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(54) **DEVICE FOR HANDLING HOSES OF A WORKING WELL FOR A DRILLING RIG**

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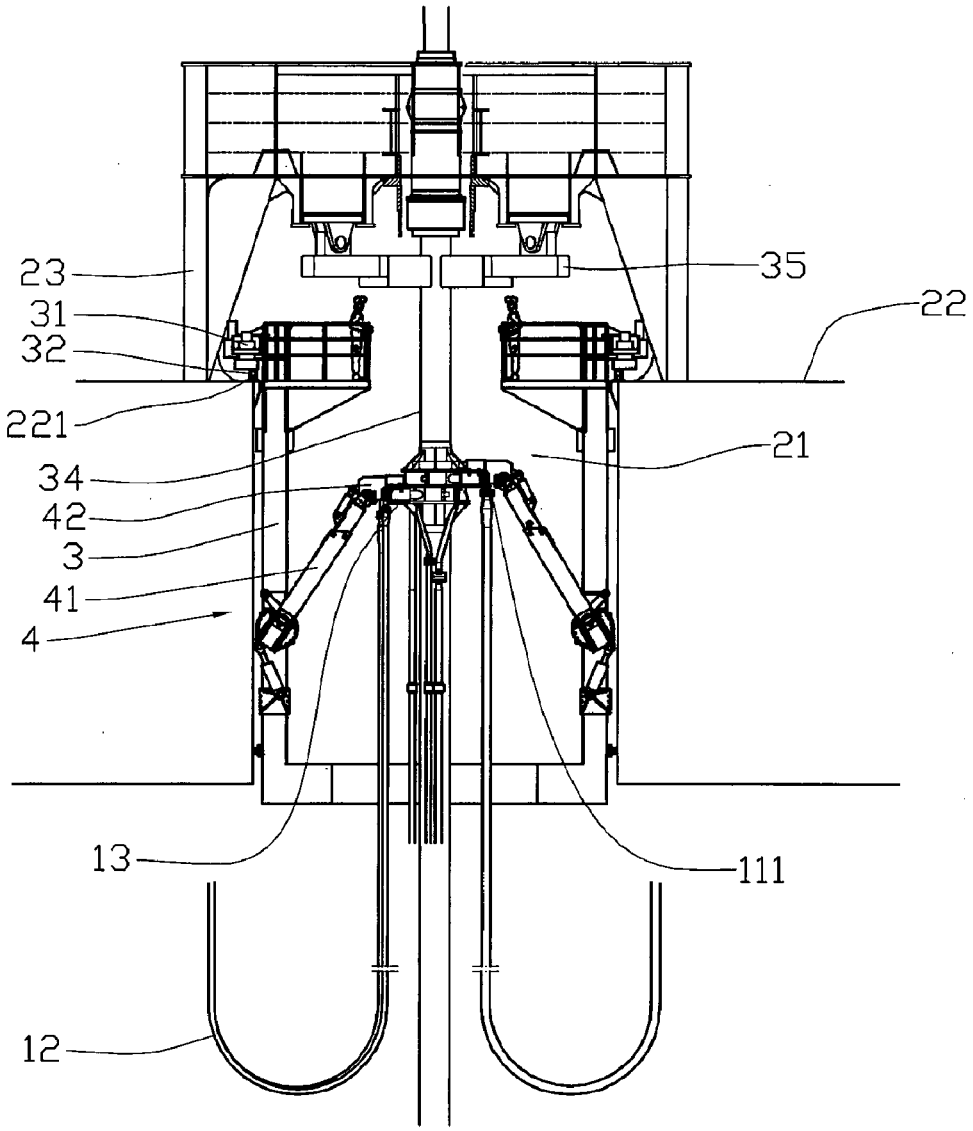
(57) **ABSTRACT**

A manipulator device (**4**) arranged to move a hose manifold (**13**) as one or more hoses (**12**) is/are being connected to and disconnected from pipelines (**11**) arranged on a marine riser (**1**), the manipulator (**4**) being fixed to an undercarriage (**3**) which is movable relative to a working well (**21**).



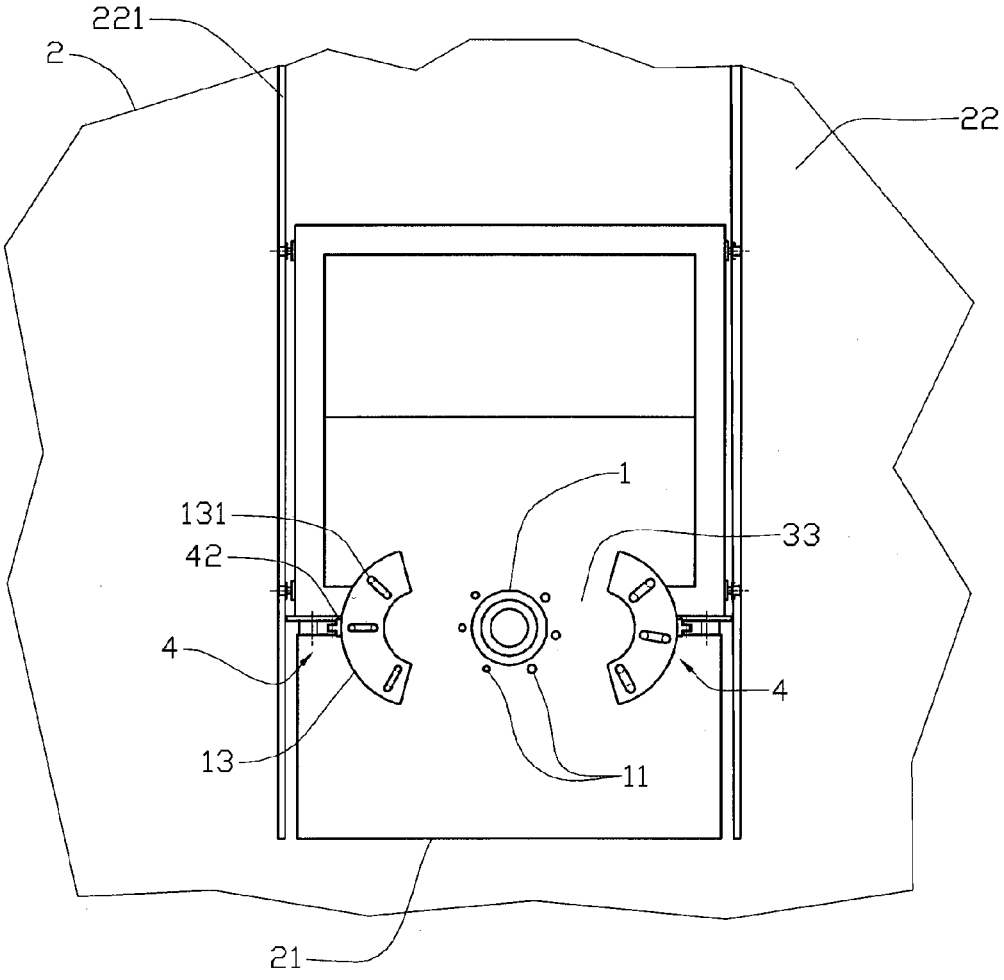


Fig. 1

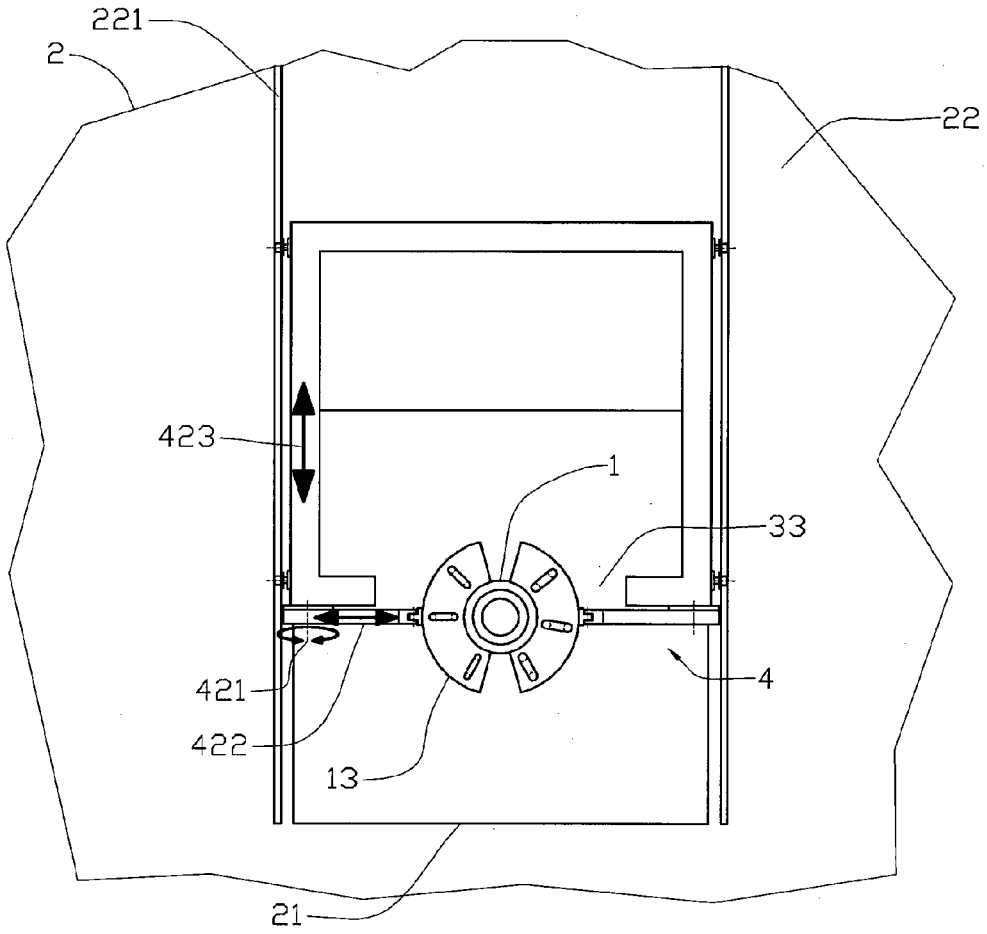


Fig. 2

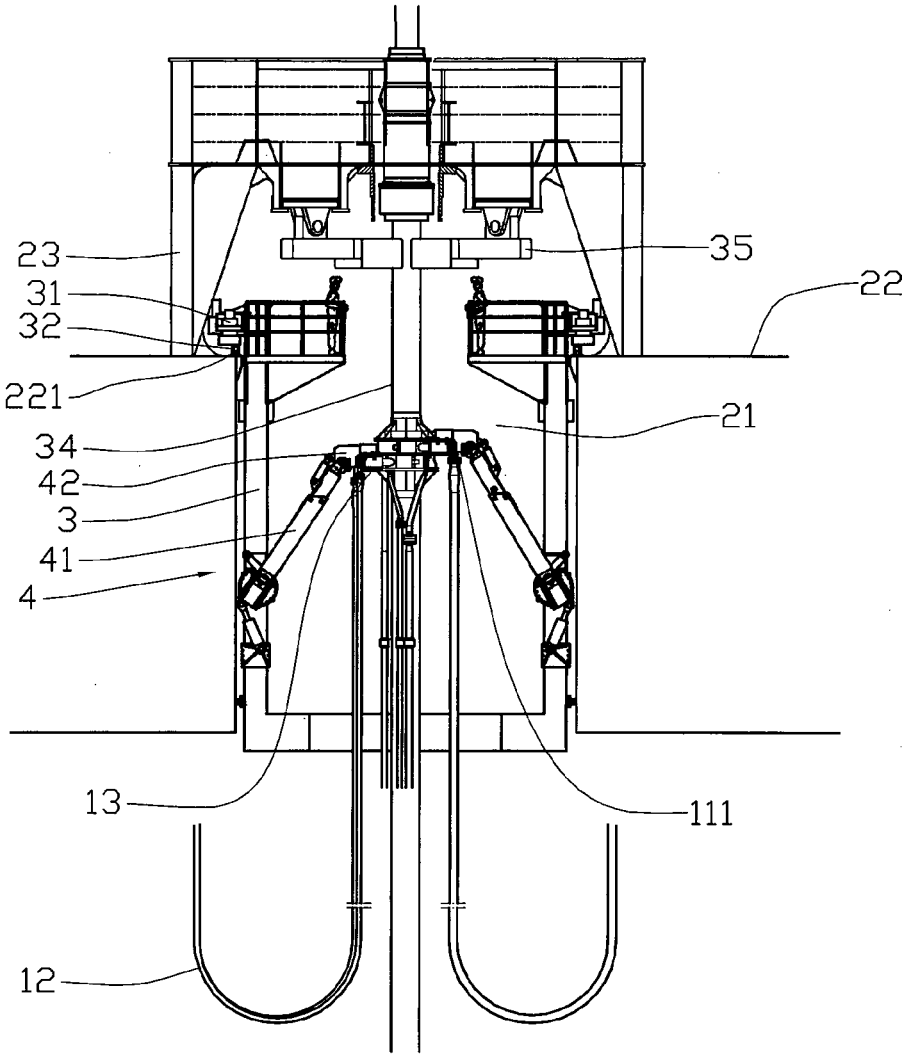


Fig. 3

DEVICE FOR HANDLING HOSES OF A WORKING WELL FOR A DRILLING RIG

[0001] A manipulator device is described, arranged to move a hose manifold as one or more hoses is/are being connected to and disconnected from pipelines arranged on a marine riser at a floating field installation with one or more well centres.

[0002] Between a marine riser which is anchored to a seabed and a floating installation moving with the waves, fluids are carried in hoses. Conventionally, one end of the hoses is connected to the riser via pipe bends, so-called goosenecks, near to a telescopic riser element. The other end of the hoses will be firmly connected to the floating installation, hanging in a loop down around the upper portion of the riser. The connection of hoses is, to a great degree, carried out manually by means of one or more operators hanging on a belt in the so-called moon-pool area, called the working well in the further description, the operations being greatly exposed to the influence of wind and waves and also adjacent structures.

[0003] Mechanical systems are also known, for example the ROPS (Remote Operated Pull-in System) from Sub Sea Services AS, Stavanger, Norway, in which the hoses are connected to a hose manifold provided with several goosenecks, each connected to a hose, and in which quick-release couplings provide for releasable connection between the gooseneck and a pipe socket on the riser. In the connection phase, the hose manifold is manoeuvred by a first manipulator which is arranged on the riser, and the hose manifold is moved towards or away from the riser by means of a second manipulator arranged near the working well.

[0004] The prior art technique entails hoses and handling equipment taking up space around the riser centre and the working well, which is obstructive to handling other equipment to be used in the well operations.

[0005] The invention has for its object to remedy or reduce at least one of the drawbacks of the prior art, or at least provide a useful alternative to the prior art.

[0006] The object is achieved through features which are specified in the description below and in the claims that follow.

[0007] A device for handling a hose manifold arranged to releasably connect one or more hoses to a marine riser extending between a well installation on a seabed and a floating installation on a sea surface is provided. The device includes at least one manipulator connected to an undercarriage which is horizontally movable relative to a working-well opening on the floating installation. The undercarriage is preferably a carriage, for example a transportation skid arranged to carry a blowout preventer (BOP).

[0008] The invention relates, more specifically, to a manipulator device arranged to move a hose manifold as one or more hoses is/are being connected to and disconnected from pipelines arranged on a marine riser, characterized by the manipulator being fixed to an undercarriage which is movable relative to a working well.

[0009] The undercarriage may be a carriage arranged on a deck bordering on the working well.

[0010] The undercarriage may be connected to a supporting structure for a well element or a well tool.

[0011] The manipulator may have three translatory degrees of freedom, first and second degrees of freedom being assigned to the manipulator arm and a third degree of freedom being assigned to the undercarriage.

[0012] In what follows is described an example of a preferred embodiment which is visualized in the accompanying drawings, in which:

[0013] FIG. **1** shows schematically a plan of a section of a working-well area, in which two hose manifolds are positioned near a riser by means of a carriage provided with two manipulators;

[0014] FIG. **2** shows the hose manifolds moved in towards the riser and connected to it; and

[0015] FIG. **3** shows, on a larger scale and in more detail, an example of a carriage provided with two manipulators in a situation in which the pipe manifolds are connected to the riser.

[0016] In the figures, the reference numeral **1** indicates a riser extending, in a manner known per se, from a subsea well-head (not shown) and up through a working well **21** on a field installation **2** floating on a sea surface (not shown). The working well **21** is defined by a deck **22**.

[0017] Along the outside of the riser **1**, several pipelines **11** extend in a manner known per se, for example for the conveyance of hydraulic fluid to a subsea blowout preventer (not shown). Each of the pipelines **11** is provided, in a manner known per se, with a connecting piece **111** arranged for releasable connection via a gooseneck **131** to a hose **12** hanging in a curve from a hose manifold **13** carrying several goosenecks **131** and being provided with suitable connection and locking elements (not shown) to hold the hose manifold **13** fixed to the riser **1**. A connection between the pipeline **11** and the field installation **2** past a telescopic riser section, here indicated by the reference numeral **34**, is thereby provided, which is necessary to provide a riser connection which is not disturbed by the heaving motion of the field installation **2**.

[0018] A supporting structure **23** is arranged at the working well **21** for the suspension of various well elements and well tools, indicated in FIG. **3** by the reference numerals **34** and **35**.

[0019] An undercarriage **3** is arranged horizontally movable between a position above the working well **21** and a position in which the undercarriage **3** is positioned outside the working well **21**, the undercarriage **3** being provided with a drive **31** comprising wheels **32** which can roll on suitable tracks **221**, shown in FIG. **3** as rails arranged on the deck **2**.

[0020] The undercarriage **3** has an approximately C-shaped ground plan with a front opening **33** which provides a possibility of moving the undercarriage **3** in an axial direction indicated by an arrow **423** (see FIG. **2**) into a position in which it encloses a portion of the riser **1**. At the side portions of the front opening **33**, two manipulators **4** are arranged, each provided with a manipulator arm **41** rotatable around a horizontal axis **421** and telescopically extendable in an axial direction indicated by an arrow **422** (see FIG. **2**). The manipulator arm **41** is provided with a gripping device **42** forming an interface between the manipulator **4** and coupling elements (not shown) on the hose manifold **13**, the hose manifold **13** being disengageable from the manipulator **4** when necessary.

[0021] Whenever there is a need to disconnect the hoses **12** from the riser **1**, the undercarriage **3** is moved in over the working well **21** by means of the drive **31** into a position in which the gripping devices **42** of the manipulator **4** are positioned right opposite the coupling elements, not shown, of the hose manifolds **13**. The manipulator arms **41** are adjusted into engagement with the hose manifolds **13** which is then disconnected from the connecting pieces **111** on the pipelines **11** as the hose manifolds are pulled away from the riser **1** and out towards the outer edges of the working well **21**. The under-

carriage **3** is moved away from the riser **1** so that the hose manifolds **13** and the hoses **12** are located far from the centre area of the working well **21**. Other work on and around the riser **1** may thereby take place unobstructed by the hose manifolds **13**.

[0022] Even though, in the exemplary embodiment, an undercarriage **3** with two manipulators **4** is shown, it is within the scope of the invention to provide the undercarriage **3** with a different set-up of manipulators **4** arranged to handle elements connected to the riser **1**.

What is claimed is:

1. A manipulator device arranged to move a hose manifold as one or more hoses is/are being connected to and disconnected from pipelines arranged on a marine riser, the manipulator being fixed to an undercarriage which is movable relative to a working well, wherein the undercarriage is a carriage arranged on a deck bordering on the working well.

2. The device in accordance with claim **1**, wherein the undercarriage is a sledge arranged on a deck bordering on the working well.

3. The device in accordance with claim **1**, wherein the undercarriage is connected to a supporting structure for a well element or a well tool.

4. The device in accordance with claim **1**, wherein the manipulator has three translatory degrees of freedom, first and second degrees of freedom being assigned to a manipulator arm and a third degree of freedom being assigned to the undercarriage by the horizontal displacement of the undercarriage.

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