(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 250 069 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **87303005.0**

(22) Date of filing: **07.04.87**

(51) Int. Cl.⁴: **E21B 7/128** , E21B 43/01 , B63B 35/44

(30) Priority: **20.06.86 US 876576**

(43) Date of publication of application: **23.12.87 Bulletin 87/52**

(84) Designated Contracting States: **DE FR GB IT NL**

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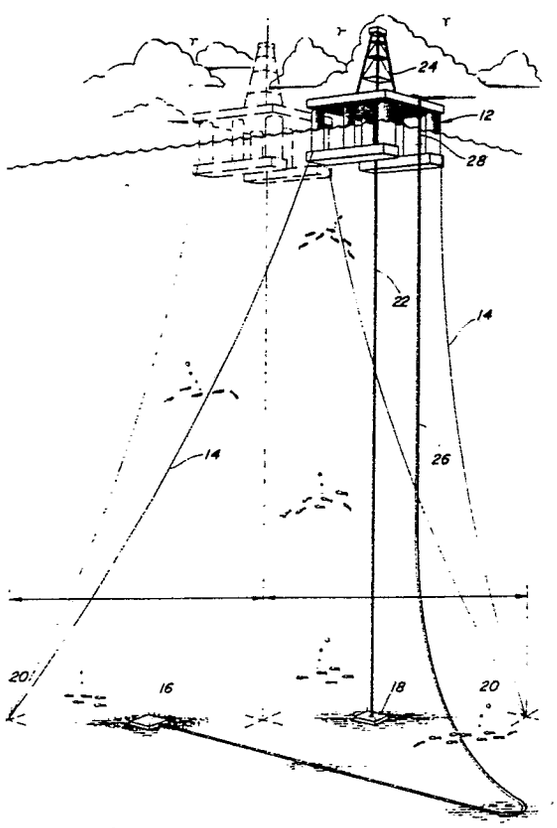
(54) A deepwater floating drilling and production facility incorporating flexible production risers.

(57) A method of using a floating platform (12) in deep (1000-3000 feet) water as a drilling/workover and production platform. By interconnecting the subsea wellheads of at least one template (16) to the platform using flexible production risers (26) connected through a reverse loop, the platform may be adjusted on its moorings to position the platform directly over a second template (18) for subsequent drilling or workover. This eliminates the need for separate drilling platforms and workboats. Further, wells of separate templates can be serviced separately and the entire field production need not be completely curtailed during such a workover.



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A DEEPWATER FLOATING DRILLING AND PRODUCTION FACILITY INCORPORATING FLEXIBLE PRODUCTION RISERS

The present invention relates to a method of utilizing a floating platform in deep water as a combination drilling/workover and production platform. More particularly, the present invention is directed to the use of a floating platform (preferably, a semisubmersible) in 1000 feet (305m) to 3000 feet (915m) of water, which is interconnected to completed wells of a template by flexible risers using a reverse loop configuration, by adjusting the mooring of the platform to position it directly over a template to permit additional drilling or workover without curtailing production from wells of other templates.

As the search for offshore oil moves into deeper water, the costs associated with producing that oil also increase. In fact, costs typically increase at a faster rate than the linear increase in water depth. This is especially true for conventional fixed platforms. These increasing costs require an increase in the size of proven oil reserves in order to justify proceeding beyond the initial exploration phase. Costs associated with operating an offshore drilling platform typically can exceed $100,000 per day. Unless ways can be developed to reduce drilling costs and accelerate return by offering early production, an increasing number of offshore fields with marginal reserves will not be produced. This problem has been exacerbated by the recent slide in oil prices.

Viewed from one aspect, the invention provides a method of performing drilling or workover operations in relation to and production from a plurality of well templates, in deep water, the method involving mooring a floating platform in a position which is generally above said templates, the platform being interconnected with one or more completed wells of at least a first well template by one or more looped flexible risers, adjusting the mooring of said platform to position it directly above a further said well template, and performing drilling or workover of one or more wells of such further template without the need to interrupt production from said one or more completed well(s) via said looped flexible user(s).

Viewed from a further aspect, the invention provides a method of using a floating platform in water of the order of from 1000 to 3000 feet deep, said method comprising:

mooring said platform in a position that is generally centered above a plurality of well templates;

adjusting the mooring of said platform so as to position said platform directly above a first one of said templates;

drilling one or more wells through said first template;

interconnecting said completed well(s) to said platform using one or more looped flexible riser(s);

adjusting the mooring of said platform so as to position said platform directly above a second one of said templates;

drilling one or more wells in said second template without interrupting production from said first template.

Viewed from a still further aspect, the invention provides a method of simultaneously using a semisubmersible platform that is moored in water on the order of from 1000 to 3000 feet deep and interconnected to at least a first and second well template by looped flexible production risers as a production and a workover platform, said method comprising:

adjusting the mooring of said platform so as to position said platform directly above a first one of said templates;

curtailing production from said first template;

conducting a workover of the wells of said first template without interrupting production from the wells of said other template(s);

restoring the wells of said first template to production.

The method of the present invention provides reduction in costs by eliminating the need for a separate drilling platform. Further, this method takes advantage of the lower costs associated with floating platforms and enables early initial production from a first well template while additional drilling is performed on a second or subsequent template. In addition, the same floating platform is used for workovers to reduce maintenance costs without interrupting production from wells of other templates. Preferably, the floating platform can be deballasted for maintenance without curtailing production.

While the use of flexible risers to interconnect subsea wells to floating production platforms is becoming conventional, the present invention incorporates the "benefit" of the mobility of the platform resulting from mooring in deep water (normally considered a drawback), to enable the platform to perform the additional drilling and workover functions. When moored in water on the order of from 1000 to 3000 feet (305 to 915 meters) deep, there is sufficient flexibility in the moorings to permit the position of the floating platform to be adjusted to lie directly above any of several well templates positioned on the ocean floor for drilling or workover. Templates may be spaced apart by 300 feet (91.5m) without causing the riser to deviate from

vertical by more than 17° (in 1000 ft water depth, 6° in 3000 ft), an angle easily accomodated by flexible risers. By configuring the flexible risers in a reverse loop, even these relatively small angles will be substantially reduced. This combined flexibility in moorings and production riser capability also permits the floating platform to be deballasted to permit certain portions that normally occupy subsurface positions to extend above the surface for inspection and maintenance, without curtailing production.

An embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawing, wherein:

The Figure is a schematic side elevational view of a floating production platform utilizing a method in accordance with the invention, the drilling/workover position being shown in solid line, the normal production position being shown in phantom.

The method in accordance with the invention is adaptable for usage with any floating production facility. It is preferred that a semisubmersible platform 12 be utilized in this method. A plurality of mooring lines 14 (typically eight or more, only two have been shown to simplify the drawing) secure platform 12 in position above templates 16 and 18 by virtue of attachments 20 to the ocean floor.

Flexible production riser(s) 26 interconnect template 16 to platform 12. A rigid production riser section 28 traverses the zone (typically 20 to 30 feet) that is subjected to wave battering to extend riser life. The flexible riser 26 is depicted in the Figure in a reverse loop configuration that enhances the flexibility of the system. The use of a flexible riser obviates the need for motion compensation devices typically required with rigid risers and a floating production platform. The reverse loop configuration increases the amount of both lateral and vertical movement of which the platform is capable. The utilization of the flexibility afforded in the moorings in 1000 to 3000 feet water depths (normally considered a problem to be overcome), with the flexible risers affords a platform that can be utilized simultaneously as a production facility and a drilling/workover rig. The flexible riser 26 may be a single conduit carrying the consolidated flow from a manifold located in proximity to the template 16 if subsea wellheads are used; or the flexible riser may be a bundle of conduits carrying production from the individual wells to wellheads located on the platform 12.

Platform 12 is ghosted into its normal position generally centered above its well templates 16 and 18. By adjusting the mooring lines 14, that is, tightening some while slackening others, the position of the platform may be adjusted to bring it directly above one of the well templates 18 as shown in the Figure. This enables drilling or workover equipment to be lowered into a well bore through a vertically positioned casing 22 from derrick 24. This mooring adjustment might be accomplished, for example, by coiling and uncoiling the mooring lines to and from winding drums (not shown).

While it is preferred that simultaneous production and drilling/workover not be accomplished on a single template (for safety reasons), there is no reason a platform could not be used to drill/workover one template while simultaneously producing from another, particularly if production is to a location outboard of the drilling derrick axis. By adjusting the moorings and continuing production from other templates as described, several economic benefits are obtained: a) only a portion of production need be curtailed during workover and, b) a separate workover unit (with the aforementioned cost of $100,000 per day) is not needed.

The flotation columns of platform 12 can be deballasted in calm weather to enable portions of the platform normally occupying subsurface positions to be raised above the level of the water for inspection and maintenance, as necessary. The flexibility of the mooring system and production risers enables this maintenance to occur without disengaging the risers or curtailing production. Further, should it be necessary to deballast from the operational to the survival mode for a hundred year storm or the like, no adjustment or disconnection of the production risers is necessary to accomodate the change of platform position.

Although in describing the method of the present invention, lateral displacement of the platform in only one plane has been discussed, it will of course be understood that displacement in the second plane (into and out of the plane of the Figure) is also possible. Accordingly, the present method can accomodate four (or more) separate well templates with associated satellite wells. If four templates are used, it is preferred that they be generally positioned at the corners of a square. Such a combination drilling/workover and production platform could accomodate on the order of 32 wells with a combined production of about 80,000 barrels of oil per day.

Various changes, modifications and alternatives will become apparent to one of ordinary skill in the art following a reading of the foregoing specification. It is intended that all such changes, modifications and alternatives as come within the scope of the appended claims be considered part of this invention.

Claims

1. A method of using a floating platform in water the order of from 1000 to 3000 feet deep, said method comprising:
mooring said platform in a position that is generally centered above a plurality of well templates;
adjusting the mooring of said platform so as to position said platform directly above a first one of said templates;
drilling one or more wells through said first template;
interconnecting said completed well(s) to said platform using one or more looped flexible riser(s);
adjusting the mooring of said platform so as to position said platform directly above a second one of said templates;
drilling one or more wells in said second template without interrupting production from said first template.

2. The method of Claim 1 wherein a reverse loop arrangement is used to interconnect the flexible riser(s) to the completed well(s) from said first template.

3. The method of Claim 1 or 2 further comprising the step of deballasting the floating platform during periods of calm weather to permit certain portions of the platform normally occupying subsurface positions to extend above the surface for inspection and maintenance, as required, without interrupting production.

4. The method of Claim 1, 2 or 3 further comprising the step of inserting one or more rigid riser(s) of sufficient length to traverse a zone imparted by waves between said platform and said flexible riser(s).

5. The method of any preceding claim further comprising the step of interconnecting the completed well(s) from the second template to the floating platform using one or more looped flexible riser(s).

6. The method of Claim 5 wherein said flexible riser(s) are interconnected to the completed well(s) of said second template using a reverse loop arrangement.

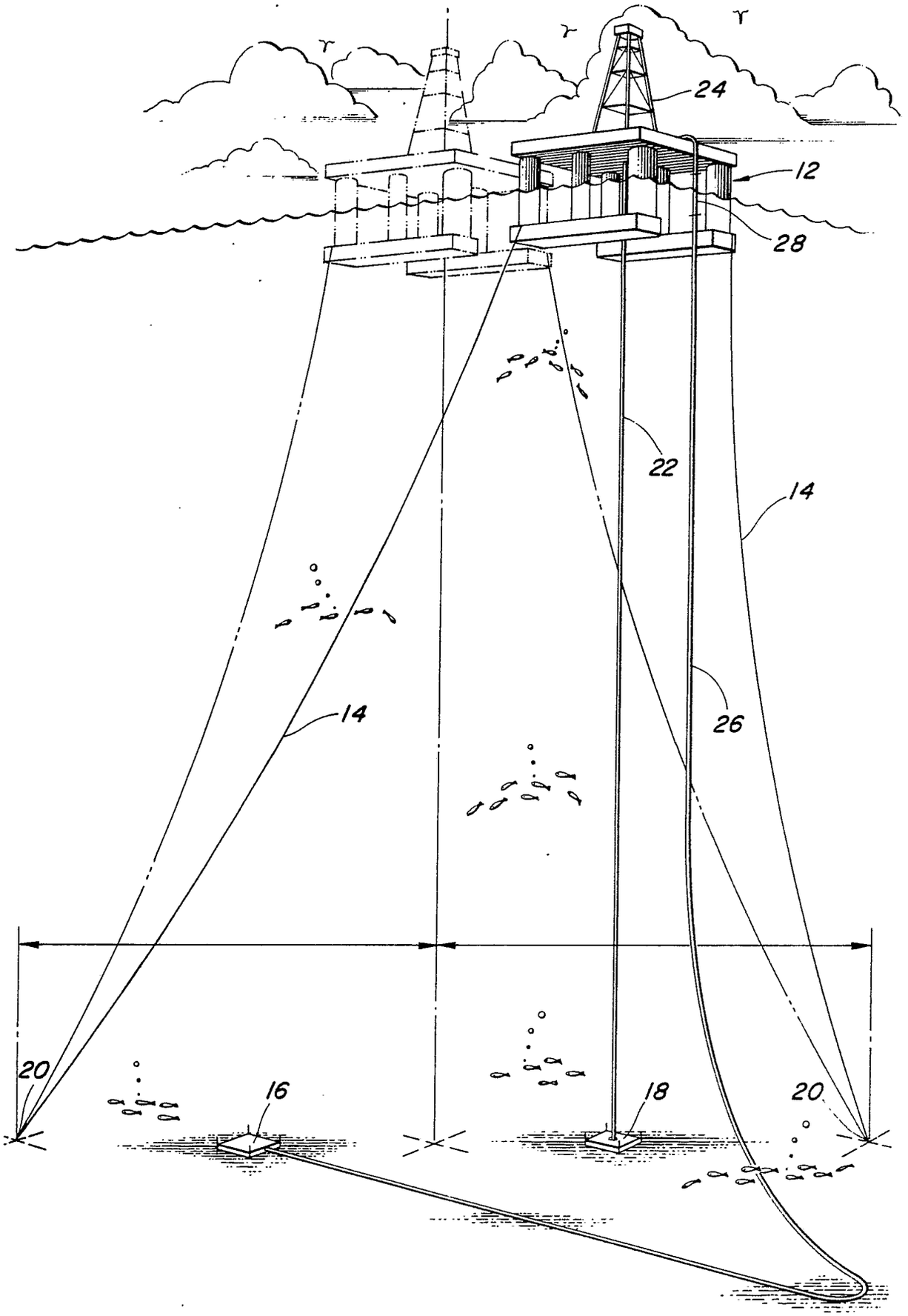
7. The method of Claim 5 or 6 further comprising the step of inserting one or more rigid riser(s) of sufficient length to traverse a zone impacted by waves between said floating platform and the flexible riser(s) of the completed well(s) of said second template.

8. A method of simultaneously using a semisubmersible platform that is moored in water on the order of from 1000 to 3000 feet deep and interconnected to at least a first and second well template by looped flexible production risers as a production and workover platform, said method comprising:
adjusting the mooring of said platform so as to position said platform directly above a first one of said templates;
curtailing production from said template;
conducting a workover of the wells of said first template without interrupting production from the wells of said other template(s);
restoring the wells of said first template to production.

9. The method of Claim 8 further comprising the steps of:
adjusting the mooring of said platform so as to position said platform directly above said second template;
curtailing production on the wells of said second template;
conducting a workover of the wells of said second template without interrupting production from the wells of said other template(s);
restoring the wells of said second template to production.

10. The method of Claim 8 or 9 further comprising the steps of deballasting said semisubmersible platform during periods of calm weather to permit portions of the platform normally occupying subsurface positions to extend above the surface for inspection and maintenance, as required, without interrupting production.

11. A method of performing drilling or workover operations in relation to and production from a plurality of well templates in deep water, the method involving mooring a floating platform in a position which is generally above said templates, the platform being interconnected with one or more completed wells of at least a first well template by one or more looped flexible risers, adjusting the mooring of said platform to position it directly above a further said well template, and performing drilling or workover of one or more wells of such further template without the need to interrupt production from said one or more completed well(s) via said looped flexible user(s).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