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D E C I S I O N
of 2 February 2005

Case Number: T 0741/02 - 3.3.9

Application Number: 93907273.2

Publication Number: 0630267

IPC: A61L 2/20

Language of the proceedings: EN

Title of invention:
Treatment of liquid on demand

Applicant:
Burris, William Alan

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 84, 123(2), 54, 56

Keyword:
"Amendments - added subject-matter (no)"
"Novelty (yes)"
"Inventive step (yes) after amendment"

Decisions cited:
-

Catchword:
-

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Case Number: T 0741/02 - 3.3.9

D E C I S I O N
of the Technical Board of Appeal 3.3.9
of 2 February 2005

Appellant: Burris, William Alan
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 27 February 2002 refusing European application No. 93907273.2 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: P. Kitzmantel
Members: A.-T. Liu
M.-B. Tardo-Dino

Summary of Facts and Submissions

I. Appeal was lodged against the decision of the Examining Division refusing European patent application No. 93 907 273.2 directed to a "Treatment of liquid on demand".

II. Of the five prior art documents cited by the Examining Division, reference will be made in the present decision to:

D1: US-A-4 599 166 and
D2: US-A-4 619 763.

III. At the oral proceedings on 2 February 2005, the Appellant filed a new set of 13 claims with correspondingly adapted pages of the description and the drawings. All the other requests submitted heretofore were relinquished on the same occasion.

IV. Claim 1 on file reads as follows:

"A liquid treatment system connected to a pressurized source (11) of untreated liquid to provide treated liquid on demand, said system comprising a generator (20) that makes an ozone containing gas, said system further comprising:

a. a valved liquid passageway for conducting said liquid from said source (11) through said system to an outflow means (15) via a contact region;

b. a pumping system (21, 25) for exclusively receiving said ozone containing gas from said

generator (20) and untreated liquid from said pressurized source (11);

c. a containment chamber (18, 48, 58) downstream of said pumping system arranged for containing said liquid at a liquid pressure lower than the pressure of said source (11);

d. a control system (12) arranged for operating said generator (20), said pumping system (21, 25), and said valved liquid passageway during each treatment cycle to deliver said untreated liquid and said ozone containing gas to said contact region and to deliver treated liquid to said outflow means from said liquid treatment system; said control system being operable automatically to initiate said treatment cycle in response to a demand event indicating a demand for treated liquid; said control system being arranged to operate during each treatment cycle compatibly with said outflow means (15) of treated liquid from said treatment system, said outflow means (15) being chosen from the group consisting of:

- o a gravity outflow means operating in response to opening an output valve for said treated liquid

- o a passive outflow means, operating in response to opening an inflow valve under control of said control system so that liquid inflow causes outflow of said treated liquid, and

o an active outflow means, operating in response to actuating a pump controlled by said control system to cause outflow of said treated liquid;

e. a demand switch (32,44) arranged in communication with said control system (12) to provide said demand event by changing state in response to a manually activated system operable in a predetermined one of a pair of direct and indirect configurations, said direct configuration comprising arrangement of said manually activated system for directly operating said demand switch (32,44), and said indirect configuration comprising arrangement of said manually activated system for operating an output valve (14) for drawing treated liquid from a treated liquid reservoir (13), the liquid level of which controls the state of said demand switch; and

f. a sensor (30) arranged for sensing the concentration of ozone in said treated liquid and wherein said control system (12) is arranged to be responsive to said sensor (30) for treating said liquid."

V. The Appellant's arguments may be summarised as follows:

– Claim 1 was essentially a combination of original claims 1 and 14. In addition, it was restricted to embodiments not involving a recirculation of treated water through the pumping system. The feature concerning the location of the containment chamber was reworded for better clarity.

- In consideration of the amendments to Claim 1, the closest prior art teaching was now represented by D2.

- With respect to D2, the technical problem to be solved was the provision of a liquid treatment system which allowed monitoring of the water quality without having recourse to recirculation of treated water.

- The solution to this problem was the incorporation of a sensor.

- Although the systems of D1 included a sensor for measuring the redox-potential of the water, these, as well as the treatment systems according to D2, both resorted to water recirculation. Therefore, even a combination of these teachings would not lead to the systems as claimed.

VI. The Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the following documents, filed together during the oral proceedings:

- Claims 1 to 13,
- description pages 1, 1a, 2 to 11,
- Figures 1,2 and 3.

Reasons for the Decision

1. *Amendments (Article 84 and 123(2) EPC)*

1.1 Claim 1 is essentially a combination of Claims 1 and 14 of the International application, as published under the PCT (hereinafter referred to as original application). In addition, it contains amendments relative to the pumping system (feature b)) and to the location of the containment chamber (feature c)).

1.2 Re: Feature b)

The stipulation that the pumping system (21, 25) be "for exclusively receiving ozone containing gas from the generator (20) and untreated liquid from the pressurized source (11)" is supported by the original description that "Inflow of untreated liquid through a venturi 21 can draw ozone containing gas from generator 20 ... An alternative, ... uses a pump 25 in place of venturi 21. Pump 25 has inputs for both untreated liquid ... and ozone containing gas" (see paragraph bridging pages 4 and 5). This feature is also illustrated in original Figures 1, 3 and 5.

Treatment systems, in which the pumping system (21, 25) receives liquid from the treatment chamber (18), are thus no longer encompassed by the present wording of Claim 1. These embodiments, as illustrated in original Figures 2 and 4, and the corresponding parts of the description, have been deleted from the present application documents.

1.3 Re: feature c)

As established at the oral proceedings, the expression "contact region" in feature c) of original Claim 1 does not have a counterpart in the description. As a consequence, it is ambiguous as to its meaning and is thus not suitable for clearly defining the position of the containment chamber. Its replacement with the expression "pumping system" makes clear that the containment chamber is situated downstream of the pumping system. This amendment is supported by the original description indicating that "Initial contact of the liquid and gas occurs upstream of chamber 18 in either of two ways, as shown in Figure 1" (see paragraph bridging pages 4 and 5).

1.4 Claims 2 to 13 correspond to Claims 2 to 13 of the original application. As a consequence, the present set of Claims 1 to 13 meets the requirements of Article 123(2) EPC. The claims also comply with the requirements of Article 84 EPC.

2. *Novelty*

None of the cited documents discloses a liquid treatment system comprising the combination of features of Claim 1. This will be clear from the following discussion of inventive step.

3. *Inventive step*

3.1 The liquid treatment system according to Claim 1 is characterised by the following essential features:

a. a valved passageway for conducting liquid from a pressurized source,

b. a pumping system for exclusively receiving ozone containing gas from a generator and untreated liquid from a pressurized source,

c. a containment chamber downstream of the pumping system,

d. a control system which initiates a treatment cycle in response to a demand event, and

f. a sensor for sensing the concentration of ozone in the treated liquid, with the control system arranged to be responsive to said sensor for treating the liquid.

As indicated in the original application, the aim of the claimed invention is to allow treatment of liquid with equipment made small enough and inexpensive enough to deal with small quantities of liquid on a demand basis (page 1: "Technical Field").

3.2 D2 also relates to a self-contained water purification system which may be efficiently packaged in a relatively modest volume (column 1, lines 22 to 25). It is therefore considered to comprise the closest prior art.

D2 discloses a system which includes a pressurized source of water, an ozone generator, a venturi injector for mixing ozone-enriched atmosphere and the water passing therethrough, and means for recirculating water

from a reservoir or holding tank for at least partial repeated passages through the same venturi (column 2, lines 13 to 34). The system, as illustrated in Figure 1, has a means which allows for the recirculation of water in the reaction tank/circulation tank 12 when there is no demand. On a signal from control 36, which is activated by a timer, the cycle pump 20 draws the water from the tank 12 and passes it through the venturi injector 24 where the ozone content of the water is enriched. The ozone enriched water leaves the venturi and mixes with the raw water during the fill cycle and flows into the tank 12 (column 3, line 56 to column 4, line 2). In the modified version according to Figure 2, raw water is supplied to a reaction vessel and treated with ozone-enriched atmosphere through a cycle pump which draws the water from that vessel. The treatment functions in the same way as shown in Figure 1 : the water is also enriched with ozone by recirculation upon a signal from a timer-activated control (column 4, line 62 to column 5, line 32). To fulfil that function, the venturi injector is necessarily connected to a branch line provided for recycling treated water from the reaction/cycle tank.

3.3 The Board accepts the Appellant's submissions that the technical problem to be solved with regard to D2 is the provision of a system which monitors and assures the quality of the liquid, without having recourse to the recirculation of treated water.

3.4 In order to solve the indicated technical problem, the application proposes a system incorporating a sensor which detects the concentration of dissolved ozone in

the treated liquid and communicates with the control system (Claim 1, feature f)).

3.5 As submitted by the Appellant, the sensor monitors the concentration of dissolved ozone in the treated liquid, which is communicated to the control system. The latter in turn regulates the quantity of ozone produced and the quantity of water entering the system from the pressurised liquid supply in order to ensure that the treated liquid is purified adequately. The Board therefore can accept that the present technical problem is solved by the liquid treatment system as claimed. The question is whether the proposed solution implies an inventive step with regard to the available prior art.

3.6 In D2, it is mentioned that : "when desired, as indicated by the water quality, the control panel 68 will open the solenoid valve 54A and recirculate the water internally as above indicated without demand being placed on the system's water output" (column 5, lines 32 to 36). D2, however, does not elaborate on the meaning of the statement "as indicated by the water quality". In consequence, the Board finds that D2 is at best vague about the incorporation of a means for measuring the water quality.

Such a device is expressly disclosed in D1, directed to a system in which the water quality is monitored by measuring the redox-potential of the water. However, the desired level of water quality is also achieved here by a recirculation of the treated water (column 3, lines 20 to 47). The venturi (injector 5) is accordingly connected to the circulation line 2

(Figure 1 with column 2, lines 8 to 18 and Figure 2 with column 4, lines 8 to 22).

A combination of the teaching according to D1 with that of D2 therefore would not lead to the system according to Claim 1 which expressly precludes the option of having the pumping system (pump 25 or venturi 21) connected to a circulation line for treated water (see item IV: Claim 1, feature b) and item 1.2 above).

3.7 As a corollary of the above, the Board considers that the prior art documents D1 and D2 would not, whether individually or in combination, lead the skilled person seeking to solve the existing technical problem to design a system according to Claim 1, which involves safeguarding an adequate level of liquid treatment by monitoring the ozone concentration without recycling of the treated liquid.

3.8 None of the other documents on file discloses a liquid treatment system including a sensor according to feature f) of Claim 1. An inventive step is thus present.

3.9 The dependent Claims 2 to 13 are directed to preferred embodiments of the system according to Claim 1; the systems concerned therefore also involve an inventive step.

4. The description and the drawings have been correctly adapted to the present set of claims (Article 84 EPC).

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 following documents:

   - Claims 1 to 13,
   - description pages 1, 1a, 2 to 11
   - Figures 1, 2, 3

   all filed during the oral proceedings.

The Registrar: The Chairman:

G. Röhn P. Kitzmantel