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Laffont

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[45] Feb. 29, 1972

[54] INDEPENDENT DRILLING RIG FOR  
ARTICULATED PLATFORM

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[57] ABSTRACT

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A marine drilling system consisting of an emergent articulated platform with positive buoyancy, fixed to a base by means of a coupling with two degrees of freedom, in which the said platform contains an opening of rectangular cross section extending from the top of the platform to a line situated several meters below the surface of the sea, the articulated platform being equipped with on the inside edges of the opening with hoisting gear, which is used for the positioning in the said opening of a drilling unit, transportable by a floating pontoon, which fits into the opening, by raising the drilling unit, which is locked on to the platform when in the correct position, it being possible for the drilling device forming part of the said unit to be moved in relation to the unit in the plane of the upper surface of the platform, so that drillings can be made from different points on the platform.

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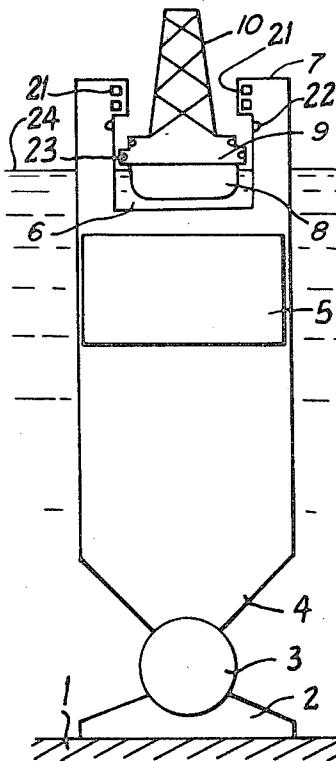
[52] U.S. Cl. ..... 61/46.5, 61/65  
[51] Int. Cl. ..... E02b 17/00, B63b 35/44  
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175/9; 114/43.5

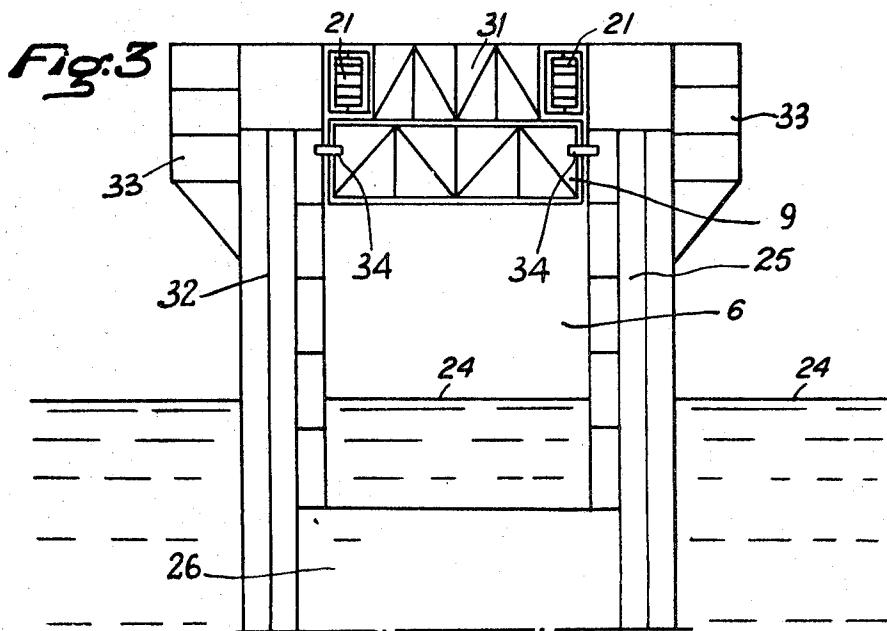
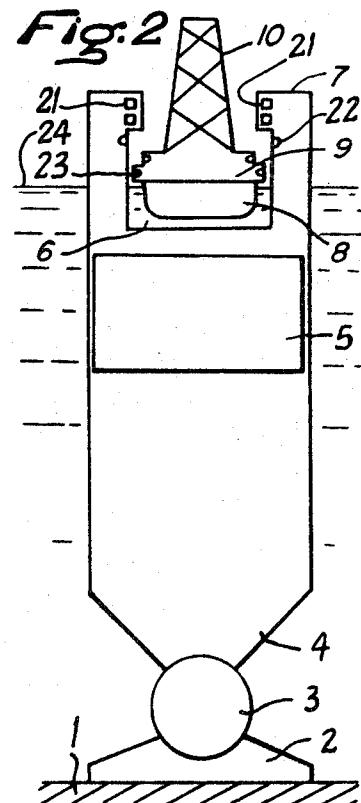
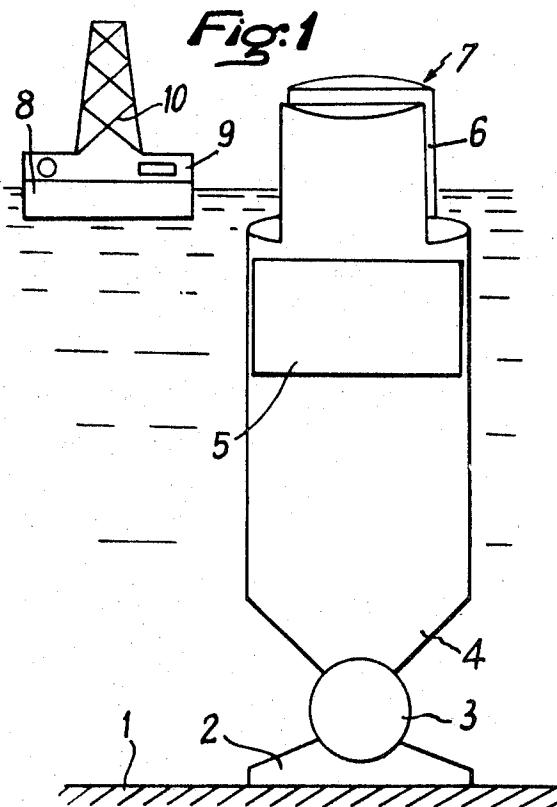
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2 Claims, 5 Drawing Figures





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Fig. 4

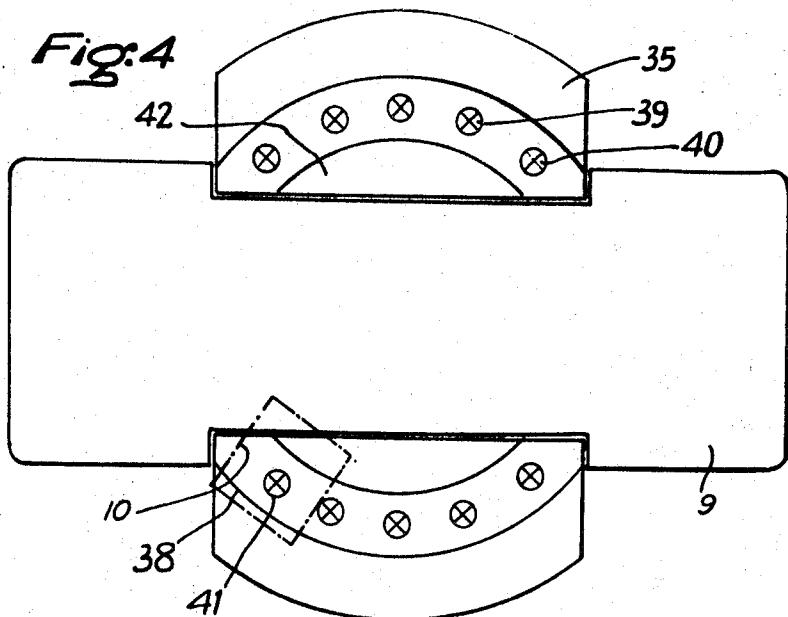
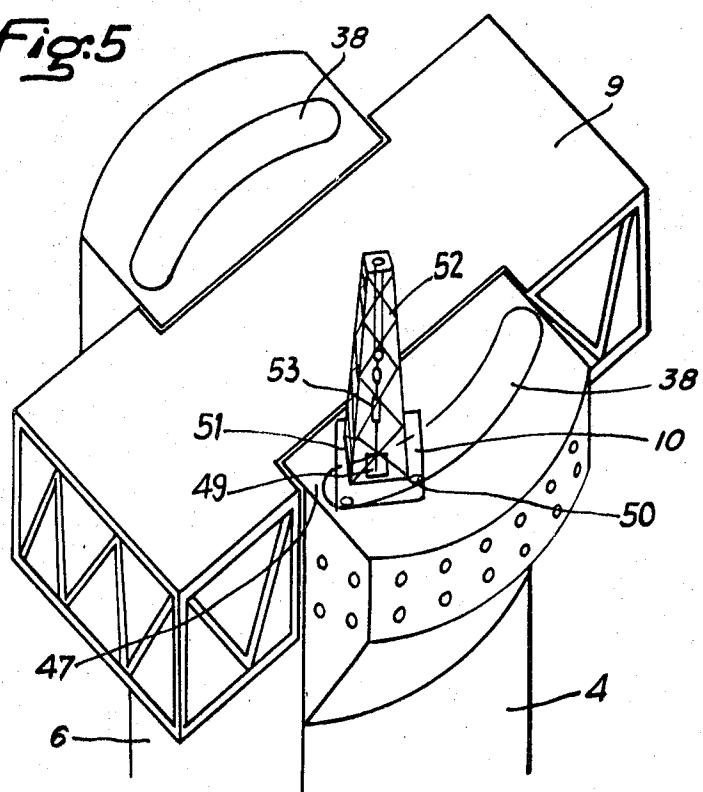


Fig:5



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## INDEPENDENT DRILLING RIG FOR ARTICULATED PLATFORM

The present invention concerns an independent drilling unit, or drilling rig, intended for attachment to the head of an articulated platform.

A known type of articulated platform consists of a base carrying an articulation attached to the column, which is cylindrical in shape and which carries a set of floats near the top; this type is more fully described in the French Pat. No. 1,519,891.

Another known type is the self-raising platform, consisting of a floating pontoon carrying a drilling unit, with a number of legs which move along in relation to the pontoon and drilling unit, and come to rest on the seabed. The drilling unit can be raised on the piles high enough to ensure that it is out of range of the highest waves.

The invention enables an articulated platform to be equipped with a drilling unit that is independent of the actual platform, and that can be moved easily from one platform to another by making use of known hoisting techniques, which can in particular be of the same type as those used for self-raising platforms.

The drilling device involved in the invention, which includes an emergent articulated platform with positive buoyancy, attached to a base by means of a coupling with two degrees of freedom, is characterized in that the said platform contains an opening of rectangular cross section extending from the top of the platform to a line situated several meters below the surface of the sea, the articulated platform being equipped on the inside edges of the opening with hoisting gear, which is used for the positioning in the said opening of a drilling unit, transportable by a floating pontoon, which fits into the opening, by raising the drilling unit, which is locked on to the platform when in the correct position, it being possible for the drilling device forming part of the said unit to be moved in relation to the unit in the plane of the upper surface of the platform, so that drillings can be made from various points on the platform.

According to another characteristic of the invention, the articulated platform is equipped with all the fixed accessories required for the passage of the line of drilling rods and for closing the annular space if required, as well as the equipment for bringing the wells into production.

According to yet another characteristic of the invention, the natural list of the articulated platform resulting from the possible displacement of the drilling appliance in relation to the drilling unit is compensated for by suitable ballasting of certain compartments of the platform.

The advantage of such a system is that it allows the articulated platform to be installed easily: it is conveyed to the drilling sites in a recumbent position, without any top-heavy load, and then tilted over into its normal position by ballasting; once in position, the drilling unit is fixed firmly to it, it being possible to unbolt the unit and remove it on a pontoon to another platform, while the first platform remains in position, to proceed with production operations on the oilfield.

Other advantages will be made clear in the description below, and the figures accompanying it, which will explain the invention more fully.

FIG. 1 shows an articulated drilling platform in accordance with the invention, with a pontoon near it carrying the drilling unit.

FIG. 2 gives a perpendicular view of the column, with the pontoon carrying the drilling unit in position in the opening at the upper end of the articulated platform.

FIG. 3 shows the drilling unit in position at the top end of the opening in the platform.

FIG. 4 represents an overhead view of the unit when in place, while FIG. 5 provides a view of the unit in perspective, when in the operating position.

On FIG. 1, a base 2 is shown resting on the seabed 1, with a swivel-joint and its support 3 attached to the base and forming part of the column 4, which is equipped with floats 5 at its upper end.

There is an opening 6 at the top of the column, forming part of the articulated platform, with the upper surface 7 of the articulated platform about 10 meters above sealevel.

The opening 6 has a rectangular cross section, which can be seen more clearly in FIG. 2. The lower end of it is below sealevel. A floating pontoon 8 carries a drilling unit 9 and drilling device 10, which can be moved in relation to the unit 9.

The pontoon is shown at a certain distance from the column, when about to enter the opening at the top of the column, before the operations to fix the drilling unit in position on top of the platform take place.

Before the arrival of the pontoon, the platform is installed, in two stages. First, the base is lowered to the seabed, and given very considerable negative buoyancy. Next, the oscillating platform containing the column, swivel-joint and swivel support is brought either from the building yard or from the previous site, in a recumbent position, with high positive buoyancy, then raised to an upright position by ballasting, and attached to the base.

FIG. 2 represents the same installation, seen from an angle perpendicular to that of the previous figure. The base 2 rests on the seabed 1, and the swivel-joint and support are attached to the base.

The column 4 forms a single unit with the swivel-joint and its support. The floats 5 help to stabilize the platform. The pontoon 8 moves into the opening 6, seen here in cross section. The drilling unit 9 and drilling appliance 10 remain on this pontoon, which floats on the surface of the sea 24.

Above sealevel is the upper surface of the platform 7 and the hoisting gear 21, consisting of machines such as motor-driven winches, fixed to the platform. Bolting appliances 22, forming part of the platform, are provided to fit into matching appliances 23 on the drilling unit; when the unit is raised, the appliances come into contact, allowing the unit to be fixed rigidly to the top of the platform.

The winches may be replaced by appliances using racks or other systems. The unit is placed in position as follows.

The pontoon is floated into the platform opening, and moored firmly to the platform. The drilling unit containing the drilling appliance is raised by means of the hoisting gear 21, to the position where it can be bolted to the platform by means of the bolting appliances 22 and 23.

The assembly is carried out in such a way that the base of the drilling appliance, which can move inside the drilling unit, is level with the surface of the articulated platform.

This enables the appliance simply to be slid over the surface of the platform, so that different wells can be drilled from the same platform.

At the same time the ballasting of the various compartments is done in such a way as to eliminate any list in the platform when at rest. This ensures a compact installation that can drill different wells, and which is close to the surface of the sea, thus reducing the effect of the wind on it, and providing a fairly stable structure, completely out of reach of waves, for drilling operations.

FIG. 3 represents the drilling unit in position on top of the platform.

Twenty-five represents the outside of the articulated platform, and 26 the top of the column, below sealevel 24. At the upper end of the opening 6, already described above, is the drilling unit 9, in working position. By drilling unit is meant all the equipment necessary to drill a well, while by drilling appliance is meant the components whose geometrical positioning in relation to the rotary table must be strictly respected. The hoisting gear 30 has been used to raise this unit from the pontoon to the working position, where the bolting appliances are used to fix it to the platform. A drilling column passes through a guide-tube 32, while the outermost installations 33 house crew accommodation and laboratories.

FIG. 4 shows the top of the platform, equipped with the drilling unit 9 and drilling appliance 10. The installations necessary for the platform and production installations cor-

respond to 35. The platform carries the drilling unit 9, which includes all the fixed installations such as motors, mud-pumps and components whose geometrical positioning in relation to the rotary table is unimportant. The base of the drilling apparatus 10 is shown positioned for the drilling of a production well at position 41. A passage 38 is provided at the top of the platform, to house the head equipment and shutters to close the annular space during drilling. 39 and 40 represent two of the completed wells, equipped with production machinery. Finally, there is a tank 42 round the drilling unit, to hold 10 drilling or production fluids, in the center of the oscillating platform.

The drilling unit weighs between 1,500 and 2,500 tons when empty, while the loads which this unit has to support, either because of the storage of drilling or lining pipes, or as a result of the forces exerted on the tool, can reach 3 to 4,000 tons. 15

Finally, FIG. 5 shows the top of the drilling platform in perspective. The cylindrical column 4 carries the platform, with its opening 6. The base 9 is suspended, coming level with the surface of the platform. Passages 38 are provided for installation of the drilling and production machinery. The area 47 houses the hoisting winches, drilling derricks and the drilling appliance it carries. The base of the drilling appliance 10 fits over the openings 44, and the rotary table 49 is fixed rigidly to this base, which is attached to the surface of the articulated platform with a series of bolts 50.

Finally, there is a hoisting winch 51, shown here in diagrammatic form, combines with the drilling apparatus 52. The derrick carries the line of rods, and a motor 53 drives the rotary

table.

What we claim is:

1. A marine drilling system comprising:  
a platform having a positive buoyancy attached to a base by means of a two-directional pivot, said platform being provided with ballasting compartments and defining an opening extending from the top of the platform downwardly to a line below the surface of the sea;  
a drilling unit carried by a pontoon and including a drilling appliance, said unit and pontoon being dimensioned to be positioned in the opening of the platform;  
hoisting gear adjacent the edges of the opening of the platform to raise the drilling unit from said pontoon into a position in which the base of said drilling appliance is level with the upper surface of said platform;  
and cooperating locking means on the platform and drilling unit for fastening said unit rigidly to the platform when the base of the drilling appliance is level with the surface of said platform;  
said drilling appliance being movable over the upper surfaces of the remainder of said drilling unit and said platform, whereby drilling can be carried out from various points on the platform.

2. A marine drilling system as claimed in claim 1 in which said drilling unit comprises the equipment necessary to drill a well, and said drilling appliance comprises those components of said unit which must necessarily occupy a particular position relative to the well being drilled.

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