

(19)



(11)

**EP 4 031 746 B1**

(12)

## EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent:  
**13.09.2023 Bulletin 2023/37**

(21) Application number: **20793567.7**

(22) Date of filing: **16.09.2020**

(51) International Patent Classification (IPC):  
**E21B 33/035** <sup>(2006.01)</sup>

(52) Cooperative Patent Classification (CPC):  
**E21B 33/035**

(86) International application number:  
**PCT/EP2020/075885**

(87) International publication number:  
**WO 2021/053027 (25.03.2021 Gazette 2021/12)**

(54) **A CONFIGURABLE WORKOVER SYSTEM AND METHOD FOR ADAPTING THE SYSTEM**

KONFIGURIERBARES ÜBERARBEITUNGSSYSTEM UND VERFAHREN ZUR ANPASSUNG DES SYSTEMS

SYSTÈME DE RECONDITIONNEMENT CONFIGURABLE ET PROCÉDÉ D'ADAPTATION DU SYSTÈME

(84) Designated Contracting States:  
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

(30) Priority: **16.09.2019 NO 20191115**

(43) Date of publication of application:  
**27.07.2022 Bulletin 2022/30**

(73) Proprietor: **Aker Solutions AS**  
**1325 Lysaker (NO)**

(72) Inventors:  
• **BJØRNSTAD, Petter**  
**1339 Vøyenenga (NO)**  
• **EGBEJULE, Omagbe**  
**1389 Heggedal (NO)**

(74) Representative: **Bryn Aarflot AS**  
**Patent**  
**Stortingsgata 8**  
**0161 Oslo (NO)**

(56) References cited:  
**WO-A1-2017/097945 AU-B2- 2009 276 614**  
**US-B2- 7 114 571 US-B2- 9 038 726**

**EP 4 031 746 B1**

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

## Description

### Technical Field

**[0001]** The invention relates to a method for adapting a riserless workover system configuration to an open water riser workover system configuration. The invention also relates to an open water riser workover system that is configured from a riserless workover system.

### Background Art

**[0002]** There are two main systems for workover operations;

- an open water riser workover system, and
- a riserless workover system.

**[0003]** The open water riser workover system comprising a set of equipment which is attached to a subsea Christmas tree and allows safe intervention operations in a hydrocarbon containing well (not shown). The open water riser workover system comprises a riser (pressure containing conduit) that extends between the part of the workover arrangement arranged subsea in connection with the well and a drilling rig or vessel arranged at the sea surface. A requirement for using an open water riser workover system is that it must be able to disconnect quickly in case of emergency situations, for instance due to rig/vessel drift off. The open water riser workover system must thus have a retainer valve arranged in the main bore. The retainer valve is able to retain the fluid in the riser to avoid spillage to the environment when disconnected. It is also a requirement in open water riser work out systems to have a bleed off valve in the system to bleed off pressure to avoid hydraulic lock.

**[0004]** A riserless system comprises a different configuration than the open riser workover system. This system does not have a riser extending between the workover system arranged subsea and the drilling rig or vessel. The system is less exposed to emergency situations as there is no riser attached between the subsea arrangement and the drilling rig or vessel. The riserless system has a wireline shear seal valve assembly arranged in connection with the main bore which facilitates cutting of wireline/coil tubing and sealing of the main bore when the main safety barriers are blocked by the bottom hole assembly tool string.

**[0005]** Publication AU2009276614B2 discloses a subsea well intervention system. The system includes a lower riser package (LRP) and an emergency disconnect package (EDP). The EDP is arranged between a lubricator section and a well control package (WCP). Moreover, the lubricator section has a wireline shear seal valve assembly.

**[0006]** US7114571 B2 discusses a landing string assembly for installing a completion through a marine riser

connected to a blowout preventer (BOP).

**[0007]** Moreover, publication US9038726B2 presents a system for managing umbilicals and jumpers.

**[0008]** WO2017097945A1 discloses a safety system for overriding a hydrocarbon control module. The system can typically be used in association with subsea workover operations.

**[0009]** For achieving access to the well, the operation of a riserless system is much quicker and more efficient than using a riser in an open water riser workover system. However, there is a requirement in certain wells to use an open water riser workover system.

**[0010]** There would thus be a huge cost savings to provide a system that has the flexibility for adapting to both the riserless system and the open water riser workover system without replacing completely the components of the one with the other. Adapting from the riserless workover system to an open water riser workover system and vice versa would be a great advantage both for the investment of the systems but also in operation time.

**[0011]** An object of the invention is thus to provide an easy and quick transformation between a workover system that is riserless and a workover system with riser (Open water).

**[0012]** The method will also be cost effective in that both systems can reuse the same components, like the well control package in both systems in order to configure any of the systems. This also provides a flexible system that is able to easily adapt to any of the systems without having to perform major additional configurations and repositions.

### Summary of invention

**[0013]** The invention relates to a method for adapting a riserless workover system configuration into an open water riser workover system configuration, wherein the system comprising an emergency disconnect package arranged between a lubricator section and well control package, the lubricator section comprises a wireline shear seal valve assembly, the system further comprises an emergency disconnect package connector for disconnecting the emergency disconnect package from the well control package in case of emergency. The the method comprising the steps of

- relocate or reposition the wireline shear seal valve assembly by rotating the valve assembly upside down prior to attaching a riser assembly to the configured open water riser workover system, and
- connecting at least one accumulator arrangement to the configured open water riser workover system.

**[0014]** Preferably, the at least one accumulator arrangement is connected to a prearranged hydraulic supply line coupled to the emergency disconnect package connector.

**[0015]** Preferably, the wireline shear seal valve assem-

bly comprising a wireline shear seal valve for sealing a main bore of the configured open water riser workover system from above.

**[0016]** Preferably, the wireline seal valve assembly comprising a ball valve or a RAM valve.

**[0017]** Preferably, the method further comprising the step of arranging a first bleed off valve in connection with the main bore in a position between the wire shear seal valve and the upper production isolation valve (UPIV) 13 in order to bleed off pressure between the wire shear seal valve and the upper production isolation valve (UPIV).

**[0018]** Preferably, the method further comprising the step of using a second bleed off valve arranged in fluidly connection with the first bleed off valve as a second barrier valve towards the well fluid below the wireline shear seal valve assembly.

**[0019]** Preferably the wireline shear seal valve assembly is turned upside down in the configured open water riser workover system in order to function as a retainer valve in the configured open water riser workover system.

**[0020]** Preferably, the method further comprises the step of attaching additional equipment(s) to the configured open workover system.

**[0021]** The invention further relates to an open water riser workover system having an emergency disconnect package connector for disconnecting the open water riser workover system. The system comprising a wire line seal shear valve assembly comprising a wireline shear seal valve adapted to seal a main bore in the open water riser workover system, said system further comprises a first bleed off valve arranged in fluid connection with the main bore, said first bleed off valve being arranged between the wireline shear seal valve and the emergency disconnect package connector in order to bleed off pressure between the emergency disconnect package connector and the wireline seal shear valve.

**[0022]** The invention further relates to an open water riser workover system comprising a lubricator section and a well control package, the system further comprises an emergency disconnect package arranged between the lubricator section and the well control package. Said lubricator section comprising a wireline shear seal valve assembly that is turned upside down, said wireline shear seal valve assembly further comprising a wireline shear seal valve adapted to seal a main bore from above in the configured open workover system.

**[0023]** Preferably, the system further comprises at least one accumulator arrangement in connection with the configured open water riser workover system.

**[0024]** The invention further relates to a riserless workover system comprising an emergency disconnect package positioned between a lower riser package and a lubricator section. The lubricator section comprises a wireline shear seal valve assembly adapted to be rotated approximately 180 degrees around a horizontal axis in order to function as a retainer valve, and said emergency disconnect package comprising an emergency discon-

nect package connector for connection to the lower riser package, said emergency disconnect package connector further comprises at least one connection point for an accumulator arrangement.

**[0025]** The invention also describes an open water riser workover system having an emergency disconnect package connector for disconnecting the open water riser workover system. The system comprising a wire line seal shear valve assembly comprising a wireline shear seal valve adapted to seal a main bore in the open water riser workover system, said system further comprises a first bleed off valve arranged in fluid connection with the main bore, said first bleed off valve being arranged between the wireline shear seal valve and the emergency disconnect package connector in order to bleed off pressure between the emergency disconnect package connector and the wireline seal shear valve.

### Brief description of drawings

**[0026]**

Figure 1 is an overview of a riserless workover system.

Figure 2 is an overview of an open water riser workover system.

Figure 3 shows a prior art configuration of an open water riser workover system in greater detail.

Figure 4 shows a configuration of a riserless workover system.

Figure 5 shows a detailed view of the riserless workover system and the valves that is used for adapting to an open water riser workover system and also hydraulic point for adapting to an open water riser workover system.

Figure 6 shows a detailed view of the open water riser workover system adapted from the riserless workover system into the configured open water riser workover system.

### Detailed description of the invention

**[0027]** Figure 1 and figure 2 shows an overview of the two alternative workover systems. The riserless workover system 1 in figure 1 has a wireline 2 that runs through the riserless workover system 1 and a Christmas tree 3 towards a subsea well 6 from a rig/vessel 4 at the sea surface 5. The wireline 2 could be attached to various equipment that performs workover operations inside the subsea well 6.

**[0028]** Among the main component of the riserless workover system 1 shown in the figure 1 are; a lubricator section 25, an emergency disconnect package 20 and

a well control package 21. The well control package 21 is connected on top of a Christmas tree 3. The principle of the riserless workover system 1 is further described in relation to figure 4.

**[0029]** Figure 2 shows another workover principle where there is arranged a pressure containing conduit or riser 31a between a part of the workover system 31b arranged subsea, hereinafter called lower workover riser package 31b, and the drilling rig or vessel 4 at the sea surface 5. This is called an open water riser workover system 30'. The system comprises a lower riser package 34 and an emergency disconnect package 33 (figure 3). The lubricator section 25 is in this system replaced by the riser 31a that extends between the emergency disconnect package 33 and the drilling rig or vessel 4. The open water riser workover system will be further described in relation to figure 3.

**[0030]** Figure 1 and 2 shows different types of rig/vessel 5. It is to be noted that any type of vessel or rig 5 that is suitable for use in a workover operation are possible embodiments of the invention.

**[0031]** Figure 3 shows a traditional lower workover riser package 31b for the open water riser workover system 30 illustrated in figure 2 in greater detail.

**[0032]** The lower workover riser package 31b comprises an emergency disconnect package (EDP) 33 and a lower riser package (LRP) 34, also called a well control package (WCP). A main bore 39 is extending through the system 30 from the riser (31a) to the subsea well 6 for performing workover operations.

**[0033]** The lower riser package (LRP) 34 is connected to the top of the Christmas tree 3. The lower riser package 34 provides a well control function in the open water riser workover system 30. The lower riser package 34 of the open water riser workover system further comprises a safety head (SH) 40 and production isolation valve (PIV) 36.

**[0034]** At the top of the lower riser package (LRP) 34, the emergency disconnect package (EDP) 33 is connected. The emergency disconnect package 33 comprises an emergency disconnect connector 37 facing the lower riser package (LRP) 34 and connecting the emergency disconnect package (EDP) 33 to the lower riser package (LRP) 34. The emergency disconnect package 33 provides the disconnect function in the open water riser workover system. The emergency disconnect package (EDP) 33 comprises a retainer valve (RV) 35 attached to the main bore in the system 39.

**[0035]** In order to perform open water riser workover operations, the emergency disconnect package 33 must be able to disconnect quickly from the lower riser package 34 and retain the fluid in the riser 31 to avoid spillage to the environment and uncontrolled bleed off.

**[0036]** The emergency disconnect package connector 37 in the emergency disconnect package connects the lower riser package 34 and the emergency disconnect package 33 together. In order to perform a quick emergency disconnect between the lower riser package 34

and the emergency disconnect package 33, the emergency disconnect package connectors 37 are connected to at least one accumulator system 38. The accumulator system is known per se. The at least one accumulator system 38 will provide hydraulic power to enable emergency quick disconnect within required timeframe and is a requirement in open workover riser systems.

**[0037]** In addition, in the emergency disconnection of the open water riser workover system, the retainer valve (RV) 35 must be closed off to retain the fluid in the riser 31a. Also, the pressure between the retainer valve (RV) 35 and the production isolation valve (PIV) 36 must bleed off to avoid hydraulic lock which prevents disconnection of the emergency disconnect package (EDP) 33. Reference number 41 illustrates bleed off valves (BOV1, BOV2) in this system.

**[0038]** When a need for quick emergency disconnection, for instance due to rig/vessel drift off, the system will perform a controlled quick disconnection where the emergency disconnect package 33 will be disconnected from the lower riser package 34 and avoid spillage to the environment and uncontrolled bleed off by closing the retainer valve 35.

**[0039]** Figure 4 shows a principle of a riserless workover system 1 in greater detail. The system 1 comprises the well control package (WCP) (Lower riser package) 21, the emergency disconnect package 20 and the lubricator section 25. The main bore 14 is extending through the riserless workover system 1 as illustrated. The system 1 further comprises a valve configuration for performing riserless well intervention. The well control package (WCP) 21 comprises a safety head (SH) 11, a lower production isolation valve (LPIV) 12 and an upper production isolation valve (UPIV) 13. The valves 11, 12, 13 are arranged in line in connection with the main bore 14 extending through the well control package (WCP) 21 from the well 6 (figure 1).

**[0040]** Figure 4 further shows a wireline shear seal valve assembly (WSSV) 10 attached to the main bore 14 in the lubricator section 25 of the riserless workover system 1. The wireline shear seal valve assembly (WSSV) 10 having a wireline shear seal valve 8 that is arranged above the main bore valve configuration 11, 12, 13. The wireline shear seal valve 8 is arranged in the main bore 14. The valve 8 is further arranged in the lubricator section 25 of the riserless workover system 1. The wireline shear seal valve 8 is adapted to shear or cut off the wireline and seal off the through bore 14 in emergency situations. The wireline shear seal valve 8 is normally a ball valve or a ram valve. The valve could however also be a gate valve or other valves suitable for use as a wireline shear seal valve. The valve 8 is normally hydraulically controlled but the valve 8 is not limited to such operation. The wireline shear seal valve 8 is further normally fully opened during workover operations. The figure 4 shows no retainer valve as this valve is not required in riserless workover systems.

**[0041]** The riserless workover system 1 further com-

prises an emergency disconnect package connector 22 as part of the emergency disconnect package 20. The emergency disconnect package connector 22 is adapted to connect the disconnect package 20 to the well control package (WCP) 21.

**[0042]** The riserless workover system 1 further comprises an upper circulation valve (UCIRC) 7 used for circulation purposes in riserless operation, that is arranged in a branch 9 from the main bore 14. The branch 9 is further arranged above the wireline shear seal valve 8 and in fluid communication with a lower circulation valve (CIRC) 16.

**[0043]** Figure 5 and 6 shows a workover system 1', 30' according to the invention. The system is designed so that it can be re-configured from a riserless workover system 1' from figure 5 into an open water riser workover configuration 30' in figure 6. The highlighted parts in figure 5 are central elements in this reconfiguration process.

**[0044]** The central elements that are affected in the reposition have been renumbered from figure 4, while the remaining features from figure 4 have the same reference number.

**[0045]** With a reconfiguration and re-using of the riserless valves 18, 17, 16 in a different configuration, it is possible to adapt the riserless workover system 1' to an open water riser workover system 30' that meets the safety requirements of an open water riser workover system. This will be further described below.

**[0046]** The figure 5-6 further discloses a wireline shear seal valve assembly 15 is attached to the main bore 14 in the lubricator section 25. This shear seal valve assembly differs from the wireline shear seal assembly 10 in figure 4 in that the assembly is configurable as will be described below. This shear seal valve assembly 15 has to be released from the riserless workover system 1'. This assembly 15 can be turned upside down, i.e. turned approximately 180 degrees around a horizontally arranged axis through the wireline shear valve assembly 15 and re-mounted on the workover arrangement. A wireline shear valve 18' arranged within the wireline shear seal valve assembly 15' will then function as a retainer valve that keeps the fluid within the riser when the emergency disconnection of the open water riser workover system 30' is activated, i.e. the emergency disconnect package 33 (figure 3) is disconnected from the lower riser package 34 (Figure 3). By turning the wireline shear seal valve assembly (WSSV) 15' upside down, a line or branch 19' from the main bore 14, will be located below the wireline shear seal valve 18'.

**[0047]** Due to this reposition, the workover system will have a different configuration and thus a different purpose in the workover system prepared for open water riser workover operations 30' than the configuration prepared for riserless workover operations 1'. The riserless valves named Ucirc valve 17' and Circ-BV valve 16' will function in a similar way as the bleed off valves (BOVs) 41 (from figure 3) to bleed off pressure between the wireline shear seal valve assembly (WSSV) 15' and the pro-

duction isolation valve (LPIV) 13' to avoid hydraulic lock during EDP disconnection. The arrangement is further shown and described in detail in figure 6.

**[0048]** A primary low pressure (LP) supply 52 and/or a secondary low pressure (LP) supply 53 will each contain prearranged hook up points 51 for future hook-up for at least one accumulator package for the primary and secondary unlock of an emergency disconnect package EDP 26 according to the invention. Such accumulator packages are illustrated with reference number 50 in figure 6. The connected accumulator(s) 50 will then provide hydraulic power such that an emergency disconnect of the emergency disconnect package (EDP) 26 is provided within the time requirements.

**[0049]** In its simplest form it may be a common accumulator for the primary and secondary unlock of the emergency disconnect package (EDP) 26. However, in most cases there are arranged an accumulator package 50 for each primary and secondary unlock due to safety and redundancy criteria.

**[0050]** The production isolation valve (LPIV) 12 and the safety head 11 will similar now function as the production isolation valve (PIV) 32 and the safety head (SH) 40 shown in the open water riser workover configuration from figure 3.

**[0051]** In addition, there may be pre-arranged and mounted hook up points for further additional equipment(s) that may be useful for the open workover configuration.

**[0052]** Figure 6 shows the riserless workover system transformed and configured for the use as an open water riser workover system 30'. In this figure the wireline seal shear valve assembly 15' has been turned upside down at the upper part of the system 30'.

**[0053]** The wireline shear seal valve 18' will in this position function as a retainer valve. The valve 18' will keep the fluid within the riser during emergency disconnecting where the emergency disconnection package 26' is disconnected from the well control package 21.

**[0054]** The reference number of the new configuration of the wireline seal valve assembly has been changed to 15' to distinguish from the configuration of the valve assembly 15 in the riserless workover system 30 in figure 5. Likewise, the configuration that has been prepared from riserless workover system 30 to a configured open workover system has reference number 30'.

**[0055]** The new orientation of the wireline seal valve assembly 15' will result in that the position of the branch 19 (now referred to as 19') from the main bore 14 is arranged between the wireline shear seal valve 18' and the emergency disconnect package connector 22. A first bleed off valve (UCIRC) 17' arranged on this branch 19 will bleed off any pressure between the wireline shear seal valve and emergency disconnect package connector 22 through a second bleed off valve (CIRC-BV) 16'. These valves are the same as the circulation valves 16 and 17 from fig. 4. In the emergency disconnection situations, the first bleed off valve 17 will bleed off pressure

between the wireline shear seal valve 18' and the upper production isolation valve (UPIV) 13 such that rocket effect during disconnection, such as the emergency disconnection, and hydraulic lock during reconnection is avoided. The second bleed off valve (CIRC-BV) 16 will further function as a second barrier for the pressure to maintain the double barrier principle during normal operations.

**[0056]** As mentioned in relation to figure 3, another requirement to be able to perform a quick disconnection between the emergency disconnect package 26' and the well control package 21 in the open water riser workover configuration, is that there are at least one accumulator package 50 attached to the emergency disconnect connector 22 through supply lines 52, 53. (figure 5) The configurable riserless workover system 30 in figure 5 thus also requires a at least one connection point 51 (figure 5) for attaching at least one accumulator arrangement to the configured system 30'.

**[0057]** The present invention has been described with reference to a preferred embodiment and some drawings for the sake of understanding only and it should be clear to persons skilled in the art that the present invention includes all legitimate modifications within the ambit of what has been described hereinbefore and claimed in the appended claims.

## Claims

1. Method for adapting a riserless workover system configuration (1') into an open water riser workover system configuration (30'), wherein the system comprising an emergency disconnect package (20) arranged between a lubricator section (28) and well control package (21), the lubricator section (28) comprises a wireline shear seal valve assembly (15), the system further comprises an emergency disconnect package connector (22) for disconnecting the emergency disconnect package (26) from the well control package (21) in case of emergency, **characterized in that** the method comprising the steps of
  - relocate the wireline shear seal valve assembly (15') by rotating the valve assembly (15) upside down prior to attaching a riser assembly to the configured open water riser workover system (30'), and
  - connecting at least one accumulator arrangement (50) to the configured open water riser workover system (30').
2. Method according to claim 1, wherein the at least one accumulator arrangement (50) is connected to a prearranged hydraulic supply line (52, 53) coupled to the emergency disconnect package connector (22).
3. Method according to claim 1 or 2, wherein the wireline shear seal valve assembly (15') comprising a wireline shear seal valve (18') for sealing a main bore (14) of the configured open water riser workover system (30') from above.
4. Method according to any of the claims 1- 3, wherein the wireline seal valve assembly (15, 15') comprising a ball valve or a RAM valve.
5. Method according to any of the claims 1-4, wherein the method further comprising the step of arranging a first bleed off valve (17) in connection with the main bore (14) in a position between the wire shear seal valve (18') and the upper production isolation valve (UPIV) 13 in order to bleed off pressure between the wire shear seal valve (18') and the upper production isolation valve (UPIV) 13.
6. Method according to any of claims 1-5, wherein the method further comprising the step of using a second bleed off valve (16) arranged in fluidly connection with the first bleed off valve (17) as a second barrier valve.
7. Method according to any of the claims 1-6, wherein the wireline shear seal valve assembly (15') is turned upside down in the configured open water workover system (30') in order to function as a retainer valve in the configured open water workover system (30').
8. Method according to any one of the claims 1-7, wherein the method further comprises the step of attaching additional equipment(s) to the configured open workover system (30').
9. A configured open water riser workover system (30') comprising a lubricator section (28') and a well control package (21), the system further comprises an emergency disconnect package (26') arranged between the lubricator section (28') and the well control package (21), **characterized in that** said lubricator section (28') comprising a wireline shear seal valve assembly (15') that is turned upside down, said wireline shear seal valve assembly (15') further comprising a wireline shear seal valve (18') adapted to seal a main bore (14) from above in the configured open workover system (30').
10. The configured open water riser workover system according to claim 9, wherein the system further comprises at least one accumulator arrangement (50) in connection with the configured open water riser workover system (30').
11. The configured open water riser workover system according to claim 9 or 10, wherein the system further comprises a first bleed off valve (17) arranged in fluid

connection with the main bore (14), said first bleed off valve (17) being arranged between the wireline shear seal valve (18) and the upper production isolation valve (UPIV) 13 in order to bleed off pressure between the upper production isolation valve (UPIV) 13 and the wireline seal shear valve (18').

12. A riserless workover system comprising a lubricator section (28), a well control package (21), and an emergency disconnect package (26) positioned between the well control package (21) and the lubricator section (28), **characterized in that** the lubricator section (28) comprises a wireline shear seal valve assembly (15) adapted to be rotated approximately 180 degrees around a horizontal axis in order to function as a retainer valve, and said emergency disconnect package (26) comprising an emergency disconnect package connector (22) for connection to the well control package (21), said emergency disconnect package connector (22) further comprises at least one connection point (51, 52, 53) for an accumulator arrangement (50).

#### Patentansprüche

1. Verfahren zum Anpassen einer steigleitungslosen Workover-Systemkonfiguration (1') in eine Freiwasser-Steigleitung-Workover-Systemkonfiguration (30'), wobei das System ein Notabschaltpaket (20) umfasst, das zwischen einem Schmierabschnitt (28) und einem Bohrlochsteuerungspaket (21) angeordnet ist, wobei der Schmierabschnitt (28) eine Drahtseil-Scherdichtungs-Ventilbaugruppe (15) umfasst, wobei das System ferner ein Notabschaltpaket-Verbindungsstück (22) zum Trennen des Notabschaltpaket (26) von dem Bohrlochsteuerungspaket (21) im Notfall umfasst, **dadurch gekennzeichnet, dass** das Verfahren die folgenden Schritte umfasst:

- auf den Kopf Stellen der Scherdichtungs-Ventilbaugruppe (15') durch Drehen der Ventilbaugruppe (15), bevor eine Steigleitungsbaugruppe an das konfigurierte Freiwasser-Steigleitung-Workover-System (30') angebracht wird, und
- Anschließen mindestens einer Speicheranordnung (50) an das konfigurierte Freiwasser-Steigleitung-Workover-System (30').

2. Verfahren nach Anspruch 1, wobei die mindestens eine Speicheranordnung (50) mit einer zuvor angeordneten Hydraulikversorgungsleitung (52, 53) verbunden ist, die mit dem Notabschaltpaket-Verbindungsstück (22) gekoppelt ist.
3. Verfahren nach Anspruch 1 oder 2, wobei die Drahtseil-Scherdichtungsventilbaugruppe (15') ein Drahtseil-Scherdichtungsventil (18') zum Abdichten einer

Hauptbohrung (14) des konfigurierten Freiwasser-Steigleitung-Workover-Systems (30') von oben umfasst.

4. Verfahren nach einem der Ansprüche 1 bis 3, wobei die Drahtseil-Scherdichtungsventilbaugruppe (15, 15') ein Kugelventil oder ein RAM-Ventil umfasst.
5. Verfahren nach einem der Ansprüche 1 bis 4, wobei das Verfahren ferner den Schritt des Anordnens eines ersten Ablassventils (17) in Verbindung mit der Hauptbohrung (14) an einer Position zwischen dem Drahtseil-Scherdichtungsventil (18') und dem oberen Produktionsabsperrventil (UPIV) 13 umfasst, um den Druck zwischen dem Drahtseil-Scherdichtungsventil (18') und dem oberen Produktionsabsperrventil (UPIV) 13 abzulassen.
6. Verfahren nach einem der Ansprüche 1 bis 5, wobei das Verfahren ferner den Schritt der Verwendung eines zweiten Ablassventils (16), das in Fluidverbindung mit dem ersten Ablassventil (17) angeordnet ist, als zweites Sperrventil umfasst.
7. Verfahren nach einem der Ansprüche 1 bis 6, wobei die Drahtseil-Scherdichtungsventilbaugruppe (15') in dem konfigurierten Freiwasser-Workover-System (30') auf den Kopf gestellt wird, um als Rückhalteventil in dem konfigurierten Freiwasser-Workover-System (30') zu fungieren.
8. Verfahren nach einem der Ansprüche 1 bis 7, wobei das Verfahren ferner den Schritt des Anbringens von zusätzlicher Ausrüstung(en) an das konfigurierte Freiwasser-Workover-System (30') umfasst.
9. Konfiguriertes Freiwasser-Steigleitung-Workover-System (30'), das einen Schmierabschnitt (28') und ein Bohrlochsteuerungspaket (21) umfasst, wobei das System ferner ein Notabschaltpaket (26') umfasst, das zwischen dem Schmierabschnitt (28') und dem Bohrlochsteuerungspaket (21) angeordnet ist, **dadurch gekennzeichnet, dass** der Schmiermittelschnitt (28') eine auf den Kopf gestellte Drahtseil-Scherdichtungsventilbaugruppe (15') umfasst, wobei die Drahtseil-Scherdichtungsventilbaugruppe (15') ferner ein Drahtseil-Scherdichtungsventil (18') umfasst, das zum Abdichten einer Hauptbohrung (14) von oben in dem konfigurierten Freiwasser-Steigleitung-Workover-System (30') geeignet ist.
10. Konfiguriertes Freiwasser-Steigleitung-Workover-System nach Anspruch 9, wobei das System ferner mindestens eine Speicheranordnung (50) in Verbindung mit dem konfigurierten Freiwasser-Steigleitung-Workover-System (30') umfasst.
11. Konfiguriertes Freiwasser-Steigleitung-Workover-

System nach Anspruch 9 oder 10, wobei das System ferner ein erstes Ablassventil (17) umfasst, das in Fluidverbindung mit der Hauptbohrung (14) angeordnet ist, wobei das erste Ablassventil (17) zwischen dem Drahtseil-Scherdichtungsventil (18) und dem oberen Produktionsabsperrrventil (UPIV) 13 angeordnet ist, um Druck zwischen dem oberen Produktionsabsperrrventil (UPIV) 13 und dem Drahtseil-Scherdichtungsventil (18') abzulassen.

12. Steigleitungsloses Workover-System, das einen Schmierabschnitt (28), ein Bohrlochsteuerungspaket (21) und ein Notabschaltpaket (26) umfasst, das zwischen dem Bohrlochsteuerungspaket (21) und dem Schmierabschnitt (28) angeordnet ist, **dadurch gekennzeichnet, dass** der Schmierabschnitt (28) eine Drahtseil-Scherdichtungsventilbaugruppe (15) umfasst, die so eingerichtet ist, dass sie etwa 180 Grad um eine horizontale Achse gedreht werden kann, um als Rückhalteventil zu fungieren, wobei das Notabschaltpaket (26) ein Notabschaltpaket-Verbindungsstück (22) zum Verbinden mit dem Bohrlochsteuerungspaket (21) umfasst, wobei das Notabschaltpaket-Verbindungsstück (22) ferner mindestens einen Verbindungspunkt (51, 52, 53) für eine Speicheranordnung (50) umfasst.

## Revendications

1. Procédé d'adaptation d'une configuration de système de reconditionnement sans colonne montante (1') en une configuration de système de reconditionnement à colonne montante à eau ouverte (30'), dans lequel le système comprend un boîtier de déconnexion d'urgence (20) disposé entre une section de lubrification (28) et un boîtier de commande de puits (21), la section de lubrification (28) comprend un ensemble de vanne à joint de cisaillement de câble (15), le système comprend en outre un connecteur de boîtier de déconnexion d'urgence (22) pour déconnecter le boîtier de déconnexion d'urgence (26) à partir du boîtier de commande de puits (21) en cas d'urgence, **caractérisé en ce que** le procédé comprend les étapes consistant à
- repositionner l'ensemble de vanne à joint de cisaillement de câble (15') en faisant tourner l'ensemble de vanne (15) à l'envers avant de fixer un ensemble de colonne montante au système de reconditionnement à colonne montante à eau libre configuré (30'), et
  - connecter au moins un agencement d'accumulateur (50) au système de reconditionnement à colonne montante à eau ouverte configuré (30').

2. Procédé selon la revendication 1, dans lequel le au

moins un agencement d'accumulateur (50) est connecté à une ligne d'alimentation hydraulique préagencée (52, 53) couplée au connecteur de boîtier de déconnexion d'urgence (22).

3. Procédé selon la revendication 1 ou 2, dans lequel l'ensemble de vanne à joint de cisaillement de câble (15') comprend une vanne à joint de cisaillement de câble (18') pour rendre étanche un alésage principal (14) du système de reconditionnement à colonne montante à eau libre configuré (30') à partir du dessus.
4. Procédé selon l'une quelconque des revendications 1 à 3, dans lequel l'ensemble de vanne à joint de cisaillement de câble (15, 15') comprend un clapet à bille ou une vanne RAM.
5. Procédé selon l'une quelconque des revendications 1 à 4, dans lequel le procédé comprend en outre l'étape consistant à agencer une première vanne de purge (17) en connexion avec l'alésage principal (14) dans une position entre la vanne à joint de cisaillement de fil (18') et la vanne d'isolation de production supérieure (UPIV) 13 afin de purger la pression entre la vanne à joint de cisaillement de fil (18') et la vanne d'isolation de production supérieure (UPIV) 13.
6. Procédé selon l'une quelconque des revendications 1 à 5, dans lequel le procédé comprend en outre l'étape consistant à utiliser une seconde vanne de purge (16) agencée en connexion fluïdique avec la première vanne de purge (17) en tant que seconde vanne barrière.
7. Procédé selon l'une quelconque des revendications 1 à 6, dans lequel l'ensemble de vanne à joint de cisaillement de câble (15') est retourné dans le système de reconditionnement à eau libre configuré (30') afin de fonctionner comme une vanne de retenue dans le système de reconditionnement à eau libre configuré (30').
8. Procédé selon l'une quelconque des revendications 1 à 7, dans lequel le procédé comprend en outre l'étape consistant à attacher un ou des équipements supplémentaires au système de reconditionnement ouvert configuré (30').
9. Système de reconditionnement à colonne montante à eau libre configuré (30') comprenant une section de lubrification (28') et un boîtier de commande de puits (21), le système comprend en outre un boîtier de déconnexion d'urgence (26') disposé entre la section de lubrification (28') et le boîtier de commande de puits (21), **caractérisé en ce que** ladite section de lubrification (28') comprend un ensemble de vanne à joint de cisaillement de câble (15') qui est re-

tourné, ledit ensemble de vanne à joint de cisaillement de câble (15') comprenant en outre une vanne à joint de cisaillement de câble (18') adaptée pour rendre étanche un alésage principal (14) à partir du dessus dans le système de reconditionnement ouvert configuré (30'). 5

10. Système de reconditionnement à colonne montante à eau libre configuré selon la revendication 9, dans lequel le système comprend en outre au moins un agencement d'accumulateur (50) en connexion avec le système de reconditionnement à colonne montante à eau libre configuré (30'). 10

11. Système de reconditionnement à colonne montante à eau libre configuré selon la revendication 9 ou 10, dans lequel le système comprend en outre une première vanne de purge (17) agencée en connexion fluide avec l'alésage principal (14), ladite première vanne de purge (17) étant agencée entre la vanne à joint de cisaillement de câble (18) et la vanne d'isolation de production supérieure (UPIV) 13 afin de purger la pression entre la vanne d'isolation de production supérieure (UPIV) 13 et la vanne à joint de cisaillement de câble (18'). 15  
20  
25

12. Système de reconditionnement sans colonne montante comprenant une section de lubrification (28), un boîtier de commande de puits (21) et un boîtier de déconnexion d'urgence (26) positionné entre le boîtier de commande de puits (21) et la section de lubrification (28), **caractérisé en ce que** la section de lubrification (28) comprend un ensemble de vanne à joint de cisaillement de câble (15) adapté pour être tourné d'environ 180 degrés autour d'un axe horizontal afin de fonctionner comme une vanne de retenue, et ledit boîtier de déconnexion d'urgence (26) comprenant un connecteur de boîtier de déconnexion d'urgence (22) pour une connexion au boîtier de commande de puits (21), ledit connecteur de boîtier de déconnexion d'urgence (22) comprend en outre au moins un point de connexion (51, 52, 53) pour un agencement d'accumulateur (50). 30  
35  
40

45

50

55

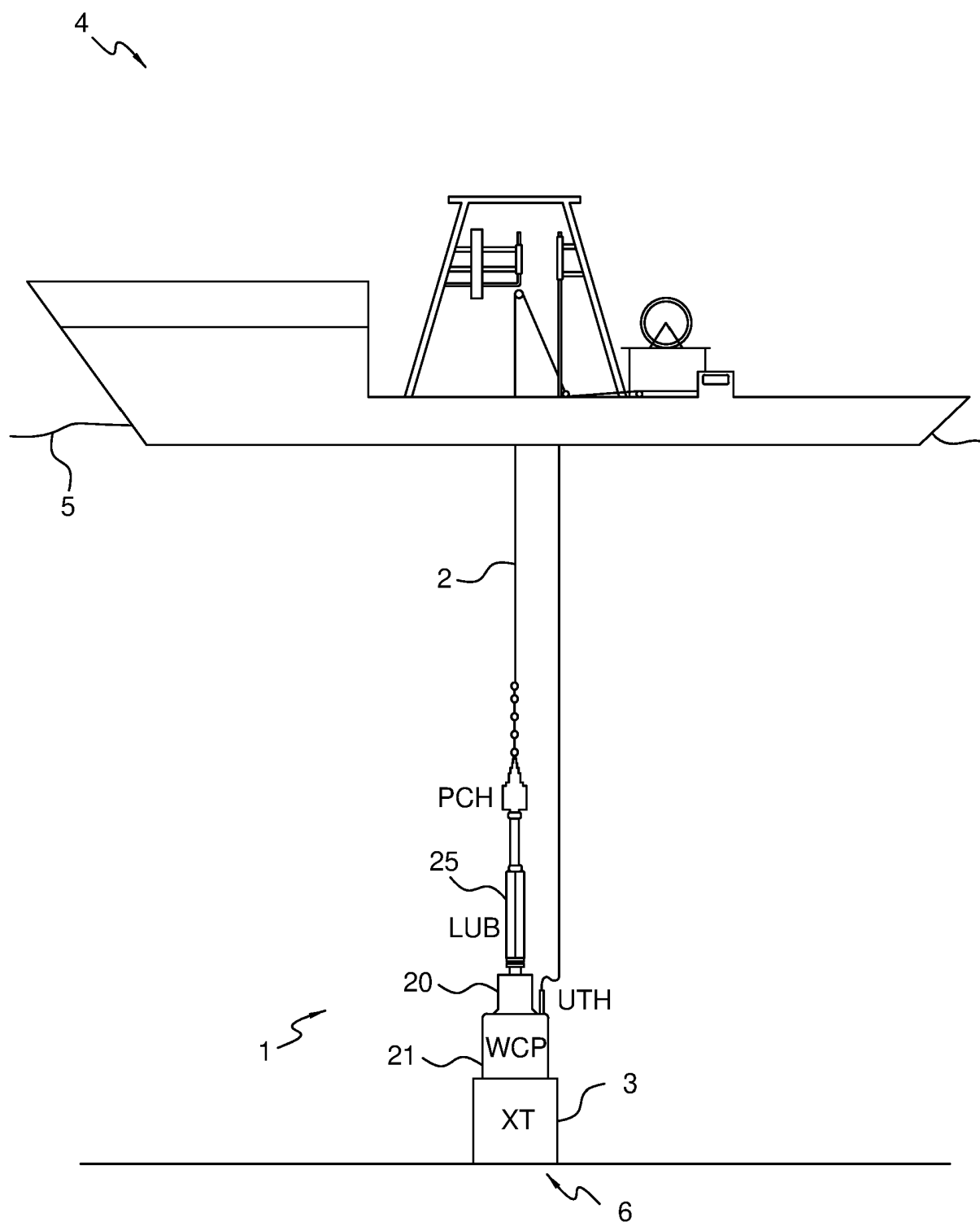


FIG. 1

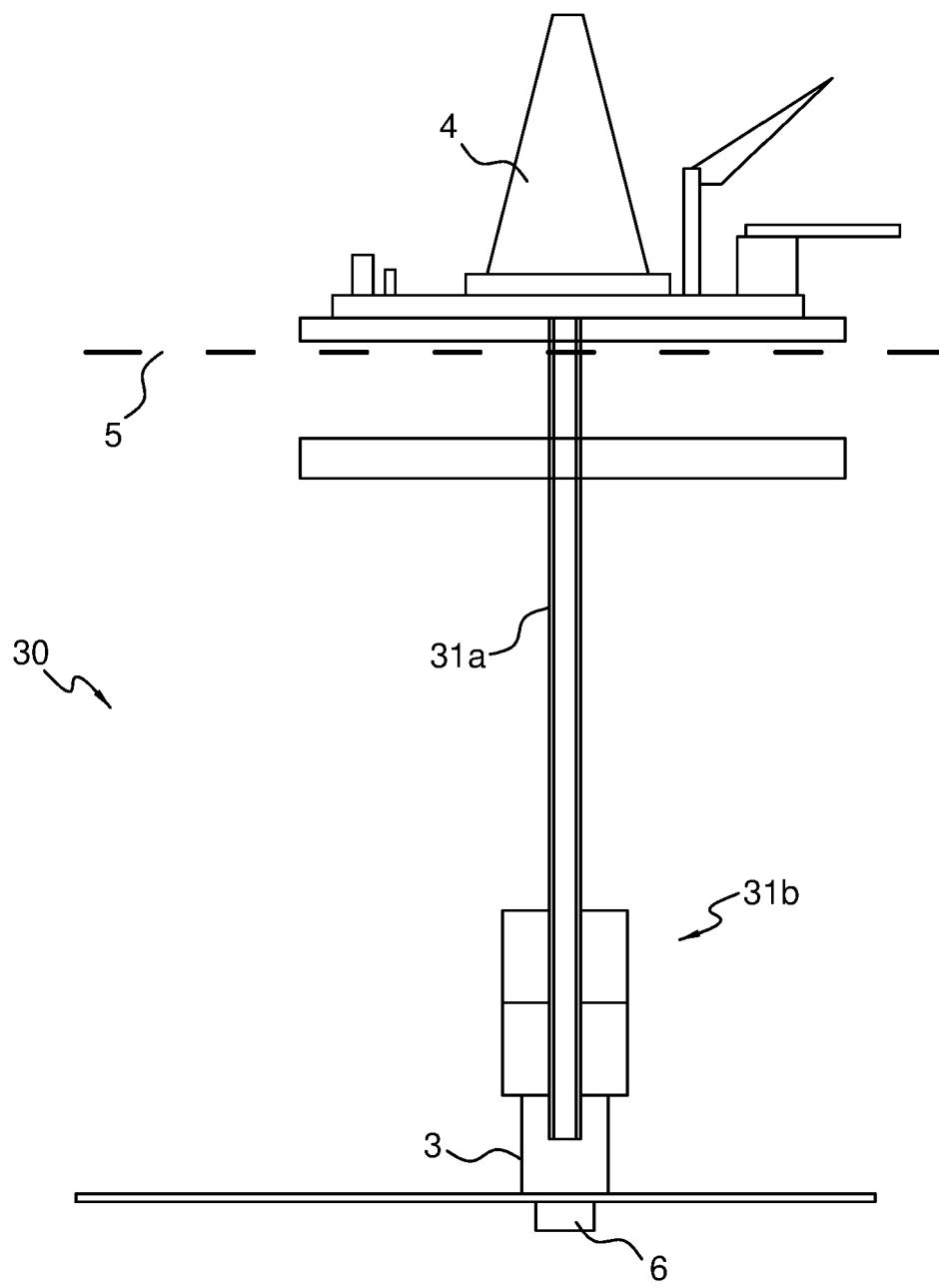


FIG. 2

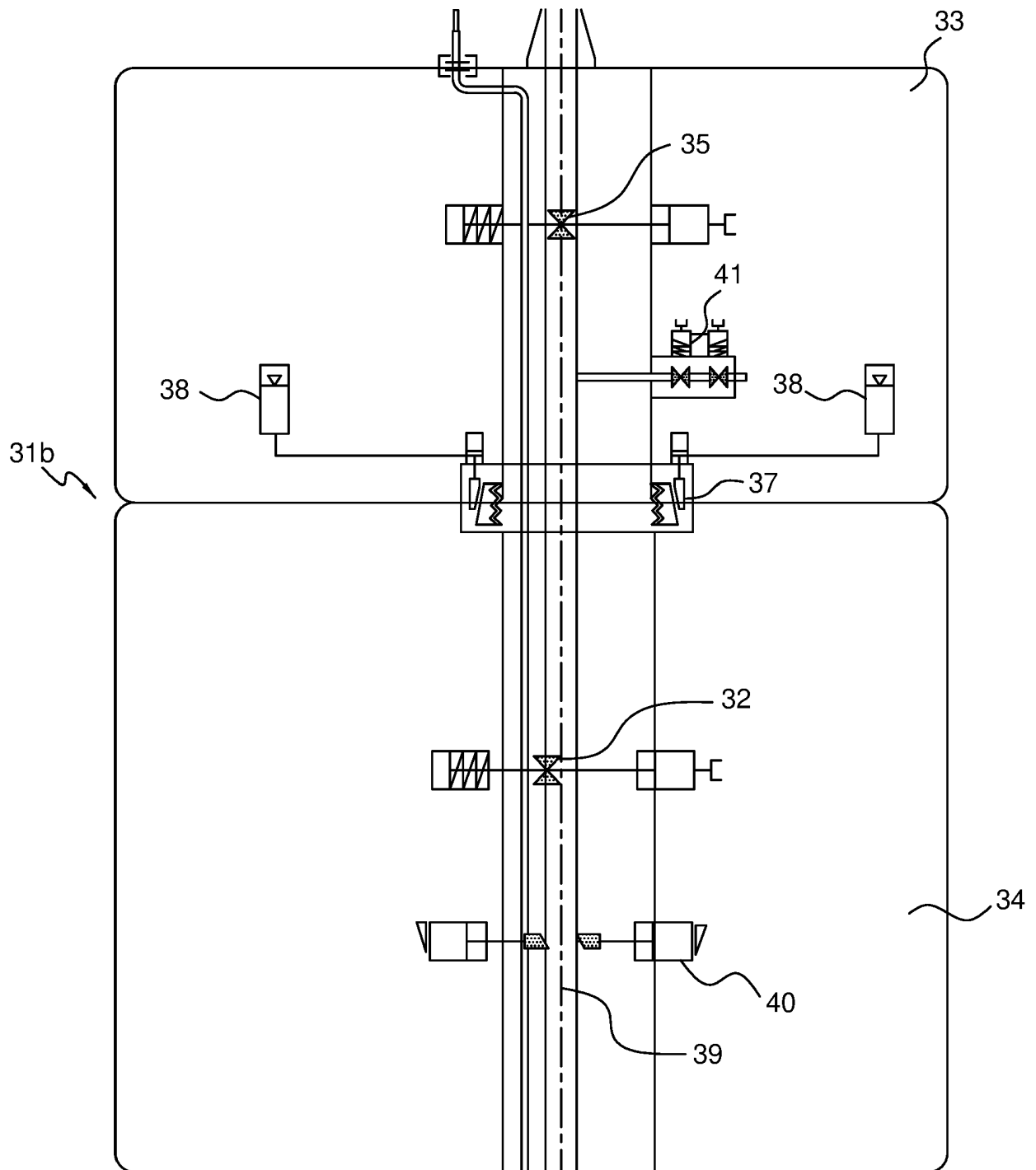


FIG. 3 (Prior Art)

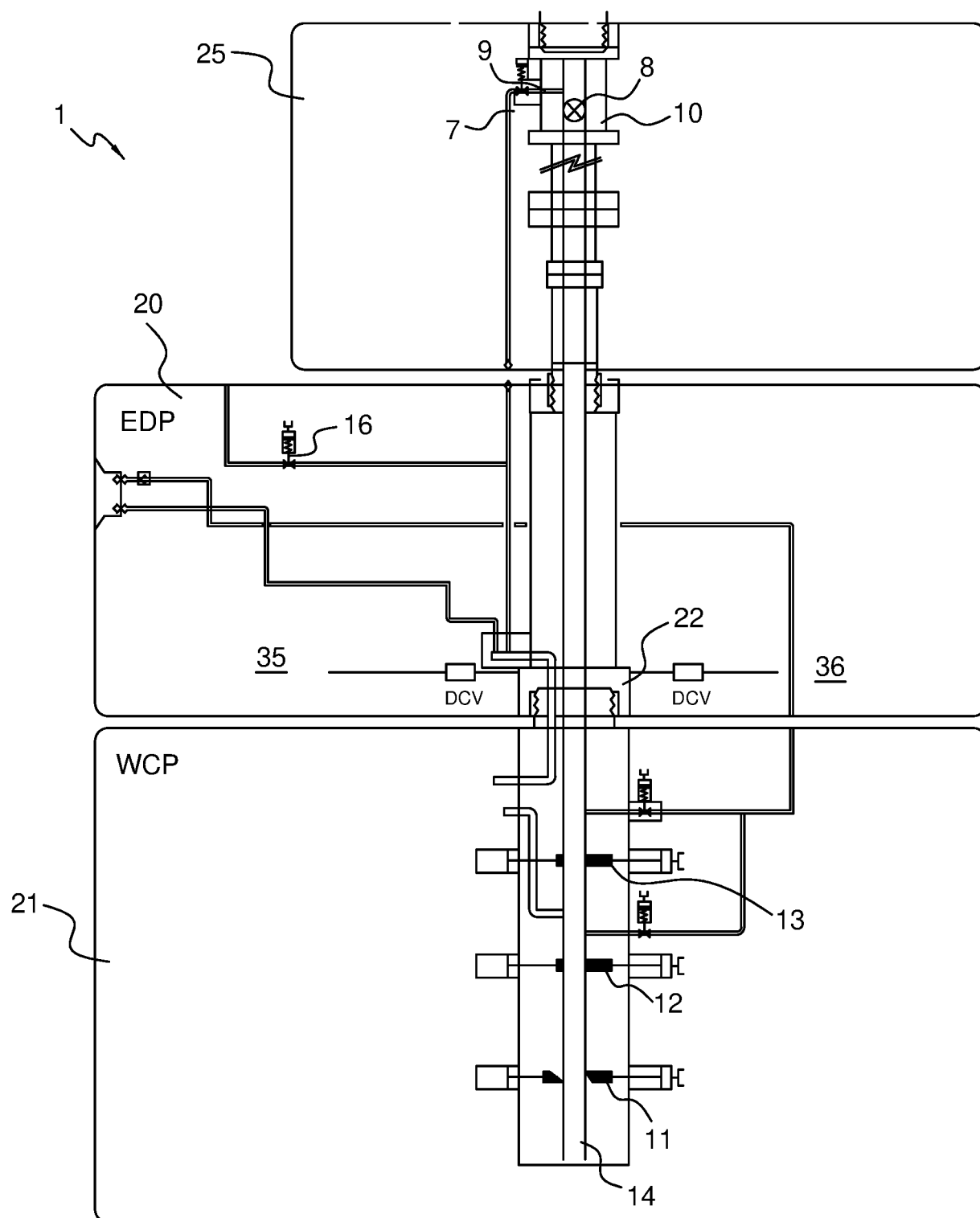


FIG. 4

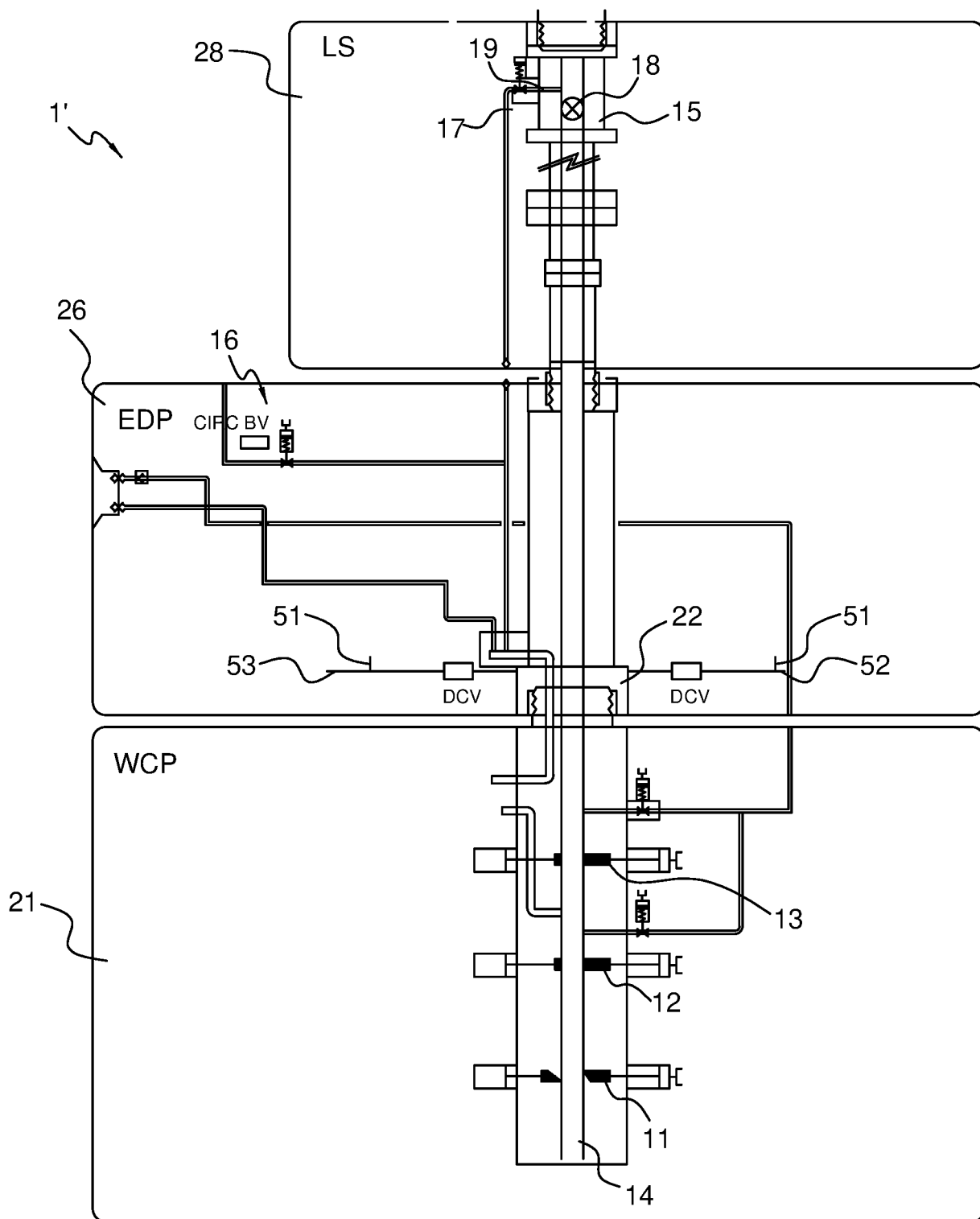


FIG. 5

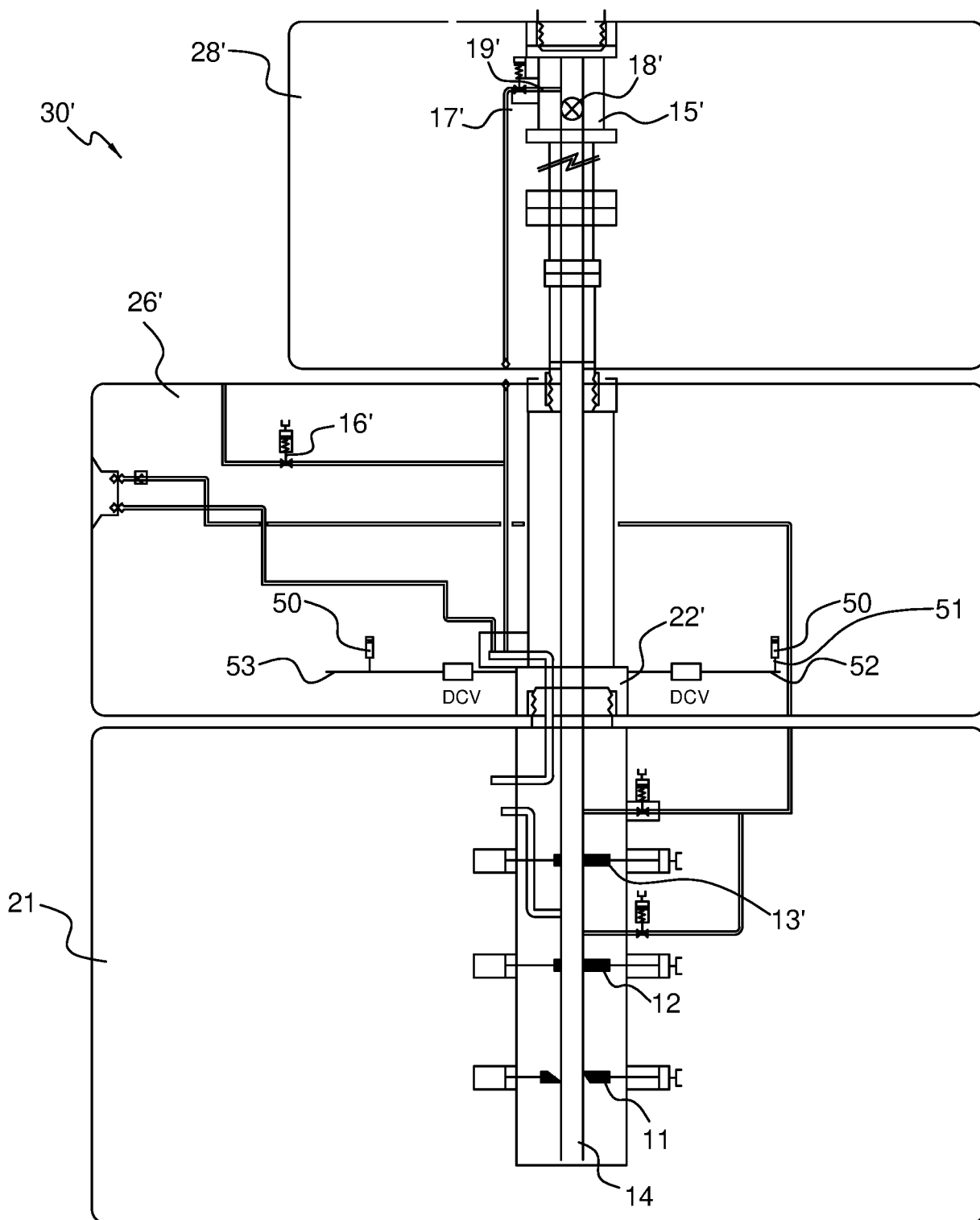


FIG. 6

**REFERENCES CITED IN THE DESCRIPTION**

*This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.*

**Patent documents cited in the description**

- AU 2009276614 B2 [0005]
- US 7114571 B2 [0006]
- US 9038726 B2 [0007]
- WO 2017097945 A1 [0008]