



PATENTS ACT 1977

APPLICANT	NeoDrill AS
ISSUE	Whether patent application GB 1706604.4 complies with section 1(1)(b) and whether patent application GB 2014821.9 complies with section 1(1)(a)
HEARING OFFICER	Dr Carol L Davies

DECISION

Introduction

- 1 This decision will consider whether patent application GB 1706604.4 complies with section 1(1)(b) and whether patent application GB 2014821.9 complies with section 1(1)(a) with regard to the same piece of prior art WO 2011/018120 A1 (WASA TVERLID).
- 2 Patent application GB 1706604.4 entitled "Arrangement for supporting a wellhead" was filed on 25 November 2015, with an earliest declared priority date of 27 November 2014. It was published as GB 2549003 A on 4 October 2017.
- 3 Patent application GB 2014821.9 is a divisional application of GB 1706604.4 and is entitled "Arrangement for supporting a wellhead" was filed on 26 April 2017, with an earliest declared priority date of 27 November 2014. It was published as GB 2585602 A on 13 January 2021.
- 4 Following a number of rounds of correspondence between the examiner and the applicant's attorneys, the examiner remains of the view that the claimed invention in both applications is not allowable under section 1(1).
- 5 With the position unresolved the applicant asked to be heard and the matter came before me at a hearing on 21 July 2021. The issues of novelty and inventive step before me were set out in the examiner's pre-hearing reports of 23 June 2021. The applicant was represented at the hearing by attorneys Gro Katarina Andorsen and Krister Mangersnes of Håmsø Patentbyrå AS. I thank the attorney for filing skeleton arguments (dated 12th July 2021) prior to the hearing. I was assisted by Mr Marc Collins.
- 6 The attorneys have filed two sets of auxiliary claims for each application along with their skeleton arguments. It is requested that I consider the respective auxiliary claim sets should I find the current set of claims on either or both applications unallowable.

The applications

- 7 The applications share very similar specifications though each have claims of slightly different scope. They are both directed to a device for reducing the load on a subsea wellhead casing from a bending moment generated by a horizontal load component from a well element arranged over the wellhead.
- 8 The problem addressed by the invention is how to prevent fatigue failure in the wellhead casing. In known wellheads, wellhead elements, in particular a blowout preventer (BOP), are typically installed at the top of a wellhead casing. This can lead to the wellhead casing being subjected to lateral forces so that the wellhead casing can become fatigued and fail.
- 9 The prior art has sought to overcome this problem through preventing the loads from reaching the wellhead. However, the present invention has taken a different approach. The present invention allows the loads to reach the wellhead but then the bending moment is prevented from adversely affecting the wellhead casing by provision of a rigid frame which absorbs a portion of the bending moment.
- 10 Reference is first made to figure 1 of the applications below. A subsea well 1 extends downwards in an underground 4 under a water mass 5. A wellhead 11 is arranged immediately above a seabed 41, an upper portion 12a of a wellhead casing 12 projecting up from the seabed and forming the wellhead 11 in which one or more wellhead elements 2 are arranged. From the wellhead element 2, at least a marine riser 3 extends up through the water mass 5 to a surface installation (not shown). The riser 3 is shown as being deflected in order to indicate a situation in which the wellhead 11 is subjected to a horizontal load component 14, which subjects the wellhead casing 12 to a bending moment M_w . The deflection of the riser 3 may be due to currents in the water mass 5 or the position of the surface installation. Currents in the water mass 5 may also subject the wellhead element 2 to a horizontal load component L_n , and skewed distribution of the mass of the wellhead element 2 will also subject the wellhead 11 to a horizontal load component L_n .
- 11 The wellhead casing 12 is shown here as a casing 122 extending up through a so-called conductor casing 121 which bounds the well 1 in a manner known per se towards the unconsolidated masses in the upper part of the base 4.
- 12 Connected to the upper portion 12a of the wellhead casing 12, there is a supporting frame 6 which projects radially outwards from the wellhead casing 12 and is provided with several abutments 61 resting in a supporting manner on a base 13 shown schematically here as an element which is partially embedded in the seabed 41. The base 13 may be any wellhead foundation, for example a suction foundation or a well frame which provides a sufficiently large degree of stability and ability to absorb a load L_v , which is transmitted through the supporting frame 6.
- 13 The wellhead casing 12 and the supporting frame 6 are connected to each other in a way that makes it possible for the supporting frame 6 to absorb a bending moment as a reaction to the horizontal load component L_n from the wellhead element 2 subjecting the wellhead casing 12 to said bending moment M_w . A coupling 62 may be arranged in such a way that the wellhead casing 12 is allowed a certain deflection before hitting the supporting frame 6 and the further load being substantially

absorbed by the supporting frame 6. The design of the coupling 62 and the dimensioning of the supporting frame 6 can thereby be used to control how great a load the wellhead casing 12 may be subjected to. Calculations carried out by the applicant and other instances have shown that the supporting frame 6 may absorb 75 to 95 % of the strain caused by said horizontal load component L_h .

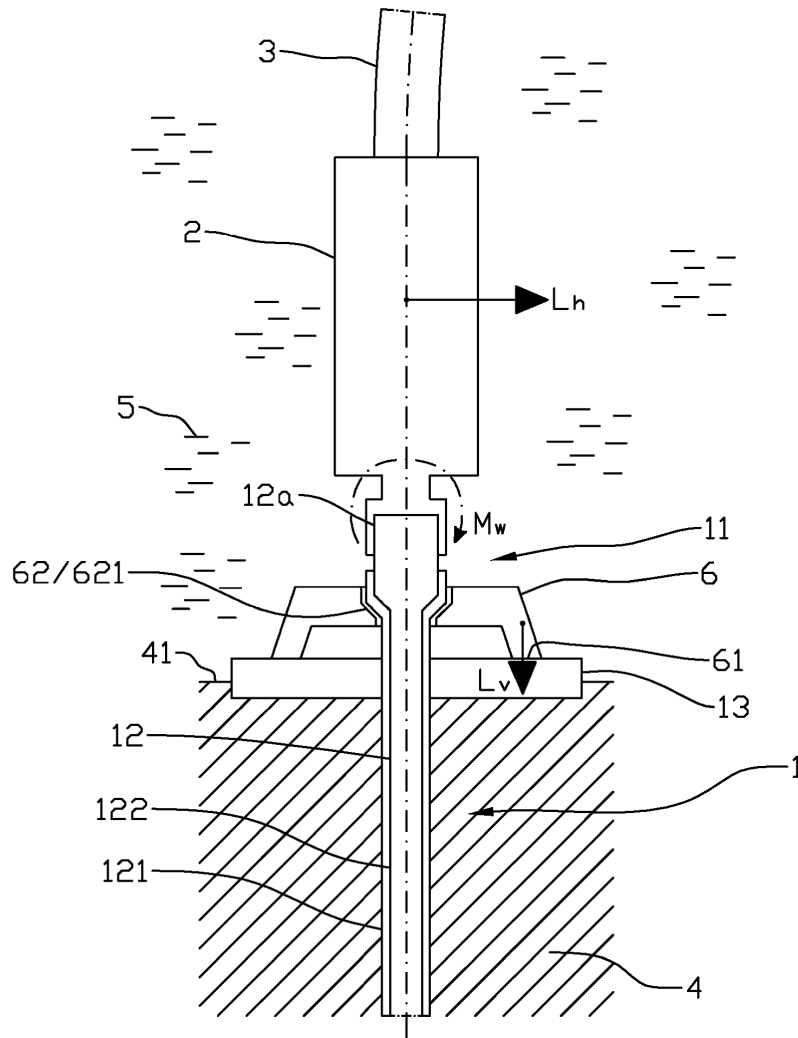


Fig. 1

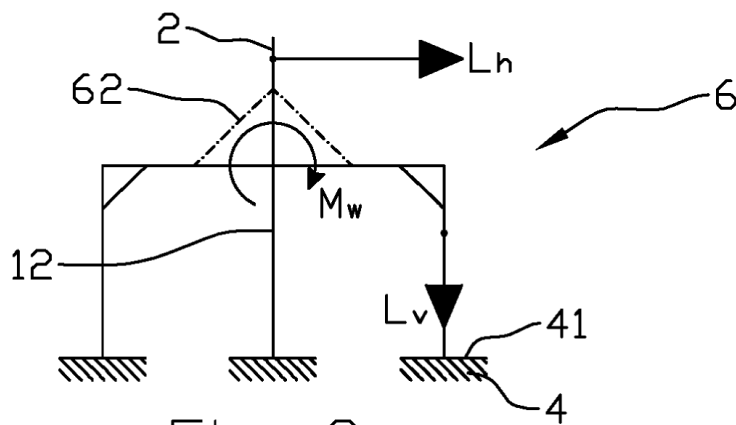


Fig. 2

14 Figure 2 shows the statics of the supporting frame 6 in principle. When the supporting frame 6 is mounted on the wellhead 11 and the wellhead 11 is subjected to a bending moment M_w generated by a horizontal load component L_n from above-lying elements 2, 3, the supporting frame 6 is subjected to a vertical load L_v which is transmitted to the seabed 41 at a distance from the centre axis of the wellhead casing 12 through the abutment of the supporting frame 6 against the base. Depending on the amount of play the coupling 62 between the supporting frame 6 and the wellhead casing 12 allows and how great a bending stiffness the wellhead casing 12 and the supporting frame 6 exhibit, the portion of the applied bending moment M_w absorbed by the supporting frame will vary.

15 For GB 2014821.9, the latest set of claims filed with attorney's letter dated 3 May 2021 has nine claims including independent claim 1. Independent claim 1 is set out below:

*1. A device for reducing the load on a subsea wellhead casing from a bending moment generated by a horizontal load component from a well element arranged over a wellhead, wherein the device comprises:
a supporting frame connected to an upper portion of the wellhead casing and projecting outwards from the centre axis of the wellhead casing; and
a base,
wherein the supporting frame is provided with abutments rigidly connected to the base at a radial distance from the wellhead casing, the supporting frame being arranged to absorb a portion of said bending moment.*

16 For GB 1706604.4, the latest set of claims filed with attorney's letter dated 12 April 2021 has nine claims including independent claim 1. Independent claim 1 is set out below:

*1. A device for reducing the load on a subsea wellhead casing (12) from a bending moment (M_w) generated by a horizontal load component (L_n) from a wellhead element (2, 3) arranged over a wellhead (11), characterized in that the device comprises:
a supporting frame (6) for connection to an upper portion (12a) of the wellhead casing (12) and projecting outwards from the centre axis of the wellhead casing (12); and
a base (13, 41) in the form of a suction foundation, the wellhead casing (12) extending through the suction foundation;
wherein the supporting frame (6) is provided with abutments (61) which are connected to the base (13, 41) and at a radial distance from the wellhead casing (12), the supporting frame (6) being arranged to absorb a portion of said bending moment (M_w).*

The Issues to be decided

17 The examiner has explained in his pre-hearing report that the novelty and inventiveness of the two applications are closely linked and relate to the same prior art i.e. WO 2011/018120 A1 (WASA TVERLID). The examiner has accepted that should I find the claims of GB 2014821.9 to be novel over WASA TVERLID, then the claims of GB 1706604.4 will be inventive over WASA TVERLID. The attorney agrees with the examiner on this point.

- 18 Having considered the arguments, I am also in agreement. I will therefore start by considering the novelty of claim 1 of GB 2014821.9 and then subsequently move onto the inventiveness of claim 1 of GB 1706604.4.
- 19 If I find the claim sets of either application to not be allowable, I will then consider the auxiliary claim sets filed by the attorney as requested.

The law

- 20 The examiner has raised objections under sections 1(1)(a) and 1(1)(b) of the Patents Act 1977 that the invention in GB 2014821.9 is not novel and in GB 1706604.4 does not involve an inventive step. The relevant provisions of the Act are shown below:

Section 1(1)

A patent may be granted only for an invention in respect of which the following conditions are satisfied, that is to say –

(a) the invention is new;

(b) it involves an inventive step;

(c) it is capable of industrial application;

(d) the grant of a patent for it is not excluded by subsections (2) and (3) or section 4A below;

and references in this Act to a patentable invention shall be construed accordingly.

Section 2(1)

An invention shall be taken to be new if it does not form part of the state of the art.

and

Section 3

An invention shall be taken to involve an inventive step if it is not obvious to a person skilled in the art, having regard to any matter which forms part of the state of the art by virtue only of section 2(2) above (and disregarding section 2(3) above).

- 21 The examiner and the applicant agree that the structured approach first set out in *Windsurfing*¹ and reformulated as the Windsurfing/Pozzoli test in *Pozzoli*² should be

¹ *Windsurfing International Inc. v Tabur Marine (Great Britain) Ltd*, [1985] RPC 59

² *Pozzoli SPA v BDMO SA* [2007] EWCA Civ 588

followed in assessing inventive step. The Windsurfing/Pozzoli approach reads as follows:

(1)(a) Identify the notional "person skilled in the art"

(1)(b) Identify the relevant common general knowledge of that person;

(2) Identify the inventive concept of the claim in question or if that cannot readily be done, construe it;

(3) Identify what, if any, differences exist between the matter cited as forming part of the "state of the art" and the inventive concept of the claim or the claim as construed;

(4) Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?

22 In terms of construing the claims, section 125(1) applies:

For the purposes of this Act an invention for a patent for which an application has been made or for which a patent has been granted shall, unless the context otherwise requires, be taken to be that specified in a claim of the specification of the application or patent, as the case may be, as interpreted by the description and any drawings contained in that specification, and the extent of the protection conferred by a patent or application for a patent shall be determined accordingly.

23 I must interpret the claims in the light of the description and drawings. It is well established that this is done through the eyes of the person skilled in the art, thus determining what the skilled person would understand the patentee to be using the language of the claim to mean.

Argument and analysis

Novelty of GB 2014821.9

24 The examiner maintains that independent claim 1 is not novel. His position is set out most recently in his pre-hearing report. Detailed arguments against the examiner's position are contained in the applicant's skeleton arguments, through their attorney. These arguments were elaborated clearly and helpfully at the hearing by Ms Andorsen and Mr Mangersnes. Taking all these arguments into account, I must determine whether the claimed invention is novel under sections 1(1)(a) and 2.

25 I will now consider the construction of independent claim 1, The examiner has argued that Claim 1 defines a device for reducing the load on a subsea wellhead casing that comprises a supporting frame and a base with particular functional limitations. Therefore, the subsea wellhead structure disclosed in the prior art need only disclose the structural features defined within the claim (i.e. a supporting frame having abutments, and a base) and be capable of performing the functional limitations defined by the claim without modification in order to be an anticipation,

even if those functional limitations were not the intent of the subsea wellhead structure of the prior art. I agree with the examiner on this point.

- 26 The examiner has also explained that the feature in claim 1 of “supporting frame connected to an upper portion of the wellhead casing and projecting outwards from the centre axis of the wellhead casing” is a functional limitation rather than a structural feature per se since the device defined by claim 1 does not comprise a wellhead casing. Again, I agree.
- 27 A main point of disagreement between the applicant and the examiner lies in whether WASA TVERLID discloses a supporting frame as required by claim 1. Therefore, I will consider what constitutes “a supporting frame” in the context of claim 1. To my mind, the skilled person would understand what is meant by “a supporting frame” when considering it in light of the description and drawings. The supporting frame must be suitable for connection to an upper portion of the wellhead casing and project outwards from the centre axis of the wellhead casing. The supporting frame is also provided with abutments which connect it to a base at a radial distance from the wellhead casing. Finally, the supporting frame must be capable of absorbing a portion of a bending moment generated by a horizontal load component from a well element arranged over the wellhead.
- 28 Ms Andorsen explained that the supporting frame is a rigid structure and a one piece structure and referred to figure 2 of the application (as shown above) which shows the supporting frame as a rigid one piece structure without any hinges or movable parts. I am not persuaded that the skilled person would construe the supporting frame with these limitations not contained in independent claim 1. The key feature of the supporting frame would appear to lie in whether it is capable of absorbing a portion of a bending moment generated by a horizontal load component from a well element arranged over the wellhead.

WO 2011/018120 A1 (WASA TVERLID STEINAR)

- 29 I will now consider the disclosure of WASA TVERLID in order to decide whether it discloses all of the features of independent claim 1. Figure 1 below shows a subsea well head structure 1 of an oil and/or natural gas well. The well head structure 1 is installed on a seabed 3. The well head structure 1 comprises a foundation ring 5 which is fixed to the soil of the seabed 3 through a plurality of anchor plates 7 or piles or the like distributed around the foundation ring 5 and extending downwardly into the soil of the seabed 3 or fixed to a larger subsea structure, e.g. a template structure indicated at T. The foundation ring 5 encloses an upper portion of a tubular casing 9 which is cemented at 11 into a wellbore 13 drilled into the seabed 3. An upper end of the casing 9 is engaged and coupled to the foundation ring 5 through a hanger structure 15. The hanger structure 15 comprises a plurality of supporting arms 17 which transmit load and tension forces between the foundation ring 5 and the casing 9 through a first load supporting path.
- 30 The well head structure 1 comprises other well head equipment, in particular a blow-out preventer which schematically is shown at 19. The blow-out preventer 19 is supported on the foundation ring 5 through a tubular or ring-like supporting structure 21, which encloses the hanger structure 15 and supports the load of the blow-out preventer 19 on the foundation ring 5 through a second load supporting path which is

independent but in parallel to the first load supporting path. Loads introduced from the blow-out preventer 19 and/or tensions and loads introduced for example from a raiser tube coupled to the blow-out preventer 19 or other equipment mounted to the blow-out preventer 19 therefore are transferred to the foundation ring 5 and thus the seabed 3 directly and without significantly influencing the hanger structure 15 and the casing 9 or other tubular components of the well head.

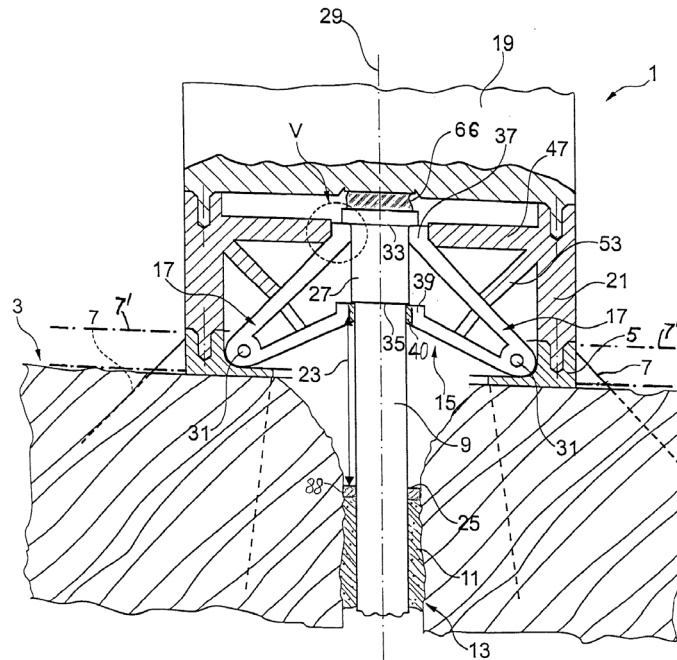


Fig. 1

- 31 The supporting arms 17 radially extend upwardly towards a center 29 of the foundation ring 5 and are pivotably mounted for an up and down movement each at a pivot axis 31.

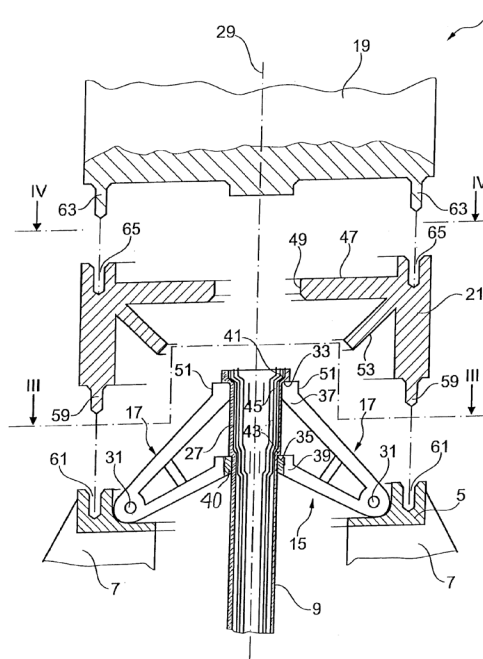


Fig. 2

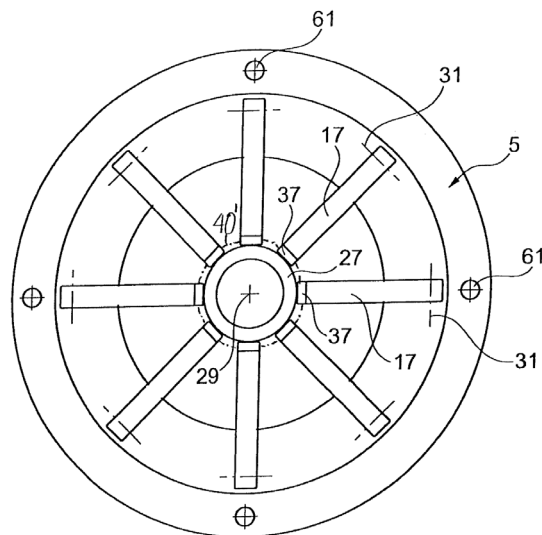


Fig. 3

- 32 The examiner considers WASA TVERLID to disclose a device comprising a supporting frame 17 and a base 5, wherein the supporting frame 17 projects outwards from a centre of the supporting frame and is provided with abutments 31 connected to the base 5 at a radial distance from the centre of supporting frame. Therefore, WASA TVERLID STEINAR discloses all the structural features of claim 1. The examiner further argues that the device is capable of performing the functional limitations defined by the claim without modification and as a result anticipates independent claim 1.
- 33 Ms Andorsen disagrees and argues that WASA TVERLID fails to disclose a number of features contained in claim 1. The first being that claim 1 requires the supporting frame is provided with abutments **rigidly** connected to the base. Ms Andorsen highlights that the supporting arms 17 are pivotally mounted to the foundation ring 5 at pivot axis 31. I agree with Ms Andorsen. There is no disclosure in WASA TVERLID of the supporting arms 17 being rigidly mounted to the foundation ring 5.
- 34 Whilst this single missing feature is sufficient to make claim 1 novel over WASA TVERLID, I will consider the arguments put forward relating to other missing features as they have bearing on the inventiveness of claim 1 of GB 1706604.4 as it does not include the feature of rigid connection between the supporting frame and base.
- 35 Ms Andorsen also disagrees that the supporting arms 17 constitute a supporting frame in the context of claim 1. Ms Andorsen does not consider multiple supporting arms 17 which are independently movable with respect to each other to be a supporting frame. She also argues that the supporting arms 17, which form part of hanger structure 15, are not capable of absorbing a portion of a bending moment generated by a horizontal load component from a well element arranged over the wellhead.
- 36 Mr Mangersnes discussed the capability of the supporting arms 17 to absorb a portion of a bending moment generated by a horizontal load component from a well element arranged over the wellhead in some detail at the hearing. He explained that a purpose of WASA TVERLID is to bypass the hanger structure 15 by transferring the load of the BOP 19 directly to the foundation ring 5. Mr Mangersnes considers it

clear that the purpose of the hanger structure is not to absorb any moment caused by the BOP, but rather the supporting structure 21 is provided to support the BOP directly. Upon mounting the BOP on the foundation ring 5 through the supporting structure 21 an independent load path is created. The supporting structure 21 is clearly adapted to be directly connected to a well element above the wellhead and direct any load outside of the hanger structure to the foundation ring 5.

- 37 Mr Mangersnes explained the hanger structure is used to hang off a casing 9 to position it during the construction of the well. During the initial phase of construction, the supporting arms fall under gravity to support the casing. The arms are supported at this stage by shoulders 33, 35 on the casing. During a subsequent phase of construction when the BOP is added, a supporting structure 21 is required to prevent the supporting arms 17 from flexing outwards as the arms are not suitable for taking any forces or loads from the BOP.
- 38 Ms Andorsen further explained that the teaching of WASA TVERLID teaches the hanger structure, which is well known in the art, is unsuitable for taking the load from the BOP which is why the supporting structure 21 is necessary.
- 39 Having considered the arguments put forward by the attorneys, I find myself persuaded that the supporting arms 17 do not constitute a supporting frame in the context of claim 1. I agree that the supporting arms 17 are not capable of absorbing a portion of a bending moment generated by a horizontal load component from a well element arranged over the wellhead as required by claim 1.

Inventive step of GB 1706604.4

- 40 Claim 1 differs from claim 1 of GB 2014821.9 by the underlined as follows:

*1. A device for reducing the load on a subsea wellhead casing (12) from a bending moment (M_w) generated by a horizontal load component (L_n) from a wellhead element (2, 3) arranged over a wellhead (11), characterized in that the device comprises:
a supporting frame (6) for connection to an upper portion (12a) of the wellhead casing (12) and projecting outwards from the centre axis of the wellhead casing (12); and
a base (13, 41) in the form of a suction foundation, the wellhead casing (12) extending through the suction foundation;
wherein the supporting frame (6) is provided with abutments (61) which are connected to the base (13, 41) and at a radial distance from the wellhead casing (12), the supporting frame (6) being arranged to absorb a portion of said bending moment (M_w).*

- 41 Further, as mentioned above, claim 1 does not include the feature of the supporting frame being provided with abutments **rigidly** connected to the base.

Step 1(a) and 1(b): Identify the notional “person skilled in the art” and their relevant common general knowledge

- 42 The first step is to identify the notional skilled person and their common general knowledge. I consider the skilled person to be a designer and engineer of subsea

wellheads in the gas and oil industry. They are well-versed in the design, construction and operation considerations for subsea wellheads. The common general knowledge of the skilled person would include known wellhead designs and configurations along with known systems for reducing the load on a subsea wellhead casing from a bending moment generated by a horizontal load component from a well element arranged over a wellhead as set out in the application.

Step 2: Identify the inventive concept of the claim in question or if that cannot readily be done, construe it

- 43 The inventive concept lies in a device for reducing the load on a subsea wellhead casing from a bending moment generated by a horizontal load component from a wellhead element arranged over a wellhead through a supporting frame being arranged to absorb a portion of said bending moment.

Step 3: Identify what, if any, differences exist between the matter cited as forming part of the “state of the art” and the inventive concept of the claim or the claim as construed

- 44 There would appear to be two main differences between the inventive concept and the disclosure of WASA TVERLID:

- A supporting frame capable of absorbing a portion of a bending moment
- A base in the form of a suction foundation through which the wellhead casing extends

- 45 As discussed above with regard to claim 1 of GB 2014821.9 I do not consider WASA TVERLID to disclose a supporting frame capable of absorbing a portion of a bending moment generated by a horizontal load component from a well element arranged over the wellhead as required by claim 1.

- 46 Further, I agree with the argument put forward by Mr Mangersnes that WASA TVERLID does not disclose a base in the form of a suction foundation through which the wellhead casing extends. WASA TVERLID does discuss that the anchors 7 could be “suction anchors”. The anchors 7 fix the foundation ring 5 to the soil of the seabed. However, the foundation ring 5 is the base in the context of claim 1.

Step 4: Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?

- 47 I agree with the arguments of the attorneys that to modify WASA TVERLID to include either a supporting frame capable of absorbing a portion of a bending moment generated by a horizontal load component from a well element arranged over the wellhead or a base in the form of a suction foundation through which the wellhead casing extends, let alone both features, would require a complete redesign of the device.

- 48 Furthermore, I agree with Ms Andorsen that WASA TVERLID teaches away from the solution of the invention in that it does not allow the bending moment to reach the

wellhead casing but rather redirects any load from the well elements from the wellhead casing through supporting structure 21.

- 49 I therefore do not consider it obvious for the skilled person to modify the disclosure of WASA TVERLID to include all of the features of claim 1.

Conclusion

- 50 I find that the claimed invention in GB 2014821.9 to be novel under section 1(1)(a) and the claimed invention in GB 1706604.4 to involve an inventive step under section 1(1)(b). I therefore remit the application to the examiner for further processing.

C.L. Davies

Deputy Director, acting for the Comptroller