Datasheet for the decision of 13 March 2014

Case Number: T 0241/13 - 3.4.02
Application Number: 99945459.8
Publication Number: 1110078
IPC: G01N21/88, H01L21/66
Language of the proceedings: EN

Title of invention:
ADAPTIVE LIGHTING SYSTEM AND METHOD FOR MACHINE VISION APPARATUS

Patent Proprietor:
Asti Holdings Limited

Opponent:
ISMECA Semiconductor Holding SA

Relevant legal provisions:
EPC Art. 123(2)

Keyword:
Amendments - added subject-matter (yes)

Decisions cited:
G 0007/93, T 0028/10
Catchword:

That an ambiguous expression as filed may be interpreted in a particular way is not sufficient to ensure the compliance of an amendment, based on that interpretation, with Article 100(c) EPC which requires a direct and unambiguous disclosure in the application as filed.

See decision, point 1.3.1, second paragraph.
Case Number: T 0241/13 - 3.4.02

DECISION of Technical Board of Appeal 3.4.02 of 13 March 2014

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Decision under appeal: Decision of the Opposition Division of the European Patent Office posted on 20 November 2012 revoking European patent No. 1110078 pursuant to Article 101(2) EPC.

Composition of the Board:
Chairman: D. Rogers
Members: A. Hornung
F. J. Narganes-Quijano
Summary of Facts and Submissions

I. The patentee appealed against the decision of the opposition division revoking European patent No. 1110078.

Opposition was filed against the patent as a whole and based on the grounds of Article 100(a), together with Articles 54(1) and 56 EPC, Article 100(b) EPC and Article 100(c) EPC.

The opposition division held that the grounds for opposition mentioned in Article 100(c) EPC prejudiced the maintenance of the patent as granted. Moreover, the opposition division did not admit into the proceedings the patentee's first auxiliary request, filed during oral proceedings, for being late filed.

II. Oral proceedings before the board were held on 13 March 2014.

III. The patentee-appellant requested that the decision of the opposition division be set aside and that the patent be maintained as granted (main request), or alternatively, maintained upon the basis of either the first or second auxiliary requests, both filed under cover of a letter dated 2 April 2013. The patentee also requested that if any of the claim requests was found to satisfy the requirements of Article 100(c) and 123(2) EPC, the case be remitted to the department of first instance for further prosecution.

The opponent-respondent requested that the appeal be dismissed and that the first and second auxiliary requests not be admitted into the proceedings.

IV. Independent claim 1 according to the patentee's main request reads as follows:
Claim 1. "Method for illuminating an article for inspecting by a machine vision apparatus, wherein said machine vision apparatus includes a lighting array comprising a plurality of light emitting elements, a camera for capturing an image of said article when illuminated and a processor including a circuit for recording an image captured by said camera, a memory, a processor circuit and a lighting intensity control circuit for controlling the intensity of light emitted by at least selected ones of said light emitting elements to adjust the illumination of said article, said method comprising the steps of:

a) retrieving a threshold light intensity level for selected ones of said lighting elements from a configuration file in said processor corresponding to the physical characteristics of the article to be illuminated;
b) capturing an image of said article with the lighting array illuminated at selected light intensities corresponding to said threshold level in said configuration file;
c) determining a median gray value of intensity of the captured image and comparing said median gray value to a predetermined threshold value for the particular type of article being viewed;
d) increasing the light intensity level of said lighting array a predetermined amount;
e) capturing another image;
f) repeating steps (c) through (e) until the median gray value of the image corresponds substantially to said predetermined threshold value; and
(g) saving the final light intensity level of selected lighting elements in the configuration file for future use in inspecting articles of the same type."

Independent claim 1 according to the patentee's second auxiliary request reads as follows:
Claim 1. "Method for illuminating an article for inspecting by a machine vision apparatus, wherein said machine vision apparatus includes a lighting array comprising a plurality of light emitting elements, a camera for capturing an image of said article when illuminated and a processor including a circuit for recording an image captured by said camera, a memory, a processor circuit and a lighting intensity control circuit for controlling the intensity of light emitted by at least selected ones of said light emitting elements to adjust the illumination of said article, said method comprising the steps of:
a1) retrieving a threshold light intensity level for selected ones of said lighting elements from a configuration file in said processor corresponding to the physical characteristics of an article to be illuminated;
a2) retrieving a threshold value of image intensity from the configuration file;
b) capturing an image of said article with the lighting array illuminated at selected light intensities corresponding to said threshold light intensity level in said configuration file;
c1) determining a median gray value of intensity of the captured image and comparing said median gray value to said predetermined image intensity threshold value for the particular type of article being viewed;
c2) if the median gray value is far from said predetermined image intensity threshold, starting the intensity level of the selected lighting elements for the image capture from a minimum value;
d) increasing the light intensity level of said lighting array a predetermined amount;
e) capturing another image;
f) repeating steps (c1), (d) and (e) until the median gray value of the image corresponds substantially to said predetermined threshold value; and
(g) saving the final light intensity level of selected lighting elements in the configuration file for future use in inspecting articles of the same type.

Reasons for the Decision

1. Main request

Claim 1 as granted contains subject-matter which extends beyond the content of the application as filed, contrary to the requirements of Article 100(c) EPC.

1.1 Amendment of claim 1

Present claim 1 is generally based on claims 30 to 32 of the application as filed, wherein, inter alia, the expression in step (a) of claim 30 of the application as filed, "retrieving a threshold intensity value", has been amended to read "retrieving a threshold light intensity level".

Interpreting this amendment in a technically sensible manner leads to a claim which comprises the combined steps (a) and (d) of retrieving a threshold light intensity level from a configuration file and, starting from that retrieved level, increasing the light intensity level by a predetermined amount.

1.2 No basis in the application as filed can be found for this combination of steps.

1.2.1 Claims 30 to 32 of the application as filed do not provide a sufficient basis for the above amendment.
Independent method claim 30 of the application as filed discloses

- in step (a), retrieving "a threshold intensity value" which appears to correspond to an image intensity of the captured image of the inspected article, since step (c) of the claim requires the comparison of a median gray value of intensity of the captured image "to the threshold value",

- in step (b), illuminating the article to be inspected at selected intensities and capturing an image thereof, wherein the "selected intensities" appear to correspond to the "minimum light intensity setting" disclosed on page 15, lines 10-16, of the original description,

- in step (d), increasing the emitted light intensity level as defined by the "minimum light intensity setting" of step (b), before capturing another image.

In contrast to claim 30 of the application as filed, granted claim 1, that is claim 1 of the main request, discloses

- in step (a), retrieving a "threshold light intensity level" which is the light intensity emitted by the lighting array,

- in step (b), illuminating the article to be inspected "at selected light intensities corresponding to said threshold level" and capturing an image thereof, wherein the "selected light intensities" appear to correspond to the emitted light intensity retrieved in step (a).
in step (d), increasing the emitted light intensity level as retrieved in step (a), before capturing another image.

It follows that claims 30 to 32 of the application as filed do not disclose the retrieval, from a configuration file, of a light intensity level which is increased before capturing another image.

1.2.2 The description of the application as filed does also not provide a sufficient basis for the above amendment.

The description of the application as filed discloses on page 12, line 21 to page 17, line 6, and with reference to the flow-chart of figure 8, a method for illuminating an article to be inspected by a machine vision apparatus.

The disclosed method starts with step 80 in figure 8 to "retrieve a threshold value of image intensity and selected lighting array segments to be used for illuminating the package from a configuration file" (page 13, lines 17-24). The retrieval of these "selected lighting array segments to be used for illuminating" does not mean that a threshold light intensity is retrieved but only identifies which segments are to be used.

Then, an image of an article to be inspected is captured (step 82), the article being illuminated "at a minimum intensity setting of the lighting array using the predetermined lighting segments" (page 15, lines 1-10). There is no disclosure in the original description that this "minimum intensity setting" is retrieved from a configuration file.

Finally, after a histogram process (step 84) and an iterative process of comparing the median gray value of the pixel
intensity distribution with an image intensity threshold value for good image contrast (steps 86, 88, 90), the final light intensity setting, corresponding to the condition when the median gray value reaches the threshold value, is saved to the configuration file for the particular package type (step 92; see page 15, lines 10-26). Hence, the only disclosure of a light intensity being stored in a configuration file for subsequent usage is about a final light intensity which required the preceding step 80 of retrieving a threshold image intensity.

Consequently, there is no disclosure of a method as claimed, comprising the steps of retrieving a threshold light intensity level and then increasing that particular threshold light intensity level before capturing another image.

1.3 The patentee presented the following counter-arguments.

1.3.1 The patentee argued that since a light intensity is saved to the configuration file (page 15, lines 22-26), it is implicit that it is retrieved at a later stage. In particular, the description discloses on page 16, lines 4-13, that at the start of inspection of the next lot of semiconductor packages, and if the median gray value is far from the threshold value, the iterative process of increasing the light intensity from the minimum intensity level of the lighting array and comparing it to the threshold is restarted. The process is carried out until the optimum setting is reached again. For the patentee, the minimum intensity setting is the light intensity as retrieved from the configuration file. Therefore, the description discloses the retrieval of a light intensity level from a configuration file and its subsequent increase.

The board accepts the implicit disclosure of retrieving a light intensity level at the beginning of the verification
process. However, there is no basis for the patentee's assertion that the minimum intensity setting, from which the verification process starts, is the same light intensity level as retrieved from the configuration file. It is true that the description does not give a precise definition of the meaning of the expression "minimum intensity level" and that, therefore, the patentee's interpretation of this expression is not clearly excluded. That such an ambiguous expression as filed may be interpreted in a particular way is not sufficient to ensure the compliance of an amendment, based on that interpretation, with Article 100(c) EPC which requires a direct and unambiguous disclosure in the application as filed. In the present case, no direct and unambiguous disclosure can be found for the patentee's interpretation, i.e. a method step of increasing the light intensity level as retrieved from the configuration file. On the contrary, the skilled person, reading the original application, would rather construe the disclosed verification process as follows:

- The verification process starts with illuminating the next lot of semiconductor packages with the light intensity level which has been previously determined as being the optimum setting and which has been saved to the configuration file (page 15, lines 22-26). Either the resulting illumination is close to optimum, thereby enabling the inspection of the next lot of semiconductor packages without increasing the light intensity, or the illumination is far from optimum, whereby the iterative process shown in figure 8 is restarted with the light intensity level increased from a "minimum intensity level". It is evident that this "minimum intensity level" corresponds to the lowest level possible and not, as contended by the patentee, to some intermediate level corresponding to the previously determined optimum setting, retrieved from
the configuration file. Indeed, in case that the illumination at the beginning of the verification process, generated by the retrieved light intensity level, is far too intense, it would make no technical sense to carry out the iterative process by further increasing the light intensity level. Therefore, none of the above alternative illumination situations is covered by the claimed method steps.

In conclusion, in the board's view, the application as filed discloses that the light intensity level as retrieved from a configuration file is either maintained unchanged or reduced to a minimum, but not increased as defined in granted claim 1.

1.3.2 In support of his contention that the application as filed discloses the retrieval from a configuration file of a light intensity level which is increased by a predetermined amount, the patentee argued that the expressions "final intensity level" (page 13, line 14; page 15, lines 22-23), "preselected light emitting intensities" and "minimum [light] intensity setting [or level]" (page 15, lines 7-8 and 12-13; page 16, lines 10-11) correspond to the same light intensity level being retrieved from the configuration file.

There is however no basis in the application as filed for the patentee's contention in this respect. In particular, the description as filed does not give a clear definition about the meaning of at least the two latter expressions. For instance, the origin of "preselected light emitting intensities" is simply left open by the description as filed. Moreover, for the reasons given above (point 1.3.1), it is technically not plausible that the "final intensity level" and the "minimum intensity setting" are the same.
1.3.3 According to the patentee, basis for step (a) of present claim 1 is to be found in step (a) of claim 30 of the application as filed because the expression "threshold intensity value" in claim 30 of the application as filed has to be interpreted as meaning "threshold light intensity level". The wording was only amended for clarification purposes: adding the word "light" clarifies the fact that illumination light is referred to, whereas the words "value" and "level" are interchangeable.

The board is not convinced by this argument.

Firstly, according to step (c) of claim 30 of the application as filed, the median gray value of intensity of the captured image is compared to "the threshold value". Since the median gray value of step (c) is a statistical measure of an image intensity value, "the threshold value" of step (c) must also be an image intensity value. Furthermore, due to the antecedent "the" and the similar wording used, "the threshold value" of step (c) corresponds, according to the formulation of the claim, to the "threshold intensity value" of step (a). It follows that original step (a) defines the retrieval, from a configuration file, of a threshold image intensity value, but not the retrieval of a threshold light intensity level as defined in step (a) of granted claim 1.

Secondly, except for a limited number of occasions, the terms "value" and "level" are generally used throughout the application as filed for designating an image intensity value and a light intensity level, respectively. Therefore, the skilled person when reading the application would rather link the term "value" to an image intensity and the term "level" to a light intensity.

Therefore, the two expressions "threshold intensity value" and "threshold light intensity level" have a different
meaning in the context of the application as filed and are not interchangeable.

2. First auxiliary request

2.1 The first auxiliary request on file is the same as the first auxiliary request submitted by the patentee at the oral proceedings before the opposition division. The request was not admitted by the opposition division into the proceedings for being late filed.

According to the appealed decision, point 5, "the objections under Article 123(2) essentially had not changed since the issuance of the summons to oral proceedings and hence the subject of the proceedings has not changed". Moreover, the opposition division argued that "the amendments contained subject-matter which was not covered by the dependent claims. It follows that it cannot be argued that they contained subject-matter that the opponent should have expected to discuss". The opposition division concluded that "the auxiliary request was therefore not admitted into the opposition proceedings under Rule 116(2) EPC".

The question before the board is therefore whether the opposition division correctly exercised its discretion in not admitting this request. The principle laid down in the decision G 7/93 (OJ EPO 1994, 775), point 2.6 of the reasons, and applied, for instance, in T 28/10, point 2.1 of the reasons, is that the exercise of discretion by the first instance should only be overturned by the board if wrong criteria were applied, or if the discretion was exercised unreasonably. The board is of the view that the opposition division correctly exercised its discretion and therefore decides not to admit the first auxiliary request into the proceedings under Article 12(4) RPBA.
2.2 The patentee argued that it only understood during oral proceedings the precise reason why the opposition division found that Article 100(c) EPC was not complied with. In particular, the opposition division's argument that the step of retrieving the threshold intensity value is to be seen as a missing essential feature became clear only during the oral proceedings. Therefore, the first auxiliary request, which corresponds to the attempt to overcome this precise reason by re-introducing the missing step, could not have been filed earlier.

The board does not find this argument convincing because the objection under Article 100(c) EPC had been dealt with in detail in the summons to oral proceedings before the opposition division. In particular, the summons explained that step (a) of claim 1 of the patent, i.e. retrieving a threshold light intensity level, and step (a) of claim 30 as filed, i.e. retrieving a threshold intensity value, are of a different nature. Nevertheless, the patentee decided not to file any auxiliary request in response to these objections.

3. Second auxiliary request

The second auxiliary request is admitted into the proceedings. No purpose is served discussing admissibility further given the outcome of the board's decision on the compliance of this request with Article 123(2) EPC.

3.1 Claim 1 of the second auxiliary request differs from claim 1 of the main request mainly in that steps (a2) and (c2) have been added. According to the new step (a2), a "threshold value of image intensity" is retrieved from the configuration file, in addition to the retrieval of the threshold light intensity level in step (a). According to the new step (c2), if the median gray value is far from the predetermined image
intensity threshold, the intensity level of the selected lighting elements for the image capture is started from a minimum value.

The claimed method according to the main request has been found by the board to contain subject-matter extending beyond the content of the application as filed (see point 1.2 above).

Step (a2) clearly does not remove that added subject-matter, i.e. the retrieval of a threshold light intensity level and its subsequent increase, since step (a2) merely adds an additional step.

Step (c2), notwithstanding any lack of clarity of its wording, seems to define an intensity level of the lighting array which, under the condition that the median gray value is far from the predetermined image intensity threshold, is set to a minimum value before increasing it. However, when the above condition is not fulfilled, i.e. when the median gray value is not far from the predetermined image intensity threshold, then step (c2) leaves the method of the second auxiliary request unchanged with respect to the method of the main request and, hence, does not remove the added subject-matter.

It follows that claim 1 of the second auxiliary request infringes Article 123(2) EPC for the same reasons as that of the main request.

3.2 The patentee explained that step (c2) is based on the original description, page 16, lines 8-13. Moreover, the patentee re-explained that the minimum intensity level of step (c2) corresponds to the retrieved threshold light intensity level of step (a1) (see point 1.3.2).
In the view of the board, these arguments are not suitable to invalidate the above reasoning since they do not address the question of how adding steps (a2) and (c2) can remove the added subject-matter from the claimed method.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:                  The Chairman:

M. Kiehl                        D. Rogers

Decision electronically authenticated