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D E C I S I O N
of 22 February 2006

Case Number: T 1191/02 - 3.3.05

Application Number: 97919670.6

Publication Number: 0900764

IPC: C02F 1/28

Language of the proceedings: EN

Title of invention:

Water purifying method and device utilizing fluid physical property changes at active carbon interface by a dynamo-electric phenomenon

Applicant:

Kabushiki Kaisha Takai Seisakusho, et al

Opponent:

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Headword:

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Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step (no) "

Decisions cited:

-

Catchword:

-



Case Number: T 1191/02 - 3.3.05

D E C I S I O N
of the Technical Board of Appeal 3.3.05
of 22 February 2006

Appellant:

Kabushiki Kaisha Takai Seisakusho
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Shizuoka (JP)

Representative:

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Decision under appeal:

Decision of the Examining Division of the
European Patent Office posted 5 September 2002
refusing European application No. 97919670.6
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: M. M. Eberhard
Members: H. Engl
H. Preglau

Summary of Facts and Submissions

- I. European patent application No. 97919670.6 was refused by a decision of the Examining Division posted on 5 September 2002.

The two amended claims filed with letter of 18 June 2001 on which the decision is based read as follows:

"1. Device for purifying water comprising a water passage filled with active carbon, said passage being nonlinear and having a shape similar to an S-curve and a pair of electrodes provided at the entrance of the water passage for applying an electric field to the untreated water entering the water passage."

"2. Method for purifying water comprising the steps of passing the untreated water through an electric field and passing the water through active carbon in a nonlinear passageway similar to an S-curve."

- II. The reason for the refusal was that the claims lacked an inventive step having regard to document

D1: GB A 2 261 874

in combination with document

D2: DE A 33 42 228.

The Examining Division found it implausible that any contaminated water could be purified, and in particular purified to drinking water quality, as is stated in the description, by the claimed method and device

irrespective of the degree and nature of the contamination and independently of process parameters, such as distance between the electrodes and water flow rate. The feature that the water followed an S-shaped pathway through the active carbon bed was known from D2 and the combination of the teachings of D1 and D2 was obvious to the skilled person. The technical problem allegedly connected with said feature, namely the problem of avoiding the so-called "water short-cut", was not credibly solved.

III. A notice of appeal against this decision was filed on 24 October 2002 and the appeal fee paid at the same time. The statement of grounds of appeal was received on 22 November 2002.

IV. The appellant argued that the essential structure of the invention only consisted of a pair of electrodes and a water passage filled with active carbon; the electrode configuration, distance, material, surface area, voltage applied, quantity and type of active carbon and other parameters would be determined by the skilled person according to the content and concentration of the contaminants in the water to be treated and the required level of water quality after treatment. Having regard to D1, the appellant argued that the document failed to teach the provision of an S-type water passage. Document D2 would not disclose the treatment of water in an electric field. In the appellant's view, it could not have been expected that the combination of said features from documents D1 and D2, namely providing an electrical field, an active carbon bed and an S-type passageway for the water would result in a superior water treatment method and device.

The appellant also filed additional practical data for a water treatment setup in accordance with the claimed subject matter.

- V. On 26 April 2005 the Board issued a communication in which the claimed invention was considered obvious having regard to D1 as the closest prior art, in combination with document D2.
- VI. With letter of 25 October 2005, the appellant filed new claims 1 and 2 replacing all previous claims. Said new claims no longer contain the feature of the S - type water passage. Claim 1 reads as follows:

"1. Device for purifying water comprising a water passage filled with active carbon and a pair of electrodes provided at the entrance of the water passage for applying an electric field to the untreated water entering the water passage."

The appellant requested in writing that the contested decision be set aside and that patent be granted on the basis of claims 1 and 2, as filed with letter of 25 October 2005.

- VII. The appellant essentially argued that the claimed subject matter differed from D1 in that D1 failed to disclose an adsorption bed of **activated carbon**. It was argued that in the claimed device and method, "*...while flowing between electrodes, the organic compound which is included in the raw water dissociates a combination with an inorganic compound, and then, an inorganic compound is ionized and becomes an ion uniting inorganic compound.*" "The organic compounds which had

electric charge energy" would then flow into the activated carbon waterway, where the electric charge would be lost and the organic compound absorbed [sic] by the active carbon. The latter in accordance with the claimed invention would function as an absorption [sic] material and not as a filtration material. In the claimed process the water would flow out before electrolysis occurs. The appellant furthermore submitted data illustrating the claimed method with details of the test run conditions and of the achieved water analysis.

VIII. In a second communication dated 7 December 2005, the appellant was informed of the provisional opinion of the Board concerning inventive step. The object of the application, starting from D1, was seen in providing a further method and device for water purification. The solution to this problem appeared to lack an inventive step, because the use of activated carbon was known from D2 and

D3: Kirk - Othmer, "Encyclopedia of Chemical Technology", 4. Edition, Volume 4, John Wiley & Sons, New York, 1992, pages 1016, 1017, 1027;

(a new document annexed to the communication). The appellant was summoned to oral proceedings.

IX. Oral proceedings took place on 22 February 2006 in the absence of the appellant who was duly summoned, but had announced with Telefax of 21 February 2006 that he would not attend the hearing.

Reasons for the Decision

1. The appeal is admissible.
2. *Novelty*

The Board considers that the subject matter of claim 1 differs from document D2 by the presence of a pair of electrodes provided at the entrance of the water passage for applying an electric field to the water entering the water passage.

In the appellant's view document D1 discloses a **charcoal filter**, but fails to disclose an **adsorption bed** provided with **active (activated) carbon** in the water passageway.

As becomes apparent from D1 (page 3, second and third complete paragraphs, and page 4, second paragraph), the charcoal bed in D1 is particularly well suited for removing **dissolved** species, such as ions (metals ions, chorines, and nitrates), salts and other chemical impurities. This being a clear indication of adsorption, rather than mere mechanical filtering, the Board cannot accept the argument that D1 would only disclose a charcoal **filter** and not an **adsorption bed**.

As to the possible differences between charcoal and active carbon, the Board has pointed in its communication dated 7 December 2005 to the fact that according to the example in the appellant's letter of 25 October 2005, page 4, the active carbon is derived from an organic source, namely (burnt) palm husks, whereas D1 discloses charcoal derived from burnt

coconut vegetation (see page 3, second complete paragraph; claim 2). In accordance with D3 (see pages 1016, 1017), activated carbon is a substance formed from carbonaceous precursors by carbonisation and activation. During said activation process, functional groups are formed on the carbon surface which render the activated carbon chemically reactive and influence its adsorptive properties (see D3, page 1016, last paragraph).

It is on that basis that the Board considers the subject matter of claim 1 to differ from the disclosure of D1 by the presence of **active carbon** instead of charcoal in the water passage. Thus, novelty of the claimed subject matter is acknowledged.

3. *Inventive step*

- 3.1 The Board concurs with the Examining Division in that document D1 represents the closest prior art. D1 discloses a water filter comprising a bed containing two different carbon compounds, such as two different charcoals, and two electrodes creating an electric field through which the contaminated water passes (see Figures 1, 2 and 3; page 3, first complete paragraph; page 6, paragraphs 1 and 2). In preferred embodiments, the charcoal filter comprises a mixture of bone and coconut charcoal and is particularly well suited for removing metal ions and chlorine/nitrates from solution (see claim 2; page 3, third paragraph; page 4, second paragraph). The electrodes (preferably applying an alternating electric field) are intended for killing bacteria in the water (see page 5, penultimate paragraph, page 9, second paragraph). In accordance

with D1, water to be treated percolates down the carbon filter bed and rises up a central riser tube (see Figure 1; page 7, last paragraph).

- 3.2 In accordance with the description (page 2, first paragraph), the object of the application consists in providing a device and method for removing all kinds of natural and artificial, inorganic and organic substances and microorganisms from water which permits purification of the water to drinking water.

Evidence on file, but not contained in the description (Experimental Report filed with letter of 17 May 2002) suggests that the claimed method and device are indeed capable of removing impurities including bacteria from the water, reduction of turbidity and chromaticity, and reduced COD (chemical oxygen demand). However, the exact conditions under which the tests were run are not reported, and, for instance in the case of the water flow speed of 20 to 800 cm/s, not recited in the claims. The Board is therefore not convinced that the object of achieving drinking water purity can be obtained with the features of the claims.

The object of removing particulate and bacterial impurities as well as chemical impurities, from water appears already to be solved by the prior art disclosed in D1 (see in particular page 6, first and second paragraphs, page 9, second paragraph). The appellant did not submit evidence that the claimed subject matter allows purification of water more efficiently than the prior art, in particular more efficiently than D1. The statement in the grounds of appeal (page 5, penultimate paragraph) to this effect is a mere allegation

unsupported by evidence. Moreover, the Board considers that a superior performance has been argued only in connection with the feature relating to the S - shaped water passage, which is no longer a feature of the current claims. The Experimental Report filed with letter of 17 May 2002 merely demonstrates that purification takes place, but no comparison has been made with the closest prior art D1. The same consideration applies to the additional data submitted in the statement of the grounds of appeal, pages 3 and 4, points 1 to 10. The examples on page 4 of the letter dated 25 October 2005 are also not suitable to demonstrate a superior performance over D1, as no comparison with the closest prior art (D1) has been made.

Therefore, the Board cannot acknowledge that the claimed subject matter provides an improvement over D1.

- 3.3 Consequently, the technical problem of the instant application starting from D1 as the closest prior art consists in providing a further device for water purification.
- 3.4 The solution claimed in device claim 1 involves, as the only feature distinguishing the claimed subject matter over D1, the use of active carbon. As has been already pointed out in the Board's communication dated 7 December 2005, this is known from D2 and from D3. More specifically, D3 at page 1027, third paragraph, states that *"Treatment of drinking water accounts for about 24 % of the total activated carbon used in liquid-phase applications"*; and that *"...treatment by activated carbon is an important additional step in*

many plants to remove toxic and other organic materials for safety and palatability". The skilled person would thus not hesitate to substitute charcoal in D1 by activated carbon, in order to remove dissolved species and to arrive at an alternative method and device of water purification. No comments from the appellant on this analysis were received by the Board.

3.5 Additional arguments submitted by the appellant on pages 2 and 3 of the letter dated 25 October 2005 which are mainly concerned with the mechanism of impurity removal do apparently not bear direct relationship to the features of device claim 1 and cannot, thus, be taken into account for the assessment of inventive step. In particular, the argument that no water electrolysis occurs concerns a feature which is not stated in the claim.

3.6 The subject matter of claim 1 therefore lacks an inventive step, contrary to the requirements of Article 56 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

A. Wallrodt

M. Eberhard