

**OPINION UNDER SECTION 74A**

Patent	GB2491085B
Proprietor(s)	Oxzo S.A.
Exclusive Licensee	
Requester	Poseidon Ocean Systems Ltd.
Observer(s)	ACAPO
Date Opinion issued	07 August 2024

**The request**

1. The comptroller has received a request from Poseidon Ocean Systems Ltd. (“the requester”) to issue an opinion as to whether the matter disclosed in the specification of the patent extends beyond that disclosed in the application for the patent as filed. Further, they seek an opinion on whether the invention for which the patent has been granted is not a patentable invention in light of various combinations of the following documents with each other or with the common general knowledge of the skilled person.

**D1** – US 2004/0149234 A1, published on 5 August 2004

**D1a** – Wikipedia article “Pressure swing adsorption”, version of 20 January 2010

**D1b** – Wikipedia article “Pressure swing adsorption”, version of 2 May 2024

**D1c** – PRISM® VSA Oxygen Generator, commercial brochure, published in 2014

**D2** – JP H06 7056 A, published on 18 January 1994

**D2a** – English translation of JP H06 7056 A

**D3** – Edie article “Oxygenation of large water bodies”, published on 13 April 2005 on <https://www.edie.net/oxygenation-of-large-water-bodies/>

**D4** – WO 01/87052 A2, published on 22 November 2001

**D5** – JP H09 70238 A, published on 18 March 1997

**D5a** – English translation of JP H09 70238 A

**D6** – <https://oxymat.com/oxygen-psa-generator-technology/>, information about common commercially available PSA systems

**D7** – <https://www.generon.com/product/psa-oxygen-generator/>, information about common commercially available PSA systems.

2. Observations have been received from ACAPO (“the observer”).
3. The requester has provided observations in reply.

## **Allowance of the request**

4. The observer has argued that the request for an opinion should be refused in part under section 74A(3)(b). They consider that the question of whether the matter of claim 1 of the patent extends beyond what was disclosed in the application as originally filed has already been considered in relevant proceedings, so there is no ‘new question’. In particular, they point out that amendment of the application in the manner which is alleged to add subject matter was allowed by the UK IPO. The requester counters that this argument relies on an incorrect interpretation of the term ‘relevant proceedings’ in section 94(1)(b). They argue that this definition does not include the UKIPO or EPO examination procedure which precedes the grant of every GB patent.
5. I agree with the requester on this point. Part 3.3 of the Opinions manual<sup>1</sup> states “Relevant proceedings are defined in Rule 92 as proceedings (whether pending or concluded) before the comptroller, the court, or the European Patent Office. The normal pre-grant examination of applications at the IPO or EPO does not constitute a relevant proceeding under Rule 92”. Part 3.4 of the Opinions manual goes on to say that it may not be appropriate to deal with a request that merely repeats an argument that was clearly raised by the examiner and answered by the applicant to the satisfaction of the examiner. In this case, although the amendments were accepted, no objections or arguments in relation to added matter were raised during the examination process. As such, I consider this to be a new question or argument.

## **The Patent**

6. The patent GB2491085 has a filing date of 20<sup>th</sup> September 2012, and a priority date of 30<sup>th</sup> March 2010. It relates to a system for generating oxygen for injection into fish cages at sea in the aquaculture industry. The system comprises a floating platform capable of being towed at sea, the platform comprising both an electricity generation system and an oxygen generation system thereon. Oxygen, food and water are three key parameters in fish farming. It is known that during the fish production cycle there is a high mortality associated with low oxygen, which can occur for various reasons. This is resolved by injecting oxygen of a high purity in situ from the floating platform into fish cages.

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<sup>1</sup> <https://www.gov.uk/government/publications/opinions-manual/opinions-manual>

7. Figure 1 below shows how the different components of the system are arranged on the floating platform. Compressor means 102 generates a pressurised air flow which is dried in drying means 103 and filtered in filter means 104 before being used by an oxygen generating means 106, which generates oxygen and accumulates it in tank 107. An oxygen piston compressor 108 compresses the oxygen for storage in a high-pressure tank 109 (not shown in figure 1). A controller, or PLC 206, controls the system by making decisions based on dissolved oxygen sensor readings and equipment states. The energy generation and distribution system (not labelled) is controlled by panel 201 to distribute the energy produced by the generation system to the oxygen production line. The energy is generated using diesel fuel stored in tanks (not shown in fig. 1).

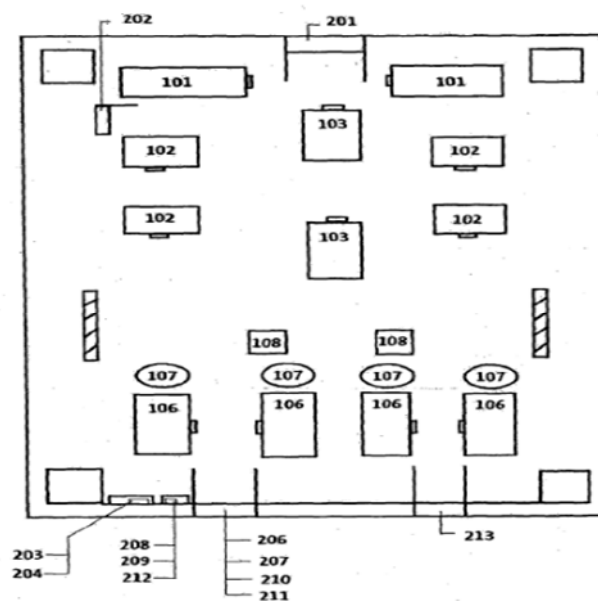


FIG.1

8. There is a single embodiment described which uses Pressure Swing Adsorption (PSA) means for generating oxygen at 93-95%.
9. The invention provides a portable system which can be moved to provide oxygen to different cages on demand. It does not require the transport of large amounts of O<sub>2</sub> in cylinders. It is capable of producing oxygen in large quantities that can solve large scale problems.
10. The granted patent has eight claims and one independent claim. The independent claim reads as follows:

Portable system for generating oxygen in situ and injecting oxygen at industrial levels in fish cages in the sea, comprising:  
 a floating pontoon-type platform, capable of being towed at sea, the platform including;  
 an oxygen-generating system configured to generate oxygen at 93 to 95% purity,  
 and  
 an electricity generation and distribution system, configured to provide electrical

power to the components of the oxygen-generating system,  
wherein the oxygen-generating system comprises:  
means for generating pressurized air;  
means for generating pressurized oxygen from the pressurized air,  
means for controlling the compression and accumulation of high- pressure oxygen,  
and  
means for controlling the oxygen-generating system.

## The prior art

11. The requester filed a number of pieces of prior art as set out in paragraph 1. The observer has commented on some of this prior art and its suitability when assessing inventive step. I will consider these in turn.
12. D1 US2004/0149234A1, D2 JPH067056A, D4 WO01/87052A2 and D5 JPH0970238A –these are patent documents which pre-date the application. The observer argues that patent documents are not evidence of common general knowledge of the skilled person, and refers to the Manual of Patent Practice (MOPP) sections 3.20 and 3.32 to back up this argument. Both of these passages in MOPP refer to the speech by Sachs LJ in *General Tire & Rubber Co v Firestone Tyre & Rubber Co Ltd*<sup>2</sup> which sets out the relationship of patent specifications to the common general knowledge. Sachs LJ stated “it is clear that individual patent specifications and their contents do not normally form part of the relevant common general knowledge”. In their observations in reply the requester points out that MOPP 3.40 states that “it is permitted to combine any of the prior art, (whether published documents, instances of prior use or common general knowledge) in order to argue that an inventive step is lacking”. I agree that these documents can be considered when making a combination argument for lack of inventive step, but individually and without any other evidence they are unlikely to be considered common general knowledge.
13. D1a is a 2010 version of the Wikipedia page of D1b. This is the version which was available at the priority date. It describes PSA technology and I consider it useful to support arguments regarding the common general knowledge of the skilled person at the time.
14. D1b is a 2024 version of the Wikipedia page shown in D1a. It has been significantly updated since 2010. Since the publication date is after priority date of the invention I do not see how it can be useful to the arguments presented here and I will not consider it.
15. D1c is a commercial brochure for a 2014 version of the PRISM VSA oxygen generator. The requestor claims it shows the oxygen generator specified in D1 as a “portable vacuum swing absorption (VSA) oxygen generator provided by Air Products and Chemicals of Allentown, Pa.” They suggest that it is “unlikely” that the 2002 version of the generator with the same name used an entirely different basic process for generating oxygen. However, the observer points out that Trade Marks

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<sup>2</sup> *General Tire & Rubber Co v Firestone Tyre & Rubber Co Ltd* [1972] RPC 457

indicate only the origin of goods and not their composition or content so the generator could have changed significantly since 2002. Also, they point out that this does not show the generator of D1, which is referred to in paragraph 0044 as model A150L. I agree with the observer that there is no reason to think this is the oxygen generator used in D1 and it is not relevant to this opinion. I will not consider this prior art.

16. The observer notes that D2 was considered during examination and does not raise a new question. However, D2 is being raised here in combination with D1 which was not the case at examination where it was cited on the International Search Report as an A doc. I will thus allow this document to be considered in the context proposed by the requester.
17. D6 and D7 are websites that provide information about PSA systems. They both have publication dates long after the priority date of the invention. The observer also notes that no further evidence has been filed by the requester as to why these might form part of the common general knowledge in the UK at the time of the invention. I agree that these documents are not useful for establishing what was known in 2010 and I will not consider them here.

## **Claim construction**

18. Before considering the documents put forward in the request I will need to construe the claims of the patent following the well-known authority on claim construction which is *Kirin-Amgen and others v Hoechst Marion Roussel Limited and others* [2005]<sup>3</sup>. This requires that I give the claims a purposive construction, interpreting them in the light of the description and drawings as instructed by Section 125(1), and taking account of the Protocol to Article 69 of the EPC. Simply put, I must decide what a person skilled in the art would have understood the patentee to have used the language of the claim to mean.
19. Section 125(1) of the Act states that:

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

20. And the Protocol on the Interpretation of Article 69 of the EPC (which corresponds to section 125(1) ) states that:

*Article 69 should not be interpreted in the sense that the extent of the protection conferred by a European patent is to be understood as that defined by the strict, literal meaning of the wording used in the claims, the*

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<sup>3</sup> *Kirin-Amgen and others v Hoechst Marion Roussel Limited and others* [2005] RPC 9

*description and drawings being employed only for the purpose of resolving an ambiguity found in the claims. Neither should it be interpreted in the sense that the claims serve only as a guideline and that the actual protection conferred may extend to what, from a consideration of the description and drawings by a person skilled in the art, the patentee has contemplated. On the contrary, it is to be interpreted as defining a position between these extremes which combines a fair protection for the patentee with a reasonable degree of certainty for third parties.*

21. The claim is generally clear and the terminology used would be clear to a person skilled in the art. However, there are a couple of elements that require some discussion.
22. Claim 1 refers to “the injection of oxygen *at industrial levels*” in fish cages in the sea. There is no indication in the description of the volume or flow rate of oxygen which would be considered “industrial levels”. Page 3 of the description indicates that the property of “injecting continuously without major logistical problems in industrial quantities” is how the invention differs from the prior art. Some idea of scale is given for the embodiment as the pontoon is described on page 4 as having “a buoyancy of at least 50 tons”, and the fuel tanks for the electricity generators have a capacity of 1, 500 litres, which allows the operation of the oxygen generation and injection system “for extended periods of time”. Without more information it is not possible to determine what quantity of oxygen is produced, but I understand from the information given that the invention is intended to be effective in a large body of water for longer periods of time than would be feasible if oxygen was being injected directly from cylinders of stored oxygen.
23. Claim 1 describes control means for the system. The claim specifies two types of control means: “means for controlling the compression and accumulation of high-pressure oxygen,” and “means for controlling the oxygen-generating system”. On page 5, lines 23-26 the control means for the oxygen generation system is described as “an equipment manual board (205), a PLC (206), means for receiving oxygen signals (207), a computer (208) with HMI software (209) and control algorithms (210) and a manual valve board (211)”. This seems clear. It is less clear what constitutes the “means for controlling the compression and accumulation of high-pressure oxygen”. Page 8, lines 22-30 describes how the system is always filling or refilling the oxygen high pressure accumulator tanks so that oxygen can be used from this storage until a certain threshold (20% used) is reached, before the oxygen generation equipment is turned on. I consider this to be the control of the compression and accumulation of high-pressure oxygen specified in claim 1. Rather than a separate control system with separate equipment I understand this to be a sub-set of actions carried out by the means for controlling the whole oxygen generating system. If I am wrong in this analysis, it does not materially affect the questions asked of me in this opinion.

### **Does the matter disclosed in the amended claims extend beyond that disclosed in the application for the patent as filed?**

24. Section 76(2) of the Act disallows amendment of an application which results in the application disclosing matter extending beyond that which it disclosed when filed.

When considering in *Bonzel and Schneider (Europe) AG v Intervention Ltd*<sup>4</sup> whether an amendment to the description had the result that a patent as granted disclosed matter which extended beyond that disclosed in the application, Aldous J described his task as –

*(1) to ascertain through the eyes of the skilled addressee what is disclosed, both explicitly and implicitly in the application;*  
*(2) to do the same in respect of the patent as granted;*  
*(3) 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.*

25. As summarised by Jacob J. in *Richardson-Vicks Inc.'s Patent*<sup>5</sup>, “the test of added matter is whether a skilled man would, upon looking at the amended specification, learn anything about the invention which he could not learn from the unamended specification.”
26. Amendments which limit the scope of a claim by the introduction of one or more features from the description or claims may in certain circumstances add matter through what is known as “intermediate generalisation”. This concept was explained by Pumfrey J in *Palmaz's European Patents*<sup>6</sup>:

*If the specification discloses distinct sub-classes of the overall inventive concept, then it should be possible to amend down to one or other of those sub-classes, whether or not they are presented as inventively distinct in the specification before amendment. The difficulty comes when it is sought to take features which are only disclosed in a particular context and which are not disclosed as having any inventive significance and introduce them into the claim deprived of that context. This is a process sometimes called ‘intermediate generalisation’.*

27. As discussed in *Nokia Corporation v IPCOM GMBH & Co KG (No. 3)*<sup>7</sup> it is not permissible to introduce into a claim a feature taken from a specific embodiment unless the skilled person would understand that the other features of the embodiment are not necessary to carry out the claimed invention. Put another way, it must be apparent to the skilled person that the selected feature is generally applicable to the claimed invention absent the other features of that embodiment.
28. The patent originates from a PCT application filed in Spanish, which was translated into English for entry into the GB national phase. During the examination some amendments were made to claim 1. Original claim 1 reads as follows:

*Portable on-site oxygen generation and injection at industrial levels of oxygen in sea*

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<sup>4</sup> *Bonzel and Schneider (Europe) AG v Intervention Ltd* [1991] RPC 553

<sup>5</sup> *Richardson-Vicks Inc.'s Patent*<sup>5</sup> [1995] RPC 568

<sup>6</sup> *Pumfrey J in Palmaz's European Patents*<sup>6</sup> (UK) ([1999] RPC 47

<sup>7</sup> *Nokia Corporation v IPCOM GMBH & Co KG (No. 3)* [2013] R.P.C. 5

*cages for fish, wherein comprising a floating platform, pontoon-type, with a buoyancy of at least 50 tons and is capable of being towed at sea where in its interior it possesses this oxygen generating system at 93 to 95% purity, and comprises a generator and power distribution, which provides electric power to the components of this oxygen generating system, where the latter consists essentially of means for generating pressurized air, means for generating pressurized oxygen, compressing means and means for the accumulation of high pressure oxygen and system control means for oxygen generation.*

29. Amended claim 1 of the granted patent reads as follows:

*Portable system for generating oxygen in situ and injecting oxygen at industrial levels in fish cages in the sea, comprising:  
a floating pontoon-type platform, capable of being towed at sea, the platform including;  
an oxygen-generating system configured to generate oxygen at 93 to 95% purity, and  
an electricity generation and distribution system, configured to provide electrical power to the components of the oxygen-generating system, wherein the oxygen-generating system comprises:  
means for generating pressurized air;  
means for generating pressurized oxygen from the pressurized air, means for controlling the compression and accumulation of high- pressure oxygen, and  
means for controlling the oxygen-generating system.*

30. The requester has asked me to consider whether two specific changes to the claims extend the subject matter beyond that which was originally disclosed:

- i) the removal of the feature “a buoyancy of at least 50 tons” from amended claim 1;
- ii) the introduction of an explicit link between the generated pressurised air and the generated pressurised oxygen in amended claim 1.

### **The removal of the 50 tons lower buoyancy limit for the pontoon**

- 31. The original claims included a limitation on the scale of the floating platform “comprising a floating platform, pontoon-type, with a buoyancy of at least 50 tons”. This feature has been removed from the amended claims which were granted.
- 32. When applying the three steps set out in *Bonze*<sup>3</sup>, step (1) requires me to ascertain what is disclosed in the application as filed.
- 33. The requester has argued that the feature of a buoyancy of at least 50 tons is “absolutely essential” given all of the claimed equipment of the system. They point out that the only embodiment disclosed in the description (page 4, line 7) has a buoyancy of at least 50 tons, and the use of “at least” is to ensure that the whole system is portable and keeps afloat at sea. It is their assertion that removal of this feature extends the subject matter beyond the scope of the original application.



34. The observer has countered that the disclosure of a buoyancy of “at least 50 tons” implicitly also discloses platforms having a buoyancy of less than 50 tons. In their observations in reply the requester states that this argument “does not make any logical sense” and they reiterate that this feature appears to be the technical requirement which enables the platform to achieve the functionality of being capable of being towed at sea. I agree with the requester on this point of construction. A limitation of “at least 50 tons” does not include within its scope platforms with a buoyancy of only 30 tons, for example. It means the platform must be capable of keeping at least 50 tons afloat, possibly more.
35. The observer notes that the omission from an amended claim of a feature specified in the original claim may be allowable if it is apparent from the whole document that its inclusion as a characterising feature was arbitrary and unnecessary. On the other hand, if the specification gave the impression that a feature was regarded as an essential element of the invention then amendment to omit this feature is not allowable. I agree with this approach, and it is in alignment with the approach set out in *Bonze*<sup>3</sup>. In their analysis of the original disclosure the observer argues that the original application does not disclose the feature of a buoyancy of at least 50 tons as an essential feature of the invention. They argue that the disclosure of the invention only requires that the platform with the equipment thereon has a sufficient buoyancy to float and to be capable of being towed at sea. They point to a passage stating, “The system...is arranged on a floating platform”. They go on to argue that the wording “**This** pontoon has a buoyancy of at least 50 tons and is capable of being towed at sea,” when discussing the exemplary embodiment, refers only to that specific embodiment.
36. Step (2) of *Bonze*<sup>3</sup> requires me to ascertain through the eyes of the skilled addressee what is disclosed, both explicitly and implicitly, in the patent.
37. The requester points out that by removing the feature of a “buoyancy of at least 50 tons” from claim 1 the patent extends the subject matter beyond that disclosed in the application as filed, as this is an essential technical feature of the invention. In their observations in reply the requester notes that they agree on the point that it is essential for the platform to be floating and to be capable of being towed at sea. The requester reiterates that the feature of the platform having a buoyancy of at least 50 tons is the technical feature required to achieve this.
38. The observer considers that, since amended claim 1 still defines “*a floating pontoon-type platform, capable of being towed at sea*”, it does not add subject matter. They argue that the patent discloses platforms having a buoyancy of at least 50 tons and platforms having a buoyancy of less than 50 tons. They also say that the limitation of a buoyancy of at least 50 tons was a feature of the embodiment and not an essential feature of the invention.
39. Step (3) of *Bonze*<sup>3</sup> requires me to compare the two disclosures and decide whether any subject matter relevant to the invention has been added whether by deletion or addition. It is evident that claim 1 of the granted patent does not include the limitation of a buoyancy of at least 50 tons.
40. As set out in paragraph 34 above, I do not agree that platforms with a buoyancy of less than 50 tons are implicitly disclosed in the original disclosure. I am also not

convinced by the arguments made by the observer which seem to suggest the phrase “this pontoon” means the specific scale applies only to a single embodiment and not the invention in general. In my opinion a skilled person reading the disclosure would understand that the scale of invention, and its ability to produce oxygen at “industrial levels”, is something that sets it apart from known systems. The specific scale set out by defining a “buoyancy of at least 50 tons” allows all of the plant and accumulation tanks to be transported so that oxygen can be generated and injected at the intended industrial levels. This feature is present in original claim 1 and the only embodiment described, and there is no suggestion that lesser buoyancies would suffice. I believe a skilled person would understand this feature to be an essential feature of the invention rather than an arbitrary and unnecessary one.

41. The skilled person learns from the amended claim 1 of the patent that there is no limitation regarding scale. I thus consider the amended claim to extend the subject matter beyond what was disclosed in the original application as filed.

### **The introduction of an explicit link between the generated pressurised air and the generated pressurised oxygen**

42. The requester has also asked me to consider if the introduction into amended claim 1 of an explicit link between the generated pressurised air and the generated pressurised oxygen adds matter by intermediate generalisation, as the claim does not also include that this is achieved by using the “Generator by Pressure Swing Adsorption” (PSA) system.
43. Using the *Bonze*<sup>β</sup> steps set out above, I will begin by ascertaining what the skilled person would consider is disclosed in the original application. The requester concedes that the patent does disclose, in claim 4 and on page 5, lines 5-16, that pressurised oxygen is generated from pressurised air. However they argue that since the only way disclosed in the description of generating the pressurised oxygen is using the PSA system, amending claim 1 to include a means for generating oxygen from pressurised air without including all the other features of this oxygen generating system is an unallowable intermediate generalisation. The observer argues that original claim 1 explicitly discloses an oxygen generating system with both means for generating pressurised air *and* means for generating pressurised oxygen included together. They assert that original claim 1 discloses these means in gas flow order. They argue that this is further confirmed by the fact that claim 4 sets out an *example* of an oxygen generating means – the “Generator by Pressure Swing Adsorption” system which takes pressurised air and generates oxygen. The precise oxygen generating system which is an optional feature of claim 4 (the PSA system) is not essential to the invention.
44. In their observations in reply the requester reasserts that they do not consider there to be a link between the pressurised air and the pressurised oxygen in claim 1 and that they are listed as separate and independent features. They argue further that the omitted features of claim 4 are essential precisely because of the high purity (93-95%) oxygen specified in claim 1 as it is the only technique disclosed in the application as filed for generating the desired purity levels.

45. When considering step (2) of *Bonzel*<sup>3</sup> it is necessary to ascertain what the skilled person would consider is disclosed in the patent. The requester considers linking the generating of pressurised oxygen from pressurised air to be an unallowable intermediate generalisation, e.g. the claim now includes within its scope means of generating pressurised oxygen from pressurised air which do not involve PSA. The observer does not dispute that the scope of amended claim 1 covers a more general oxygen generating system which generates pressurised oxygen from pressurised air. Their arguments submit that this was also true of the original application.
46. For step (3) I must compare the two disclosures and decide whether any subject matter relevant to the invention has been added whether by deletion or addition. I find the wording of original claim 1 “*the components of this oxygen generating system, where the latter consists essentially of means for generating pressurized air, means for generating pressurized oxygen, compressing means and means for the accumulation of high pressure oxygen*” to be clear that both the means for generating pressurised air and the means for generating pressurised oxygen are part of the oxygen generating system. I agree with the observer that they are included *together* as part of the oxygen generating system, and I agree that the skilled person reading the claim in the light of the description would understand them to be listed in gas flow order. Although PSA is the only method of generating oxygen from pressurised gas disclosed, it is my opinion that the skilled person would be aware that, at the priority date of the invention, other oxygen generation systems existed such as VSA, cryogenic distillation and membrane technology. They would therefore understand that the other features of the PSA system were not necessary to carry out the invention. I do not consider this amendment to add subject matter by intermediate generalisation.

## Inventive Step

47. The requester has firstly asked me to consider whether claim 1 of the patent comprises an inventive step in light of D1, when combined with common general knowledge, D4, D5 or D2.
48. To determine whether or not an invention defined in a particular claim is inventive over the prior art, I will rely on the principles established in *Pozzoli*<sup>8</sup>, in which the well-known Windsurfing steps were reformulated:

- (1)(a) Identify the notional “person skilled in the art”;
- (1)(b) Identify the relevant common general knowledge of that person;
- (2) Identify the inventive concept of the claim in question or if that cannot readily be done, construe it;
- (3) Identify what, if any, differences exist between the matter cited as forming part of the “state of the art” and the inventive concept of the claim or the claim as construed;
- (4) Viewed without any knowledge of the alleged invention as claimed, determine whether those differences constitute steps which would have been obvious to the person skilled in the art.

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<sup>8</sup> Pozzoli SPA v BDMO SA [2007] EWCA Civ 588

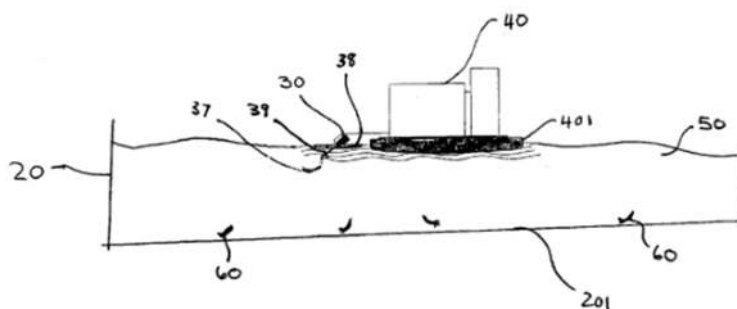
49. Step 1a of the *Pozzoli* principles require me to identify the notional “person skilled in the art”. The requester does not set out who they consider this to be in their request or their observations in reply, despite the observer noting that this is lacking. The observer considers the skilled person to be an aquaculture engineer. In the absence of any argument to the contrary from the requester, I agree with the observer in this regard.
50. Step 1b requires me to identify the common general knowledge of that person. In their request the requester does not clearly identify what they consider to be the common general knowledge of the skilled person, but they point to D1, D2 and D3 as evidence of the fact that floating platforms with oxygen generators that are used to inject high-purity oxygen into water were “common practice” at the date of the patent. The observer considers the common general knowledge of the skilled person to include well-known methods of injecting oxygen into fish tanks and fish cages using cylinders or thermos containers of oxygen.
51. In my opinion, the skilled person is an aquaculture engineer who will be aware that systems exist for oxygenating bodies of farmed water and that optimal oxygenation is beneficial for the production of healthy fish stock. They will be aware that injecting high purity oxygen is more efficient than using air. I think it likely that they will have some knowledge of systems outside of aquaculture which are employed to keep waters healthy and optimally oxygenated for the benefit of animal and plant life. I agree with the requester that floating platforms or barges which are used to oxygenate bodies of water with air or oxygen will be known to the skilled person, with D1 and D2 being examples of floating barges used in aquaculture and D3 an example of a floating barge used for oxygenating polluted water. I also consider that using oxygen from cylinders to inject into the water will be part of their common general knowledge.
52. Step 2 of the *Pozzoli* principles requires me to identify the inventive concept of the claim in question. The requester states “it is clear the inventors considered the installation of an oxygen generator on a moveable floating platform to be the key element of the invention”. The observer points to the inventive concept being an
- “oxygen-generating system and an electricity generation and distribution system on a floating pontoon-type platform, capable of being towed at sea. The oxygen-generating system is configured to generate oxygen at 93 to 95% purity, and the electricity generation and distribution system, are configured to provide electrical power to the components of the oxygen-generating system. In this way, the oxygen at 93 to 95% purity is generated on the floating pontoon-type platform and injected in situ in fish cages in the sea, thereby improving the production yields of fish, such as salmon”.*
53. The observer goes on to stress that high levels of oxygen purity are required to make oxygen transfer rates more efficient. It is my opinion that the inventive concept comprises more than an oxygen generator on a moving platform as suggested by the requester. The electrical energy generator and distribution system would appear to be essential for powering the oxygen generating means when the platform is at sea, and the use of high purity oxygen appears to be necessary to improve oxygen transfer in bodies of water. I consider the inventive concept to be:

*an oxygen-generating system and an electricity generation and distribution system on a floating pontoon-type platform, capable of being towed at sea. The oxygen-generating system is configured to generate high purity oxygen, and the electricity generation and distribution system provides electrical power to the oxygen-generating system.*

54. Step 3 of the *Pozzoli* principles requires me to identify what, if any, differences exist between the matter cited as forming part of the “state of the art” and the inventive concept of the claim. The observer has helpfully set out a version of the claim with labelled features which I shall reproduce below. Areas highlighted in bold represent where the observer thinks the differences lie:

(1A) *Portable system for generating oxygen in situ and injecting oxygen at industrial levels in fish cages in the sea, comprising:*  
 (1B) *a floating pontoon-type platform, capable of being towed at sea, the platform including;*  
 (1C) *an oxygen-generating system **configured to generate oxygen at 93 to 95% purity, and***  
 (1D) *an **electricity generation and distribution system, configured to provide electrical power to the components of the oxygen-generating system,***  
 (1E) *wherein the oxygen-generating system comprises:*  
 (1F) *means for generating pressurized air;*  
 (1G) *means for generating pressurized oxygen **from the pressurized air,***  
 (1H) *means for controlling the compression and accumulation of high-pressure oxygen, and*  
 (1I) *means for controlling the oxygen-generating system.*

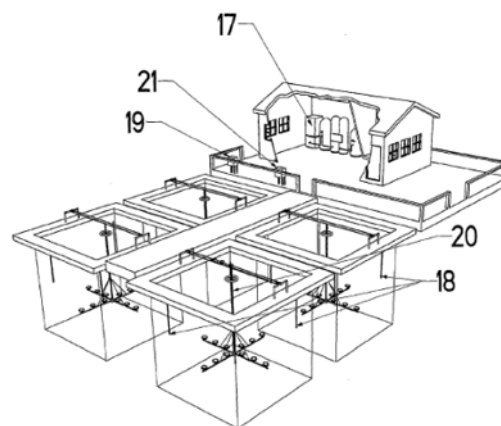
55. The first approach set out by the requester starts with the disclosure in D1. D1 describes a floating oxygen generating system used in farming shrimp in containment vessels 20. In one embodiment an oxygen generator 40 is provided on a floating platform (401, fig.4) and an oxygen injector 30 injects oxygen from the generator into the water. Sensors sense when the system is low on oxygen and a monitoring system can activate the generator.



56. When starting from the matter disclosed in D1, the requester notes that the suitability of the system for use at sea is at least implied. The observer does not appear to dispute the suitability of this equipment for use at sea but does point out that D1 is intended for use on a pond or containment vessel. Fish cages can be placed in the

sea without being far out on the open waters so in my opinion D1 would at least be suitable for use in coastal sea waters.

57. The requester acknowledges that D1 does not explicitly describe generating oxygen from pressurised air, i.e. feature 1G. However, they argue that the suggested use of either vacuum swing adsorption (VSA) or Pressure Swing Adsorption (PSA) plant in D1 implies the generation of oxygen from pressurised air, as well as control of the compression and accumulation of the oxygen. They point to D1a to support this implicit disclosure. D1a is a Wikipedia page dated 10 January 2010 which describes the PSA process. This describes passing pressurised air through a vessel containing an adsorbent bed. With regards to feature 1G, the observer argues that the paragraphs in D1 referred to by the requester relate to a wheeled platform rather than a floating system. They also submit that D1a at most describes PSA as an economic choice for small-scale production of reasonable purity of oxygen from air.
58. I agree with the requester on this point. The PSA process uses pressured air in the presence of adsorbent materials to separate the components of gases, and this is implied in the use of this process. Paragraph 0044 of D1 describes how the oxygen can be generated by adsorption techniques such as VSA or PSA. It discusses how said oxygen generator 40 can be moved around the periphery of the containment vessels or “mounted on a floatable skid”. Paragraph 0045 also goes on to describe an oxygen generator 40 mounted on a floatable platform as shown in figure 4. As such it is clear that the PSA system, which necessarily requires pressurised air, can be provided on a floating platform. The requester does not elaborate on why the compression and accumulation of oxygen is implied other than stating that it is inevitable that pressure will be controlled and pressurised oxygen accumulated. In the absence of any contradicting argument from the observer I will accept this point.
59. The requester acknowledges that two more features are not explicitly disclosed in D1 - 1C and 1D. The first of these, 1C, is the generation of oxygen having a purity level of 93-95%. They point out that D1 does however disclose a purity level of 90% or more (paragraph 0094), and the patent does not provide any special technical effect for the claimed purity level of 93-95%. They assert that the purpose would be to achieve a purity level that is as high as possible with the available equipment. They refer to D4 which uses a fixed PSA oxygen generating system (shown below) in aquaculture and discloses an achievable purity level of 90-95% (page 5, line 21 and page 13, line 19).

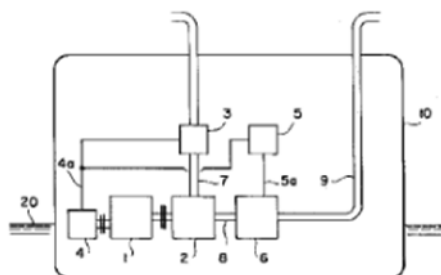


60. The observer refutes this by arguing that D4 is not evidence of common general

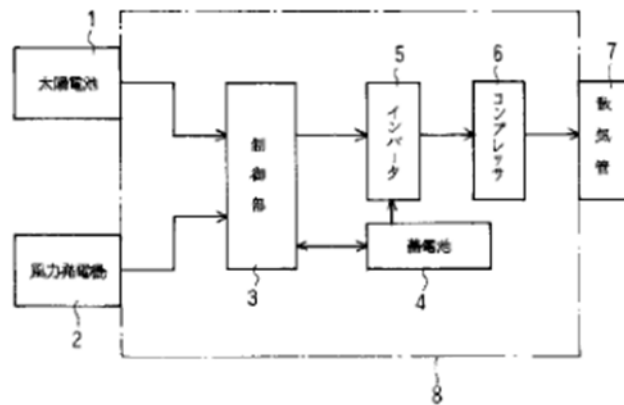
knowledge. I agree that a single patent document is not normally a good indicator of the knowledge the skilled person could be assumed to have. However, D4 is useful here to support a purported matter of fact, that purities of 90-95% can be achieved using a PSA system, rather than to suggest what a skilled person would know. D1 already discloses a PSA system in use to generate the oxygen.

61. Step 4 of *Pozzoli* requires me to determine whether the differences between what is disclosed in the prior art and the invention constitute steps which would have been obvious to the person skilled in the art. I agree with the requester that the feature 1C, the generated oxygen having a purity level of 93-95%, is not inventive. D1 discloses purities of "90% or greater" and it is clear from the disclosure of D4 that PSA oxygen generation means at least can achieve purities of 90-95%. The skilled person would understand that in order to achieve the most efficient oxygen transfer in the water the highest purity of injected oxygen is desired. As such, if the oxygen generating system is capable of generating oxygen levels in the range 93-95% then the skilled person would consider using this range.
62. The second feature which the requester acknowledges is not present in D1 is the electricity generation and distribution system 1D. The requester argues that for an off-shore, portable, platform based oxygen generating system it is obvious to use an on board power generator even without reference to specific prior art. They also argue separately that it would be obvious to add the solar cells and wind power generator of D5, or the diesel generator of D2, to the system set out in D1.
63. In response to this point the observer does not present me with an argument, they only reiterate that D2 and D5, being patent documents, are not part of the common general knowledge.
64. D2 describes a floating barge used in the aquaculture industry to aerate seawater when farming yellowtail. A PSA oxygen generator is provided on board to generate ozone, which is mixed with air and injected into seawater. The barge 10 comprises a PSA system powered by an on-board diesel engine 1. The ozone generator 6 is powered by current generated by the alternator 5.

【圖3】



65. The disclosure in D5 relates to an offshore aeration device located on a ship or floating pier. Solar cells 1 are used to charge a battery 4 which is used to power the compressor 6 which feeds compressed air to the sea via diffusion tube 7.



66. While it may be necessary for a far off-shore platform to comprise some sort of energy source for an oxygen generating plant, I do not agree that an on-board power generator is necessarily obvious. A source of stored energy such as batteries could be contemplated. The requester's arguments all start from the disclosure in D1 and revolve around whether it would be obvious to adapt the system described in D1 to meet the requirements of the claim. It is notable that D1 is completely silent on how the plant disclosed therein is powered. In my opinion, a skilled person, starting from the disclosure in D1, would not necessarily conclude that a power source must be located on the platform at all. D1 is intended for use in containment vessels on land such as the above ground Tilipia production tank set out in example 1, or in an "intercostal area". I have understood "intercostal area" to mean areas of water near coastal land. In my opinion the skilled person would understand that although the platform is moveable about the containment vessel it would most likely be connected to an on-shore power source. Given that energy production plant is likely to be heavy and expensive, I am not convinced a skilled person would consider adding it to the platform of D1 without using hindsight. The diesel generator of D2 is included on an off-shore vessel which requires an off-shore energy source. Since D1 is not described as being used far from the shore I do not think a skilled person would find it obvious to adapt it in light of D2 without using hindsight.
67. The text of the patent specifically explains on page 3, lines 10-14, why solar panels would not be suitable to power a system of the scale envisaged by the invention. A very large area of solar panels would be required to produce enough energy. The system set out in D5 only powers a compression pump that takes atmospheric air and injects it into the sea. A skilled person would realise that to power an oxygen generation system for the injection of high purity oxygen at the "industrial levels" required by the invention, solar panels would not be a feasible energy source. I do not think the skilled person would find it obvious to adapt the system of D1 in light of D5.
68. In my opinion claim 1 is inventive in light of D1 combined with common general knowledge, D4, D5 or D2.
69. The requester has also asked me to consider whether claim 1 lacks an inventive step starting from the disclosure in D3, when combined with common general knowledge or D4.



70. D3 is an article from an online magazine Edie. It was published in April 2005 and discusses how the company BOC have been injecting oxygen into natural waters since 1972 to address issues with water quality caused by pollution. The requester argues that the same technology is equally useful for aquacultural farms.
71. The devices described in D3 include an oxygenation craft called the "Thames Bubbler". This is equipped with oxygen generation plant and an injection system. The barge is described as "self-powered". It is described as having a capacity of 30 tons per day.
72. The requester argues that although this document does not describe the claimed oxygen purity levels of 93-95%, commonly used PSA systems would produce these levels. If this is not enough to show a lack of inventive step, then combining the disclosure with D4 does. D4 is described in paragraph 58 above. It discloses an on-shore PSA plant producing oxygen for adding to fish cages with a purity of 90-95%.
73. The observer comments that the Thames Bubbler has fixed Vitox systems, not floating ones. They seem to base this assertion on the passage on page 3, paragraph 2 "6 fixed Vitox systems were designed and installed to mix and oxygenate a 1.5km body of water 200m wide". In their observations in reply the requester argues that this means the Vitox systems are fixed to the barge or vessel and does not suggest that the water oxygenation system is not floating.
74. The observer also argues that D3 is not common general knowledge and was not available to the public. This is refuted by the requester in their observations in reply, where they assert that the vessels have been used in public since 1980 and the article itself was published before the priority date. On this point I agree with the requester – the published article is part of the prior art as it was available to the public before the priority date of the invention. As far as I can tell the requester is not claiming it to be common general knowledge, rather they are using it as a starting point to argue a lack of inventive step in light of common general knowledge (or in combination with D4).
75. The observer agrees that the missing feature from D3 is the level of oxygen purity of 93-95%. They submit that there is no evidence that this was part of the common general knowledge at the priority date. They argue that D3 does not teach that river barges may be used in the open sea for fish cages. They consider that a skilled person would not modify D3 in this way without the benefit of hindsight.
76. Steps 1a, 1b and 2 of the *Pozzoli* principles are set out above. Step 3 requires me to establish the differences between the prior art and the invention. D3 comprises a very brief disclosure of several different systems. In my opinion it is not really enough disclosure to enable the skilled person to understand or implement the necessary interactions between power plant, oxygen generating plant, control means and storage means set out in claim 1. D3 describes several different oxygenation vessels:
  1. The 1980 "prototype river oxygenation craft". This used PSA plant to generate oxygen and had a 10 tonne per day oxygenation capacity. There is no mention of this craft being "self-powered".

2. The 1988 "Thames Bubbler". This had an undisclosed means of generating oxygen at 30 tonnes per day. It was "self-powered" and had continuous monitoring stations.
  3. The 1999 "Thames Vitality". A mobile reactive system. No disclosure of the type of oxygen producing plant or the vessel being self-powered.
  4. The 1986 Hong Kong system. Six fixed Vitox systems were installed. No disclosure of the plant being mobile, no clear disclosure of the type of oxygen generating means, no disclosure of the system being "self-powered".
77. Even if I were to accept that the skilled person would consider that any PSA oxygen generating plant would produce oxygen at the purity required by claim 1, this type of plant is only clearly disclosed as being used on the 1972 prototype craft. There is no disclosure of this craft being "self-powered" or having any other type of electricity generating system on board, it may well have been powered by on-shore means. The skilled person would not consider adapting the craft in such a substantial way (in terms of weight and expense) without using hindsight.
78. The only craft which is clearly disclosed as "self-powered" is the 1988 "Thames Bubbler", but since the type of oxygen generating means used on this craft is not clearly disclosed it is not obvious that it would be generating oxygen at the required high levels of purity set out in claim 1.
79. D3 does not provide sufficient information about the other two crafts to establish how they are powered, what type of oxygen generating plant they use and thus what purity of oxygen is generated.
80. As such I do not consider D3, considered in the light of the skilled person's common general knowledge, to show a lack of inventive step in claim 1. D4 demonstrates that a land-based PSA oxygen generating plant would likely produce oxygen in the required purity range set out in claim 1. The skilled person would be aware that using high purity oxygen is advantageous, but the entire disclosure of D4 would not be part of their common general knowledge. Many other oxygen generating technologies were available to the skilled person at the time. In my opinion the skilled person would not combine a floating, self-powered barge D3 with the specific fixed, land-based oxygen generating system of D4 without using hindsight.
81. Since I consider claim 1 to be novel and inventive, I also consider the dependent claims to be novel and inventive.

## **Opinion**

82. I consider amended claim 1 to extend the subject matter beyond that originally filed by the omission of the feature "a buoyancy of at least 50 tons".

83. I do not consider the explicit link between the means for generating pressurised oxygen from the pressurised air in amended claim 1 to add subject matter by intermediate generalisation.
84. I consider amended claim 1 be novel and inventive in light of D1 when combined with common general knowledge, D4, D5 or D2.
85. I consider claim 1 to be novel and inventive in light of D3 when combined with common general knowledge or D4.

### **Application for review**

86. Under section 74B and rule 98, the proprietor may, within three months of the date of issue of this opinion, apply to the comptroller for a review of the opinion.

Emma Tonner  
Examiner

*Emma Tonner*

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### **NOTE**

*This opinion is not based on the outcome of fully litigated proceedings. Rather, it is based on whatever material the persons requesting the opinion and filing observations have chosen to put before the Office.*