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**Datasheet for the decision
of 16 February 2007**

Case Number: T 0089/06 - 3.2.01

Application Number: 96908555.4

Publication Number: 0808270

IPC: B63B 21/04

Language of the proceedings: EN

Title of invention:
Offshore turret system

Patentee:
SBM-IMODCO, Inc.

Opponents:
Bluewater Energy Services B.V.
Mercon Steel Structures B.V.

Headword:
-

Relevant legal provisions:
EPC Art. 56, 83, 123(2)

Keyword:
"Inventive step - yes"
"Disclosure - sufficiency (yes)"
"Amendments - deletion of feature"

Decisions cited:
T 0005/99, T 0632/01, T 0409/91

Catchword:
-



Case Number: T 0089/06 - 3.2.01

D E C I S I O N
of the Technical Board of Appeal 3.2.01
of 16 February 2007

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(Opponent II)

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Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted
25 October 2005 concerning maintenance of the
European patent No. 0808270 in amended form.

Composition of the Board:

Chairman: S. Crane
Members: J. Osborne
G. Weiss

Summary of Facts and Submissions

- I. The appeals by the patent proprietor and by opponent II are directed against the interlocutory decision posted 25 October 2005 according to which, account being taken of the amendments made by the patent proprietor during the opposition procedure, European patent No. 0 808 270 and the invention to which it relates were found to satisfy the requirements of the EPC.
- II. The following state of the art played a role during the appeal procedure:
- D1: WO-A-93/07048
- D7: EP-B-0 259 072.
- III. During oral proceedings held 16 February 2007 the patent proprietor requested that the decision under appeal be set aside and the patent be maintained as granted (main request) or in the alternative on the basis of claim 1 filed with a letter of 2 March 2006 and claims 2 to 11 as granted (first auxiliary request), respectively claims 1 to 10 filed with the letter of 2 March 2006 (second and third auxiliary requests) or the claims held allowable by the opposition division (fourth auxiliary request; request B-11 filed with a letter of 6 September 2005). The opponents requested that the decision under appeal be set aside and the patent revoked.
- IV. The claims as granted (main request) contain two independent claims which read as follows:

"1. A hydrocarbon production system (10) which includes a vessel (12) for floating in a sea, a turret (24) having lower and upper portions lying respectively above and below the sea surface, a bearing structure (60) which supports said turret on said vessel in relative rotation about a substantially vertical axis (22), a fluid swivel (104) coupled to said vessel, and a plurality of tubes (72) extending primarily vertically between said turret lower and upper portions for surrounding upper portions of each of a plurality of risers (40 and 40A-40L) extending up from the sea floor, and a plurality of pipes (100) for coupling upper ends of at least some of said risers to said fluid swivel, characterized by:

said bearing structure has a predetermined bearing inside diameter A ;

a group of said tubes (72) each extends at an incline (F) of a plurality of degrees from said axis so higher locations along said tubes lie closer to said axis, and with said group of tubes having lower ends lying under water on an imaginary lower circle (122) which is of a diameter (C) that is greater than said bearing inside diameter (A), and with said group of tubes having upper ends (80) lying above the sea surface and lying on an imaginary upper circle which is of a diameter (D) that is smaller than said imaginary lower circle diameter C ."

"10. A method for establishing an offshore hydrocarbon production system (10) which includes at least six flexible risers (40, 40A-40C) extending up from the sea floor to a turret (24) that is rotatable about a substantially vertical axis on a weathervaning vessel (12), which includes mounting at least two groups of

primarily vertical tubes (72) in said turret (24) with each group including at least three tubes, pulling said risers upwardly through said tubes and mounting the upper end of each of said risers at substantially the level of the upper end of a corresponding tube, and connecting the upper end of each riser that lies in one of said groups to a pipe that is coupled to said vessel to carry fluid from the riser to said vessel;

characterized by:

said step of mounting includes mounting the upper ends of tubes (72) of a first group so they lie above the level of the upper ends of tubes of the second group."

Claim 1 according to the first auxiliary request essentially differs from that as granted in that it specifies that the diameter of the imaginary lower circle is 'at least 10%' greater than the bearing inside diameter.

Claim 1 according to the second auxiliary request differs from that according to the first auxiliary request in that it contains the additional feature that the upper ends of the group of tubes are 'at least about as high as said bearing'.

Claim 1 according to the third auxiliary request differs from that according to the second auxiliary request in that the tubes are defined as being 'substantially straight' and the wording 'smaller than said imaginary lower circle diameter C' at the end of the claim is replaced by the wording 'such that the substantially straight tubes (62,70,72) are progressively closer to the axis at progressively

higher tube locations so the tubes can pass through the opening at the inside of the bearing structure.'

Claim 1 according to the fourth auxiliary request, as held allowable by the opposition division, reads as follows:

"A hydrocarbon production system (10) which includes a vessel (12) for floating in a sea, a turret (24) having lower and upper portions lying respectively below and above the sea surface, a bearing structure (60) which supports said turret on said vessel in relative rotation about a substantially vertical axis (22), a fluid swivel (104) coupled to said vessel, and a plurality of tubes (72) extending primarily vertically between said turret lower and upper portions for surrounding upper portions of each of a plurality of risers (40 and 40A-40L) extending up from the sea floor, and a plurality of pipes (100) for coupling upper ends of at least some of said risers to said fluid swivel, characterised by:

said bearing structure has a predetermined bearing inside diameter A;

a group of said tubes (72) each extends at an incline (F) of a plurality of degrees from said axis so higher locations along said tubes lie closer to said axis, and with said group of tubes having lower ends lying under water on an imaginary lower circle (122) which is of a diameter (C) that is at least 10% greater than said bearing inside diameter (A), and with said group of tubes having upper ends (80) lying above the sea surface and at least about as high as said bearing and lying on an imaginary upper circle which is of a

diameter (D) that is no greater than said bearing inside diameter."

Claim 1 according to the fourth auxiliary request is followed by claims 2 to 7 which specify features additional to those of claim 1, claim 8 which is identical to claim 10 as granted (and according to the main request) and claim 9 which specifies steps additional to those of claim 8. The subject-matter of claims 2 to 7 and 9 corresponds to that of respective claims 4 to 7 and 11 as granted.

V. The opponents argued essentially as follows:

The deletion of the following features in claim 1 according to the main request in comparison with claim 1 as originally filed results in objection under Article 100(c) EPC:

- that the imaginary lower circle is of a diameter which is 'at least 10%' greater than the bearing inside diameter;
- that the upper ends of the tubes are 'at least about as high as the bearing';
- that the diameter of the imaginary upper circle is 'smaller than the bearing inside diameter'.

Corresponding objections arise in part as regards the respective claim 1 according to the first and second auxiliary requests.

In claim 1 according to the third auxiliary request a lack of clarity results from the feature that the tubes are "substantially straight" when considered in the context of the description paragraph [0018] and from

the specification that the upper ends of the tubes are "about" as high as the bearing. The latter objection applies equally in respect of the fourth auxiliary request.

The patent fails to disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art, resulting in objection under Article 100(b) EPC. The patent sets out two aspects of the problem of accommodating a larger number of tubes within a given size of bearing, these being the mutual spacing of the respective upper and lower ends. Solutions to both of these problems are contained in the single embodiment but each of the independent claims contains a solution to only a respective one of the problems. If as a result of an increase in the number of tubes it were to become necessary to provide a solution to one of the problems the result would remain unworkable without a solution also to the other problem. Indeed, the patent proprietor has stated that the embodiment is "the invention". Whilst it is not disputed that the skilled person is able to build the subject-matter as claimed, the requirement of sufficiency of disclosure is satisfied only if the problem is solved over the entire claimed range. This view is supported by decisions T 409/91, T 5/99 and T 632/01.

As regards inventive step of the subject-matter of claim 1 according to the fourth auxiliary request the closest state of the art may be seen as that known from D1 which already discloses inclined risers. The subject-matter of claim 1 differs therefrom in that the imaginary lower circle is of a diameter that is at

least 10% greater than the bearing inside diameter. D1 is silent as regards details of the turret but if the skilled person were to reduce the size of the bearing it would fall within his technical competence to choose an appropriate value, thereby arriving at the claimed relationship without inventive activity. Alternatively, D7 discloses in the embodiment of figure 9 a turret through which a plurality of parallel risers pass. The skilled person faced with the problem of increasing the number of risers and finding that this would result in too little space at the lower ends would employ the inclined arrangement according to D1 to provide that additional space.

No objection was raised to inventive step of the subject-matter of claim 8 according to the fourth auxiliary request.

VI. The patent proprietor's rebuttal of the opponents' objections may be summarized as follows:

The invention resides in the various concepts of modifying the arrangement of the inclined tubes to provide sufficient space around both the upper and lower ends, thereby permitting the passage of a larger number of tubes through a bearing of a given diameter. The essential aspect as regards the lower ends is that they extend outside of the bearing inner diameter. The 10% figure contained in claim 1 as originally filed is without technical significance and the original description indicates this by using terms such as "larger" and "much larger". The requirement that the upper ends of the tubes be "at least about as high as the bearing" is still contained in claim 1 according to

all requests by virtue of the specification that the tubes extend between the lower and upper portions of the turret. Moreover, the advantage of the greater spacing around the lower ends of the tubes is obtainable independently of the relative heights of the upper ends and of the bearing. Similarly, the inventive spacing of the lower ends of the tubes does not require that the upper ends lie on a circle of any particular size in comparison to the diameter of the bearing. In the original application page 7, lines 13, 14 it was explicitly stated that the upper ends of the lowest tubes could lie on a larger circle. The specification in claim 1 according to the third and fourth auxiliary requests that the imaginary circle on which the upper ends lie be "about" as high as the bearing is sufficiently clear in context for the skilled person to determine the technical significance.

As regards sufficiency of disclosure the opponents acknowledge that the claimed subject-matter can be put into effect. The EPC requires nothing more in respect of sufficiency of disclosure. There are two mutually independent aspects to the invention and the presentation of both within one embodiment is merely for reasons of convenience. Nevertheless, once the conventional limitation on the size of the imaginary lower circle is removed, each tube may be moved away from the axis whilst maintaining its inclination, thereby providing a greater spacing also between the upper ends of the tubes.

The patent proprietor agrees with the opponents as regards the difference between the subject-matter of claim 1 according to the fourth auxiliary request and

the disclosure of D1. The problem solved is to enable more tubes to be accommodated without increasing bearing size which is limited in the case of precision bearings. D1 discloses a turret using bogey wheel bearings for which there are fewer size constraints and so already contains a suggestion to solve the problem of accommodating additional tubes in a different way. The opponents' suggestion that reduction of the bearing size in D1 would result in the subject-matter of claim 1 is unrealistic; if it were desired to accommodate additional tubes it would not be obvious to reduce the size of the bearing. The state of the art contains no suggestion that changing the inclination of the tubes so that the lower ends lie on a circle of a diameter which is greater than the bearing inner diameter would permit the accommodation of more tubes by virtue of the increased spacing between the lower ends. The turret according to D7 is very long in relation to its diameter and a modification to incorporate inclined tubes would result in a large increase in its diameter.

Reasons for the Decision

1. The patent relates to equipment to enable a vessel to act effectively as an offshore oil or gas production platform. Production risers extend from wells on the sea bed and are connected to tubes which pass upwards through a turret mounted on the vessel. In order to permit the vessel to turn to face into the wind direction (cf. "weathervaning" in the claims) whilst the risers remain stationary the turret is rotatably mounted on the vessel by means of a bearing. Larger

numbers of risers potentially require larger diameter turrets to accommodate the corresponding tubes, which would result in larger bearings and less storage space on the vessel. The present patent aims to permit a larger number of tubes to be accommodated without increasing the size of the bearing. The independent claims relate to two aspects which permit improved access to the respective ends of the tubes by providing more space. Claim 1 concerns the size of the lower imaginary circle on which the lower ends of the tubes lie and claim 10 (as granted) concerns vertical spacing of the upper ends of the tubes. The single disclosed embodiment includes both aspects.

Formal admissibility of the requests

Main request

2. Claim 1 according to this request, claim 1 as granted, differs essentially from the claim on which it is based, claim 1 as originally filed, by *inter alia* deletion of the requirement that the upper ends of the tubes are "at least about as high as said bearing".

2.1 As set out in the original application, the problem relates to accommodating additional tubes within the turret without increasing the size of the bearing and therefore the space through which the tubes can pass. Claim 1 as originally filed contained features concerning the first aspect of the solution to this problem, cf. 1 above, and specified that the upper ends of the tubes were at least about as high as the bearing. This was clearly a limitation wholly consistent with the disclosed problem since the size of the bearing

would only restrict the space available to accommodate tubes which reach to a height at which the size of the bearing limits the space available.

2.2 The patent proprietor argues that in the single embodiment the lower ends of one group of tubes 62 are on an imaginary circle larger than the inner diameter of the bearing although their upper ends do not reach as high as the bearing and that this provides a basis for deleting the feature from the claim. This line of argument overlooks the fact that, as explained in more detail in point 7.1 below, the original application is directed to two related but nevertheless distinct ideas, concerned with working space requirements around the lower ends and the upper ends of the tubes respectively. It is only the second of these ideas which specifically requires the division of the tubes into groups the upper ends of which terminate at different heights (see original independent claims 5, 8 and 10). The first idea on the other hand can be implemented with a single group of tubes and where that is the case it is apparent that the location of the upper ends of the tubes must then be such that their radial positioning is restrained by the size of the bearing. Otherwise the requirement of present claim 1 that the diameter of the imaginary circle on which the lower ends of the tube are located is larger than the inner diameter of the bearing becomes devoid of any genuine technical significance.

2.3 The patent proprietor further argues that the deleted feature is implicitly contained in present claim 1 in as far as it specifies that the tubes extend between the turret upper and lower portions lying respectively

above and below the sea surface. The board cannot agree because there is no clear definition of the upper and lower portions of the turret relative to the height of the bearing.

- 2.4 The absence from claim 1 according to the present request of the feature that the upper ends of the tubes are "at least about as high as said bearing" therefore extends the subject-matter of the patent beyond the content of the application as originally filed (Article 100(c) EPC) and the request fails.

First auxiliary request

3. In claim 1 also according to this request the feature that the upper ends of the tubes are "at least about as high as said bearing" is absent. This request therefore fails for the same reasons as the main request.

Second auxiliary request

4. Claim 1 according to this request has been amended to include the feature whose absence led to the failure of the main and first auxiliary requests, cf. 2 above. However, it differs from claim 1 as originally filed in as far as the feature that the diameter of the imaginary upper circle is no greater than the bearing inside diameter has been replaced by the feature that the diameter of the imaginary upper circle is smaller than the imaginary lower circle diameter.

- 4.1 Present claim 1 specifies that the group of tubes each inclines at a plurality of degrees so higher locations along the tubes lie closer to the central axis of the

turret. It automatically follows from this that the diameter of the upper imaginary circle must be smaller than that of the lower imaginary circle. The introduced feature therefore is tautologous but does not in itself lead to objection under Article 100(c) EPC. However, as a result of the deletion of the feature that the diameter of the upper imaginary circle is no greater than the bearing inside diameter, the possibility is introduced that the tubes do not pass through the bearing. Such a possibility is contrary to the concept according to the invention of accommodating more tubes without increasing the diameter of the bearing, cf. 1 above.

- 4.2 It follows from the foregoing that the opposition ground according to Article 100(c) EPC is valid in respect of claim 1 according to this request which therefore fails.

Third auxiliary request

5. Claim 1 according to this request specifies that the tubes are "substantially straight". The term 'substantially' is commonly used in patents in order to denote that the property to which this refers is to be considered as present but subject to normal deviations. Indeed, it is used in this way in present claim 1 which specifies that the turret is supported for rotation about an axis which is "substantially vertical". However, the term has no universally accepted meaning and its influence on the clarity of a claim must be considered on the facts of the particular case. The present description paragraph [0018] states in respect of the single embodiment that the tubes are "preferably

substantially straight in that the top and bottom of each tube preferably extend within 15° of each other and more preferably within 10° of each other". It is thus evident that the term "substantially straight" is defined in the description of the patent specification in a manner which is not consistent with the way it would normally be understood in the context of a claim. Indeed, the term "substantially" has two different meanings within the one claim. This leads to an unacceptable lack of clarity in the definition of the matter for which protection is sought. Furthermore is to be noted that the claim also specifies that the tubes are inclined to the axis at "a plurality of degrees" which in the embodiment is 7° , 9° or 11° depending on the group. However, if each "substantially straight" tube may exhibit a 15° angular misalignment a nominal inclination of from 7° to 11° would result in a tube which in fact at least partly upwardly deviates away from the central axis, in contradiction to the requirement in the claim that the inward inclination results in higher locations along the tubes lying closer to the axis. It follows that the introduction into the claim of the term "substantially straight" renders the claim unclear (Article 84 EPC), for which reason the request fails.

Fourth auxiliary request

6. All of the objections which led to the failures of the earlier requests are overcome by the amendments made in claim 1 according to this request. Nevertheless, one objection by the opponents remains, that the term "about" which has been introduced into claim 1 results in a lack of clarity (Article 84 EPC).

6.1 As set out above, the problem addressed by the patent is to permit an increase in the number of tubes which can be accommodated in a turret without increasing the size of the bearing. Accordingly, present claim 1 specifies that the tubes have upper ends lying at least about as high as the bearing. It is clear to the skilled person that the solution taught by the patent is applicable to tubes which extend not just to the height of the immediate proximity of the bearing but also ones which have their upper ends at a somewhat lower height at which the size of the bearing still acts as a significant restriction. It is this which is reflected in the word "about" which therefore does not cause any lack of clarity.

6.2 In the light of the foregoing the board finds that claim 1 according to the fourth auxiliary request is formally admissible. No formal objections were raised by the opponents against present claim 8 or any of the dependent claims. The claims according to this request therefore form the basis of the further considerations set out below.

Sufficiency of disclosure - Article 100(b) EPC

7. The patent contains two independent claims, an apparatus claim 1 which relates generally to the arrangement of the lower ends of the tubes relative to the turret and claim 8 (according to the fourth auxiliary request which forms the basis of the present consideration, see 6.2 above), a method claim which relates generally to the arrangement of the upper ends of the tubes relative to the turret. A single

embodiment is described which contains both of the arrangements. The opponents do not dispute that the disclosure of the patent is sufficient for the skilled person to put into effect the subject-matter of each of the independent claims either individually or in combination. However, they argue with reference to decisions T 5/99, T 632/01 (both not published in OJ EPO) and T 409/91 (OJ EPO 1994, 653) that the requirement of sufficiency of disclosure is satisfied only if the problem is solved over the entire claimed range. In particular, they argue that if the system according to claim 1 were put into effect there would remain a problem with accommodating the upper ends of the tubes. Similarly, they argue that if the method according to claim 8 were put into effect there would remain a problem with accommodating the lower ends of the tubes.

- 7.1 The core of the opponents' argument is that there is a single problem which is solved by the present patent and that this requires the presence of the features of both claims 1 and 8. However, this argument implies that in order to accommodate any larger number of tubes within a bearing of a particular size it would be necessary to provide the claimed features at both the upper and lower ends. There is no evidence that this would be the case. An increase in the number of tubes would result in a reduction of the free space around both the upper and lower ends of the tubes and incorporation of the features according to claims 1 and 8 would provide more space at both ends. However, it is entirely plausible that when the number of tubes accommodated in a turret having a bearing of a certain size is increased the features of claim 1 may be

employed to provide more space around the lower ends of the tubes whilst the space available around the upper ends would be reduced but nevertheless remain within acceptable limits. A corresponding argument is applicable in respect of the features of claim 8. It would rest with the skilled person to decide whether the restricted access resulting from an increase in the number of tubes would justify employing the claimed solutions at the upper end, the lower end or both.

7.2 The decisions T 5/99 and T 632/01 (both *supra*) cited by the opponents deal with the requirements of sufficiency of disclosure in accordance with the EPC. However, in both decisions it was found that the respective disclosures were deficient to the extent that the meaning of essential terms in the claims was not able to be determined. This is not so in the present case and the opponents have not suggested otherwise. Those decisions therefore are not relevant to the present case. In decision T 409/91 (*supra*) it was found that the skilled person would not be able to put into effect the subject-matter over the whole range as claimed because it was known from neither the disclosure nor the relevant common general knowledge how to produce a particular property falling within the scope of the claims, cf. reason 2. Contrary to the present opponents' assertions also this decision is not relevant to the present case because, as the opponents admit, the skilled person is able to put into effect the subject-matter as claimed.

7.3 On the basis of the foregoing the board finds that the objection under Article 100(b) EPC is not valid.

Inventive step - Article 56 EPC

8. The opponents made no attack during appeal on inventive step of the subject-matter of the independent method claim (claim 8 according to the fourth auxiliary request) and the board agrees with the findings of the opposition division in this respect. It is therefore necessary to consider inventive step only in respect of claim 1.

9. The board and the parties are in agreement that the closest state of the art is known from D1 and that this discloses all features of claim 1 except that the tubes have lower ends lying on an imaginary lower circle which is of a diameter that is at least 10% greater than the bearing inside diameter.

- 9.1 The disclosure of D1 relates generally to the provision of tubes on the turret and through which the risers pass. The tubes are inclined at an angle which is essentially the same as the natural angle of the riser. The turret is mounted on a bearing of a type which all parties agree to be one which presents no significant obstacles to being manufactured to any chosen large diameter and, as shown in D1, the inner diameter of the bearing is indeed greater than the diameter of the imaginary circle defined by the lower ends of the tubes. Nevertheless, the skilled person would be unwilling to enlarge the bearing when attempting to accommodate additional tubes because the additional space requirement would reduce the vessel's payload. The cited documents are silent as regards the problem of providing sufficient space around the lower ends of the

tubes when an increased number of them is to be used without increasing the size of the bearing.

9.2 The opponents argue that the claimed feature that the diameter of the imaginary lower circle is at least 10% greater than the inner diameter of the bearing would be the obvious result of simply reducing the size of the bearing. However, this view is based on *ex post* considerations since it bears no relation to the problem to be solved which is not to reduce the size of the bearing but to increase the number of tubes without increasing the size of the bearing. Even if the skilled person were to attempt to reduce the diameter of the bearing in the system according to D1 which proposes that the inclination of the tubes be according to the natural angle of the risers and therefore essentially fixed, the imaginary lower diameter would be reduced similarly and the result would not be the subject-matter of present claim 1.

10. Another approach by the opponents is to consider D7 as disclosing the closest state of the art and to argue that its combination with the disclosure of D1 renders the subject-matter of claim 1 obvious. D7 in its embodiment of figure 9 discloses a system generally according to claim 1 but wherein the tubes are located parallel to the central axis of a cylindrical turret. The opponents argue that the skilled person faced with the problem of increasing the number of risers which may be used with the D7 system and finding that this would result in too little space at the lower ends would employ the inclined arrangement according to D1 to provide that additional spacing. However, D1 is totally silent about any benefits of extra space at the

lower ends of the tubes so the skilled person would receive no encouragement to combine the teachings for that reason. It is feasible that the skilled person might combine the teachings of D7 and D1 in order to provide inclined tubes in the system of D7. However, in so doing he would still have no incentive to extend the imaginary lower circle beyond the confines of the turret which in both D1 and D7 are defined by the respective inner diameters of the bearings.

11. On the basis of the above considerations the board concludes that the subject-matter of claim 1 involves an inventive step. Since the subject-matter of claims 2 to 7 contains all features of claim 1 the same conclusion applies also to those claims.

Order

For these reasons it is decided that:

The appeals are dismissed.

The Registrar:

The Chairman:

A. Vottner

S. Crane