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**Datasheet for the decision
of 23 April 2013**

Case Number: T 1235/11 - 3.3.07

Application Number: 02000951.0

Publication Number: 1213048

IPC: B01D 63/02

Language of the proceedings: EN

Title of invention:

Method of potting fiber membranes

Patent Proprietor:

Zenon Technology Partnership

Opponent:

Koch Membrane Systems GmbH

Headword:

-

Relevant legal provisions:

EPC Art. 54, 56

Keyword:

"Novelty (yes)"

"Inventive step (yes)"

Decisions cited:

-

Catchword:

-



Case Number: T 1235/11 - 3.3.07

D E C I S I O N
of the Technical Board of Appeal 3.3.07
of 23 April 2013

Appellant: Zenon Technology Partnership
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Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted
13 April 2011 concerning maintenance of
European patent No. 1213048 in amended form.

Composition of the Board:

Chairman: J. Riolo
Members: D. Semino
D. T. Keeling

Summary of Facts and Submissions

- I. The appeal of the patent proprietor (appellant) lies against the decision of the opposition division announced at the oral proceedings on 15 May 2007 to maintain as amended European Patent 1 213 048.
- II. The granted patent comprised 23 claims, namely process claims 1 to 19 directed to a process of potting a plurality of hollow fibre membranes and apparatus claims 20 to 23, wherein claim 20 read as follows:
- "20. A header and permeate collection means incorporating potted hollow fibre membranes (12,112,212), the header and permeate collection means having,
- (a) a solid mass of a potting material having a first face;
- (b) a plurality of hollow fibre membranes (12,112,212) sealed in the potting material; and,
- (c) terminal portions (12",12b",212",212b") of the hollow fibre membranes (12,112,212) adjacent open ends of the membranes protruding from the first face, characterized in that
- (d) the solid mass of potting material extends to and adhesively secures to the inner periphery of the permeate collection means (20,102,120,120b) to form a permeate collection zone and
- (e) the open-ended terminal portions (12",12b",212",212b") of the hollow fibre membranes protrude into the permeate collection zone."
- III. A notice of opposition was filed against the granted patent requesting revocation of the patent in its

entirety on the grounds of lack of novelty and lack of inventive step in accordance with Article 100(a) EPC.

IV. During opposition proceedings the following documents were *inter alia* cited:

D1: US-A-3 704 223

D2: US-A-3 551 331

D4: DE-A-38 27 527

D6: JP-A-02 095422 (English translation, English abstract and figures)

D7: JP-A-06 343837 (English translation, English abstract and figures)

V. The decision was based on the patent as granted as main request, on two sets of claims filed as subsidiary requests 1 and 2 with letter of 20 February 2007 and on two further sets of claims filed as subsidiary requests 3 and 4 during the oral proceedings on 15 May 2007, together with a description adapted to subsidiary request 4 filed with letter of 22 August 2007.

The independent apparatus claim of subsidiary request 1 differed from claim 20 as granted in that the header and permeate collection means incorporated a gas tube extending through the potting material. The independent apparatus claim of subsidiary request 2 differed from claim 20 as granted in that the permeate collection means were redefined as permeate pan or header enclosure having walls, enclosing a plenum or manifold for introduction of gas and being adapted to be immersed in a substrate. The independent apparatus claim of subsidiary request 3 differed from claim 20 as granted in that the header and permeate collection

means were defined for use in a non-pressurised liquid substrate and several further elements were added including an enclosure with walls and a platform extending between the walls, a permeate port, a gas tube and a gas port.

Subsidiary request 4 comprised process claims 1 to 16 and no apparatus claims.

VI. The decision of the opposition division, as far as relevant to the present decision, can be summarised as follows:

- (a) Process claim 1 of the patent as granted was not novel over the disclosure of D4.
- (b) Apparatus claim 20 of subsidiary request 1 was not novel over the one of D6. In particular, the ends of the cylindrical shell shown in the figure formed part the inner periphery of the permeate collection means and the solid mass of potting material was adhesively (without the use of gaskets) secured to the inner wall of the shell.
- (c) Apparatus claim 17 of subsidiary request 2 was not inventive over D7, taken as the closest prior art, because it differed from the disclosure in D7 only in that the open-ended terminal portions of the hollow fibre membranes protruded into the permeate collection zone and the provision of that feature did not support an unexpected effect and was an obvious alternative to the ending of the fibres in the same plane as the lower face of the header in view of D6.

(d) The inclusion of the feature "a platform extending between the walls" in apparatus claim 18 of subsidiary request 3 without the other features with which it was associated in the original disclosure infringed the requirements of Article 123(2) EPC.

(e) Subsidiary request 4, which included only process claims, met the requirements of the EPC.

VII. The appellant lodged an appeal against that decision. With the statement setting out the grounds of appeal it submitted eleven sets of claims and main and subsidiary requests 1 to 10.

The claims according to the main request included claims 1 to 16 of subsidiary request 4 on which the decision was based and which were considered allowable by the opposition division and apparatus claims 17 to 20 which corresponded to granted claims 20 to 23. In particular apparatus claim 17 corresponded to granted claim 20.

VIII. In the reply to the statement setting out the grounds of appeal the opponent (respondent) raised several objections against all the requests on file, including lack of novelty over D1, D2 and D6.

IX. With letter dated 22 February 2013 the appellant renumbered auxiliary request 7 as auxiliary request 4a, filed an auxiliary request 4b and an amended auxiliary request 8.

- X. In a communication sent in preparation to oral proceedings the Board summarised the objections of the respondent and noted that the two critical features in the analysis both of novelty and of inventive step were a potting material which "adhesively secures to the inner periphery of the permeate collection means" and open-ended terminal portions of the hollow fibre membranes which "protrude into the permeate collection zone". The Board expressed therein its preliminary opinion that in view of those features novelty over D1, D2 and D6 should be acknowledged.
- XI. With letter of 18 April 2013 the respondent reiterated the objection of lack of novelty over document D1, maintained the objection of lack of novelty over document D6 and pleaded lack of inventive step over document D1 as the closest prior art.
- XII. Oral proceedings were held on 23 April 2013. During the oral proceedings the appellant partially reordered the subsidiary requests on file by asking for subsidiary requests 6 and 9 to be considered after all the others. The respondent maintained the objection of lack of novelty over documents D1 and D6 and did not raise any objection related to document D2. After the deliberation on novelty of claim 17 of the main request over documents D1 and D6 and before opening the discussion on inventive step, the Board informed the parties that it was of the opinion that the distinguishing feature over the disclosure of D1 was the fact that the potting material adhesively secured to the inner periphery of the permeate collection means.

XIII. The arguments of the appellant, as far as relevant to the present decision, can be summarised as follows:

Novelty

- (a) The apparatus of claim 17 of the main request differed from the one of D1 in that the latter did not include permeate collection means in the sense of the patent, as only filtration from the inside to the outside of the fibres was disclosed in D1, in that the potting material of D1 was not adhesively secured to the collection means, but to a frame which was part of the header and in that in the embodiment of D1 including a collection chamber (figure 26) the terminal portions of the hollow fibre membranes did not protrude into the collection zone, whereas protruding fibres were present only in an embodiment (figure 28) which showed a non-finished apparatus without a collection zone.

- (b) Document D6 did not disclose the feature of claim 17 that the potting material adhesively secured to the inner periphery of the permeate collection means, firstly because the cylindrical case in the figure of D6 could not be considered as part of the permeate collection means and secondly because there was no disclosure in D6 of an adhesive connection to the walls of the case.

- (c) On that basis novelty of the apparatus of claim 17 of the main request over the disclosures of D1 and D6 had to be acknowledged.

Inventive step

(d) The apparatus of claim 17 of the main request differed from the one disclosed in D7, taken as the closest prior art, in that the potting material adhesively secured to the inner periphery of the permeate collection means and in that the terminal portion of the hollow fibre membranes protruded into the permeate collection zone. The problem to be solved was the provision of a header and permeate collection means in which the potting material was sealed without the use of gaskets and the risk of damage to the fibres was reduced. None of the prior art documents gave any hint that the distinguishing features should be adopted in order to solve the posed problem. On that basis, the presence of an inventive step should be acknowledged.

(e) The apparatus of claim 17 of the main request differed from the disclosure in D1, which was an even more remote starting point, at least in the same two features, so that an inventive step attack starting from D1 could not lead to a different conclusion.

XIV. The arguments of the respondent, as far as relevant to the present decision, can be summarised as follows:

Novelty

(a) The apparatus disclosed in D1, in particular with reference to figures 26 and 28, was novelty destroying for the apparatus of claim 17 of the

main request. A possible difference in use could not be acknowledged as a distinguishing feature of the apparatus, as long as the apparatus of D1 was suitable for the use specified in the claim. In particular, as in D1 it was indicated that filtration in both directions was possible, the chamber 24 was suitable as a chamber for permeate collection. All elements constituting the walls of that chamber were part of the permeate collection means, including the frame 21, as the claim did not specify that the permeate collection means was composed by a single element. The adhesive connection between the potting material and the frame was therefore anticipating an adhesive connection to the inner periphery of the permeate collection means. Terminal portions of the hollow fibre membranes protruding into the permeate collection zone were shown in figure 28 and it was mentioned in the description that the terminal portions could be protruding or be finished by machining operation. The embodiment of figure 28 had to be read in the light of the description as analogous to the one of figure 26, therefore still to be completed by the addition of a collection chamber.

- (b) Also document D6 disclosed all the features of the apparatus of claim 17 of the main request in combination. The cylindrical case, whose lower wall formed part of the collection chamber, had to be seen as part of the permeate collection means and the potting material was adhesively attached to it. The adhesive attachment was clear from the disclosure of D6 which did not show any gasket.

Moreover, the wording "adhesively secures" in claim 17 had to be read very broadly in view of the disclosure in paragraph [0034] of the patent, which indicated that an adhesive connection obtained by curing the potting resin within the permeate collection means, a seal resulting from a later added adhesive and even the use of gaskets all fell under the wording of the claim.

Inventive step

- (c) Taking D7 as the closest prior art, the apparatus of claim 17 of the main request differed from the disclosure therein only in that terminal portions of the hollow fibre membranes were protruding into the permeate collection zone, an adhesive connection between the potting material and the inner periphery of the permeate collection means being disclosed in D7 by means of the absence of a gasket in the figure. There was no advantage or effect related to the presence of the distinguishing feature, whose addition to the apparatus of D7 was obvious in view of the disclosure of D1, which mentioned both protruding and non-protruding ends as a result of the specific method of fabrication and underlined the importance of avoiding breakage of the fibres, or of D6, which showed protruding ends in the figure.

- (d) If D1 were taken as the closest prior art, only the presence of protruding fibre ends or a difference in use could be considered as distinguishing features between the claimed apparatus and the disclosure of D1. No inventive

step could be attributed to the addition of any of these features in view of D7, which disclosed a similar module and filtration by immersion of the module in a substrate, and D1 itself or D6, which disclosed protruding fibre ends.

XV. The appellant requested that the decision under appeal be set aside and the patent be maintained according to one of the twelve sets of claims filed as main request and subsidiary requests 1 to 4, 4a, 4b, 5, 8, 10, 6 and 9, of which subsidiary requests 4a, 4b and 8 were filed with letter of 22 February 2013, the others being filed with the grounds of appeal.

XVI. The respondent requested that the appeal be dismissed.

Reasons for the Decision

Main request - novelty

1. While lack of novelty was addressed in the reply of the respondent to the statement of grounds with reference to documents D1, D2 and D6, in the letter dated 18 April 2013 and during the oral proceedings the respondent did not maintain the objection of lack of novelty of the apparatus of claim 17 of the main request over document D2. The Board has no reason to differ from its positive conclusion as to novelty over document D2 indicated in its communication (point X, above).
2. Document D1 concerns a process for the production of a capillary exchanger and the resulting product (column 1,

lines 27 to 29). The produced exchangers may have many applications including exchange of gases or components of solutions (column 1, lines 30 to 32) and the exchange between the intercapillary interior space and the space surrounding the capillaries can take place in one or in both directions (column 2, lines 31 to 34).

2.1 An exemplary exchanger is shown in figure 26 of D1 (column 8, line 59 to column 9, line 2) including a solid mass of potting material (element 18 in the figure) attached to a frame (element 21), a plurality of hollow fibre membranes sealed in the potting material (elements 1) having terminal portions with open ends and collecting chambers (elements 24). The potting material is adhesively attached to the frame as a result of the method of fabrication (column 8, lines 59 to 66, figures 24 and 25). Any material exchanged from the outside to the inside of the capillaries may be considered as a permeate and may collect in chambers 24 which are therefore suitable to be used as permeate collection chambers.

2.2 In the embodiment of figure 26 of D1 the open ends of the hollow fibre membranes are not protruding into the permeate collection zone. Protruding ends are present in some other embodiments of D1, which either show only the potting material and the fibre ends (figures 16, 17, 18, 18') or an exchanger before being completed by the provision of collecting chambers (figure 28). In any case the general description mentions with reference to figures 16 to 19 (column 8, lines 15 to 34) that the ends may be protruding from or terminate flush with the potting material.

- 2.3 While it may be disputed whether the embodiments of figures 26 and 28 of D1 disclose at least implicitly protruding ends of the hollow fibres in combination with a permeate collection chamber, the critical issue to establish novelty with respect to document D1 is whether D1 discloses in figures 26 and 28 a solid mass of potting material which "extends to and adhesively secures to the inner periphery of the permeate collection means".
- 2.4 The skilled person reading the wording of claim 17 of the main request against the disclosure of figure 26 of D1 would consider the two units consisting of elements 18 and 21 (the potting material and the frame) on the two sides of the apparatus as the headers of the same and the elements connected to them to form chambers 24 as the permeate collection means. This reading is in agreement with the definition of permeate collection means given in the patent ("receptacle beneath a header in which receptacle the permeate collects", see paragraph [0151] in the patent) and corresponds to the normal understanding of the skilled person, that the potting material reinforced by the frame is the part of the apparatus heading the hollow fibres and that the receptacles which build the collecting chambers (elements 24) and the collection tubes (elements 25) are the elements with a collecting function.
- 2.5 As the potting material is adhesively attached to the frame, which is part of the header and not of the permeate collection means, D1 does not disclose a potting material which "extends to and adhesively secures to the inner periphery of the permeate collection means", so that the apparatus of claim 17 of

the main request is novel with respect to the disclosure of document D1.

3. As far as document D6 is concerned, it discloses (see the drawing and its description on page 3 of the English translation) a header and permeate collection means including a potting material (element 31 in the drawing), a plurality of hollow fibre membranes (element 2) sealed in the potting material and a permeate collection zone (space between the potting material and end caps 51 and 52), the open ends of the fibres protruding in the permeate collection zone (see the drawing). These disclosures have not been disputed by the parties.
 - 3.1 Here again the crucial issue to establish novelty is whether D6 discloses that the solid mass of potting material "extends to and adhesively secures to the inner periphery of the permeate collection means".
 - 3.2 The apparatus of D6 includes a cylindrical case (element 1) whose technical function is the containment of the exchange part of the apparatus including the space surrounding the hollow fibre membranes where the fluid to be filtered flows. Such a case has no permeate collecting function, which is taken by end caps 51 and 52.
 - 3.3 In the apparatus of D6 the end caps (elements 51 and 52) are therefore the permeate collection means present on each side of the apparatus. While it is true that the claim does not limit the permeate collection means to be composed by a single element, there is no other

element of the apparatus of D6 which performs a collecting function.

3.4 Already on that basis the Board comes to the conclusion that D6 does not disclose a potting material which adhesively secures to the inner periphery of the permeate collection means, as the potting material of D6 does not even come into contact with the permeate collection means, but is connected to them through the intermediate presence of the apparatus cylindrical case. In view of that the apparatus of claim 17 of the main request is novel over the disclosure of D6.

3.5 In addition, it is noted, that the argument of the respondent that the wording "adhesively secures" in claim 17 has to be read very broadly in view of the disclosure in paragraph [0034] of the patent, so that even the use of gaskets without adhesive falls under the wording of the claim, cannot be accepted by the Board. Paragraph [0034] specifies that when the integral header is adhesively secured, no gasket is required, while one may be used if it is to be disassembled. This sentence does not change the fact that in order for the feature of the claim to be met, an adhesive connection is needed.

3.6 As far as D6 is concerned and independently of the reasons already given above, this document does not provide any unambiguous disclosure of an adhesive connection between the potting material and the case. The drawing is a schematic representation of the apparatus which cannot exclude the presence of gaskets or other sealing means and the description does not

provide any explicit or implicit disclosure in this sense.

Main request - inventive step

4. Both in the decision under appeal and in the first presentation of the case by the parties (statement of grounds and reply thereto), document D7 has been considered as the closest prior art. On that basis the Board will first analyse the issue of inventive step starting from D7.
- 4.1 D7 discloses (see the drawings and their description in paragraphs [0008] and [0009] of the English translation) a header and permeate collection means including a potting material (elements 2 and 4 in the drawing), a plurality of hollow fibre membranes (element 1) sealed in the potting material and a permeate collection zone (element 5). The open ends of the fibres are not protruding in the permeate collection zone (see the drawing). On this analysis there was agreement between the parties.
- 4.2 In this case as well it was disputed whether D7 discloses a solid mass of potting material which "extends to and adhesively secures to the inner periphery of the permeate collection means".
- 4.3 The schematic representation in the drawings of D7 and the lack of any information in D7 of how the seal between the collection chamber and the space external to the fibre is accomplished lead to the conclusion also in this case that an adhesive connection is not disclosed. The arguments regarding the broad reading of

- the wording "adhesively secures" and the lack of a gasket in the drawings do not hold for the same reasons as given in the analysis of document D6 (see points 3.5 and 3.6, above).
- 4.4 The patent in suit relates the presence of an adhesive connection between the potting material and the inner periphery of the permeate connection means to a simplification of the apparatus, which does not need any gasket to accomplish the necessary seal (paragraph [0034] in the patent), and explains that by not cutting the fibres after potting, a damage of the fibres and a possible collapse of their wall are eliminated (paragraph [0050]).
- 4.5 On that basis the problem to be solved by the apparatus of claim 17 of the main request with respect to the disclosure of D7 is, in agreement with the formulation of the appellant, the provision of a header and permeate collection means in which the potting material is sealed without the use of gaskets and the risk of damage to the fibres is reduced.
- 4.6 The Board considers that on the basis of the technical explanations given in the patent (see in particular paragraphs [0034] and [0050]) this problem is plausibly solved by the apparatus of claim 17 of the main request in view of its differences with respect to the disclosure of D7.
- 4.7 None of the documents cited by the respondent in the analysis of inventive step, namely D1, D6 and D7, discloses an adhesive connection between the potting material and the inner periphery of the permeate

collection means (see above, points 2.3 to 2.5 for D1, points 3.1 to 3.6 for D6 and points 4.2 and 4.3 for D7), let alone any hint to use this measure to solve the posed problem. The presence of an inventive step can be acknowledged on this basis alone.

4.8 In addition, while D1 and D6 disclose protruding fibres (D6 in the drawing without any explanation or comment and D1 in a number of embodiments, see point 2.2, above), neither of them indicates that this measure could be adopted in order to solve the posed problem.

4.9 For these reasons, the apparatus of claim 17 of the main request involves an inventive step, starting from D7 as the closest prior art.

5. In the latest letter of the respondent dated 18 April 2013 and during the oral proceedings the respondent raised an objection of lack of inventive step based on document D1 as the closest prior art.

5.1 In spite of the direct indication of the Board before the discussion on inventive step at the oral proceedings that the distinguishing feature of the apparatus of claim 17 of the main request over the disclosure of D1 is the fact that the potting material adhesively secures to the inner periphery of the permeate collection means, the respondent did not provide an attack of the claim which took account of the distinguishing feature, but discussed only the relevance of the use of the apparatus and of the presence of protruding ends of the hollow fibres.

- 5.2 On this basis alone all arguments of the respondent with regard to lack of inventive step over D1 as the closest prior art cannot be followed by the Board and do not need to be dealt with in any more detail.
- 5.3 In any case, the difference which has been acknowledged between the apparatus of claim 17 of the main request and the disclosure of D1 (see the analysis of novelty over D1 under point 2, above) is sufficient to support the presence of an inventive step, as shown with regard to document D7 (see point 4, above), so that a proper application of the problem-solution approach starting from document D1 would lead to the same conclusion reached when considering D7 as the closest prior art.

Conclusion

6. As none of the objections against claim 17 of the main request in the decision under appeal and in the submissions of the respondent holds and process claims 1 to 16 of this request correspond to the claims of the set on which the opposition division had decided to maintain the patent, which decision has not been appealed by the respondent, the patent is to be maintained on the basis of the set of claims of the main request.
- 6.1 Reinsertion of apparatus claims with respect to the request on which maintenance had been decided in first instance proceedings renders a re-adaptation of the description necessary. Such an adaptation is to be accomplished before the opposition division.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the opposition division with the order to maintain the patent on the basis of the set of claims of the main request filed with the statement of grounds of appeal and a description to be adapted thereto.

The Registrar

The Chairman

A. Counillon

J. Riolo