(57) Abrégé/Abstract:
A mudline riser-casing connecting assembly for an underwater well, where the mudline riser-casing connecting assembly comprises a bore hole conductor casing adapted to be fixed in a bore hole in the mudline and terminating at its upper end at or in the region of the mudline and which is adapted to support a fluid conveying riser and well bore casing, the assembly further
comprising an annular landing shoulder on the inner face of the bore hole conductor casing at a position spaced downwardly from the upper end of the bore hole conductor casing and an annular hanger assembly adapted to be mounted to the upper end of the well bore casing, the annular hanger assembly being engagable with the landing shoulder to support the well bore casing from the landing shoulder, the mudline riser-casing connecting assembly further comprising a connector adapted at one end to be connected with the hanger assembly and adapted to be connected at the other end to the lower end of the riser, the connector being capable of selective engagement and disengagement with the hanger, the connector being supported in the bore hole conductor casing in the region of the upper end of the bore hole conductor casing through a support assembly to prevent radial movement of the connector within the bore hole conductor casing, the upper end of the connector extending above the support assembly and including a stress joint which is adapted to be fixed to the lower end of the riser, the stress joint being adapted to accommodate the stress arising from the movement of the lower end of the riser relative to that part of the mudline riser-casing connecting assembly within the bore hole conductor casing.
Abstract

A mudline riser-casing connecting assembly for an underwater well, where the mudline riser-casing connecting assembly comprises a bore hole conductor casing adapted to be fixed in a bore hole in the mudline and terminating at its upper end at or in the region of the mudline and which is adapted to support a fluid conveying riser and well bore casing, the assembly further comprising an annular landing shoulder on the inner face of the bore hole conductor casing at a position spaced downwardly from the upper end of the bore hole conductor casing and an annular hanger assembly adapted to be mounted to the upper end of the well bore casing, the annular hanger assembly being engagable with the landing shoulder to support the well bore casing from the landing shoulder, the mudline riser-casing connecting assembly further comprising a connector adapted at one end to be connected with the hanger assembly and adapted to be connected at the other end to the lower end of the riser, the connector being capable of selective engagement and disengagement with the hanger, the connector being supported in the bore hole conductor casing in the region of the upper end of the bore hole conductor casing through a support assembly to prevent radial movement of the connector within the bore hole conductor casing, the upper end of the connector extending above the support assembly and including a stress joint which is adapted to be fixed to the lower end of the riser, the stress joint being adapted to accommodate the stress arising from the movement of the lower end of the riser relative to that part of the mudline riser-casing connecting assembly within the bore hole conductor casing.
"Mudline Riser-Casing Connecting Assembly"

Field of the Invention

This invention relates to a mudline connecting assembly for an underwater well.

Background

The invention has particular application in circumstances where the blowout preventer for an underwater well being drilled by a semi-submersible rig is located in the region of the surface of the water. It has been conventional practice in underwater wells to locate the blowout preventer mechanism at the mudline (usually the seabed) and to provide a riser connection between the blowout preventer and the surface whilst the well bore casing is suspended from the mudline. However in some circumstances it is appropriate or advantageous to locate the blowout preventer in the region of the surface of the water.

It is an object of this invention to provide mudline connection which will accommodate the stresses which will be created as a result of the relative movement of the riser to the borehole connector casing and which will facilitate the connection and disconnection of the riser from the casing.

Disclosure of the Invention

Accordingly, the invention resides in a mudline riser-casing connecting assembly for an underwater well said mudline riser-casing connecting assembly comprising a bore hole conductor casing adapted to be fixed in a bore hole in the mudline and terminating at its upper end at or in the region of the mudline and adapted to support a fluid conveying riser and well bore casing, the assembly further comprising an annular landing shoulder on the inner face of the bore hole conductor casing at a position spaced downwardly from the upper end of the bore hole conductor casing and an annular hanger assembly adapted to be mounted to the upper end of the well bore casing, said annular hanger assembly being engageable with the landing shoulder to support the well bore casing from
the landing shoulder, the mudline riser-casing connecting assembly further comprising a connector adapted at one end to be connected with the hanger assembly and adapted to be connected at the other end to the lower end of the riser, the connector being capable of selective engagement and disengagement with the hanger, said connector being supported in the bore hole conductor casing in the region of the upper end of the bore hole conductor casing through a support assembly to prevent radial movement of the connector within the bore hole conductor casing, the upper end of the connector extending above the support assembly and including a stress joint which is adapted to be fixed to the lower end of the riser, said stress joint being adapted to accommodate the stress arising from the movement of the lower end of the riser relative to that part of the mudline riser-casing connecting assembly within the bore hole conductor casing.

According to a preferred feature of the invention, said connector comprises a first portion extending between the hanger and the upper end of the bore hole conductor, said support assembly comprising an annular support provided at the upper end of the first portion and receivable in the upper end of the bore hole conductor casing to resist relative radial movement between the connector and the upper end of bore hole conductor, said connector comprising a second portion extending between the upper end of the first portion and the riser said second portion providing the stress joint.

According to a preferred feature of the invention a stabiliser element is located between the outer radial face of the first portion and the inner face of the bore hole conductor casing at a position intermediate of the hanger and the upper end of the bore hole conductor, said stabiliser being adapted to resist relative radial movement between the first portion and the upper end of bore hole conductor at said position. According to one embodiment the stabiliser element comprises an annular element fixed to the first portion.

According to a further preferred feature of the invention, the mudline riser-casing connecting assembly incorporates a disconnect facility which enables remote
interengagement and disengagement of the lower end of the connector with the hanger assembly.

The invention will be more fully understood in the light of the following description of one specific embodiment.

5 Brief Description of the Drawings

The description is made with reference to the accompanying drawings of which:

Figure 1 is a sectional elevation illustrating the mudline riser-casing connecting assembly according to the embodiment;

Figure 2 is a sectional elevation of the mudline riser-casing connecting assembly according to the embodiment illustrating a drill rod accommodated within the riser and the well bore casing accommodating the mechanical disconnect tool;

Figure 3 is a sectional elevation of the mudline riser-casing connecting assembly according to the embodiment illustrating the disconnection of the riser from the upper end of the casing; and

Figure 4 is a sectional elevation of the mudline riser-casing connecting assembly according to the embodiment illustrating the mounting of a Christmas tree assembly to the well for production purposes.

Detailed Description of Specific Embodiment

The embodiment is directed to a mudline riser-casing connecting assembly providing connection between the riser and the casing of an underwater well in circumstances where the blowout preventer is at or about the surface of the water. The embodiment serves to provide a connection between the riser and casing which will accommodate for the suspension loads exerted by the casing to isolate the suspension loads from the riser, whilst allowing for the relative
movement of the riser without causing resultant movement of the casing within the bore hole.

The embodiment comprises a borehole conductor casing 11 which is receivable in a borehole. The borehole conductor casing 11 provides support for both the riser 27 and the well bore casing 23 of the well. Such support is in part provided by a landing shoulder 13 which comprises an inwardly directed annulus provided in the inner face of the bore hole conductor casing at a position spaced downwardly from the upper end of the bore hole conductor casing. Support for the riser is provided by an enlarged support housing 15 which is provided at the upper end of the bore hole conductor casing in the region of the mudline.

The mudline riser-casing connecting assembly further comprises a hanger 17 which is engageable with the landing shoulder 13 and which comprises a central tubular portion 19 and an annulus 21 where the annulus 21 is adapted to be engageable with the landing shoulder to prevent movement of the hanger 17 past the landing shoulder 13. The hanger 17 is adapted to be fixed to the upper end of the well bore casing 23 to enable the well bore casing 23 to be supported from the landing shoulder 13.

The upper end of the hanger 17 is engageable with a connector assembly 25 which extends between the hanger 17 and the lower end of the riser pipe 27. The connector assembly comprises a first portion 29 which extends between the hanger 17 and the support housing 15 of the bore hole conductor casing and a second portion which comprises a tapered stress joint 31 located between the upper end of the first portion 29 and the lower end of the riser 27. The upper end of the first portion is formed with an annular flange 33 which is receivable with the support assembly 15 of the support housing of the bore hole conductor casing to be incapable of relative radial movement within the bore hole conductor casing 11. In addition, an annular stabiliser 35 is mounted to the first portion to be receivable within the bore hole conductor casing 11 at a position intermediate of the length of the first portion 29 to prevent flexure of the first portion between its ends.
The stress joint 31 is configured to accommodate for the relative movement of the lower end of the riser 27 to the bore hole conductor casing and to accommodate the stresses which are the result of such relative movement.

The lower end of the first portion 29 accommodates a mechanical disconnect tool 37 which is of a substantially conventional form and through which the lower end of the first portion 29 can be remotely engaged with and disengaged from the upper end of the hanger 17 whereby the riser can be disconnected from the casing as illustrated at Figure 3 when it becomes necessary to decommission a well and/or it becomes necessary for the rig associated with the well to move out of station.

The mudline riser-casing connecting assembly of the embodiment ensures that no bending loads which are exerted upon the riser are transmitted to the casing below the mudline. Furthermore, the mudline riser-casing connecting assembly provides a means of supporting the casing within the borehole from the mudline in order to isolate the loading exerted by the weight of the casing from the riser. Furthermore, the embodiment enables the use by a semi-submersible drilling rig of a blowout preventer located at or about the surface of the water by virtue of its capacity to accommodate the flexure of the riser. In addition, the embodiment provides a means of selectively connecting and disconnecting the riser from the casing as required without permanently decommissioning the well. This is enabled by the circumstance that the weight of the casing is accommodated by the bore hole conductor casing. This latter feature enables the temporary suspension of drilling and/or draw off activities from a well in the event that the supporting rig is required to move off station from the well. Furthermore, the disconnect and reconnect facility enables an exploration well to be converted to a production well as required.

Throughout the specification, unless the context requires otherwise, the word "comprise" or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.
It should be appreciated that the scope of the present invention need not be limited to the particular scope of the embodiment as described above.
Claims

The claims defining the invention are as follows:

1. A mudline riser-casing connecting assembly for an underwater well, said mudline riser-casing connecting assembly comprising a bore hole conductor casing adapted to be fixed in a bore hole in the mudline and terminating at its upper end at or in the region of the mudline and adapted to support a fluid conveying riser and well bore casing, the assembly further comprising an annular landing shoulder on the inner face of the bore hole conductor casing at a position spaced downwardly from the upper end of the bore hole conductor casing and an annular hanger assembly adapted to be mounted to the upper end of the well bore casing, said annular hanger assembly being engagable with the landing shoulder to support the well bore casing from the landing shoulder, the mudline riser-casing connecting assembly further comprising a connector adapted at one end to be connected with the hanger assembly and adapted to be connected at the other end to the lower end of the riser, the connector being capable of selective engagement and disengagement with the hanger, said connector being supported in the bore hole conductor casing in the region of the upper end of the bore hole conductor casing through a support assembly to prevent radial movement of the connector within the bore hole conductor casing, the upper end of the connector extending above the support assembly and including a stress joint which is adapted to be fixed to the lower end of the riser, said stress joint being adapted to accommodate the stress arising from the movement of the lower end of the riser relative to that part of the mudline riser-casing connecting assembly within the bore hole conductor casing.

2. A mudline riser-casing connecting assembly as claimed at claim 1 wherein, said connector comprises a first portion extending between the hanger and the upper end of the bore hole conductor, said support assembly comprising an annular support provided at the upper end of the
first portion and receivable in the upper end of the bore hole conductor casing to resist relative radial movement between the connector and the upper end of bore hole conductor, said connector comprising a second portion extending between the upper end of the first portion and the riser said second potion providing the stress joint.

3. A mudline riser-casing connecting assembly as claimed at claim 1 wherein, a stabiliser element is located between the outer radial face of the first portion and the inner face of the bore hole conductor casing at a position intermediate of the hanger and the upper end of the bore hole conductor, said stabiliser being adapted to resist relative radial movement between the first portion and the upper end of bore hole conductor at said position.

4. A mudline riser-casing connecting assembly as claimed at claim 2 wherein, a stabiliser element is located between the outer radial face of the first portion and the inner face of the bore hole conductor casing at a position intermediate of the hanger and the upper end of the bore hole conductor, said stabiliser being adapted to resist relative radial movement between the first portion and the upper end of bore hole conductor at said position.

5. A mudline riser-casing connecting assembly as claimed at claim 3 wherein, the stabiliser element comprises an annular element fixed to the first portion.

6. A mudline riser-casing connecting assembly as claimed at claim 4 wherein, the stabiliser element comprises an annular element fixed to the first portion.

7. A mudline riser-casing connecting assembly as claimed at claim 1 wherein, the mudline riser-casing connecting assembly incorporates a disconnect facility which enables remote interengagement and
disengagement of the lower end of the connector with the hanger assembly.

8. A mudline riser-casing connecting assembly as claimed at claim 2 wherein, the mudline riser-casing connecting assembly incorporates a disconnect facility which enables remote interengagement and disengagement of the lower end of the connector with the hanger assembly.

9. A mudline riser-casing connecting assembly as claimed at claim 3 wherein, the mudline riser-casing connecting assembly incorporates a disconnect facility which enables remote interengagement and disengagement of the lower end of the connector with the hanger assembly.

10. A mudline riser-casing connecting assembly as claimed at claim 4 wherein, the mudline riser-casing connecting assembly incorporates a disconnect facility which enables remote interengagement and disengagement of the lower end of the connector with the hanger assembly.

11. A mudline riser-casing connecting assembly as claimed at claim 5 wherein, the mudline riser-casing connecting assembly incorporates a disconnect facility which enables remote interengagement and disengagement of the lower end of the connector with the hanger assembly.

12. A mudline riser-casing connecting assembly as claimed at claim 6 wherein, the mudline riser-casing connecting assembly incorporates a disconnect facility which enables remote interengagement and disengagement of the lower end of the connector with the hanger assembly.