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Datasheet for the decision of 17 April 2007

Case Number: T 0028/04 - 3.3.05

Application Number: 97306170.8

Publication Number: 0826636

IPC: C02F 1/46

Language of the proceedings: EN

Title of invention:
Water containing dissolved electrolytic hydrogen, and method and apparatus of production thereof

Applicant:
Nihon Trim Co. Limited

Opponent:
-

Headword:
Hydrogen containing water/NIHON TRIM

Relevant legal provisions:
EPC Art. 123(2), 83, 84, 56

Keyword:
"Inventive step (yes)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0028/04 - 3.3.05

D E C I S I O N
of the Technical Board of Appeal 3.3.05
of 17 April 2007

Appellant: Nihon Trim Co. Limited
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 13 August 2003 refusing European application No. 97306170.8 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: M. Eberhard
Members: J.-M. Schwaller
H. Preglau

Summary of Facts and Submissions

I. The appeal was lodged against the decision of the examining division to refuse European patent application No. 97306170.8.

II. The following prior art documents were *inter alia* relied upon during the examination proceedings:

D1 = English translation of JP 7-185550 and WPI abstract

D2 = EP-A-470841

D3 = English translation of JP 7-265859 and PAJ abstract

III. In the contested decision, the examining division held that the subject-matter of claim 1 of the main request then on file (directed to an electrolytic hydrogen dissolved water) lacked an inventive step over D1 or D2 and that the subject-matter of claims 1 of the 1st to 6th auxiliary requests filed with letter dated 4 June 2003 (all directed to a method of producing electrolytic dissolved water) lacked an inventive step, starting from D3 as the closest prior art, because the distinguishing feature(s) did not present unexpected effects or advantages over the cited prior art.

IV. In the statement of grounds of appeal, the appellant withdrew the previous main request and requested that a patent be granted on the basis of the claims of one of the 1st to 6th auxiliary requests filed with the letter dated 4 June 2003.

V. In two communications dated respectively 12.04.06 and 01.02.07, the board raised objections under Articles

123(2) and 83 EPC. Regarding the allowability of the amendments in the claims then on file, the board observed that there was no basis in the application as filed for the use of a diaphragm in the electrolyzing step in combination with a step wherein hypochlorous acid was removed from the cathode water. In the objection under Article 83 EPC, the board noted that since HClO was produced at the anode and since the cathode and anode chambers were separated by a diaphragm, assuming that the said diaphragm was not permeable to the HClO (or $HClO^-$) species, no movement of these species would occur from the anode chamber to the cathode chamber. It was therefore not understood why hypochlorous acid (or $HClO^-$ ions) could be found in the cathode water derived from the electrolysis step of claim 1 of each of the requests then on file. The question thus arose whether the application as filed contained all the features necessary for carrying out the claimed method, in particular for ensuring the presence of HClO (or $HClO^-$ ions) in the cathode chamber.

In the first of the communications mentioned above, the board also observed inter alia that the process of claim 1 of each of the requests then on file referred to a purifying step ("*obtaining purified water*") and the independent apparatus claim of each of the requests on file referred to a means for obtaining purified water, without however respectively clearly defining the type of purification sought and the means necessary to achieve said purification, thus leaving the reader in doubt as to the meaning of said features (Article 84 EPC).

The board further pointed out that, in view of the technical problem defined by the appellant, a neutralisation step appeared to be necessary to make the alkaline cathode water suitable for human consumption. Under these circumstances, claim 1 of the main request and of each of the 1st to 3rd auxiliary requests then on file did not meet the requirements of Article 84 taken in combination with Rules 29(1) and (3) EPC that any independent claim had to contain all the technical features essential to solve the problem underlying the invention.

VI. In reply to the above mentioned communications, the appellant submitted amendments and observations respectively on 22 August 2006 and 30 March 2007. Eight sets of claims were in particular filed on 30 March 2007 as a main and 1st to 7th auxiliary requests, in replacement of those previously filed, i.e. those submitted on 22 August 2006. Concerning the amendments, it is observed that the first amended handwritten line in claim 1 of each of the requests, except in the 6th auxiliary request, has been overwritten incidentally by EPO's fax annotations, but as confirmed by the appellant, the missing line reads "*removing the sodium, potassium, magnesium and calcium ions*".

Claims 1 and 4 of the main request read:

"*1. A method of producing electrolytic hydrogen dissolved water comprising the steps of:*
preparing raw water including at least sodium, potassium, magnesium and calcium ions, removing the sodium, potassium, magnesium and calcium ions from the raw water by distillation or filtration with a reverse

osmosis membrane to obtain purified water, adding NaCl as a catalyst for promoting electrolysis in said purified water, electrolyzing said purified water containing said added catalyst in electrolysis apparatus comprising a cathode and an anode separated by a diaphragm, obtaining cathode water derived from said electrolysis step, and adding a buffer into said derived cathode water to neutralize said cathode water.

4. An apparatus for producing electrolytic hydrogen dissolved water comprising:
means for distilling or filtering raw water with a reverse osmosis membrane to obtain purified water from which sodium, potassium, magnesium and calcium ions have been removed, NaCl supply means for supplying NaCl to promote electrolysis in said purified water, means for electrolyzing said purified water containing NaCl in electrolysis apparatus comprising a cathode and an anode separated by a diaphragm, to produce cathode water, and means for adding a buffer into said cathode water to neutralize said cathode water."

VII. Oral proceedings took place on 17 April 2007 in the absence of the appellant.

VIII. The appellant submitted in writing that the method and apparatus claims involved an inventive step over D1 because the electrolytic hydrogen dissolved water produced thereby had a higher concentration of dissolved hydrogen in comparison to the water produced by known methods and apparatus. Said water could also reduce and eliminate radicals (superoxide anion radicals) that cause DNA damage, and was made harmless

to the human body by neutralisation following removal of hypochlorous acid ions from the cathode water.

IX. The appellant requested to set aside the contested decision and to grant a patent on the basis of claims 1-6 according to the main request submitted on 30 March 2007, or in the alternative, on the basis of the claims as set out in one of the 1st to 7th auxiliary requests submitted on the same day. He also requested the reimbursement of the appeal fee.

Reasons for the Decision

1. *Allowability of the amendments (main request)*

The features "*removing hypochlorous acid from the cathode water*", "*means for removing hypochlorous acid from said cathode water*" having been deleted from respectively independent claims 1 and 4, the objection under Article 123(2) EPC raised by the board in both communications no longer exists.

The claims of this request have a basis as follows in the application as filed:

- claim 1: claims 9 and 12; page 5, lines 16-21; page 9, line 21 to page 10, line 2 as filed
- claim 2: claim 11 and page 5, lines 19-22
- claim 3: page 6, lines 18-20
- claim 4: claims 14 and 12; Figure 2; page 9, line 21 to page 10, line 2; page 5, lines 16-21
- claims 5 and 6: respectively claim 15 and 16.

Therefore the requirements of Article 123(2) EPC are complied with.

2. The above-mentioned deletion of features from claims 1 and 4 renders obsolete as well the objection under Article 83 EPC raised in the board's communications.

3. The type of purification sought and the means necessary to achieve said purification having furthermore been defined in independent claims 1 and 4 ("*distilling or filtering with a reverse osmosis membrane*" and means therefor), the board's objection of lack of clarity raised under Article 84 EPC is thereby overcome too.

The objection under Article 84 EPC and Rule 29(1)(3) EPC that technical features essential for making the cathode water suitable for human consumption were lacking in the independent claims has also been overcome, the feature "*and adding a buffer into said derived cathode water to neutralize said cathode water*" having been recited in claims 1 and 4.

4. The subject-matter of independent claims 1 and 4 is novel with respect to the cited prior art documents.

5. Owing to the amendments to the claims and in contrast to the contested decision, D3 no longer represents the closest prior art for the following reasons.

D3 (last full paragraph at page 1 of the English translation; claim 1) is concerned with a method for generating bactericidal acidic water of low pH value. A raw water such as groundwater and tap water is subjected to an ion exchange by a hydrogen ion type

exchange resin, sodium chloride is added to said ion-exchange processed water or to a mixture of said ion-exchange processed water and raw water, and the water is electrolyzed so that the pH of the electrolytic water is not more than 6.0. In the specific embodiment of Figure 1 described at page 3, line 5 to page 4, line 16 of said translation, the electrolytic device used in the process is partitioned by a diaphragm 4c, thus providing a cathode chamber 4d and an anode chamber 4e. The electrolytic acidic water having a pH of not more than 6, preferably 3-4, is provided from the anode chamber via the electrolytic water discharge channel 10a (page 4, lines 14-16). A water, which is described as being alkaline, is discharged (via channel 10b) from the cathode chamber 4d and stored in a tank 6 (Figure 1 and page 3, lines 25-27).

D3 does not indicate which potential use this alkaline water may have, let alone that it can be applied to the human body; D3 thus does not deal with the technical problem of the present application. Under these circumstances and in view - as explained hereinafter - of the more relevant disclosure of D1, the board does not consider D3 as representing the closest prior art to the subject-matter of claims 1 and 4 of the main request.

6. D1 (claim 1) discloses a water generated electrolytically at a cathode side by electrolyzing water through a diaphragm, said cathode water containing 2-6 ppm of dissolved oxygen. The examples describe that said cathode water furthermore contains hydrogen ions and was given to drink to patients suffering from chronic hepatitis for one month. The

liver function of patients was then tested. Since D1 discloses a cathode water containing dissolved hydrogen which is applicable to the human body, this document represents the closest prior art.

7. D1 does not describe whether the raw water to be electrolyzed includes sodium, potassium, magnesium and calcium ions. Despite this lack of information and even if this was implicitly the case, because as stated in the contested decision, raw water always contains these species, claim 1 of the main request would nevertheless distinguish from the disclosure of D1 by the following features:

- removing the sodium, potassium, magnesium and calcium ions from the raw water by distillation or filtration with a reverse osmosis membrane to obtain purified water,
- adding NaCl as a catalyst for promoting electrolysis in said purified water, and
- adding a buffer into the derived cathode water to neutralize said cathode water.

8. The appellant argued that the electrolytic hydrogen dissolved water produced by the claimed method and apparatus had a higher concentration of dissolved hydrogen than electrolytic hydrogen dissolved water produced by known methods and apparatus, and consequently could reduce and eliminate radicals (superoxide anion radicals) that caused DNA damage.

The alleged effects of providing a higher dissolved hydrogen concentration or a reduction or elimination of radicals that cause DNA damage cannot be retained for the formulation of the technical problem to be solved

with respect to D1 because there is no evidence at all in the file that the said effects were effectively obtained.

9. Under these circumstances, starting from D1, the problem to be solved by the subject-matter of claim 1 may be seen in the provision of another process for producing a water which contains dissolved hydrogen and is applicable to the human body (see in this respect page 3, lines 3-5 and page 6, lines 16-18 of the application).

In view of the statements and data in the patent application, in particular in Tables 1 and 2 and on page 6, lines 16-18 and page 16, lines 15-17, it is credible that this problem has actually been solved by the method as defined in claim 1.

10. The solution, as proposed in said claim, also involves an inventive step for the following reasons.

10.1 As indicated in item 5. *supra*, D3 describes the production of an alkaline water in the cathode chamber of an electrolytic device partitioned by a diaphragm. D3 indeed discloses a purification step of the raw water to be electrolyzed, this step is however different from the one presently claimed. In D3, the addition of NaCl to the purified water is disclosed, but not the addition of a buffer to the cathode water. Concerning the alkaline water produced in the cathode chamber, D3 only describes that it is stored in a storage tank 6, without giving further information as regards its potential use, let alone that it may be applied to the human body.

D3 deals with a different problem, namely providing a method for generating bactericidal acidic water of low pH value and the acidic water, rich in hypochlorous acid, is obtained in the anode chamber.

Under these circumstances, the skilled person faced with the problem of providing a water which contains dissolved hydrogen and is applicable to the human body would not be prompted in view of the teaching of D3 to pick out of the process of D3 the particular feature that NaCl is added, and to use this particular feature in the process of D1 in order to solve the problem stated above. Moreover, the combination of the teachings of D1 and D3 would not lead to the claimed process since none of these documents disclose the claimed purification step and the addition of a buffer to the cathode water. Therefore, any conclusion that it would be obvious to arrive at the claimed process by combining the teachings of D3 and D1 would be based on an hindsight analysis.

10.2 D2 addresses the problem of producing a sterilized water containing hypochlorous acid at a good yield with no deposition of calcium on the cathode. The produced water is suitable among others as drinking water and for hand washing (page 2, lines 54-58; page 7, lines 3-5). To solve this problem, the method as defined in claim 1 of D2 comprises mixing a sodium chloride-added water and a hydrogen chloride-added water, electrolyzing the mixture in an electrolytic cell not having a diaphragm and diluting the resultant electrolyzed water with water.

Contrary to the subject-matter of claim 1 of the present request, the process of D2 expressly avoids the use of a diaphragm. D2 furthermore neither describes a step of removing sodium, potassium, magnesium and calcium ions from the raw water sent to the electrolytic cell nor a step wherein a cathode water is derived from the electrolysis step and treated with a buffer to neutralize it. Both NaCl and HCl are added to the electrolytic cell. Thus the teaching of this document cannot give an incentive to the skilled person in particular to add NaCl in the process of D1 which, on the contrary, involves the use of a diaphragm in the electrolytic cell.

10.3 The remaining documents cited in the European search report do not contain further information which would point towards the claimed solution of the problem stated in item 9. *supra*.

10.4 Accordingly, for the reasons indicated above, the subject-matter of process claim 1 cannot be considered obvious to a person skilled in the art in view of the cited prior art.

10.5 Independent apparatus claim 4 is specifically designed for carrying out the process according to claim 1. Its subject-matter is novel over the cited prior art, in particular over the closest prior art document D1, from which it differs by the following features:

- means for distilling or filtering raw water with a reverse osmosis membrane,
- NaCl supply means,
- means for adding a buffer into the cathode water derived from the electrolysis step.

Starting from D1, and similarly to the process according to claim 1, the problem to be solved by the subject-matter of present claim 4 may be seen in the provision of another apparatus for producing a water which contains dissolved hydrogen and is applicable to the human body.

The considerations indicated in items 10.1 to 10.4 *supra* - although concerning process claim 1 - apply analogously to present apparatus claim 4; its subject-matter therefore also involves an inventive step.

10.6 Claims 2 and 3 being dependent on method claim 1 and claims 5 and 6 on apparatus claim 4, these claims therefore also meet the requirements of Article 56 EPC.

11. *Reimbursement of the appeal fee*

According to Rule 67 EPC, one of the conditions to be fulfilled for reimbursing the appeal fee is that reimbursement is equitable by reason of a substantial procedural violation.

The appellant argued that the examining division failed to address some of the perfectly reasonable arguments raised during examination of the application. He also referred to the letters of 15 August 2001 and 4 June 2003, without however clearly stating which arguments had not been taken into consideration by the first instance. The appellant also complained that a fundamental distinction between the method of D3 and that of claim 1 of the 1st auxiliary request then on file seemed to have been completely ignored, although

this distinction had been pointed out in its letter of 4 June 2003. The said distinction concerned the cathode water derived from the electrolysis apparatus. The appellant submitted that the examining division incorrectly asserted that D3 disclosed a method in which water containing hypochlorous acid was obtained from a **cathode** of an electrolysis apparatus, as required by claim 1 of the 1st auxiliary request then on file.

Concerning the "perfectly reasonable arguments" which have not been taken into consideration by the examining division, the board pointed out in its communication dated 12 April 2006 that it was not clear which "perfectly reasonable arguments" had not been taken into account in the absence of details from the appellant's side in this respect. In its further submissions, the appellant did however not discuss this point at all. In these circumstances, the appellant's allegation cannot be endorsed by the board.

Concerning the purported wrong interpretation of D3 by the examining division, even if this would have been the case, according to established case law (see in particular Case Law of the Boards of Appeal, 5th edition 2006; VII.D.15.4.5, 7th paragraph), a wrong interpretation of a document does not constitute a substantial procedural violation.

It follows from the above that the reimbursement of the appeal fee cannot be allowed.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside

2. The case is remitted to the first instance with the order to grant a patent on the basis of the main request (claims 1 to 6) submitted on 30 March 2007, and a description and figures to be adapted.

3. The request for reimbursement of the appeal fee is rejected.

The Registrar: The Chairman:

C. Vodz M. Eberhard