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(54) Title: A METHOD AND DEVICE FOR STABILIZING A CONDUCTOR IN A SUBMERGED CONDUCTOR GUIDE

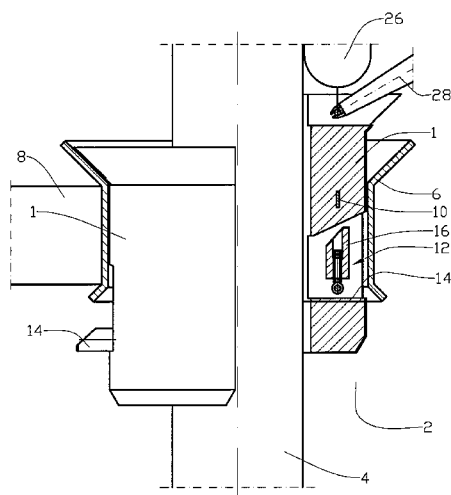


Fig. 1

(57) Abstract: A method and device for stabilizing a conductor (4) in a submerged conductor guide (6) on an offshore installation (8) where an annulus (2) is present between the conductor (4) and the conductor guide (6), wherein the method includes: - establishing any misalignment between the conductor (4) and the conductor guide (6); - producing a support body (1) that is adapted to said misalignment and where the support body (1) is designed to fill a sector of the annulus (2); and - moving the support body (1) axially into the annulus (2) between the conductor (4) and the conductor guide (6).

CONDUCTOR STABILIZATION SYSTEM

A METHOD AND DEVICE FOR STABILIZING A CONDUCTOR IN A SUB-MERGED CONDUCTOR GUIDE

There is provided a method for stabilizing a conductor in a
5 submerged conductor guide. More precisely there is provided a
method for stabilizing a conductor in a submerged conductor
guide on an offshore installation where an annulus is present
between the conductor and the conductor guide. The invention
also includes a device for stabilizing a conductor in a sub-
10 merged conductor guide.

In offshore installations, in particular installations used
for petroleum exploitation, it is common to stabilize conduc-
tors by passing them through one or more conductor guides. A
conductor guide typically has the form of a pipe-formed ring
15 that is welded to the installation structure.

The inner diameter of the conductor guide is normally sub-
stantially larger than the outer diameter of the conductor.
An annulus is thus formed between the conductor guide and the
conductor.

20 Traditionally a steel frame is placed in the annulus for sta-
bilizing the conductor in the conductor guide. The steel
frame may be designed to take up any misalignment between the
conductor and conductor guide.

Experience shows that such steel frame systems are sensitive to wave-induced forces and that such forces may induce fracturing, fatigue or stability problems to the conductor guide.

The purpose of the invention is to overcome or reduce at least one of the draw-backs of prior art, or at least provide a useful alternative to prior art.

The purpose is achieved according to the invention by the features as disclosed in the description below and in the following patent claims.

- 10 There is provided a method for stabilizing a conductor in a submerged conductor guide on an offshore installation where an annulus is present between the conductor and the conductor guide, wherein the method includes:
- establishing any misalignment between the conductor and conductor guide;
 - 15 - producing a support body that is adapted to said misalignment where the support body is designed to fill a sector of the annulus; and
 - moving the support body axially into the annulus between the conductor and the conductor guide.
- 20

The support body may typically be produced as a casting in an elastic material. A polymer material sold under the trademark "Elastogran" by BSAF has proved suitable. By producing the support bodies in a suitable form for filling a sector of the annulus, the support body may relatively easily be positioned at the conductor guide and then moved into the annulus.

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The method may further include positioning of the support body at the conductor guide and moving the support body into the annulus by use of a remote operated vehicle (ROV).

By utilizing an ROV for moving and inserting the support body into the annulus, a diver less installation is achieved.

The method may further include locking the support body in the conductor guide. In this way the support body is prevented from moving out of the conductor guide.

The method may further include, while installing the support body, having a buoyancy aid connected to the support body.

The buoyancy aid may compensate for the weight of the support body and a locking mechanism during transport and installation of the support body in the water.

There is also provided a support body for positioning in an annulus between a conductor and a conductor guide in an offshore installation, wherein the support body is equipped with a lock that is movable between a passive position and an active position, and where the lock engages with the conductor guide.

The lock may include a hinged lock member. Under some circumstances a slidable lock member would be preferable. It could be advantageous to position the centre of gravity of the lock member in such a way that the lock member by gravity will move from its passive position and to its active, locking position.

The lock member may be connected to a frame that is embedded in the support body. The frame may be cast in an elastic material of the support body.

The hinged lock member may in its passive position be placed in an aperture of the support body.

Although the terms "conductor" and "conductor guide" are used throughout this document, these terms does not limit the

scope of the invention as a person skilled in the art will understand that the invention may apply to any kind of tubular or shaft.

The method and device according to the invention make it possible to install support bodies by use of ROV's, thus avoiding the use of divers with the involved hazards and cost. Further, the properties of the design and materials used render the system tolerable to wave-induced forces.

Below, an example of a preferred method and device is explained under reference to the enclosed drawings, where:

Fig. 1 shows vertical section of a conductor guide and a support body according to the invention;

Fig. 2 shows a perspective view of a support body of fig. 1 where some of the support body material is removed;
and

Fig. 3 shows to a larger scale a lock in fig. 1.

On the drawings the reference number 1 denotes a support body suitable for positioning in an annulus 2 between a conductor 4 and a conductor guide 6. In this embodiment the support body 1 is designed to fill a little less than 180 degrees of the annulus sector. The sector filled by one support body may in some cases be different from this. More than two support bodies 1 may be needed in order to fill the annulus 2. The conductor guide 6 is welded to an offshore installation 8.

In this preferred embodiment the support body 1 is cast in an elastic material and adapted to any misalignment of the conductor 4 in the conductor guide 6.

As shown in fig. 2, a frame 10 is cast into the support body 1. The frame 10 is designed to give good attachment to the

support body 1. The purpose of the frame 10 is to carry a lock 12 that is positioned in an aperture 14 of the support body 1.

The lock 12 includes a lock member 16 that by use of two
5 hinge bolts 18 is hinged to the frame 10, see fig. 3.

Each hinge bolt 18 is passed through a sleeve 20 that is casted in the lock member 16. The hinge bolts 18 are fixed to the lock members 16 by nuts 22.

As shown in fig. 1 right side of the drawing, the lock 12 is
10 in its passive position, while on the left side of the drawing the lock 12 is in an active position engaged with the conductor guide 6. In fig. 2 the lock 12 is shown in a position between the two positions shown in fig. 1.

When a conductor 4 is to be stabilized in a conductor guide
15 6, any misalignment is determined and a support body 1 produced with a frame 10 and lock 12 incorporated. The dimensions of the support body 1 are adapted to any misalignment.

A buoyancy aid 26 of predetermined size is attached to the support body 1 and the support body 1 and the buoyancy aid 26
20 connected to an ROV 28. The ROV 28 is transporting the support body 1 to the conductor guide 6 in question. The support body 1 is moved into the annulus 2 between the conductor 4 and the conductor guide 6.

When the support body 1 is in position the lock 12 is moved
25 from its passive position to its active position, thus preventing the support body 1 from moving out of the annulus 2.

The buoyancy aid 26 and the ROV 28 are disconnected from the support body 1.

The procedure is repeated with at least one other support

body 1 in order to substantially fill the annulus 2 with support bodies 1.

C l a i m s

1. A method for stabilizing a conductor (4) in a submerged conductor guide (6) on an offshore installation (8) where an annulus (2) is present between the conductor (4) and the conductor guide (6), c h a r a c t e r i z e d i n
5 that the method includes:
 - establishing any misalignment between the conductor (4) and the conductor guide (6);
 - producing a support body (1) that is adapted to said
10 misalignment and where the support body (1) is designed to fill a sector of the annulus (2); and
 - moving the support body (1) axially into the annulus (2) between the conductor (4) and the conductor guide (6).
- 15 2. A method according to claim 1, c h a r a c t e r i z e d i n that the method further includes positioning the support body (1) at the conductor guide (6) and moving the support body (1) into the annulus (2) by use of an ROV (28).
- 20 3. A method according to claim 1, c h a r a c t e r i z e d i n that the method further includes locking the support body (1) in the conductor guide (6).
4. A method according to claim 1, c h a r a c t e r i z e d i n that the method further includes, while installing
25 the support body (1), having a buoyancy aid (26) connected to the support body (1).
5. A support body (1) for positioning in an annulus (2) between a conductor (4) and a conductor guide (6) in an offshore installation (8), c h a r a c t e r i z e d
30 i n that the support body (1) is equipped with a lock (12) that is movable between a passive position and an

active position where the lock (12) engages with the conductor guide (6).

6. A support body according to claim 5, characterized in that the lock (12) includes a hinged lock member (16).
7. A device according to claim 5, characterized in that the lock member (16) is connected to a frame (10) that is at least partly embedded in the support body (1).
8. A device according to claim 7, characterized in that the frame (10) is cast in an elastic material of the support body (1).
9. A device according to claim 1, characterized in that the hinged lock member (16) in its passive position is placed in an aperture (14) of the support body (1).

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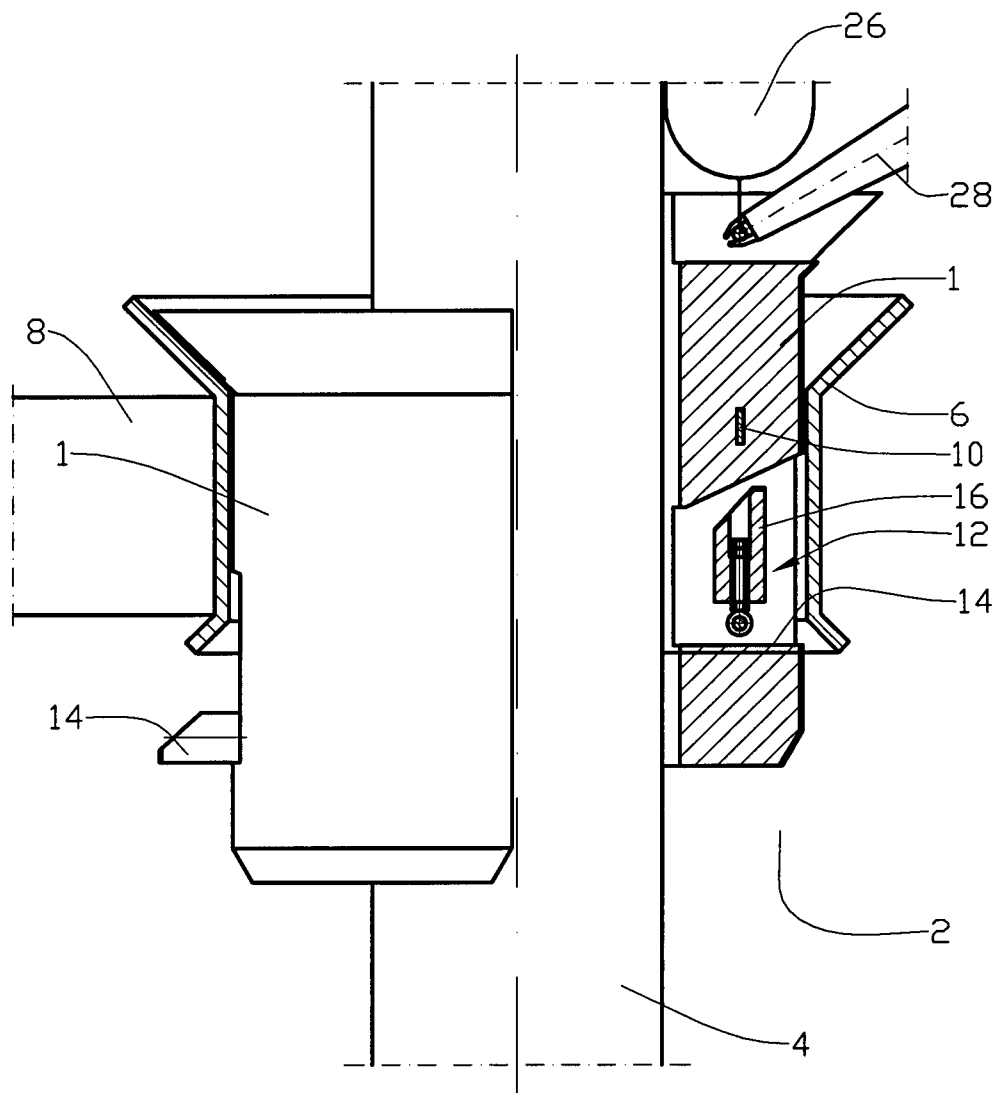


Fig. 1

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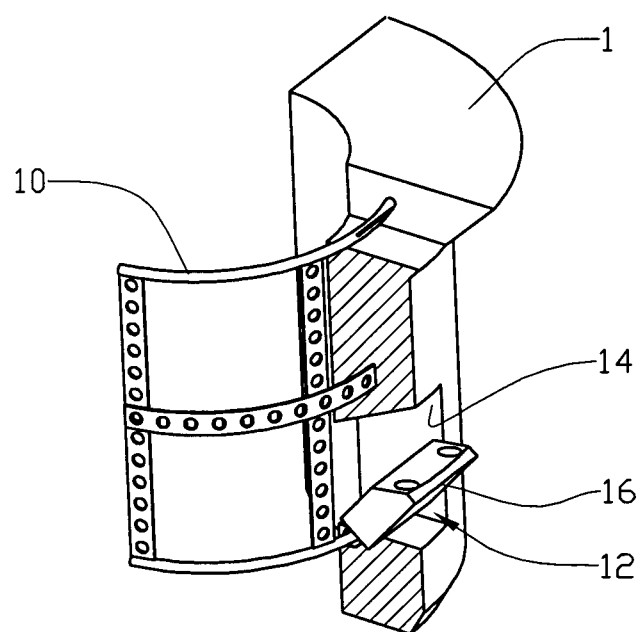


Fig. 2

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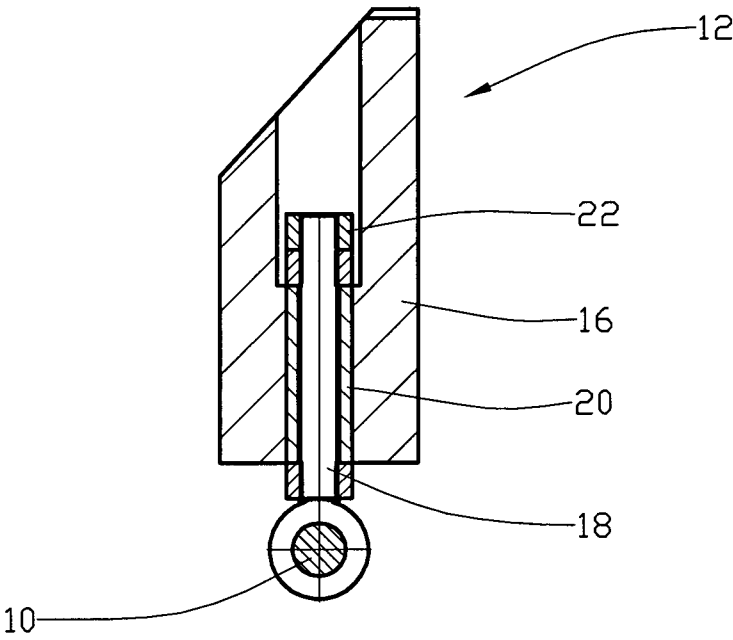


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NO2011/000220

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

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

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

SE, DK, FI, NO classes as above

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

EPO-Internal, PAJ, WPI data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2004038166 A1 (FMC TECHNOLOGIES), 6 May 2004 (2004-05-06); whole document --	1-4
A	US 20040079271 A1 (CHARNOCK ROBERT ALAN ET AL), 29 April 2004 (2004-04-29); whole document --	1-4
A	US 20090056930 A1 (ANGELLE JEREMY R ET AL), 5 March 2009 (2009-03-05); whole document --	1-4
A	US 1591376 A1 (HANSEN CHARLES C), 6 July 1926 (1926-07-06); claims --	1-4



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

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“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

“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

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“&” document member of the same patent family

Date of the actual completion of the international search

16-01-2012

Date of mailing of the international search report

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Name and mailing address of the ISA/SE

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/NO2011/000220

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 20040251055 A1 (SHAHIN DAVID ET AL), 16 December 2004 (2004-12-16); whole document -- -----	1-4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NO2011/000220

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1: Claims 1-4 directed to a method for stabilizing a conductor in a submerged conductor guide on an offshore installation.

2: Claims 5-9 directed to a support body for positioning in an annulus between a conductor and a conductor guide in an offshore installation, the support body being equipped with a lock engaging the conductor guide.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: **1-4**

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

Continuation of: second sheet

International Patent Classification (IPC)

E21B 19/24 (2006.01)

E21B 17/10 (2006.01)

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Paper copies can be ordered at a cost of 50 SEK per copy from PRV InterPat (telephone number 08-782 28 85).

Cited literature, if any, will be enclosed in paper form.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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			CA	2699175 A1	12/03/2009
			EP	2189619 A1	26/05/2010
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			US	8002027 B2	23/08/2011
			US	7992634 B2	09/08/2011
US	1591376 A1	06/07/1926	NONE		
US	20040251055 A1	16/12/2004	US	6994176 B2	07/02/2006