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D E C I S I O N
of 26 April 2006

Case Number: T 0232/03 - 3.5.04

Application Number: 95120382.7

Publication Number: 0720360

IPC: H04N 5/232

Language of the proceedings: EN

Title of invention:
An electronic camera with rapid automatic focus of an image upon an image sensor

Patentee:
EASTMAN KODAK COMPANY

Opponent:
Olympus Optical Company Ltd.

Headword:
-

Relevant legal provisions:
EPC Art. 56, 114(2)

Keyword:
"Inventive step - yes"
"Late submitted material - document admitted (no)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0232/03 - 3.5.04

D E C I S I O N
of the Technical Board of Appeal 3.5.04
of 26 April 2006

Appellant: (Patent Proprietor)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 22 November 2002 revoking European patent No. 0720360 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: F. Edlinger
Members: C. Kunzelmann
T. Karamanli

Summary of Facts and Submissions

I. This appeal is against the decision of the opposition division revoking European Patent No. 0 720 360.

II. The decision of the opposition division is based on the claims of the patent as granted. Claim 1 of these claims reads as follows:

"An electronic camera having an automatically focused lens (22) that is operable to focus an image based on image data electronically obtained by the camera from a partial area (66) of the whole image, the camera further having a progressive scan image sensor (20) comprising a two-dimensional array of photosites (58) arranged in lines and columns to provide image charge, the sensor having the capacity to eliminate some lines of image charge and to transfer other lines of image charge, and a timing and control section (27) for controlling the sensor (20) to noninterlaced read out of complete image frames from the sensor, characterized by a charge drain (62) being controlled in a focus mode by said timing and control section (27) so as to eliminate a pattern of lines of image charge from the partial area (66) and to transfer the intervening lines of image charge within the partial area; and a processor (35) for generating a focus adjustment signal based on the intervening lines of image charge transferred from the partial area (66)."

Claims 2 to 10 are dependent on claim 1.

III. The following documents cited in the opposition proceedings will be referred to below:

A1: US 5 363 137 A

A2: US 4 870 494 A

A3: EP 0 421 243 A2.

IV. The opposition division came to the conclusion that the electronic camera of claim 1 did not involve an inventive step in view of the disclosures of A2 and A3. The reasons may be summarised as follows:

In A2 a pattern of lines was eliminated and the teaching of A2 was combinable with that of A3 in a direct and straightforward manner, leading to a camera that differed from the claimed subject-matter only in that

(i) a noninterlaced read out was performed, and
(ii) a charge drain was controlled so as to eliminate the pattern of lines.

However, the progressive (noninterlaced) format was a well-known alternative that a person skilled in the art could choose and implement without the exercise of inventive skill. The charges of the lines to be eliminated in A2 had to be dealt with somehow and A3 already suggested the use of an overflow drain to eliminate signal charges.

V. The patent proprietor filed an appeal setting out the reasons why the decision under appeal was based on a misinterpretation of A2.

VI. The further submissions of the parties essentially concentrated on the interpretation of A2, in particular on the question whether the camera of A2 in a "fast" mode eliminated a pattern of lines or not. More than a year after notification of the grounds of appeal, the respondent (opponent) filed a second written reply in which reference was made to a further prior art document EP 0 051 110 A2 (which will be referred to as D1) which was said to be cited as evidence that it was already well known to use charge drains before the priority date of A2.

VII. The Board sent a summons to attend oral proceedings with a communication pursuant to Article 11(1) RPBA in which the Board indicated that it did not seem contentious that charge drains in general were well-known at the priority date of the patent in suit and that a person skilled in the art could easily have conceived charge elimination in general. Thus D1 did not seem to constitute relevant evidence. The Board also indicated that it tended to agree with the interpretation of A2 given by the respondent and the opposition division, but that it had doubts whether a combination of A2 with A1 or A3 led to the conclusion that the electronic camera of claim 1 was obvious to a person skilled in the art.

VIII. The appellant did not comment on the Board's provisional opinion.

IX. Oral proceedings were held on 26 April 2006 in the absence of the appellant who had indicated in a letter dated 27 March 2006 that he would neither be

represented at the oral proceedings nor would he attend the oral proceedings himself.

X. The appellant's (patent proprietor's) arguments filed in writing can be summarised as follows:

The opposition division had misinterpreted A2 when it stated that a pattern of lines was eliminated in the fast mode. On a proper interpretation of A2, charges from adjacent lines were combined into combined charge packets, resulting in only half as many signal charge packets in the fast mode, each charge packet being composed of the charges from two adjacent lines. A2 achieved a faster readout by increasing the transfer speed rather than by charge elimination. Focusing in A2 was based on the whole image.

If a person skilled in the art had combined the teachings of A2 and A3 he would have increased the transfer speed in accordance with the teaching of A2 for only a group of (central) photodiodes as in A3 and would have provided a charge drain as in A3 for sweeping charges from photodiodes outside that group which were ineffective for focusing. A person skilled in the art would not have arrived at a camera which eliminated a pattern of lines of image charge inside the focus area and transferred the intervening lines of image charge. He would instead have tried to reduce the partial area used for focusing.

If a person skilled in the art had combined the teachings of A2 and A1 he would have used a partial area for focusing in accordance with the teaching of A1 and means for reading out this partial area with

"n signal lines as one unit" (A2, column 3, lines 21 and 22) to increase the reading speed.

Therefore, neither a combination of A2 with A1 nor A2 with A3 would have led in an obvious manner to an electronic camera as specified in claim 1 of the patent in suit.

XI. The respondent's (opponent's) arguments can be summarised as follows:

Concerning the disclosure of A2, the opposition division had not misinterpreted this document. In a first aspect, A2 made use of larger potential wells by applying the same clock signal to a plurality (e.g. pairs) of adjacent transfer electrodes to speed up the transfer of charges. In a second aspect, some of the lines were skipped so that, for example, only half of the lines of photodiodes were read out. Mixing of charges of different lines in the larger potential wells was avoided even when a Bayer filter was used. It was a well-known necessity to provide a charge drain when not reading out charges of certain lines. A3 already suggested an overflow drain. The camera specified in claim 1 of the patent in suit did not provide an inventive surplus over a direct and straightforward combination of A2 and A3.

Also a combination of A2 and A1 rendered the camera of claim 1 obvious. A1 disclosed a line selective operation capable of specifying, resetting and reading any desired line of an image sensor. A charge drain was also known from A1. The only information not contained in A1 was that lines were skipped. It did not matter

that A1 referred to floating gate arrays (FGA) in the given examples because the functioning was equivalent to that of charge coupled devices (CCD). A person skilled in the art knew that a CCD had to be reset by draining the charges, not by recharging to a predetermined potential as with an FGA. Moreover, the alternatives of eliminating the pattern of lines of image charge in accordance with the teaching of A2 or by appropriate control of a charge drain were equivalent.

D1 was merely cited as evidence that it was already known before the priority date of A2 to use charge drains. Figure 2A of D1 was the relevant disclosure in D1 because it showed a charge drain (29) adjacent to a terminal electrode (20) and a control gate (28). This structure was the same as that of the patent in suit and was capable of eliminating lines and transferring other lines. Therefore D1 showed what a person skilled in the art already knew when considering a combination of, for example, A2 and A3. In case the Board disregarded D1, a similar argument was derivable from the patent in suit itself (paragraph [0017] of the description).

XII. The appellant (patent proprietor) requests that the decision under appeal be set aside and that the patent be maintained in unamended form.

XIII. The respondent (opponent) requests that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

2. *Late-filed document D1 (Article 114(2) EPC)*

D1 was filed and referred to for the first time in the second written reply of the respondent, after expiry of the time limit for filing any written reply to the statement of grounds of appeal. The respondent has not contested that D1 was not submitted in due time. Pursuant to Article 114(2) EPC the Board may therefore disregard D1.

The respondent relied on Figure 2A of D1 in support of the allegation that selective elimination of lines of image charge was already known on the priority date of A2. No relevant passages in the description were referred to for an explanation of the function of the circuit in Figure 2A of D1. After a *prima facie* examination of these submissions the Board came to the conclusion that they were not relevant for deciding this case.

It has never been contested that charge drains as such were known to a person skilled in the art. Also, according to paragraph [0017] in combination with Figure 2A of the patent in suit, a conventional use of a known fast dump structure 62 (or gate 62) is to eliminate stray charge or unwanted non-image lines above and below the image. Even the fact that similar charge drains were known at the priority date of A2 was not contested by the patent proprietor. Moreover, the question whether it was obvious to provide a charge

drain of an electronic camera with the control specified in claim 1 of the patent in suit has to be judged from the perspective of a person skilled in the art at the priority date of the patent in suit. Therefore the Board saw no reasons for further investigations of D1 of its own motion and disregarded D1 pursuant to Article 114(2) EPC.

3. *Inventive step (Article 56 EPC)*

3.1 The novelty of the subject-matter of claims 1 to 10 has not been disputed. In appeal proceedings, lack of inventive step has been the only ground for opposition raised.

3.2 Disclosure of A2

A2 discloses a solid state image pickup device of the interline CCD type realising interlace operation (see column 5, lines 27 to 32) for use in an electronic camera (see column 2, lines 10 to 21). The image pickup device comprises a matrix arrangement of rows and columns of photodiodes with charge transfer channels formed between the columns of the matrix arrangement. In order to reduce the time required, for example for autofocusing, the signal charge transfer speed in the charge transfer channels is increased by means of a switch control device consisting of a network of two groups of transistors. For taking photographs, the first group of transistors is switched on and the charge transfer electrodes of the charge transfer channels are clocked with signals establishing a normal signal charge transfer speed. For autofocusing, the second group of transistors is switched on instead so

that pairs (or larger groups) of adjacent charge transfer electrodes form units (see column 4, line 4 to column 5, line 1). These units are clocked with the same signals (see column 5, lines 19 and 20 and column 6, lines 31 to 36) as the ones used with the first group of transistors, thereby doubling (tripling etc.) the length of the potential wells in the charge transfer channels and thus doubling (tripling etc.) the signal charge transfer speed with respect to the normal one (see column 7, lines 25 to 33). For instance, when pairs of adjacent charge transfer electrodes form such units the charges of some rows of photodiodes are not read out into the charge transfer channels (see column 5, lines 27 to 30). Only half the number of signal charges are read out (see column 5, lines 34 to 42), thereby lowering the resolution (see column 5, lines 49 to 54).
Thus, the decision under appeal correctly states that a pattern of lines is "eliminated" in A2 in the sense that a pattern of lines is not read out.

In column 5, lines 23, 25 and 27 of A2 the vertical index of each photodiode and transfer gate and the index of each charge transfer electrode are erroneously decreased by one. These indexes are inconsistent with the disclosure of the rest of A2 and do not disclose charges from adjacent lines being merged into combined charge packets.

3.3 Combination of A2 and A3

A3 discloses a charge drain structure (overflow drain OFD) of an interline or frame transfer CCD (45, see column 5, lines 5 to 22 and column 12, lines 43 to 52).

The CCD is controlled by a timing generator (44, see column 5, line 54 to column 6, line 4) to sweep out as ineffective charges all the lines of image charge of the top two fifths of the image to the overflow drain OFD (see Figure 6 in conjunction with column 11, lines 8 to 24) and to sweep out the lower two fifths of the image to the horizontal transfer portion (see column 11, lines 25 to 34). The charges swept out during this period are ineffective for focusing and meaningless as video signals (see column 11, lines 33 to 58).

Thus, if a person skilled in the art had combined the teachings of A2 and A3, he would have arrived at a CCD in which a charge drain structure would be used to sweep out as ineffective charges the lines of image charge of a top part of the image in accordance with the teaching of A3, and some lines of image charge in the central part of the image would not be read out in accordance with the teaching of A2. However, he would not have arrived at an electronic camera having a charge drain structure controlled so as to eliminate a pattern of lines of image charge within a partial area of the whole image and to transfer the intervening lines of image charge of the partial area. Indeed, none of the available prior art documents suggests controlling a charge drain structure in the manner specified in claim 1 of the patent in suit. Furthermore, modifying the teaching of A2 so that it becomes compatible with a frame transfer CCD as mentioned in A3, i.e. compatible with a progressive scan readout operation, would have required a substantial reconsideration of the teaching of A2, since the image pickup device disclosed in A2 is itself a modification

of a prior art device which realises an interlace operation, but not a progressive scan operation (see A2, column 1, lines 10 to 60 in conjunction with column 5, lines 15 to 17; Figures 4 to 6).

3.4 Combination of A2 and A1

The image sensor of A1 does not have a charge drain structure because it is of the floating gate array type (see column 3, lines 60 and 61). Resetting of such an image sensor requires charging the light receiving elements of the image sensor to a predetermined potential (see A1, column 4, lines 18 to 23). Even if one had considered that resetting the image sensor of A1 by charging it were equivalent to resetting image sensors of the charge transfer type by discharging them, there still would not have been a reason to control a charge drain structure in the manner specified in claim 1, since the image sensor of A1 is capable of selectively reading out only a pattern of lines (see A1, column 3, lines 21 to 29 and lines 57 to 60) without a charge drain. Furthermore, modifying the teaching of A2 so that it becomes compatible with progressive scan readout would have required a substantial reconsideration of the teaching of A2 for the reason given in 3.3 above.

3.5 Further considerations

The argument that "eliminating" lines by not reading out all the lines of image charge as disclosed in A2 is equivalent to controlling a charge drain structure in the manner specified in claim 1 did not convince the Board that the electronic camera of the patent in suit

constitutes an obvious modification of the camera disclosed in A2, even if considered in combination with A1 or A3.

It is correct that reading out only wanted lines for focusing and later clearing the image sensor (as in A2) and reading out all the lines and eliminating the unwanted ones in a charge drain (as in the patent in suit) both result in the same lines being used for focusing. However, this does not mean that providing a charge drain controlled in the manner specified in claim 1 of the patent in suit does not involve an inventive step. In A2, the problem of increasing the signal charge transfer speed is solved on the basis of the principal concept of applying the same signals to adjacent charge transfer electrodes forming a unit. Modifying the teaching of A2 so that the desired increase in signal charge transfer speed is achieved by control of a charge drain is only possible if this principal concept of A2 is replaced by the different principal concept disclosed in the patent in suit. Although charge drains were generally known, there is no indication in any available prior art document that an increase in signal charge transfer speed could be achieved by suitable control of a charge drain. Thus, without knowledge of the invention of the patent in suit, it would not have been obvious to a person skilled in the art to modify the teaching of A2 in such a way that it would have resulted in an electronic camera as specified in claim 1 of the patent in suit.

3.6 In view of the above considerations, the Board judges that the electronic camera as specified in claim 1 involves an inventive step (Article 56 EPC).

4. For these reasons, the grounds for opposition mentioned in Article 100 EPC do not prejudice the maintenance of the patent unamended.

Order

For these reasons it is decided that:

1. The contested decision is set aside.

2. The patent is maintained unamended.

The Registrar: The Chairman:

D. Sauter F. Edlinger