

**IN THE HEARINGS AND MEDIATION DEPARTMENT OF
THE INTELLECTUAL PROPERTY OFFICE OF SINGAPORE
REPUBLIC OF SINGAPORE**

Patent No. 161075
26 March 2018

IN THE MATTER OF A PATENT

**IN THE NAME OF
HITACHI, LTD.**

AND

**APPLICATION FOR REVOCATION THEREOF BY
(1) SINGAPORE SHIPPING ASSOCIATION
(2) ASSOCIATION OF SINGAPORE MARINE INDUSTRIES**

Hearing Officer: Ms See Tho Sok Yee
Principal Assistant Registrar of Patents

Representation:

Mr Alban Kang and Ms Oh Pin-Ping (Bird & Bird ATMD LLP) for the Applicants

GROUNDINGS OF DECISION

- 1 Singapore Patent Application No. 2010031078 entitled “Ballast water treatment system” was filed on 4 November 2008, in the name of Hitachi, Ltd. (“the Proprietor”), claiming a priority date of 8 November 2007 from Japanese application JP 2007-290955. It was granted as Singapore Patent No. 161075 (“the 075 patent”) on 7 July 2015. The invention under the 075 patent (“the invention”) relates to a ballast water management system (“BWMS”) for a ship. As of the date of this decision, the patent was in force.

- 2 The present application is one of three applications filed jointly by Singapore Shipping Association and Association of Singapore Marine Industries (“the Applicants”) for revocation of patents related to the Proprietor, pertaining to ballast water treatment. Proceedings for this and Singapore Patent No. 10201602094R entitled “Vessel” were uncontested by the Proprietor ([6] below), progressed concurrently, and were heard on the same day. Proceedings for Singapore Patent No. 159788 entitled “Vessel Structure” were, on the other hand, contested, and are pending an ancillary opposition to amendments proposed by the proprietors, Hitachi, Ltd. and Mitsubishi Heavy Industries, Ltd.

Applicable Law and Burden of Proof

- 3 The applicable law is the Patents Act (Cap 221, 2005 Rev Ed) (“the Act”) and the Patents Rules (Cap 221, 2007 Rev Ed) (“the Rules”). Unless otherwise specified, references to rules in these grounds of decision are references from the Rules. The burden of proof in the present case falls on the Applicants.

Procedural History

- 4 An application for revocation of the 075 patent was filed by the Applicants on 22 June 2017. The Applicants amended their statement of grounds (“the Grounds”) on 10 July 2017 and accordingly, the Proprietor’s deadline to file its counter-statement was adjusted to 10 October 2017.
- 5 A case management conference (“CMC”) was first held on 2 August 2017, with both parties in attendance, and various procedural matters were discussed. I also impressed upon parties that they could resolve their disputes through negotiation, mediation and/or expert determination, which may prove more time- and cost-effective.
- 6 On 9 October 2017, the Proprietor informed the Registrar in writing that it denied the Applicants’ assertions but that for business reasons, it would not be filing a counter-statement. In this regard, Rule 80(4) states the consequences of a counter-statement not being filed as follows:

If the proprietor of the patent fails to file the counter-statement in accordance with paragraph (3), he shall not be allowed to take part in the subsequent proceedings, and the application for revocation shall be considered by the Registrar as if each specific fact set out in the statement were conceded, except in so far as it is contradicted by other document in the possession of the Registrar.

- 7 I met the Applicants at a second CMC (the Proprietor being disallowed from participation by application of Rule 80(4)) on 20 October 2017 to discuss the conduct of the case. On 26 October 2017, the Applicants confirmed their intention to file expert evidence and requested an oral hearing. The Applicants went on to file a statutory declaration by its expert witness, Peter Sahlen, on 20 December 2017 (“1st SD”). Mr Sahlen’s qualifications to establish him as a viable expert witness are exhibited as Exhibit “PS-1”, and his expert report exhibited as Exhibit “PS-2”. Mr Sahlen also exhibited a claim chart comparing the claims of the 075 patent with the disclosures of the prior art; this is found at Exhibit “PS-3” in his 1st SD.

- 8 Written submissions were filed by the Applicants on 22 January 2018, but with no reference to the third ground originally pleaded under Section 80(1)(c) (insufficiency). In view of the detailed reasoning provided by Mr Sahlen in his evidence, I decided that the presence of Mr Sahlen would not be required at the hearing, if he could satisfactorily clarify some points arising from his evidence, and informed the Applicants of this, along with the points to clarify, in my letter of 29 January 2018. Furthermore, due to the lack of submissions in relation to the ground of insufficiency, I sought clarification upon which grounds revocation was being sought.
- 9 The Applicants responded with their letter of 31 January 2018, confirming that they no longer intended to rely on the ground of insufficiency. They further clarified some of the points raised, and followed with further evidence (“2nd SD”) from Mr Sahlen with their letter dated 12 February 2018. After a review of this further evidence, I wrote to the Applicants on 14 February 2018 with some questions in relation to their 2nd SD. From their response on 21 February 2018, it appeared that the questions I asked may not have been clearly understood, and therefore I wrote again to the Applicants on 23 February 2018, rephrasing the questions asked on 14 February 2018, as well as asking the Applicants for details of any proceedings in other jurisdictions in relation to family members of the 075 patent. The Applicants responded in writing on 16 March 2018, where they denied any knowledge of proceedings in other jurisdictions in relation to family members of the 075 patent, and filed further evidence (“3rd SD”) from Mr Sahlen. The case was heard before me on 26 March 2018.

Grounds of Revocation

- 10 The Applicants cite the following in the Grounds, in relation to the Act:
- (i) The invention is not a patentable invention as it lacks an inventive step (Section 80(1)(a));
 - (ii) The specification of the patent does not disclose the invention clearly and completely for it to be performed by a person skilled in the art (Section 80(1)(c));
 - (iii) The matter disclosed in the specification of the patent extends beyond that disclosed in the application as filed (Section 80(1)(d)); and
 - (iv) The patent is one of 2 or more patents for the same invention having the same priority date and filed by the same party or his successor in title (Section 80(1)(g)).
- 11 I will therefore make an assessment on the validity of the 075 patent taking into account the Applicants’ Grounds, and the documents provided in relation thereto. This includes the 1st SD, 2nd SD and 3rd SD sworn by the expert witness, Mr Peter Sahlen. I further note the Applicants’ reference, in oral submissions, to the last line of Rule 80(4), which provides the exception that the facts alleged by the Applicants are conceded except in so far as they are contradicted by other documents in the possession of the Registrar. At the hearing, the Applicants’ counsel pointed out that the Applicants have not seen any other such documents, and given that as a matter of natural justice these should be provided, it is assumed that there are no such additional documents.
- 12 I can confirm that there are no additional documents, and that my decision will be made based solely upon the Applicants’ submissions, expert evidence, and the prior art documents provided. However, I should still make an independent assessment of the relevance of all the documents and submissions provided by the Applicants in order to determine the validity of the 075 patent.

Context of the Invention

- 13 Ballast is used to control the stability of ships by controlling the depth of submergence of the vessel in the water. In earlier times, sailors used rocks and sandbags as ballast. These were loaded as cargo was discharged from their vessels and unloaded as cargo was loaded. By and large, the same principle is applied today, except that today's vessels use liquid ballast, such as sea water, instead.
- 14 Complications set in when water is used as ballast in vessels, because the quality of water differs at the place where it was taken onboard, and at the place of discharge during the voyage or at the arrival port. Aquatic organisms are transferred to new environments where their species is non-indigenous, leading to undesirable environmental and economic impact. To mitigate this, there is a need to treat the ballast water before discharge. Details on the background of a BWMS have been set out in Mr Sahlen's evidence, such as that described at [30]-[31] below.

The Invention

- 15 The invention generally relates to a BWMS for a ship. The system comprises a pump that takes in and discharges the ballast water, a treatment apparatus to remove substances from the ballast water, and a ballast tank. A monitoring apparatus monitors the concentration of aquatic organisms at an inlet part of the water treatment apparatus and at an outlet part of the water treatment apparatus. The control apparatus controls the opening of a valve situated between the pump and the water treatment apparatus tank, in order to adjust the treatment amount per unit time of the treatment apparatus, depending upon the results of the monitoring. It also controls the discharge of the ballast water if the concentration of aquatic organisms is at a permissible value, or controls the discharge of the ballast water after it has been re-treated (if it had not been at a permissible value before retreatment).
- 16 The description provides some background into the invention, and specifically highlights the problems faced in trying to maintain the quality of ballast water within the standards established by the International Maritime Organization (IMO). It provides some examples of solutions to this problem, such as injecting an excess of disinfectant or an excess of chemicals for forming magnetic flocs. However, these pose problems in either affecting the coating of the ballast tank and subsequently killing microorganisms in that area when the ballast water is discharged, or requiring a needless increase in the amount of magnetic flocs that need to be recovered.
- 17 At this point I should note that because the present invention is one of a number of family members relating to a water treatment system, the description and drawings provided include a number of embodiments that are not claimed in the present invention but instead are apparently claimed in related patents or patent applications. I will therefore refer only to those embodiments which, in my view, relate to the invention as defined in the claims of the present patent, and not the others, unless it is necessary to further understand the invention.
- 18 The invention aims to alleviate some of the identified problems with BWMS by controlling the operational conditions of the water treatment apparatus such that a constant water quality is obtained, even when there are significant variations in the water intake conditions. The water treatment is performed in accordance with the variation in the ballast water at the time of water intake by monitoring the ballast water at an inlet of the water treatment apparatus. Further

monitoring of the water quality of the ballast water at an outlet part of the water treatment apparatus allows the system to cope with a change in performance, such as degradation, of the water treatment apparatus. According to the description, because the quality of the ballast water is monitored and the operational conditions of the water treatment apparatus are controlled as a result, a desired water quality can be obtained for the ballast water, despite variations in the water intake conditions.

- 19 The drawings relating to the 075 patent provide a schematic view of the system of the invention. Figure 2 provides the simplest interpretation of the invention according to the claims, and is reproduced below, along with explanations of the reference numerals *most relevant for this invention*:

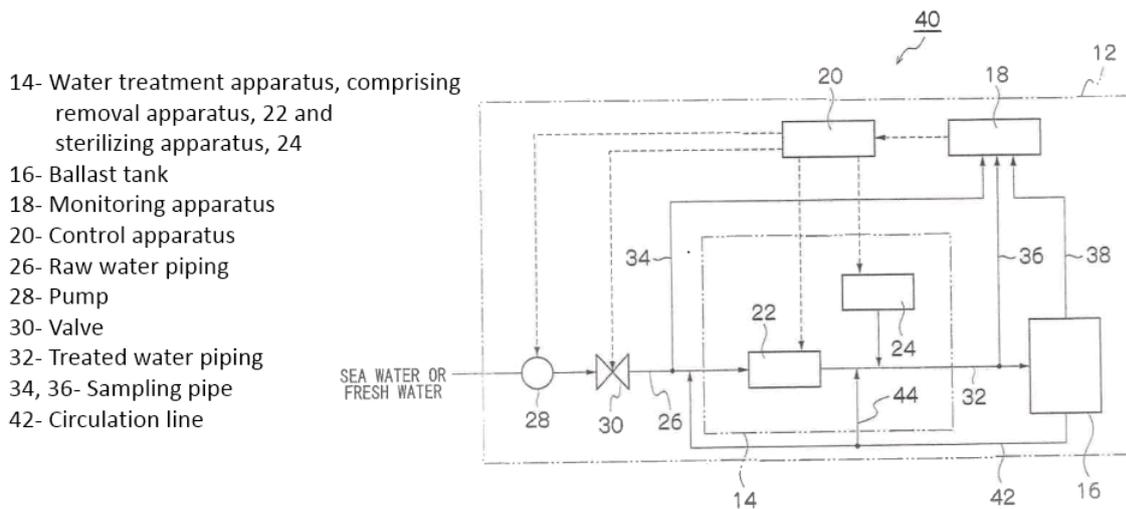


Figure 2

- 20 The ballast water treatment system of the invention is installed in a ship, and is primarily made up of a water treatment apparatus (14), a ballast tank (16), a monitoring apparatus (18), and a control apparatus (20). According to the schematic depicted in Figure 2, the water enters the system through the raw water piping (26), through a pump (28). A valve (30) is present after the pump and I note here that each schematic provided, as with Figure 2, depicts this as being located in the raw water piping, i.e. between the pump and the treatment apparatus. The water then enters the water treatment apparatus (14), where it undergoes treatment, before exiting through the treated water piping (32) to the ballast tank (16). Sampling pipes (34) and (36) respectively connect the raw water piping (26) (inlet part of the water treatment apparatus) and the treated water piping (32) (outlet part of the water treatment apparatus) to the monitoring apparatus (18), which automatically samples the water at these locations in order to determine the water quality. The information from the monitoring apparatus (18) is then fed to the control apparatus (20), which can be connected to various components of the system. For the present invention the control apparatus is connected to, and adjusts the opening of, the valve (30). In addition, but not shown in Figure 2, the invention requires that water is discharged from the ballast tank by use of the pump (28).
- 21 In operation, the pump intakes ballast water, and the ballast water is sampled at the time of water intake (34) and sent to the monitoring apparatus (18). When the monitoring apparatus detects that the quality of the ballast water has decreased, indicating an increase in the concentration of aquatic organisms, the treatment capacity of the treatment apparatus is increased by decreasing the flow rate of the ballast water through the treatment apparatus,

utilising the valve (30). Although it is not explicitly disclosed in the specification that the control through the valve is through the opening degree of the valve, this would be implicit, simply because it would be understood that this is how a flow rate through piping systems, via a valve, is controlled. Therefore, the control of the flow rate into the treatment apparatus (14) will be enabled by the control apparatus changing the opening degree of the valve (30) such that less water can flow through the raw water piping (26) into the treatment apparatus (14). This means that where a decrease in ballast water quality has been detected, the treatment flow rate, i.e. the volume that is treated by the apparatus per unit time, is decreased, and the ballast water will remain in the water treatment apparatus longer, thus ensuring a longer treatment time. The treated ballast water then leaves the treatment apparatus, through the treated water piping (32), where it is sampled again via the sampling pipe (36) and then is fed to the ballast tank (16). The ballast water is sampled again prior to discharge from the ballast tank and if the quality of the water in the ballast tank does not meet required standards then it is re-circulated to the treatment apparatus, using circulation line (42), where it is subjected to further treatment. If, however, the quality of the water in the ballast tank does meet the required standards, then it is discharged, presumably using the pump (28).

22 There is only one independent claim, which reads as follows:

1. A ship comprising:
 - a pump which intakes and discharges ballast water;
 - a water treatment apparatus which removes a substance to be removed from ballast water;
 - a ballast tank which stores the ballast water treated by the water treatment apparatus;
 - a valve which is arranged between the pump and the water treatment apparatus;
 - a monitoring apparatus which monitors the concentration of aquatic organisms in the ballast water at an inlet part and an outlet part of the water treatment apparatus; and
 - a control apparatus which monitors the concentration of aquatic organisms in the ballast water when the ballast water is taken;
 - controls the opening of the valve based on the result of the monitoring to adjust the treatment amount per unit time of the water treatment apparatus;
 - monitors the concentration of aquatic organisms in the ballast water when the ballast water is discharged;
 - controls to discharge the ballast water if the concentration of aquatic organisms based on the result of the monitoring satisfies a permissive value; and
 - controls to discharge the ballast water after the water treatment apparatus retreats the ballast water if the concentration of aquatic organisms based on the result of the monitoring does not satisfy the permissive value.

23 There are 11 claims in total. Claims 2-11 are dependent upon Claim 1 and define further features of the ballast system.

MAIN DECISION

Claim Construction

Purposive Approach

24 Before I begin my assessment on the validity of the patent, I will first construe the claims. Whilst the monopoly afforded by the patent grant is defined by the claims, Section 113(1) of

the Act provides that the claims can be “*interpreted by the description and any drawings contained in that specification*”. Nevertheless, it is not permissible to import gloss from the description such that the wording of the claims departs from its ordinary meaning.

- 25 As noted by the Court of Appeal in *First Currency Choice Pte Ltd v Main-Line Corporate Holdings Ltd and another appeal* [2008] 1 SLR(R) 335 (“*First Currency Choice*”) at [22], “*Once the scope of the claims has been ascertained, the questions of whether the claims are obvious, whether a piece of prior art anticipated the claims and whether there has been an infringement of the patent can then be answered in concrete terms*”. The Court went on to endorse the principles of “purposive construction” of the claims (which had been adopted earlier by the Court of Appeal in *FE Global Electronics Pte Ltd v Trek Technology (Singapore) Pte Ltd* [2006] 1 SLR(R) 874 (“*FE Global Electronics*”)) in order to determine the essential features of the invention, and referred to the decisions of the UK House of Lords in both *Catnic Components Limited v Hill & Smith Limited* [1982] RPC 183, and *Kirin-Amgen Inc v Hoechst Marion Roussel Ltd* [2005] RPC 9. The crux of these decisions is essentially that the starting point in patent construction is to ask the threshold question: What would the *notional skilled person* have understood the patentee to mean by the use of the *language of the claims*? This affirms that the purpose of claim construction is in fact to identify the invention *as defined in the claims*, and not by a vague assertion of the problem to be solved present in the description. Moreover, the emphasis is placed upon the wording of the claims, and if the words of the claims are clear then the monopoly sought should not be extended or cut down by reference to the specification.
- 26 In the course of last year, the controversial UK Supreme Court decision in *Actavis UK Limited and others v Eli Lilly and Company* [2017] UKSC 48 (“*Actavis*”) gave us cause to wonder whether the approach in Singapore, as described above, should and would still stand. It did not take long for Singapore’s Court of Appeal in *Lee Tat Cheng v Maka GPS Technologies Pte Ltd* [2018] SGCA 18 to put to rest any doubts when it categorically rejected the application of *Actavis* and reaffirmed the principles of purposive construction as Singapore has known it: see [50]–[55].

The Person Skilled in the Art

- 27 In their submissions, the Applicants referred to the Court of Appeal decision in *First Currency Choice* (at [28]), where it was stated that the skilled person “*should be taken to be the workman or technician who is aware of everything encompassed in the state of the art and who has the skill to make routine workshop developments, but not to exercise inventive ingenuity or think laterally*”. As such, they submitted that the skilled person would be someone who has a Bachelor’s degree in Engineering and who has experience in the design of ballast water treatment systems. As the Proprietor has not challenged this, I agree that the skilled person would indeed be someone as submitted by the Applicants, although with a cautionary note to emphasise the uninventive capacity of that skilled person.

The Common General Knowledge of the Skilled Person

- 28 The common general knowledge of the skilled person is essentially what makes the skilled person skilled. As pointed out by Laddie J in *Raychem Corp’s Patents* [1998] RPC 31, at [40], common general knowledge “*includes all that material in the field he is working in which he knows exists, which he would refer to as a matter of course*”.

- 29 The Applicants did not elaborate on what would be the common general knowledge of the notional skilled person in their submissions. However, during the course of his evidence, Mr Sahlen does discuss what the common general knowledge would be, and therefore I will take this into consideration. Indeed, in his evidence, Mr Sahlen goes into some detail regarding the common general knowledge at the priority date.
- 30 In his 1st SD, Mr Sahlen provides some useful background into the purpose of a BWMS. It is clear that the problem of transfer of aquatic organisms into an alien marine environment has been known for many years, and in 1948 a UN agency with responsibility for, amongst other things, prevention of marine pollution by ships, was established. Within the IMO, the Marine Environment Protection Committee (MEPC) addresses environmental issues, including ballast water management, anti-fouling systems, and the like. All members of the IMO are signatories to the International Convention for the Control and Management of Ships' Ballast Water and Sediments ("the Convention"), which was adopted in 2004, and entered into force in September 2017. The Convention aims to prevent the spread of harmful aquatic organisms from one region to another by establishing standards and procedures for management and control of ships' ballast water and sediments. All ships under the Convention are required to manage their ballast water and sediments to a certain standard, and this establishes the need for an effective BWMS within maritime vessels.
- 31 It is clear from this that the skilled person would fully understand the problems faced by ships when trying to perform ballasting and deballasting operations in different regions. It would also be within the knowledge of the skilled person that different amounts of contaminating aquatic organisms would be present at different locations, and therefore the amount of decontamination required prior to deballasting would vary depending upon the degree of contamination in the region in which ballast water was taken on board.
- 32 Following on from his discussion of the background to BWMS, Mr Sahlen elaborates on what he considers to be the common general knowledge of the skilled person. In his evidence, Mr Sahlen referred to the "*Guidelines for Approval of Ballast Water Management Systems (G8)*" ("Guidelines"), which was adopted by the MEPC in July 2005. This document states at [7.2] that "sampling facilities should in any case be located on the BWMS *intake*, before the discharging points, and any other points necessary for sampling to ascertain the proper functioning of the equipment". A copy of the Guidelines was annexed by Mr Sahlen as part of an exhibit to his 1st SD. I find these of interest, and of relevance in establishing the common general knowledge as they are indicated as being of use in providing guidance to manufacturers and ship owners on what is required of a BWMS, and how the systems will be evaluated. In other words, it seems to me that these Guidelines would indicate to the skilled person what the minimum requirements would be for a BWMS to ensure that it met the required standards in accordance with the Convention.
- 33 Whilst the Guidelines provide the requirements of the technical specifications of a BWMS, it appears to me that many of these requirements relate to the system as a whole, its operation, and its location on the ship. However, there are some references within these Guidelines that do assist in the understanding that the skilled person would have in relation to the specific parts of the system, which would be of importance in the understanding of the present invention. In particular, [4.8] of the Guidelines points out that the means for operation and control of the treatment equipment should be simple and effective, and that operation should be ensured through the necessary automatic arrangements. The Guidelines at [4.10] go on to suggest that the BWMS should automatically monitor and adjust the necessary treatment dosages or

intensities, or other aspects of the BWMS of the vessel. However, whilst these sections establish that automated control of the treatment and/or dosage would be well within the understanding of the person skilled in the art, they do not go into any further detail in relation to what would fall under this ‘automation’.

- 34 The remainder of the Guidelines outlines what tests will be performed upon the BWMS in order to ensure that it meets the requirements of the Convention. These include testing the ballast water at various stages between uptake and discharge, in order to evaluate the efficacy of the treatment system. This includes, as pointed out by Mr Sahlen, sampling the water on the BWMS intake, before any discharge points, in order to ascertain the proper functioning of the equipment. Mr Sahlen goes on to point out that it was well known at the priority date that the information gathered at these sampling points could be used to control the treatment process, as well as to determine if ballast water should be re-circulated for additional treatment. From this observation drawn from outside the Guidelines, Mr Sahlen appears to acknowledge that the Guidelines do not provide specifications of a BWMS, but rather are used to determine how the BWMS already installed in the ship is performing. Therefore, whilst the Guidelines indicate where sampling will occur during such checks, they do not definitively state the BWMS itself should in fact have sampling points placed at these positions *in order to control* the system based on the results. Nevertheless, I accept Mr Sahlen’s expert opinion that information from these sample points could be used to control the treatment process.
- 35 Mr Sahlen goes on to briefly discuss the different solutions that had been in place before the adoption of the Convention, as well as the considerations of the vessel owners when selecting what BWMS to incorporate into their specific vessel. He then discusses the importance of pumps and valves in any vessel with ballasting capacity in order to uptake/discharge ballast water and control the flow respectively. This seems to be common sense to me, and I accept that such features would form part of the common general knowledge of the skilled person.
- 36 To summarise, from the expert evidence provided by Mr Sahlen and from the Guidelines, BWMS were well known at the priority date of the 075 patent, in order to ensure that there was no transfer of aquatic organisms from one ecosystem to another as the ships travelled from port to port. These BWMS were generally known to comprise a pump, a treatment system and ballast tanks for storing the treated water. It is clear from the Guidelines that in order to ensure the water quality, the ballast water should be sampled and tested at several locations in the system, including at uptake and before discharge, and other locations in between. I also consider that it would be common general knowledge to the skilled person that the amount of treatment required to remove the contaminating aquatic organisms from the ballast water would depend upon the concentration of aquatic organisms present in the ballast water at intake; and that this treatment could be in terms of amount or concentration of the treatment provided, or in terms of the length of time that the treatment takes place.

Claim Construction

- 37 The Applicants, in their submissions, outlined the inventive concept of the 075 patent, and went into some detail to identify the ‘technical problem to be solved’ by the invention. In the Applicants’ opinion, the problem to be solved is the need to consistently achieve ballast water management standards established by the IMO due to variability in the intake water quality. The invention aims to solve this problem by monitoring the quality of the ballast water and controlling the conditions of the water treatment apparatus, based upon the quality of the water intake. In this regard, the Applicants refer to the passage of the patent specification at page 6,

lines 26-29, which outlines the advantageous effects of the invention. Based on this, the Applicants surmise that the inventive concept is “controlling the treatment time of the ballast water in the water treatment apparatus depending on intake water quality, and whether the treated ballast water should be discharged or recirculated for retreatment depending on the quality of water in the ballast tank”. According to the Applicants, this concept is found in Claim 1.

- 38 I agree with the Applicants that this is the basis of the invention, and indeed this is consistent with my understanding of the invention as I outlined in [15]–[18] above. However, I do not think that the Applicants have properly construed the claims in accordance with what is required by the authorities in [25] above. What they have instead done is outline the purpose of the invention, i.e. the result that the system defined in Claim 1 actually achieves. Nevertheless, this result does have a material role to play in the functioning of the system, and the skilled person reading Claim 1, with an understanding of the invention from the description and from the common general knowledge, would appreciate that the ultimate *goal* of the invention defined in the claim is to control the treatment by the water treatment apparatus, and to determine whether the ballast water should be discharged or recirculated, depending on the quality of the water. However, from a fair reading of the claim, the skilled person would understand that the inventive concept also lies in the arrangement of the parts of the system that allows the system to achieve this result, and therefore I am of the opinion that the Applicants have over-simplified the claim in their written submissions. In doing so, they have omitted to identify some of the key features of the invention.
- 39 Nevertheless, Mr Sahlen has laid out what he understands the technical features of the claim to mean as part of his expert evidence. At this point, I reiterate that purposive construction requires the claims to be read as they would be understood by the notional person skilled in the art, and it is necessary here to consider whether Mr Sahlen is in fact a person skilled in the art, as intended by the Courts. Mr Sahlen has provided a brief biography, in Exhibit “PS-1” of his 1st SD, and from this it is clear that he has a wealth of experience in BWMS. Along with his career in research and development in these systems, he is also an advisor to the Swedish IMO delegation on ballast water topics. It is clear that Mr Sahlen does possess the credentials of an expert in this technical field, but I also am aware of the cautionary comment of the Court of Appeal in *Mühlbauer AG v Manufacturing Integration Technology Ltd* [2010] 2 SLR 724, at [48], that many experts would not themselves fall within the category of the ‘person skilled in the art’ for the purposes of inventive step as they possess extraordinary knowledge as well as expertise. However, for argument’s sake and in the absence of any submissions to the contrary from the Proprietor, I will assume Mr Sahlen to take on the mantle of the ordinary skilled person in his understanding of the technical features of the claims.
- 40 Claim 1 has already been set out in [22] above, and in its broadest sense defines a vessel comprising a pump, a water treatment apparatus, a ballast tank, a valve, a monitoring apparatus and a control apparatus. The pump is specified to intake and discharge ballast water, and in Mr Sahlen’s opinion, this means the same pump is used for both actions. I agree with this – based on the claim, there is a single pump that both takes on board and pumps out the water from the ballast system. The valve is disposed between the pump and the water treatment apparatus, and as pointed out by Mr Sahlen in his evidence, this would be in the piping there between.
- 41 The claim also requires a monitoring apparatus to be disposed at *an inlet part and an outlet part* of the water treatment apparatus. I note here that the water treatment apparatus is one component of the system defined in Claim 1, and therefore this part of the claim is clearly

directed to monitoring at an inlet and an outlet of that apparatus. Whilst it would *prima facie* appear that the respective monitoring occurs in the raw water piping and treated water piping proximal to the treatment apparatus, the use of the phrase “an inlet” (as opposed to “*the* inlet”) suggests that the water treatment apparatus may have more than one inlet and therefore the claim would not be limited to an embodiment where there is only a single inlet. As such, from a plain reading of Claim 1, the monitoring of the concentration of aquatic organisms may occur at any entry point to the water treatment apparatus. The same applies for the outlet, as the wording also suggests there may be more than one outlet. This is a slightly broader interpretation than that given by Mr Sahlen. Nevertheless, in my opinion, the skilled person would understand that this monitoring takes place in a piping proximal to the treatment apparatus and not in any other part of the system.

42 The specifics of the control apparatus defined by the claim are more problematic, and for ease of reference I have reproduced these as features a to e below. Mr Sahlen has three main observations regarding the understanding of this part of the claim: firstly, the role of the control apparatus in controlling the system (i.e. features b, d and e); secondly, the locations of the monitoring and the relationship of this to the controlling functions within the apparatus (features a and c); and thirdly the opening of the valve and treatment amount per unit time of the water treatment apparatus. I agree that this part of the claim is not clear, although this may be an artefact of poor translation. Nevertheless, I cannot account for a poor translation, if that is the case, and therefore must construe the claim as it would be understood by the skilled person. The control system as defined in Claim 1 therefore also:

- a) monitors the concentration of aquatic organisms in the ballast water when the ballast water is taken;
- b) controls the opening of the valve based on the result of the monitoring to adjust the treatment amount per unit time of the water treatment apparatus;
- c) monitors the concentration of aquatic organisms in the ballast water when the ballast water is discharged;
- d) controls to discharge the ballast water if the concentration of aquatic organisms based on the result of the monitoring satisfies a permissive value; and
- e) controls to discharge the ballast water after the water treatment apparatus retreats the ballast water if the concentration of aquatic organisms based on the result of the monitoring does not satisfy the permissive value.

43 I will deal with (i) the function of monitoring by the control apparatus, and (ii) the location of this monitoring within the system, together. The wording in this part of Claim 1 suggests that the control apparatus has a monitoring function that is separate from that of the monitoring apparatus. Mr Sahlen considers that this simply means that the control apparatus is acting upon the results of the monitoring, although his interpretation here is based upon how the system is described within the specification. Even though Mr Sahlen observes that the wording of the claim here is inconsistent with that of the description, his understanding of the claim here incorporates features from the description and as such he considers that the monitoring in features a and c above is performed by the monitoring apparatus and not the control apparatus. In line with this, in his opinion, the monitoring that is performed in feature a is performed at the same location as the monitoring at the inlet to the water treatment apparatus that is performed by the monitoring apparatus.

44 Whilst I acknowledge that the description does not suggest a control apparatus that performs a monitoring function, I must still construe the claim here using its ordinary language. The

monitoring apparatus itself is used to monitor the concentration of aquatic organisms at an inlet part and an outlet part of the water treatment apparatus, as I discussed in [41] above. The monitoring function of the control apparatus on the other hand monitors the concentration of aquatic organisms when the ballast water is taken and when the ballast water is discharged (features a and c, respectively). Of note here is that the claim does not specify where the water is taken from, when in fact it can be taken from the environment, the piping, the water treatment apparatus or the ballast tank, at least. However, as the results of this monitoring control the opening of the valve to adjust the treatment amount, this implies that the monitoring occurs somewhere between intake and the inlet of the water treatment apparatus. Therefore, whilst I agree that the monitoring in feature a has to be prior to the water treatment apparatus, I disagree with Mr Sahlen that the claim explicitly requires this monitoring to occur at an inlet to the water treatment apparatus and instead consider that it can occur anywhere between intake of the ballast water and an inlet to the water treatment apparatus.

- 45 The location of the monitoring when the ballast water is discharged is more clearly distinct from the second monitoring position performed by the monitoring apparatus, and as such reaffirms my opinion that the monitoring performed by the control apparatus is distinct from the monitoring performed by the monitoring apparatus. Specifically, the monitoring apparatus monitors the water at an outlet of the water treatment apparatus; as I discussed above this would be understood to mean in downstream piping proximal to the water treatment apparatus. The monitoring performed by the control apparatus, on the other hand, is performed “in the ballast water when the ballast water is discharged”. Mr Sahlen understands this to mean when the water is discharged from the ballast tank, based on his understanding that the purpose of this monitoring is to re-treat the ballast water if the quality has degraded in the ballast tank. I agree with this interpretation. The control functions of features d and e are clearly to safeguard against release of contaminated ballast water to the environment, and therefore the most logical position for monitoring of this is at the discharge point of the ballast tank. This could be in the ballast tank or immediately upon exit of the ballast tank, as long as the position was such that it was performed before the ballast water was discharged to the environment so as to allow recirculation to the treatment apparatus if needed.
- 46 Given that the monitoring performed by the control apparatus can occur at locations distinct from those locations that are monitored by the monitoring apparatus, as I have outlined above, I disagree with Mr Sahlen’s opinion that the monitoring by the control apparatus is performed through the monitoring apparatus. I acknowledge that an embodiment where the control apparatus itself monitors the aquatic organisms is not envisaged by the specification as filed. However, it is not uncommon for claims to define features that are not literally supported by the description and/or drawings. Furthermore, it would not be impossible for the skilled person to provide such a control system that within it also has a monitoring function (indeed prior art D1 provided by the Applicants depicts such a scenario). Giving the words their ordinary meaning here, and in view of the differences in monitoring locations, monitoring is performed both by the monitoring apparatus and the control apparatus.
- 47 Mr Sahlen’s third observation is in relation to the feature where the valve adjusts “the treatment amount per unit time of the water treatment apparatus”. This phrase does not seem clear to me, which again suggests a poor translation, and could mean anything from the amount of the actual treatment to the dwell time in the water treatment apparatus. However, Mr Sahlen understands this to mean the flow rate through the water treatment apparatus only. Given that this rate is linked to the opening and closing of the valve, I agree that this is the most sensible interpretation

of this term and therefore am willing to accept that the control system controls the opening of the valve to adjust the flow rate through the water treatment apparatus.

48 In summary, in my opinion, Claim 1 is construed as a ship comprising a pump that takes on board and pumps out ballast water, a water treatment apparatus to remove a substance from the ballast water, and a ballast tank for storing the treated water, with a valve located between the pump and the water treatment apparatus. A monitoring apparatus monitors the concentration of aquatic organisms at an inlet and an outlet of the water treatment apparatus, and a control apparatus monitors the concentration of aquatic organisms at intake of ballast water, and controls the opening of the valve to adjust the flow rate through the water treatment apparatus, based upon the results of the monitoring by the control apparatus. The control apparatus also monitors the concentration of aquatic organisms in the ballast water at a discharge point from the ballast tank, and if the concentration satisfies a permissive value, then the control apparatus discharges the ballast water from the ship. If the concentration does not satisfy a permissive value, then the control apparatus only discharges the ballast water after it has been re-treated by the water treatment apparatus.

49 Having construed the sole independent claim of the 075 patent, I now direct my mind to the substantive ground of revocation pleaded under Section 80(1)(d) of the Act.

Ground of Revocation under Section 80(1)(d): Added Matter

50 Section 80(1)(d) of the Act reads:

80.—(1) Subject to the provisions of this Act, the Registrar may, on the application of any person, by order revoke a patent for an invention on (but only on) any of the following grounds:

...

(d) the matter disclosed in the specification of the patent extends beyond that disclosed

—
(i) in the application for the patent, as filed; or

...

The Applicants' Submissions

51 The Applicants submit that Claim 1 of the patent contains added matter, specifically in relation to the feature that the control apparatus monitors the concentration of aquatic organisms in the ballast water when taken, and also when it is discharged. The claims were amended several times pre-grant during the examination process, culminating in the present, granted claims.

The Test

52 The Applicants refer to the decision of the Court of Appeal in *FE Global Electronics*, which affirmed, at [24], the three-fold test for determining “added matter” laid out by the UK Patents Court in *Bonzel (T) and Schneider (Europe) AG v Intervention Limited (No. 3)* [1991] RPC 553 (“*Bonzel*”), at 574. There, Aldous J stated that the task of the court when determining the issue of “added matter” was:

(i) To ascertain through the eyes of the skilled addressee what is disclosed, both explicitly and implicitly, in the application.

- (ii) To do the same in respect of the patent as granted.
- (iii) To compare the two disclosures and decide whether any subject matter relevant to the invention has been added whether by deletion or addition. The comparison is strict in the sense that subject matter will be added unless such matter is clearly and unambiguously disclosed in the application either explicitly or implicitly.

- 53 The Applicants further referred to the decision of the High Court in *Main-Line Corporate Holdings Ltd v DBS Bank Ltd* [2012] 4 SLR 147 (“*Main-Line v DBS*”), where Ang J likewise applied the test in *Bonzel* in the context of Section 80(1)(d) of the Act.
- 54 It is undisputed that the proper test to apply is that set out by Aldous J in *Bonzel* (the “*Bonzel* test”) and as subsequently affirmed and applied in Singapore in *FE Global Electronics and Main-Line v DBS*.

Analysis

- 55 The first step of the *Bonzel* test requires me to consider, through the eyes of the skilled person, what is disclosed both explicitly and implicitly in the application as it was filed. I should first note that the application was filed under the Patent Cooperation Treaty (PCT) in Japan, and as such was in Japanese. A verified translation was provided upon entry to Singapore, and therefore, as is the intention with a verified translation, I will assume that the application filed in Singapore is for all intents and purposes identical to the original Japanese language document filed under the PCT.
- 56 As I pointed out in [17] above, there are numerous embodiments disclosed within the application as filed. Nevertheless, it is clear from each of these embodiments that the BWMS of the invention comprises a separate monitoring system and control system, and this is illustrated in Figure 1 of the patent, reproduced below. The ballast water is sampled at particular locations, and sent through sampling points (34), (36) and (38) to the monitoring apparatus (18) in this particular embodiment, although I do note that the description suggests that monitoring is not limited to these positions. The monitoring system monitors the ballast water, and the description goes on to state that this monitoring is through mechanisms such as measuring turbidity, chromaticity or image analysis. The monitoring apparatus (18) is connected to the control apparatus (20), and transmits the *results of the monitoring* to the control apparatus. The control apparatus can control various components of the system, such as the pump (28), the valve (30) or components (22) and (24) of the water treatment apparatus (14), in accordance with the results of the monitoring that it receives from the monitoring apparatus. There is no embodiment within the application as filed which suggests that the monitoring is performed by any component other than the monitoring apparatus itself.

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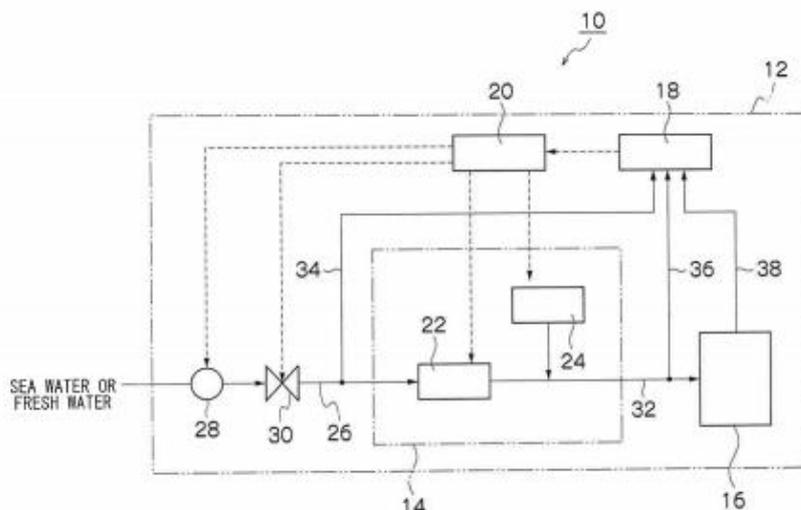


Figure 1

- 57 This is consistent with the understanding of the Applicants. In their submissions, the Applicants point out that the control apparatus acts on a monitoring result of the monitoring apparatus, and that this is evident from both the description and the claims of the application as filed.
- 58 Whilst it is clear from the specification as filed there that there is no explicit disclosure of a control apparatus that can monitor the concentration of aquatic organisms, I still need to consider whether the skilled person would understand such a disclosure to be implicit.
- 59 For an implicit disclosure, the claims may contain features that are not explicitly disclosed by the description but would be understood by the skilled person to be implicit in the working of the invention. However, there is a distinction here between what the skilled person would understand to be implicitly disclosed, and what the skilled person would understand *could be* incorporated into the specification. In this regard, I refer to the decision of Aldous J in *Re Flexible Directional Indicators Ltd's Application* [1994] RPC 207 (“*Flexible Directional Indicators*”), at 226, where he observed that the provision against added subject matter “*is concerned with what is disclosed, not with that which the skilled reader might think could be substituted or had been omitted*”. The Applicants submit that, based upon their understanding of the application as filed, the skilled person would ascertain that there would be no need to provide a control apparatus with monitoring capability, given that a stand-alone monitoring apparatus is provided. I agree with this.
- 60 Therefore, even though I note that the skilled person may be able to readily provide a control apparatus that also performs a monitoring function, they would not consider this to be an implicit disclosure of a control apparatus that also performs a monitoring function; even if the skilled person would readily substitute the control apparatus for a combined monitoring-control apparatus, the inquiry on whether there is added subject matter does not include that which would have been obvious for a skilled person to do, in line with *Flexible Directional Indicators*.
- 61 The second step of the *Bonzel* test requires the determination of what is disclosed in the patent as granted, through the eyes of the skilled person. As far as I can tell, the only changes made to the application during the examination process were to the claims; the description and figures remain unchanged. Therefore, the only part of the granted patent that could contain any added

matter is the claims. I have already construed Claim 1 in [37] – [48] above, and based upon my construction, I agree with the Applicants that the skilled person would understand that the granted claim bears the feature that the control apparatus *monitors* the concentration of aquatic organisms in the ballast water when the ballast water is taken, and *monitors* the concentration of aquatic organisms in the ballast water when the ballast water is discharged.

62 The third step of the *Bonzel* test requires that I compare the two disclosures and decide whether any subject matter relevant to the invention has been added either by deletion or addition. It is clear to me that the application as filed sets out a separate monitoring apparatus and control apparatus; this is evident from the description, the figures, and the claims. Whilst there is some suggestion that monitoring may occur at places other than those described, there is nothing in the original disclosure that would suggest that any of these monitoring positions would be linked to anything other than the monitoring apparatus. Indeed, there is no indication that the control apparatus performs any sort of monitoring; it merely acts upon the results of the monitoring that it is fed from the monitoring apparatus.

63 I can make further reference here to the understanding of Mr Sahlen in his expert report, where he noted that there is an inconsistency between the wording of the claims and the description. In his opinion, and according to the description, the monitoring function is performed solely by the monitoring apparatus, and the control apparatus only performs a function based on the result of the monitoring performed by the monitoring apparatus. However, he went on to read into Claim 1 that any monitoring performed by the control apparatus is through the monitoring apparatus. I discuss at [46] above why I disagree with this interpretation; from a plain reading of the claim and given the distinct positions for ‘monitoring’ by the monitoring apparatus and the control apparatus, I do not think that it is explicit or implicit that all monitoring performed would necessarily be through the monitoring apparatus.

64 As such, Claim 1 of the patent as granted does include the feature of a control apparatus that performs a monitoring function, which was not disclosed either implicitly or explicitly in the specification as filed.

65 Therefore, upon comparing the disclosures of the application as filed and the patent as granted, I find that the feature of “a control apparatus which monitors” in Claim 1 constitutes added subject matter.

Conclusion

66 The revocation under Section 80(1)(d) therefore succeeds.

Overall Conclusion

67 As the ground of revocation under Section 80(1)(d) has been established, and as this application for revocation is undefended by the Proprietor in any case, there is no necessity to assess all the pleaded Grounds.

68 I therefore allow the application for revocation based on Section 80(1)(d) of the Act. In accordance with Section 80(7) of the Act, my order to revoke the 075 patent in full takes effect from the date of grant. The Applicants are entitled to costs, to be taxed if not agreed.

Date of Issue: 25 July 2018