BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

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File Number: T 423/89 - 3.3.1

Application No.: 82 304 317.9

Publication No.: 0 072 695

Title of invention: Process for chemical sensitizing a photographic silver chlorobromide emulsion

Classification: G03C 1/02

D E C I S I O N
of 10 June 1992

Applicant: Konica Corporation

Proprietor of the patent: Agfa-Gevaert AG, Leverkusen

Headword: Sensitizing/KONICA

EPC Art. 56

Keyword: "Inventive step (confirmed after amendment) - prior art concerned with a problem unrelated to that of the invention does not qualify as closest prior art" - "Change in category from a product-by-process to process claim (allowed)"

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number : T 423/89 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 10 June 1992

Appellant : (Proprietor of the patent)
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Representative :

Decision under appeal :
Decision of Opposition Division of the European Patent Office of 9 March 1989 posted on 2 May 1989 revoking European patent No. 0 072 695 pursuant to Article 102(1) EPC.

Composition of the Board :

Chairman : K.J.A. Jahn
Members : Bauriedel
J.A. Stephens-Ofner

Summary of Facts and Submissions

I. European Patent No. 0 072 695 was granted on 12 November 1986 on the basis of eight claims in response to European patent application No. 82 304 317.9 filed on 16 August 1982. Claim 1 read as follows:

"1. A silver halide photographic emulsion having silver halide grains consisting essentially of silver chlorobromide characterised in that the silver chlorobromide has been sulfur-sensitized in the presence of a silver halide solvent but has not been gold-sensitized."

II. Notice of opposition was duly filed requesting the revocation of the patent on the grounds that its subject-matter lacked novelty and did not involve any inventive step. In the course of the opposition proceedings the following documents were cited:

(1) US-A-3 507 657

(2) C.E. Kenneth Mees and T.H. James, "The Theory of the Photographic Process", 3rd Edition, 1966, page 36

(3) T.H. James, "The Theory of the Photographic Process", 4th Edition, 1977, page 151

(4) Ullmann's Encyklopädie der technischen Chemie, 3rd Edition, Volume 13, pages 603 ff.

(5) T.H. James, "The Theory of the Photographic Process", 4th Edition, 1977, page 88

III. By a decision of 9 March 1989, with written reasons posted on 2 May 1989, the Opposition Division revoked the patent. The decision was based on Claim 1 filed in the course of oral proceedings on 9 March 1989. This claim reads as follows:

"Process for chemically sensitizing a silver halide photographic emulsion having silver halide grains consisting essentially of silver chlorobromide characterised by adding to the emulsion a sulfur sensitizer but not a gold sensitizer and, prior to or during chemical sensitization, a silver halide solvent."

In the reasons given for the decision, the Opposition Division held that the above claim met the requirements of Articles 123(2) and (3) EPC, but that its subject-matter did not involve any inventive step having regard to document (1), which disclosed a process of emulsion preparation closely similar to the one claimed. They held that Example 1 in connection with column 2, lines 2 to 7 of this document described a process of chemically sensitising a silver chlorobromide emulsion containing silver halide grains grown or formed in the presence of a water soluble thiocyanate and an organic thioether acting as silver halide solvent, with thioureas as suitable sulphur sensitisers. It was held that this teaching included the possibility of an addition of the silver halide solvent at a moment when the silver halide emulsion was already formed, but was still ripening. Merely by following the teaching of document (1), a person skilled in the art would therefore have arrived, without any inventive step, at the process as claimed in Claim 1.

IV. Notice of Appeal was lodged against this decision on 30 June 1989, with payment of the prescribed fee. A statement of grounds of appeal was filed on 12 September

1989. In the course of the oral proceedings held on 10 June 1992, the appellants filed a series of new claims and argued essentially as follows:

Document (1) did not constitute the closest prior art, because it made no reference whatsoever to the problem associated with chemical sensitising of improving sensitivity, without causing excess fogging or increasing grain size. Document (1) gave no indication that silver halide solvent should be added at a moment when grain growth has already ended. The process described in Example 1 of document (1) usually involved a washing-step between physical and chemical ripening, during which the water-soluble silver halide solvent thiocyanate was washed out. As this was a trivial step, it was not normally mentioned in the working examples given in patent specifications. It therefore had to be assumed that the chemical sensitising of silver chlorobromide emulsion described in Example 1 of document (1) took place when the water-soluble silver halide solvent thiocyanate is no longer present.

The opponents countered the patent proprietors' arguments as follows:

Concerning inventive step, the possibility of silver halide solvent being present during chemical sensitising in the method disclosed in Example 1 of document (1) could not be discounted by assuming that it has been washed out beforehand. The wording of this example contained no reference to a washing step. It would therefore have had to be assumed that the silver halide solvent thiocyanate added during the preparation of silver chlorobromide emulsion as described in Example 1 of document (1) was still present during the subsequent chemical sensitisation, this being the only salient feature of the disputed patent. Nor did the process as now

claimed involve an inventive step, merely because it specified that the silver halide solvent had to be added "...during chemical ripening...". It was a generally known fact, as could be gathered from document (5), that the individual steps in the preparation of photographic emulsions (silver halogen precipitation, physical ripening, chemical ripening) could also be combined.

Furthermore, to produce the technical effect claimed, it was immaterial whether the silver halide solvent was added before or during the chemical ripening. The patent proprietors have not demonstrated any surprising effect resulting from adding the silver halide solvent during chemical ripening, as opposed to before it. Furthermore, in their letter of 22 May 1992, the patent proprietors themselves confirmed that the instance in time at which the silver halide solvent was added, (i.e. before or during chemical sensitisation), was not critical to the result. Thus even the most recently amended version of the process described in the contested patent lacked inventive step having regard to document (1).

Nor did the contested patent have any other object than the one a skilled person would have gathered from document (1). The object of achieving the highest possible sensitivity with the minimum of fogging could also be seen from citation (1), column 1, lines 28 to 60, stating that the object was to provide emulsions with relatively high sensitivity. That fogging during the preparation of photographic silver chlorobromide emulsions should also be reduced was evident from this document, column 1, lines 61 to 65, stating that the high density differential there cited indicated low fog densities.

The Appellant (patent proprietor) requested (main request) that the decision under appeal be set aside and

that the patent be maintained on the basis of the claims of the main and two auxiliary requests submitted in the course of oral proceedings.

The respondents requested that the appeal be dismissed.

Claim 1 of the main request reads as follows:

"1. Process for chemical sensitizing a silver halide photographic emulsion having silver halide grains consisting essentially of silver chlorobromide characterised by adding to the emulsion a sulphur sensitizer but not a gold sensitizer and, during chemical ripening, a silver halide solvent."

At the conclusion of the oral proceedings the Board announced its decision to allow the appeal.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. Claim 1 as granted related to a photographic emulsion characterised by having been prepared by specific manufacturing processes. Amended Claim 1 seeks protection for only one of these processes. The characteristic of this process is that the silver halide solvent required for chemical sensitisation is not added until chemical ripening begins, i.e. in a subsequent and separate step following silver halide precipitation and the first physical ripening in the process for the preparation of photographic silver halide emulsions usually involving several process steps (cf. the sequence of steps for

standard methods of emulsion preparation described in document (4), "Verlauf der Emulsionsherstellung", p. 617, and document (5), left-hand column, p. 88).

This process is disclosed on page 3 of the original description in the paragraph following the formulae and is also to be found in patent specification 0 072 695 (cf. page 2, lines 55 and 56). Here it is stated that the silver halide solvent may be added before or - as now claimed -during chemical ripening. There are therefore no objections under Article 123(2) EPC with regard to the characteristics of the process now claimed in the present version of Claim 1.

The characteristics of present dependent Claims 2 to 7 are derived from the original Claims 2 to 7 as formulated in the patent specification.

The change in category from a product-by-process claim to a (manufacturing) process claim is, in the present circumstances, admissible. Claim 1 of the patent specification protected a product (photographic silver chlorobromide emulsion with improved characteristics) which was characterised by the processes described in this claim. In a case such as this, the protection afforded by the granted patent must necessarily extend to all those methods of manufacture covered by the processes described in the claim and disclosed in the patent specification. By restricting Claim 1 to only one of these methods - namely to one of the two alternatives described on page 2, line 55, of the patent specification, the one specifying that silver halide solvent is added during chemical ripening -the patent proprietors have ceased to claim absolute product protection and have undertaken a significant limitation of their claim.

There are therefore no objections to the present claims of the main request under Article 123(3) EPC.

3. It is true that the chemical sensitising of a silver chlorobromide emulsion using sulphur compounds in the presence of a silver halide solvent, but without the use of a gold sensitiser, is known from document (1) (cf. Example 1 in connection with column 2, lines 3 to 8), taking into account that this example makes no mention of a washing step prior to the addition of the sulphur compound. While the silver halide solvent can be added at any time during the preparation of the emulsion (see column 4, lines 12 to 14, of (1)), it must be added before the grains of silver halide have reached their ultimate size and shape, i.e. during silver halide precipitation as described in Example 1, or during the subsequent first (physical) ripening.

In contrast to the sensitising method, or manufacturing process, known from (1), the process now claimed - in which chemical sensitisation is likewise achieved by adding sulphur compounds in the presence of a silver halide solvent - specifies that the silver halide solvent may not be added until chemical ripening has begun, i.e. after precipitation and first physical ripening, and hence grain growth, have been completed (cf. column 4, lines 12 to 15). The sensitising process now claimed is therefore novel.

4. Board of Appeal case law states that when assessing inventive step consideration must only be given to prior art which seeks to solve the same or a similar problem as does the patent in suit. This disqualifies document (1), as can be gathered from point 6 of the decision. In these circumstances, the Board considers that prior art as being the closest one which is indicated in the disputed patent.

The passage on page 2, lines 10 to 13 reads "It is known that the combination of sulfur sensitization and gold sensitization achieves a higher sensitivity than sulfur sensitization alone, but this combination is not practical for the purpose of sensitizing silver halide photographic emulsions substantially made of silver chlorobromide since excess fog results".

Therefore, the Board sees the technical problem with which the contested patent is concerned, in providing a process for the manufacture of a silver chlorobromide photographic emulsion which, like the already known combination of sulphur and gold sensitising (cf. also Claim 1 in the citation DE-OS-2 140 323 in connection with column 3, lines 60 to 64), has equally high photographic sensitivity but less fog (cf. patent specification 0 072 695, page 2, lines 16 and 17).

According to the patent in suit this problem is solved by a process for chemical sensitising a silver halide photographic emulsion having silver halide grains consisting essentially of silver chlorobromide characterised by adding to the emulsion a sulphur sensitiser but not a gold sensitiser and, during chemical ripening, a silver halide solvent.

With the comparative examples (see the results listed in Table 2 of the patent specification) the patent proprietors have shown that a change from the known method of chemical sensitisation of using sulphur and gold sensitisers (emulsion E7), to the method now claimed of dispensing with gold sensitisers, and using sodium thiosulphate resp. allyl thiourea in the presence of the silver halide solvent ammonium thiocyanate (emulsions E9, E10 and E11), produces a higher relative sensitivity, while the significant increase in fogging encountered with

emulsion E7 (Dmin = 0.48) is avoided with the emulsions chemically sensitised in the way described in the invention (Dmin = 0.02, 0.0 and 0.02 respectively). These results are not disputed. Therefore, the Board is satisfied that the technical problem underlying the disputed patent is effectively solved.

5. Document (1) does not hint at this solution, which is the only one now claimed (and which involves the silver halide solvent not being added until the silver halide precipitation and physical ripening have been completed). All it teaches is that the silver halide solvent sodium thiocyanate can be added either during precipitation of the silver halide (as in Example 1) or, in accordance with column 4, lines 14 to 15, during subsequent first or physical ripening.

6. Nor would document (1) be helpful to a skilled person seeking to increase the sensitivity of a silver chlorobromide emulsion to a degree comparable with the known sulphur/gold sensitisation while at the same time avoiding a significant increase in fogging, because the presence of the water-soluble thiocyanate and the organic thioether (cf. Claim 12) solves a problem unrelated to the one addressed and solved by the patent.

Thus the object of the technical teaching described in columns 1 and 2 of document (1) is to provide a light-developable, radiation-sensitive photographic material that:

(a) has a high rate of photodevelopment (lines 54 to 57);

(b) has a relatively high photographic sensitivity (lines 58 to 69);

(c) has a high density differential between the initially exposed and unexposed areas upon photodevelopment (lines 61 to 65);

(d) provides archival-quality records (lines 66 to 69);

(e) does not lead to density increase in the unexposed areas upon photodevelopment and subsequent exposure to room-light (column 1, line 70 to column 2, line 2).

Although column 1, lines 58 to 60, describes the object of the invention as being to provide "relatively high sensitivity" (a feature required of every kind of photographic material), reference to this objective and all the others described in document (1) is not sufficient to carry out the chemical sensitisation of a silver halide emulsion in such a way as to obtain a significant improvement in sensitivity (comparable with the sensitisation achieved with gold and sulphur compounds) while ensuring that the increase in fog during chemical development remains insignificant. Thus the Board is unable to agree with the opponent's submission that the high density differential aimed at in (1) (column 1, lines 61 to 65), which finds measurable expression in the difference between Dmax and Dmin in column 7, lines 11 to 14 and Table B, points to the achievement of a low emulsion fog during chemical development aimed at in the claimed invention (and also quoted in Dmin values in the patent). The high density differential achieved in (1) can be due not only to a low figure for Dmin but also to a high figure for Dmax. Furthermore, the low Dmin values obtained by photodevelopment (column 7, lines 11 to 14) do not permit the conclusion that the fog density measured after the exposure in chemical developing solution under standard conditions (Example 1, lines 13 to 29 of the

contested patent specification) is also small. The invention described in document (1) thus has a different objective and offers a different solution to the one claimed in Claim 1 of the main request and, therefore, does not render that claim obvious to a skilled person.

7. Finally, applying the possibility of merging one or more of what are otherwise separate steps in the emulsion preparation process (see page 88 of (5), middle of left-hand column) to the teaching in (1) - not an immediately obvious thing to do - does not provide any direct indication of how to solve the task of carrying out the chemical sensitisation of silver chlorobromide emulsions in the way described in the current Claim 1.

The Board's conclusion would furthermore not be altered by consideration and analysis of the contents of the other documents, i.e. (2) and (3), cited by the opponents, neither of which played any role in the appeals proceedings.

8. It would therefore not have been obvious to sensitise a silver chlorobromide emulsion with a sulphur sensitiser, a silver halide solvent being added during chemical ripening to increase sensitivity without fog. Consequently, the choice of the sensitising process in Claim 1 involves an inventive step.

The subject-matter of the dependent claims is supported by the inventive step of the corresponding independent claims.

9. Since the process according to the main request satisfies the requirements of Article 56 EPC the patent should be maintained on this basis. The two auxiliary requests of the appellants need not, therefore, be considered.

Order

For these reasons, it is decided that:

1. The Opposition Division decision is set aside.

2. The case is remitted to the Opposition Division with the order to maintain the patent on the basis of the main request submitted in the course of oral proceedings.

The Registrar: The Chairman:

P. Martorana K. Jahn