Feb. 28, 1956 T. C. McCHESNEY 2,736,172

REMOVABLE DRILLING BARGE CRADLE

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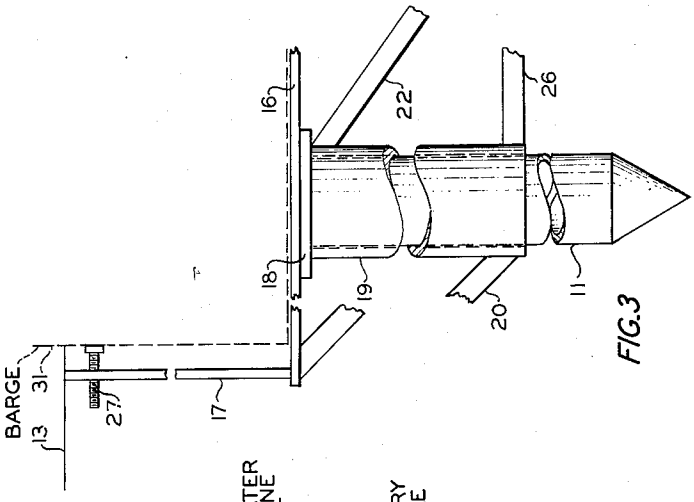

FIG. 3

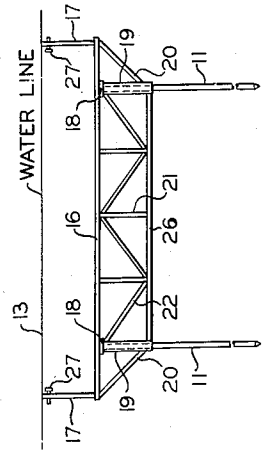

FIG. 2

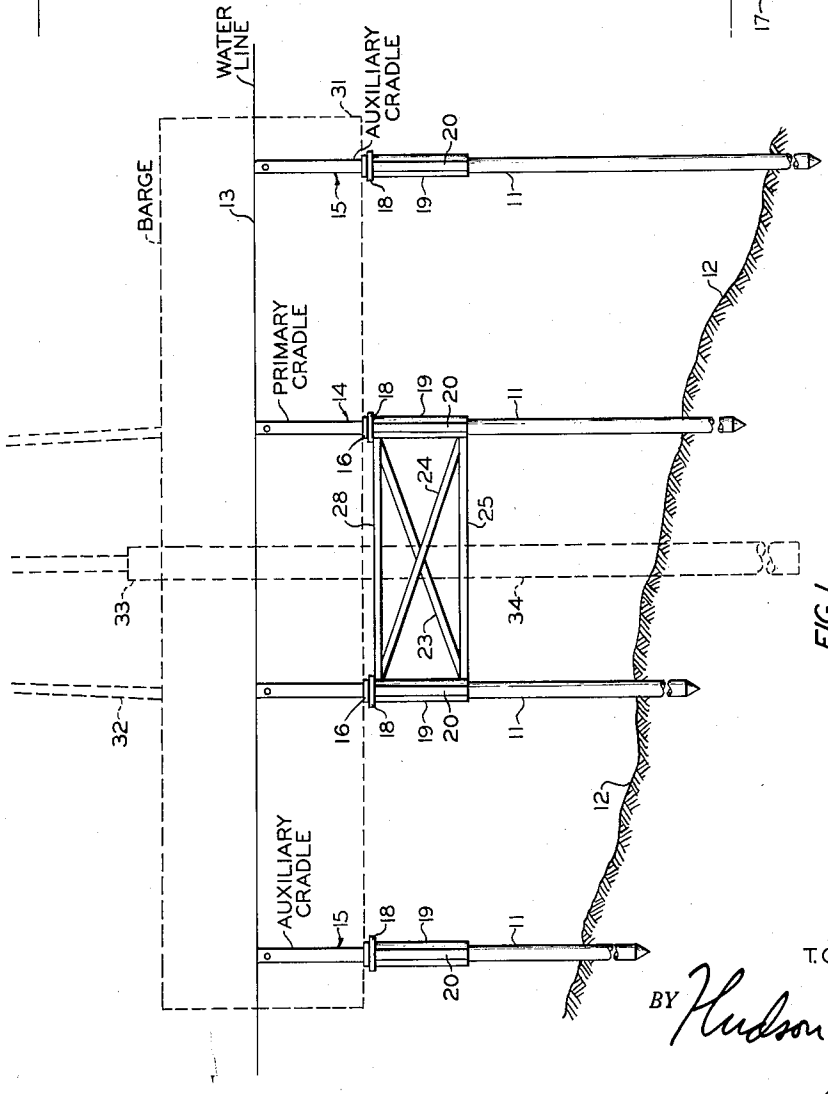

FIG. 1

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REMOVABLE DRILLING BARGE CRADLE

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4 Claims. (Cl. 61—46)

This invention relates to offshore oil well drilling. In one aspect, it relates to offshore drilling wherein the drilling rig and other drilling apparatus are mounted on a barge. In another aspect it relates to a removable cradle supported by piling and upon which rests a drilling barge for offshore drilling operation.

Oil is found under bodies of water such as bays, lakes, rivers, or oceans. It is old to exploit these fields by drilling the wells from barges upon which are mounted the usual drilling equipment such as drawworks, derricks, pumps, etc. The usual procedure is to float the drilling barge to location and then open the sea valves to the ballast tanks and sink the barge hull to the bottom. These barges are formed with an open slot so that upon completion of the well the barge may be refloated and moved to another location. Unfortunately, more and more of the oil development is being forced into deeper and deeper water so that a shallow water drilling barge cannot be used, consequently, drilling barges of greater draft and height must be used to drill in the deeper water. This forces the drilling operator to maintain different drilling barges because obviously a shallow water barge cannot be used in deep water because the working deck is below water and a deep water barge cannot be used in shallow water because the depth of water is insufficient to float the barge to location.

It is also known to use one or more barges as a subplatform so that a shallow water drilling barge may be used. Piles are driven to prevent the upper barges from sliding off the lower barge. However, such a procedure is costly, not only from the standpoint of using several expensive barges, but it also involves an operation of leveling off the floor of the body of water so that the barge will lie horizontal. It is therefore a purpose of my invention to reduce the unnecessary cost of maintaining unnecessary duplicate equipment and to provide means whereby a shallow water drilling barge may be used in various depths of water.

I propose by my invention to construct a removable cradle to slip over and rest upon piling to support a shallow water drilling barge and auxiliary equipment for deep water drilling.

A purpose and object of my invention is to make possible the utilization of standard shallow water drilling barges in deep and open water drilling.

Another object of my invention is to provide a removable cradle which is suitable for supporting a shallow water drilling barge in deep water drilling operations and upon completion of the drilling the cradle may be removed from its piling support and transported to another location for subsequent use.

Still other objects and advantages of my invention will be apparent upon reading the following description which taken in conjunction with the attached drawing forms a part of my disclosure.

In the drawing, Figure 1 is a side elevation in diagrammatical form of a drilling barge in place upon a removable

cradle assembly which, in turn, is resting upon piling. Figure 2 is an end view of my cradle assembly resting upon piling. Figure 3 is an end view in enlarged form that shows how my cradle rests upon 2 pile.

Referring now to the drawing, piling **11** may be driven into place by any desired method. The tops of all the piling are driven or cut to the same elevation. The cradle member as illustrated in Figure 3 is attached to piling **11** by means of sleeve **19** which is capped by plate **18**. Member **16** which is attached directly to plate **18** overhangs the pile **11**, as may be seen in Figure 2. This overhang is reinforced by knee brace **20**. Member **16** is further reinforced by horizontal member **26** vertical members **21** and diagonal members **22**, as illustrated in Figure 2. At the ends of the cross member **16** are placed upright members **17**, the top ends of which are intended to be approximately at the mean water level **13**. The top ends of these members **17** may carry adjustment means **27** for maintaining the barge in a centered position in the cradle during all operations.

As seen in Figure 1, a completed assembly may have double or primary cradles **14** and single or secondary cradles **15**. A double cradle is made by tying two single cradles together with horizontal members **25** and **28** and diagonal members **23** and **24**. These members fasten directly to sleeves **19**. As shown in Figure 1, the bottom of the barge rests directly upon the cross members **16**.

Also in Figure 1 and at the center top of the barge **31** is shown diagrammatically upright members **32** of a derrick. Reference numeral **33** is the casing head, while reference numeral **34** identifies the casing which extends from the casing head at least sufficiently far into the earth **12** as to exclude sand, silt, and surface water from the well.

It is preferable to construct the several cradle members on land and transport them by freighter or an equipment carrying barge to the drilling site. After the piling **11** have been driven to proper depth, the cradles are placed in position with sleeves **19** encircling the ends of the piling. When these cradles are so positioned, the four cross members **16** define substantially a horizontal plane. The drilling barge may then be floated to a position directly over these cradles and the sea cocks opened for admission of water into the ballast tanks. The admission of water to these tanks, of course, causes the barge to sink and rest upon the cross members **16** of the cradles. If the ballast tanks are completely filled with water, the weight of the water together with the weight of the barge and its appurtenances causes the barge to rest firmly upon its barge supporting apparatus in such a manner that wave action and tide action will not move the barge. During the barge sinking operation, the adjustment members **27** may be adjusted so as to center the barge as desired. After the barge has come to rest on the support member **16**, the adjusting member **27** may be further adjusted so as to prevent side movements of the barge with respect to the supporting apparatus.

When the drilling barge has been so positioned upon its supporting apparatus, drilling operations may be begun.

Upon completion of a well, the drilling barge may be removed from its support by first loosening the adjusting apparatus **27** and then pumping air into the flooded ballast tanks. This air upon entering the ballast tanks forces the water out and ultimately the barge will float. After the barge has been removed from the vicinity of the well, the cradles are removed from the piles by crane barges and transported to another location. In case the well is a dry hole, the several piling are all that need be sacrificed. However, if the well is a producer, the several piling members may serve as supports for a production platform. This latter apparatus is well-known in the art and consists

mainly of a horizontal steel platform carrying the pumping equipment and one or more separator and storage tanks with connection pipes and other apparatus as needed for the production of oil.

Materials of construction of the piling and of my cradle apparatus may be selected from among those commercially available and adaptable for the problem at hand. Due consideration should be given to materials of construction since salt water and salt water spray are very corrosive.

It will be obvious to those skilled in the art that the particular construction of the cradles described above may be varied according to structural demands as may be dictated by the type and weight of barge and drilling apparatus to be supported, and by the type of piling to be used. In case the barge to be supported is extremely heavy, additional structural elements similar to elements **16**, **21**, **22**, **23**, **24**, **25**, **26**, and **28** may be used. For example, some members may be positioned from one piling member across and diagonally to another piling member. In another embodiment, the auxiliary cradles **15** may be tied or temporarily attached to the main cradle member **14** so as to make the auxiliary cradles rigidly positioned with respect to the main cradle. In still another embodiment, two cradles of the type of main cradle **14** may be used, in which case one main cradle may be positioned relatively close to one end of the barge, while the other double cradle may be positioned at a point near the other end.

The above-described cradle structures are given for illustrative purposes and should not be regarded as limiting the invention, the scope of which is set forth in the following claims.

Having described my invention, I claim:

1. A support for an oil well drilling barge comprising a plurality of vertically disposed piling the bottom ends of which are driven into the earth beneath the body of water and their top ends terminating in a common horizontal plane below the surface of said body of water at its highest normal level, a pile of said plurality of piling disposed at each of the corners of a rectangle, and a removable non-floatable cradle member resting on said piling, said cradle member comprising, in combination, a separate plate member resting on each pile of said plurality of piling, a horizontally disposed member rigidly attached to and extending from each of said plate members to each adjacent plate member and defining the sides of said rectangle, a separate hollow cylindrical and vertically disposed guide member rigidly attached at one end to the underside of each plate member and extending downward therefrom and around the top ends of said piling to prevent horizontal movement of said cradle with respect to said piling, and a vertically disposed member rigidly attached to and extending vertically upward from each end of one parallel pair of said horizontally disposed members to prevent side slippage of said barge.

2. A support for an oil well drilling barge comprising a plurality of vertically disposed piling the bottom ends of which are firmly embedded in the earth beneath the body of water and their top ends terminating in a common horizontal plane below the surface of said body of water at its highest normal level, a pile of said plurality of piling disposed at each of the corners of a rectangle, and a removable cradle apparatus comprising a removable non-floatable primary cradle member resting upon said piling, said primary cradle member comprising, in combination, a separate plate member resting on each pile of said plurality of piling, a horizontally disposed first member rigidly attached to and extending from each of said plate members to each adjacent plate member and defining the sides of said rectangle, one pair of mutually parallel first members extending horizontally beyond said plate members at the corners of said rectangle, a separate hollow cylindrical and vertically disposed guide member

rigidly attached at one end to the underside of each plate member and extending downward therefrom around the top ends of said piling to prevent horizontal movement of said cradle with respect to said piling, brace members extending from each cylindrical guide member at each corner of said rectangle to each adjacent elongated guide member to maintain said elongated guide members rigidly fixed and mutually parallel, a vertically disposed second member rigidly attached to and extending vertically upward from each of the outer ends of said one pair of mutually parallel first members in such a manner as to prevent side movement of said drilling barge.

3. In the support for an oil well drilling barge of claim 2, said plurality of vertically disposed piling comprises at least four additional piling firmly embedded in the earth beneath said body of water and their top ends terminating in said common horizontal plane, two piles of said additional piling being disposed on one side of said rectangle and two on the opposite side thereof, and said plurality of piling being disposed in two parallel rows of four piling each with a pile of said additional piling forming the ends of said two rows of piling, and said removable cradle apparatus including a secondary removable non-floatable cradle member on either side of said primary cradle member and each of said secondary removable cradle members comprising a separate plate member resting on each pile of said pair of said additional piling on one side of said primary cradle, a horizontally disposed third member being rigidly attached to and extending from one of the latter mentioned plate members to the other, this latter horizontally disposed third member extending beyond the plate members to which it is attached, and said latter horizontally disposed third member and extensions thereof being parallel to the corresponding members of said rectangle, a separate hollow cylindrical and vertically disposed guide member rigidly attached at one end to the underside of each plate member resting on each pile of said pair of additional piling and extending downward therefrom and around the top ends of said pair of piling to prevent horizontal movement of said secondary cradle with respect to said pair of piling, brace members extending from one elongated guide member of said secondary cradle to the adjacent guide member in the other row of piling to maintain the latter guide members rigidly fixed and mutually parallel, and a vertically disposed second member rigidly attached to and extending vertically upward from each of the extended ends of said third member of said secondary cradle, the four vertically disposed secondary members adjacent each of said rows of piling defining a straight line and the straight lines being parallel, said secondary cradles being disposed at such distances from said primary cradle member that said secondary cradles are adapted to support the ends of an oil well drilling barge and said primary cradle member is positioned intermediate said secondary cradles to support the central portion of said drilling barge.

4. In the support for an oil well drilling barge of claim 2, said plurality of vertically disposed piling comprises at least two additional piling firmly embedded in the earth beneath said body of water and their top ends terminating in said common horizontal plane, said additional piling being disposed on one side of said rectangle, and said plurality of piling disposed in two parallel rows of three piling each with a pile of said additional piling forming an end of each of said two rows of piling, and said removable cradle apparatus including a secondary removable and non-floatable cradle member on said one side of said primary cradle member and comprising a separate plate member resting on each pile of said pair of additional piling on said side of said primary cradle, a horizontally disposed third member being rigidly attached to and extending from one of the latter mentioned plate members to the other, this latter horizontally disposed member extending beyond both plate members to which it is at-

tached, and said latter horizontally disposed member and extensions thereof being parallel to the corresponding members of said rectangle, a separate hollow cylindrical and vertically disposed guide member rigidly attached at one end to the underside of each plate member resting on each pile of said pair of additional piling and extending downward therefrom and around the top ends of said pair of piling to prevent horizontal movement of said cylindrical cradle with respect to said pair of piling, brace members extending from one elongated guide member of said secondary cradle to the adjacent guide member in the other row of piling to maintain said guide members rigidly fixed and mutually parallel, and a vertically disposed second member rigidly attached to and extending vertically upward from each of the extended ends of said third member of said secondary cradle, the three vertically disposed second members adjacent each of said rows of piling defining a straight line and the straight lines being parallel, said secondary cradle member being disposed at such a distance from the primary cradle member that said

secondary cradle member is adapted to support one end of an oil well drilling barge and the primary cradle member is adapted to support the other end thereof.

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