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(54) Title: A RISER HANGER AND METHOD

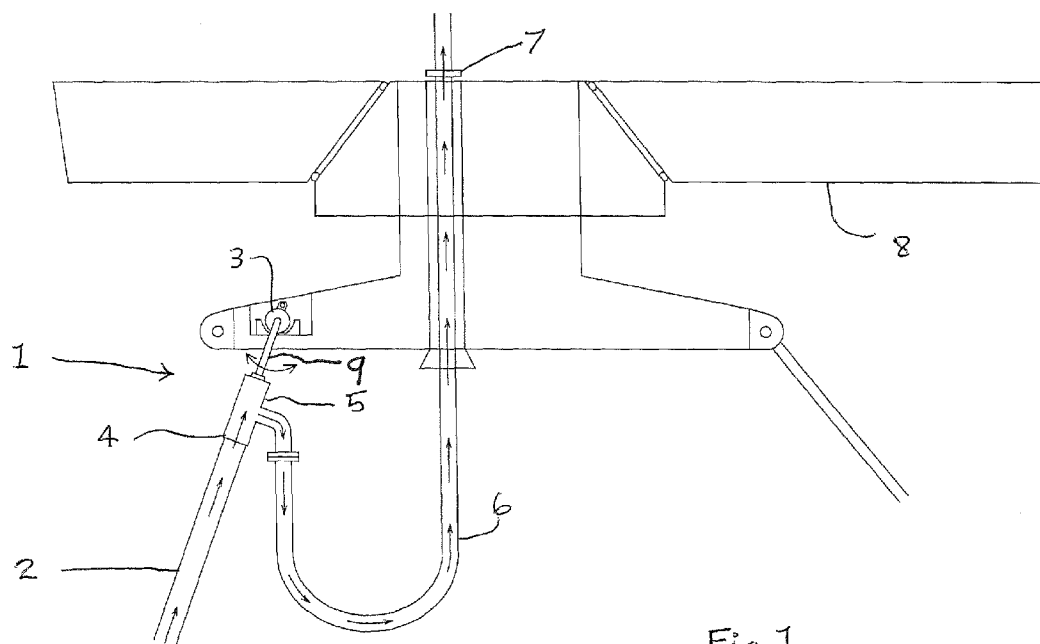


Fig. 1

(57) Abstract: A riser hanger (1) for connecting a riser (2) to a host facility (8), the riser hanger (1) comprising a pivot joint (3), and a fluid conduit (5, 6) connected to the pivot joint (3) for pivotable movement and connectable to a riser end for transporting fluid from the riser (2) to a host facility (8), the fluid conduit (5, 6) comprising a flexible hose (6).



A RISER HANGER AND METHOD

Field of the Invention

- 5 The invention relates to offshore hydrocarbon production systems, in particular to rigid risers and means to connect such risers to a host facility.

Background

- 10 For deep water applications there is a cost reduction potential by utilizing rigid risers (e.g. steel catenary risers or Steel lazy wave risers) instead of flexible risers. Flexible risers are also prone to a number of failure modes, so in deep water the rigid risers have a robustness advantage. However, there are also many design issues with rigid risers, and one of these challenges is related to riser hang off which is used to connect
15 the riser to the host facility. The hang-off system must be able to perform the following three basic functions:

1. Support the riser weight
2. Accommodate the rotation between the riser and the host facility
- 20 3. Transfer fluid between the riser and the host facility

- There are basically two riser hang off methods commonly used today, flexible joint and stress joint. The flexible joint has some issues related to leak potential and the stress joint is challenging to engineering and is relatively heavy and large. The maximum
25 allowable rotation angle is also an issue for both alternatives. For some applications weight and space is limited in the riser hang off area.

- A semi-flexible system is described for example in US 2010/0006300 which provides a hang-off arrangement for catenary risers suspended from an offshore or inshore
30 platform by using a rigid spool with limited flexibility. In particular, the prior art tailored for connection to Tension Leg Platforms (TLP) or semi-submersible platforms.

- A common problem for areas with surface ice, ice bergs, typhoons or hurricanes (e. g. Bay du Nord) is that the Floater needs to be disconnectable. The risers and mooring
35 system are hung off at a flotation device (Riser Mooring Buoy) and the space and

weight margins of the buoy are particularly limited. Hence, increased flexibility is required for these areas.

SUMMARY

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The invention provides a riser hanger for connecting a riser to a host facility, the riser hanger comprising, a pivot joint, and a fluid conduit connected to the pivot joint for pivotable movement and connectable to a riser end for transporting fluid from the riser to a host facility, the fluid conduit comprising a flexible hose.

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In accordance with an embodiment of the invention an armoured and/ or unbonded flexible "hose" is provided at the top of the riser. Armoured or unbonded flexible hose, allows reduced length of the flexible member, reducing the amount of flexible member that requires inspection. In particular, the required length can be determined in advance by calculating the likely maximum deflection of the riser to the platform to which it is connected.

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The invention can be tailored to fit on a disconnectable buoy for Floating Production Storage and Offloading (FPSO) purposes, in particular turret/buoy systems for FPSOs.

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The pivot may comprise a ball joint.

The flexible hose may be an unbonded flexible hose. The flexible hose may be an armoured flexible hose.

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The riser hanger may comprise a connector affixed to the ball joint and providing a connection for the riser end and for an end of the flexible hose to complete the fluid path.

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The riser hanger may comprise an arm pivotally connecting the fluid conduit to the pivot joint.

The riser hanger may be adapted for use with a disconnectable buoy for Floating Production Storage and Offloading (FPSO) purposes, in particular turret/buoy systems for FPSOs.

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The invention also provides a method of connecting a riser end to a host facility, comprising connecting the riser to a pivot joint connected to the host end facility and providing a fluid path from the riser end to the host facility via a fluid conduit comprising a flexible hose.

DRAWINGS

Figure 1 shows a perspective view of a riser connected to a platform in accordance with an embodiment of the invention.

Detailed description

A hang-off device for a riser is illustrated in Figure 1, where the hang off device is identified by reference numeral 1, and the riser is identified by reference numeral 2. As will be clear from the following discussion, the hang-off device is able to provide increased flexibility, which may reduce risk, weight, space needed and ultimately cost.

Referring to Figure 1, there is provided an exemplary hang-off device 1, which preferably comprises a ball joint 3. Any other type of long lasting bearing type joint with the ability to take up large offset angles can however be used.

A connector 5 hangs from the ball joint 3 by an arm 9 allowing pivotable movement either freely constrained only by the ball joint, or the movement of the arm might be constrained by constructional features of the joint assembly or an assembly of which the joint is a part. For example, movement might be constrained in a single plain as shown notionally in the figure; movement outside of the plain would allow the hanger to deal with more complex movements of the riser relative to the host facility such as a floater.

Hydrocarbons or fluids/gases are not transferred through the joint. Instead the riser content is transferred through a fluid conduit which is connected to the riser end 4 via a connector 5 hanging from the joint 3. The fluid conduit includes a flexible jumper 6 from the connector 5 and over to a floater stationary connection point 7. The flexible jumper 6 comprises an unbonded and/ or armoured flexible hose.

In the case of a disconnectable system the jumper 6 will be from the connector 5 and over to the riser mooring buoy 8. This will allow enough flexibility in the system to take relatively large rotations of the riser without having to have hydrocarbons passing a
5 gasket / bearing assembly and without having to take any stress in the connection / riser hang-off.

The invention has been described with reference to a specific embodiment. Variations will suggest themselves to those skilled in the art without departing from the scope of
10 the inventions as defined by the appended claims.

CLAIMS:

1. A riser hanger for connecting a riser to a host facility, the riser hanger comprising:
5 a pivot joint; and
a fluid conduit connected to the pivot joint for pivotable movement and connectable to a riser end for transporting fluid from the riser to a host facility, the fluid conduit comprising a flexible hose.
- 10 2. The riser hanger according to claim 1, wherein the pivot comprises a ball joint.
3. The riser hanger according to claim 1 or 2, wherein the flexible hose is an unbonded flexible hose.
- 15 4. The riser hanger according to claim 1, 2 or 3, wherein the flexible hose is an armoured flexible hose.
5. The riser hanger according to any one preceding claim, comprising a connector affixed to the pivot joint and providing a connection for the riser end and for an end of
20 the flexible hose to complete the fluid path.
6. The riser hanger according to any one preceding claim and adapted for use with a disconnectable buoy for Floating Production Storage and Offloading (FPSO) purposes, in particular turret/buoy systems for FPSOs.
- 25 7. The riser hanger according to any one preceding claim and further comprising an arm pivotally connecting the fluid conduit to the pivot joint.
8. A method of connecting a riser end to a host facility, comprising connecting the
30 riser to a pivot joint connected to the host end facility and providing a fluid path from the riser end to the host facility via a fluid conduit comprising a flexible hose.

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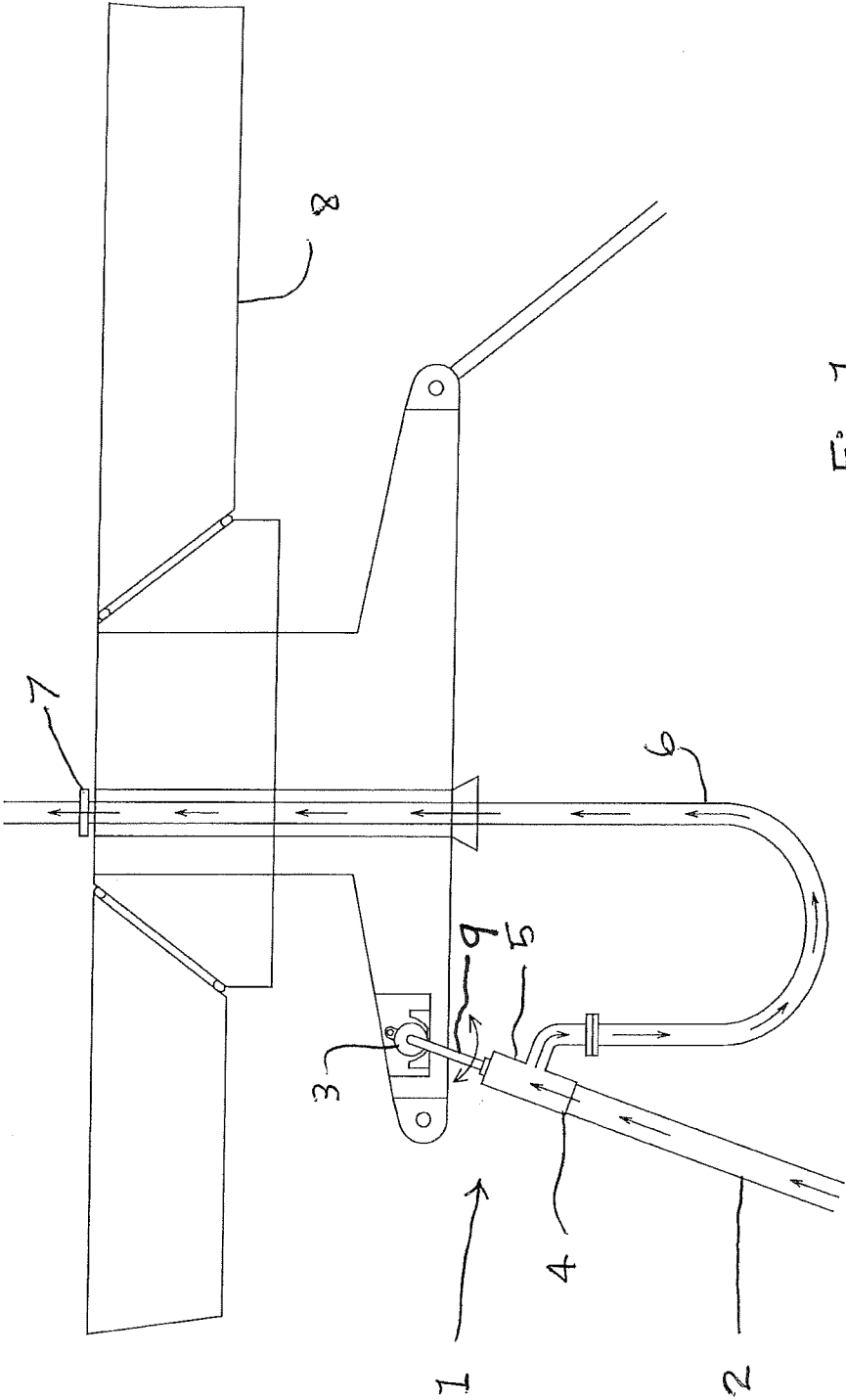


Fig. 1

INTERNATIONAL SEARCH REPORT

International application No.

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A. CLASSIFICATION OF SUBJECT MATTER E21B 19/00 (200601), E21B 17/01 (200601), B63B /27/34 (200601) According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC: E21B, B63B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched DK, NO, SE, FI: Classes as above.		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WPI, EPODOC		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 01/30646 A1 (APPLIED MFG TECHNOLOGY AS) 2001.05.03 Page 4 lines 7-12, page 6 lines 3-11 and 16-26, figs. 4, 5.	1-8
X	WO 98/49050 A1 (FMC CORP) 1997.04.25 Page 3 line 18-page 4 line 1, page 4 lines 18-23, figs. 1, 2.	1-8
A	WO 2013/189496 A1 (NAT OILWELL VARCO DENMARK IS) 2013.12.27 Page 8 lines 11-12, page 10 lines 12-17, page 25 line 21-page 26 line 16, fig. 2.	1-8
A	US 2010/0006300 A1 (WAJNIKONIS, K. J. et al.) 2010.01.14 Paragraphs [0092]-[0094], figs. 2a, 2b. Cited in the application.	1-8
☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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