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LOCATING SUBMARINE WELLS AND LOWERING WELL TOOLS INTO SAID WELLS

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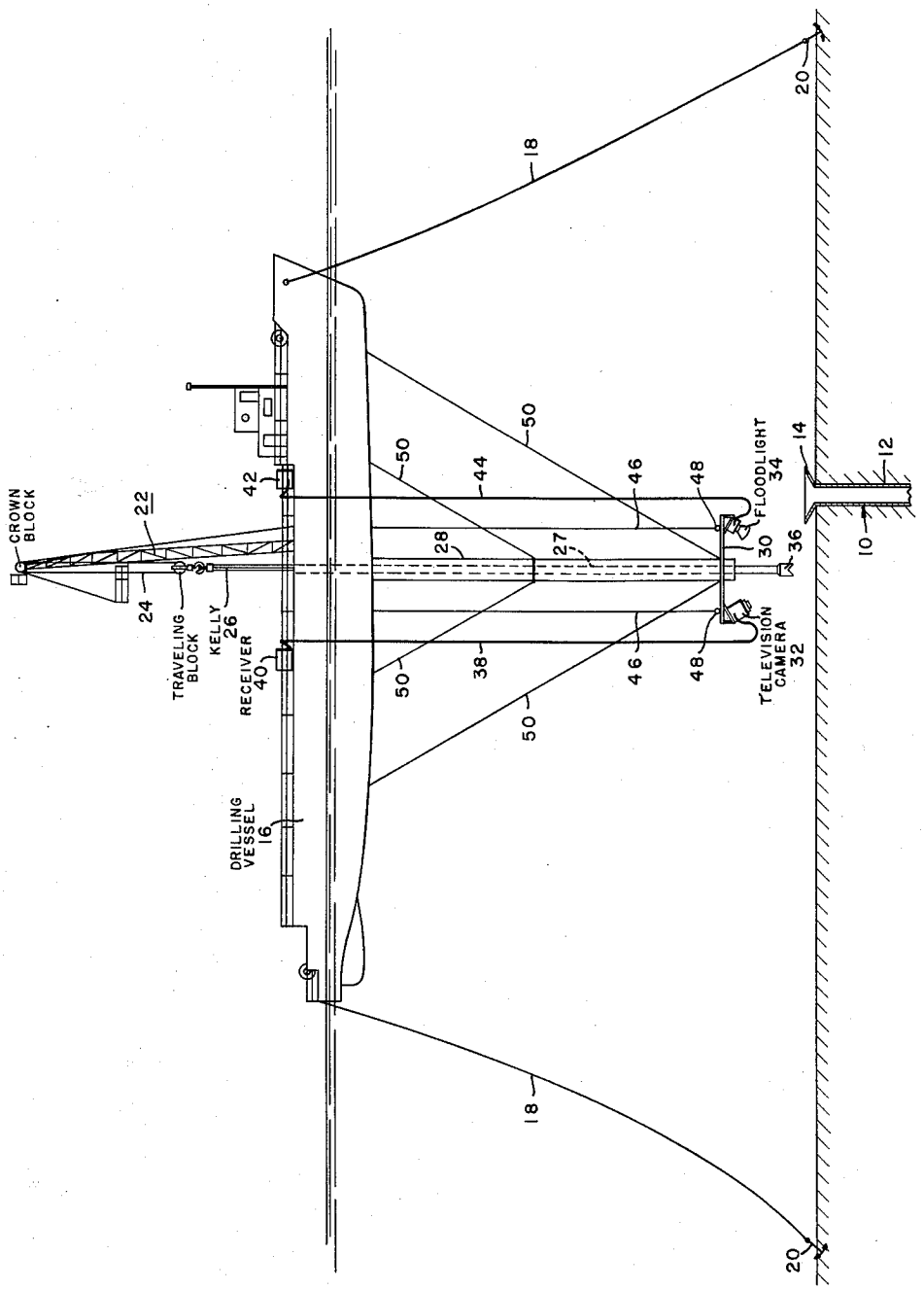

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LOCATING SUBMARINE WELLS AND LOWERING WELL TOOLS INTO SAID WELLS

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This invention relates to production of oil and gas. More particularly, this invention relates to methods for locating a submarine well and then placing a well tool, such as a drill bit, into the submarine well.

The invention to be described herein is described with relation to its application to the locating of a submarine well entrance and then placing a drill bit into the well. It is to be understood, however, that the method can be practiced using similar apparatus to locate and place commonly used well tools other than drill bits into the well.

After the drilling of a submarine well has begun, the drill bit is often removed from the submarine well for various reasons. It often occurs that contact between the vessel and the well bore is lost after the drill bit has been removed from the well entrance. One of the major problems associated with underwater drilling from a floating vessel or other support is the problem of locating the submarine well and then re-entering the drill bit into the submarine well.

Conduits and other guide means extending to the sea surface from the submarine well have been used with some success, but these means have not been completely satisfactory. Conduits connected to the well pipe or casing and extending to the sea surface or other location of the drilling rig restrict the motion of the rig support, present large resistance to the passage of ocean waves and currents, and constitute a menace to navigation when the drilling vessel or other rig support is removed.

Guide cables and similar devices offer only a limited range of motion to a floating drilling vessel and generally must be cast adrift when adverse seas or currents move the vessel or other rig supporting means a substantial distance away from the desired vertical alignment with the well bore. When the presently available guide means are dropped from the vessel or other drill-supporting means and contact between the vessel and well bore is lost, it is necessary to employ divers to make an underwater search for the lost well bore. This can be time consuming and costly, with no assurance of success in the vast ocean areas.

With my invention, the submerged well bore may be located from the floating drilling vessel with no mechanical connection between the two. The vessel or other rig-supporting means may be moved off the drilling location any desired distance and returned to permit the entry of the drill pipe or other tools into the submerged well.

Briefly described, the method includes lowering television means and the well tool into the water. A television picture is obtained at the surface showing the relative positions of the well tool and the entrance to the submarine well. The well tool is then moved until the television picture shows the well tool is located directly above the entrance to the submarine well. The well tool is then lowered into the well.

The invention as well as its many advantages will be further understood by reference to the following detailed description and single drawing which shows schematically a preferred method and apparatus for practicing my invention.

Referring to the drawing, a submarine well 10 is shown. The submerged well bore was initially cased with a large diameter conduit or pipe 12 having a large funnel 14

at the upper end that extends a short distance above the sea bottom.

The floating vessel 16 may be anchored in the vicinity adjacent the submarine well 10 by means of the mooring lines 18 anchored to the ocean floor by anchors 20.

A drilling rig 22 is shown constructed on the deck of the drilling vessel 16 and includes the usual drilling bit supports, such as the conventional traveling and crossover block assembly 24 supporting kelly 26 which is attached to drill string 27.

A drill stem guide 28 is shown lowered to a point not too far above the ocean floor. Mounted upon the lower portion of the drill stem guide 28 is a platform 30. The platform is used to support the television means such as the television camera 32 and a television flood light 34, both shown schematically. The structure of the camera 32 and the flood light 34 are such that the material used can withstand the underwater pressures and are insulated against water leakage. This structure is now well known to those skilled in the art of using television systems for underwater investigations.

The television camera 32 and the flood light 34 are angularly mounted so as to direct the light from the flood light 34 and the eye of the television camera 32 centrally toward the drill bit 36 after it is lowered through the drill stem guide 28 and its lower end extends below the lower extremity of the drill stem guide. Thus, a continuous picture of the drill bit 36 will be transmitted from the television camera 32 and up the multi-conductor cable 38 to a television receiver 40 located on the drilling vessel 16. Current for the flood light 34 is supplied from a voltage source 42 on vessel 16 through conductor cable 44 to the flood light 34.

The platform 30 is rotatably mounted about the lower portion of the drill stem guide 28 and may be rotated from the drilling vessel deck by a rotational force applied to the cable lines 46 which extend from the vessel 16 and are connected at their lower end through eye members 48 mounted on the top of the rotatable platform 30. Means other than cable lines 46 may be used to rotate the platform 30. For example, a servo-mechanism including a first synchro motor on vessel 16 and a second synchro motor on platform 30 may be used. Hence, the platform 30 may be rotated until the eye of the television camera 32 transmits a continuous picture to the receiver 40 which shows both the drill bit 36 and the entrance 14 of the well 10. A continuous picture of the relative locations of the drill bit 36 and the well 10 are thus thereafter transmitted to the receiver 40.

The drill stem guide 28 is braced by two or more guy lines 50, which permit controlled movement of the lower end of the drill stem guide 28.

In practicing my invention, assume the well 10 was initially cased with the large diameter conduit 12 and the upwardly extending funnel 14. It then became necessary to remove the drill bit 36 from the well and vessel 16 removed from the area. A small marker buoy on the sea surface with a cable extending to the pipe funnel 14 would serve as an indication of the general ocean area location of the well bore. When it is desired to perform additional operations or drilling in the well 10, the vessel or other rig support is brought into close proximity to the marker buoy. The drill stem guide 28 with its attached television camera 32 and flood light 34 are then lowered from the floating vessel to a point just above the water bottom. The drill bit 36 may then be lowered through the drill stem guide 28 until it projects below the lower extremity of the drill stem guide 28. At this point, a picture of the drill bit 36 is continuously transmitted to the receiver 40.

After the television means and the drill bit have been lowered, the rotatable platform 30 may then be rotated

and/or the floating vessel moved by adjustment of mooring lines **18** until a picture of the submarine well entrance is also transmitted to the vessel. Thereafter, a picture showing the relative positions of the drill bit **36** and the submarine well entrance is continuously transmitted to the vessel.

The drill bit **36** is then moved toward the well **10** until the transmitted picture indicates the drill bit is directly above the entrance to the well. This vertical alignment may be accomplished by adjustment of the mooring lines, **18**, and the guy lines, **50**. Final positioning of the drill stem guide **28** is made by adjustment of the guy lines **50**. The drill bit **36** or other drill tool is then lowered into the well **10** by means of the mechanism attached to the rig **22**.

In turbid or muddy water it may be desirable to increase the effective range of the television camera by coating the pipe funnel **14** with material having a high light-reflecting characteristic such as aluminum paint. In extreme cases, a still greater range may be obtained by placing a light source on the conductor pipe funnel **14** or other portions of the upper end of the well bore. The submerged light on the funnel **14** could be battery operated and controlled by light from the flood light **34**.

I claim:

A method of locating and then placing a well tool into a submarine well provided with a large funnel-shaped entrance coated with material having a high light-reflecting characteristic and extending above the water bottom comprising: lowering from a floating vessel and to a point just above the water bottom a rotatable member having a central opening and having a flood light and television camera diametrically mounted thereon; then lowering the well tool from the floating vessel and through the central opening in the rotatable member until the lower portion of the well tool is seen by the television camera and a picture of said lower portion continuously transmitted to the vessel; rotating the rotatable member and/or moving the floating vessel until a picture of the submarine well entrance is also transmitted to the vessel whereby, thereafter, a picture showing the relative positions of the well tool and the submarine well entrance is continuously transmitted to the vessel; moving the vessel until the transmitted picture indicates the well tool is directly above the submarine well entrance; and then lowering the well tool into the submarine well.

References Cited in the file of this patent

UNITED STATES PATENTS

1,469,574	Allen	Oct. 2, 1923
2,019,059	Sherman	Oct. 29, 1935
2,215,365	Vestergren	Sept. 17, 1940
2,433,971	Adams	Jan. 6, 1948
2,476,309	Lang	July 19, 1949
2,808,229	Bauer et al.	Oct. 1, 1957
2,981,347	Bauer et al.	Apr. 25, 1961