Internal distribution code:
(A) [ ] Publication in OJ
(B) [ ] To Chairmen and Members
(C) [ ] To Chairmen
(D) [X] No distribution

Datasheet for the decision of 22 November 2010

Case Number: T 0320/07 - 3.5.04

Application Number: 96305209.7

Publication Number: 0756416

IPC: H04N 3/15

Language of the proceedings: EN

Title of invention:
Imaging apparatus

Patentee:
E2V Technologies (UK) Limited

Opponent:
Koninklijke Philips Electronics N.V.
Sirona Dental Systems GmbH

Headword:
-

Relevant legal provisions:
-

Relevant legal provisions (EPC 1973):
EPC Art. 54, 56

Keyword:
"Novelty (yes)"
"Inventive step (yes)"

Decisions cited:
-

Catchword:
-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0320/07 - 3.5.04

D E C I S I O N
of the Technical Board of Appeal 3.5.04
of 22 November 2010

Appellant: (Patent Proprietor)
E2V Technologies (UK) Limited
106 Waterhouse Lane
Chelmsford
Essex CM1 2QU (GB)

Representative:
Loveless, Ian Mark
Reddie & Grose
16 Theobalds Road
London WC1X 8PL (GB)

Respondent 01: (Opponent 01)
Koninklijke Philips Electronics N.V.
Groenewoudseweg 1
NL-5621 BA Eindhoven (NL)

Representative:
Cohen, Julius Simon
Philips
Intellectual Property & Standards
P.O. Box 220
NL-5600 AE Eindhoven (NL)

Respondent 02: (Opponent 02)
Sirona Dental Systems GmbH
Fabrikstraße 31
D-64625 Bensheim (DE)

Representative:
Sommer, Peter
Sommer
Patentanwalt und European Patent
and Trademark Attorney
Augustaanlage 32
D-68165 Mannheim (DE)

Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 14 December 2006 revoking European patent No. 0756416 pursuant to Article 102(1) EPC 1973.

Composition of the Board:

Chairman: F. Edlinger
Members: A. Dumont
B. Müller

Summary of Facts and Submissions

I. The patent proprietor filed an appeal against the decision of the opposition division revoking European patent No. 0 756 416.

II. Oppositions by opponents 01 and 02 had been filed on the grounds that the subject-matter of the claims as granted was not new and did not involve an inventive step (Article 100(a) together with Articles 54 and 56 EPC 1973).

III. The opposition division decided that the subject-matter of claim 1 as granted according to the patent proprietor's main request, as well as of claim 1 according to the auxiliary requests then on file, lacked inventive step in view of the following prior art documents:

D1: WO 93/25059 A1;

D4: G. Boucharlat, J.-L. Coutures, A. Jutant, "THX 7887A: a new high-frame-rate 1024 x 1024 pixel CCD sensor", Thomson Components and Tubes Corporation, Ref. AI-82, corresponding to XP001119577 published in the Proceedings of the SPIE, vol.2273, pages 255 to 264, Conf. Photonics 94 San Diego, USA, 27 and 28 July 1994;

E5: Excerpts from CCD Data Book 1988, Thomson Composants Militaires et Spatiaux.

IV. Oral proceedings before the board took place on 22 November 2010 in the presence of the appellant (patent proprietor) and respondent 02 (opponent 02). Respondent 01 (opponent 01) had announced in writing

that he would not be represented at the oral proceedings.

V. The appellant (patent proprietor) requested that the decision under appeal be set aside and the patent maintained as granted or, alternatively, that the patent be maintained on the basis of the claims of the first auxiliary request or the second auxiliary request filed with the statement of grounds of appeal.

Respondent 01 (opponent 01) had requested in writing that a decision be taken on the basis of the written submissions.

Respondent 02 (opponent 02) requested that the appeal be dismissed.

VI. Claim 1 as granted reads as follows:

"Imaging apparatus comprising:
a solid state imager device (3) having radiation sensitive detector elements (4) arranged in an array of rows and columns;
means (7, 8) for summing together charge from elements in two or more rows to derive an output signal;
means (9) for using the output signal to detect when radiation to be imaged is incident on the array; and
means (8) for initiating image acquisition when the incident radiation is detected."

VII. The reasoning in the decision under appeal may be summarised as follows.

D4 discloses an imager according to claim 1 suitable for binning, i.e. for summing together charge from CCD elements. It is implicit from D4 that binning is performed on-chip, as can be concluded from the function disclosed in section 8.1 of D4, which is also supported by E5 disclosing a CCD clock generator designed by the same manufacturer (Thomson). Furthermore, binning within a sensor has been well-known at least since 1990. The remaining features relating to the use of the imager output signal of the imaging apparatus of claim 1 are known from D1. The problem solved by the invention relates to improving sensitivity (or signal-to-noise ratio) or the frame rate, as identified in section 8.1 of D4. Not taking into account the technical problem formulated in the patent in suit, namely initiating image acquisition more reliably and promptly, is justified by claim 1 not comprising a special technical feature relevant only to this problem. It would have been obvious for the skilled person to use the imager of D4 in the apparatus of D1, in order to achieve the advantages identified therein.

VIII. The argumentation by the appellant (patent proprietor) may be summarised as follows.

The opposition division did not interpret the claim properly. The invention addresses the problem of synchronising image acquisition with the incidence of (X-ray) radiation, i.e. a problem arising before image acquisition is initiated. Binning is used to improve the signal-to-noise ratio before triggering image acquisition. It is clear from the patent specification that during image acquisition the native resolution of

the (CCD) imager is used, i.e. binning is only used to detect the incidence of radiation and the full resolution is used for image acquisition. Otherwise one would merely use a higher-sensitivity lower-resolution sensor in the first place.

The closest prior art D1 is silent about details of the CCD sensor used. D4 describes a CCD sensor capable of on-chip binning. However, D4 primarily aims at a video (high frame rate and high speed) operation. As a video sensor D4 also does not address the problem of triggering image acquisition depending on incident radiation. Moreover, D4 suggests that X-ray doses can be reduced when the sensor is used in a binning mode in the medical field. If both the binning mode and the reduction of radiation were retained from the teaching of D4, the detection of incident radiation would not have been improved because the signal-to-noise ratio is not improved due to the reduced radiation signal. Although the skilled person could have used the sensor of D4 in the apparatus of D1, he would not have done so in the absence of a mention of the technical problem to be solved, namely improving the triggering of image acquisition, while potentially retaining the same image acquisition process as in the prior art.

IX. Respondent 01 (opponent 01) did not file a reply to the statement of grounds of appeal or any substantive arguments in response to the board's summons to oral proceedings.

X. The arguments by respondent 02 (opponent 02) may be summarised as follows.

The skilled person is experienced in the technical field of imaging devices in general, and not exclusively in the field of dental X-ray imaging, to which claim 1 is not limited. Furthermore, claim 1 does not exclude the binning mode being used also for image acquisition. The objective technical problem solved by binning is to improve the signal-to-noise ratio and sensitivity in triggering the imager when radiation to be imaged is incident on the array. But binning reduces the available resolution. The person skilled in the art would select the proper elements in the prior art, in order to balance the conflicting requirements of sensitivity and resolution. Thus using, in the apparatus of D1, the imager of D4 operated in a binning mode to improve sensitivity would be obvious, all the more so since standard CCD sensors were generally available with a resolution higher than needed for a particular application, in particular in the field of medical imaging.

Reasons for the Decision

1. The appeal is admissible.

2. Novelty

2.1 It is common ground that D1 constitutes the closest prior art at hand. It discloses an imaging apparatus comprising a solid state imager device (CCD detector 7), means for using the output signal from elements of the imager device to detect when radiation to be imaged is incident on the array; and means (threshold detector 17) for initiating image acquisition when the incident

radiation is detected. As in the present invention, image acquisition is initiated when the amount of incident radiation exceeds a threshold (see D1, page 4, lines 2 to 8; and the specification of the patent in suit, paragraph [0018]).

2.2 The respondents do not contest that D1 does not disclose means for summing together charge from elements of the imager device in two or more rows to derive an output signal, a technique commonly known as "binning" in the context of CCD detectors to which D1 and D4 relate.

2.3 The subject-matter of claim 1 is thus new.

3. Inventive step

3.1 The feature distinguishing the apparatus of claim 1 from the apparatus of D1 yields an output signal which reflects the summed charge of elements in several rows and is used for initiating image acquisition. It is common ground that this has the effect of increasing the signal-to-noise ratio of the output signal and that the means for summing is adapted for the operation of the imager before image acquisition.

3.2 The technical problem mentioned in the patent in suit is to allow for a more prompt and reliable initiation of image acquisition (see paragraph [0009] of the patent specification), but may require reformulation, as long as this is justified by the actual technical problem solved and does not contain pointers to the solution. The opposition division has reformulated the problem as improving frame rate or sensitivity. The

appellant in appeal proceedings has reformulated the technical problem as improving the triggering of image acquisition, while potentially retaining the same image acquisition process as in the prior art. Also respondent 02 has acknowledged that the technical problem relates to improving sensitivity in triggering the imager when radiation to be imaged is incident on the array.

3.3 Summing (binning) charge from elements in several rows before image acquisition is the essential distinguishing feature of claim 1, which according to the patent specification improves triggering, for instance when high dark current and noise conditions would otherwise require high trigger reference levels in the case of CCD imagers (see paragraphs [0007], [0008] and [0018]). Claim 1 does not exclude the means for summing charge also being used after image acquisition has been initiated. The patent specification is silent about the resolution used thereafter. The skilled person would determine it, according to normal considerations for image acquisition, to be for instance the native spatial resolution of the imager or a reduced resolution in a binning mode. However, these considerations are unrelated to the summing (binning) of charge before image acquisition.

3.4 As a result, the board, unlike the opposition division, judges it justified to take into account an essential aspect of the technical problem formulated in the patent in suit, since the essential distinguishing technical feature of claim 1 is relevant to this problem only. The board therefore concurs with the

patent proprietor that the objective technical problem has to be seen as improving the triggering of image acquisition, while potentially retaining the same image acquisition process as in D1.

3.5 D4 discloses a CCD sensor component, i*nter alia* for X-ray radiation in the medical field. The sensor may be operated in its native spatial resolution (1024 x 1024 pixels) or in a reduced resolution (for instance 512 x 512 pixels) in a binning mode. Binning is expressly stated to be performed on-chip, so that E5 is not necessary as evidence (see ABSTRACT of D4 on page 255). D4 expressly mentions that binning improves responsiveness and allows reduction of the X-ray doses, i.e. either of the intensity of the incident radiation or of the exposure time. This is done at the expense of resolution (see section 8.1). Section 8.1 of D4 summarises partly conflicting requirements between the interdependent factors of responsiveness, sensitivity (or signal-to-noise ratio) and spatial resolution in imagers, in particular in CCD sensors, which belong to the common general knowledge of the person skilled in the relevant field.

3.6 Firstly, the board does not see any reason why the skilled person confronted with the above problem of improving triggering by the apparatus of D1 would have favoured increasing responsiveness or sensitivity over increasing resolution. In particular, there is no indication in D4 that this may have a positive effect on improving triggering of the imager, in particular under high dark current and noise conditions for CCD imagers.

3.7 Secondly, if an increased responsiveness or sensitivity were to be favoured, the skilled person could have directly selected an imager of low native resolution and operated it in a non-binning mode. By contrast, claim 1 of the patent in suit sets out means for summing charges before an image is taken, which allows for retaining the native spatial resolution during image acquisition.

3.8 Thirdly, a detector arrangement of the kind of D1 is merely one (see paragraph [0004] of the patent specification) of several known arrangements for detecting the incidence of radiation energy, as acknowledged in the patent specification (see paragraphs [0003] and [0004]).

3.9 Thus the board judges that there was no obvious reason why the skilled person would have considered binning to improve triggering by the apparatus of D1, all the more so in the absence of any mention in either D1 or D4 of the problem underlying the patent in suit, i.e. of improving the triggering of image acquisition, while potentially retaining the same image acquisition process as in D1.

3.10 Thus a combination leading to an apparatus according to claim 1 was possible only with impermissible hindsight. Therefore the board judges that the subject-matter of claim 1 involves an inventive step over a combination of D1 and D4, also taking the common general knowledge of the skilled person into account.

4. The board sees nothing in the further facts and evidence in support of the grounds on which the

oppositions were based which prejudices the maintenance of the European patent. As a result, the decision under appeal must be set aside.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is maintained unamended.

The Registrar The Chairman

L. Fernández Gómez F. Edlinger