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Datasheet for the decision of 17 June 2021

Case Number: T 1146/19 - 3.2.01

Application Number: 13193905.0

Publication Number: 2875897

IPC: B23K26/06, B22F3/105, B23K26/34, B29C67/00

Language of the proceedings: EN

Title of invention:
Method of and device for controlling an irradiation system for producing a three-dimensional workpiece

Patent Proprietor:
SLM Solutions Group AG

Opponents:
(2)Concept Laser GmbH

Headword:

Relevant legal provisions:
EPC Art. 52(1), 54, 56

Keyword:
Novelty - main request (yes)
Inventive step - main request (yes)

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

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Chambres de recours

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Case Number: T 1146/19 - 3.2.01

D E C I S I O N
of Technical Board of Appeal 3.2.01
of 17 June 2021

Appellant: (Patent Proprietor)	SLM Solutions Group AG Estlandring 4 23560 Lübeck (DE)
Representative:	Schicker, Silvia Wuesthoff & Wuesthoff Patentanwälte PartG mbB Schweigerstraße 2 81541 München (DE)
Appellant: (Opponent 2)	Concept Laser GmbH An der Zeil 8 96215 Lichtenfels (DE)
Representative:	Hafner & Kohl PartmbB Schleiermacherstraße 25 90491 Nürnberg (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 11 February 2019 concerning maintenance of the European Patent No. 2875897 in amended form.**

Composition of the Board:

Chairman	G. Pricolo
Members:	V. Vinci
	P. Guntz

Summary of Facts and Submissions

I. The appeals filed by the patent proprietor and by the opponent 2 are directed against the interlocutory decision of the opposition division to maintain the European patent No. 2 875 897 in amended form. In its decision the opposition division held that the subject-matter of claims 1 and 9 as granted and according to the 1st auxiliary request lacked novelty in the meaning of Articles 52(1) and 54 EPC in view of the following prior art pursuant to Article 54(3) EPC:

E1: WO 2014/199134 A

Furthermore, the opposition division held that the following prior art documents pursuant to Article 54(3) EPC:

E2: WO 2014/187606 A
E3: WO 2014/199149 A

were not prejudicial to the novelty of claims 1 and 9 as granted, and that the subject-matter of claims 1 and 8 according to the 2nd auxiliary request involved an inventive step in the meaning of Articles 52(1) and 56 EPC in view of the following prior art documents:

E6: JP 2009 6509 A and English translation E7

in combination with common general knowledge or with

E8: JP 4 113 828 A

II. With the communication according to Article 15(1) RPBA dated 1st December 2020 the Board informed the parties

of its preliminary assessment of the case.

Oral proceedings pursuant to Article 116 EPC were held before the Board on 17 June 2021 by videoconference.

III. The appellant (patent proprietor) requested that the decision under appeal be set aside and the patent be maintained as granted, or in the alternative, that the patent be maintained on the basis of the 1st or 2nd auxiliary requests underlying the decision under appeal or on the basis of any of the 3rd to 5th auxiliary requests as submitted with the reply to the statement of grounds of appeal dated 16 October 2019.

The appellant (opponent 2) requested that the decision under appeal be set aside and that the European patent be revoked.

IV. Claim 1 as granted reads as follows (labelling of the features added):

M1: *Method of controlling an irradiation system (20) for use in an apparatus (10) for producing a three-dimensional work piece and*

M2: *comprising a plurality of irradiation units (22a, 22b), the method comprising the steps of:*

M3: *defining a first and a second irradiation area (18a, 18b) as well as an overlap area (26) arranged between the first and the second irradiation area (18a, 18b) on a surface of a carrier (16) adapted to receive a layer of raw material powder,*

M4: *assigning a first irradiation unit (22a) of the irradiation system (20) to the first irradiation area*

(18a) and the overlap area (26), and

M5: *assigning a second irradiation unit (22b) of the irradiation system (20) to the second irradiation area (18b) and the overlap area (26),*

characterized by the steps of:

M6: *determining that a section (S) of a radiation pattern according to which radiation beams (24a, 24b) emitted by the irradiation units (22a, 22b) of the irradiation system (20) are guided over the layer of raw material powder received on the carrier (16) and/or a contour (C) of the three-dimensional work piece to be produced extend(s) into the first and the second irradiation area (18a, 18b) defined on the surface of the carrier (16),*

M7: *splitting said section (S) of the radiation pattern and/or said contour (C), in a splitting region of the section (S) of the radiation pattern and/or the contour (C) which is located in the overlap area (26) arranged between the first and the second irradiation area (18a, 18b) into a first portion (S1, C1) and a second portion (S2, C2),*

M8: *assigning the first portion (S1, C1) of said section (S) of the radiation pattern and/or said contour (C) to the first irradiation unit (22a), and*

M9: *assigning the second portion (S2, C2) of said section (S) of the radiation pattern and/or said contour (C) to the second irradiation unit (22b).*

Claim 9 as granted reads as follows (labelling of the features added):

M1': *Device (27) for controlling an irradiation system (20) for use in an apparatus (10) for producing a three-dimensional work piece and*

M2': *comprising a plurality of irradiation units (22a, 22b), the device comprising*:

M3': *a definition unit (28) adapted to define a first and a second irradiation area (18a, 18b) as well as an overlap area (26) arranged between the first and the second irradiation area (18a, 18b) on a surface of a carrier (16) adapted to receive a layer of raw material powder, and*

M4': *a first assigning unit (30) adapted to assign a first irradiation unit (22a) of the irradiation system (20) to the first irradiation area (18a) and the overlap area (26), and to assign a second irradiation unit (22b) of the irradiation system (20) to the second irradiation area (18b) and the overlap area (26),*

characterized by:

M5': *a determining unit (32) adapted to determine that a section (S) of a radiation pattern according to which radiation beams (24a, 24b) emitted by the irradiation units (22) of the irradiation system (20) are guided over the layer of raw material powder received on the carrier (16) and/or a contour of the three-dimensional work piece to be produced extend(s) into the first and the second irradiation area (18a, 18b) defined on the surface of the carrier (16),*

M6': *a splitting unit (34) adapted to split said section (S) of the radiation pattern and/or said*

contour (C), in a splitting region of the radiation pattern and/or the contour (C) which is located in the overlap area (26) arranged between the first and the second irradiation area (18a, 18b), into a first portion (S1, C1) and a second portion (S2, C2), and

M7': *a second assigning unit (38) adapted to assign the first portion (S1, C1) of said section (S) of the radiation pattern and/or said contour (C) to the first irradiation unit (22a) and to assign the second portion (S2, C2) of said section (S) of the radiation pattern and/or said contour (C) to the second irradiation unit (22b).*

Reasons for the Decision

MAIN REQUEST

Interpretation of the expression *'overlap area'*

1. For the purpose of the assessment of novelty, it is necessary to construe the term *'overlap area'* in claims 1 and 9 of the patent as granted.

1.1 The appellant (patent proprietor) argued that this term should be understood, in the context of claim 1 and in the light of the patent disclosure, as meaning a third area defined on the carrier and located between the first and second irradiation area as defined in feature M3, said third area not belonging to any of the first and the second irradiation areas. The appellant (opponent 2) replied that this interpretation would be clearly inconsistent with the common understanding of the term *'overlap area'* which, as is well-known, defines the common area resulting from the geometrical intersection of two areas. In its view, the

interpretation proposed by the appellant (patent proprietor) would thus be disregarded by the person skilled in the art when construing the claims at stake.

1.2 The Board cannot concur with the view of the appellant (opponent 2) and concurs with the interpretation suggested by the appellant (patent proprietor) for the following reasons:

It is indisputed that the expression *'overlap area'*, in its most general and recognized meaning, indicates indeed a common area resulting from the intersection of two areas. However, according to established Case Law of the Boards of Appeal, a claim must be read and construed by the person skilled in the art with a mind willing to understand and to make technical sense of it, thereby ruling out any interpretation which appears illogical or technically meaningless in view of the actual context of the claim. As correctly pointed out by the appellant (patent proprietor), feature M3 of claim 1 recites that the *'overlap area (26) is arranged between the first and second irradiation area (22a, 22b)'*. This additional information prompts the person skilled in the art to exclude that the overlap area (26) defined on the carrier (16) results from the intersection of the first and second irradiation area because, if that were the case, the overlap area would be included in the irradiation areas rather than arranged between them. This consideration provides the person skilled in the art with a first clear hint that what is meant by the expression *'overlap area'* is in fact a further irradiation area defined on the carrier which is distinct from the first and second irradiation areas, but which is located contiguously between them. This interpretation is further confirmed by the wording

of the following features M4 and M5 of claim 1 as granted, according to which a first irradiation unit and a second irradiation unit are assigned to the first and second irradiation area respectively and to the overlap area as well. If the overlap area were not a fully distinct area, but an area resulting from the intersection of the first and second irradiation areas as asserted by the appellant (opponent 2), there would have been no need to specify in the claim that the first and second irradiation units were assigned to the overlap area as well, because this assignment would implicitly result from the fact that the overlap area is in common with both the first and second irradiation areas to which the irradiation units are assigned anyway. Therefore, when read in the context of claim 1, the word *'overlap'* indicates that in this further area an overlapping of the irradiation provided by the two irradiation units takes place, rather than an surface overlapping in the geometrical sense as asserted by the opponent 2. This interpretation is also fully supported by the representation of the partition of the carrier surface given for example in figures 2 and 4 and 6 in combination with the respective passages of the description and analogously applies to the same expression in claim 9 which uses for the corresponding features M3' and M4' the same wording as for the features M3 to M5 of claim 1.

1.3 Therefore, the term *'overlap area'* in claims 1 and 9 as granted is to be understood as referring to a third irradiation area defined on the carrier which is not part of any of the first and the second irradiation areas and which is located contiguously between them.

Novelty in view of E1

2. When applying the interpretation above to the embodiment in figure 4 of E1 and looking for those features of claim 1 that are present in said embodiment, one could say, as put forward by the appellant (patent proprietor), that the central cusp-shaped area delimited by the upper portions of the boundaries of the scanning zones (1a) and (2b) corresponds to the overlap area (26) in the meaning of claim 1, while the two areas contiguously located on the left and right side of the cusp and delimitated by the remaining portions of the boundaries of the scanning zones (1a) and (2b) correspond to the claimed first and second irradiation areas (18a,18b), respectively. Hence, while E1 discloses the three areas defined on the carrier according to feature M3 and the assignment of the irradiation units to these areas according to features M4 and M5 of claim 1, as asserted by the appellant (opponent 2), E1 does not disclose the step of determining a section (S) of a radiation pattern and/or a contour (C) of the three-dimensional workpiece which extend/s into the first an the second irradiation area defined on the surface of the carrier in the meaning of feature M6. In fact, in view of the definition of the irradiation areas on figure 4 of E1 presented above, the '*island*' (5) or (6) in figure 4 of E1, which the appellant (opponent 2) correctly identified with the '*section (S)*' recited in claim 1 as granted, do not extend '*into the first and second irradiation area*' as required by feature M6, but in the first or second irradiation area respectively and in the overlap region. Feature M6 is thus not anticipated by E1. The same applies for the same reasons to the corresponding features M6' of apparatus claim 9 as

granted.

2.1 Therefore, the subject-matter of claims 1 and 9 is novel over E1.

2.2 In view of this conclusion, there is no need to deal with the issue raised by the appellant (opponent 2) concerning the admissibility of the arguments submitted by the appellant (patent proprietor) that features M3 to M5 and M3' and M4' of claims 1 and 9 as granted, respectively, also represented distinguishing features over E1.

Novelty in view E2 and E3

2.3 The subject-matter of claims 1 and 9 as granted is novel in view of E2 and E3 either, as correctly assessed by the opposition division in the decision under appeal.

2.4 It is uncontested that document E2 discloses, for example in figures 1(a), 2 and 3, a first and a second irradiation area (*'selected location 1 and 2'*) and an overlap area (*'overlap zone 3'*) located between them and defined on a carrier (314) thus according to feature M3, as well as the assignment of a first (301) and a second (302) irradiation unit to the respective irradiation area (1,2) and to the overlap area (3) according to features M4 and M5 of claim 1 as granted.

2.5 The appellant (opponent 2) drew the attention to paragraph [0066] of E2 which states that, according to a first operation way, the powder is fused or heated with the first beam (351) at a first passage in the overlapping zone (3) while simultaneously the second beam (352) may be fusing or heating the powder at a

second passage, which is separated from said first passage. It was argued that the simultaneous fusing of the powder at two separated passages in the overlapping area (3) would unambiguously result in a splitting of the section of the radiation pattern into a first and a second portion according to feature M7, and in the assignment of said first and second portions to the respective irradiation unit according to features M8 and M9 of claim 1 as granted. A previous determination of a section of a radiation pattern extending in both the first and second irradiation areas according to feature M6 of claim 1 was not only a possible choice but rather a logic and necessary precondition for the execution of the splitting step described in paragraph [0066] which was thus also directly and unambiguously disclosed in E2. The appellant (patent proprietor) drew the attention to the whole disclosure provided by paragraphs [0062] to [0066] of E2 in combination with figures 1(a) to 1(c) from which it could only be derived that the beams might be both active within the entire overlap area (3), but not that a splitting according to feature M7 necessarily took place. The same applied to the determination of a section of a radiation pattern according to feature M6 which was just a possibility of execution of the method of E2 which however was not directly and unambiguously derivable from this prior art.

2.6 The Board is not convinced by the reasoning of the appellant (opponent 2) and follows the arguments of the appellant (patent proprietor) for the following reasons:

Irrespective of the assessment of the alleged disclosure in document E2 of a splitting step according to feature M7, the Board cannot see why such a

splitting step, if disclosed, should imply as necessary pre-condition a determination of a section S of the radiation pattern which, according to feature M6, extends in the first and second irradiation area (1,2). A determination of a different section of the radiation pattern, for example a section extending in the first or second irradiation area and in the overlap area would be compatible with the splitting step allegedly disclosed in paragraph [0066] of E2. Therefore, a determination step according to feature M6 of claim 1 as granted cannot be considered to be directly and unambiguously derivable from this prior art document, and this irrespective of the assessment of whether feature M7 is disclosed therein or not. The same holds *'mutatis mutandis'* for the corresponding apparatus claim 9 with regard to features M6'.

2.7 In conclusion, the Board is convinced that the subject-matter of claims 1 and 9 as granted differs from E2 at least in the feature M6 and M6' respectively and is thus novel also in view of this prior art document.

2.8 Regarding document E3, the appellant (opponent 2) referred to figures 4 to 6 and to the corresponding passages of the description, in particular page 10, lines 15-19 stating that *'In these overlapping regions, both laser beams consolidate portions of the object that fall within these regions'* and page 10, line 26 to page 11, line 3, stating that *'at interfaces where one laser beam hands-over to another laser beam, areas of the powder may be consolidated by both laser beams'.* It was argued that the fact that an hand-over from the first laser beam to the second laser beam took place at the interface, directly and unambiguously resulted in a splitting step according to feature M7 of claim 1 as

granted.

2.9 The Board does not agree for the following reasons:

The Board concurs with the appellant (patent proprietor) that when referring the cited passages to the embodiments in figures 4 and 5 it can be only derived that the hand-over takes place at the boundary of the overlap area with the first or second irradiation area and not within a clearly defined overlap area, whereby a splitting step according to feature M7 of claim 1 as granted, which according to claim 1 takes place in the overlap zone, cannot be directly and unambiguously derived from these embodiments. The appellant (opponent 2) correctly observed that document E3 also discloses in the context of Fig. 6 that the scanning zones 140h to 140j can be defined in such a way as to overlap by a significant amount (see description, page 10, line 21 onwards) and that, in this situation, it appears reasonable that a person skilled in the art would consider the possibility to carry out the hand-over from a laser beam to the other in these large overlapping regions, thereby executing '*de facto*' a splitting according to feature M7. However, the Board agrees with the appellant (patent proprietor) that while this teaching might be considered obvious for a persons skilled in the art in view of the technical context of figure 6 of E3, it is not directly and unambiguously derivable as it is mandatorily requested when assessing lack of novelty. The same applies for the same reasons to feature M7' of apparatus claims 9 as granted.

2.10 Therefore, the Board concurs with the appellant (patent proprietor) and with the opposition division that the subject-matter of claims 1 and 9 as granted differs

from the content of E3 in the features M7 and M7' respectively and is therefore novel.

2.11 In view of the above, the Board comes to the conclusion that the subject-matter of claims 1 and 9 as granted is novel over the cited prior art in the meaning of Articles 52(1) and 54 EPC, thereby deviating from the assessment of the opposition division in the decision under appeal which is thus to be set aside.

Inventive Step

3. The appellant (opponent 2) alleged that the subject-matter of independent claims 1 and 9 of the patent as granted did not involve an inventive step in view of E6 in combination with common general knowledge or with the disclosure of E8. The reasoning of the appellant is based on the assumption that, in view of the embodiments in figures 9, 10 and 12 of E6 and the corresponding passages of the English translation E7 (see paragraphs [0045], [0046] and [0048]), this prior art would disclose all the features of claim 1 as granted with the exception of the features M6. In this respect it was argued that the fact that document E6 taught that each of the irradiation units A-C can generally cover the whole carrier surface (see figure 9) was a clear indication that a definition of two irradiation areas and of an overlap area as well as the subsequent respective assignment of the irradiation units thereto according to features M3-M5 was also feasible with the device of E6. Furthermore the determination of a section of the radiation pattern according to feature M6 of claim 1 as granted would be an obvious choice for a person skilled in the art in view of common general knowledge or suggested in the context of the similar controlling method by E8,

whereby the subject-matter of claim 1 as granted would not involve an inventive step.

3.1 The Board disagrees for the following reasons:

As convincingly argued by the appellant (patent proprietor), the assumption of the appellant (opponent 2) that features M3 to M5 are disclosed in E6 is not correct. According to figure 9 the irradiation areas assigned to each one of the irradiation units (A-C) are fully overlapping each other on the whole carrier area, so that no definition step leading to three distinguished irradiation areas according to feature M3 and no assignments of the irradiation units according to features M4 and M5 takes place and can thus be derived. According to the embodiment shown in figure 10, the contour S is split into 2 irradiation areas S1 and S2 each one being exclusively assigned to a respective irradiation units. There is no disclosure of a defining step resulting in a third overlap area located between the areas S1 and S2 and assigned to the respective irradiation unit. Regarding the embodiment in figure 12, three irradiation areas S1-S3 are in fact shown and thus defined on the carrier. However, it is doubtful whether one of these areas can be considered to be located between the other two as required by feature M3, and this because they appear to be just adjacent and contiguous. Even if this were the case, each irradiation unit is exclusively assigned to the corresponding irradiation area only, whereby the assigning steps according to features M4 and M5 of claim 1 as granted are not fulfilled. Therefore, even if the device disclosed in E6 might be potentially suitable, if programmed accordingly, as alleged by the appellant (opponent 2), to execute the steps M3 to M5 which represent the basic principle underlying the

contested patent, this prior art document does not directly and unambiguously disclose that these steps are carried out in a method of controlling an irradiation system or that the means provided are programmed in order to do so. In conclusion, the reasoning submitted by the appellant (opponent 2) in order to substantiate the alleged lack of inventive step of the subject-matter of claim 1 as granted is based on the wrong assumption that features M3-M5 are known from E6 and is thus moot. Contextually, the Board does not see any reason why it should be obvious for the person skilled in the art to introduce the steps M3 to M5 in the controlling method of E6. Therefore, irrespective of the assessment of the alleged disclosure in E6 of features M7 and M8, which is contested by the appellant (patent proprietor), and of the question whether the introduction of feature M6 in the controlling method of E6 would be obvious in view of common general knowledge or of the teaching of E8, no lack of inventive step has been convincingly demonstrated by the appellant (opponent 2). The same applies with the same reasons to the subject-matter of apparatus claim 9 as granted.

3.2 In view of the above the Board concludes that the subject-matter of claims 1 and 9 of the patent as granted involves an inventive step over the prior art in the meaning of Articles 52(1) and 56 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is maintained as granted.

The Registrar: The Chairman:

A. Vottner G. Pricolo

Decision electronically authenticated