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D E C I S I O N
of 19 May 1994

Case Number: T 0279/92 - 3.3.2

Application Number: 88311170.0

Publication Number: 0323705

IPC: C02F 3/12

Language of the proceedings: EN

Title of invention:

Two-stage wastewater treatment process

Applicant:

Zimpro Passavant Environmental Systems, Inc.

Opponent:

-

Headword:

Wastewater treatment/ZIMPRO PASSAVANT

Relevant legal norms:

EPC Art. 56

Keyword:

"Inventive step - non-obvious alternative"

Decisions cited:

T 0020/81

Catchword:

-



Case Number: T 0279/92 - 3.3.2

D E C I S I O N
of the Technical Board of Appeal 3.3.2
of 19 May 1994

Appellant: Zimpro Passavant Environmental Systems, Inc.
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Decision under appeal: **Decision of the Examining Division of the European Patent Office dated 22 November 1991 refusing European patent application No. 88 311 170.0 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: A. J. Nuss
Members: G. J. Wassenaar
S. C. Perryman

Summary of Facts and Submissions

- I. European patent application No. 88 311 170.0 (publication No. 0 323 705) was refused by a decision of the Examining Division.

The decision was taken on the basis of Claims 1 to 4 filed with letter of 23 October 1990 and Claims 5 to 22 as originally filed.

Claim 1 reads as follows:

"A process for purifying wastewater containing organic and adsorbable pollutants comprising the steps of:

(a) providing a primary treatment zone including an aeration zone and a quiescent zone substantially isolated from said aeration zone, the lower portion of said quiescent zone opening into the lower portion of said aeration zone to provide continuous fluid communication with said aeration zone;

(b) introducing the wastewater into said aeration zone;

(c) continuously aerating the wastewater with an oxygen-containing gas in said aeration zone in the presence of sufficient amounts of a powdered adsorbent and biologically active solids to reduce the BOD, COD and TOC to desired levels, said thus-treated wastewater passing from the lower portion of said aeration zone into said quiescent zone through the opening in the lower portion of said quiescent zone;

(d) retaining said thus-treated wastewater in said quiescent zone for a sufficient time for solids therein to settle by gravity and produce a first solids phase and a first aqueous phase containing a maximum predetermined amount of said solids;

(e) transferring said first aqueous phase from said quiescent zone into a contact zone;

(f) agitating said first aqueous phase in said contact zone in the presence of a powdered adsorbent, introduced into said contact zone, for an agitation period sufficient to reduce the BOD, COD and TOC to desired levels;

(g) terminating agitation and allowing solids in said thus-treated first aqueous phase to settle by gravity for a settling period sufficient to produce a clarified, substantially solids-free, second aqueous phase and a second solids phase;

(h) thereafter withdrawing a predetermined amount of said second aqueous phase from said contact zone; and

(i) repeating steps (e) through (h)."

Dependent Claims 2 to 22 are particular embodiments of the process of Claim 1.

II. The Examining Division held that the subject-matter of Claims 1 to 22 did not meet the requirements of Article 56 EPC, having regard to the following documents:

- (1) DE-A-2 101 376
- (2) Journal WPCF 59 (1987), No. 4, pages 199 to 211
- (3) US-A-4 623 464
- (4) Abwassertechnologie, Springer Verlag 1984, page 685.

In its decision the Examining Division took the view that the claimed process did not involve an inventive step for the following reasons:

The process of Claim 1 differed from the closest prior art, which was considered to be (2), only in an

additional adsorption stage as defined by features (e) to (i);

The problem to be solved by the invention was to improve the purification performance;

This problem was solved by said additional adsorption stage;

The use of an adsorbent, such as activated carbon, to further reduce the pollutant level of wastewater which had already been subjected to a biological treatment was well known, such as from (3), and this would lead the skilled person to add an adsorption stage to the process of (2) if further pollutant removal is required;

The operation of the added adsorption stage in a fill-and-draw mode in accordance with features (e) to (i) of Claim 1 would be an obvious design choice to the skilled person;

The process of Claim 1 was thus no more than the obvious solution of the addressed problem and hence did not involve an inventive step.

III. The Appellant lodged an appeal against this decision.

In the Statement of Grounds of Appeal, the Appellant argued that (2) related to laboratory scale tests and did not disclose all the features (a) to (d) of present Claim 1. (2) should therefore not be considered as the closest state of the art. In view of this, the correct starting point for the invention appeared to be the closest working field process, i.e. the standard powdered activated carbon-activated sludge (PAC-AS) process referred to in column 1, lines 26 to 35 of the published application and corresponding to (1).

With respect to (1), the problem to be solved was to improve the purification performance of the process when dealing with wastewater containing pollutants which are difficult to biodegrade and only weakly adsorbed on adsorbent such as powdered activated carbon, while at the same time avoiding the need for the separate, conventional clarifier stage utilised in the standard PAC-AS process.

This problem was solved by a novel, fully integrated process as defined by Claim 1. It was admitted that several of the features of Claim 1 were known in the art but that their integrated combination was not obvious to the skilled person. In particular, the use of a quiescent zone opening into the lower portion of the aeration zone of the primary treatment zone, as in itself known from (4), in combination with an additional adsorption zone, whereby the quiescent zone reduced the sludge content in the adsorption zone without the need of a separate clarifier, in order to enhance the adsorption of pollutants, would involve an inventive step.

IV. The Appellant requested that the decision under appeal be set aside and a patent be granted on the basis of the documents on file, namely:

Claims: 1 to 4 as on pages 22 and 23 filed with
 the letter of 23 October 1990;
 5 to 22 as on pages 24 to 28 originally
 filed;

Description: pages 1 to 4 and 7 to 21 as originally
 filed;
 pages 5 and 6 as filed with the letter of
 23 October 1990;

Drawings: sheets 1/2 to 2/2 as originally filed.

Reasons for the Decision

1. The appeal is admissible.
2. New Claim 1 differs from Claim 1 as originally filed by the additional requirements that the lower portion of the quiescent zone opens into the lower portion of the aeration zone and that the treated wastewater passes through the opening in the lower portion of said quiescent zone. These amendments are apparent from the Figures and the description thereof (page 11, line 24 to page 12, line 10 of the originally filed application), so that the requirements of Article 123(2) EPC are met. The admissibility of the amendments was in fact not disputed in the contested decision. Claims 2 to 22 are the same as in the original application, though Claims 2 to 4 appear on a retyped page. Pages 5 and 6 have been amended to correspond to the amended Claim 1 and so are admissible for the same reasons as this claim.
3. Since none of the prior art documents on file discloses a process having all the features of Claim 1, the subject-matter of Claim 1 is novel. Novelty was not disputed in the contested decision.
4. According to the Examining Division, (2) represents the closest prior art, because it was considered that therein all of the features (a) to (d) of Claim 1 are already disclosed. To the Board it is however not apparent that the requirement of step (a), namely that the lower portion of the quiescent zone opens into the lower portion of the aeration zone, is actually disclosed in this document.

The following speaks against the interpretation made by the Examining Division:

Figure 1 of (2) shows a schematic representation of a reactor into which a settling zone is integrated, which is **closed at the bottom**. It is worthwhile to note that the settling zone indicated in Figure 1 is called "solids-liquid separator section" on page 200, right-hand column, last paragraph. Thus this section is not a quiescent zone in the meaning of present Claim 1, but rather is similar to the clarifier (settling tank) 13 of (1). The separation section has been integrated into the PAC-AS reactor to obtain a compact laboratory scale apparatus.

The fact that (4), Figure 6.4-23 shows a large scale installation with a built-in clarifier, which opens into the lower portion of the aeration zone, does not imply that the settling zone of Figure 1 of (2) is also of such a construction.

In view of this and in the absence of any specific description in (2) how transfer between the aeration zone and settling zone occurs, Figure 1 suggests that transfer occurs merely by overflow at the baffle. Consequently, (2) appears to disclose only a laboratory scaled version of the standard PAC-AS reactor.

- 4.1 Since the application relates to a full scale wastewater purification treatment, it is more realistic to consider (1), which discloses the standard PAC-AS process, as the closest prior art.

This document describes a process for purifying wastewater containing organic and adsorbable pollutants, comprising a treatment zone wherein the wastewater is aerated in the presence of powdered activated carbon and

activated sludge, followed by a clarifier for settling the carbon and the sludge and separating the purified water (see, pages 9 and 10 of the description and the Figure).

The process of present Claim 1 differs therefrom essentially by creating in the primary treatment zone a quiescent zone from which the treated wastewater is transferred to a contact zone, wherein the wastewater is agitated in the presence of a powdered adsorbent, introduced into said contact zone, followed by a settling period to produce a clarified aqueous phase.

4.2 On the available evidence, the Board does not accept that the technical problem can be defined as submitted by the Appellant, as being to improve the purification performance of the PAC-AS process such as disclosed in (1) when dealing with wastewater containing pollutants which are difficult to biodegrade and only weakly adsorbed on adsorbents such as powdered activated carbon, while at the same time avoiding the need for the separate, conventional clarifier stage utilised by the standard PAC-AS process.

Although improvement of the purification performance might have been an object aimed at by the inventor, there is no proof available, that such an improvement was actually obtained. Neither the description nor the submissions of the Appellant contain any concrete data from which the alleged improvement is apparent. Alleged but unsupported advantages cannot be taken into consideration when defining the problem underlying the claimed invention; cf. T 20/81 (OJ EPO 1982, 217).

In relation to said closest prior art, the Board considers thus that the problem underlying the invention is to provide an alternative for the standard PAC-AS process.

This problem is to be solved by the process as defined in present Claim 1.

The description and Figures 1 and 2 of the patent application provide sufficient evidence that the stated problem has indeed been solved by the process with the features required by present Claim 1.

4.3 It is clear from paragraphs 4.1 and 4.2 above, that neither (1) nor (2) contains any information suggesting the use of a two-stage process, including an additional adsorption zone, for purifying wastewater containing organic and adsorbable pollutants. The same also applies to the other citations.

The two stage treatment mentioned in the abstract of (3), to which was referred in paragraph 3 of the contested decision, relates to a process wherein the first stage of the two stage treatment is a pure biodegradation stage. In such a case it makes sense to complete it with an adsorption stage; in the present case however, adsorption already takes place in the PAC-AS reactor. Moreover, (3) does suggest that the removal of even recalcitrant pollutants such as dioxins and PCB's is already substantially complete by a simple PAC-AS process (see column 2, lines 51 to 62).

The idea of replacing the clarifier in (1) with a quiescent zone in the primary treatment zone is linked to the notion that for the additional adsorption stage it is not necessary to have a complete separation of water and sludge as is obtained by a clarifier according

to (1). This teaching is not disclosed in the prior art. The only document disclosing a quiescent zone in an aeration zone is (4). This document relates however to a pure biological purification reactor and mentions the necessity of an additional clarifier, which the applicant tried to avoid. Thus (4) in fact teaches away from the claimed invention.

The Board could find no support in the cited documents that the performance of the adsorption steps (f) to (i) mentioned in present Claim 1, namely introducing powdered adsorbent and agitating the aqueous phase and operating the adsorption in the fill and draw mode, is one out of several possibilities for an additional adsorption stage a skilled person would necessarily have envisaged. The contested decision indeed merely stated that the selection of this mode was well within the level of the skill of an expert, without however giving reasons in support of that allegation. Thus, the available prior art would not provide the skilled person with any incentive for solving the above mentioned problem by the combination of steps indicated in present Claim 1.

5. It follows from the foregoing considerations that Claim 1 is not only new, but also involves an inventive step in the sense of Article 56 EPC.

Since Claims 2 to 22 are all subclaims dependent upon Claim 1, their allowability follows from that of Claim 1 without the need for any separate consideration for novelty and inventive step.

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 in the following version:

Claims: 1 to 4 as on pages 22 and 23 filed with the letter of 23 October 1990;
5 to 22 as on pages 24 to 28 originally filed;

Description: pages 1 to 4 and 7 to 21 as originally filed;
pages 5 and 6 as filed with the letter of 23 October 1990;

Drawings: sheets 1/2 to 2/2 as originally filed.

The Registrar:

The Chairman:

P. Martorana

A.J. Nuss