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**Datasheet for the decision
of 8 June 2016**

Case Number: T 0211/14 - 3.3.05

Application Number: 03719750.6

Publication Number: 1499563

IPC: C02F1/20, B01D19/00

Language of the proceedings: EN

Title of invention:

APPARATUS AND METHOD OF BALLAST WATER TREATMENT

Patent Proprietor:

McNulty, Peter, Drummond

Opponent:

OceanSaver AS

Headword:

Ballast water treatment/McNULLTY

Relevant legal provisions:

EPC Art. 56

Keyword:

Inventive step - main request (no) - obvious solution - first
auxiliary request (yes) - non-obvious improvement

Decisions cited:

Catchword:



Beschwerdekammern
Boards of Appeal
Chambres de recours

European Patent Office
D-80298 MUNICH
GERMANY
Tel. +49 (0) 89 2399-0
Fax +49 (0) 89 2399-4465

Case Number: T 0211/14 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 8 June 2016

Appellant: OceanSaver AS
(Opponent) PO Box 2087
NO-3003 Drammen (NO)

Representative: Taylor, Adam David
Dehns
St Bride's House
10 Salisbury Square
London EC4Y 8JD (GB)

Respondent: McNulty, Peter, Drummond
(Patent Proprietor) 900 South Serrano Avenue, Apt. 701
Los Angeles, CA 90006 (US)

Representative: Boulton Wade Tennant
Verulam Gardens
70 Gray's Inn Road
London WC1X 8BT (GB)

Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted on 8 November 2013 rejecting the opposition filed against European patent No. 1499563 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman A. Haderlein
Members: J.-M. Schwaller
O. Loizou

Summary of Facts and Submissions

I. The present appeal lies from the decision of the opposition division to reject the opposition against European patent No. 1 499 563, independent claims 1 and 10 of which, after correction of a printing error (see communication of the EPO dated 14 January 2014) read as follows:

*"1. A system (10) for the treatment of a vessel's ballast water, the system comprising:
a ballast water pump (14);
a venturi injector means (16,46) having an inlet port (48) adapted to receive water, an injector port (50) adapted to receive stripping gas and an outlet port (54) adapted to expel said water;
an oxygen stripping gas source (18); and a receptacle (24) which is a ballast water tank having a top portion, the system further comprising a pressure relief valve (34) positioned on the top portion of the ballast water tank (24),
wherein, in use, water passes through said injector means (16,46) thereby contacting said stripping gas received through said injector port (50), and said water is expelled from said outlet port (54) to said receptacle."*

*"10. A method for the treatment of a vessel's ballast water using the system of any one of claims 1 to 9, the method comprising the following steps:
supplying to said inlet port (48) said water to be treated;
supplying oxygen stripping gas to said injector port (50), thereby providing said water with a myriad of microfine bubbles wherein oxygen in said water diffuses*

from an aqueous phase to a gaseous phase within said micro-fine bubbles; expelling said water and said micro-fine bubbles from said outlet port (54) to a receptacle (24), wherein said micro-fine bubbles are released from said water, thereby diffusing said oxygen from said water."

II. According to the contested decision, the above claimed subject-matter involved an inventive step over the cited documents, in particular over the combined teachings of

D12: M. TAMBURRI et al.: *"Ballast water deoxygenation can prevent aquatic introductions while reducing ship corrosion"*, Biological Conservation, 103, 2002, pages 331-341, and

D2: US 4 931 225.

According to the opposition division, D12 represented the closest state of the art, as it disclosed the claimed subject-matter except the venturi injector means.

The injector means according to D2 was not the same type of venturi injector as the one according to claim 1 at issue, as it disclosed a pipe with either an upstream gas injection or a pipe with gas injection into the stream entering the venturi, such that the suction effect defined by the functional feature of claim 1 at stake could not occur. It followed that any combination with D12, should the skilled person contemplate it, would not result in the same ballast water treatment installation as defined by above claim 1.

III. The following further documents from the proceedings before the opposition division are of importance for the present decision:

D7: WO 01/36339 A1

D9: J. W. BOYLSTON: "*Ballast water management for the control of nonindigenous species*", SNAME TRANSACTIONS, 104, 1996, pages 391-417.

IV. With its grounds of appeal, the opponent ("the appellant") held claim 1 of the patent to lack inventive step in particular over D12 in combination with D2 or, alternatively, over D7 in combination with D2 or, alternatively, over D9.

The appellant further maintained its objections raised in the proceedings before the opposition division against the auxiliary requests, in particular as regards inventive step, the additional features being either disclosed or suggested in the cited prior art, thus rendering them obvious to the skilled person.

V. In its reply, the patentee ("the respondent") filed a set of observations challenging the arguments of the appellant. Further, it stated that its requests filed in the proceedings before the opposition division formed part of its appeal.

VI. The parties informed the board that they would not be attending the oral proceedings. The respondent further declared that it maintained its thirteen auxiliary requests filed before the opposition division with letter of 9 September 2013.

Independent claims 1 and 9 of the first auxiliary request read as follows (amendments with respect to the main request in bold):

"1. A system (10) for the treatment of a vessel's ballast water, the system comprising:
a ballast water pump (14);
a venturi injector means (16,46) having an inlet port (48) adapted to receive water, an injector port (50) adapted to receive stripping gas and an outlet port (54) adapted to expel said water;
an oxygen stripping gas source (18); and a receptacle (24) which is a ballast water tank having a top portion, the system further comprising a pressure relief valve (34) positioned on the top portion of the ballast water tank (24),
wherein, in use, water passes through said injector means (16,46) thereby contacting said stripping gas received through said injector port (50), and said water is expelled from said outlet port (54) to said receptacle, **and the system further comprising a first stripping gas delivery means, and a second stripping gas delivery means, wherein said first stripping gas delivery means connects said oxygen stripping gas source (18) to said ballast water tank (24) and said second stripping gas delivery means connects said ballast water tank (24) to said injector port (50) of said venturi injector (16,46).**"

"9. A method for the treatment of a vessel's ballast water using the system of any one of claims 1 to **8**, the method comprising the following steps:
supplying to said inlet port (48) said water to be treated;
supplying oxygen stripping gas to said injector port (50), thereby providing said water with a myriad of

*microfine bubbles wherein oxygen in said water diffuses from an aqueous phase to a gaseous phase within said micro-fine bubbles;
expelling said water and said micro-fine bubbles from said outlet port (54) to a receptacle (24), wherein said micro-fine bubbles are released from said water, thereby diffusing said oxygen from said water."*

Dependent claims 2 to 8 and and 10 to 12 represent specific embodiments of the above independent claims.

- VII. Oral proceedings took place on 8 June 2016 in the absence of the parties.
- VIII. According to the written submissions, the parties' requests are as follows:

The appellant requests that the decision under appeal be set aside and that the patent be revoked.

The respondent requests that the appeal be dismissed and the patent be maintained as granted (main request) or, in the alternative, be maintained in amended form on the basis of the set of claims of auxiliary requests 1 to 13, all requests filed on the 9 September 2013.

Reasons for the Decision

1. Main request - inventive step

Applying the problem-solution approach, the board came to the conclusion that the subject-matter of claim 1 of this request does not involve an inventive step for the following reasons:

- 1.1 The invention relates to a system for the treatment of a vessel's ballast water using an oxygen stripping gas.
- 1.2 As regards the state of the art closest to this invention, since the appellant brought up three different documents, namely D7, D9 and D12, the board has to identify which document is the most promising starting point for assessing the inventive step of the claimed subject-matter. In this respect, it is standard practice that the closest state of the art is normally a document disclosing subject-matter conceived for the same purpose or aiming at the same objective as the claimed invention and having the most relevant technical features in common with, i.e. requiring the minimum structural modifications.

On the basis of these prerequisites, D12 represents the closest state of the art as it discloses (see title and abstract) a system conceived for the same purpose as the claimed invention, namely the ballast water deoxygenation by nitrogen purging, and the same objective, namely preventing the development of aquatic microorganisms and reducing ship corrosion. In the system according to D12, nitrogen purging is carried out under constant pressure by bubbling nitrogen into the water present in a ballast tank having a pressure release valve on its roof portion (see D12, paragraphs 2.1 and 2.2 and Figure 1). The parties agree that D12 does not disclose venturi injector means and the corresponding functional features of claim 1. Moreover, the respondent was of the opinion that D12 does not disclose a ballast water pump. The board, however, is of the opinion that D12 implicitly discloses a ballast water pump because it states that by definition ballast water is "water which is pumped into dedicated ballast tanks" (see page 331, right column, last paragraph).

For the board, documents D7 and D9 are more remote from the claimed subject-matter than D12, as they do not address at all the problem of corrosion. Furthermore, while D9 (see page 404, left column, point (8) Deoxygenation) uses the same principle as the invention, namely purging oxygen with an inert gas, D7 uses another principle, namely the supersaturation of the water system with a gas which is preferably air (D7, page 8, lines 18 to 20), i.e. a gas which is to be avoided according to the claimed subject-matter.

- 1.3 As to the problem underlying the contested patent, this is described at paragraph [0001] of the patent as consisting in the provision of a system for reducing the population of aquatic organisms present in water while inhibiting corrosion of vessels' ballast tanks.
- 1.4 As a solution to this problem, the contested patent proposes the system according to claim 1 at issue, which is characterised by the presence of a venturi injector means having water inlet and outlet ports and a stripping gas injector port wherein, in use, water passes through said injector means thereby contacting said stripping gas received through said injector port, and said water is expelled from said outlet port.
- 1.5 The parties agreed that the problem as defined in the patent was already solved by the system according to D12, but this could be reformulated as the provision of a more efficient ballast water treatment system, as it was credible that the claimed venturi injector means was more efficient for stripping oxygen from water than the bubbling means known from D12.
- 1.6 For the question of obviousness, it has to be determined whether the solution proposed in claim 1 at

issue was obvious in the light of the state of the art, in particular in view of the teaching of document D2.

- 1.6.1 D2 discloses (column 4, lines 33 to 43) an apparatus for improving the dispersion of a gas into a liquid, in which the dispersed gas can be used to remove dissolved gases present in the liquid. One typical application of this apparatus is the stripping of dissolved oxygen from sea water using nitrogen as the stripping gas in order to minimise corrosion (D2, column 2, line 60 to column 3, line 17). The dispersion is obtained by injecting the gas at a linear velocity which is at least sonic and under co-current flow of the liquid (D2: column 4, lines 49 to 60). The preferred injection means comprises a configuration explicitly designated as "venturi configuration" comprising an incoming compression cone through which the gas-liquid mixture enters and an expansion cone through which the fluid exits (D2, column 8, lines 36 to 40).
- 1.6.2 The respondent argued that the venturi configuration of D2 was different from the one defined in claim 1 at issue, since the former required a positive pressure upstream the venturi tube/nozzle, while the claimed venturi injector means was an injector which passively pulled the gas in under negative pressure by a vacuum. It followed that by combining the teaching of document D2 with that of D1, the skilled person would not arrive at the subject-matter of claim 1 at issue.
- 1.6.3 The board cannot accept this argument because claim 1 is not restricted to the specific venturi injector means referred to by the respondent. It is true that Figure 5 of the patent

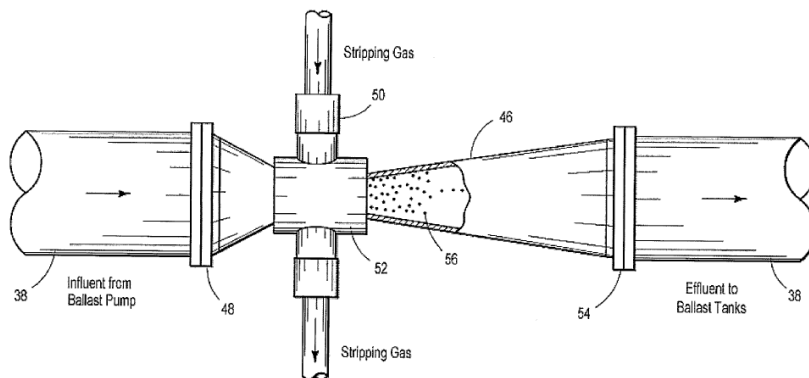


FIG. 5

and the corresponding part of the description (column 9, lines 26 to 38) describe a very specific type of injector in which the oxygen stripping gas is delivered through a port located in the constricting portion of the venturi means, thus allowing the stripping gas to be delivered under negative pressure, as alleged by the respondent. This very specific type of venturi injector is, however, not the broad one defined in claim 1, which is a "venturi injector means" and merely includes:

- an inlet port adapted to receive water,
- an injector port adapted to receive stripping gas and
- an outlet port adapted to expel said water.

Such a "venturi injector means" also covers means in which gas is injected into a liquid and which make use of a venturi configuration, i.e. the type of venturi injector means disclosed in D2, e.g. Figure 5.

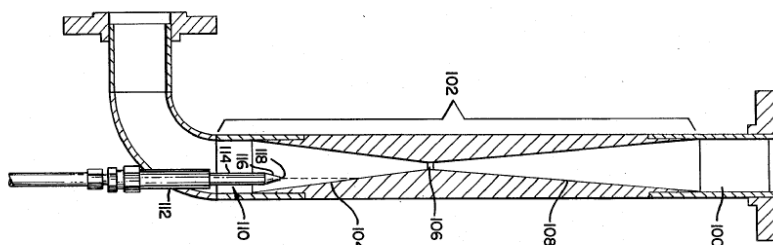


FIG. 5

- 1.6.4 The board also observes that the "venturi injector means" called for in claim 1 also covers configurations wherein the gas is provided under positive pressure. The functional feature of "thereby contacting said stripping gas received through said injector port" in claim 1 does not exclude the provision of the gas under positive pressure. This interpretation is also supported by the patent itself, which teaches that the gas can be delivered to the injector means by a booster blower, i.e. under positive pressure (see column 7, lines 37 to 40 and claim 5).
- 1.6.5 It follows from the above considerations that the skilled person faced with the problem underlying the invention, namely improving the ballast water treatment system known from D12, would be prompted by the teaching of D2 - which explicitly discloses an improvement over the known art as regards the efficiency in dispersion of the stripping gas (D2; column 4, lines 27 to 31) - to substitute the bubbling device of D12 with the venturi injector configuration of D2, thus arriving in an obvious manner at the subject-matter of claim 1 at issue.
- 1.6.6 For the sake of completeness, the board also observes that, as submitted by the appellant, it is common general knowledge that a venturi injector provides for a better dispersion of gas within a liquid than the mere bubbling of gas put into practice in the process of D12. Therefore for this reason, too, the subject-matter of claim 1 at issue would be obvious to the person skilled in the art.
- 1.7 It follows from the above that the main request cannot be allowed as it does not meet the requirements of Article 56 EPC.

2. Auxiliary request 1 - Admissibility - Amendments

2.1 This auxiliary request was filed during the proceedings before the opposition division. In its reply (see point 1.5), the respondent explicitly stated that its requests filed at the first instance formed part of the present appeal proceedings. The appellant did not contest the admissibility of this request and in its grounds of appeal (see page 7) even raised an objection of lack of inventive step in respect of this request. The board does not see any reason not to admit this request into the proceedings.

2.2 Claim 1 of this request differs from claim 1 of the main request in that the apparatus further comprises
- a first stripping gas delivery means connecting the oxygen stripping gas source (18) to the ballast water tank (24), and
- a second stripping gas delivery means connecting the ballast water tank (24) to the injector port (50) of the venturi injector (16,46).

The basis for this amendment can be found in claim 2 as originally filed, and so there is no reason not to allow this request under Article 123(2) EPC. The board notes that no ground of opposition was raised under Article 100(c) EPC in the first instance proceedings and that the remaining claims correspond to their granted counterparts. The amendments are therefore allowable.

3. Auxiliary request 1 - Inventive step

Applying the problem-solution approach, the board came to the conclusion that the claims of this request involve an inventive step for the following reasons:

- 3.1 For the invention, the closest prior art and the problem, see 1.1 to 1.3 *supra*.
- 3.2 As a solution to the problem underlying the invention, the contested patent proposes the system according to claim 1 at issue, which is in particular characterised by the presence of:
- (a) a venturi injector means having water inlet and outlet ports and a stripping gas injector port,
 - (b) a first stripping gas delivery means connecting the oxygen stripping gas source to the ballast water tank, and
 - (c) a second stripping gas delivery means connecting the ballast water tank to the injector port of the venturi injector.
- 3.3 The objective problem underlying the invention was, as indicated in point 1.5 above, to provide a ballast water treatment system which was more efficient than the one known from D12, in which nitrogen was merely bubbled into water already present in the ballast tank. For the board, it is credible that the proposed solution efficiently solves this problem.
- 3.4 On the question of the obviousness of the proposed solution, the board is of the following opinion:
- 3.4.1 While the inclusion of feature (a) in the system according to D12, as explained in points 1.6.1 to 1.6.6 above, was obvious from the teaching of document D2, it was not obvious to include features (b) and (c).
 - 3.4.2 As regards features (b) and (c), the appellant argued (point 6.1 of the statement of grounds for opposition) that the skilled person would be well aware of the use of nitrogen to prevent corrosion of ballast tanks, and

so he would use the nitrogen stored in the headspace of the ballast tank known from document D12.

- 3.4.3 For the board, this conclusion is based on an *ex post facto* reasoning, because in the process of D12 the gas stored in the headspace is not used for oxygen stripping but is vented into the atmosphere via the pressure release device. Furthermore, D12 does not disclose any means for connecting the oxygen-stripping gas source to the ballast water tank, nor any stripping gas delivery means connecting the ballast water tank to the injector port of the gas bubbler.
- 3.4.4 It follows that the subject-matter of claim 1 cannot be held as derivable in an obvious manner from the content of document D12, as alleged by the appellant.
- 3.4.5 The board observes that the other documents in the proceedings do not disclose or suggest features (b) and (c) either, and therefore do not lead in an obvious manner to the subject-matter of claim 1 at issue, which therefore involves an inventive step within the meaning of Article 56 EPC.
- 3.4.6 The same conclusion applies to claims 2 to 12, the subject-matter of which depends on claim 1.
4. Since the claims of the first auxiliary request meet the requirements of the EPC, there is no need to consider the lower-ranking requests.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance with the order to maintain the patent in amended form on the basis of the set of claims of the first auxiliary request as filed on 9 September 2013 and a description to be adapted thereto.

The Registrar:

The Chairman:



C. Vodz

A. Haderlein

Decision electronically authenticated