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Datasheet for the decision of 27 October 2017

Case Number: T 1921/16 - 3.2.02

Application Number: 10164289.0

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Language of the proceedings: EN

Title of invention:
Dental extraoral x-ray imaging system and method

Patent Proprietor:
Oy Ajat Ltd.

Opponent:
Clara Sattler de Sousa e Brito

Headword:

Relevant legal provisions:
EPC Art. 87(1), 54, 123(2)

Keyword:
Right of priority (main request - no; auxiliary request E - yes) - earlier application for the same invention
Novelty (main request - no; auxiliary request E - yes)
Added subject-matter (auxiliary request E - no)

Decisions cited:
T 1001/16, T 1400/16, G 0002/98, G 0001/03

Catchword:

Europäisches Patentamt
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Office européen des brevets

Beschwerdekammern

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Case Number: T 1921/16 - 3.2.02

D E C I S I O N
of Technical Board of Appeal 3.2.02
of 27 October 2017

Appellant: (Opponent)	Clara Sattler de Sousa e Brito Schönfeldstr. 19 80539 München (DE)
Representative:	Ostertag & Partner Patentanwälte mbB Epplestraße 14 70597 Stuttgart (DE)
Respondent: (Patent Proprietor)	Oy Ajat Ltd. Tekniikantie 4B 02150 Espoo (FI)
Representative:	Seppo Laine Oy Itämerenkatu 3 B 00180 Helsinki (FI)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 3 June 2016 concerning maintenance of European Patent No. 2223651 in amended form.**

Composition of the Board:

Chairman	E. Dufrasne
Members:	M. Stern
	D. Ceccarelli

Summary of Facts and Submissions

I. The opponent lodged an appeal against the decision, posted on 3 June 2016, concerning maintenance of European patent No. 2 223 651 in amended form.

II. The following documents are relevant for the present decision:

D3: US-A-2006/0203959 (US 11/277,530)
USPRE: US 60/677,020
E1: Shorter Oxford English Dictionary, sixth edition, 2007, Vol. 2, page 2964.

III. Notice of appeal was filed on 11 August 2016, and the fee for appeal was paid the same day. A statement setting out the grounds of appeal was received on 13 October 2016.

IV. Oral proceedings were held on 26 and 27 October 2017, during which appeals T 1001/16 and T 1400/16 were also heard; these concerned the patents granted on the parent and another divisional application respectively.

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

The respondent (patent proprietor) requested that the appeal be dismissed or, in the alternative, that the decision under appeal be set aside and that the patent be maintained on the basis of auxiliary request E, filed with letter dated 26 September 2017. Auxiliary request B, filed with letter dated 7 March 2017, and auxiliary requests C and D, filed with letter dated 26

September 2017, were withdrawn during the oral proceedings.

V. Claim 1 of the **main request** (which was held allowable by the Opposition Division) reads as follows:

"An extra-oral dental x-ray imaging system comprising:
(a) an x-ray source (16) adapted for generating x-rays for exposure of such x-rays to an object to be imaged (19), which x-ray source (16) is adapted to move for the duration of the exposure;
(b) an x-ray imaging device (14) adapted for producing multiple overlapping frames (40) during at least part of the exposure at a frame rate of at least 50 frames per second, the x-ray imaging device (14) comprising a CMOS (630) and having an active area with a long dimension m and a short dimension n such that m/n > 5;
(c) at least one rotational axis around which at least one of the x-ray source and imaging device rotates along a spline in a scanning direction, the axis being located between the x-ray source (16) focal point (36) and the x-ray imaging device (14), and wherein the spline is a non-circular trajectory;
(d) a memory for storing the multiple overlapping frames (40) substantially concurrently with the exposure; and
(e) a digital processing unit, said processing unit being configured to take inputs of the multiple overlapping frames during the exposure and to execute a reconstuction algorithm for composing a panoramic image;
characterized in that
said memory is adapted for storing and accessing the multiple overlapping frames (40) in any order, the memory having storage locations that are all equally accessible;

said x-ray imaging device (14) is adapted for producing the multiple overlapping frames (40) during at least part of the exposure with time intervals between consecutive frames (40) during which pixels of the detector have shifted by more than half a pixel length in the scanning direction; and
said processing unit is adapted for composing said panoramic image in real time, real time being not more than 10 seconds from the end of the exposure."

VI. Claim 1 of **auxiliary request E** reads as claim 1 of the main request, except that feature (b) includes the following amendment:

"an x-ray imaging device (14) adapted for producing multiple overlapping frames (40) during at least part of the exposure at a frame rate of ~~at least 50~~ more than 300 frames per second, ...".

Claims 2 to 10 are dependent claims.

VII. The arguments of the appellant which are relevant for the present decision may be summarised as follows:

Main request

- Priority right

Priority could not be validly claimed from D3 since the same applicant had already disclosed the same invention in the previous application US 60/677,020 (USPRE). In particular, USPRE directly and unambiguously disclosed that the trajectory of the x-ray source and imaging device was a non-circular spline trajectory. The panoramic layers shown in Figures 3 and 7 were smooth curves without sharp turns or kinks, thus having

continuous derivatives. The direction of radiation was disclosed to be perpendicular to the panoramic layers (page 16, paragraphs 4 and 5; Figure 3). Hence, the x-ray source and imaging device moved on a non-circular spline trajectory.

Moreover, USPRE disclosed an imaging device having a slot-shaped CMOS sensor of 150 mm x 6,4 mm (page 13, paragraph 4). The ratio of these dimensions m/n was 23,4, which fell within the claimed range of m/n > 5. The sensor was described as producing a frame rate of 200 to 300 frames per second (page 13, paragraph 4), which fell within the claimed range of at least 50 frames per second.

It followed that D3 was not the first application and could therefore confer no right to priority. D3 was hence comprised in the state of the art and undisputedly anticipated the subject-matter of claim 1 of the main request.

Auxiliary request E

- Article 123(2) EPC

The following features of claim 1 were not directly and unambiguously derivable from the application as filed:
(a) the spline is a non-circular trajectory;
(b) the memory as defined in feature (d) omitting the wording of a fast memory having sufficient speed for storing the multiple frames substantially concurrently with the exposure (as in original claim 11); and
(c) the memory being adapted for storing and accessing the multiple overlapping *frames* in *any order* and having storage locations that are all equally accessible

(contrary to the disclosure of original page 8, last paragraph).

- Priority right

USPRE disclosed in claim 16 the claimed range of more than 300 frames per second. Hence, for this request, too, priority could not be claimed from D3, which was hence prior art and undisputedly novelty-destroying.

There were no other novelty or inventive-step objections.

VIII. The arguments of the respondent which are relevant for the present decision may be summarised as follows:

Main request

- Priority right

Priority was claimed from US 11/277,530, i.e. document D3. This was the first application for the claimed subject-matter within the meaning of Article 87(1) EPC. The earlier provisional application US 60/677,020 (USPRE) did not directly and unambiguously disclose that the trajectory of the x-ray source and imaging device was a non-circular spline trajectory. USPRE was therefore not the first application for which full priority was claimed. The relevant criteria for establishing which was the first application were given in G 3/93, G 2/98 and G 1/03. The question of "partial priority" addressed in the impugned decision with reference to G 1/15 was of no relevance in the present case since no partial, but full priority was being claimed from D3.

USPRE did not disclose whether the layers illustrated in Figures 3 and 7 were formed using a smooth non-circular trajectory. In particular, it did not rule out that the panoramic images of Figure 7 could have been obtained with a circular trajectory, which was one of the alternatives specified in claim 1 of USPRE. According to page 16, paragraph 5, the transversal layer did not have to be strictly parallel to the direction of radiation, but could also be "close to parallel". Figure 3 and its description on page 3, paragraphs 4 and 5 did not describe an embodiment of the invention, but referred to prior-art orthopantomographs (OPG).

It followed that USPRE did not directly and unambiguously disclose that the trajectory of the x-ray source and imaging device was a non-circular spline. USPRE also did not disclose the CMOS of the imaging device as having an active area with a ratio of long dimension m to short dimension n of $m/n > 5$ and the frame rate as being at least 50 frames per second. Consequently, D3 was the first application within the meaning of Article 87(1) EPC, from which the patent validly claimed its priority. D3 therefore did not constitute prior art.

Auxiliary request E

- Article 123(2) EPC

The expression "wherein the spline is a non-circular trajectory" was based on original page 17, lines 7 to 10 of the original application. The definitions of the memory according to feature (d) and the characterising portion did not go beyond the content of original

claim 11 and the paragraph bridging pages 8 and 9 of the original application.

- Priority right

The sensor disclosed on page 13 of USPRE was specifically disclosed as producing 200 to 300 frames per second. Hence, claim 16 defining a range of at least 300 frames per second did not correspond to this sensor. D3 was hence the first application from which priority was validly claimed. Thus, D3 did not constitute prior art.

Reasons for the Decision

1. The appeal is admissible.

2. Definition of the invention

2.1 The invention concerns a dental panoramic x-ray imaging system having an x-ray source and an imaging device which move around the patient's head according to a predetermined geometric path and speed profile (paragraph [0010] of the patent; Figure 3). The movement is such that an image of a predetermined layer of interest is formed. The invention allows the x-ray scan to be performed by moving the x-ray source and imaging device in a continuous movement around the patient's head (paragraph [0030]).

2.2 The movement is defined in claim 1 (feature (c)) by specifying a "rotational axis around which at least one of the x-ray source and imaging device rotates along a spline in a scanning direction, ... wherein the spline is a non-circular trajectory". Whilst the patent as

granted already defined the motion "... along a spline", the feature "wherein the spline is a non-circular trajectory" was added during opposition proceedings.

It is common general knowledge that a "spline" is a continuous curve having continuous derivatives. This concept corresponds, for example, to the definition in the Shorter Oxford English Dictionary (E1) and the Wikipedia article "Spline (mathematics)" filed with the statement of grounds of appeal. In essence, "spline" designates a smooth curve, without sharp turns or kinks (as in a "V"-shaped curve).

As explained in the patent as granted (page 8, lines 28 to 30, corresponding to page 17, lines 7 to 10 of the application as filed), the movement along a spline can be either a circular or a non-circular trajectory, and in the presently pursued claims 1 the movement of the x-ray source and imaging device is limited to a non-circular trajectory. Hence, the claimed expression of "a spline, which is a non-circular trajectory" can be given no meaningful reading other than that of a non-circular spline trajectory.

3. Main request

3.1 Priority right

3.1.1 It is undisputed by the parties that application US 11/277,530, from which the patent claims its priority, is represented by document D3. It is likewise undisputed that if the claim to priority fails, D3 is comprised in the state of the art within the meaning of Article 54(2) EPC (as it was published on 14 September 2006, before the 10 November 2006 filing

date of the application leading to the patent in suit) and that, in that case, D3 is novelty-destroying.

3.1.2 What was disputed, however, is whether priority could be validly claimed from D3, since the same applicant had already disclosed the same invention in the earlier previous application US 60/677,020 (USPRE). USPRE had been filed on 2 May 2005, i.e. before the 27 March 2006 filing date of D3 and about 18 months before the 10 November 2006 filing date of the parent of the divisional application leading to the patent in suit.

3.1.3 According to Article 87(1) EPC, only the first application filed in a state party to the Paris Convention or a member of the WTO can form the basis for a priority right. Therefore, if apart from the application whose priority is being claimed in the patent (in this case D3), an earlier previous application had also been filed (in this case USPRE), in order to check the validity of the priority claim it must be established whether the invention claimed in the patent was already disclosed in the earlier previous application (USPRE).

To establish whether the invention claimed in the patent was already disclosed in the earlier previous application, USPRE, the same principles have to be applied as when establishing identity of invention between the application forming the basis for priority and the application claiming priority. The question is whether the person skilled in the art could derive the subject-matter of the claim of the patent directly and unambiguously, using common general knowledge, from the earlier previous application USPRE (G 2/98, OJ 2001, 413). As confirmed in G 1/03, point 4 of the Reasons, the disclosure as the basis for the right to priority

under Article 87(1) EPC and as the basis for amendments in an application under Article 123(2) EPC has to be interpreted in the same way.

3.1.4 The respondent contested that USPRE directly and unambiguously disclosed that:

(a) the trajectory of the x-ray source and imaging device was a *non-circular spline trajectory*,
(b) the CMOS of the imaging device had an active area with a ratio of the long dimension m to the short dimension n of $m/n > 5$, and
(c) the frame rate was *at least 50 frames per second*.

3.1.5 In the Board's view, these features are disclosed in USPRE for the following reasons.

3.1.6 *Non-circular spline trajectory*

USPRE discloses in claim 1 that the x-ray source and imaging device rotate on a circular or non-circular trajectory. USPRE does not explicitly mention that the trajectory is a spline, i.e. essentially a smooth curve without sharp turns or kinks, as explained under point 2.2 above.

However, the Board considers that from what is disclosed on page 16, paragraphs 4 and 5 in connection with Figure 7, such a trajectory inevitably occurs in USPRE as well. This passage explains that a transversal layer is obtained, the layer being transversal to the panoramic images which follow the contour of the jaw and parallel to the direction of radiation. Thus, the direction of radiation will be perpendicular to the panoramic images or layers which are illustrated in Figure 7. This is what Figure 3 illustrates too, albeit

with reference to prior-art orthopantomographs (OPG), in which the perpendicularity of the center of the x-ray beam to the panoramic layer is expressly indicated by a graphical symbol denoting perpendicularity. Moreover, in the description of Figure 3, on page 3, paragraphs 4 and 5, it is mentioned that the movement of the x-ray source and imaging device is synchronised so that the imaging device surface normal is perpendicular to the layer of interest, i.e. the panoramic layer.

The respondent held the view that USPRE disclosed on page 16, paragraph 5, that the transversal layer did not have to be strictly parallel to the direction of radiation, but could be just "close to parallel". In the Board's view, this possibility (mentioned in parentheses after the feature "parallel") addresses the fact that for a fan-type x-ray beam, as depicted in Figure 3, only the center ray will be strictly perpendicular to the panoramic layer, while the rays of the periphery of the beam will be only substantially perpendicular to it.

The jaw of a patient has a roughly horseshoe-shaped contour, which is clearly non-circular, particularly in its lateral portions. Hence, if a circular trajectory of the x-ray source and imaging device were used, as suggested by the respondent, the direction of the x-rays would not be perpendicular to the panoramic layers which follow the contour of the jaw. Moreover, the panoramic layers shown in Figure 7 of USPRE, as well as in Figure 3, are undoubtedly smooth curves without sharp turns or kinks, thus having continuous derivatives. Hence, since the x-rays are emitted perpendicularly to these curves, the x-ray source and

imaging device will likewise move along a smooth trajectory.

The Board therefore finds that from the explicit direct and unambiguous disclosure of the movement of the x-ray source and imaging device in USPRE, the skilled person would conclude that the movement inevitably occurs along a non-circular spline. This is consequently no new information over what is explicitly disclosed.

3.1.7 *m/n > 5*

In USPRE, the imaging device is disclosed as a slot-shaped CMOS sensor having dimensions of 150 mm x 6,4 mm (page 13, paragraph 4). The ratio of these dimensions is thus 23,4, which falls within the claimed range m/n > 5.

3.1.8 At least 50 frames per second

The CMOS sensor disclosed on page 13, paragraph 4 of USPRE is specified as producing a frame rate of 200 to 300 frames per second. These frame rates fall within the claimed range of at least 50 frames per second.

3.1.9 Apart from the aforementioned features the respondent identified no further ones in claim 1 of the main request which goes beyond the subject-matter disclosed in USPRE.

3.1.10 As the person skilled in the art derives the subject-matter of claim 1 of the main request directly and unambiguously, using common general knowledge, from the earlier previous application USPRE, D3 is not the first application within the meaning of Article 87(1) EPC and thus does not form the basis for a priority right.

Consequently, D3 is comprised in the state of the art within the meaning of Article 54(2) EPC.

3.2 Novelty

As it is undisputed that D3 discloses the subject-matter of claim 1 of the main request, the novelty requirement of Article 54(1) EPC is not fulfilled.

4. Auxiliary request E

4.1 Article 123(2) EPC

Contrary to the appellant's view, the Board finds that the following features are indeed directly and unambiguously derivable from the application as filed.

4.1.1 "Wherein the spline is a non-circular trajectory"

As already explained under point 2.2 above, page 17, lines 7 to 10 of the application as filed discloses that the movement along a spline can be either a circular or a non-circular trajectory. In claim 1, the movement of the x-ray source and imaging device is limited to one of these disclosed alternatives in which "the spline is a non-circular trajectory".

4.1.2 Fast memory

Claim 11 as originally filed defines "a fast memory having sufficient speed for storing the multiple frames substantially concurrently with the exposure" [emphasis added]. The appellant pointed out that the underlined terms were omitted from the definition of the memory in feature (d) of claim 1. It argued that this omission led to an unallowable intermediate generalisation.

The Board does not share this view. The claim defines the storing of frames within a certain time period, namely "substantially concurrently with the (x-ray) exposure". It is thus implicit that the memory speed needs to be "sufficient" to do so. Also, the omitted specification of the memory as a "fast" one is devoid of any precise additional content. It is incidentally noted that the last sentence of the paragraph bridging pages 8 and 9 of the application as filed actually omits to mention this attribute.

4.1.3 Random access memory

The last paragraph on page 8 is also the basis for the further definition in claim 1 (first paragraph of the characterising portion) of the memory being adapted for storing and accessing the multiple overlapping frames in any order and having storage locations that are all equally accessible. The last full sentence on page 8 makes reference to the memory allowing "information" to be stored and accessed in any order, and the next sentence explains that the multiple *frames* stored in the memory are retrieved in real time. Hence, in the terminology of the claim, the "information" which is stored and accessed in any order is clearly that of the multiple frames.

4.1.4 The Board thus concludes that claim 1 of auxiliary request E satisfies the requirements of Article 123(2) EPC.

4.2 Priority right

The range of frame rates of at least 50 frames per second (fps) as defined in claim 1 of the main request

has been replaced in claim 1 of auxiliary request E by the more limited one of more than 300 fps.

This range lies outside the range of 200 to 300 fps disclosed for the specific slot-shaped CMOS sensor with dimensions of 150 mm x 6,4 mm mentioned on page 13, paragraph 4 of USPRE. Therefore, the claimed range of more than 300 fps is not disclosed in USPRE in this context.

The appellant pointed out that claim 16 of USPRE defined an imaging device capable of producing at least 300 fps, including, inter alia, more than 300 fps. The Board considers that this range of frame rates is not directly and unambiguously disclosed in conjunction with the aforementioned particular sensor of page 13, having dimensions of 150 mm x 6,4 mm and producing frame rates from 200 to 300 fps.

The Board therefore comes to the conclusion that the subject-matter of claim 1 of auxiliary request E is novel over USPRE and that for this subject-matter D3 is the first application within the meaning of Article 87(1) EPC, thereby conferring a right to priority.

4.3 Novelty

As a consequence, D3 is not comprised in the state of the art under Article 54(2) EPC. The appellant's novelty objection based on D3 therefore fails.

4.4 The appellant explicitly stated during the oral proceedings that, apart from the objection based on D3, there were no objections concerning the novelty and

inventive step of the subject-matter of claim 1 of auxiliary request E. The Board saw none either.

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 with the order to maintain the patent on the basis of:

   - claims 1 to 10 of auxiliary request E filed with letter dated 26 September 2017;

   - adapted description, pages 2 to 11, filed during oral proceedings; and

   - Figures 1 to 8h (12 pages) of the patent as granted.

The Registrar: The Chairman:

D. Hampe E. Dufrasne

Decision electronically authenticated