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Datasheet for the decision of 27 February 2024

Case Number: T 1786/22 - 3.3.05

Application Number: 16815432.6

Publication Number: 3313786

IPC: B01D61/00, C02F1/44, C12G3/08, B01D61/02

Language of the proceedings: EN

Title of invention:
METHODS OF DEWATERING OF ALCOHOLIC SOLUTIONS VIA FORWARD OSMOSIS AND RELATED SYSTEMS

Patent Proprietor:
Porifera, Inc.

Opponent:
Aquaporin A/S

Headword:
DEWATERING OF ALCOHOLIC SOLUTIONS VIA FORWARD OSMOSIS/Porifera

Relevant legal provisions:
EPC Art. 83, 54, 56, 113(1)
RPBA 2020 Art. 12(6)

Keyword:
Late-filed objection - should have been submitted in first-instance proceedings (yes)
Late-filed evidence - should have been submitted in first-instance proceedings (yes)
Sufficiency of disclosure - (yes)
Novelty - (yes)
Inventive step - (yes)
Right to be heard - violation (no)

Decisions cited:
G 0003/14, T 1076/21, T 0019/90

Catchword:

Europäisches Patentamt
European Patent Office
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Beschwerdekammern

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Case Number: T 1786/22 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 27 February 2024

Appellant: (Opponent)	Aquaporin A/S Nymøllevej 78 2800 Lyngby (DK)
Representative:	Nordic Patent Service A/S Bredgade 30 1260 Copenhagen K (DK)
Respondent: (Patent Proprietor)	Porifera, Inc. 1575 Alvarado Street San Leandro, CA 94577 (US)
Representative:	D Young & Co LLP 120 Holborn London EC1N 2DY (GB)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 24 May 2022 concerning maintenance of the European Patent No. 3313786 in amended form.**

Composition of the Board:

Chairman	E. Bendl
Members:	J. Roider
	O. Loizou

Summary of Facts and Submissions

I. The appeal by the opponent (appellant) lies from the interlocutory decision of the opposition division to maintain patent EP 3 313 786 B1 in amended form based on the then auxiliary request 17 filed during the oral proceedings before the opposition division.

This request differs from the claims as granted mainly in the deletion of claims relating to the system for dewatering an alcoholic solution.

II. The following documents, which were already cited in the opposition proceedings, are relevant here:

D1 US 5,281,430 A
D3 US 3,216,930 A
D10 WO 2014/144778 A1

III. In the statement of grounds of appeal, the appellant cited the following new documents:

D17 WO 2014/144778 A1 (remark: same as D10)
D18 WO 2013/032742 A1
D19 US 7,955,506 B2

IV. Claim 1 of the main request (claim 1 as granted) in the appeal procedure reads as follows:

1.1 *"1. A method for dewatering a solution, the method comprising:*
1.2 *introducing a feed solution comprising water and a permeable solute into a first side (115) of a forward osmosis system (100);*

1.3 *circulating a draw solution through a second side (125) of the forward osmosis system (100),*

1.4 *the draw solution having a concentration of said permeable solute greater than or equal to the concentration of said permeable solute in the feed solution;*

1.5 *generating a diluted draw solution in the second side (125) of the forward osmosis system (100),*

1.6 *the diluted draw solution having a higher water concentration than the draw solution; and*

1.7 *producing a product stream including a concentrated feed solution from the first side (115) of the forward osmosis system (100),*

1.8 *the concentrated feed solution having a concentration of said permeable solute greater than or equal to the concentration of said permeable solute in the feed solution."*

V. Dependent claims 2-9 (claims 2-9 as granted) concern particular embodiments of the invention.

VI. The appellant's key arguments can be summarised as follows:

Admission of D17, D18 and D19

D17, D18 and D19 were *prima facie* prejudicial to the maintenance of the patent and should thus be admitted into the proceedings.

Sufficiency of disclosure

The patent was not sufficiently disclosed for a number of reasons which are assessed in detail below in the Reasons.

Novelty

D1 anticipated the subject-matter of claim 1.

Inventive Step

Starting from D1, column 12, first paragraph, the skilled person would add alcohol to the draw solution to increase the amount of water removed from the beverage. The skilled person wishing to remove only water would have added alcohol to the draw solution in an amount at least equalling the concentration in the feed solution.

The subject-matter of claim 1 moreover lacked an inventive step in view of D3.

Right to be heard

The appellant alleges that their right to be heard has been infringed because the opposition division did not address inventive step arguments regarding D3 in the decision under appeal.

VII. The patent proprietor's (respondent's) key arguments can be summarised as follows:

Admission of D17, D18 and D19

D17 was already on file as D10 but no objection under Article 54(1) and (2) EPC was raised based on D10. D18 and D19 were used to attack claim 1 as granted. They should have been filed in the proceedings leading to the impugned decision.

Sufficiency of disclosure

The objections raised instead related to the clarity of the claims.

Novelty

The objection starting from D1 was not sufficiently substantiated. Moreover, D1 did not disclose that a

specific type of permeable salt was present in a higher concentration in the draw solution than in the feed solution.

Inventive Step
D1 did not render the subject-matter obvious to the skilled person. Moreover an argument based on D1, column 12 was new and should not be admitted into the proceedings. D3 was an even more remote document.

Right to be heard
The right to be heard had not been violated.

VIII. Substantive requests:

(a) The appellant requested that the decision under appeal be set aside and the patent be revoked.

(b) The respondent requested that the patent be maintained on the basis of the main request, or in the alternative that the patent be maintained in amended form on the basis of one of auxiliary requests 1-31, all requests filed with the reply to the grounds of appeal.

Reasons for the Decision

1. Admission of new documents and objections

1.1 D17 and the objection under Article 54(1) and (2) EPC based thereon

The opponent requested that D17 be admitted because it was *prima facie* prejudicial to the maintenance of the patent. They referred to paragraphs [0018]-[0025] and

the embodiment according to Fig. 1.
They argued that the filing of D17 and the new objection under Article 54(1) and (2) EPC was a response to opposition division's decision. For procedural reasons the opponent did not raise all objections in the proceedings before the opposition division.

The Respondent requested that D17 or at least the objections starting from D17 not be admitted.

The Board notes that D17 was cited as D10 in the notice of opposition and therefore forms part of the proceedings.

However, the objection under Article 54(1) and (2) EPC, starting from D17, was first raised with the statement of grounds of appeal, and is therefore an amendment of the appellant's case in the sense of Article 12(4) RPBA.

The present claim 1 corresponds to claim 1 as granted. There is no apparent reason why the new objection could not have been raised earlier, particularly since, according to the appellant, D10/D17 was *prima facie* relevant. Moreover, the appellant did not invoke any such reason.
The Board hence finds that the objection should have been raised in the proceedings leading to the decision under appeal (Article 12(6) RPBA, second sentence).

The new objection based on D10/D17 is thus not admitted into the proceedings (Article 12(6) RPBA).

1.2 D18 and D19

D18 and D19 were first filed with the statement of grounds of appeal to support a new objection under Article 56 EPC and are therefore an amendment of the appellant's case (Article 12(4) RPBA).

Claim 1 of the present main request corresponds to claim 1 of the patent as granted.
There is no apparent reason why this objection could not have been presented in the proceedings leading to the decision under appeal nor did the appellant invoke any such reason. Introduction of the new objection only at the appeal stage is thus not justified.

The new documents D18 and D19 are not admitted into the proceedings (Article 12(6) RPBA).

2. Main request

The main request consists of method claims 1-9 of the patent as granted. The system claims as granted were all deleted.
With respect to claim 1 as granted, claim 1 of auxiliary request 17 however contained two indefinite articles "a" instead of definite articles "the". As apparent from the impugned decision, point 5, it was the intention of the patent proprietor to restrict auxiliary request 17 to the method claims as granted and the impugned decision relies thereon.
By filing a main request which included the corrected claim 1, i.e. claim 1 as granted, the patent proprietor merely brought the request in line with the decision under appeal (see point 3.1 of the reply to the appeal).

The appellant did not object to this correction.

The corrected main request is therefore admitted into the proceedings.

2.1 Sufficiency of disclosure, Article 100(b) EPC / Article 83 EPC

Sufficiency of disclosure can only be denied if there are serious doubts substantiated by verifiable facts (T 19/90, point 3.3; T 1076/21, point 1.1.1).

This is not the case here.

2.1.1 According to the appellant, it was impossible for the skilled person to determine the meaning of the "permeable solute" because several examples of solutes were described as being both permeable and impermeable. This feature was moreover unclear because the permeability was a characteristic of the barrier not of the substance.

The expression *permeable solute* was already contained in the subject-matter of claim 1 as granted and is therefore not open to an objection under Article 84 EPC (G 3/14, catchword).

Permeability is indeed a characteristic of the barrier. However, as is not disputed, the substance which can permeate must also be specified.

Despite the inaccurate terminology, it is immediately clear that in the present context, the feature "permeable solute" expresses that the solute must in principle be capable of permeating through the membrane used in a specific implementation of the claimed process. It is evident that a specific substance does not qualify as a "permeable solute" in a specific

implementation of the claimed process if it cannot in principle permeate through the membrane.

Contrary to the appellant's opinion, the subject-matter of claim 1 requires a membrane since this is immediately implied by the feature "forward osmosis system". The claim does not define a specific membrane, which merely results in a broad scope. No evidence was provided demonstrating that the skilled person was not able to implement the claimed process

2.1.2 The appellant disagrees with the opposition division because it considered the terms "selectively permeable membrane" and "semipermeable membrane" to be interchangeable.

It is acknowledged that the appellant disagrees with the opposition division. No further arguments were provided concerning this aspect. However, disagreeing with the impugned decision is not enough to substantiate the appellant's opposite view and demonstrate a deficiency of the decision which would justify its review by the Board.

2.1.3 The appellant argued that the skilled person could not carry out the invention over the whole claimed range because it was not restricted to alcoholic beverages.

The appellant did not provide any evidence to this effect. A broad claim is not *per se* a reason to deny sufficiency of disclosure. There is no reason to assume from the outset that the method cannot be successfully applied to other liquid mixtures.

2.1.4 The appellant argued that the patent did not contain a single detailed example.

The lack of an example is not *per se* a reason to deny sufficiency of disclosure. Moreover the patent does provide examples of the invention, particularly the method of dewatering of alcohol solutions (Fig. 1 and 2, paragraph [0015] et sqq.). There is no evidence that the principle of this process cannot be applied to other uses.

2.1.5 The hypothetical example at the top of page 4 of the statement of grounds of appeal would, according to the appellant, dilute the feed solution and concentrate the draw solution, contrary to what the invention aimed to achieve.

It is not credible that the skilled person would be incapable of modifying the process so as to arrive at the desired result. The appellant had no difficulty in estimating the effect of 10% glucose in the feed solution in the hypothetical example.

2.1.6 The appellant argued that determining a suitable membrane placed an undue burden on the skilled person.

It would seem that the skilled person has no difficulty in selecting the membrane depending on the substances involved in a specific separation task.

The appellant did not provide a single example where a suitable membrane consistently failed to be selected on the basis of the skilled person's common general knowledge.

2.1.7 Furthermore, it was alleged that the patent was insufficiently disclosed because it did not define how the concentration was determined. The appellant

referred to the possibility of using the mass concentration, the molar concentration, the number concentration, and the volume concentration.

The subject matter of claim 1, compares the concentration of the permeable solute in different instances of the process. A similar comparison is also made with the water concentration. It is not convincing that the chosen system of units of measurement has any relevance to the outcome of these comparisons. Evidence to the contrary was not provided.

2.1.8 The appellant argued that claim 4 lacked sufficiency of disclosure because it did not define whether alcohol was a permeable solute or not.

When it comes to assessing sufficiency of disclosure, the disclosure of the whole patent in suit is relevant. The examples disclosed therein repeatedly disclose that alcohol is a permeable solute.

In summary, the patent in suit sufficiently discloses the claimed invention.

3. Novelty, Article 54(1) and (2) EPC

Irrespective of whether or not this objection is sufficiently substantiated by the appellant, D1 does not disclose that the feed and draw solution contain a permeable solute in the sense of claim 1.

The appellant argued that the salt or sugar were the permeable solute.

With regard to the sugar, D1 explicitly discloses that it is not permeable (col. 9, paragraph bridging to

col. 10).
Therefore sugar does not correspond to the permeable solute in the sense of claim 1.

With regard to the salt, the appellant further argued that D1 disclosed in column 10, lines 37-40 that the draw solution comprised the salt components of the juice at a molar concentration at least three to five times greater than the undiluted juice. The definite article *"the"* rendered it clear that the salt components in the draw solutions corresponded to the salt components in the juice.
Moreover, the subject-matter of claim 1 at issue did not specify what technical features were implied by the term *"permeable"*.
They further argued that the patent in suit, column 4, lines 41-42 disclosed that the solute qualified as permeable even if the membrane retained almost 99% of it. Consequently, if the membrane allowed the permeation of just slightly more than 1% of the solute, it was considered permeable to that solute and the solute was considered a permeable solute.
Only membranes with very high retention rates were effectively outside of the scope of the subject-matter of claim 1. It was clear to the skilled person that the membrane in D1 had a retention rate lower than 99%, at least for small salts, such as NaCl.

D1 does not disclose anything as to the permeability of salts. The fact that a salt is contained in the feed at a lower concentration than in the retentate does not imply that it could permeate across the membrane. Such a change in concentration can already be observed when the permeation of water reduces the overall volume flow. A change in concentration cannot in itself reveal whether or not the salt could permeate through the

membrane.

Even if, for the sake of argument, it is assumed that small salts can somewhat permeate through the membrane, the subject-matter of claim 1 is not directly and unambiguously disclosed.
As acknowledged by the appellant, the juice referred to in D1, column 10, lines 37-40 may also comprise large organic salts which may not permeate through the membrane at a rate of 1% or less. The draw solution in D1 is a designed fluid (D1, column 12, lines 10-15) comprising large organic salts and possibly permeable salts. However, the salt components referred to in column 10, lines 37-40 do not need to be present in the same proportions as in the juice. The draw solution may contain a lower proportion of small (perhaps permeable) salts and a larger proportion of large (impermeable) salts than the juice, such that the requirement for the permeable solute to be present in the draw solution at the same or a higher concentration than in the feed solution is not necessarily met.

In summary, it is speculative to assume the existence of a salt component which is capable of permeating through the membrane and is moreover present in the draw solution in a higher concentration than in the feed solution.

The subject-matter of claim 1 is thus not disclosed in D1.

4. Inventive Step, Article 56 EPC

4.1 The present invention is directed to a method for dewatering a solution, such as beverages, by forward

osmosis.

4.2 The appellant considered D1 and D3 to be suitable starting points for an inventive step objection.

D1 discloses a method for removing water from beverages by forward osmosis (column 5, line 47 et sqq.).

D3 discloses a process for recovering water from beverages by forward osmosis (column 2, line 4 et sqq.).

Both documents qualify as a starting point for an inventive step objection.

4.3 D1 alone

4.3.1 Notwithstanding the question of the admission of a new argument based on D1, column 12, the subject-matter of claim 1 is inventive over D1.

4.3.2 In the respondent's view, the patent aims to improve the efficiency and performance of a method for dewatering a feed solution (reply to the grounds of appeal, paragraph 144).

4.3.3 It is proposed to solve this technical problem by the features of claim 1 which differs from D1 in feature 1.4, which reads:

> *the draw solution having a concentration of said permeable solute greater than or equal to the concentration of said permeable solute in the feed solution;*

The respondent argued that claim 1 moreover differed from D1 by feature 1.8.

However, in view of D1, column 10, lines 48-50 the concentration of alcohol, the permeable solute, remains constant in the feed solution even as water is removed, thus disclosing feature 1.8.

4.3.4 In view of the cited reply, paragraph 143 and the patent in suit, paragraph [0009], the distinguishing features neither provide enhanced efficiency and performance, as alleged in the patent proprietor's reply, paragraph 144, nor is it apparent that the claimed process is more efficient or performs better than the process in D1.

The patent in suit instead aims at controlling the selectivity of the forward osmosis separation process because the concentration gradient over the membrane is reduced for the permeable solute. The permeable solute is thus selectively retained in the feed solution.

However, D1 also addresses the problem of controlling the selectivity of the forward osmosis separation process (see paragraph bridging from column 6 to 7; column 12, first paragraph).

The technical problem stated by the respondent must hence be reformulated to be that of providing an alternative measure for controlling the selectivity of a forward osmosis separation process, in which several substances of the feed solution can permeate through the membrane.

4.3.5 It remains to be determined whether the proposed solution is obvious.

Document D1 teaches adjusting the sugar content in the

draw solution. Large amounts of sugar make it possible to remove water faster than alcohol, whereas lower amounts of sugar make it possible to remove alcohol faster than water (column 6, last paragraph; column 12, first paragraph). The skilled person would therefore immediately be directed to try different amounts and perhaps also different types of sugar.

D1, column 12, lines 5 - 6 moreover discloses that the large amount of sugar in the draw solution can be reduced by adding alcohol to the draw solution.
The opponent concluded from this disclosure that the skilled person would also consider significantly increasing the alcohol content because there was no special technical effect achieved by the patent in suit, which distinguished a draw solution with an alcohol content below the feed solution from a draw solution with an alcohol content above the feed solution.

However, there is no teaching directing the skilled person to an alcohol concentration in the draw solution which exceeds the alcohol concentration in the feed. D1 focuses on the use of a draw solution mainly comprising water and sugar.

If the skilled person aimed at removing a permeate with a high proportion of water, they would use a draw solution with a high concentration of sugar. Only if they wanted to use a draw solution with a lower sugar content, would they add some alcohol to it.
There is however no pointer for the skilled person that the concentration of alcohol in the draw solution may be as high as in the feed solution. D1, column 10, lines 48-50 rather points to the opposite, by disclosing maintaining the relative percentage of

alcohol in the beverage. When upgrading the beverage by removing water, some alcohol must also be removed. This cannot be achieved with a draw solution containing alcohol in at least the same concentration as the feed solution.

4.3.6 Therefore D1 does not render the subject-matter of claim 1 obvious to the skilled person.

4.4 D3

D3 is less suitable than D1 as a starting point for an inventive step objection.

D3 requires that the membrane be permeable only to the desired liquid (column 3, lines 4-6; column 2, lines 4-14). However, the idea of the present invention starts from a process in which the membrane is also permeable to another substance in the feed.

An inventive step objection starting from D3 has thus no prospect of success.

4.5 On the basis of the available documents, an inventive step has to be acknowledged.

5. Right to be heard, Article 113(1) EPC

The appellant alleges that their right to be heard was infringed since the decision under appeal did not include their arguments under Article 56 EPC in view of D3.

5.1 It is stated in the minutes and the decision under appeal that both parties and the opposition division agreed on that D1 was the most promising springboard

for inventive step (page 12, first full paragraph). A discussion took place and the parties put forward their arguments. The result of the discussion was that the closest prior art (D1) did not lead to the conclusion that the claimed subject-matter lacked an inventive step. Further evaluation of more remote documents, such as D3, would not have led to a different conclusion. In addition, no request was made to the opposition division on behalf of the appellant for D3 to be discussed.

5.2 The appellant's right to be heard has not been infringed since they were given the opportunity to present their case regarding inventive step.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

L. Malécot-Grob E. Bendl

Decision electronically authenticated