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D E C I S I O N
of 27 September 2002

Case Number: T 0345/99 - 3.3.5

Application Number: 91910941.3

Publication Number: 0533754

IPC: B01D 24/16

Language of the proceedings: EN

Title of invention:
Filtration apparatus and method

Applicant:
ANGLIAN WATER SEVRICES LTD., et al

Opponent:
-

Headword:
Water purification/ANGLIAN WATER

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - yes, simplification of known process"

Decisions cited:
-

Catchword:
-



Case Number: T 0345/99 - 3.3.5

D E C I S I O N
of the Technical Board of Appeal 3.3.5
of 27 September 2002

Appellant: ANGLIAN WATER SERVICES LTD.
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Representative: Burrows, Anthony Gregory
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 3 November 1998
refusing European patent application
No. 91 910 941.3 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: R. K. Spangenberg
Members: G. J. Wassenaar
M. B. Günzel

Summary of Facts and Submissions

I. European patent application No. 91 910 941.3, publication No. 0 533 754, was refused by a decision of the Examining Division.

II. The Examining Division held that the subject-matter of claim 1 then on file lacked novelty over

D1: FR-A-2 538 800.

During the examination procedure inventive step was also discussed and further reference was, inter alia, made to

D2: EP-A-0 347 296

D5: GB-A-1 601 380

D6: US-A-4 246 118

D11: JP-A-2-17908.

III. The appellants lodged an appeal against this decision. With the statement of grounds of the appeal the appellant filed new sets of claims (I to VIII). With a letter dated 19 September 2002 further sets of claims (X to XIV) together with affidavits of Dr. Alan David Cole Cantwell, one of the inventors, and Professor Thomas Stephenson were submitted. During oral proceedings, which took place on 27 September 2002 an amended set of claims 1 to 12 (Annex I), corresponding essentially to the claims according to set XII, was submitted. Claim 1 thereof read as follows:

"A method of biological treatment of liquid and thereby removing biodegradable impurities from said liquid, comprising causing the liquid to flow up a column (1) having lower liquid inlet (7), an upper liquid outlet (2) and an intermediate internal screen (4) below which is confined a bed of buoyant particles (5) on which biomass grows, and intermittently operating expansion means to expand the bed of buoyant particles (5), and removing biomass-carrying liquid, characterised in that, normally, gas is introduced into said liquid at a first rate to flow upwardly through said liquid such that said bed is left substantially undisturbed, and, intermittently, gas is introduced into said liquid at a second rate higher than said first rate to flow upwardly through said liquid to expand said bed and, with the bed in its expanded condition, to give scouring of the particles (5) to remove a proportion of the biomass from the particles (5), in that the expansion of the bed is caused by only said gas introduced into said liquid at said second rate, and in that said removing comprises draining out from said column (1) said biomass-carrying liquid."

- IV. It was argued that this method differed from the methods disclosed in D1 and D2 in using only a gas current to expand the bed of buoyant particles resulting in a more efficient regeneration of the bed. This was surprising for persons skilled in the art, who would not expect that adequate regeneration could be obtained without backwashing with water. Documents D5, D6 and D11, were in this respect not very relevant because they related to physical filtration systems, in which the particles were not bound together.

- V. The appellants requested that the decision under appeal be set aside and that the case be remitted to the examining division with the order to grant a patent on the basis of claims 1 to 12 (Annex I) filed during oral proceedings and a description to be adapted.

Reasons for the Decision

1. The appeal is admissible.
2. Claim 1 is substantially based on claim 8 as originally filed. It differs therefrom in that
 - (a) the treatment is a biological treatment whereby biomass grows on the buoyant particles,
 - (b) the intermittently operating expansion means are only the gas introduced into the liquid at an increased rate, and
 - (c) the biomass removal comprises draining out from the column.

These additional features are disclosed in the claimed context in the application as originally filed. See for feature (a), page 2, lines 12 to 20; for features (b) and (c), the first embodiment of the invention disclosed on page 2, line 23 to page 3, line 4, and the example illustrated by Figure 1 and described on page 6, line 21 to page 7, line 7.

The features of claims 2, 3, 4, 5, and 10 are based on original claims 9, 4, 5, 10 and 13 respectively.

For the features of claim 6 to 9 and 12, see page 5, lines 12 to 35 and original claims 10 and 11. The feature of claim 11 is based on the preferred flow rates disclosed on page 3, lines 20 to 22.

The amendments, therefore, fulfil the requirements of Article 123(2) EPC.

3. It is undisputed that D1 represents the closest prior art and that the process according to present claim 1 differs from the process disclosed in D1 in the expansion of the bed and the scouring of the particles of the bed by only the gas introduced into the liquid during the intermittent regeneration of the bed. The process according to claim 1 is thus novel.

4. D1 discloses that in order to clean the bed of buoyant particles the introduction of liquid to be treated is interrupted and wash water is introduced for back-washing whereby a downwardly directed water current is created. At the same time air is introduced under pressure from the bottom of the column. In this way the bed is expanded and excess micro-organisms removed from the bed (page 6, lines 12 to 29). In agreement with the submissions made by the appellants, starting from D1, the problem underlying the invention can be seen in a simplification of the process. According to claim 1 the appellants propose to solve this problem by expanding the bed during the intermittent cleaning phase only by introducing the gas at a higher rate than during normal operation. According to the affidavit of Dr. Cantwell the process according to claim 1 is commercialized as

the BIOBEAD system and its commercial success is at least partly due to the simplified cleaning system which does not use clean wash water so that no clean water storage and pumping arrangement is required (Point 5 A of the affidavit). The board, therefore, accepts that the process according to claim 1 actually solves the above-mentioned problem.

5. It remains to be decided whether the claimed solution was obvious to a person skilled in the art. D1 itself unambiguously discloses the necessity of backwashing with water to expand the bed and contains no suggestion that the air treatment alone could serve the purpose. Also D2 discloses that for the same purpose wash water should be run through the column at high speed while the air stream used during normal operation could be maintained to assist the expansion (column 4, line 48 to column 5, line 28).
6. D5, D6 and D11 all disclose that in the physical separation of suspended solids from a liquid in the purification of effluents by buoyant particles compressed air can be used to expand the bed during the regeneration treatment without the use of backwashing with clean water. See D5, page 4, line 121 to page 5, line 20 and page 5, lines 69 to 76; D6, column 7, line 47 to column 8, line 7; D11, Figures 1 to 3 and WPI/Derwent and PAJ/JPO English abstracts of D11. In the physical separation processes of D5, D6 and D11 there is no growth of biomass which could glue the buoyant particles together and it is thus not surprising that turbulence created by the compressed air alone is sufficient to expand the bed.
7. In his affidavit Professor Stephenson has given as his

expert opinion that in all biological aerated filters (BAF) he is aware of, other than those of the present invention, bed cleaning is achieved through combined air scour and introduction into the bed of high velocity backwash water and that it would not have been apparent to a person skilled in the art in June 1991 (filing date of the present application 7 June 1991) that air scour alone would clean the bed, either of sunken or of floating granular media, that has biomass growing in the bed, such as BAF.

8. On the basis of the documents on file the board has come to the same conclusion and holds that in view of the fundamental differences between a bed of buoyant particles having biomass grown on the particles forming a glutinous mass, as in D1 and D2, and a bed of buoyant particles comprising only entrapped solids, which do not glue the particles together, as in D5, D6 and D11, it was not obvious to a skilled person to apply the simplified cleaning method disclosed in the latter documents to solve the above-mentioned problem. Thus the process according to claim 1 involves an inventive step within the meaning of Article 56 EPC.
9. Claims 2 to 12 are sub-claims depending on claim 1. The inventive step of their subject-matter follows from this dependency.
10. The description has still to be brought into conformity with the amended claims. Following the appellants' requests, the board exercises its power under Article 111(1) EPC and leaves it to the examining division to deal with that matter.

Order

For these reasons it is decided:

1. The decision under appeal is set aside.
2. The case is remitted to the examining division with the order to grant a patent with the claims of Annex I, filed during the oral proceedings, and a description to be adapted.

The Registrar:

The Chairman:

U. Bultmann

R. Spangenberg