

Nov. 8, 1960

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2,959,015

METHOD AND APPARATUS FOR REMOVING MARINE DRILLING RIGS

Filed Aug. 28, 1956

3 Sheets-Sheet 1

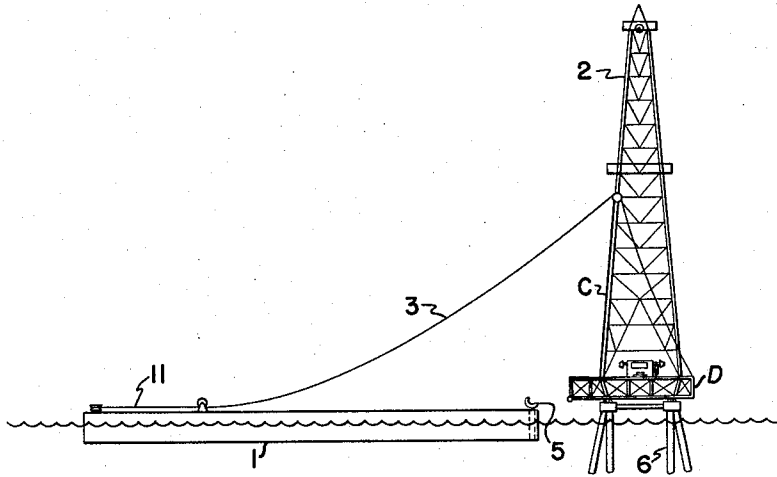


FIG. 1

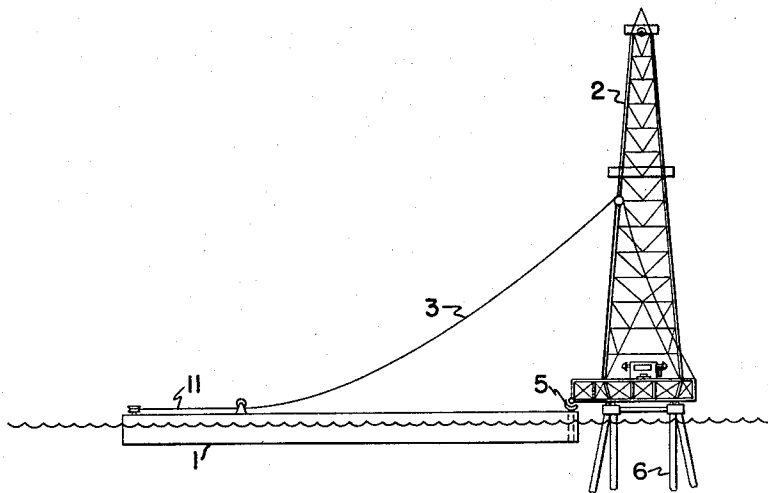


FIG. 2

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3 Sheets-Sheet 2

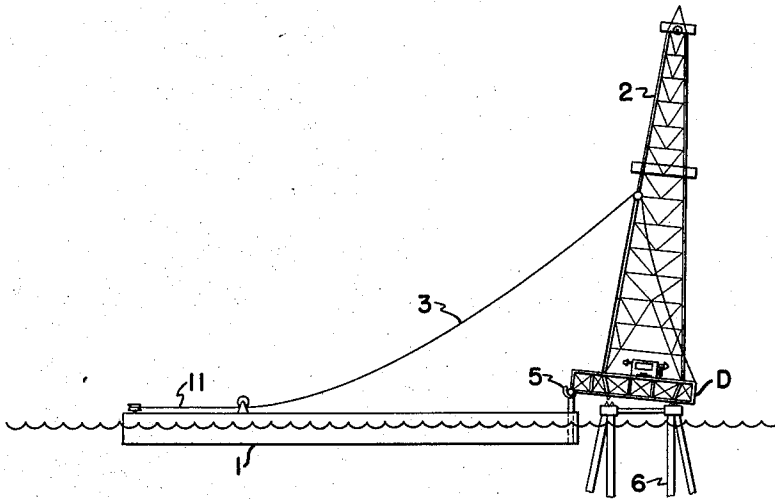


FIG. 3

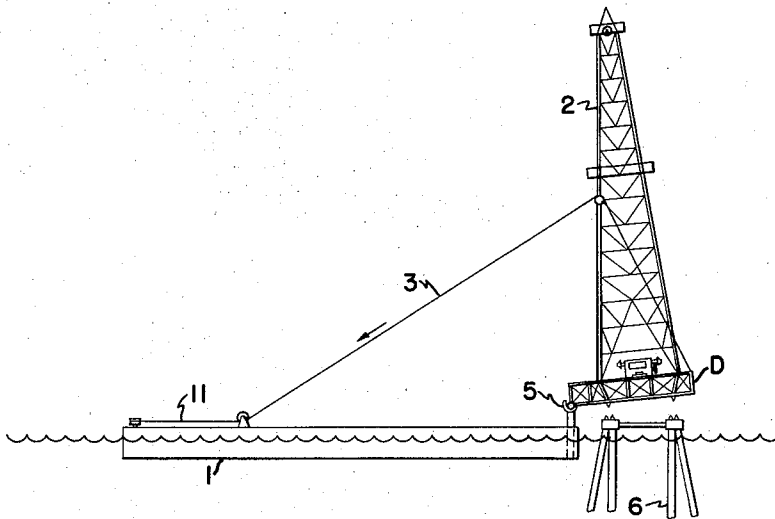


FIG. 4

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Filed Aug. 28, 1956

3 Sheets-Sheet 3

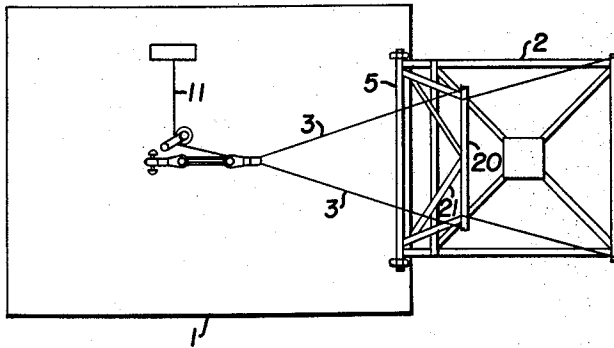


FIG.-5

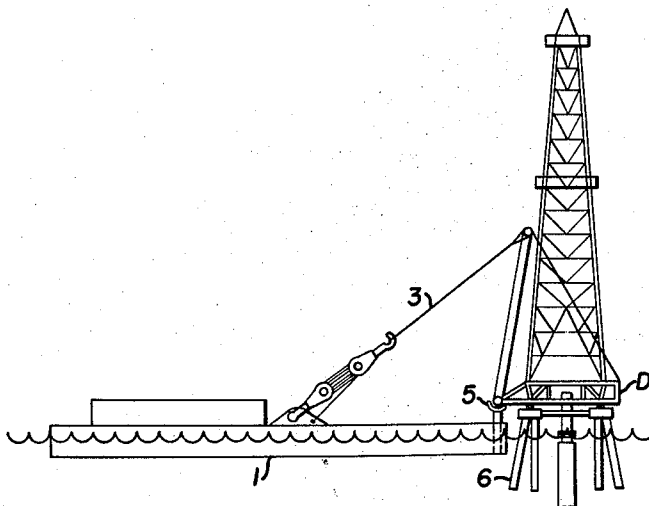


FIG.-6

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METHOD AND APPARATUS FOR REMOVING MARINE DRILLING RIGS

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Filed Aug. 28, 1956, Ser. No. 606,715

2 Claims. (Cl. 61—46.5)

The present invention is concerned with an improved movable marine drilling rig. The invention is especially concerned with an apparatus for drilling oil wells in marine locations and submerged lands, which apparatus can be readily transported by floating from one location to another. The invention is specifically directed toward a method of transporting a complete drilling rig including the substructure, the derrick, the draw-works and auxiliary equipment as a single unit from one marine location to another marine location.

It is known in the art to position drilling rigs on barges as an integral part of the barge and to utilize the barge as a drilling base during the drilling operation. However, this method is relatively expensive and many times cumbersome to operate. Another method known in the art is to erect permanent foundations and to position thereon the drilling rig which can be disassembled. Upon completion of the borehole, the rig is disassembled, placed upon a barge and then transported to a new location and erected on the new base. This method is very time consuming.

The method of the present invention consists of moving a complete unitized drilling rig from one foundation to another foundation by supporting the rig outboard the bow of a conventional drilling barge which is adapted to move the rig. The transporting barge of the present invention is equipped with jacking elements on the bow of the barge and with a particular arrangement of cables and winches.

In operation, the barge is positioned under the substructure of the rig supporting the derrick. The inboard end of the substructure is lifted free of the marine foundation with the jacking elements of the barge. Cable arrangements which run from winches on the barge to the derrick of the rig or to a gin pole permanently affixed to the rig are then used to lift the outboard end of the substructure of the rig free of the marine foundation. The rig is then readily moved to the next location.

Advantages of the present process are that rig-up and rig-down time is eliminated during the moving operation. Furthermore, no additional crane barges or other floating equipment are required. In addition, the rig is much more efficient since it does not have to be designed to be easily assembled and disassembled.

Many marine operations are carried out at depths from about 60 to 100 feet and greater below the surface of the water. Wells are then dug to a depth of from 5,000 to 10,000 feet. In order to accomplish this, it is customary to fabricate and position a suitable marine foundation upon which the rig can be placed for the handling of the drill pipe necessary for drilling the borehole and for conducting the various well completion operations. These rigs vary in weight greatly, as for example, from about 150 to 200 tons. Wells may be dug and completed at a rate of about one every 20 days. Thus, after well completion, there exists at the

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present time only two alternates, namely, to leave the rig intact on the foundation, to be dismantled at a later date, or to go through the expensive procedure of disassembling the rig, transporting it to a new location and then reassembling the rig.

The present invention covers an apparatus and procedure for efficiently and effectively moving marine drilling rigs from one location to another, which invention may be readily understood by reference to the drawings illustrating one adaptation of the same.

Figure 1 illustrates a barge positioning itself for the raising of the rig. Figure 2 illustrates the barge in position prior to raising the jacks of the barge. Figure 3 illustrates the position of the equipment as the inboard end of the substructure of the rig is raised, while Figure 4 illustrates the position of the rig as the barge is in a position to transport it to any desired new location. Figures 5 and 6 illustrate in some detail structural features of the barge and rig.

Referring specifically to Figure 1, a barge 1 with suitable power and mechanical equipment is positioned below the substructure of the rig 2. The rig 2 carries suitable drilling equipment, such as the conventional traveling block and other equipment necessary to handle the pipe string and to take care of other operations during a drilling operation. The substructure D of the rig is fabricated of suitable I beam and auxiliary structural members necessary to carry the load. Barge 1 at the bow is equipped with jack elements 5 containing at the upper end thereof a cradle member. In Figure 2 the cradle member of jack 5 is positioned along one of the I beams or equivalent element of the substructure and lifting operations ready about to start. This particular element seats snugly in the cradle of jack 5. In Figure 3 jacks of the barge have been raised, thereby raising the substructure D supporting the derrick of the rig off the foundation 6 at the inboard side. In Figure 4 suitable winches 11 have been operated so as to tighten cable 3 and lift the rig off foundation 6. At this point the rig is ready to be moved to any desirable location.

Referring specifically to Figures 5 and 6, structural details of the equipment are illustrated. Identical numbers designate the parts described with respect to Figures 1 to 4. From Figures 5 and 6 it can be seen that the rig contains a gin pole element 20 suitably braced by struts 21. The lower end of the gin pole is attached to the lowest strut of the substructure of the rig which extends outwardly on the inboard side. Thus, in operation, jacks 5 of barge 1 are raised, thereby raising the cradle into which the base element of the substructure will seat. The inboard side of the rig will be raised off foundation 6. Cable 3 is then drawn taut by means of suitable winches and power equipment, pulleys, etc. 11. This force will be transmitted to the far side of the rig, thereby raising the far side of the rig off foundation 6. While exact dimensions may vary appreciably, a typical apparatus may comprise a rig having a height of about 130 to 140 feet. A typical side of the substructure may vary from about 20 to 40 feet. The height of the gin pole or equivalent member may vary from about 30 to 75 feet.

As pointed out heretofore, the present invention is concerned and directed toward an efficient method of drilling a plurality of wells in marine locations by providing a rig and barge combination which will permit the removal of the rig as a single unit from one foundation when the borehole has been dug and the well completed. The rig is then transported to a new foundation and utilized as required. Thus, one rig can serve for the completion of many wells from various foundations in any given area.

What is claimed is:

1. Marine well drilling apparatus comprising in com-

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 bination a barge containing at one end thereof jacks and means for raising and lowering said jacks and at the other end thereof winches and cable handling means, said jacks terminating in cradles at the upper ends thereof; a rig assembly comprising a derrick and a substructure which supports said derrick on a marine foundation, said substructure being characterized by having a section extending beyond said foundation on the barge side of said foundation when positioned thereon and said section being fitted with a horizontal strut adapted to seat in the cradles of said jacks whereby one side of said rig assembly is raised from said foundation when said jacks are raised; and a cable member extending from the side of said substructure opposite said strut to a point in said derrick, which point is above said winches and said substructure and thence to said winches and cable handling means whereby said rig assembly pivots in said cradles and is raised clear of said foundation when said cable member is wound upon said winches.

2. Apparatus as defined by claim 1 wherein said rig

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 assembly is characterized in that it contains a gin pole element, the lower end of which is affixed to said horizontal strut and the upper end of which supports said cable.

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