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D E C I S I O N
of 4 October 1994

Case Number: T 0615/92 - 3.3.2

Application Number: 86111665.5

Publication Number: 0218066

IPC: C02F 1/28

Language of the proceedings: EN

Title of invention:
Wastewater purification process

Patentee:
N.V. Sanotec

Opponent:
Linde Aktiengesellschaft, Wiesbaden

Headword:
Wastewater/SANOTEC

Relevant legal norms:
EPC Art. 56

Keyword:
"Inventive step (yes) - non-obvious improvement"

Decisions cited:
-

Catchword:
-

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Case Number: T 0615/92 - 3.3.2

D E C I S I O N
of the Technical Board of Appeal 3.3.2
of 4 October 1994

Appellant: (Opponent)
Linde Aktiengesellschaft, Wiesbaden
Zentrale Patentabteilung
D-82049 Höllriegelskreuth (DE)

Representative:
-

Respondent: (Proprietor of the patent)
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Decision under appeal:
Interlocutory decision of the Opposition Division of the European Patent Office dated 29 April 1992 concerning maintenance of European patent No. 0 218 066 in amended form.

Composition of the Board:

Chairman: A. J. Nuss
Members: G. J. Wassenaar
C. Holtz

Summary of Facts and Submissions

I. European patent No. 0 218 066 was granted on 28 March 1990 in response to European patent application No. 86 111 665.5.

II. Notice of Opposition was filed against the European patent by the Appellant. Revocation of the patent was requested on the grounds of lack of inventive step.

During the procedure before the Opposition Division the following documents were cited:

(1) EP-A-0 110 240
(2) DE-C-666 060
(3) Linde Berichte aus Technik und Wissenschaft, No. 57, 1985, pages 43-47
(4) US-A-4 664 804
(5) Pamphlet Achema - 88Linde - Information
(6) Linde Reports on Science and Technology, 49/1991, pages 40 to 42

III. The Opposition Division maintained the patent in amended form by a decision dated 29 April 1992.

IV. The Appellant lodged an appeal against this decision and mentioned as ground lack of inventive step. The Appellant argued in his written submissions and at the oral proceedings before the Board, which were held on 4 October 1994, in essence that the only difference between the patent in suit and the closest prior art (1) consisted in the dying-off step for complete stabilisation of the anaerobically digested sludge before using it as adsorbent. He took the view that since the dying-off step as described in the specification consisted in merely storing the digested

sludge for one or two weeks in drying beds in the open air (column 2, lines 45 to 50 of the specification), the sludge was still viable and biological active so that the claimed adsorption treatment although formally new was essentially the same as that disclosed by (1). Moreover, since it was known from (2) that dried sludge could be used as adsorbent and filter medium in a water purification plant, it was considered obvious to use dried sludge also as adsorbent in the water purification process of (1).

To further support his argumentation the following two new documents were cited:

(7) Abwassertechnik, 6/1987, pages 6 to 10
(8) Korrespondenz Abwasser, 12/1988, pages 1325 to 1333.

V. The Respondent disagreed with these submissions and expressed the view that after the dying-off step the stabilized sludge was substantially free of viable microorganisms so that the adsorption mass was essentially different from that was used in (1). Moreover, since the skilled man reading (1) would consider the presence of microbiological active sludge as essential for the adsorption of heavy metals, it was not obvious to replace it with inactivated sludge.

VI. At the oral proceedings, the Respondent had amended Claims 1, 4 and 7 to state explicitly that by the dying-off period the sludge is rendered substantially free of viable microorganisms. Amended Claim 1 reads as follows:

"1. A process for the purification of wastewater comprising the steps of: contacting wastewater with sludge of an oxidative biological water purification process that has been subjected to a complete anaerobic

fermentation step followed by a dying-off period to render it substantially free of viable micro-organisms, in order to adsorb metals, colorants, detergents, phenols, and the like from the wastewater onto the sludge, and separating the sludge from the wastewater after contact."

VII. The Appellant requested that the decision under appeal be set aside and that the patent be revoked.

VIII. The Respondent requested that the patent be maintained as amended in the oral proceedings.

Reasons for the Decision

1. The appeal is admissible

2. *Allowability of the amendments*

Amended Claims 1, 4 and 7 differ from the corresponding Claims as originally filed and granted in the additional requirement that by the dying-off period the sludge is rendered substantially free of viable microorganisms This feature is disclosed on page 2, lines 33 to 35 of the description as originally filed. The amendment clarifies the purpose of the "dying-off" step and does not extend the protection conferred. The amendments therefore fulfil the requirements of Articles 123(2) and (3) EPC. This was not contested by the Appellant.

3. *Novelty*

Since none of the prior art documents considered in the present proceedings discloses a process for the purification of wastewater with all the features of

present Claim 1, the subject-matter of Claim 1 is novel. Novelty was in fact not contested by the Appellant.

4. *Inventive step*

4.1 With respect to the invention as claimed, (1) is regarded as constituting the closest prior art. It relates to a process for the purification of wastewater comprising the steps of contacting wastewater with the fermented sludge of an oxidative biological water purification process in order to adsorb heavy metals onto the sludge and separating the loaded sludge from the wastewater after contact (cf. Claims 1, 2 and 3 and Figure 3). According to the description page 2, lines 20 to 24 and page 4, lines 1 to 22, the water to be treated preferably contains a high amount of organic substances which are metabolized anaerobically by the anaerobic sludge with the forming of sulphides, which assist in the adsorption of the heavy metals. The retention time which can be calculated from the first Example on page 9 is 1 hour, which is in agreement with the retention time of 0.5 to 2 hours mentioned in column 7, lines 3 to 6 of the corresponding US patent specification (4) published after the priority date of the patent under appeal.

4.2 As convincingly put forward by the Respondent, a disadvantage of the adsorption treatment of (1) is that in practice the contact time should be relatively long. Moreover, since the adsorption takes place under anaerobic conditions, the adsorption reactor should be shielded from the air.

4.3 Starting from (1), the technical problem underlying the invention can thus be regarded as reducing the retention time of the adsorption treatment. The claimed solution of this problem consists in using as adsorbent a stabilized sludge obtained by subjecting the sludge of

the oxidative biological water purification to a complete anaerobic fermentation step followed by a dying-off period to render it substantially free of viable microorganisms. According to column 3, lines 17 to 19 of the specification, the retention time is from 5 to 20 min while 10 min are preferred. A test report filed on 1 March 1989 in the examination procedure by the Respondent confirms that a retention time of 10 min is sufficient for adsorption of the main part of the heavy metals and other contaminants. The Board is therefore satisfied that the underlying technical problem has actually been solved by the claimed process.

4.4 It remains therefore to be decided whether the available prior art would give the skilled man an incentive to solve the said problem by replacing the active anaerobic sludge with an inactivated completely fermented sludge according to present Claim 1.

4.4.1 The man skilled in the art would find no incentive in (1) since nothing suggests that similar or better results could be obtained by using inactivated anaerobic sludge.

According to the Appellant the use of inactivated sludge should be considered equivalent to that of the anaerobic sludge containing viable microorganisms, used according to (1). He further argued that it would have been obvious to use inactivated sludge as an alternative since governmental regulations generally require decontamination of anaerobic sludge to eliminate or at least greatly reduce pathogenic germs before further use. For this purpose the anaerobic sludge is inactivated by an aerobic-thermophilic treatment. The Board cannot accept this argument for the reason that said decontamination requirements are obviously only relevant if the sludge is used in an open environment

such as its use as fertilizer on the fields. This does not play, however, any role in the waterpurification plant according to (1), where the sludge used for adsorption of the heavy metals is clearly recirculated in a closed loop. Moreover, since (1) discloses the use of active sludge containing viable microorganisms which can metabolize organic material into sulphides as already indicated under point 4.1 above, it would be entirely against the teaching of (1) to inactivate the anaerobic sludge by subjecting it to a dying-off period to render it substantially free of viable microorganisms.

4.4.2 Document (3), which following the uncontested statement in the decision under appeal is considered to belong to the state of the art, discloses a metal adsorption treatment similar to that of (1) and stresses on page 45 that the adsorption reactor should be shielded from the air to maintain anaerobic conditions. On the same page it is also indicated in Table 2, that the retention time is 24 hours. This document thus teaches away from the claimed invention.

4.4.3 Document (2), a German patent specification published more than 47 years before the priority date of the patent in suit, discloses a process for waterpurification, whereby putrefaction sludge of a purification station is used as an adsorbing filter medium for the purification of wastewater. Before use, the sludge may be dried and crumbled to improve the transmission properties of the filter and to facilitate the transport of the sludge (page 1, left-hand column, lines 19 to 22 and page 2, left-hand column, lines 22 to 25). The sludge may come from a sewage clarification plant. According to page 2, left-hand column, lines 11 to 22 the adsorption can be increased by adding crumbled peat or brown coal to the sludge. It is not indicated

what kind of materials are filtered or adsorbed but the purpose is said to obtain a fermentation free water. Although adsorption is mentioned, the process described in (2) is mainly a filtration process. Since additional adsorbents were recommended, the adsorption capacity of the sludge was probably considered low. Because there is no reference in (2) to the adsorption of metals and the process described therein is primarily a filtration process, it is, in the opinion of the Board, unlikely that a skilled man who seeks to reduce the retention time of the adsorption step as disclosed in (1) will take (2) into consideration. According to the Appellant, the skilled man would be aware that although not explicitly disclosed, sewage also contains metals, which in the process of (2) are adsorbed by the sludge, so that the fact that metals are not mentioned in (2) does not mean that the skilled man would not consider this document. Although not concerned with the adsorption of metals, the Board does not exclude that some adsorption of metals will also take place in (2), but is of the opinion that without an explicit reference to metal adsorption there was no reason for the skilled man to take this document into consideration when trying to solve the above mentioned technical problem. But even if he would have taken (2) into consideration, he would not be provided with the now claimed solution.

4.4.4 An essential feature of the claimed solution is that a complete anaerobic fermentation step of aerobic sludge takes place before the dying-off period. According to (2) the sludge is the putrefaction sludge of a sewage clarification plant, which is either used as such or after drying and crumbling; a complete fermentation step is not foreseen. Although (2) mentions the drying of the sludge, there is no indication to what extent the sludge is dried, so that it is not evident that the dried sludge according to (2) is substantially free of viable

microorganisms as required by present Claim 1. Moreover, since the drying step mentioned in (2) was only recommended to improve transport and filtration properties, without any relation to the adsorption properties, this document could not give the skilled man an incentive that by the claimed dying-off step the adsorption process as disclosed in (1) could be accelerated.

4.4.5 Citations (5) and (6), published after the effective filing date of the patent in suit, were only invoked to support Patentee's argument that still at this time the presence of viable anaerobic microorganisms were considered essential for the performance of processes according to (1).

At the oral proceedings the Board decided on the basis of Article 114(2) EPC not to admit for consideration citations (7) and (8) invoked by the Appellant at the stage of appeal. Both documents were also published after the effective date of the patent in suit and none of them contained technical information considered to be relevant for the issues to be decided in the present case.

4.4.6 Thus the available prior art does not give the skilled man an incentive that the above mentioned technical problem could be solved by the method as claimed in Claim 1. Moreover the solution as claimed has the additional advantage that the adsorption can take place under aerobic conditions so that no shielding of the adsorption reactor from the air is necessary.

5. It follows from the foregoing considerations that Claim 1 is not only new but also involves an inventive step in the meaning of Article 56 EPC. Since Claims 2 to 7 are all sub-claims dependent upon main Claim 1, their

patentability follows from that of Claim 1 without the need for any separate considerations for novelty and inventive step.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is maintained with description and claims as amended in the oral proceedings and Figures 1 to 4 as granted.

The Registrar: The Chairman:

P. Martorana A. J. Nuss