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**Datasheet for the decision
of 15 September 2022**

Case Number: T 0680/19 - 3.3.09

Application Number: 12827719.1

Publication Number: 2752445

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F27B9/04, D01F9/12, B29K105/06,
B29B17/04

Language of the proceedings: EN

Title of invention:

DEVICE FOR MANUFACTURING RECYCLED CARBON FIBERS, AND METHOD
FOR MANUFACTURING RECYCLED CARBON FIBERS

Patent Proprietor:

Carbon Fiber Recycle Industry Ltd.

Opponent:

ELG Carbon Fibre International GmbH

Headword:

Device for manufacturing recycled carbon fibers/CARBON FIBER
RECYCLE INDUSRTRY

Relevant legal provisions:

EPC Art. 54, 56, 83, 123(2)

Keyword:

Novelty - (yes)

Inventive step - (yes)

Sufficiency of disclosure - (yes)

Amendments - added subject-matter (no)

Decisions cited:

Catchword:



Beschwerdekammern

Boards of Appeal

Chambres de recours

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Case Number: T 0680/19 - 3.3.09

D E C I S I O N
of Technical Board of Appeal 3.3.09
of 15 September 2022

Appellant: ELG Carbon Fibre International GmbH
(Opponent) Kremerskamp 16
47138 Duisburg (DE)

Representative: Von Rohr Patentanwälte Partnerschaft mbB
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Respondent: Carbon Fiber Recycle Industry Ltd.
(Patent Proprietor) 2727-2 Ota-cho
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Representative: Murgitroyd & Company
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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 14 February
2019 rejecting the opposition filed against
European patent No. 2752445 pursuant to Article
101(2) EPC.**

Composition of the Board:

Chairman A. Haderlein
Members: M. Ansorge
D. Rogers

Summary of Facts and Submissions

- I. The opponent (appellant) lodged an appeal against the opposition division's decision rejecting the opposition.
- II. With its notice of opposition, the opponent had requested revocation of the patent on the grounds for opposition under Article 100(a) (lack of novelty and lack of inventive step), Article 100(b) and Article 100(c) EPC.
- III. The opposition division decided that the claims as granted met the requirements of Articles 100(b) and (c) EPC; were novel over D6 and D13a; and had an inventive step in view of a combination of documents D6 and D7, D1 and D7 as well as D13a and D7.
- IV. In the present decision, reference is made to the following documents:

D1: JP-H07-33904
D6: WO 03/089212 A1
D7: Machine-generated English translation of JP-H04-100834
- V. With the reply to the grounds of appeal, the proprietor (respondent) filed 12 auxiliary requests.
- VI. The board issued a communication pursuant to Article 15(1) RPBA indicating its preliminary opinion that the main request (claims as granted) and the first and second auxiliary requests were not allowable.

VII. By letter of 21 April 2021, the proprietor (respondent) withdrew the main request and the first and second auxiliary requests, filed with the reply to the grounds of appeal, and maintained the third to twelfth auxiliary requests, which were re-filed and renumbered - in the same order - as the (updated) main request and first to ninth auxiliary requests.

VIII. Independent claims 1 and 5 of the main request read as follows:

"1. A device (100, 200) for manufacturing recycled carbon fibers (8) using carbon fiber reinforced plastic (40) containing carbon fibers and a matrix component as a source material, comprising:

a dry distillation-carbonization furnace (101) for dry distilling the carbon fiber reinforced plastic (40) and converting a portion of the matrix component into fixed carbon to attach the fixed carbon to the surfaces of the carbon fibers, said dry distillation-carbonization furnace provided with a box-shaped main body (105, 205), a dry distillation-carbonization chamber (102) which is arranged in the inside of the main body (105, 205) and accommodates the carbon fiber reinforced plastic (40), a combustion chamber (103, 203) which is arranged in the lower part of the dry distillation-carbonization chamber (102) and equipped with a burner (104), and a heating chamber (115) formed in the space between the main body (105, 205) and the dry distillation-carbonization chamber (102); and

a continuous furnace (26) for continuously heating the carbon fibers attached with the fixed carbon and removing a portion of the fixed carbon, said continuous

furnace provided with a mesh transportation part (6) for transporting the carbon fibers attached with the fixed carbon and an elongated tunnel shaped heat treatment space (2),

wherein a steam generator (105, 205) is provided to the dry distillation carbonization furnace (101, 102) said steam generator providing steam at 100°C or higher and 700°C or lower to the dry distillation-carbonization chamber (102)."

"5. A method for manufacturing recycled carbon fibers using carbon fiber reinforced plastic (40) containing carbon fibers and a matrix component, the method using a device as claimed in claim 1, wherein the method comprises:

a dry distillation step of dry distilling the carbon fiber reinforced plastic (40) while supplying steam at 100°C or higher and 700°C or lower by the dry distillation carbonization furnace (101, 201) and converting a portion of the matrix component into fixed carbon to attach to the surfaces of the carbon fibers; and a heat removal step of heating the carbon fibers attached with the fixed carbon by a continuous furnace (26) having an elongated tunnel-shaped regeneration space (2) constructed in the inside with a fire resistant material and removing a portion of the fixed carbon to obtain recycled carbon fibers (8)."

Claims 2 to 4 of the main request are dependent on independent device claim 1.

IX. Both parties indicated that they would not attend the oral proceedings.

X. The oral proceedings were cancelled.

XI. The parties' relevant arguments, submitted in writing, are reflected in the reasons for the decision below.

XII. Requests

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

The respondent requested that the patent be maintained upon the basis of one of the main request to the ninth auxiliary request, filed with the letter of 21 April 2021.

Reasons for the Decision

1. Admittance

1.1 According to the appellant, the main request should not be admitted into the proceedings.

1.2 For the following reasons, the main request is admitted into the proceedings.

1.2.1 The board considers the filing of this request a legitimate reaction to the appellant's grounds of appeal. The main request essentially differs from the claims as granted in that in main method claim 5, the feature "the method using a device as claimed in claim 1" was inserted. This amendment to the main method claim was not objected to by the appellant under Article 123(2) EPC. It clarifies that the method uses the device claimed in claim 1 and thus further limits its scope. Given that it was criticised by the appellant under a sufficiency argument that not any

device was suitable for use in the claimed method and a novelty objection over D13a was raised, this amendment clearly addresses these objections.

1.2.2 The board does not see that the respondent withheld this request and did not file it before the department of first instance for tactical reasons. The board does not see why, in the current case, this request should have been filed before the department of first instance. Filing this request does not amount to a fresh case either. The board does not see admitting this request as detrimental to the procedural economy given that the amendment carried out merely addresses the issue of whether the claimed method applies the claimed device.

1.2.3 In line with Article 12(3) RPBA 2020, the claim requests in question were filed with the respondent's reply to the grounds of appeal. Thus, the respondent's reply contained the respondent's complete case.

Under these circumstances, the board does not see any reason to exclude the current main request from the appeal proceedings. Thus, it is considered to be in the appeal proceedings.

2. Objections raised by the appellant - preliminary remarks

2.1 Claim 1 of the (current) main request corresponds to claim 1 of the former main request submitted by the respondent with its reply to the grounds of appeal. Thus, the objections raised by the appellant against claim 1 of the former main request are also dealt with in the context of the current main request.

- 2.2 With respect to claim 5 of the (current) main request (corresponding to claim 5 of the third auxiliary request filed with the respondent's reply to the grounds of appeal), the appellant argued that the objections and deficiencies raised against device claim 1 were directly applicable to the method of claim 5 (see point "3) Hilfsantrag III" on pages 14 and 15 of the appellant's letter of 18 September 2019). In the appellant's view, the subject-matter of claim 5 of the (current) main request is not allowable.

In its letter of 12 March 2021, the appellant clarified that it considered that the (current) main request had deficiencies under Article 123(2) EPC and Article 83 EPC. It also stated that claim 1 lacked novelty and inventive step of claim 1 over D6 as the closest prior art.

3. Article 123(2) EPC

- 3.1 The appellant submitted that the subject-matter of claims 1 and 5 of the main request and paragraphs [0007] to [0009] of the specification extended beyond the content of the application as filed, thus violating the requirement of Article 123(2) EPC.

It argued that claim 1 of the main request was amended so that concrete process features were changed for features suitable for carrying out the former concrete process features, for example, "...that dry distils ... and converts..." was changed to "...for dry distilling ... and converting...". These features were now merely desirable and need not be achieved. Such features in combination with the concrete device features of the claim lacked a basis in the application as filed.

The appellant also raised objections on the characterisation of the steam generator amended to be functionally linked to the provision of steam. The direct passage of steam from the steam generator to the dry distillation chamber was not disclosed in the application as originally filed.

The appellant further objected to various amendments to the description made during the examination proceedings. According to the appellant, paragraphs [0007] to [0009], which concerned the state of the art, were amended in a way that lacked a basis in the application as originally filed.

3.2 For the following reasons, the claims of the main request and paragraphs [0007] to [0009] of the specification meet the requirement of Article 123(2) EPC.

3.2.1 With respect to the question of added matter of claim 1, the opposition division held as follows:

"The statements 'that dry distills' (originally filed) and 'for dry distilling' (amended) describe clearly and unambiguously the same function for the furnace, which is further already defined as being a dry distillation carbonization furnace.

The statements 'that continuously heats' (originally filed) and 'for continuously heating' (amended) describe clearly and unambiguously the same function for the furnace, which is further already defined as being a continuous furnace.

A device that is originally presented as achieving a particular function is already intrinsically suitable for achieving this function.

Not making working a device does not imply changes in the intrinsic features of the device, as long as this device remains suitable for this action.

Regarding the features related to the steam generator, no change was introduced in view of the function of said steam generator, since the amended claim does not specify that the steam generator is suitable for providing steam but still that said generator is providing steam.

The amendment is, for this feature, only a reformulation of a disclosure which was already present in the claim as filed.

The person skilled in the art is, therefore, not confronted with features which were not originally disclosed."

The board fully concurs with this reasoning and the opposition division's conclusion.

3.2.2 With respect to claim 5, the appellant argued that due to the back-reference to claim 1, the same problem as alleged for claim 1 also existed for claim 5. For the reasons given for claim 1 above, the board does not agree with the appellant.

3.2.3 In paragraph [0007] of the patent, the document JP-H07-33904 (i.e. document D1, cited in the Supplementary European Search Report) was acknowledged in the

specification. This is common practice and does not amount to a violation of Article 123(2) EPC.

In paragraphs [0008] and [0009] of the patent, it is merely mentioned that according to the current invention, a device and a method are provided as claimed in the accompanying claims. This is clearly supported by the application as filed and does not violate the requirements of Article 123(2) EPC either.

- 3.2.4 No other added-matter objection was raised by the appellant. The board did not see any reason to raise such an objection on its own motion. There is sufficient basis in the application as filed, when taken as a whole, for inserting the feature "the method using a device as claimed in claim 1" into claim 5 of the main request.

In view of the above, the subject-matter of claims 1 and 5 of the main request as well as paragraphs [0007] to [0009] of the specification comply with the requirement of Article 123(2) EPC.

4. Article 100(b) EPC

- 4.1 The appellant contested that the features for carrying out the invention were sufficiently disclosed or defined in the patent to enable the skilled person to reproduce the claimed invention without undue burden. It argued that claim 1 referred to various process features that were not features of the claimed device but rather the desired outcomes of using the device. The skilled person was not taught by these features how to make a device that can achieve these outcomes.

4.2 The board does not agree. As regards claim 1, the board is convinced that a skilled person is in a position to construct the claimed device. How to implement the functional or process features in claim 1 with the claimed device is set out in paragraphs [0036] to [0043] of the description.

4.3 The appellant argued that the process of claim 5 of the former main request was not restricted to the devices disclosed in the patent, and it was not disclosed how such a process could be carried out with any device.

In view of the limitation of claim 5 of the main request, now using the device claimed in claim 1, this objection is no longer relevant.

Claim 5 of the main request relates to a method for manufacturing a product which unequivocally uses the device as claimed in claim 1 of the main request. Paragraphs [0036] to [0043] set out detailed guidance on how to implement the claimed method.

In view of the above, claims 1 and 5 of the main request satisfy the requirement of Article 83 EPC. Thus, the invention can be carried out by a skilled person.

5. Novelty

5.1 The appellant argued that the subject-matter of claim 1 is not novel over D6.

5.2 D6 relates to a plant for the recovery of reinforcing fibres from the composite materials of the same in polymeric matrixes, comprising a reaction section in which the pyrolysis and upgrading steps take place in

sequence (see claim 11 of D6). The plant may further comprise "a fume-treating section, wherein the pyrolysis and upgrading vapours are treated to allow discharging the cleaned gases into air, as well as cogeneration" (see claim 12 of D6).

Figure 14 of D6 (considered by the appellant to be the most relevant disclosure of a device in D6) is a simplified process diagram of the implemented plant, the main procedures of the processing being reactor loading, material pyrolysis, upgrading, and cooling and discharge (see page 15, line 26 to page 16, line 1 of D6).

5.3 As outlined below, the board concludes that the opposition division correctly assessed the novelty of claim 1 of the main request and correctly identified the following distinguishing features 1 to 4 of claim 1 of the main request as not being disclosed in D6:

1) "... a combustion chamber which is arranged in the lower part of the dry distillation-carbonization chamber and equipped with a burner ..."

2) "... a heating chamber formed in the space between the main body and the dry distillation-carbonization chamber ..."

3) "... a continuous furnace for continuously heating the carbon fibers attached with the fixed carbon and removing a portion of the fixed carbon, said continuous furnace provided with a mesh transportation part for transporting the carbon fibers attached with the fixed carbon and an elongated tunnel shaped heat treatment space ..."

4) "... said steam generator providing steam at 100°C or higher and 700°C or lower to the dry distillation carbonization chamber ..."

5.4 The appellant argued that features 1 and 2 were implicitly disclosed in Figure 14 of D6. However, Figure 14 is merely a simplified process diagram of the implemented plant (see page 15, line 26 to page 16, line 1 of D6). Figure 14 does not show the construction and arrangement of the plant and details of its individual elements. Even the description of D6 does not contain details on the function and arrangement of the elements shown in Figure 14. For instance, Figure 14 does not disclose a burner in the combustion chamber and only gives a schematic representation of the relative positions of the combustion chamber and the dry distillation carbonisation chamber. Furthermore, the feature "CF" in Figure 14 is not explicitly defined as being a heating chamber.

5.5 The appellant argued that feature 3 was disclosed on page 16, lines 21 to 26 of D6. The opposition division correctly assessed that this disclosure suggested the implementation of a conveyor belt for transporting the material between different thermo-treating areas. There is no disclosure of a combination of a dry distillation carbonisation furnace and a continuous furnace.

5.6 The appellant argued that feature 4 was disclosed on page 9, lines 5 to 8 and page 11, lines 15 to 21 of D6. However, the board does not agree that these passages cited by the appellant unambiguously disclose a steam generator providing steam at 100 °C or higher and 700 °C or lower to the dry distillation carbonisation chamber. Instead, page 9, lines 5 to 8 of D6 mentions that during the first step of the process,

the material supplied to the plant is treated at temperatures ranging from 250 to 700 °C with a residence time of a few hours. Page 11, lines 15 to 21 of D6 states that the "upgrading process could also be made either in parallel to the pyrolysis analysis or subsequently, otherwise with a combined pyrolysis/upgrading process in a single step". However, there is no unambiguous disclosure given for the steam generator specified in claim 1 of the main request.

Thus, the device of claim 1 of the main request is novel over D6. The same applies to claims 2 to 4, which are directly dependent on claim 1 of the main request, as well as to method claim 5 of the main request, which refers back to and includes the features of device claim 1 of the main request.

6. Inventive step

6.1 The appellant submitted a large number of inventive-step objections using numerous starting documents. On the question of which document might be suitable as the closest prior art, it merely argued that D6 qualifies as the closest prior-art document and that the subject-matter of claim 1 of the main request did not involve an inventive step in view of D6 in combination with the common general knowledge or D7.

6.2 The board also considers D6 the closest prior-art document since D6 - like the opposed patent - deals with a method for recovering reinforcing fibres from composite materials and an apparatus for recovering carbon fibres from composites (see e.g. claims 11 to 14 and Figure 14 of D6).

- 6.3 The appellant did not provide arguments why documents other than D6 might be equally suited to being the closest prior art.
- 6.4 The opposition division held that none of the combinations of documents submitted in the first-instance proceedings is suited to render the claimed subject-matter obvious. The board considers that the appellant did not address why the opposition division's conclusion in this respect was wrong. Instead, it essentially repeated the arguments submitted before the opposition division.
- 6.5 Under these circumstances, the board is unable to see why any document other than D6 might also qualify as the closest prior art. Thus, D6 is considered the closest prior-art document for assessing inventive step in the current case.
- 6.6 The subject-matter of claim 1 of the main request differs from D6 in the four distinguishing features 1 to 4 identified under point 5.3 above.
- 6.7 Even when assuming that the objective technical problem to be solved is merely the provision of an alternative device, in view of the high number of distinguishing features, the board cannot see how a skilled person might arrive at the claimed device in an obvious manner. Neither the common general knowledge of a skilled person nor D7 motivates a skilled person in this respect. The claimed device is a non-obvious alternative in view of D6 as the closest prior art.

In view of the above, the device claimed in claim 1 of the main request involves an inventive step in view of D6 as the closest prior art. The same applies to

claims 2 to 4, which are directly dependent on claim 1 of the main request, as well as to method claim 5 of the main request, which refers back to and includes the features of claim 1 of the main request.

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 as amended in the following version:

Description:

Pages 2 to 11 of the patent specification

Claims:

No. 1 to 5 according to the main request filed with the letter of 21 April 2021

Drawings:

Sheets 1 to 12 of the patent specification

The Registrar:

The Chairman:



M. Schalow

A. Haderlein

Decision electronically authenticated