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D E C I S I O N
of 17 August 2000

Case Number: T 1059/96 - 3.3.6

Application Number: 88102576.1

Publication Number: 0280238

IPC: G03C 7/26

Language of the proceedings: EN

Title of invention:

Silver halide color photographic photosensitive materials

Patentee:

Fuji Photo Film Co., Ltd.

Opponent:

Agfa-Gevaert AG

Headword:

Crystal shape/FUJI

Relevant legal provisions:

EPC Art. 54, 56, 84, 123

Keyword:

"Novelty (main request - yes) - no unambiguous disclosure in the prior art document"

"Inventive step (main request -yes)"

Decisions cited:

T 0793/93

Catchword:

-



Case Number: T 1059/96 - 3.3.6

D E C I S I O N
of the Technical Board of Appeal 3.3.6
of 17 August 2000

Appellant: Agfa-Gevaert AG
(Opponent) -Patentabteilung-
Postfach
D-51368 Leverkusen (DE)

Representative: -

Respondent: Fuji Photo Film Co., Ltd.
(Proprietor of the patent) 210 Nakanuma
Minamiashigara-shi
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Representative: Grünecker, Kinkeldey,
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Decision under appeal: Interlocutory decision of the Opposition Division
of the European Patent Office posted 25 October
1996 concerning maintenance of European patent
No. 0 280 238 in amended form.

Composition of the Board:

Chairman: P. Krasa
Members: G. N. C. Raths
B. J. Schachenmann

Summary of Facts and Submissions

I. This appeal is from the Opposition Division's decision maintaining European patent No. 0 280 238 in amended form. The patent had been granted in respect to the European patent application No. 88 102 576.1, filed on 22 February 1988 and claiming the priorities of 23 February 1987 (JP 39825/87) and of 26 June 1987 (JP 158948/87). In a notice of opposition, based on lack of novelty and inventive step, the following documents had been submitted, inter alia,

(1) EP-A-0 276 319 (cover sheet and Claims)

(3) US-A-4 201 589

(8) "The Journal of Photographic Science", vol. 27, 1979, 47-53

II. Claim 1 of the patent as maintained by the Opposition Division reads:

"A silver halide color photographic photosensitive material comprising on a support at least one silver halide photographic emulsion layer comprising an emulsified dispersion of fine lipophilic particles comprising at least one type of oil-soluble coupler which is nondiffusible and which forms a dye by coupling with the oxidized form of a primary aromatic amine color developing agent and at least one type of high boiling point organic solvent, said emulsified dispersion of fine lipophilic particles comprises a dispersion obtained by emulsifying and dispersing a mixed solution which comprises at least one type of

coupler and at least one type of high boiling point organic solvent as mentioned above, and at least one type of homopolymer or copolymer which is water-insoluble and soluble in an organic solvent and which comprises at least one type of repeating unit which does not have acid groups on the main chain or on a side chain wherein the ratio of the high boiling point organic solvent to the polymer is from 0.02/1 to 100/1 by weight, and the silver halide emulsion of said silver halide emulsion layer comprises a monodispersed silver chloride, silver chlorobromide or silver bromide emulsion containing not more than 3 mol% of silver iodide and having a cubic or tetradecahedral crystal shape, the (100) plane of which has, in the main, been enclosed."

III. In its decision the Opposition Division found that the subject-matter of the Claims as maintained was novel in view of document (1), since cubic or tetradecahedral grains were not disclosed by document (1); it, further, found that the subject-matter of the claims as maintained were inventive in view of documents (2) and (3) because the objects of these documents were different from that of the patent in suit.

IV. The Appellant (Opponent) argued in essence with respect to novelty that document (1) disclosed that silver halide grains may have any structure having a various ratio of a [100] plane to [111] plane which was synonymous for cubic and tetradecahedral crystals and it concluded that therefore the subject-matter of Claim 1 was not novel.

It argued with respect to inventive step

- that the wording "comprises a monodispersed silver chloride" in Claim 1 did not exclude emulsions containing silver halide having a large grain size distribution so that not only colour photographic photosensitive materials containing silver halogenide with a narrow grain size distribution were claimed;
- that this was confirmed by the examples of the patent in suit which showed mixtures of emulsions so that not only monodispersed emulsions having narrow grain size distributions were obtained;
- that silver chloride and silver bromide crystallized according to the sodium chloride crystal structure and displayed, therefore, a cubic grain shape;
- that light and dark fastness were properties of a product containing no silver halogenide at all since the latter, which should have the specific crystal shape as defined in Claim 1 of the patent in suit, had been washed out;
- that comparative tests, submitted with Appellant's letter dated 28 July 1997, showed no difference in effects between emulsions having cubic crystal shape and those having octahedral crystal shape in so far as storage properties and colour stability were concerned;
- and that any improvement of the storage properties, if present at all, was due to the presence of a polymer in the emulsion and not to a particular crystal shape.

The Appellant concluded that the subject-matter of all the claims did not involve an inventive step.

- V. The Respondent (Patent Proprietor) argued in essence with respect to novelty that document (1) did not describe silver halogenide grains of cubic or tetradecahedral shape; in particular, that it could not be concluded that the grains of the silver chlorobromide used in Examples 1 to 3 and 5 of document (1) had in fact cubic crystal shape.

The Respondent concluded that the subject-matter of Claim 1 was novel.

It argued with respect to inventive step

- that the objects of documents (2) and (3) were different from the object of the patent in suit;
- that invention sample 101 (cubic habit) and comparison sample 104 (octahedral habit), both of the patent in suit, proved that cubic grain emulsions have a large impact on the overall performance of the photographic material;
- that, when octahedral grain emulsions were used, storage under forced conditions resulted in a relatively higher loss in sensitivity as compared to cubic grain emulsions;
- that according to comparison samples 102 and 105 of the patent in suit the addition of a polymer to the coupler emulsion reduced the loss of sensitivity for both cubic and octahedral types of emulsion which results did not contradict the

Respondent's finding that the silver halide grain shape was important in respect to the storage properties of the photographic material.

The Respondent concluded that the requirements of Article 56 EPC were fulfilled by the claimed invention.

In response to the comparative test results submitted by the Appellant with the letter of 28 July 1997, the Respondent filed with the letter of 16 December 1997

- (9) *F.H. Claes et al.*, "Crystal Habit Modification of AgCl by Impurities Determining the Solvation", *The Journal of Photographic Science*, vol. 21, 1973, 39-50

and

- (10) *D. Wyrsh*, "Sulfur sensitization of monosized silver chloride emulsions with (111), (110) and (100) crystal habit (FC-4)", *Papers from the 1978 International Congress of Photographic Science*, Rochester Institute of Technology, Rochester, N.Y., U.S.A., August 20-26, 1978, 122-4

to prove that methods were known for producing photographic emulsions containing silver chloride or silver halide having a high content of silver chloride exhibiting an octahedral crystal habit.

VI. Oral proceedings took place on 17 August 2000.

VII. The Appellant requested that the decision under appeal be set aside and that the European patent No. 0 280 238 be revoked.

The Respondent requested that the appeal be dismissed and that the patent be maintained as maintained by the Opposition Division (main request) or according to one of the auxiliary requests 1 and 2 filed on 3 September 1996.

VIII. At the end of the oral proceedings the Chairman announced the Board's decision.

Reasons for the Decision

Main request

1. *Amendments (Articles 84 and 123 EPC)*

1.1 The Board is satisfied that Claim 1 meets the requirements of Article 84 EPC. Since no objections were raised in this respect, no detailed discussion is necessary.

1.2 Claim 1 differs from Claim 1 as originally filed in that the term "said silver halide emulsion comprises" was replaced by "the silver halide emulsion of said silver halide emulsion layer comprises" and the passage "and having a cubic or tetradecahedral crystal shape" was inserted before the passage "the (100) plane of which has, in the main, been enclosed".

The above mentioned replacement is an editorial amendment under Rule 88 EPC. Since this was not contested, it is not necessary to give further arguments.

The passage relating to the cubic and tetradecahedral

crystal habit finds its support in the description of the application as filed (page 142, lines 11 to 15).

The expression "in the main" in the passage "the (100) plane of which has, in the main, been enclosed" refers to a property of the crystal shape and means, in the Board's judgement, that such shape is referred to for which the size of the surface of the (100) planes prevails over the size of the surface of the (111) planes, the grains of silver halogenide having thus a form mainly confined by the (100) plane. During oral proceedings, this was confirmed by the Respondent.

1.3 Claim 1 as amended does not extend its protection conferred by the patent. Since no objections have been raised in this respect, no further reasons have to be given.

1.4 Consequently, the Board finds that Claim 1 meets the requirements of Articles 84 and 123 EPC as do dependent Claims 2 to 21 against which no objections were raised by the Appellant in this respect.

2. *Novelty*

2.1 Article 54(3) EPC

Document (1) is a European patent application which was published 3 August 1988, i.e. after the priority dates of the patent in suit, but has the earlier priority date of 10 July 1986 and is, therefore, state of the art according to Article 54(3) EPC.

According to this citation "silver halide grains may have a regular crystal structure or an irregular

crystal structure, such as a spherical structure, a tabular structure, a twin structure etc..

Further, any crystal structure having a various ratio of a [100] plane to a [111] plane may be employed" (page 123, second paragraph).

To interpret the said passage of document (1), the Appellant referred to document (8): "The transition point between cubic and octahedral forms is defined as that tetradecahedron which has equal surface areas of (200) and (111) faces" (abstract, lines 2 to 4)." It inferred therefrom that, hence, the second sentence in the above quotation from document (1) (starting with "Further,...) is a synonym for the passage of Claim 1 reading "silver halogenide emulsions having a cubic or tetradecahedral crystal shape, the (100) plane of which has, in the main, been enclosed".

Further, it referred to example 1 of document (1) in which a silver chlorobromide photographic emulsion (98 mole% silver chloride) was used (page 139, lines 13 to 15). It argued that the silver chlorobromide crystal had a cubic habit since according to document (10) "the precipitation of silver chloride microcrystals in gelatin solution yields normally cubic grain habits" (introduction, lines 1 and 2). The influence of the 2 mole% of bromide of the emulsion according to example 1 would be so small that the resulting crystal habit was still cubic.

The Board disagrees with the Appellant's reasoning. In document (1), the passage "Any crystal structure having a various ratio of a [100] plane to a [111] plane" is a formulation which allows for all possible crystal

shapes having (100) planes and (111) planes at specific ratios. This statement, in fact, only means that (100) planes and/or (111) planes may be present; the formulation does not contain any restriction in this respect.

Taking further into account the fact that no other crystal structures are conceivable than regular or irregular ones, the whole passage on page 123 of document (1) referred to by the Appellant boils down to the information that silver halide grains of any shape can be used.

According to Claim 1 of the patent in suit, however, either the cubic crystal shape, i.e. the (100) plane only, or the tetradecahedral crystal shape in which the (100) planes prevail in terms of size are present, but the octahedral shape and those tetradecahedral shapes in which the size of the (111) planes is greater than that of the (100) planes are excluded.

In respect of the Appellant's allegation that the silver chlorobromide grains according to example 1 of document (1) were, by necessity, of cubic shape only the Respondent pointed to the lack of information regarding the details of the preparation method of crystals according to said example 1; in support of its argument, it referred to document (10). This document shows that applying the proper precipitation conditions the three grain habits, cubic, octahedral and rhombododecahedral, can be obtained (in the presence of Cd^{2+} ion and ammonia; right-hand column, 2nd paragraph of the introduction). Under these circumstances, the Board finds that it was not proved beyond all reasonable doubt that silver chlorobromide grains

displaying a cubic shape only were the inevitable outcome of example 1 of document (1) (see T 0793/93, point 2.1 of the Reasons for the Decision).

In the absence of further respective evidence and as the burden of proof for this issue lies with the Appellant (opponent), the Board concludes that the subject-matter of Claim 1 is not anticipated by document (1).

2.2 Article 54(1), (2) EPC

The Board is satisfied that the subject-matter of Claim 1 is novel in view of documents (2) and (3) since in both documents the feature relating to the crystal shape of the silver halogenide is missing.

Since this has not been contested, no further reasoning is necessary.

3. *Inventive step*

3.1 Claim 1 concerns a silver halide colour photographic photosensitive material comprising, *inter alia*, a silver halide emulsion layer comprising in turn silver halogenide "having a cubic or tetradecahedral crystal shape, the (100) plane of which has, in the main, been enclosed."

3.2 The technical problem as stated in the patent in suit was to provide silver halide colour photographic photosensitive materials having improved light fastness and dark fastness and, more precisely, which can form colour images exhibiting excellent storage properties, even under conditions of high temperature and high

humidity, a good balance between yellow, magenta and cyan colour fading, a dye image having good colour image storage properties without reduction of the photographic sensitivity (patent in suit, page 4, lines 1 to 18).

3.3 The Board takes document (3) as the starting point for evaluating inventive step, as did the Appellant. The tables of examples 5 and 14 to 17 of this citation display values for light fastness and dark fastness of silver halide photo-sensitive materials at specific temperatures and humidity which demonstrate that the problem relating to light and dark fastness was already solved.

3.4 In the light of the state of the art disclosed in document (3) the technical problem underlying the patent in suit can, therefore, be reformulated as the provision of a silver halide colour photographic photosensitive material having a good colour stability or, in other words, the colour reproduction should not deteriorate even on long storage so that a good balance between yellow, magenta and cyan colour fading is maintained.

3.5 First, it has to be decided whether this technical problem was solved.

3.6 The tables of the examples in the patent in suit display, inter alia, relative sensitivity results once immediately after coating and once after 21 days under specific conditions as well as colour image fastness results after 6 and 10 days under specific conditions.

A direct comparison between the results of document (3)

and those of the patent in suit is not possible since the testing conditions for measuring the colour image fastness are not the same.

- 3.7 By its letter of 28 July 1997 the Appellant had filed test results comparing the performance (in terms of relative sensitivity and colour stability) of the emulsions having cubic crystal shape with those having octahedral crystal shape.

The Respondent compared the difference in green sensitivity (green being the colour to which the eye is especially sensitive) in the Appellant's aging test and arranged the test results in their order of sensitivity difference. The lower the value, the better the storage stability.

The biggest amplitude in sensitivity difference among red, green and blue calculated by the Respondent was 79 in case of the material according to the patent in suit (i.e. the material complying with the two requirements of a cubic crystal shape of silver halide grains and the presence of a water-soluble polymer). The results of the samples which did not comply with both requirements were higher: thus, the difference was 112 i.e. higher when the polymer was omitted, it was 162 in case of an octahedral crystal shape and in presence of a polymer, and 164 (actually to be corrected to 159) in case of an octahedral crystal shape when the polymer was omitted (see letter dated 16 December 1997, page 3). The storage stability is best for the invention material having the lowest value (79) and worst for the materials having the highest value (159 and 162, respectively).

While thus basing its findings on the Appellant's results the Respondent proved that the material made according to the patent in suit had the smallest sensitivity difference after aging and the best colour stability.

So, the material according to the patent in suit showed a minimum deterioration of the colour reproduction after aging; in other words, a good balance between yellow, magenta and cyan colour fading (corresponding to blue, green and red, respectively) was maintained. These findings were not contested by the Appellant.

3.8 In view of these results the Board is satisfied that the problem underlying the patent in suit has been solved.

3.9 It remains to be decided whether or not the silver halide colour photographic photosensitive material having "cubic or tetradecahedral silver halide crystal structure, having, in the main, the (100) plane enclosed" involves an inventive step.

3.10 As there was no pointer in document (3) to use in colour photographic photosensitive material silver halide emulsions having a cubic shape, i.e. the (100) plane only, or the tetradecahedral shape in which the (100) planes prevail in terms of size, and as further there was no hint to exclude the octahedral shape or those tetradecahedral shapes in which the size of the (111) planes is greater than that of the (100) planes, the skilled person had no information about the impact of the crystal shape on the colour stability. As this information could not be taken from any of the other cited documents, the measure taken by the Respondent to

use a silver chlorobromide or silver bromide emulsion having "a cubic or tetradecahedral crystal shape, the (100) plane of which has, in the main, been enclosed" for achieving the improved colour stability was not obvious.

- 3.11 The Appellant compared the relative sensitivity of silver bromide emulsions having cubic crystal shape with that of emulsions having octahedral crystal shape (page 8 of the annex to the letter dated 28 July 1997); it submitted that the results were not conclusive since no uniform trend could be established.

According to the Appellant table 3 of the patent in suit for instance shows that the colour image fastness of invention sample 101 (cubic crystal habit) and that of comparison sample 104 (octahedral crystal habit) were practically the same. Hence, no beneficial effect could be demonstrated for the colour photographic photosensitive material of Claim 1 of the patent in suit.

In respect to the relative sensitivity results displayed in the tables of the patent in suit, the Appellant criticised the comparison basis; it pointed for instance in table 3 to samples 102 (cubic shape, no polymer) and 105 (octahedral shape, no polymer); the reference for both samples having been set as standard 100, a comparison between them was not possible since one standard reference was based on cubic shape, the other on octahedral shape (the polymer being absent in both references); thus, the invention sample 101 (cubic shape) and comparative sample 104 (octahedral shape), both containing a polymer, were not comparable.

In spite of the Appellant's criticism applying to the lack of comparability of the relative sensitivity values of each individual colour, the Board nevertheless agrees with the Respondent who inferred that the overall colour stability of the invention sample had been kept at a maximum as compared to the other samples (see point 3.7); the goal of a good balance between yellow, magenta and cyan colour fading was mentioned in the patent in suit (page 4, lines 5 to 7). It is the effect of colour stability which takes advantage over the shortcomings of the relative sensitivity values. Since the extent of fading of each of the yellow, magenta and cyan dye images differ, the Respondent was looking for an overall tricolour (blue, green and red) balance imaging; this effect was obtained by using the cubic crystal shape what could not be inferred from the cited prior art documents (see point 3.10).

3.12 The Appellant's general argument that silver chloride crystals usually show a regular cubic habit (document (9), page 40, right column, figure 3 and last paragraph) fails to take into account specific conditions of the preparation method of the emulsion.

3.13 The Board, therefore, concludes that the subject-matter of Claim 1 involves an inventive step.

Dependent claims 2 to 21 relate to particular embodiments of Claim 1 and derive their patentability from that of Claim 1.

Auxiliary requests

4. Since the main request is allowable, the auxiliary

requests have not to be considered.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

G. Rauh

P. Krasa