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**D E C I S I O N**  
**of 29 September 1998**

**Case Number:** T 0449/97 - 3.4.2  
**Application Number:** 87303281.7  
**Publication Number:** 0242185  
**IPC:** G03F 7/26, G03F 3/10

**Language of the proceedings:** EN

**Title of invention:**

Continuous tone colour imaging using laser or light emitting diode sources

**Patentee:**

Minnesota Mining and Manufacturing Company

**Opponent:**

Fuji Photo Film Co., Ltd.

**Headword:**

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**Relevant legal provisions:**

EPC Art. 54, 56, 87

**Keyword:**

"Inventive step (no)"

"Invalid priority (not the first application for the same invention)"

**Decisions cited:**

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**Catchword:**

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Case Number: T 0449/97 - 3.4.2

**D E C I S I O N**  
**of the Technical Board of Appeal 3.4.2**  
**of 29 September 1998**

**Appellant:**  
(Opponent)

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**Appellant:**  
(Proprietor of the patent)

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**Decision under appeal:**

**Interlocutory decision of the Opposition Division  
of the European Patent Office posted 19 March  
1997 revoking European patent No. 0 242 185 in  
amended form.**

**Composition of the Board:**

**Chairman:** E. Turrini  
**Members:** A. G. Klein  
M. Lewenton

## Summary of Facts and Submissions

I. European patent No. 0 242 185 (application No. 87 303 281.7) was maintained in amended form by an interlocutory decision of the Opposition Division.

The Opposition Division in particular held that the light sensitive photographic element of claim 1 was not novel in view of the contents of document:

D2: Brochure of Eastman Kodak Company; 1980;  
pages DS-1 and DS-40 and an English translation thereof.

The Opposition Division however considered that the subject-matter of an amended independent process claim was patentable in view of the nearest prior art as disclosed in document:

D1: JP-A-55-13505 and an English translation thereof,  
and of the remaining citations on the file, amongst which the following will also be referred to in the present decision:

D4: US-A-4 565 774;

D7: Basic Principles of Photographic Science; 1978; pages 458 to 460 and 471 and an English translation thereof; and

D12: Neblett's Handbook of Photography and Reprography; 7th edition; 1977; pages 391 to 393.

II. Appeals were filed against the interlocutory decision by both parties, which for the sake of clarity will be referred to hereinafter as the proprietor appellant and the opponent appellant, respectively.

III. In a communication pursuant to Article 11(2) of the Rules of Procedures of the Boards of Appeal, annexed to the summons to attend oral proceedings, the Board in particular questioned the validity of the priority right claimed for the patent, and drew the parties' attention to document:

D18: GB-A-2 172 118,

published between the priority date and the actual filing date of the patent.

IV. Oral proceedings were held on 29 September 1998, at the end of which the decision of the Board was announced.

The proprietor appellant requested that the patent be maintained on the basis of either one of five sets of claims submitted during the oral proceedings as his main and first to fourth auxiliary requests.

The set of claims of the main request comprises four claims, of which claims 1 and 3, the only independent claims, read as follows:

"1. A light sensitive photographic element for producing a continuous tone colour image comprising a substrate bearing three imaging media coated thereon, said imaging media comprising:

(1) an imaging medium capable of forming a yellow image upon imagewise exposure and processing,

(2) an imaging medium capable of forming a magenta image upon imagewise exposure and processing,

(3) an imaging medium capable of forming a cyan image upon imagewise exposure and processing,

each imaging medium having a maximum spectral sensitivity at a wavelength different from that of the maximum spectral sensitivity of the other imaging media within the range 550 to 900 nm, characterised in that;

the sensitivities at the wavelength of maximum spectral sensitivity of the media decrease in order from the medium of shortest wavelength maximum spectral sensitivity to the medium of longest wavelength maximum spectral sensitivity, the difference in said sensitivities between the media of shortest and longest wavelength maximum spectral sensitivity being greater than 1 log exposure unit, not more than one imaging media being sensitised to infrared radiation and at least one of the imaging media have a wavelength of maximum spectral sensitivity which does not lie within the principal absorption wavelength band of the dye used to form the colour image generated in that layer.

3. A process for producing a continuous tone colour image comprising providing a light sensitive photographic element comprising a substrate bearing three imaging media coated thereon said imaging media comprising:

- (1) an imaging medium capable of forming a yellow image upon imagewise exposure and processing,
- (2) an imaging medium capable of forming a magenta image upon imagewise exposure and processing,
- (3) an imaging medium capable of forming a cyan image upon imagewise exposure and processing, each imaging medium having a maximum spectral sensitivity at a wavelength different from that of the maximum spectral sensitivity of the other imaging media within the range 550 to 900 nm, the sensitivities at the wavelength of maximum spectral sensitivity of the media decreasing in order from the medium of shortest wavelength maximum spectral sensitivity to the medium

of longest wavelength maximum spectral sensitivity, the difference in said sensitivities between the media of shortest and longest wavelength maximum spectral sensitivity being greater than 1 log exposure units, exposing said element to three independently modulated sources each emitting radiation of a wavelength corresponding to the wavelength of maximum sensitivity of a respective imaging medium, the maximum emission intensities of the sources at the wavelength of their maximum output increasing from the source of shortest wavelength to longest wavelength by an amount corresponding to the sensitivity difference of the imaging media, said exposures being conducted in raster fashion and over a number of discrete intensity levels."

The set of claims of the first auxiliary request is distinguished from the set of the main request only in that a disclaimer - extending over 2½ pages and excluding a light sensitive photographic element prepared by the procedure set out in document D18 from page 10, line 13 to page 11, line 44 - is added at the end of claim 1.

The set of claims of the second auxiliary request is distinguished from the set of the first auxiliary request by the addition at the beginning of the characterising portion of claim 1 of the expression "each imaging medium is of the silver dye bleach type or of the dye diffusion transfer type".

The set of claims of the third auxiliary request

comprises two claims, of which claim 1, the only independent claim, is identical to independent claim 3 of the main request.

Finally, the set of claims of the fourth auxiliary request is distinguished from the set of the third auxiliary request by the addition in claim 1, after the expression "greater than 1 log exposure units," of the expression "each imaging medium having a sensitivity at the wavelengths of maximum spectral sensitivity of the other imaging media which is not significant,".

The opponent appellant for his part requested that the patent be revoked.

- V. In support of his request the opponent appellant first questioned the validity of the priority claimed for the present patent. Document D18 was the publication document of an application filed by the proprietor appellant before the filing of the application of which priority was claimed in the present patent. Accordingly, with respect of the photographic element defined in claim 1 of the main, first auxiliary and second auxiliary requests, the latter application did not constitute a "first application" in the sense of Article 87 EPC, from which a valid priority right could be derived.

Since furthermore document D18 was published before the actual filing date of the attacked patent, the subject-matter of claim 1 of the above requests lacked novelty in view of the contents of document D18.

Concerning the patentability of the subject-matter of the process claims, the nearest prior art was disclosed in document D1. The claimed process for producing a continuous tone colour image was distinguished from the closest prior art process essentially in that the difference in the sensitivities between the media of shortest and longest wavelength maximum spectral sensitivity was greater than 1 log exposure unit, whereas in document D1 it was only about 0.8 log exposure units.

Increasing this difference, and providing for sensitivities decreasing in order from the medium of shortest wavelength maximum spectral sensitivity to the medium of longest wavelength maximum spectral sensitivity however constituted a well known means of achieving good colour reproduction and of reducing cross-talk between the adjacent imaging media, which was part of the body of common general knowledge available to the skilled person, as was evidenced for instance by documents D4, D7 or D12.

The further distinguishing feature of the process claims, directed to the exposure of the photographic element to radiation sources having maximum emission intensities increasing from the source of shortest wavelength to the source of longest wavelength by an amount corresponding to the sensitivity difference of the respective imaging media, only defined an obvious requirement to be met if proper colour balancing of the image was to be achieved.

Finally, the "discrete" character of the intensity levels over which the exposures were conducted according to the claimed process was totally irrelevant to the technical problem of achieving good colour reproduction and reduced cross-talk between the adjacent media.

VI. The proprietor appellant for his part, whilst admitting at the oral proceedings that product claim 1 of his main request did not benefit from the claimed priority, however, stressed that his process claims certainly benefited from the priority, since they defined an imaging technique involving raster scanning, which was not disclosed in the earlier application D18.

The priority claim was also valid in respect of claim 1 of his first and auxiliary requests, from which the specific example of document D18, which constituted an accidental novelty-destroying disclosure, had been disclaimed.

With respect to the patentability of the subject-matter of his process claims, the proprietor appellant first stressed that the sensitivity curves shown in Figure 4 of document D1 represented the sensitivities for the different media in terms of transmittance only. Sensitivity difference in terms of log exposure units in the sense of the patent could not therefore be directly derived from this disclosure. Moreover, the claimed decreasing of the sensitivities at the wavelengths of maximum spectral sensitivity from the medium of shortest wavelength maximum spectral sensitivity to the medium of longest wavelength maximum spectral sensitivity could not be derived from the schematic representations of the sensitivity curves in documents D1 and D2.

The available prior art did not in an obvious way teach that colour separation in a process for producing a continuous tone colour image could be improved by modifying the speed of respectively adjacent layers of the photographic element. In this respect, documents D4, D7 or D12 relied upon by the opponent appellant were specifically directed to the problem of mitigating the deleterious effect of the sensitivity of imaging media to blue radiation. The invention did not however make use of light radiation in the blue region of the electromagnetic spectrum.

## Reasons for the Decision

1. The appeals filed by the respective parties are both admissible.
2. *Proprietor appellant's main and first to third auxiliary requests*

Independent process claim 3 of the main, first auxiliary and second auxiliary requests and independent process claim 1 of the third auxiliary request are identical.

### 2.1 Validity of the priority right

The priority claimed by the patent on the basis of British patent application No. 8 609 133 of 15 April 1986 is valid with respect of the above process claims.

As a matter of fact, the wording of these claims is almost identical to the wording of claim 1 of the priority application.

In addition, the earlier application filed on 7 March 1986 in the name of the proprietor appellant and published as document D18 does not involve the producing of a continuous tone colour image by conducting exposures in raster fashion and over a number of discrete intensity levels. Accordingly, the priority application actually constitutes the first application filed by the proprietor appellant with respect of the presently claimed process.

Document D18, published on 10 September 1986, which is later than the priority date of the present patent, does not therefore belong to the state of the art in the sense of Articles 54(1) and (2) EPC.

## 2.2 Patentability

2.2.1 Both parties agreed that the subject-matter of the independent process claim of the main and first to third auxiliary requests was new in the sense of Article 54 EPC and that the nearest prior art was constituted by the process disclosed in document D1.

2.2.2 Document D1 discloses a process for producing a continuous tone colour image in which - like in the claimed process - a light sensitive photographic element is provided, which comprises a substrate bearing three imaging media coated thereon, capable respectively of forming a yellow, a magenta and a cyan image upon imagewise exposure and processing (see the English translation of document D1, claim 1 and the paragraph bridging pages 6 and 7 of the description). Moreover, each imaging medium has a maximum spectral sensitivity at a wavelength different from that of the maximum spectral sensitivity of the other imaging media within the range 550 to 900 nm (see Figure 4). The photographic element is exposed to three independently modulated sources each emitting radiation at a wavelength corresponding to the wavelength of maximum sensitivity of a respective imaging medium (see page 5, last paragraph and Figure 3 in conjunction with Figure 4). The exposures are conducted in raster fashion ("scanning"; see page 9, second paragraph) over a number of intensity levels (see page 5, third paragraph).

However, when comparing the sensitivities at the wavelength of the maximum spectral sensitivity of the three media within the range 550 to 900 nm, it appears that the sensitivities of the two media of shortest wavelength are substantially equal, and that the sensitivity then decreases for the medium having its maximum spectral sensitivity at the longest wavelength. Admittedly, a small decrease towards longer wavelengths of the sensitivities of the two media which have their maximum spectral sensitivity at the shorter wavelengths could be discerned from a careful measuring of the curves. Figure 4 however is a schematical representation only, and there is no indication in the document that the figure was intended to show anything more than the general outline of the sensitivity curves.

Accordingly, the subject-matter of the independent process claims is distinguished first from the process disclosed in D1 in that the sensitivities at the wavelength of maximum spectral sensitivity also decreases from the medium of shortest wavelength maximum spectral sensitivity to the medium of intermediate wavelength maximum spectral sensitivity, with the difference between the media of shortest and longest wavelength maximum spectral sensitivity being greater than 1 log exposure unit (hereafter distinguishing feature (i)).

Furthermore, document D1 with respect of the emission intensities of the sources used for recording an image, in substance only states that they correspond to the amplitude of the respective image signals (see page 5, third paragraph). In contrast, the present process claims require that the maximum emission intensities of the sources, at the wavelength of their maximum output, increase from the source of shortest wavelength to longest wavelength by an amount corresponding to the sensitivity difference of the imaging media (hereinafter distinguishing feature (ii)).

Finally the exposures in the claimed process are conducted over a number of "discrete" intensity levels, whilst document D1 merely refers to modulation of the intensity in accordance with the levels of the three primary colour components of the colour image to be recorded, without specifying whether these levels are discrete or continuous (hereinafter distinguishing feature (iii)).

2.2.3 The technical problem solved by feature (i), as submitted by the proprietor appellant, is to improve the quality of colour reproduction by minimising cross-talk (i.e. increasing colour separation) between adjacent imaging layers. This technical effect is not explicitly identified in the description of the present patent, but an explanation of the effect on colour separation of the claimed decrease in the sensitivity peaks of the respective media is given in document D18 as cited in the description (see D18, page 4, lines 11 to 17).

The technical problem solved by feature (ii) is not indicated either in the present description. However, setting the maximum emission intensities of the sources in inverse correspondence to the maximum sensitivities of the respective media clearly allows for each imaging media being exposed so as to achieve maximum colour density, whereby adequately balanced black image portions can be obtained.

Finally, distinguishing feature (iii) allows for the exposures being electronically controlled using digital data-processing means.

Thus, the three distinguishing features identified in the subject-matter of the process claims address independent technical problems. Since they do not cooperate with each other in such a way as to achieve any additional or synergetic effect, their respective contributions to inventive step can be assessed independently.

- 2.2.4 Achieving good colour separation between respective imaging layers is a very common concern in the photographic and reprographic technologies. A main, well known, cause for excessive cross-talk between imaging layers in conventional colour photographic materials is constituted by the intrinsic blue sensitivity of the red and green sensitive emulsions. A number of documents on the file provide evidence not only that the skilled person was well aware of this blue sensitivity problem, but also that substantially

increasing the sensitivity of the blue sensitive layer was a known means of achieving better colour separation (see for instance the prior art discussion in document D4, column 8, lines 22 to 69: "a silver halide having a large-size silver halide particles is used as the blue-sensitivity emulsion to thereby make a large difference between the blue-sensitivity of the blue-sensitive emulsion and the blue-sensitivities of the red-sensitive and green-sensitive emulsions"; document D7, last paragraph of the translation: "sensitivity of a blue-sensitive layer of a colour paper is designed at remarkably higher level than intrinsic sensitivity (blue sensitivity) of a green-sensitive and a red-sensitive layers so that it is unnecessary to provide a yellow filter for cutting the intrinsic sensitivity of the green and red-sensitive emulsion layers"; document D12, the paragraph bridging pages 391 and 392: "still higher blue speed is needed to provide an adequate speed separation between the blue-sensitive layer and the blue sensitivity of the other layers" and "with this speed relationship, the low intensity of blue light required to give an adequate yellow density in a print causes little or no exposure in the magenta and cyan layers").

The imaging process of document D1 admittedly is of the "false-colour" type and, accordingly, the layers capable of forming the yellow, magenta and cyan images are respectively sensitive to green, red and infrared radiation instead of being sensitive to blue, green and red radiation, respectively, like in the above citations. However, the skilled person striving at

improving colour separation in the process of document D1 would easily recognise that the well-known technique consisting in increasing the sensitivity differences, in particular by substantially increasing the maximum sensitivity of the medium of shortest wavelength sensitivity (blue sensitivity), is of general applicability and that it would induce the same effect in terms of improved colour separation when employed in the false-colour scheme of document D1.

Increasing the green sensitivity of the green sensitive layer of document D1, which is the medium of shortest wavelength maximum spectral sensitivity, however, immediately leads to the sensitivity of the three media decreasing in the order set out in the present independent process claims.

Since furthermore, the above mentioned citations clearly show that the degree of colour separation between respective media directly depends on the difference of the sensitivities of the respective spectral maxima, the skilled person would as a matter of course aim at achieving the maximum, practicable sensitivity increase for the green-sensitive layer of document D1. Selecting, for the difference in the sensitivities between the media of shortest and longest wavelength maximum spectral sensitivity, a value above the arbitrary limit of 1 log exposure unit, to which the proprietor appellant himself did not ascribe any particular or surprising advantage, would not in the Board's view exceed the normal capability of the skilled person either.

Therefore, distinctive feature (i) cannot be considered to provide any positive contribution for the recognition of inventive step in the claimed process.

2.2.5 In the process of document D1, exposure is controlled via the modulation of the intensity of the radiation emitted by the respective sources, in such a way that maximum intensity of a given radiation causes maximum colour density in the corresponding imaging media (see page 5, second paragraph). Obtaining adequately balanced black image portions obviously requires that maximum colour density be achieved in **each** of the superposed yellow, magenta and cyan layers. In view of the differences in the sensitivities of the sensitivity peaks of the respective media, such maximum colour density in each media can only be obtained by operating all the radiation sources at their maximum intensities, and with the maximum intensities differing from each other in inverted relation to the sensitivity differences of the layers.

Distinguishing feature (ii) therefore in the Board's view merely defines an obvious requirement which the skilled person would meet by way of necessity when performing the process of document D1.

2.2.6 Distinguishing feature (iii) in the Board's opinion immediately results from the obvious desire to perform the process of document D1 using digital data-processing means for controlling the intensity-modulated radiation sources. Intensity levels representative of respective digital, and accordingly "discrete", data cannot but be discrete themselves.

2.2.7 For the above reasons, the subject-matter of independent process claim 3 of the main, first auxiliary and second auxiliary requests and of process claim 1 of the third auxiliary request does not involve an inventive step in the sense of Article 56 EPC.

3. *Proprietor appellant's fourth auxiliary request*

Claim 1 of the fourth auxiliary request comprises the additional limitation that each imaging medium has a sensitivity at the wavelengths of maximum spectral sensitivity of the other imaging media which is not significant.

Avoiding significant sensitivity of each imaging medium at the wavelength of maximum spectral sensitivity of the other imaging media is a most common prerequisite of adequate colour separation between the media. Otherwise, the radiation intended for forming an image in one media would necessarily cause significant image formation also in the others.

This obvious prerequisite cannot confer inventive step to the claimed process either.

4. For the above reasons, the independent process claims in accordance with any of the proprietor appellant's main and auxiliary requests do not meet the requirement of the Convention, and the patent therefore must be revoked.
  
5. The question of the patentability of the subject-matter of the independent product claims of the proprietor appellant's main, first auxiliary and secondary auxiliary requests has also given rise to considerable discussion at the oral proceedings. For the sake of completion, the Board wishes to make the following comments.
  - 5.1 Claim 1 of the main request is directed to a light sensitive photographic element for producing a continuous tone colour image. Example 1 of the description of the attacked patent describes a specific embodiment of such element (see page 6, line 55 to page 9, line 7).

The same specific embodiment is disclosed in document D18 (see page 12, Example 3 in conjunction with pages 10 and 11, Example 2).

Since document D18 constitutes the publication of a patent application filed by the same applicant earlier than his filing of the patent application from which the present patent claims the priority (see point 2.1 above), said priority application was not the first application for the same invention in the sense of

Article 87 EPC. Therefore, claim 1 of the main request does not validly benefit from the claimed priority, and document D18, published earlier than the filing date of the present patent, belongs to the state of the art under Article 54(2) EPC.

The subject-matter of claim 1 of the main request therefore lacks novelty in view of the contents of document D18.

- 5.2 Claim 1 of the first auxiliary request corresponds to the claim 1 of the main request with a disclaimer disclaiming the specific example as disclosed both in document D18 and in the present patent.

The disclaiming of one specific example does not however in substance change the character of the invention set out in claim 1 of the first auxiliary request. The claimed invention still encompasses a photographic element comprising the three imaging media with the differential sensitivities set out in detail in the claim. Such photographic element had already been disclosed in the earlier application corresponding to D18, both in the specific embodiment of Example 3 and, in more general terms, in independent claim 31.

Accordingly, claim 1 of the first auxiliary request does not validly benefit from the claimed priority either, and its subject-matter lacks novelty in view of document D18, accordingly.

- 5.3 Claim 1 of the second auxiliary request corresponds to

claim 1 of the first auxiliary request, with the additional limitation that each imaging medium is of the silver dye bleach type or of the dye diffusion transfer type.

The imaging media of document D18 also are either of the silver dye bleach type or of the dye diffusion transfer type (see page 4, lines 31 to 33).

The subject-matter of claim 1 of the second auxiliary request therefore also lacks novelty in the sense of Article 54 EPC in view of the contents of document D18, for the reasons set out in paragraphs 5.1 and 5.2 above.

## **Order**

### **For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The European patent No. 0 242 185 is revoked.

The Registrar:      The Chairman:

P. Martorana      E. Turrini