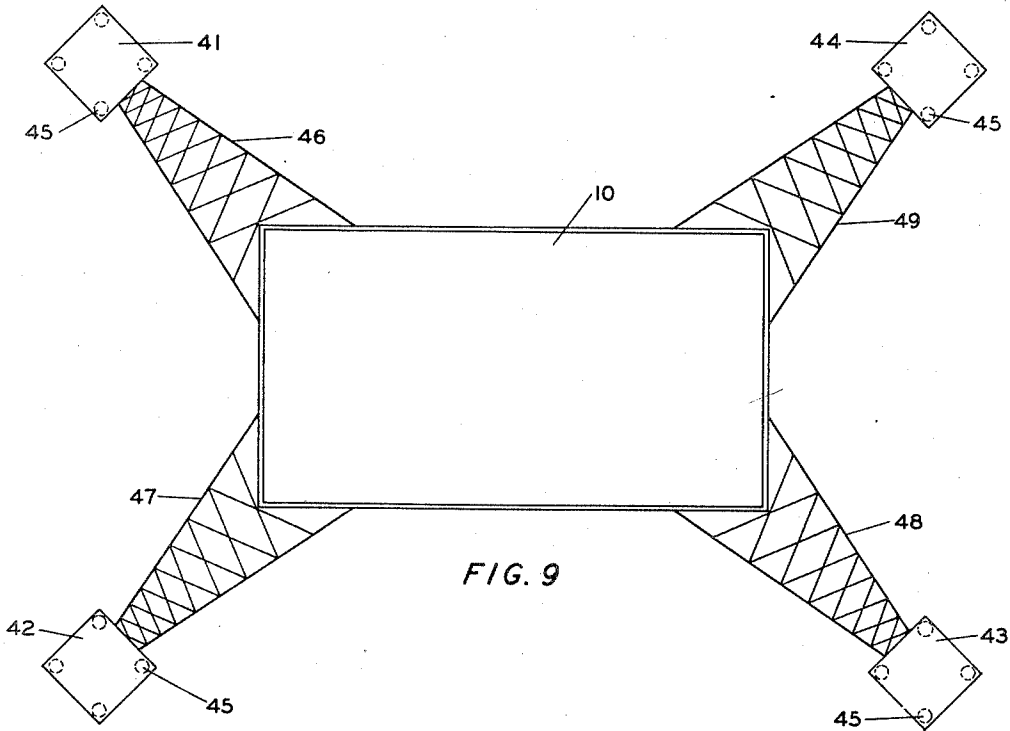


FIG. 9

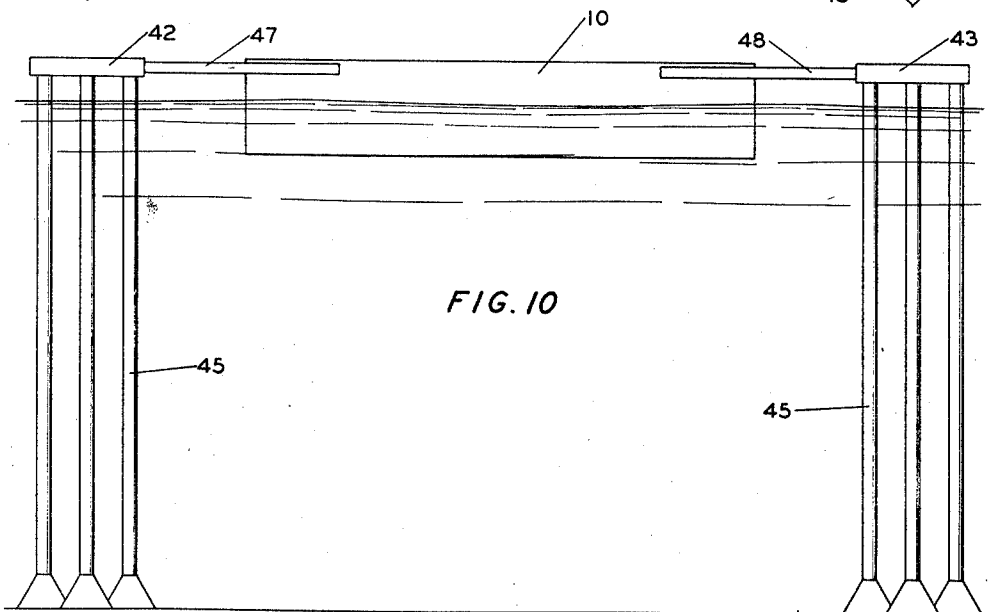


FIG. 10

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UNITED STATES PATENT OFFICE

2,237,387

DRILLING BARGE

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Application June 28, 1939, Serial No. 281,720

6 Claims. (Cl. 61—46)

This invention relates to a barge which has drilling apparatus mounted thereon to be used in drilling wells in land submerged by water such as lakes, rivers, marshes and particularly for use in open sea drilling.

The idea of drilling wells in land submerged by water is not a new development, since pilings have been sunk heretofore to provide a platform from which drilling operations could proceed. This proved to be an expensive operation and limited as to the depth of water in which drilling operations could be carried on. As exploration methods of locating oil fields developed, it was found that more and more oil is located in reservoirs covered with a body of water.

Numerous attempts have been made to drill from barges which could be floated into place and removed when the well was completed, the most notable along this line being the barge shown in the Giliasso Patent 1,681,533 issued August 21, 1928. The Giliasso structure is limited as to the depth of water in which it can be used and further, it is not so well adapted for open sea drilling. The Giliasso barge is suited for development in inland waters of shallow depths or marshes where it is possible to dredge a foundation upon which the barge may rest. In the use of this barge it is necessary that certain definite depth ranges be not exceeded for it has no adjustments for levels other than that which is allowed by the depth of the barge and the height of the substructure.

In open water drilling it is necessary if a barge is used that some auxiliary means of adjusting the height of the barge below or at the normal water level be used. This is on account of the varying depths and non-uniform contours in open water that are not so frequently encountered in inland waters.

It is an object of this invention to provide a drilling barge to be used in drilling operations over a body of water particularly on the open sea.

It is a further object of the invention to provide a drilling barge which is fully equipped for drilling a well, can be towed to the scene of operations, anchored to the bottom and be towed away when the well is finished.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings, forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same—

Figure 1 is a side elevational view of the whole assembly of the barge showing the same anchored to the bottom,

Figure 2 is a plan view of the floor of the barge,

Figure 3 is a side elevational view of the barge showing the piling members in position under the bottom of the barge,

Figure 4 is a sectional view of the piling taken through section A—A of Figure 5,

Figure 5 is an elevational view of the top of the piling showing the means of fastening the barge to the piling when anchored,

Figure 6 shows a sectional view of the clamping means used to anchor the barge and piling,

Figure 7 is a schematic diagram showing a conductor pipe running from the barge to a tender, Figure 8 is an elevational view of a pipe support bracket attached to the top of the piling to support the pipe,

Figure 9 is a diagrammatic view showing corner bracing means for the barge, and

Figure 10 shows the bracing means in elevation.

In the drawings, wherein for the purpose of illustration, is shown a preferred embodiment of our invention, the numeral 10 represents the main body of the barge having the smooth, sloping ends and sides 11. The end and side portions are made in this fashion in order to minimize the impact forces from the waves. The waves in hitting the barge will be guided by the gentle slope and not be completely stopped. The bottom of the barge is a series of truncated cone receptacles 12 which receive the bottoms 14 of the piling 13 when the barge is being towed in open water. Further, while the truncated cone receptacles on the bottom of the barge form a protection for the bottoms of the piling when the barge is in motion, this feature also tends to reinforce the barge body. The bottom of the barge might have been made flat and in a single plane with the piling as shown in detail, however, if this is done it would be necessary to internally brace the rectangular construction of the barge to the extent that it greatly increases the cost of construction.

The piling members 13 telescope through openings 15 in the barge body and are filled with water to lower them to the bottom of the body of water. The bottom of the piling has the truncated cone base, or the base may be pyramidal or rectangular, if desired, portion 14 connected to the piling member 13 by means of the universal joint 16. The bottom of the base 14 is concaved as at 17 so

that a vacuum cup effect will be had when the base rests on the bottom. The joint 16 allows the base to anchor on an uneven surface and allows the base to more or less adjust itself to this surface.

Mounted on top of the barge are the derrick 18 having the usual crown block on top thereof, draw works, rotary table, engine and under floor drive, and traveling block. The derrick and accessories to drilling are located in the center of the barge and the portion 19 of the barge is an opening in the barge to allow drilling operations to proceed. Casing 20 extends from the floor of the derrick to the bottom of the body of water and the drill tubing opens within the casing 20. On the left of the derrick is located a mud pit 21 having suitable pumps to maintain a circulation of the mud fluid during drilling operations. The mud pit is elevated to prevent the waves from breaking on the side walls of the barge and diluting the drilling fluid. On the right of the derrick is a rack 22 for supporting drill tubing and casing when not in use.

As shown in Figure 2, the main barge body 10 is made in two sections 23 and 24, which sections are attached together in any suitable manner as by bolts and flanges. In drilling operations the two sections 23 and 24 are rigidly attached together but when drilling operations are concluded and it becomes necessary to move to a new location, the barge must be separated into sections in order to remove it from the well. The bolts holding the flanges of the two sections together are removed and each section is then towed away, thus leaving the well just drilled intact and without harm or injury. Each section is then towed to the new location and reassembled and drilling operations start anew.

Mounted on the barge body 10 and rigidly attached thereto are the thimbles 25 through which the piling members 13 are free to telescope. The thimble 25 has windows 26 therein and wedge members 27 are driven between the piling members 13 and sleeve member 25 to hold the barge rigidly attached to the piling members. The slip windows 26 allow the slips to be removed when the barge is to be moved.

The problem of the piles rotating on their axes, which would not be objectionable in the case of the truncated cone base, might cause considerable trouble with a rectangular or pyramidal base. Therefore, means are provided to prevent rotation of the piling and may take the form of guide rails incorporated below the deck of the barge substructure so that a key slot in the pile may be engaged with a key insert in the slot in the piling and guide rail to thus prevent turning of the piling in raising and lowering. The key will be removable and only used in the raising and lowering operation.

In the operation of the barge the drilling equipment including the rig, drawworks, drill pipe, pumps, in fact everything except the boilers and fuel tanks which are mounted on a separate barge, are all put in readiness while the barge is in port. The barge sections 23 and 24 are therefore fully equipped and made ready to start drilling operations in port. The barge sections 23 and 24 are then towed to location with the barge section 23 which carries the derrick, being first centered over the location where drilling is to proceed. The bay 19 is centered over the hole and the barge section 24 is moved into the bay and the two sections 23 and 24 are joined together by

bolts passing through the flanges on the two sections.

During the moving and placement operations the piling members 13 have been drawn up close to the barge substructure and the base members 14 rest in the receptacle members 12. It is to be understood that the piling members 13 may be made sectional, so that their length may be increased as desired. It now becomes necessary to anchor the base members 14 of the pilings on the bottom and this is accomplished by filling the piling members with water. This robs the piling members of their buoyancy and causes them to fall to the bottom and the base members 14 accommodate themselves to whatever contour they may encounter in view of the universal joint 16. This procedure is followed until all of the piling members are securely anchored on the bottom. During this time the barge has been free to telescope, or move up and down on the piling 13 through the opening 15 on the barge body and the sleeve 25. With the pilings 13 all in place, water is pumped into the barge body 10 until the barge has lowered its level at least to the point that the deck is even with the normal water level. From investigations made by applicants to determine the governmental requirements for craft of this type, considerable thought was given to the effect of the impact forces of the waves on a barge of this type. It was learned that there is very little, if any, impact at or below the normal water level. For this reason the deck of the barge is set at the level of the water or slightly below the normal water level. The slips 27 are then placed in engagement with the piling 13 through the slip windows 26 and more water will be pumped into the barge to make the anchorage secure.

Drilling operations are now ready to proceed and the well is drilled just the same as if the derrick had been set up on land, the only difference being that the drilling proceeds through a casing in the water area in order to keep up a mud circulation for drilling purposes. Applicants make no claim to novelty for the drilling or drilling apparatus, their sole contribution being a support for the drilling apparatus over water. Should there be at any time a sinking of any part of the barge which would cause it to tip, it is only necessary to pump water out of the barge, release the slips, re-engage them and pump water back into the barge in order to level the whole structure.

After the drilling is completed, sufficient water is pumped out of the barge to relieve any pressure on the pilings. To make the pilings buoyant, water is then pumped out of the piling members, and they are allowed to rise through the sleeve 25 and opening 15 in the barge. If the pilings 13 are in sections, they are uncoupled and the sections are placed on the barge floor. The base 14 fits into the receptacle 12 in the bottom of the barge and by means of the sleeves 25 and slips 27 the pilings may be clamped in this position for transportation purposes. Those pilings which are not pulled loose from the bottom by their own buoyancy, will be pulled loose by the buoyancy of the barge. Water is pumped back into the barge body to lower the same several inches. The slips 27 are then used in reverse by insertion through the slip windows 26 on the piling members which have not been pulled loose. Water is then pumped out of the barge and the buoyant force of the barge is then transmitted as a pulling force on the piling members to thus

pull them loose from the bottom. After all the pilings are loose, the sections 23 and 24 are separated by removing the bolts holding them together and both are pulled away from the well to a new location.

As has been previously stated applicants contemplate a separate barge to carry the boilers for steam and Figures 7 and 8 show details of this arrangement. The drilling barge is represented at 10 in Figure 7 and the boiler barge at 30. To support the pipe 31 running from barge 30 to barge 10 where the steam is used to drive the drilling equipment, a series of piles 32, the same as used to support the barge 10 are employed. The piles 32 are set on a straight line between the two barges 10 and 30 and are sunk to the bottom by pumping them full of water. Pipe support 33 is then hooked by means of the hook portion 34 into the open ended top 35 of each piling. The seat portion 36 of the support 33 forms a support for the pipe 31. To allow for the different depths at which the piling members 32 may be sitting, the support 33 has openings 37 into which bolts 38 may fit to adjust the length of the supporting member to keep the pipe in a straight line.

Figures 9 and 10 show means for stabilizing the barge when drilling in depths of water greater than the length of the barge. The drilling barge is represented at 10 and the points 41, 42, 43, and 44 represent points at which piling means 45 are sunk to the bottom. These piling members are the same as previously described and are tied together at points 41, 42, 43, and 44. Bracing members 46, 47, 48 and 49 run from each corner of the barge to the points 41, 42, 43, and 44 and in this manner add stability to the barge.

It is to be understood that the form of our invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size, and arrangement of parts may be resorted to, without departing from the spirit of our invention, over the scope of the subjoined claims.

Having thus described our invention, we claim:

1. A barge for drilling oil wells located under a body of water comprising a main barge body, piling members carried by the barge body into which water is pumped to anchor the piling to the bottom of the body of water, connector means carried by the barge for connecting the barge to the piling members when said piling members are anchored and said piling members being buoyant when unwatered so as to be lifted from the bottom of the body of water and the barge floated away when drilling is completed.

2. A barge for drilling oil wells located under a body of water comprising a main barge body made in sections, means for holding the sections in assembled relation over the well, piling members carried by the barge body into which water is pumped to anchor the piling to the bottom of the body of water, connector means carried by the barge for connecting the barge to the piling members when said piling members are anchored

and said piling members being buoyant when unwatered so as to be lifted from the bottom of the body of water and the barge floated away when drilling is completed.

3. A barge for drilling oil wells located under a body of water comprising a main barge body, piling members carried by the barge body into which water is pumped to anchor the piling to the bottom of the body of water, openings in the bottom of the barge body through which the piling members pass, a sleeve over the opening in the barge body and connected to the barge body through which the piling members pass, clamping means passing between the sleeve and piling to connect the barge to the piling and said piling members being buoyant when unwatered so as to be lifted from the bottom of the body of water and the barge floated when drilling is completed.

4. A barge for drilling oil wells located under a body of water comprising a main barge body, the barge body being reinforced on the bottom by a series of depressed portions, piling members carried by the barge body into which water is pumped to anchor the piling to the bottom of the body of water, connector means carried by the barge for connecting the barge to the piling members when said piling is anchored, said piling members being buoyant when unwatered so as to be lifted from the bottom of the body of water and the barge floated away when drilling is completed and the depressed portions in the bottom of the barge body receiving the head portion on the bottom of the piling members when the barge is floated.

5. A barge for drilling oil wells located under a body of water comprising a main barge body, piling members carried by the barge body into which water is pumped to anchor the piling to the bottom of the body of water, pumping water into the barge body to sink the top of the barge body to the top of the water level, connector means carried by the barge for connecting the barge to the piling members when said piling members are anchored, said piling members and barge body being buoyant when unwatered so the piling can be lifted from the bottom of the body of water and the barge floated away when drilling is completed.

6. A barge for drilling oil wells located under a body of water comprising a main barge body, piling members carried by the barge body into which water is pumped to anchor the piling to the bottom of the body of water, pumping water into the barge body to sink the top of the barge body to the top of the water level, connector means carried by the barge for connecting the barge to the piling members when said piling members are anchored, said barge body being unwatered and the buoyancy of the barge used to lift the piling from the bottom and said piling members being unwatered so as to be lifted from the bottom by their buoyancy and floated away with the barge.

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