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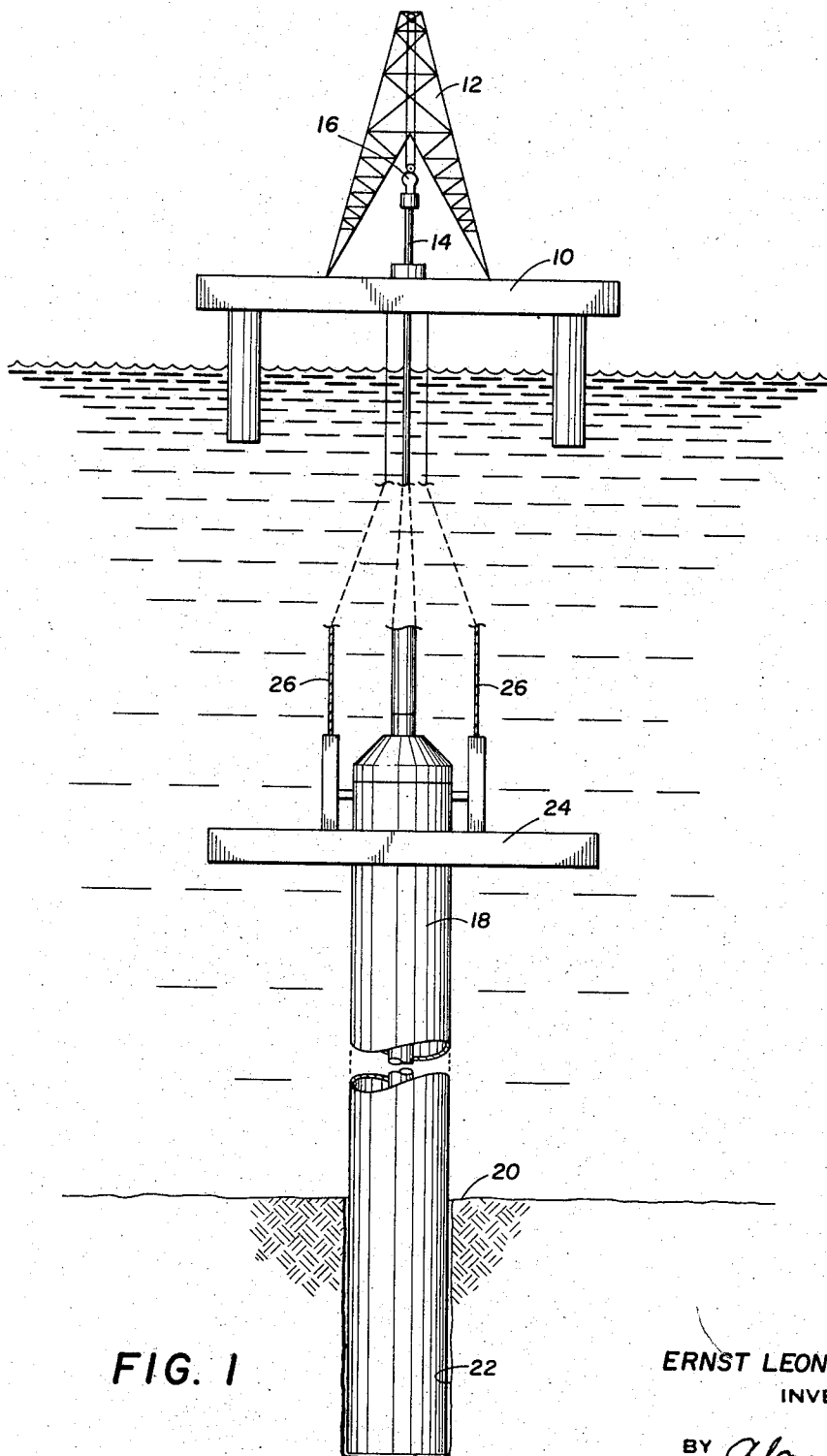
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JET STRING AND WEIGHT CAN ASSEMBLY

Filed June 8, 1966

2 Sheets-Sheet 1



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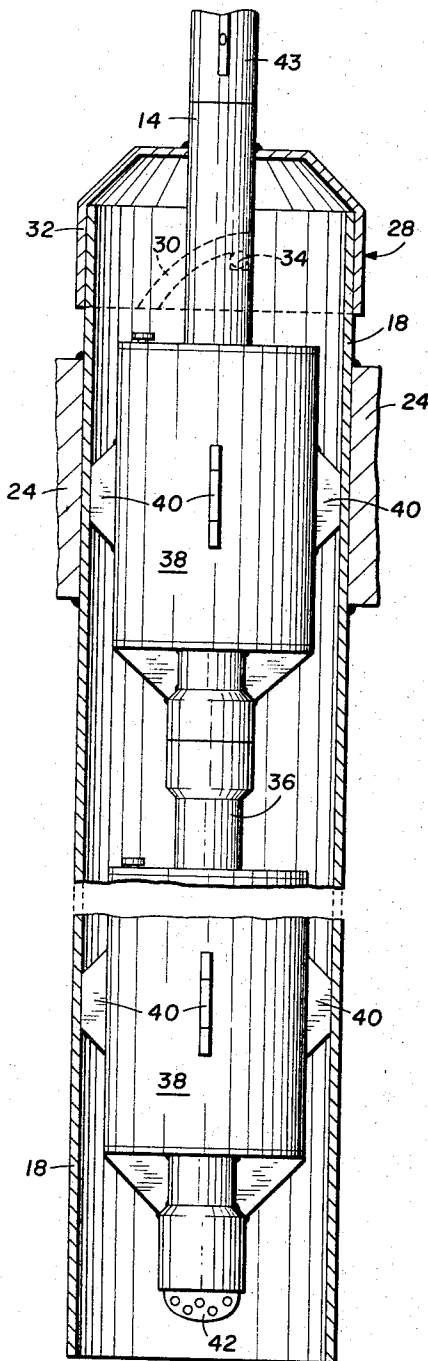


FIG. 2

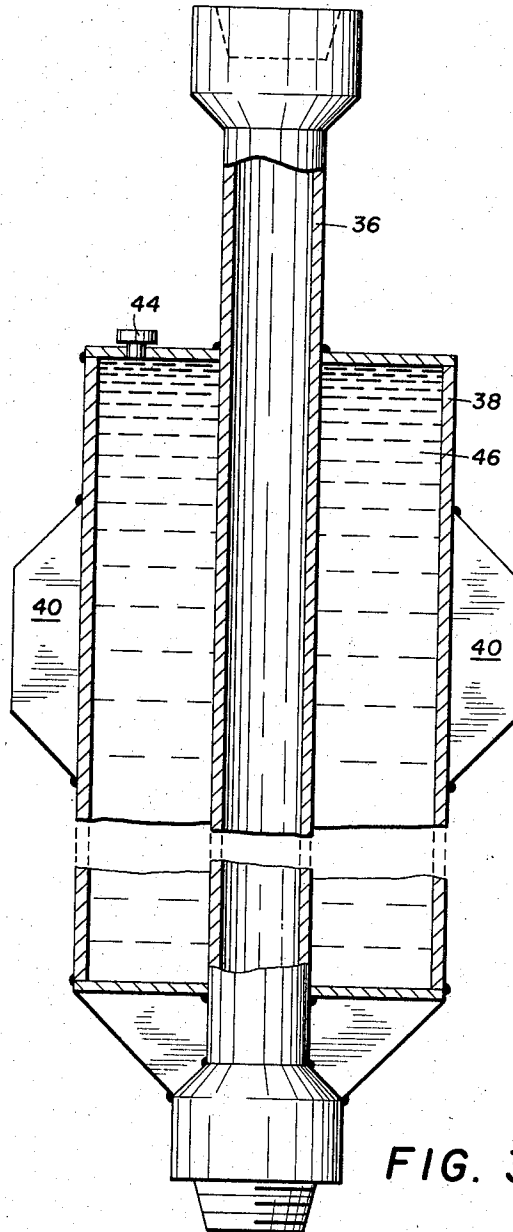


FIG. 3

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JET STRING AND WEIGHT CAN ASSEMBLY
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ABSTRACT OF THE DISCLOSURE

This invention relates to the offshore drilling of oil and/or gas wells and more particularly to a method and apparatus for installing a surface well casing or conductor pipe for a subaqueous well.

In drilling an offshore gas and/or oil well from an above-surface platform, particularly from a floating vessel, a connection must be made with the marine bottom and the underlying formations, to provide a base point for guidelines connecting the borehole with the floating vessel, so that the well can be re-entered after the drill string is withdrawn. One common method of initiating a subaqueous well is to position a surface casing or conductor pipe in a preliminary wellbore, extending several hundred feet into the underlying formations. A weighted landing base supporting a guidance and alignment system, including the flexible guidelines, would be attached to the upper end of the surface conductor pipe to help support the conductor pipe during the drilling operation and provide a firm base for hanging the later casings and tubings in the well.

Two common methods of setting the surface casing in a subaqueous wellbore are concerned with first forming a preliminary borehole. In one of these methods, the drill string is lowered from the above-surface station to the ocean floor and a hole is formed in the ocean floor by drilling or jetting. The drill string is removed from the hole and surface casing is then suspended from the drill string and lowered into the borehole where it is set and anchored as by cementing. When drilling in deeper water, the surface casing is first suspended from the vessel beneath the rotary table and the drill string is lowered through the pipe to the ocean floor. After the drilling operation, the surface casing is slipped down over the drill string into the hole where it is cemented along at least a portion of its length. Each of the methods requires that the subaqueous formations underlying the marine bottom be consolidated enough so that a hole may be drilled or jetted therein, without the earth caving in or filling the hole. When using the first method, a diver would be required to relocate the hole subsequent to being drilled and prior to the surface casing being set. The second method would require a collapsible drill bit so that the original hole could be drilled large enough for the surface casing to settle therein while still allowing the drill string to be withdrawn after the casing is stripped down over the drill string into the hole. It has usually been considered more satisfactory to drill the hole than to jet it, due to the more accurate control over the size of the hole under these conditions.

It is desirable to utilize a single-step procedure rather than the two-step procedures noted above. In one such procedure, the surface casing itself is utilized as the lower joints of the drill string and it is fitted with a bit on the lower end thereof for drilling through the underlying formations or a jetting head for jetting into the marine bottom. This approach has proved to be necessary in fact, where the upper formations of the marine bottom are not consolidated enough to be drilled without the earth caving in and filling the hole when a drill string

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is withdrawn. It is even more desirable to be able to permanently mount the guidance and alignment system, including a landing base, directly on the conductor pipe before it is guided down to the marine bottom. This is not possible if the initial hole is drilled, since the rotation of the entire landing base and guidance system at drilling speeds would be virtually impossible. Therefore, where the underlying formations are soft enough to permit it or make it necessary, the forming of the preliminary borehole by jetting would appear advisable especially if the diameter of the borehole can be sufficiently controlled.

Such a system which has been utilized consist of releasably fixing the lower end of a drill string within the surface casing itself and lowering the unit to the ocean bottom. A jetting head is fixed to the end of the drill string which is displaced slightly up from the lower end of the surface casing. The surface casing is jetted in and the drilling returns are conducted up the annulus between the drill string and the surface casing. In this way the upper end of the hole does not tend to widen by being continually washed away by the drilling returns, as would be the case with an open jet pipe. Mounted above the surface casing or conductor pipe on the drill string are removable weights, being applied to the upper end of the surface casing to assist in driving the casing down into the marine bottom. These weights, above the surface casing, raise the center of gravity of the drilling apparatus, making it difficult to control the drill string from the above-surface platform. The large weights also provide more surface area for the ocean currents increasing the drag imposed on the drill string. Furthermore, the axial length of the weight cans makes the use of this apparatus inconvenient in shallow water where the distance between the marine bottom and the drilling deck is rather restricted.

An object of this invention is to provide a lower center of gravity for the combined drill string and surface casing to control better the string during the jetting-in operation.

Another object of the invention is to provide a more compact arrangement, for jetting in a surface casing, that would be adaptable for use in shallow water.

Other objects and advantages of the present invention will be apparent from the following description taken with reference to the accompanying drawings wherein is shown a preferred embodiment of the invention:

FIGURE 1 is an elevational view of a surface casing, with a landing base attached thereto, of the present invention, being jetted into the marine bottom;

FIGURE 2 is a cross-sectional view of a portion of the apparatus, partially in cross section, illustrating the arrangement of the surface casing and the enclosed weight cans mounted on the drill string; and

FIGURE 3 is a cross-sectional view of one joint of the drill string with a weight can affixed thereto.

Now referring to FIGURE 1, a floating vessel 10, having a drilling rig 12 mounted thereon, is positioned above a drilling site. A drill string 14 is suspended by a swivel 16 of the drilling rig 12 and is connected below to a surface casing or conductor pipe 18 being jetted into the marine bottom 20 to form a preliminary borehole 22 and position the surface casing 18 therein. A landing base 24, fixed on the upper end of the surface casing 18, has flexible guide cables 26 extending back to the drilling vessel 10 to conduct equipment down to the borehole 22 after the jetting-in operation has been completed and the drill string 14 has been removed.

Now looking at FIGURE 2, the surface casing 18 is shown as connected to the drill string 14 by a J slot connector 28, the J slot connector consisting in part of a plurality of shaped slots 30 in an enlarged cap 32 fixed

to the drill string 14. The slots 30 in the cap 32 coact with radially extending pins 34 projecting from the outer surface of the casing 18. Each of the drill pipe joints 36 of the drill string 14, within the surface casing 18, has a cylindrical weight can 38 coaxially mounted thereon. Radial fins 40, spaced around each of the weight cans, act to center the drill string 14 within the casing 18. A jetting head or nozzle 42 is connected to the lower end of the drill string, within the surface casing 18, and is spaced upwardly from the lower end of the casing. A bumper sub 43 is inserted above the J connector 28 in the drill string 14 and can be actuated as a hammer, as well as taking up any vertical movement of the surface vessel 10.

As shown in FIGURE 3, the cylindrical weight can 38 is hollow and has a capped valve 44 in the upper end thereof for adding sufficient weighting material 46. The weighting material can be barite, galena, or other material commonly used for controlling mud weight.

To jet in the surface casing 18, the casing is connected by the J connector 28 to the lower end of the drill string 14 and lowered until the casing 18 rests on the marine bottom 20. The drill string 14 serves as a wash pipe through which water is then jetted into the interior of the surface casing to flush out the unconsolidated material. The jet head 42 is spaced a distance above the lower end of the surface casing which is driven continuously into the underlying formations by the weighted drill string 14, so that no water escapes up the outside of the surface casing to overenlarge the hole and impair the necessary frictional contact between the casing and the sides of the borehole. This frictional contact permits the surface casing to support the weight of the tubing later hung therein. The jetting returns are conducted out of the borehole 22 through the annular space between the weight cans 38 and the casing 18, exiting through the J connector cam slots 30. When the surface casing 18 has been jetted in until the landing base 24 rests on the marine bottom 20, the drill string 14 is rotated to release it from the surface casing 18. The drill string 14 is then raised up out of the borehole 22 leaving the casing 18 in place. The flexible guidelines 26 connected to the landing base 24 are then used to mount, on the upper end of the casing 18, a blowout preventer (not shown) and either a surface riser pipe or a receiver assembly with a flexible drilling mud return line (also not shown), depending whether the drilling is to be done with an enclosed or an open pipe, respectively. The subaqueous well can then be drilled in a convention operation to the total depth.

Although the present invention has been described in connection with details of the specific embodiment thereof, it is to be understood that such details are not intended to limit the scope of the invention. Terms and expressions employed are used in a descriptive and not a limiting sense and there is no intention of excluding such equivalents in the invention described, as fall within the scope of the claims. Now having described the apparatus and method of the invention, reference should be had to the claims which follow.

What is claimed is:

1. Apparatus for jetting a surface well casing into a marine bottom at an offshore site comprising: a surface

casing; a drill string made up of a plurality of drill string joints, said drill string having a jetting head on a first end thereof; means for releasably suspending said casing over said first end of said drill string; at least one cylindrical weight can having a diameter substantially less than the internal diameter of said surface casing, said weight can being mounted on one of said joints of said drill string within said surface casing; and spaced radial guide means on said weight can for centrally locating said drill pipe within said surface casing to form an annulus for the jetting returns whereby the jetting apparatus is compact and center of gravity is lowered to increase the controllability of said drill string during the jetting operation.

2. The apparatus for jetting a surface well casing into a marine bottom at an offshore site as recited in claim 1 wherein said jetting head on said first end of said drill string is within said surface casing, spaced a distance from the end thereof whereby the sides of the borehole being jetted are not washed out and the size of the borehole can be controlled.

3. The apparatus for jetting a surface well casing into a marine bottom at an offshore site as recited in claim 1 wherein said weight can is hollow and wherein the weighting material used to adjust the weight of said weight can is the same material used to weight drilling mud.

4. The apparatus for jetting a surface well casing into a marine bottom at an offshore site as recited in claim 1 wherein said joints of said drill string within said surface casing each has one of said weight cans affixed thereto.

5. The apparatus for jetting a surface well casing into a marine bottom at an offshore site as recited in claim 1 wherein said means for suspending said surface casing from said drill string comprises: a cap portion fixed to said drill string and adapted to fit over an end of said surface casing; a plurality of cam slots in the surface of said cap; and radial pins on said end of surface casing to coact with said slots whereby the surface casing is releasably suspended from said drill string during jetting.

6. Apparatus for jetting a surface well casing into a marine bottom at an offshore site as recited in claim 1 wherein said apparatus includes an above-surface platform; means on said above-surface platform for supporting said drill string and lowering said drill string into said marine bottom; and a landing base mounted on the upper end of said surface casing and flexible guidelines attached to said landing base and extending to said above-surface platform.

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