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Datasheet for the decision of 11 February 2014

Case Number: T 2044/09 - 3.3.02

Application Number: 00929313.5

Publication Number: 1183326

IPC: C12M1/36

Language of the proceedings: EN

Title of invention:
U-SHAPE AND/OR NOZZLE-U-LOOP FERMENTOR AND METHOD OF CARRYING OUT A FERMENTATION PROCESS

Patent Proprietor:
Larsen, Ebbe Busch

Opponent:
NORFERM AS

Headword:
Fermentor/LARSEN

Relevant legal provisions:
EPC Art. 56
RPBA Art. 13(1), 15(3)

Keyword:
Oral proceedings - held in absence of appellant
Inventive step - non-functional modification
Late-filed auxiliary requests - admitted (no)

Decisions cited:
G 0004/92, T 0204/06

Catchword:
Even if there is no pointer or suggestion in the prior art towards the addition of a distinguishing feature, if said modification is not linked to a particular functionality, then it cannot *per se* constitute the basis for acknowledging an inventive step.

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Case Number: T 2044/09 - 3.3.02

D E C I S I O N
of Technical Board of Appeal 3.3.02
of 11 February 2014

Appellant: (Opponent)	NORFERM AS Forusbeen 50 4035 Stavanger (NO)
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Respondent: (Patent Proprietor)	Larsen, Ebbe Busch UniBiotech A/S, Noerregade 73, 1.th 5000 Odense C (DK)
Representative:	Larsen, Hans Ole Larsen & Birkeholm A/S, Banegårdspladsen 1, P.O. Box 362 1570 Copenhagen V (DK)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 27 July 2009 rejecting the opposition filed against European patent No. 1183326 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman: U. Oswald
Members: T. Sommerfeld
R. Cramer

Summary of Facts and Submissions

I. European patent 1183326, based on application No. 00929313.5, entitled "U-shape and/or nozzle-U-loop fermentor and method of carrying out a fermentation process" and published as international application No. WO 00/70014, was granted with 9 claims.

Independent claim 1 as granted read as follows:

"1. A U-shape and/or nozzle-U-loop fermentor having a U-part consisting of an essentially vertical downstream part (2), an essentially vertical upstream part (4), a U-shape bend part (3), which connects the lower ends of the downstream and the upstream parts, an in-line pump (12) placed in the U-part for circulation of fermentation liquid in the fermentor, a top part (5) which is provided above the upper end of the downstream part and has the form of a cylinder with a diameter which is substantially larger than the diameter of the downstream part and is connected thereto via a truncated cone-shaped connection part, the upper end of the upstream part (4) being passed essentially horizontally and tangentially into the lower part of the top part (5) via a bend, a vent tube (6) for discharging gas(es) released in the headspace of the top part, an outlet (11) preferably placed in the U-bend part (3) for withdrawing fermentation liquid, and gas supply members (7,8,9,10) which according to wishes and demand optionally are placed in the downstream part, the U-part and the upstream part, preferably in the lower end thereof, with accompanying static-mechanical mixing members (13,14,15,16,17) for comminution of the gases introduced into the fermentation liquid, and inlet members for water and

nutrient salts (18) and (19), respectively, **characterized in that** one (or more) ion sensor(s) or analyser(s) (20,21,22,23) for sensing the concentration of at least one of the ion species phosphate, ammonium, nitrate and hydrogen ion, oxygen sensor(s) for sensing the oxygen concentration, and at least one thermo phial for sensing the temperature are provided in-line in the circulating fermentation liquid in connection with the supply members (7,8,9,10,18,19) or in by-pass arrangements in connection therewith, said sensor(s), analyser(s) and phial(s) deliver signals to a data processing system (PC), and that sensors (24) are also provided in a liquid recirculation conduit (25) for sensing the concentration of at least one of the ion species phosphate, ammonium, nitrate and hydrogen ion, said sensors also deliver signals to the data processing system (PC), wherein the signals received are processed and the dosage of feed gases, water, minerals and pH adjustment means via the supply members (7,8,9,10,18,19) are calculated and optimised from pre-programmed amounts relative to the results measured."

II. Opposition was filed against the granted patent, the opponent requesting revocation of the patent in its entirety on the grounds of lack of inventive step (Article 56 EPC and Article 100(a) EPC) and lack of sufficiency of disclosure (Article 100(b) EPC).

III. The documents cited during the proceedings before the opposition division and the board of appeal include the following:

D1 EP 0185407
D3 EP 0418187
D4 EP 0306466
D6 Declaration by Dr Oosterhuis, dated 08.04.2009

D18 Aquareport 1998, Session IV.

IV. By its decision pronounced at oral proceedings on 13 May 2009 and posted on 27 July 2009, the opposition division rejected the opposition (Article 101(2) EPC).

The opposition division decided that the claims according to the main request (claims as granted) fulfilled the requirements of the EPC, in particular those of Articles 83 and 56 EPC.

As regards Article 83 EPC, the opposition division was of the opinion that contrary to opponent's arguments, sensors were available at the priority date and that their operation was not a critical feature of the invention. Moreover, a thermo phial was a well known device, the information contained in the example of the patent was complete and the patent provided an adequate definition of the data processing system, its operation being feasible to the skilled person.

Concerning Article 56 EPC, the opposition division decided that even upon combination of documents D3, D1 and D4, and together with a "row of assumptions", the prior art still did not disclose the use of the sensors for the nutrient ions in the liquid recirculation circuit. This distinguishing feature was linked to a technical effect, namely that measurement of the concentration in the relatively small volume represented by the recirculation liquid avoided the problem that the signals sent by the sensors operating only in the loop reactor might not represent the real concentration in the culture liquid.

V. The opponent (hereinafter appellant-opponent) lodged an appeal against that decision. With the statement of the

grounds of appeal, it requested that the decision of the opposition division be set aside and that the patent be revoked in its entirety. It also made an auxiliary request for oral proceedings and submitted new documents designated D16 to D27.

VI. With its letter of reply, the patent proprietor (hereinafter respondent-patentee) requested that the patent be maintained as granted (main request) or alternatively according to auxiliary requests A, B or C, and also made an auxiliary request for oral proceedings. Moreover it submitted new documents designated D28 to D43.

VII. The board issued a summons to oral proceedings before the board scheduled for 11 February 2014.

VIII. With letter dated 10 January 2014, the respondent-patentee submitted new auxiliary requests 1 to 4 to replace the auxiliary requests on file.

IX. By letter dated 27 January 2014, the appellant-opponent stated that it would not be attending the oral proceedings.

X. Oral proceedings before the board took place as scheduled, in the absence of the appellant-opponent as announced.

During the oral proceedings, the respondent-patentee withdrew all auxiliary requests filed with letter of 10 January 2014, and submitted new auxiliary requests 1 to 3.

Claim 1 of each of the auxiliary requests differs from claim 1 of the main request in that features have been

added from the description as filed, corresponding to the text of page 12 lines 25 to 31 (**auxiliary request 1**), of page 12 line 14 to page 13 line 3 (**auxiliary request 2**) and of page 12 line 14 to page 13 line 19 (**auxiliary request 3**).

XI. The appellant-opponent's submissions, in so far as relevant for the present decision, may be summarised as follows:

Main request - Inventive step

The closest prior art was the loop-fermentor with a recirculation conduit and various other downstream processes and ion sensors in the loop disclosed in D3 and D1 (incorporated by reference into D3).
The only distinguishing feature between claim 1 and the closest prior art was the presence of a sensor in the recirculation conduit for sensing at least one of ammonium, nitrate, phosphate and pH. There was no evidence in the patent that the measurement of an ion species in the recirculation conduit solved the posed problem of providing improved process control in loop fermentors. In fact, the distinguishing feature had no technical effect, since, as supported by the declaration D6, the ion content of the recirculation conduit liquid was identical to that in the loop: the only difference between the liquid in the loop and the liquid in the recirculation conduit was that the latter was cell-free, as there was removal of biomass in the harvest stream.
The recirculation conduit represented a tiny fraction of the total liquid in the reactor, and thus measuring this insignificant recirculation stream could not improve the process control. There was no inventive

step in adding a further sensor which did not give any new or useful information.
In fact, the patent did not provide any evidence of improvement either: the only example did not even fall within the scope of the claims, as it did not mention measurement of pH or temperature.

XII. The respondent-patentee's arguments, in so far as relevant for the present decision, may be summarised as follows:

Main request - Inventive step

None of the prior art documents disclosed measuring nutrient ions with sensors or analysers in the recirculation line.
The patent indicated that the invention was related to improving the control of the fermentor (paragraphs 2, 20-21 and 33). D1 was the only document suitable as closest prior art, as it disclosed a U-shaped fermentor with one or more sensors or analysers being used for some kind of control of the fermentation process performed in the fermentor. The fermentor according to claim 1 differed from that of D1 by having a recirculation line for returning recovered supernatant from downstream processes to the fermentor; and incorporating sensors or analysers in the recirculation line for measuring substrate components.
The effect of this difference was an improved process in terms of reproducibility, yield and process control. Although this effect was not shown in the patent, since there were indeed no comparative results, this improvement had been repeatedly shown in internal experiments. Even if it was considered that there was no substantiation for an improvement, then the claimed fermentor / method was an alternative solution, for

which there was no pointer in the prior art, since the prior art did not suggest measurements in recirculation lines and, according to D6, the skilled person would not contemplate doing such measurements.
Combining D1 with any of the documents disclosing a recirculation line on a U-shaped fermentor (e.g. D18) would not lead the skilled person to the fermentor of claim 1: indeed the features of measuring the specified nutrient ions with online sensors or analysers in the recirculation line and controlling the fermentor by including those measurements in the control of the fermentor would still distinguish it over the prior art. D18 did not measure ions anywhere, and would not lead the skilled person to consider measurement of the ions in the recirculation circuit. Again, according to D6, the skilled person would consider this as an irrelevant additional step.
Even in combination with D4 (which related to air lift fermentors), the resulting fermentor would still lack a recirculation line with sensors or analysers. The circuit shown in Figure 1 of D4 could not be considered a liquid recirculation conduit as in claim 1; rather, it was a bypass arrangement, wherein the liquid was identical to the liquid in the fermentor.

Auxiliary requests 1, 2 and 3 - Admissibility

The amendments made to claim 1 of these requests served to further distinguish the claimed subject-matter from the disclosure of D4. The added features further defined a liquid recirculation circuit, thus making it clear that this was different from the bypass configuration disclosed in D4.
These amendments could not have been made earlier, since this argument had only been raised at oral proceedings.

XIII. The appellant-opponent requested in writing that the decision under appeal be set aside and the patent revoked in its entirety.

XIV. The respondent-patentee requested that the appeal be dismissed and that the patent be maintained as granted (main request) or alternatively that the decision under appeal be set aside and that the patent be maintained in amended form on the basis of one of auxiliary requests 1, 2 or 3, all filed during oral proceedings.

Reasons for the Decision

1. The oral proceedings before the board took place in the absence of the appellant-opponent who was duly summoned but decided not to attend.
As Rule 115(2) EPC states, "If a party duly summoned to oral proceedings before the European Patent Office does not appear as summoned, the proceedings may continue without that party". In the interests of the proper administration of justice, therefore, no party should be able to delay the issue of a decision by failing to appear at the oral proceedings (G 4/92, OJ EPO 1994, 149, reasons 4).

2. Moreover, under Article 15(3) RPBA the board is not obliged to delay any step in the proceedings, including its decision, by reason only of the absence at the oral proceedings of any party duly summoned who may then be treated as relying only on its written case.

3. The appeal is admissible.

4. Main request - Inventive step

4.1 The present patent relates to U-shape and/or nozzle-U-loop fermentors which are provided with sensor(s) or analyser(s) for sensing the concentration of at least one of the ion species phosphate, ammonium, nitrate and hydrogen ion, oxygen sensor(s) for sensing the oxygen concentration and at least one thermo phial for sensing the temperature; said sensor(s), analyser(s) and phial(s) are provided in-line in the circulation fermentation liquid, or in bypass arrangements, in connection with the supply means for gas, water and nutrient salts, and deliver signals to a data processing system which then calculates and optimises the doses of supplied gases, water, minerals and pH controlling means. According to the patent (paragraphs [0021] and [0022]), it becomes possible, in this way, to supply necessary gases and the additional nutrients required for the fermentation process, pH adjustment means and water in such amounts and ratios that at all times it corresponds to the actual need for achieving an optimum utilisation of the gases as well as an optimal fermentation process with the largest possible yield of fermentation product in the shortest possible period of time. Paragraph [0032] of the patent further discloses that similar measurements are also performed on the supernatant, which is returned from the centrifugal separation, and on the liquid, which is passed back from ultrafiltration, and that these measurements are also incorporated in the optimisation of the fermentor.

4.2 Document D1 discloses a U-loop fermentor with the same structural features as those disclosed in the preamble of claim 1 (D1: column 4, line 36 to column 5 line 26; Figure 1) and further discloses control of the

fermentation process by means of one or more sensors or analysers which measure substrates in the fermentation liquid (D1: column 5, lines 27 to 58; Figure 3). D1 thus relates to a fermentation system comprising a U-loop fermentor and means for the control of the fermentation process, which is also the subject of the present patent. The board thus considers D1 as the most suitable starting point for the discussion of inventive step.

4.3 The fermentor according to claim 1 differs from that of D1 in that it is linked to a recirculation conduit comprising sensors or analysers for measuring substrate components. According to the respondent-patentee, this difference over the closest prior art results in an improved process, in terms of better reproducibility, yield and process control. The board notes that, as admitted by the respondent-patentee, there is no data either in the patent or elsewhere on file to support the alleged effect. While it may be conceivable that the presence of one or more sensors, be it in the fermentation liquid itself or in the recirculation circuit, may indeed allow a tighter process control, it can also not be excluded that they are merely redundant and thus provide no improvement. Therefore, in view of the absence of any data confirming this alleged improvement, such an effect cannot be taken into account in the formulation of the technical problem (T 20/81, OJ 1982, 217). The technical problem is thus formulated as the provision of an alternative U-loop fermentor / fermentation system.

4.4 The proposed solution is the U-loop fermentor as claimed, and the board is convinced that the technical problem - as formulated above - is indeed solved. It

remains to be examined whether the skilled person would arrive at the solution in an obvious way.

4.5 The board agrees with the respondent-patentee that the combination of D1 with other prior art documents does not necessarily disclose the invention. In particular, combining D1 with any of the documents disclosing a recirculation line on a U-shaped fermentor (e.g. D18) does not provide the fermentor of claim 1, since the features of measuring the specified nutrient ions with online sensors or analysers in the recirculation line and using those measurements to control the fermentor would still distinguish it from the prior art.

4.6 However the board notes that the mere fact that the claimed subject-matter is novel over the prior art, even when combining documents, is not sufficient to render it inventive. In fact, in the absence of a proven effect in comparison to the prior art, it is considered that this must be regarded as an arbitrary non-functional modification of the prior art. Even if there is no pointer or suggestion in the prior art towards the addition of a distinguishing feature, if said modification is not linked to a particular functionality, then it cannot *per se* constitute the basis for acknowledging an inventive step.

4.7 The respondent-patentee argued that the skilled person would not consider performing these measurements in the recirculation circuit, as was clearly stated in D6 (paragraphs 16, 17 and 22), and that therefore the claimed subject-matter was inventive. Document D6 is a declaration by a technical expert in the field, stating *inter alia* that the skilled person would not consider introducing the sensors in the recirculation conduit because s/he would not expect this modification to have

any effect. The board does not interpret this statement as evidence that there was a prejudice in the prior art, for which it would have to be shown that such a prejudice existed at the priority date; rather, D6 is taken as the opinion of one expert, issued almost ten years after the priority date. In any case, even if it were accepted that D6 demonstrated the existence of a teaching away from the claimed subject-matter, then the patent has not provided any evidence that a prejudice in general has been overcome.

4.8 Lastly, it is noted that, even if the alleged improvement of the process had indeed been shown to be an effect of the modification of the closest prior art, if the skilled person expects some advantage of said features in a claim and obtains no more than this advantage, then the claimed feature combination is obvious (T 204/06 of 21 January 2009, reasons 2.11). In the present case, it is not even confirmed that the eventually expected advantage is achieved, let alone an unexpected effect.

4.9 For the above reasons, the board comes to the conclusion that the claims of the main request do not fulfil the requirements of Article 56 EPC.

5. Auxiliary requests 1, 2 and 3 - Admissibility

5.1 The purpose of appeal proceedings is to review a decision taken by the department of first instance and not to continue examination. Therefore, new requests with amended claims may only exceptionally be admitted in appeal proceedings.

5.2 The admission of late filed requests in appeal proceedings is governed by the Rules of Procedure of

the Boards of Appeal. According to Article 12(2) RPBA, the statement of the grounds of appeal and the reply thereto shall contain a party's complete case. Article 13(1) RPBA leaves it to the board's discretion to admit any amendment to a party's case after it has filed its grounds of appeal. This discretion is to be exercised in view of *inter alia* the complexity of the new subject matter submitted, the current state of the proceedings and the need for procedural economy.
Moreover, amended claims submitted at such a late stage as oral proceedings should be admitted only if clearly allowable in the sense that it can be quickly ascertained that they overcome all outstanding issues without raising new ones (T 1993/07 of 13 October 2011, reasons 4.4.3).

5.3 Auxiliary requests 1 to 3 were all filed at oral proceedings before the board and thus their admission into the proceedings is governed by the principles of Article 13(1) RPBA.

5.4 The board acknowledges that these requests constitute an attempt to overcome objections raised during oral proceedings. However, the board considers that they are not *prima facie* allowable in that the new amendments raise issues under Articles 123(2), 84 and 83 EPC. A number of features have been introduced from the description and it is not readily apparent that the combination of these features with the other features of claim 1 is also disclosed in the application as filed. Moreover, some of the features include relative terms such as "substantially depleted for biomass/ product substances", "enriched with biomass/product substances" (claim 1 of all auxiliary requests), "sufficiently low pH" (claim 1 of auxiliary requests 2 and 3), thus rendering the claim unclear as to its

delimitations (emphasis added by the board). Finally, some of the introduced features (such as "temperature of e.g. 140°C" in claim 1 of auxiliary requests 2 and 3) contradict the respondent-patentee's arguments in relation to sufficiency of disclosure, and would thus make it necessary to re-open the discussion of Article 83 EPC.

5.5 The board therefore considers that the auxiliary requests add to the complexity of the case and that their admission would run needlessly counter the need for procedural economy. The board thus decides not to admit any of auxiliary requests 1, 2 and 3 into the proceedings (Article 13(1) RPBA).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

N. Maslin U. Oswald

Decision electronically authenticated