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**Datasheet for the decision
of 27 October 2017**

Case Number: T 1001/16 - 3.2.02

Application Number: 06808030.8

Publication Number: 1998674

IPC: G03B42/04, G06T7/00, A61B6/14,
G01T1/24, H04N5/32, H04N5/232,
G06T5/00

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(1), 54(2)

Keyword:

Right of priority (no) - earlier application for the same
invention (yes)

Novelty (no) - all requests

Decisions cited:

T 1400/16, T 1921/16, G 0002/98, G 0001/03

Catchword:



Beschwerdekammern
Boards of Appeal
Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 1001/16 - 3.2.02

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

Appellant: Clara Sattler de Sousa e Brito
(Opponent) Schönfeldstr. 19
80539 München (DE)

Representative: Ostertag & Partner Patentanwälte mbB
Epplestraße 14
70597 Stuttgart (DE)

Respondent: Oy Ajat Ltd.
(Patent Proprietor) 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
10 February 2016 concerning maintenance of
European Patent No. 1998674 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 10 February 2016, concerning maintenance of European patent No. 1 998 674 in amended form.

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

D3: US-A-2006/0203959 (US 11/277,530)

D10: WO-A-2004/055550

USPRE: US 60/677,020

E1: Shorter Oxford English Dictionary, sixth edition, 2007, Vol. 2, page 2964.

III. Notice of appeal was filed on 20 April 2016, and the fee for appeal was paid the same day. A statement setting out the grounds of appeal was received on 20 June 2016.

IV. Oral proceedings were held on 26 and 27 October 2017, during which appeals T 1400/16 and T 1921/16 were also heard; these concerned the patents granted on two divisional applications.

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 one of auxiliary request 2, filed with letter dated 15 October 2016 and auxiliary request 5, filed with letter dated 26 September 2017. Auxiliary requests 1 and 3, filed

with letter dated 15 October 2016, and auxiliary request 4, 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 in an operational arrangement:

(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;

(c) at least one rotational axis around which at least one of the x-ray source and imaging device is adapted to rotate along a spline, which is a non-circular trajectory, the axis being located between the x-ray source (16) focal point (36) and the x-ray imaging device (14);

(d) a fast memory having an access and storage speed comparable to a readout speed of the x-ray imaging device (14), and

(e) a digital processing unit, interconnected in the operational arrangement, said processing unit being configured to execute a reconstruction algorithm for composing a first panoramic image (12) utilizing overlapping frames produced during at least part of the exposure,

characterized in that

(f) 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,

(g) said fast memory is adapted to provide sufficient speed for storing the multiple frames substantially concurrently with the exposure in a manner which permits retrieval and display substantially in real time, and

(h) said processing unit is further configured to take inputs of the multiple overlapping frames (40) during the exposure or after the exposure to compose a second panoramic image with a focus depth which is different in at least some part of the second panoramic image from a focus depth of the first panoramic image as defined by the rotation of the x-ray source (16) and the x-ray imaging device (14) along a predetermined geometric path and with a predetermined speed profile."

VI. Claim 1 of **auxiliary request 2** reads as claim 1 of the main request, with the following additional expression at the end of feature (b):

"wherein the x-ray imaging device (14) is adapted to produce at least 50 frames per second".

VII. Claim 1 of **auxiliary request 5** reads as claim 1 of the main request, with the following additional expression at the end of feature (b):

"wherein the x-ray imaging device (14) is adapted to produce more than 300 frames per second".

VIII. The arguments of the appellant which are relevant for the present decision are essentially those on which the reasons set out below are based.

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

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.

According to E1, the mathematical meaning of the term "spline" was "a continuous curve constructed so as to pass through a given set of points and have continuous first and second derivatives". 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. 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.

USPRE did not disclose either an imaging device producing at least 50 frames per second (fps). Claim 14 disclosed a different range of at least 30 fps. Neither was the value of 50 fps disclosed. Even if USPRE stated that it incorporated document D10 by reference, this did not mean that its entire content was incorporated.

An imaging device producing more than 300 fps was not disclosed in USPRE either. In particular, claim 16 specified something different, namely frame rates of at least 300 fps, meaning frame rates of 300 fps *and* more than 300 fps.

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 is adapted to rotate along a spline, which is a non-circular trajectory, ...". Whilst the patent as granted already defined the motion "... along a spline", the feature "which 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 26 to 28), 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 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 to an application under Article 123(2) EPC has to be interpreted in the same way.

3.1.4 The respondent disputed that USPRE directly and unambiguously disclosed that the trajectory of the x-ray source and imaging device was a non-circular spline trajectory.

3.1.5 In the Board's view such a trajectory is disclosed in USPRE for the following reasons:

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 centre 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.

3.1.6 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. The respondent has identified no other feature in claim 1 of the main request which goes beyond the subject-matter disclosed in USPRE.

3.1.7 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 2*

4.1 Claim 1 of auxiliary request 2 adds to claim 1 of the main request the limitation that "the x-ray imaging device (14) is adapted to produce at least 50 frames per second".

4.2 However, this feature too is directly and unambiguously derivable from USPRE.

Claim 14 of USPRE specifies an open-ended range of at least 30 frames per second (fps). Furthermore, in the last paragraph of page 11, USPRE provides further information on the frame rates the imaging device should achieve and points the reader in this precise context directly to the imaging devices disclosed in document D10 which it explicitly "incorporates by reference". Consequently, the Board considers that at least those aspects concerning the frame rate of the imaging device disclosed in D10 are to be seen as being part of the content of USPRE. In particular, D10 discloses frame rates of 50 fps, 100 fps and 400 fps (page 5, lines 17 to 20).

Given that USPRE discloses an open-ended range of at least 30 fps and the discrete value of 50 fps, the range of at least 50 fps is likewise disclosed.

4.3 It follows, similarly to the conclusions for the main request, that the subject-matter of claim 1 of auxiliary request 2 is directly and unambiguously derivable from the earlier previous application USPRE, so that D3 is not the first application within the meaning of Article 87(1) EPC and does not form a basis for a priority right. Thus, D3 is comprised in the

state of the art within the meaning of Article 54(2) EPC and is undisputedly novelty-destroying.

The novelty requirement of Article 54(1) EPC is therefore not fulfilled.

5. *Auxiliary request 5*

5.1 Claim 1 of auxiliary request 5 adds to claim 1 of the main request the limitation that "the x-ray imaging device (14) is adapted to produce more than 300 frames per second".

5.2 However, this feature too is directly and unambiguously derivable from USPRE.

According to claim 16 of USPRE, the imaging device produces frame rates of at least 300 fps, which is equivalent to stating the frame rate to be 300 fps or more than 300 fps. The latter of these alternatives is what claim 1 of auxiliary request 5 specifies.

5.3 It follows, similarly to the conclusions for the preceding requests, that the subject-matter of claim 1 of auxiliary request 5 is directly and unambiguously derivable from the earlier previous application USPRE, so that D3 is not the first application within the meaning of Article 87(1) EPC and does not form a basis for a priority right. Thus, D3 is comprised in the state of the art within the meaning of Article 54(2) EPC and is undisputedly novelty-destroying.

The novelty requirement of Article 54(1) EPC is therefore not fulfilled.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:



D. Hampe

E. Dufrasne

Decision electronically authenticated