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**Datasheet for the decision
of 6 September 2011**

Case Number: T 0061/11 - 3.5.04
Application Number: 00307869.8
Publication Number: 1085751
IPC: H04N5/232, H04N3/15, H04N5/335
Language of the proceedings: EN

Title of invention:
Image pickup apparatus

Applicant:
CANON KABUSHIKI KAISHA

Headword:

Relevant legal provisions:
EPC 1973 Art. 83, 113(1)
EPC 1973 R. 67

Keyword:
Disclosure - sufficiency (yes)
Basis of decisions - opportunity to comment (yes)

Decisions cited:

Catchword:



Case Number: T0061/11 - 3.5.04

D E C I S I O N
of the Technical Board of Appeal 3.5.04
of 6 September 2011

Appellant: CANON KABUSHIKI KAISHA
(Applicant) 30-2, 3-chome, Shimomaruko,
Ohta-ku
Tokyo (JAPON)

Representative: TBK
Bavariaring 4-6
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 28 July 2010
refusing European patent application No.
00307869.8 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: F. Edlinger
Members: C. Kunzelmann
B. Müller

Summary of Facts and Submissions

I. The appeal is against the decision of the examining division to refuse European patent application No. 00 307 869.8.

II. The proceedings before the first instance may be summarised as follows:

The examining division issued three communications pursuant to Article 96(2) EPC 1973, raising objections as to lack of novelty (see Article 54 EPC 1973), lack of inventive step (see Article 56 EPC 1973) and lack of clarity (see Article 84 EPC 1973). Furthermore, in summons to oral proceedings the examining division raised objections under Articles 56 and 84 EPC 1973. The applicant filed new claim sets in reply to the first and second of these communications and in preparation for the oral proceedings. In the oral proceedings the examining division for the first time raised an objection under Article 83 EPC 1973. At the end of the oral proceedings the examining division refused the European patent application.

III. The decision under appeal was based on the ground that the application did not disclose the invention claimed in claim 1 then on file in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art, contrary to the requirements of Article 83 EPC 1973.

IV. The applicant appealed. With the statement of grounds of appeal the appellant filed claims 1 to 4 according to a new main and five auxiliary requests. The appellant requested that the decision under appeal be set aside and a patent be granted on the basis of any

of the requests filed with the statement of grounds of appeal, and that the appeal fee be reimbursed.

- V. The board issued a communication pursuant to Article 15(1) of the Rules of Procedure of the Boards of Appeal (RPBA), annexed to a summons to oral proceedings dated 22 June 2011.
- VI. Oral proceedings were held before the board on 6 September 2011. In the oral proceedings the appellant ultimately requested that the decision be set aside and that either a patent be granted on the basis of any one of the requests filed with the statement of grounds of appeal or the application be remitted to the examining division for further examination on the basis of those requests. In addition, the appellant requested that the appeal fee be reimbursed. At the end of the oral proceedings the chairman announced the board's decision.
- VII. Claim 1 of the main request reads as follows:
- "An image pickup apparatus (100) comprising:
a plurality of pixels (30-11, 30-12, ..., 30-22;
70-11, ..., 70-44), each of which has:
a first photoelectric conversion *unit* (1) for photoelectrically converting a light *beam* from a *first* half (211; 213) of an exit pupil (210) into an electrical signal, and
a second photoelectric conversion *unit* (51) for photoelectrically converting a light *beam* from a *second* half (212; 214) of said exit pupil (210) into an electrical signal;
a control unit (101, 103, 104, 3, 53) for obtaining a first signal and a second signal from each pixel, wherein the first signal includes separately the

electrical signal obtained by said first photoelectric conversion *unit* (1) thereof and the electrical signal obtained by said second photoelectric conversion *unit* (51) thereof, and the second signal is a sum signal corresponding to the addition of the electrical signal obtained by said first photoelectric conversion *unit* (1) and the electrical signal obtained by said second photoelectric conversion *unit* (51); and process means (105-107; 507) arranged to execute focus adjustment on the basis of phase difference between the signals outputted respectively from said first and second photoelectric conversion *units* (1, 51) and to subject the sum signal to colour correction to execute image forming processing; characterised in that: said first and second photoelectric conversion *units* (1, 51) are arranged in a direction in which said exit pupil is divided into the *first* and *second* halves; and each pixel includes amplification means (5) arranged to amplify and output the signals from said first and second photoelectric conversion *units* (1, 51), wherein the signals from said first and second photoelectric conversion *units* are added at an input (21) of said amplification means (5)."

(Amendments to claim 1 on which the decision under appeal was based are shown in *italics*.)

Claims 2 to 4 are dependent on claim 1.

VIII. The reasons for the decision under appeal may be summarised as follows:

Claim 1 (then on file) comprised the feature that the first and second photoelectric conversion units were arranged in a direction in which an exit pupil was

divided into the upper and lower halves. A vertical division of the exit pupil was in line, for instance, with the disclosure of figures 28 and 29 showing an exit pupil divided into upper and lower halves. The first and second photoelectric conversion units, however, were arranged horizontally and thereby allowed different column accumulation times to be selected by reading out the image sensor column by column. This was disclosed in figure 2, in which the vertical and horizontal scanning units (15, 16) defined the horizontal direction along the length of the page and the vertical direction along the width of the page. The horizontal arrangement of the photoelectric conversion units had also been emphasised by the applicant in the written proceedings. The arrangement of the photoelectric conversion units of the image sensor was a critical issue for the invention. However, the operation and arrangement of the image sensor was not clear from the disclosure of the application. Hence a person skilled in the art would not be able to understand and unambiguously derive the subject-matter of the claimed invention from the disclosure of the application.

IX. The appellant's arguments may be summarised as follows:

The arrangement direction of the first and second photoelectric conversion units (1 and 51) in figure 2 was a vertical direction. The horizontal scanning unit 16 depicted in figure 2 did not define the horizontal direction along the length of the page. Instead it was a unit for scanning the horizontal rows of the image sensor. These horizontal rows were depicted along the width of the page showing figure 2. The vertical scanning unit 15 was a unit for addressing the individual vertical columns of the image sensor. The

vertical columns were depicted along the length of the page showing figure 2. This orientation of the vertical and horizontal directions was consistent with the other figures of the application. The application as filed clearly and unambiguously taught that the photoelectric conversion units of a single pixel were (and had to be) arranged in the exit pupil dividing direction (which in the illustrated embodiments was the vertical direction). This feature enabled an autofocus operation to be performed on a phase difference method, which was the basic underlying concept of the invention. By virtue of this feature, signals from the first and second photoelectric conversion units could not only be combined together to provide a signal corresponding to the whole of the exit pupil, but could also be used separately to calculate the defocus amount from the respective signals. Specifically in the embodiment of figure 8 the first and second photoelectric conversion units were pupil-divided via one microlens. The examining division had inadmissibly relied on obviously incorrect arguments in which the applicant had accidentally confused the terms "horizontal" and "vertical". The denomination of some elements in the application did not always correctly reflect their function, but this would not prevent a person skilled in the art from understanding the principle of the invention.

The reimbursement of the appeal fee was justified because the applicant's right to be heard had been violated. The objection under Article 83 EPC 1973 had been raised for the first time in the oral proceedings before the examining division even though the feature of the pupil division of the first and second photoelectric conversion units had been present in the new claim sets presented to the examining division in

the written examination proceedings. The representative had been taken by surprise in the oral proceedings. He could not have expected this objection and prepared counter-arguments. Furthermore the representative could not be equated with the applicant as far as the opportunity to present comments was concerned. The applicant was not given the opportunity to present comments on the new issue in the oral proceedings.

Reasons for the Decision

1. The appeal is admissible.
2. *Disclosure of the invention (Article 83 EPC 1973)*
 - 2.1 According to Article 83 EPC 1973, "[t]he European patent application must disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art." In the present case the invention in question is that specified in claim 1 of the main request (see point VII above).
 - 2.2 Claim 1 specifies that the invention is an image pickup apparatus comprising a plurality of pixels, each of the pixels having a first photoelectric conversion unit and a second photoelectric conversion unit, a control unit and a process means, each with functions as specified in the claim. In particular the first and second photoelectric conversion units are each for photoelectrically converting a light beam respectively from the first and second halves of the exit pupil into a respective electrical signal.

- 2.3 It is undisputed that the application discloses such an image pickup apparatus, and the board agrees. In agreement with the appellant the board will refer to the description pages and figures as filed. (The amendments made in the replacement pages of the description filed during examination have no bearing on the present decision.) In particular, figure 27 and the corresponding description page 12 disclose a perspective view of the image pickup apparatus of a first embodiment including the image sensor element 100 having a plurality of pixels. The image sensor element is a CMOS sensor, viz. a sensor of a type known from the state of the art. The optical arrangement of the diaphragm stop, exit pupil and photoelectric conversion units is disclosed, for instance, in figures 8 to 10 and 29 and on page 20, line 22, to page 21, last line. Such image pickup apparatuses are used, for example, in digital cameras (see page 1, lines 5 to 8).
- 2.4 In particular the application discloses on page 21, lines 17 to 27, in conjunction with page 22, lines 14 to 24, that the first and second photoelectric conversion units of a pixel are arranged in the direction in which the exit pupil is divided. In the embodiment this division direction is vertical, with an upper half and a lower half of the exit pupil (see figure 29) corresponding to lower and upper photoelectrical conversion units (see also page 38, lines 25 to 27). This arrangement allows the signals required for focus adjustment to be generated (see page 22, lines 19 to 24). The signal processing for focus detection is disclosed in figures 18 to 26 and on page 40, line 8, to page 52, line 2. The effects of providing first and second photoelectric conversion units within one pixel are disclosed on page 36, line 21, to page 38, line 3.

- 2.5 The amplification means specified in claim 1 are disclosed in figure 2 and page 13, line 18, to page 14, line 6, and the corresponding output mode for outputting a signal based on the light beam coming from the entire pupil of the objective lens is described on page 38, line 4, to page 39, line 4.
- 2.6 The reasons for the decision under appeal are based on the understanding that figure 2 defines the horizontal direction along the length of the page and the vertical direction along the width of the page. The board does not share this assessment. As convincingly argued by the appellant, the horizontal scanning unit 16 depicted in figure 2 is a unit for scanning the horizontal rows of the image sensor. In figure 2, the horizontal rows are depicted along the width of the page. The vertical scanning unit 15 is a unit for addressing the individual vertical columns of the image sensor. In figure 2 the vertical columns are depicted along the length of the page.
- 2.7 Besides, in the context of digital cameras, the orientation of the image sensor is dependent on how the camera is held. In the present application, it is clear that the expressions "vertical" and "horizontal" refer to the orientation of the image sensor element when the camera is held in its normal upright orientation. Figure 4 and page 13, lines 7 to 17, disclose that, in the first embodiment, the image sensor element comprises 1920 (vertical) columns and 1080 (horizontal) rows (thus 1920 x 1080 pixels) and that the "focus detection areas are made vertically oblong" (i.e. in the direction of the columns). However, for the invention specified in claim 1 of the main request, the

orientation of the image pickup apparatus is irrelevant.

2.8 Also, the reasons for the decision under appeal are not based on the understanding that "horizontally" specifies the orientation of the image sensor element. Instead they are based on the understanding that read-out of the pixels column by column (i.e. vertical line by vertical line) is described in figures 15A to 15D, and that such read-out of pixels is in line with the disclosure of figure 2 only if the photoelectric conversion units in figure 2 are arranged horizontally in order to select different column accumulation times.

2.9 The board does not agree with this assessment. Figure 2 illustrates pixels which are arranged in vertical columns (pixels 30-11 and 30-21 in a first column, pixels 30-12 and 30-22 in a second column), each pixel being divided into an upper and a lower photoelectric conversion unit (see also point 2.6 above). These columns correspond to the columns referred to in figures 15A to 15D. A particular read-out operation on the pixels arranged in columns is not a feature of the invention specified in claim 1.

2.10 The argument that (only) a horizontal arrangement of the photoelectric conversion units in figure 2 allows different column accumulation times to be selected does not convince the board either. The charge accumulation under the photogates of the photoelectric conversion units is described on page 31, line 9, to page 32, line 10. Each of the photoelectric conversion units, for transferring its charge, can be selected by a control pulse to a respective transistor MOS (e.g. 3 or 53; see page 31, line 23, to page 32, line 10, and figure 2). The application does not disclose that the

two photoelectric conversion units of a single pixel belong to different columns and have different charge accumulation times.

2.11 Claim 1 specifies an image pickup apparatus, not a particular operation for reading out its pixels. The image pickup apparatus is described as comprising a CMOS sensor, viz. an image sensor element of a type belonging to the state of the art. A person skilled in the art of image pickup apparatus would know, on the basis of his common general knowledge, the general operation of reading out the image sensor element even in the absence of a detailed disclosure of the sequence of control pulses to rows and columns. The examining division in the decision under appeal has not set out specific inconsistencies and/or ambiguities in the description which may cause doubts concerning the described particular order of reading out the pixels of the image sensor element when figure 2 is correctly interpreted as set out in points 2.9 and 2.10 above. Nor does the board see inconsistencies or ambiguities which render the disclosure of the image pickup apparatus so unclear or incomplete that the image pickup apparatus specified in claim 1 could not be carried out by a person skilled in the art.

3. In view of the above the decision under appeal has to be set aside.

4. *Reimbursement of the appeal fee (Rule 67 EPC 1973)*

4.1 The decisive question is whether the examining division gave the applicant the opportunity to comment before issuing its decision based on the objection under Article 83 EPC 1973 which was raised for the first time in the oral proceedings. The appellant argues that the

examining division, proceeding in this manner, did not comply with the requirements of Article 113(1) EPC 1973.

4.2 It is undisputed that the representative was informed of the examining division's objection under Article 83 EPC 1973 and then given the opportunity to present comments after a break in the oral proceedings from 10h25 to 10h55. The representative actually presented comments, in that the issue was discussed with the examining division on a whiteboard. Furthermore no request for a longer break or for postponement of the oral proceedings was made, which might have indicated that the representative felt unable to present comments concerning the issue of sufficiency of disclosure (Article 83 EPC 1973).

4.3 The argument that the applicant could not be equated with the representative has not convinced the board that the applicant was not given the opportunity to present comments. This follows from the very fact that the representative represented the applicant in the oral proceedings and was given the opportunity to defend the case of the applicant who had chosen not to attend those proceedings. Had the representative felt a need to contact the applicant before taking a position on certain topics in the oral proceedings, he should have requested a break. Independently thereof, and only for the sake of completeness, the board notes that the objection concerned the functioning of the invention, more particularly the functioning as emphasised in written proceedings. Objectively it should not come as a surprise to the applicant if statements made by or on behalf of the applicant in written proceedings, in particular explanations concerning the functioning of

the described invention, are discussed in the oral proceedings.

4.4 According to the statement of grounds of appeal, in the present case some of the arguments given in written proceedings were "obviously incorrect". Thus the representative could have made a comment to that effect in the oral proceedings before the examining division and attempted to convince the examining division by correctly explaining the functioning of the invention. Furthermore, the minutes of the oral proceedings before the examining division make clear that the representative raised the argument that an interchange of the horizontal and vertical scanning circuits was within the skills of a person skilled in the art.

4.5 Thus, in the board's judgment, the applicant's right to be heard was not infringed. Instead, what happened was that the representative's arguments did not convince the examining division. This entailed the refusal of the application and made the present appeal necessary. It was not the way in which the first-instance proceedings were conducted which made the present appeal necessary. Under these circumstances the request for reimbursement of the appeal fee must be refused.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the first instance for further prosecution.
3. The request for reimbursement of the appeal fee is refused.

The Registrar:

The Chairman:

K. Boelicke

F. Edlinger

Decision electronically authenticated