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**D E C I S I O N**  
of 8 May 2003

**Case Number:** T 1095/99 - 3.3.6

**Application Number:** 94401217.8

**Publication Number:** 0627660

**IPC:** G03C 1/498

**Language of the proceedings:** EN

**Title of invention:**  
Infrared sensitized, photothermographic article

**Patentee:**  
EASTMAN KODAK COMPANY

**Opponent:**  
Fuji Photo Film Co., Ltd.

**Headword:**  
Grain size/EASTMAN

**Relevant legal provisions:**  
EPC Art. 54(1), 56

**Keyword:**  
"Novelty (yes) - implicit disclosure not proven"  
"Inventive step (yes) - ex post facto analysis inadmissible"

**Decisions cited:**  
T 0939/92, G 0001/92

**Catchword:**  
-



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Boards of Appeal

Chambres de recours

Case Number: T 1095/99 - 3.3.6

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.6  
of 8 May 2003

**Appellant:**  
(Opponent)

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**Decision under appeal:**

Interlocutory decision of the Opposition Division  
of the European Patent Office posted 2 November  
1999 concerning maintenance of European patent  
No. 0 627 660 in amended form.

**Composition of the Board:**

**Chairman:** L. Li Voti  
**Members:** G. N. C. Rath  
C. Holtz

## Summary of Facts and Submissions

I. This appeal is against the interlocutory decision of the Opposition Division concerning maintenance of European patent No. 0 627 660 in amended form, said patent relating to an infrared sensitized, photothermographic article.

II. The patent as amended contained a set of 10 claims of which independent claims 1 and 9 read as follows:

"1. An infrared sensitized photothermographic silver halide element comprising a support layer having on at least one surface thereof a photothermographic composition comprising a binder, a light insensitive silver source, a reducing agent for silver ion and infrared radiation sensitive preformed silver halide grains having number average particle size of  $\leq 0.088 \mu\text{m}$  with at least 80% of all grains with  $\pm 0.05 \mu\text{m}$  of the average, in combination with an antihalation layer having an absorbance ratio of IR absorbance (before exposure)/visible absorbance (after processing)  $> 30$ , and an IR absorbance of at least 0.3 within the range of 750-1400 and an optical density of less than 0.03 in the visible region."

"9. A process for the exposure of an ultraviolet radiation sensitive imageable medium comprising the steps of:

- a) exposing the element of claim 1 to infrared radiation to which said silver halide grains are sensitive to generate a latent image,
- b) heating said element after exposure to develop said latent image to a visible image,
- c) positioning the element with a visible image thereon between an ultraviolet radiation energy source and a ultraviolet radiation photosensitive imageable medium,

and

d) exposing said imageable medium to ultraviolet radiation through said visible image, absorbing ultraviolet radiation in the areas where there is a visible image and transmitting ultraviolet radiation where there is no visible image."

Claim 1 differed from Claim 1 as granted only insofar as the number average particle size of the silver halide grains is required to be  $\leq 0.088 \mu\text{m}$  instead of lower than  $0.10 \mu\text{m}$ .

The dependent claims can be summarized as follows:

Dependent claim 2 was directed to supersensitizers, dependent claim 3 to the antihalation layer. Dependent claims 4 to 6 concerned the particle size, dependent claim 7 the optical density, dependent claim 8 a transparent organic polymeric layer. Dependent claim 10 concerned the infrared laser.

III. The notice of opposition was based on lack of novelty and inventive step (Articles 100(a), 54, 56 EPC). The opposition was based, *inter alia*, on the following documents:

- (1) English translation of JP-A-4 182 640 and the Japanese document,
- (2) English translation of "Preparation of Photosensitive Silver Halide Grains in Organic Solvents" by K. Kagami, 17th Symposium on Investigations of Heat Developable Salt-Containing Recording Systems, 29 May 1987,
- (6) US-A 4 725 534,

- (7) T. H. James, "The Theory of the Photographic Process", 4th edn., 1977, 584-585.

A third party filed, *inter alia*, the following documents under Article 115 EPC:

- (10) Donald H. Klosterboer, "Thermally Processed Silver Systems", "Imaging Processed Materials", Neblett's 8th edn., 1989, Chapter 9, 279-291,

- (12) GB-A-1 565 593 and

- (13) Declaration by Hans Strijkers, 16 February 1999.

IV. In its decision the Opposition Division held that the subject-matter as defined in the set of 10 Claims submitted as the main request (claims as granted) was novel but did not involve an inventive step (Articles 52(1) and 56 EPC). The Opposition Division found however that the subject-matter of claims 1 to 10 as amended according to the first auxiliary request met the requirements of the EPC.

V. The appellant (opponent) lodged an appeal against this decision; its arguments are summarized as follows:

V.1 Example 1 of document (1) describes a silver halide grain which inherently has a number average particle size of  $\leq 0.88 \mu\text{m}$ . This is corroborated by the teaching of documents (2) and (6) which are not relied upon as prior art teaching but as evidence of what the skilled person would immediately have understood from document (1) itself. According to document (6) the particle size of the photosensitive silver halide particles depends on the amount of the particle size-controlling agent (column 8, lines 24 to 26), which may be sodium bromide. Hence sodium bromide, used in example 1 of document (1), acts as a particle size-controlling

agent. The amount of the grain size-controlling agent has a strong influence on the grain size distribution (document (2), page 10, lines 4 to 6 and figure 4). Taking into account the amount of sodium bromide specified in example 1 of document (1) and using the graph of figure 4 of document (2), the grain size of the resulting silver halide particles, as proven by the calculation submitted in the notice of opposition (page 5, paragraph 7), meets the size requirements defined in Claim 1. Further, according to document (2) such an amount of sodium bromide does not impair the grain size distribution (page 10, lines 4 to 6), which would implicitly be understood by a skilled person as being a hint to a narrow distribution.

Irrespective of whether or not particular reasons can be identified for analysing the composition, a chemical product is state of the art when available as such to the public (G 1/92).

V.2 The properties of the claimed material are not surprising since document (7) teaches that a small size of preformed silver halide grains leads to a low haze (page 584, figure 20.11) and document (10) that 0.01  $\mu\text{m}$  size grains lead to a very high speed, a low contrast and a low maximum optical density (page 282, right-hand column, item 3).

As regards the dyes used in the antihalation layer the visible absorbance ratio of 30:1, as required by Claim 1 of the patent in suit, is not achieved by several dyes of the patent in suit. This would not be in conformity with T 939/92.

According to the declaration by Hans Strijkers (see document (13)) the dyes disclosed by document (9) satisfy the requirements of the visible absorbance of 30 : 1 as defined in Claim 1. Such dyes are also used

in the photosensitive members according to document (1) and thus the skilled person would necessarily arrive at the subject-matter of Claim 1 of the patent in suit.

Further, taking into account the teaching of documents (7) and (10), the combination of the teaching of documents (9) and (12) leads also to the claimed invention.

The appellant concluded that the subject-matter of claim 1 was lacking an inventive step.

- VI. The respondent (proprietor) refuted the arguments of the appellant, *inter alia*, as follows:

Under EPO practice, it is not allowed to combine documents for an objection against novelty. The teaching of documents (2) and (6) in combination with the disclosure of document (1) is not apt to prove lack of novelty of the claimed subject-matter.

The properties obtained by the photothermographic silver halide elements according to the patent in suit have been convincingly shown in the examples of the patent in suit and are sufficient to substantiate inventive step.

- VII. The appellant requested that the decision under appeal be set aside and the patent be revoked.

The respondent requested that the appeal be dismissed.

- VIII. Oral proceedings scheduled for 8 May 2003 were cancelled since the appellant withdrew its request for oral proceedings under cover of its letter dated 18 March 2003 and the respondent had not requested such proceedings.

## Reasons for the Decision

### 1. Novelty

#### 1.1 Claim 1

1.1.1 Claim 1 relates to an infrared sensitized photothermographic silver halide element comprising a support layer having, *inter alia*, infrared radiation sensitive preformed silver halide grains having number average particle size of  $\leq 0.088 \mu\text{m}$  with at least 80% of all grains with  $\pm 0.05 \mu\text{m}$  of the average, in combination with an antihalation layer having an absorbance ratio of IR absorbance (before exposure)/visible absorbance (after processing)  $> 30$ , and an IR absorbance of at least 0.3 within the range of 750-1400 nm and an optical density of less than 0.03 in the visible region.

1.1.2 The appellant cited documents (2) and (6) as evidence that a grain size falling within the claimed range would automatically be obtained in the photothermographic silver halide element of example 1 of document (1). Relying on G 1/92, its arguments were based on an inherent disclosure of the particle size of  $\leq 0.088 \mu\text{m}$  with at least 80% of all grains within  $\pm 0.05 \mu\text{m}$ .

1.1.3 "The chemical composition of a product is state of the art when the product as such is available to the public and can be analysed and reproduced by the skilled person, irrespective of whether particular reasons can be identified for analysing the composition" (G 1/92, OJ EPO 1993, 277, Conclusion 1). "Where it is possible for the skilled person to discover the composition or the internal structure of the product and to reproduce



it without undue burden, then both the product and its composition or internal structure become state of the art." (G 1/92, reasons, 1.4, last sentence).

Document (1) disclosed the use of 0.4 g of silver bromide solid (example 1, page 16, last line) which is a solid of silver bromide-polyvinylbutyral containing stearic acid, i.e. the silver halide and the organic silver salt (silver stearate) are separately formed or "preformed" in a binder ("ex-situ" formation). This mode of processing was identical to that one of the patent in suit (page 8, lines 35 and 36). As regards the feature "preformed" the Board thus does not see any difference between the products according to document (1) and those according to Claim 1.

Since the grain size was not explicitly disclosed by document (1) the appellant referred to documents (6) and (2). Document (6) taught that "the particle size of the photosensitive silver halide particle depends on the amount of the particle size-controlling agent..." (column 8, lines 24 to 26). Document (2) described the grain size control of silver bromide grains in chapter 5.

*"When a silver salt of fatty acid (document (1): silver stearate) is reacted with NBS (document (1): N-bromosuccinimide) in the presence of a catalytic amount of cations, the grain size of the resulting silver halide grains decreases in proportion to the amount of the cations used"* (document (2), page 9, lines 17 to 20).

According to a calculation based on example 1 of document (1) made by the appellant during the opposition procedure in its letter dated 11 September 1997 (table on page 5), the catalytic amount of sodium

cations was 0.22 mol% which according to an extrapolation on the graph of figure 4 of document (2) (page 10) led to a grain size of ca. 0.08  $\mu\text{m}$ .

However it was known that "the physical properties (such as particle form and particle size) of the photosensitive silver halide produced...may be controlled by a conventional controlling technique by varying the addition rate of the halogenating agent, aging time, temperature and stirring speed." (document 6, column 8, lines 8 to 13). The Board finds that in absence of any proof showing that the controlling technique was the same in documents (1) and (2), no reliable conclusion on the size of the halide grains and their distribution obtained according to the technique according to document (1) can be drawn since deliberate choices such as the addition rate of the halogenating agent or aging time or temperature had to be made and these choices influence the characteristics of the infrared sensitized photothermographic silver halide element. Since the specific measures have not been made available to the public, the Board concludes that neither the product nor its composition or its structure were made available to the public before the priority date of the patent in suit. Hence decision G 1/92, cited by the appellant, is not applicable to the present case.

It follows that claim 1 meets the requirements of Articles 52(1) and 54(1) EPC.

#### 1.2 Claim 9

Claim 9 concerns the process for the exposure of an ultraviolet radiation sensitive imageable medium comprising, *inter alia*, the steps of:

- (a) exposing the element of claim 1 to infrared radiation to which said silver halide grains are sensitive to generate a latent image,
- (b) heating said element after exposure to develop said latent image to a visible image.

Since the process comprises the exposure of the element of Claim 1, which is novel, the process of Claim 9 is also novel.

It follows that Claim 9 meets the requirements of Articles 52(1) and 54(1) EPC.

2. *Inventive step*

2.1 Claim 1 relates to an infrared sensitized photothermographic silver halide element comprising a support layer having on at least one surface thereof a photothermographic composition comprising a binder, a light insensitive silver source, a reducing agent for silver ion and infrared radiation sensitive preformed silver halide grains having number average particle size of  $\leq 0.088 \mu\text{m}$  with at least 80% of all grains with  $\pm 0.05 \mu\text{m}$  of the average, in combination with an antihalation layer having an absorbance ratio of IR absorbance (before exposure/visible absorbance (after processing)  $> 30$ , and an IR absorbance of at least 0.3 within the range of 750-1400 nm and an optical density of less than 0.03 in the visible region.

2.2 The patent in suit addressed the problem of enhancing the infrared sensitivity of a photothermographic article. The objective was to obtain high speed, high  $D_{\text{max}}$ , high efficiency, low  $D_{\text{min}}$  and low haze material as well as excellent image sharpness (page 3, lines 28 to 35).

The objective of document (1) relating to a dry process silver salt photosensitive member was to provide a photosensitive member having, *inter alia*, a halation preventing effect caused by the absorption effect of indolenine-based pigment, high sensitivity in the infrared region and distinguished sharpness (page 5, lines 14 to 20).

2.3 The Opposition Division took document (1) as the starting point for evaluating inventive step. The Board does not see any reason to deviate from this starting point since sharpness and sensitivity were common goals of both the patent in suit and document (1).

2.4 Hence, the problem underlying the patent in suit can be defined as the provision of an infrared photothermographic element having high  $D_{max}$ , high efficiency, low  $D_{min}$ , high contrast and low haze material.

2.4.1 With respect to the dye S-1 used in examples 1 and 2 the appellant objected that the requirements of Claim 1 were not met, or, in other words, that the problem defined under point 2.4 was not solved. The patent in suit stated that the dye S-1 failed to achieve the IR/visible absorbance ratio of 30:1 (page 14, line 26). The appellant argued further that no substantial difference may be acknowledged between a silver halide photographic material using silver halide grains of 0.1  $\mu m$  size or of 0.088  $\mu m$  size (letter of 2 March 2000, page 4, last paragraph).

The Board does not agree. Apart from the haze values, table 1 displayed, *inter alia*, values for  $D_{max}$  and contrast which the appellant did not take into consideration. Further, the appellant ignored that

examples 1 to 3 were run as preliminary tests, in particular to determine the preformed silver halid grain size limits. The coated materials according to these examples served for preparing the photothermographic silver halide elements according to Claim 1. In examples 1 and 2 dye-S 1 was not used for the purpose of anti-halation but for the purpose of infra-red-sensitization. This results from the amount used, namely  $0.34 \text{ mg/m}^2$  (appellant's letter of 1 September 2000, page 6, lines 16 to 17) which is below the minimum generally required of  $5 \text{ mg/m}^2$  (patent in suit, page 7, lines 7 to 8).

The conclusion drawn from these preliminary tests in the patent in suit was that the  $0.1 \text{ }\mu\text{m}$  grain size was unacceptable for the types of application according to the patent in suit whereas  $0.088 \text{ }\mu\text{m}$  may be marginally acceptable (page 13, lines 46 to 47). Hence, the grain size of  $0.1 \text{ }\mu\text{m}$  has been excluded and grains having a size of  $\leq 0.088 \text{ }\mu\text{m}$  qualified as acceptable candidates for running the experiments falling under the scope of Claim 1.

Therefore the grain size is relevant in respect of the technical problem to be solved.

- 2.4.2 With reference to T 939/92 the appellant objected that not all the photothermographic compositions covered by Claim 1 achieved the technical effects as defined under point 2.4. The appellant was of the opinion that the respondent had to prove the allegedly inventive effect with other dyes than those taken in the invention examples or to restrict its Claim 1 to the exemplified dyes only (letter of 11 April 2001, page 4, lines 2 to 17).

The Board does not agree. The burden of proof is on the appellant. In absence of any proof to the contrary the Board is satisfied that any dye falling within the scope of Claim 1 solves the technical problem as defined under point 2.4

The Board notes that the image quality of the photothermographic element of example 23 had a rating of 3 on a scale from 1 (severe halation) to 10 (no halation). However the quantity of dye used was  $1.8 \text{ mg/m}^2$  (table on page 19) whereas in the patent in suit it was stated that generally the minimum amount required was  $5 \text{ mg/m}^2$  (page 7, lines 7 to 8). Hence, the compositions according to the examples 23 to 25 are considered as a test series analysing the image quality in function of the amount of the antihalation dye. Image quality improved with increasing amounts of the indolenine dye (see examples 24 ( $3.7 \text{ mg/m}^2$ ) and 25 ( $7.5 \text{ mg/m}^2$ ) (ratings of 9 and 10, respectively)) but at the expense of speed reduction (patent in suit, page 18, lines 15 to 16 as well as the results compiled in the table on page 19). The preferences of characteristics are thus dictated by the need in the art.

2.4.3 In absence of any proof to the contrary the data in the table on page 19 and the examples 14 to 22 of the patent in suit show that the technical problem as defined under 2.4 was credibly solved.

2.5 The question which remains to be decided is whether the solution to this technical problem involves an inventive step or not.

2.6 The product according to document (1) differed, *inter alia*, from the subject-matter of Claim 1 in that it does not disclose the grain size of the silver halide used. Document (1) does not suggest any grain size being apt to solve the technical problem as defined under point 2.4.

As regards the grain size, the appellant cited documents (10) and (7) in order to show that these documents gave a hint to select a small grain size.

The Board finds that document (10) describes a model of "in-situ" formed silver halide (page 282, left-hand column, paragraph 2, line 1; page 288, left-hand column, paragraph 1, penultimate line) whereas the patent in suit concerns an "ex-situ" formation. Document (10) does not disclose the grain size distribution.

Further, document (7) is concerned with emulsions which are used in conventional wet processes whereas the patent in suit is concerned with photothermography involving a dry process. In document (7) there is no hint to photothermography.

The Board concludes that the skilled person would not have considered the teaching of document (7) or (10) for selecting preformed silver halide grains (i.e. formed "ex-situ") having a number average particle size of  $\leq 0.088 \mu\text{m}$  with at least 80% of all grains with  $\pm 0.05 \mu\text{m}$  of the average.

The reasoning of the appellant was based on an *ex post facto* analysis which draws on knowledge of the invention, in particular in respect of the grain size and the grain size distribution. An *ex post facto* analysis is however inadmissible.

- 2.7 Without giving a detailed reasoning showing the lack of inventive step over documents (9) and (12) the appellant referred to the arguments submitted by a third party during the opposition procedure (letter of 2 March 2000, page 4, paragraph 4).

Document (9) disclosed a general formula of a dye. Two dyes representing specific embodiments of this general formula have an IR absorbance of 0.3 as demonstrated in document (13).

Document (12) related to acutance dyes in dry silver compositions (page 1, lines 12 to 17).

However, there was no hint in any of these documents to the grain size and the grain size distribution as defined in Claim 1. Therefore these documents cannot lead to the claimed invention.

- 2.8 The same reasoning as set out under points 2.2 to 2.7 applies *mutatis mutandis* to Claim 9 directed to a process comprising, *inter alia*, the exposure of the element of Claim 1 to infrared radiation.

- 2.9 The subject-matter of Claims 1 and 9 involves an inventive step, and, therefore, meets the requirements of Article 56 EPC.

The dependent claims derive their patentability from the respective independent claims.



Order

For these reasons it is decided that:


The appeal is dismissed.

The Registrar:

The Chairman:



G. Rauh



L. Li Voti

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