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(54) **EQUIPMENT FOR INSTALLING AND REMOVING PLUGS**

(57) The present invention refers to an equipment for the installation and removal of plugs from submarine well, which comprises a hydraulic cylinder (1) which is coupled to specific tools (9) for installation and removal of plugs (2) in columns suspenders (3) or WCTs (4).

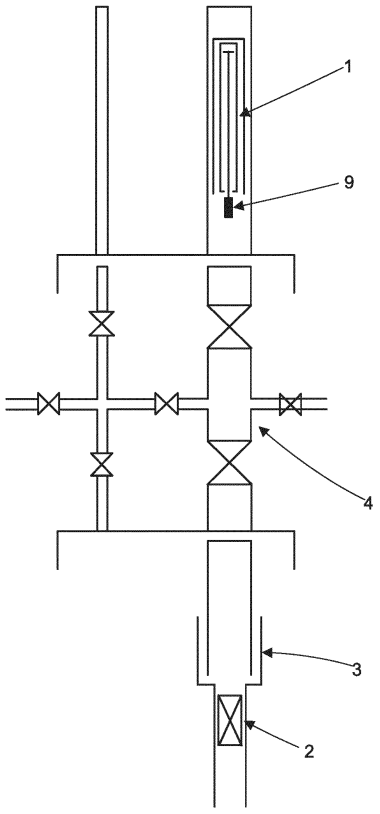


Figure 1

EP 3 231 985 A1

Description

Field of the Invention

[0001] The present invention refers to an equipment for the installation and removal of plugs from submarine wells. More specifically, the present invention refers to a hydraulic equipment for the installation and removal of plugs column suspenders or wet Christmas trees.

History of the Invention

[0002] When the submarine well is complete or suspended, it is necessary to obstruct the passage of piping and, optionally, the ring passage in the well to provide barriers against the well pressure. In order to prepare a well for production, it is necessary the removal of plugs from the piping and/or from the suspension barriers, allowing the well fluid to flow inside the production flow line.

[0003] The removal of plug from a well under pressure is performed by having complete control over the well. Usually, plugs are removed through lifters (riser) and BOP systems to ensure the necessary complete control. This operation, often, needs an intervention vessel or a drilling platform with the largest dimensions, which represents very high cost for its realization. Thus, there is a need for more economical methods of installation and removal of plug-type barriers in wet Christmas tree holes or tubing hanger, without relying on intervention vessels or drilling platforms which, as said, are of high operational cost.

[0004] Another system traditionally used for the installation or removal of plugs from submarine wells is the tool system descent by wire/threads. However, this system has as the main disadvantage the fact of requiring lubricating equipment to isolate pressure from inside the well. This equipment is expensive and requires an operation with some difficulty.

[0005] The document US 6.719.059, for example, describes a tool for recovering and installing plugs in a submarine well having a production tree, a tubing hanger, a passage extending vertically through the tubing hanger and tree and a plug located inside a plug profile in the passage inside of the tubing hanger. The device for plug retrieval has a housing and a connector which is lowered on an elevation line to the upper end of the tree. An axially extendable stem in the housing is driven by a mechanism into the production passage of the tubing hanger. A stem-mounted recovery element attaches to the plug and pulls it up while the stem is being moved upwards. The connector, the drive mechanism and the recovery element are energized by a ROV.

[0006] The document CA2564698 refers to an apparatus to install a plug, or to recover a plug from a horizontal Christmas tree. The apparatus comprises a housing with a through bore adapted to be releasable connected by a first end to a horizontal Christmas tree. Said housing includes at least one axially movable member which also includes at least one radially movable element and an extended tool within the through bore of said housing by an elongated support and adapted to be releasable connected to the plug. It further has a tool having a shaped outer surface portion for releasable engaging an engaging surface, or at least one radially movable element by means of which, in operation, Engagement of the at least one radially movable element with the outer surface portion of the tool allows the plug, connected to said tool, to be installed in the horizontal Christmas tree or recovered from it by axial movement of the at least one axially movable member.

[0007] The document US8.672.037 describes a method for removing a plug that includes a step of deploying an intervention packet Which has at least one valve, cutting elements and tube seals, and a lubricating apparatus in a submarine environment.

Objects of the Invention

[0008] The present invention aims to provide an equipment for installing and removing the plugs from the submarine wells that can Advantageously replace those of the prior art, providing technical, operational and economic gains for this operation.

[0009] Thus, the present invention provides an equipment coupled with specific tools for installation and removal of plugs on column suspenders or wet Christmas trees (WCTs), instead of using lifters and BOP system, or the tool system descent by wire/thread traditionally used by these operations.

Brief Description of the Figures

[0010] The present invention will be described below with reference to the attached figures, which represent in a schematic and non-limiting way of its scope:

Figure 1 - illustrates the installation or removal of plugs by the equipment in column suspenders and wet Christmas tree, according to the invention; and

Figure 2 - illustrates the main components of the equipment of the invention.

Detailed Description of the Invention:

[0011] According to figure 1, it is noted that the equipment for the installation and removal of plugs from submarine wells comprises a hydraulic cylinder (1), is coupled to the specific tools (9) for the installation and removal of plugs (2) in column suspenders (3) or WCTs (4).

[0012] In figure 2, it is noted that the hydraulic cylinder (1) will remain anchored by means of a locking mechanism (5) to a tool (6) which will be part of the installation or removal assembly of the WCT of the oil well. Said hydraulic cylinder (1) can have multiple seals (7) isolating the interior of the well from the external environment, and

can be, in contingency, removed with or without the plug and plug tools from the place where it is anchored. For this, said hydraulic cylinder (1) has in its upper part a compatible profile with tools for recovering (8).

Claims

1. EQUIPMENT FOR INSTALLATION AND REMOVAL OF PLUGS, comprising a hydraulic cylinder (1) which is coupled to the specific tools (9) for the installation and removal of plugs (2) in columns suspenders (3) or WCTs (4).

2. EQUIPMENT, according to claim 1, wherein the cylinder (1) is anchored by means of a locking mechanism (5) to a tool (6).

3. EQUIPMENT, according to claim 1, wherein the cylinder (1) has multiple seals (7), isolating the interior of the well from the external environment.

4. EQUIPMENT, according to claim 1, wherein the cylinder (1) has in its superior part a compatible profile with tools for recovery (8).

5. EQUIPMENT, according to claim 4, wherein the cylinder (1) is removed from the place where it is anchored with or without the plug and tools (8).

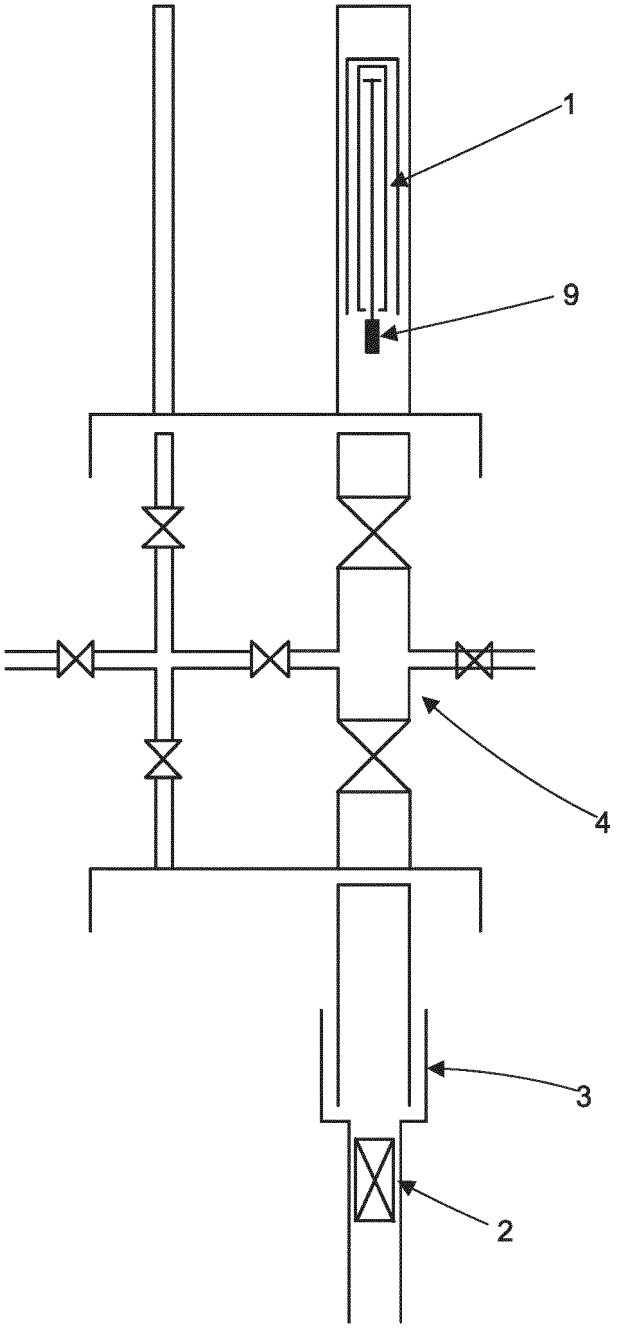


Figure 1

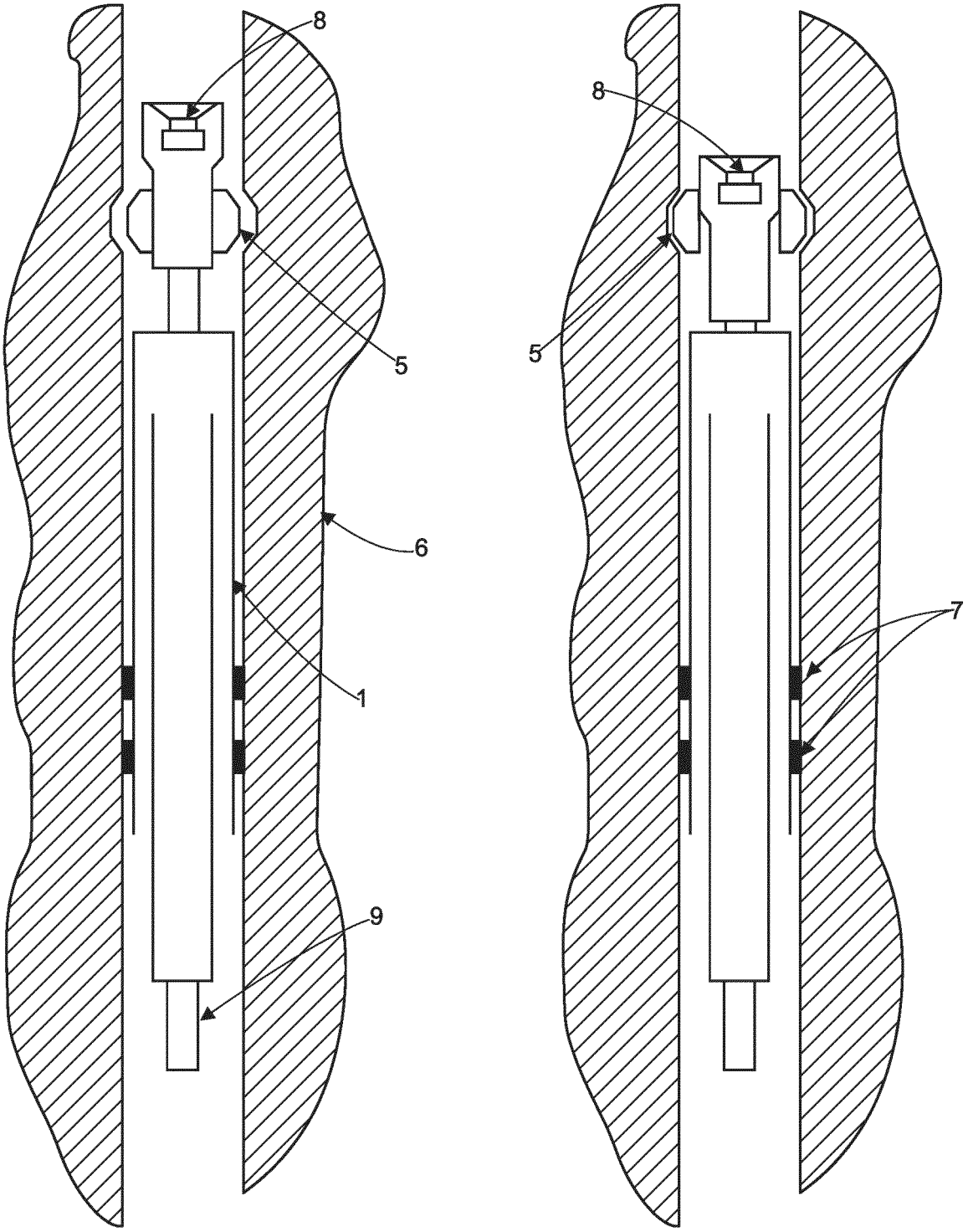


Fig. 2

INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER

E21B 33/035 (2006.01), E21B29/12 (2006.01), E21B 33/12 (2006.01), E21B 23/00 (2006.01)

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)

E21B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SINPI(Banco de patentes INPI-BR), Google Patents

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2012227974 AI (TETRA TECH [US]) 13 September 2012 (2012-09-13) Specification, page 2, paragraph [0022] and [0023] Specification, page 3, paragraph [0038] Specification, page 5, paragraph [0107] Figures 4 a 6	1 - 5
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A	US 2004163818 AI (STEPHEN P. FENTON [US]) 26 August 2004 (2004-08-26)	

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
09/03/2016	24/03/2016
Name and mailing address of the ISA/ **BR** INPI INSTITUTO NACIONAL DA PROPRIEDADE INDUSTRIAL Rua Sao Bento nº 1, 17º andar cep: 20090-010, Centro - Rio de Janeiro/RJ Facsimile No. +55 21 3037-3663	Authorized officer **Marcilio Haddad Andrino** +55 21 3037-3493/3742 Telephone No.

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