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Datasheet for the decision of 18 July 2024

Case Number: T 0135/22 - 3.4.02

Application Number: 12703338.9

Publication Number: 2800995

IPC: G02F1/33, G02B21/00, G01N21/64

Language of the proceedings: EN

Title of invention:
METHOD FOR SCANNING ALONG A CONTINUOUS SCANNING TRAJECTORY WITH A SCANNER SYSTEM

Patent Proprietor:
Femtonics Kft.

Opponent:
Agile Diffraction Ltd

Relevant legal provisions:
EPC Art. 100(c), 111(1), 113(1)
RPBA 2020 Art. 11

Keyword:
Added subject-matter (no)
Remittal for further prosecution (yes)
Substantial procedural violation (yes), reimbursement of appeal fee for reasons of equity (no)

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Case Number: T 0135/22 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 18 July 2024

Appellant: (Patent Proprietor)	Femtonics Kft. 59 Tuzoltó utca 1094 Budapest (HU)
Representative:	Kacsuk, Zsófia Kacsukpatent Kft. Üteg u. 11/a 1139 Budapest (HU)
Respondent: (Opponent)	Agile Diffraction Ltd 10-12 Mulberry green Harlow Essex CM17 0ET (GB)
Representative:	J A Kemp LLP 80 Turnmill Street London EC1M 5QU (GB)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 15 November 2021 revoking European patent No. 2800995 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	R. Bekkering
Members:	F. J. Narganes-Quijano
	B. Müller

Summary of Facts and Submissions

I. The patent proprietor (appellant) lodged an appeal against the decision of the opposition division revoking European patent No. 2800995.

The opposition filed by the opponent (respondent) against the patent as a whole was based on the grounds for opposition of added subject-matter (Article 100 (c) EPC), of insufficiency of disclosure (Article 100 (b) EPC) and of lack of novelty and of inventive step (Article 100 (a) EPC in conjunction with Articles 52 (1) EPC, 54 (1) and 56 EPC).

II. During the appeal proceedings the parties referred *inter alia* to the following documents cited during the first-instance proceedings:

D1: "Acoustic-optic lens with very fast focus scanning", A. Kaplan *et al.*; Optics Letters Vol. 26 (2001); pages 1078 to 1080
D2: WO 2008/032061 A2
D3: WO 2012/143702 A1
D4: "Technical Annex D4", P. Kirkby; pages 1 to 8
D5: "Fast 3D Imaging of Spine, Dendritic, and Neuronal Assemblies in Behaving Animals" - "Supplemental Information"; G. Szalay *et al.*; Neuron, Vol. 92 (2016); bibliographic page and pages 1 to 66
D14: WO 2010/076579 A1.

III. In the decision under appeal the opposition division held that

- the ground for opposition under Article 100 (c) EPC prejudiced the maintenance of the patent as granted (main request),

- the patent as amended according to auxiliary requests 1 to 5 then on file did not comply with Article 123 (2) EPC.

In addition, auxiliary requests 6 to 35 then on file were not admitted into the proceedings pursuant to Rule 116 (1) EPC.

IV. With the statement setting out the grounds of appeal the appellant filed a series of documents, among which the following one was filed in support of the substantive submissions relating to the ground for opposition under Article 100 (c) EPC:

D26: "A compact acousto-optic lens for 2D and 3D femtosecond based 2-photon microscopy", P. A. Kirkby *et al.*; Optics Express Vol. 18 (2010), pages 13721 to 13745.

V. With the letter of reply to the statement of grounds of appeal the respondent submitted document

D27: "Dynamic wavefront shaping with an acousto-optic lens for laser scanning microscopy", G. Konstantinou *et al.*; Optics Express, Vol. 24 (2016), pages 6283 to 6299.

VI. Oral proceedings before the board were held on 18 July 2024.

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

- as granted or

- in amended form on the basis of the claims of auxiliary requests 1 to 5, all filed with a letter dated 16 April 2021.

The respondent requested that the appeal be dismissed or, should the requirements of Articles 100(c) in combination with 123(2) EPC be found to be met in respect of any request of the patent proprietor, that the case be remitted to the opposition division for examination of the grounds for opposition of sufficiency of disclosure, novelty and inventive step.

At the end of the oral proceedings the chairman announced the decision of the board.

VII. Claim 1 and dependent claim 2 as granted (main request) read as follows:

"1. Method for scanning along a continuous 3-dimensional scanning trajectory with a scanner system (100) comprising a first pair of acousto-optic deflectors (10) for deflecting a focal spot of an electromagnetic beam generated by a consecutive lens system (200) defining an optical axis (z) in an x-z plane, and a second pair of acousto-optic deflectors (20) for deflecting the focal spot in a y-z plane being substantially perpendicular to the x-z plane,

characterised by passing the electromagnetic beam through the first and second pairs of acousto-optic deflectors (10,20) while providing time dependent acoustic frequency chirps, which change with time continuously and non-linearly in the deflectors (12, 12') of the first pair of deflectors (10) and in the deflectors (22, 22') of the second pair of deflectors (20) so as to cause the focal spot of the

electromagnetic beam to move continuously along the scanning trajectory."

"2. The method according to claim 1, **characterised** by changing the acoustic frequency chirps by:

- setting a slope mismatch between the acoustic frequency sweeps of the deflectors (12,12') of the first pair of deflectors (10) in order to cause the focal spot to move along the x axis with a first velocity (v_x), and

- setting a slope mismatch between the acoustic frequency sweeps of the deflectors (22, 22') of the second pair of deflectors (20) in order to cause the focal spot to move along the y axis with a second velocity (v_y) having regard to the first velocity (v_x) so as to move the focal spot continuously along the scanning trajectory and

- changing the acoustic frequency chirps with time such that the frequency slopes in the two deflectors (12, 12’ and 22, 22') of a pair (10, 20) are shifted non-symmetrically in order to cause the focal spot to move along the z axis with a third velocity (v_z) having regard to the first and second velocity (v_x and v_y) so as to move the focal spot continuously along the 3-dimensional scanning trajectory."

Reasons for the Decision

1. The appeal is admissible.

2. *Main request (patent as granted) - Article 100 (c) EPC*

2.1 In its decision the opposition division found that

A) claim 1 as granted constituted an unallowable intermediate generalization of the content of the application as filed (Article 100 (c) EPC) in view of the omission in the claim of features relating to the non-symmetry - in particular, to "some sort of breaking of the symmetry" or to "some kind of non-symmetry" - of the time variations of the chirp functions in the claimed feature "time dependent acoustic frequency chirps, which change with time continuously and non-linearly", and that

B) the feature of granted claim 1 relating to "passing the electromagnetic beam through the first and second pairs of acousto-optic deflectors" resulted in the claimed subject-matter extending beyond the content of the application as filed (Article 100 (c) EPC).

In addition, the respondent maintained on appeal the objection under Article 100 (c) EPC not decided upon by the opposition division in its decision and according to which

C) the feature of dependent claim 2 as granted relating to "the frequency slopes in the two deflectors [being] shifted non-symmetrically" extended beyond the content of the application as filed (Article 100 (c) EPC).

2.2 Objection "A)"

2.2.1 According to the reasons given by the opposition division in the contested decision 3D scanning was disclosed in the application as filed (page 9, lines 2 to 4 and original dependent claim 3) only in conjunction with non-linearity of the chirp functions combined with some sort of non-symmetry of the slopes of the chirp functions, and the omission of the latter

feature in granted claim 1 amounted to an unallowable intermediate generalization.

The respondent essentially submitted that there was no basis in the application as filed for providing 3D scanning using non-linear chirps alone because as held by the opposition division the original disclosure always required the non-linear chirps to be accompanied by a non-symmetric shift in the slopes. The combination of non-linear chirps and the non-maintenance of the symmetric shift of the slopes was consistently presented together and had technical significance, and there was nothing that would prompt the skilled person to disregard the clear disclosure on page 9, lines 1 to 7, of the application as filed relating to "not maintain[ing] symmetric shift of the slopes of the different deflectors". In addition, the mentioned non-symmetric shift was not implicit in claim 1. In particular, there was no evidence that all 3D scans would always require in all circumstances not maintaining symmetric shift in the slopes of the different deflectors. On the contrary, scanning in the z-direction using symmetrical non-linear scans were possible (see document D5 together with document D4, and document D27).

2.2.2 It is first noted that claim 1 as granted is directed to a method "for scanning along a continuous 3-dimensional scanning trajectory" and therefore it is - unlike, for instance, granted dependent claim 2 requiring "the focal spot to move along the z axis" - directed to a 3D scanning method in which the scanning focal spot is moved along a 3D scanning trajectory, without the trajectory being restricted to any particular trajectory. It follows that - as acknowledged by the parties during the oral proceedings

before the board - the claimed method is not confined to 3D movements of the scanning focal spot having a component in the z-direction - i.e. in the direction of the optical axis of the lens system generating the focal spot - and that it does not exclude arbitrary 3D scanning trajectories encompassing 2D trajectories on an arbitrary plane and, in particular, it does not exclude two-dimensional (2D) scanning in a z-plane, i.e. on a plane orthogonal to the z-direction.

In addition, this finding also applies to the passages of the application as filed on which granted claim 1 is based, see

- page 9, line 1 *et seq.*: "3D scanning [...] achieve scanning along arbitrary 3D path, given by the function z = f(x,y)" [here, and in the following, emphasis added by the board] - it being noted that the function "z = f(x,y)", without further restrictions, does not define a one-dimensional path, but a surface, and that the mentioned function defines a one-dimensional path in a plane orthogonal to the z axis only upon imposition of the further condition z = constant (which also defines a surface);

- page 4, lines 1 to 5: "to provide a new operating mode for moving the focus spot continuously along an arbitrary scanning trajectory (curve)";

- page 4, lines 6 to 8: "if the slopes in the two deflectors [...] are not kept equal, but instead varied in time, then it is possible to move the focal spot along trajectories (curves) in 2D and 3D"; and

- page 6, lines 9 to 13: "The inventive method [...] allows both for scanning in 2D [...], and for scanning in 3D (along an arbitrary 3D trajectory within the sample)".

2.2.3 The board further notes the following in respect of the reasons given by the opposition division and the respondent's submissions:

The application as filed discloses two embodiments of a scanning method involving the use of a first and a second pair of AODs (acousto-optic deflectors) for deflecting the focal spot of an electromagnetic beam formed by a lens system having an optical axis z by providing the deflectors with time dependent acoustic frequency chirps:

- A 2D scanning method for scanning in the x- and y-directions while the z coordinate of the focal spot is maintained constant, the method involving shifting symmetrically the frequency sweep slopes of the chirps in the two deflectors of each pair of AODs (in the following the "symmetry condition"), see section "2D scanning" on page 6, line 20, to page 8, line 25, and in particular page 6, lines 26 to 29 ("The velocity of the scanning in a given plane can be set by nearly symmetrically increasing the mismatch between the slopes of the deflectors [...]"), together with page 6, line 29, to page 7, line 4, and page 8, lines 23 to 25.

- And a 3D scanning method of the focal spot involving the use of non-linear chirps and not maintaining the symmetry condition imposed in the 2D scanning method in order to achieve 3D scanning, see section "3D scanning" on page 9, line 1, to page 11, line 25, and in particular the first sentence on page 9 according to which "When [...] we use nonlinear chirps, and in the same time do not maintain symmetric shift in the slopes of the different deflectors, we can in principle achieve scanning along arbitrary 3D path".

It follows that the symmetry condition under consideration is a mathematical constraint imposed in the case of the 2D scanning method in the context of maintaining constant the z-coordinate of the moving focal spot and scanning along a path contained within a z-plane. In particular, the application as filed specifies that "[i]f the deflectors [of each pair of AODs] are identical as well the z level of the plane of the deflected focus spot does not change, if the slopes in the two deflectors [...] are shifted symmetrically [...]" (page 6, line 29, to page 7, line 4) and that when the deflectors of each pair of AODs are not identical (page 7, line 5 *et seq.*) "[t]he z level of the plane does not change, if the slopes [...] are shifted symmetrically [...]" (page 8, last paragraph).

In this technical context, the subsequent statement on page 9, lines 2 to 7, according to which "scanning along arbitrary 3D path" involves using non-linear chirps "and in the same time [...] not maintain[ing] symmetric shift in the slopes of the different deflectors" would, in the board's view, not be understood by the skilled person - from the logical point of view and also in its technical context - in the sense that 3D scanning along an arbitrary 3D path requires imposing the complementary condition to the mentioned symmetry condition (i.e. expressly imposing the condition that the symmetry condition disclosed by reference to the 2D scanning method not be fulfilled when carrying out 3D scanning), but only in the sense that the symmetry condition is no longer imposed when scanning in directions other than those contained within a z-plane, while for predetermined 3D scanning trajectories or segments thereof - in particular, for 2D scanning trajectories containing no movement of the focal spot in the z direction - the symmetry condition

could - as disclosed for the case of the 2D scanning within a z-plane - still be fulfilled.

This conclusion is, in addition, consistent with, and supported by dependent claim 3 of the application as filed in which the acoustic frequency sweeps are required to be "asymmetrically" changed with time not for arbitrary 3D scanning trajectories, but specifically "in order to cause the focal spot to move along the z axis".

2.2.4 During the oral proceedings the respondent submitted by reference to its letter dated 16 July 2024 and documents D2 and D3 that, although claim 1 encompassed arbitrary scanning trajectories, the limitation to non-linearly changing frequency chirps, at least when coupled with a non-maintenance of the symmetry condition, removed from claim 1 any focal spot scanning in the Z-plane, i.e. it removed the "2D scanning" embodiment disclosed in the description in which scanning in the Z-plane was achieved using linear chirps. The main purpose of the symmetric shift of the drive signal slopes was not to avoid Z-scanning, but to create a lateral velocity to achieve lateral scanning, and scanning in the Z direction could only be achieved using non-linear drive signals. In particular, the idea that the skilled person would see the symmetry condition as simply keeping Z constant was not borne out by the disclosure of the application as filed or by any technical reality. Furthermore, there was no disclosure in the application as filed of the combination of non-linear drive signals and a symmetric shift of the signals or of the focal spot being moved continuously along a trajectory solely in a z-plane using non-linearly frequency chips. In addition, the description of the symmetry condition in the

application as filed related only to linear drive signals and was ambiguous in view of the incorrect and inconsistent mathematical expressions on page 7, lines 1 to 4, and page 8, last paragraph, and it was not clear what was to be understood by not maintaining the symmetric condition in the case of non-linear drive signals.

The board notes, however, that the conclusion in point 2.2.3 above is based on the technical information actually disclosed in the application as originally filed and on what the skilled person would directly and unambiguously derive from this technical information, irrespective of whether and to what extent the mentioned information reflects the actual physical mechanism underlying the claimed method and independently of whether all the embodiments encompassed by claim 1 as granted are technically achievable and/or are individually disclosed. The respondent's submissions might be pertinent to other requirements of the EPC - in particular, as submitted by the appellant, to the issue of sufficiency of disclosure under the ground for opposition of Article 100 (b) EPC - but not to the question under consideration which falls exclusively under Article 100 (c) EPC.

2.2.5 It follows from the considerations above that in the board's view claim 1 as granted is directed to a method "for scanning along a continuous 3-dimensional scanning trajectory" and that the skilled person in the technical field under consideration would not understand that the application as filed would require imposing on the scanning along an arbitrary 3D path using non-linear chirps any particular constraint relating to the symmetry - or, more particularly, to

the lack of symmetry - of the shifts of the slopes of the frequency chirps in the two deflectors of each of the two pairs of AODs.

2.2.6 The board concludes that the omission in claim 1 as granted of any particular condition relating to the symmetry - or to the absence of symmetry - in the changes of the time dependent acoustic frequency chirps does not constitute an unallowable intermediate generalization of the content of the application as filed and that, therefore, objection A) is not persuasive.

2.3 Objection "B)"

2.3.1 In its decision, the opposition division held that while the application as filed only provided a basis for an electromagnetic beam which was split by the first deflector in a deflected beam and in a zeroth order diffraction beam which was then blocked or removed (page 5, lines 3 to 22, together with Fig. 1 and 2), granted claim 1 was silent as to this zeroth order diffraction beam and it comprised an embodiment in which this zeroth diffraction order beam also passed through the deflectors. Therefore, the claimed subject-matter extended beyond the content of the application as filed. The opposition division also noted in this context that, while the electromagnetic beam of the preamble of granted claim 1 referred to a deflected beam downstream of the deflectors, the electromagnetic beam mentioned in the characterizing portion should be upstream of the deflectors, and that there was no basis in the application as filed for an electromagnetic beam passing through all the deflectors.

The appellant essentially submitted that granted claim 1 referred to one and the same electromagnetic beam and that this electromagnetic beam would be understood by a skilled person willing to understand in line with the conventional terminology used in this specific technical field (see, for instance, documents D1, D2, D3, D5 and D26) not as the beam emanating from the light source, but as being constituted by the useful electromagnetic beam from which the focal spot is generated for being used for scanning, and therefore only as a part of the beam emanating from the light source and which implicitly excluded the zeroth order diffraction beam. More particularly, the skilled person would understand that the purpose of the AODs is to deflect the electromagnetic beam and that, therefore, the mentioned useful electromagnetic beam passes through the AODs. In addition, this electromagnetic beam propagated through all the AODs, and the claimed feature "by passing the electromagnetic beam through the [AODs]" was already directly and unambiguously derivable from claim 1 as originally filed.

The respondent submitted that the application as filed disclosed a focal spot generated by an electromagnetic beam (claim 1) and referred to incident and to deflected electromagnetic beams (page 5, lines 3 to 9), but that there was no literal disclosure in the application as filed for "passing" a complete electromagnetic beam through the AODs as claimed. The respondent referred to the effect of the claimed pairs of AODs on an electromagnetic beam incident on the first AOD as disclosed in the application as filed by reference to Fig. 1 and essentially submitted that the zeroth order undiffracted beam components were discarded and that only the first order diffraction beam emanating from each of the AODs was fed into the

next AOD. Therefore, in the application as filed the electromagnetic beam was filtered when sequentially emerging from the AODs at least four times and the electromagnetic beam passing through the pairs of AODs was not the same, in particular not the same as the electromagnetic beam incident on the first of the pairs of AODs or the electromagnetic beam forming the focal spot. Consequently, there was no basis in the application as filed, in particular not in the passage on page 5, lines 3 to 22, for passing a complete electromagnetic beam, and in particular the undiffracted zeroth order diffraction beams, through the pairs of AODs as claimed. Granted claim 1 omitted the features disclosed in the application as filed and relating to the specific way the incident electromagnetic beam actually passed through the AODs and the claimed method constituted an unallowable intermediate generalization of the content of the application as filed.

2.3.2 The board first notes that

- the assessment of whether the subject-matter of claim 1 as granted goes beyond the content of the application as filed depends - as submitted by the appellant - not on whether the application as filed contains a literal basis for the amendments made to claim 1 as granted, but on what the person skilled in the specific technical field under consideration would derive directly and unambiguously, using the common general knowledge in this technical field, from the whole content of the application as filed, and

- Article 84 EPC does not constitute a ground for opposition under Article 100 EPC, and any possible unclarity in a granted claim pertinent for the assessment of the ground for opposition under Article 100 (c) EPC requires construction of the claimed

subject-matter by the skilled person in the specific technical context of the claim.

2.3.3 The opposition division's assessment and the respondent's arguments relating to objection B) rely on construing the claimed feature "by passing the electromagnetic beam through the [AODs]" as requiring that the mentioned electromagnetic beam is passed, as such, through all the AODs and possibly as also requiring that this electromagnetic beam encompasses arbitrary ones or all of the electromagnetic beam components actually passing through the AODs, and more particularly as a beam incident on the first of the AODs, passing through all the AODs and emerging from the last of the AODs. However, the person skilled in this specific technical field is aware that an AOD operates by diffraction so that an electromagnetic beam incident thereon and passing through the AOD is generally split by diffraction into a zeroth order diffraction beam component and a plurality of first and higher order diffraction beam components, and that - unlike the zeroth order diffraction beam component which emerges from the AOD as an undeflected beam component - the diffraction beam components of a diffraction order higher than zero are deflected. In addition, the electromagnetic beam referred to in the mentioned claimed feature "by passing the electromagnetic beam [...]" specifically refers - as submitted by the appellant - to the electromagnetic beam defined in the preamble of claim 1, i.e. to the electromagnetic beam being focused by the lens system into the focal spot, this focal point being deflected by the AODs.

Consequently, the skilled person would not understand this specific electromagnetic beam referred to in the

claim as an electromagnetic beam which is first directed, as a whole, towards the pairs of AODs and then made to pass through all the deflectors, but as one or more of the diffraction beam components emerging from the last AOD of the two pairs of AODs and that result from other diffraction beam components that have passed through, and have been sequentially diffracted by all the AODs of the pairs of AODs after having been deflected at least once by an AOD, and therefore excluding at least the beam component successively passing through all the AODs and emerging from each of them as a zeroth order diffraction beam component since this beam component is not deflected by the AODs and could therefore not cause the corresponding focal spot being deflected as required by granted claim 1.

It also follows from these considerations that the skilled person would not construe the claimed feature "by passing the electromagnetic beam through the [AODs]" literally as requiring that this electromagnetic beam is a predetermined beam initially identifiable as such and then caused to pass, as such, through all the AODs, but in its technical context in the sense that the specific electromagnetic beam considered in the claim results from diffraction beam components that have passed through the AODs, even if the electromagnetic beam - which results, as set forth above, from the successive diffraction of electromagnetic beam components passing through the AODs - is not actually identifiable as such while "passing" through the AODs.

This construction of the claimed feature under consideration is, in addition, consistent with the remaining features of granted claim 1, and in particular with the features of the characterizing

portion, which essentially define how the focal spot of the specific electromagnetic beam mentioned in the claim is moved by virtue of this specific electromagnetic beam "passing" - or, as a matter of fact, having passed in the sense mentioned above - through the pairs of AODs while these are driven with the specific acoustic frequency chirps mentioned in the claim.

2.3.4 In addition, the claimed feature "by passing the electromagnetic beam [...]" has - as mentioned by the opposition division and the respondent - no literal basis in the application as filed, but this feature, construed in its technical context as mentioned in point 2.3.3 above - and to the extent that it is not already implicit in claim 1 as filed as submitted by the appellant -, is directly and unambiguously derivable from the content of the application as filed, and in particular from the passages according to which the electromagnetic beam focused by the lens system so as to form the mentioned focal spot results from diffraction electromagnetic beam components that have previously passed through the first and the second pairs of AODs (see page 5, lines 3 to 22, and also the description of Fig. 1 to 3, together with page 6, lines 7 to 9, which - although referring to the prior art, in particular to document D14 - set the underlying principles on which the claimed invention is based).

2.3.5 The board also notes that granted claim 1 is - as objected to by the opposition division and by the respondent - silent as to how the specific electromagnetic beam considered in the claim is actually formed by the pairs of AODs and, more particularly, silent as to the electromagnetic beam initially incident on the pairs of AODs and as to the

remaining beam components thereof that might have reached and passed through any of the deflectors of the first and the second pairs of AODs, but not reached the lens system so as to be focused on the focal spot, and more particularly silent as to the successive (undiffracted) zeroth order diffraction beam components been filtered out or eliminated (see description of the application as filed, page 5, lines 9 to 22). However, the same applies to claim 1 of the application as filed and on which granted claim 1 is based. In this context, the fact that granted claim 1 omits these features might give rise to objections falling under requirements of the EPC such as the requirement of clarity and/or of support in the description under Article 84 EPC - which, nevertheless, does not constitute a ground for opposition under Article 100 EPC -, but not under Article 100 (c) EPC because, as already noted above, the feature "passing the electromagnetic beam through the [AODs]" is - to the extent that it is not already implicit in claim 1 as originally filed - directly and unambiguously derivable from the application as filed, irrespective of the features mentioned above as being missing in granted claim 1. In other words, the broad formulation of claim 1 as granted is, when compared with the broad formulation of claim 1 of the application as filed, not rendered objectionable under Article 100 (c) EPC for the mere fact that granted claim 1 specifies that the method involves "passing the electromagnetic beam through the [AODs]" when construed as set forth in point 2.3.3 above.

2.3.6 In view of the above considerations, the board is of the opinion that the subject-matter of claim 1 as granted does not extend beyond the content of the application as filed by virtue of the feature "by

passing the electromagnetic through the [AODs]" (Article 100 (c) EPC).

2.4 Objection "C)"

2.4.1 The board notes that, as submitted by the respondent,

- while dependent claim 3 as originally filed requires changing "the acoustic frequency sweeps [...] asymmetrically" with time, dependent claim 2 as granted requires changing the acoustic frequency chirps with time such that "the frequency slopes [...] are shifted non-symmetrically", and that

- shifting the frequency slopes is more specific than changing the frequency sweeps.

The board notes, however, that

- the acoustic frequency sweeps are non-linearly and asymmetrically changed with time in dependent claim 3 as originally filed specifically "in order to cause the focal spot to move along the z axis", and that

- according to the description of the application as filed a symmetrical shift of the frequency slopes is involved in the movement of the focal spot in the z-plane (page 6, line 20, to page 8, line 25) and movement of the focal spot having a component in the z axis involves using non-linear chirps and not maintaining this symmetry condition on the shifts of the frequency slopes (page 9, line 1 *et seq*.), see point 2.2.3 above, second paragraph.

In the board's view the skilled person would understand in this technical context that the asymmetric change of the acoustic frequency sweeps disclosed in dependent claim 3 as filed can specifically be achieved by non-symmetrically shifting the frequency slopes as required by dependent claim 2 as granted. Therefore, the

subject-matter of dependent claim 2 as granted is directly and unambiguously derivable from the content of the application as filed.

2.4.2 The respondent also submitted that the asymmetric condition defined in dependent claim 3 as filed and the non-symmetric condition defined in granted claim 2 do not express the same condition. In addition, the symmetric condition was disclosed in the application as filed only for linear chirps (see the "2D scanning" embodiment on page 6, line 20, to page 8, line 25), the corresponding disclosure was unclear (see point 2.2.4 above, first paragraph, last sentence) and therefore it was unclear what was meant by imposing an asymmetric or non-symmetric condition in the case of non-linear chirps as defined in dependent claim 3 as filed (compare page 8, lines 23 to 25, with the time-dependent coefficients a_{1x} and a_{2x} on page 9, lines 20 and 21), so that there was no clear derivation of the non-symmetric condition imposed to non-linear chirps required by dependent claim 2 as granted.

The board, however, is not convinced by these arguments. The application as filed discloses what is meant by the symmetric condition (see page 6, line 22 *et seq*.) and the skilled person would understand that the asymmetric and the non-symmetric condition refer to a same condition, i.e. to the complementary condition of the mentioned symmetry condition (i.e. expressly imposing the condition that the symmetry condition is not fulfilled). In addition, any unclarity or ambiguity present in the application as filed as to the technical meaning of imposing this non-symmetric or asymmetric condition might imply that dependent claim 2 is not clear within the meaning of Article 84 EPC - which does not constitute a ground for opposition under Article

100 EPC - or could have an impact on other grounds for opposition - in particular on the ground for opposition under Article 100 (b) EPC -, but it has no implication on the ground for opposition under Article 100 (c) EPC because, as already concluded in point 2.4.1 above, the subject-matter of dependent claim 2 as granted is, as such, directly and unambiguously derivable from the content of the application as filed

2.4.3 For these reasons, the board is of the opinion that the subject-matter of dependent claim 2 as granted does not extend beyond the content of the application as filed (Article 100 (c) EPC).

2.5 In view of the considerations above, the board concludes that the ground for opposition under Article 100 (c) EPC does not prejudice the maintenance of the patent as granted.

3. *Further prosecution*

In the light of the foregoing, the decision under appeal cannot stand and must be set aside. The appeal is thus allowable within the meaning of Article 111 (1), first sentence, EPC.

The reasons given by the opposition division in its decision to revoke the patent - as far as the patent as granted is concerned - were only based on the ground for opposition under Article 100 (c) EPC and, as concluded in point 2 above, the board is of the opinion that this ground for opposition does not prejudice the maintenance of the patent as granted. The question therefore arises whether the remaining grounds for opposition raised by the respondent (*cf*. point I above, second paragraph) prejudice the maintenance of the

patent as granted. Addressing this question on appeal would require the board going beyond the primary object of the appeal proceedings to review the appealed decision in a judicial manner (Article 12 (2) RPBA). In the board's view, this constitutes a special reason within the meaning of Article 11 RPBA that justifies the remittal of the case to the opposition division for further prosecution. For these reasons - and in line with the auxiliary request of the respondent - the board considers it appropriate exercising its discretion under Article 111 (1), second sentence, together with Article 11 RPBA, in the light of the circumstances of the case, to remit the case to the opposition division for further prosecution.

4. *Appellant's allegation of a violation of the right to be heard*

4.1 The reasons given by the opposition division in its decision in respect of objection B) (see point 2.3.1 above, first paragraph, last sentence) were based, among others, on the opposition division's view that "the electromagnetic beam" referred to in the objected feature should be upstream the deflectors and was therefore different from the electromagnetic beam previously defined in the preamble of the claim and being "downstream of the deflectors".

In the statement of grounds of appeal the appellant submitted that they were not made aware of this objection during the first-instance proceedings and in particular during the first-instance oral proceedings. More particularly, they were unaware of the opposition division's view that the two recurrences of the expression "electromagnetic beam" mentioned above were to be interpreted as meaning different electromagnetic

beams. Consequently, the decision was based on grounds on which the appellant had no opportunity to comment and this amounted to a violation of the right to be heard under Article 113 (1) EPC.

4.2 The board notes that during the first-instance proceedings the feature "passing the electromagnetic beam through the [AODs]" of claim 1 as granted was construed by the respondent (see, for instance, minutes of the oral proceedings, page 2, third paragraph, lines 5 and 6) and by the opposition division (see, for instance, minutes, page 4, third paragraph, lines 11 to 14) as referring to the "complete" or "whole" electromagnetic beam passing through the AODs and, therefore, to the electromagnetic beam incident on the deflectors, and that there is no indication that during the first-instance proceedings the mentioned claimed electromagnetic beam - in particular, when interpreted as the beam incident on the AODs - could be considered as being different from the electromagnetic beam mentioned in the preamble of the claim. For this reason, the decision under appeal is based on grounds on which the appellant had no opportunity to comment (Article 113 (1) EPC).

However, the mentioned violation of the right to be heard concerned only a counter-argument presented by the opposition division in reply to one of the arguments submitted by the appellant in respect of objection B) addressed in point 2.3 above and the mentioned counter-argument has no incidence on the main arguments given by the opposition division in respect of this objection and, in any case, no incidence on the reasons given by the opposition division in respect of the remaining objection under Article 100 (c) EPC (i.e. objection A), see point 2.2 above) addressed in the

decision. In these circumstances, the mentioned violation of the right to be heard did not affect the whole proceedings - in particular, not the revocation of the patent in view of objection A) - and had no causal connection with the outcome of the case before the opposition division. Therefore, the violation does not constitute a substantial procedural violation that would justify the reimbursement of the appeal fee for reasons of equity under Rule 103 (1) (a) EPC - or a fundamental deficiency that would *ab initio* had justified the remittal of the case under Article 11 RPBA.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance for further prosecution.

The Registrar: The Chairman:

L. Stridde R. Bekkering

Decision electronically authenticated