

Veröffentlichung im Amtsblatt	Ja/Non
Publication in the Official Journal	Yes/No
Publication au Journal Officiel	Oui/Non



Aktenzeichen / Case Number / N° du recours : T 197/86 - 3.3.2

Anmeldenummer / Filing No / N° de la demande : 80 303 642.5

Veröffentlichungs-Nr. / Publication No / N° de la publication : 0 028 099

Bezeichnung der Erfindung: Photographic couplers, emulsions, materials and
Title of invention: processes
Titre de l'invention :

Klassifikation / Classification / Classement : G03C 7/34

ENTSCHEIDUNG / DECISION

vom / of / du 4 February 1988

Anmelder / Applicant / Demandeur :

Patentinhaber / Proprietor of the patent /
Titulaire du brevet : Eastman Kodak Company

Einsprechender / Opponent / Opposant : Agfa Gevaert AG

Stichwort / Headword / Référence : Photographic couplers/KODAK

EPÜ / EPC / CBE Article 56

Schlagwort / Keyword / Mot clé : "Inventive step - comparative tests,
prerequisites therefor"

Leitsatz / Headnote / Sommaire

In the case where comparative tests are chosen to demonstrate an inventive step with an improved effect over a claimed area, the nature of the comparison with the closest state of the art must be such that the effect is convincingly shown to have its origin in the distinguishing feature of the invention. For this purpose it may be necessary to modify the elements of comparison so that they differ only by such a distinguishing feature (supplementing T 181/82, "Spiro compounds", OJ EPO 1984, 401) (cf. point 6.1.3 of the Reasons).

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Case Number : T 197/86 - 3.3.2

D E C I S I O N
of the Technical Board of Appeal 3.3.2
of 4 February 1988

Appellant :
(Opponent) Agfa-Gevaert AG, Leverkusen
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Decision under appeal : Decision of the Opposition Division of the European Patent Office dated 25 April 1986 rejecting the opposition filed against European patent No. 0 028 099 pursuant to Article 102(2) EPC.

Composition of the Board :

Chairman : P. Lançon
Members : G. Szabo
R. Schulte

Summary of Facts and Submissions

I. European patent No. 28 099, granted with six claims on 23 November 1983 in response to the European patent application No. 80 303 642.5, was opposed on 20 August 1984 on the grounds of Article 100(a) in conjunction with Article 56 EPC. The following documents were inter alia cited in connection with the opposition:-

(b) US-A-3 446 622

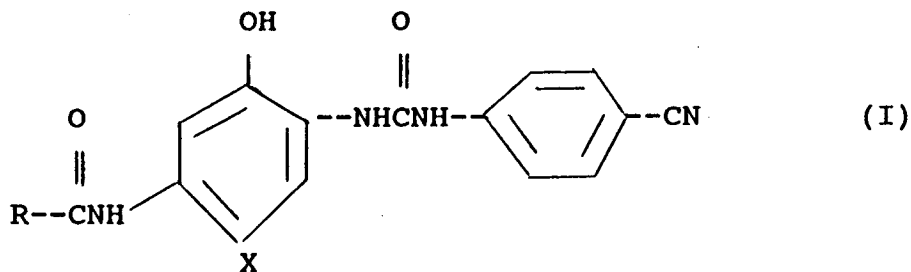
(c) K. Venkatamaran, "The Chemistry of Synthetic Dyes", Academic Press, New York and London, Volume IV (1971), Chapter VI:

J. Bailey and L.A. Williams, "The Photographic Color Development Process", pages 360, 361, 367, 370, 371 and Table VI;

(d) US-A-3 880 661.

II. Claim 1 of the patent-in-suit reads:

A photographic cyan dye-forming coupler having the structural formula:



wherein:

X is a hydrogen or a coupling-off group; and
R is a ballast group.

- III. In a decision dated 25 April 1986, the Opposition Division rejected the opposition and maintained the patent unamended. The reasoning was that starting from the structurally nearest prior art according to (d), which disclosed a specific coupler compound having the formula I above, but without the paracyano substitution (specifically as coupler No. 9, column 7), a combination of documents (d) + (c) might lead to something falling within the scope of Claim 1, since (c) associates a p-cyano phenyl substitution with a bathochromic shift (increased wavelength of absorption maximum). Nevertheless, the person skilled in the art had not appeared to have a reason to combine the documents or to choose the particular closest state of the art for modification.
- IV. A Notice of Appeal was filed by the Appellant (who was the Opponent) on 28 June 1986, the fee being paid on the same day. The Statement of Grounds was filed on 30 August 1986.

Oral proceedings before the Technical Board of Appeal were appointed for 4 February 1988.

Shortly before the oral proceedings were held, separate submissions including experimental evidence were received from the Appellant on 22 January and 28 January 1988 respectively. A further document was also produced by the Appellant during the oral hearing. The latter of the two submissions and the further document were excluded from consideration by the Board under Article 114(2) EPC after representations by the Respondent concerning both their lateness and lack of relevance.

V. In their written submissions and at the oral proceedings the Appellants argued inter alia substantially as follows:-

- (i) The nearest state of the art was coupler No. 9 of document (d); compared with this, the technical problem was exclusively to be seen in increasing the absorption maxima (-max) of the resulting dyestuffs to the greatest extent possible;
- (ii) according to (c) a shift to a longer wavelength was associated, as a general rule, with electron withdrawing substitution of the phenyl nucleus in the coupler, a maximum shift to 711 nm being disclosed for the paracyano substitution; absorption maxima of above 700 nm being required for colour negatives, the skilled man would have been led to follow the general rule and combine (c) with (d) contrary to the findings of the Opposition Division;
- (iii) the obviousness of such a combination meant that any additional advantage (such as a narrowing of the half bandwidth of absorption, HBW) was inevitable and could not justify the recognition of an inventive step;
- (iv) the comparative experiments provided by the Respondent to demonstrate the additional effect of the narrowing of HBW were not suitable for this purpose, since they were neither truly comparative nor made with the structurally closest coupler of the state of the art.

VI. The Respondent submitted substantially the following arguments:

- (i) Although it was agreed that document (d) represented the closest state of the art, document (c) was not sufficiently close to it to justify the combination wished for by the Appellant;
- (ii) the teaching of (c) did not amount to a general rule, but only to a summary of certain experimental results;
- (iii) the crucial effect of narrowing of the HBW was not mentioned in (c) or (d), or indeed in any of the other documents cited;
- (iv) exact comparisons had been given of the inventive couplers with couplers which differed from them only by the absence of a paracyano group.

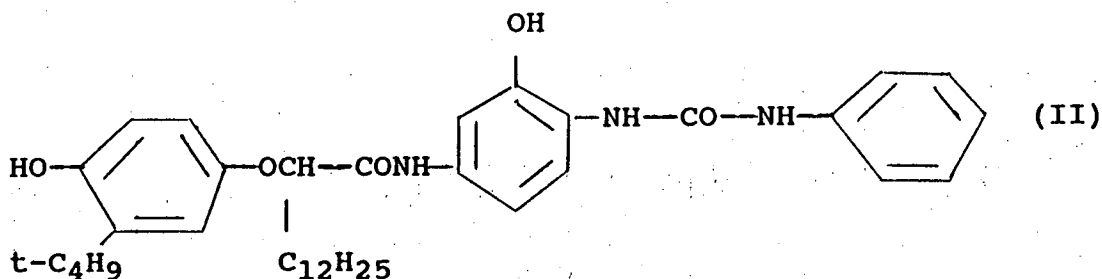
VII. The Appellant requests that the decision of the Opposition Division be set aside and the patent revoked.

The Respondent requests that the appeal be dismissed and that the patent be maintained in its entirety.

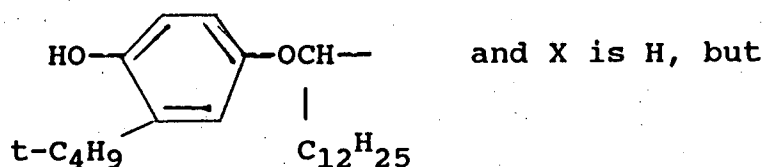
Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC and is therefore admissible.
2. The patent-in-suit relates to phenolic cyan dye-forming couplers and their use in photographic emulsions and processes.

The structurally nearest prior art according to (d) discloses, as coupler No. 9, a specific dye forming coupler compound having the formula



i.e. corresponding to formula I above, where the ballast group R is



without the paracyanogroup substitution. The technical problem is to be seen in providing a coupler capable of giving dyes which have narrower absorption half bandwidths (HBW) compared with those disclosed in (d), while maintaining absorption at the longer end of the red spectrum and being light fast, and stable to Fe^{++} ions.

3. The solution to this problem, according to the patent-in-suit was to add a cyano group at the para position of the 2-ureido-linked phenyl nucleus.

The couplers have also an amido-ballast group in the 5-position of the phenolic nucleus, a hydrogen or a coupling-off group in the 6-position as in the prior art but carry the added -CN group in the para position of the ureidophenyl nucleus (see formula I above). The ballast group R is to prevent the coupler diffusing when it should remain immobilised in a photographic emulsion layer. The X group, is released when the coupler reacts with an

oxidation product of the colour developing agent to form a cyan (green) dye.

Such dyes are suggested to maintain the qualities associated with the closest state of the art of (i) good light stability, (ii) absorption maxima toward the longer wavelength portion of the red spectrum ($\lambda_{\max} > 650 \text{ nm}$) and (iii) good stability to the Fe^{++} ions which are commonly found in bleach-fix baths, and furthermore to have (iv) improved narrow spectral absorption bands, as measured by half bandwidth. The light stability and stability to Fe^{++} ions were already known to be associated with the ureido-linkage and the amido-ballast group at the 5-position, respectively.

4. The principles laid down in the highly relevant "Spiro compounds" decision (T 181/82, OJ EPO, 1984, 401) require that where comparative tests are submitted as evidence of an unexpected effect, there must be the closest possible structural approximation in a comparable type of use to the subject-matter claimed.

In the present case, both parties agreed that the compound having the closest structural similarity to the subject-matter claimed and belonging to the published prior art was coupler No. 9 of document (d).

Following these principles in the present case, however, of the couplers disclosed, the one to which coupler No. 9 of (d) has the greatest structural similarity would appear to be coupler No. 5. This is because of the identity of X and the appearance of the t-butyl substituent on the phenyl group of the ballast in both instances. From the Declaration of Dr Bass of 4 December 1981 the following results were obtained for developers A and B. The figures for λ_{\max} and HBW are in nm.

	A		B	
	λ max	HBW	λ max	HBW
Coupler No. 9 of (d)	666	150	660	148
Coupler 5 of patent-in-suit	675	133	670	139

Thus, in each case the coupler of the patent-in-suit produces an increase in λ max and a narrowing of HBW compared with the closest compound of the prior art. This corresponds to a fully correct comparison according to the principles laid down in the "Spiro compounds" decision.

On this basis, therefore, the technical problem as originally stated has been credibly solved by the provision according to the patent-in-suit.

5. The issue of novelty does not arise, as none of the documents cited discloses a coupler conforming to formula I of Claim 1. The Appellant implicitly acknowledged this in paragraph 2 of the letter filed on 23 December 1985 during the opposition proceedings, and has not raised the matter since.
6. On the issue of inventive step, two questions arise:
 - 6.1 As to the exact character of the effects obtained with the invention, the Appellant argued that the comparisons made in the examples of the patent-in-suit did not properly demonstrate in relation to the feature of p-CN- the effect of narrowed HBW with maintenance or increase of λ max. This was because the prior art couplers chosen for comparison differed in more than one parameter from the tested coupler of the patent-in-suit, e.g. by a different ballast group

and/or coupling-off group, or by further or different substituents on the ureido-linked phenyl nucleus. Thus, it had not been demonstrated that any HBW narrowing effect was in fact due simply to the presence of the distinguishing paracyano group on the phenyl nucleus.

6.1.1 The criticism of the Appellant bears on the fact that even coupler 5 differs by more than just the presence of the paracyano group from coupler No. 9 of (d). In particular, the ballast group is different. To the extent that the choice of ballast group could have an effect on λ_{\max} and/or HBW, the comparison of coupler No. 9 with coupler 5 is blurred as regards the role of the paracyano group. Alternatively, it can be stated that such comparison may only strongly support the superiority of a combination of five substituents, i.e. the cyano group and the particular features of the ballast. However, this is then a question of scope, i.e. how far the particular evidence can support the non-obviousness of other compounds falling within the ambit of the generic claim. Nevertheless, the burden of proof is now on the Appellant, as Opponent, to show any lack of inventive step in this respect in opposition proceedings (cf. T 219/83, "Zeolites" OJ EPO, 1986, 211) if before grant the Examining Division has not raised the matter.

6.1.2 The Respondent has, however, now strengthened the support for his claim by voluntarily providing comparisons with variants which, although not expressly belonging to the prior art, differ from the claimed tested couplers only in respect of the paracyano group. This is an extra contribution to the clarification of the issues, which went beyond the obligations imposed by T 181/82 and could be seen as giving support to a claim with broadened definitions of the ballast group, leaving the cyano group as the only characterising, i.e. distinguishing feature

over the prior art. These comparisons were with other variants differing from specific claimed couplers only by the absence of the paracyano group (cf. submission of the Respondent filed on 14 January 1987, and Declaration of Dr Bass for the Respondent, filed by the Appellant with his submission on 22 January 1988). From the table of figures given in Appendix I of the submission of 14 January 1987 (corresponding information also being given in the Affidavit) it can be seen, for instance, that the couplers 1, 5 and 7, according to the patent-in-suit, give higher λ -max and narrower HBW than the corresponding couplers which are identical except for having H instead of a paracyano group. In the case of coupler No. 5, the values of λ max and HBW compared with the corresponding coupler but with -H instead of -CN, are, according to developer, as follows.

max (nm)			HBW (nm)		
Coupler with	Developer		Developer		Coupler with
	A	B	A	B	
-H	671	655	147	147	H-
-CN	675	670	133	139	NC-
λ max	+4	+15	-14	-8	Δ HBW

Thus it is evident that there is always an increase in λ max and a simultaneous narrowing of HBW when the paracyano substitution is made. It is furthermore noticeable from the above table that the size of the reduction of HBW does not correlate in any foreseeable way with the size of the increase in λ max, the higher HBW in the case given correlating with the lower increase in λ max (developer A).

6.1.3 On the basis of these voluntary comparisons the Board is inclined to take the Respondent's view because the advantageous effect of the para-cyano group is clearly shown. According to an earlier decision (T 35/85, 16.12.86) the onus of proof may be discharged by "submitting comparative tests with newly prepared variants of the closest state of the art, making identical the features common with the invention in order to have a variant lying closer to the invention so that the advantageous effect attributable to the distinguishing features of the invention is thereby more clearly demonstrated". In the present case the Board has concluded that in the case where comparative tests are chosen to demonstrate an inventive step with an improved effect over a claimed area, the nature of the comparison with the closest state of the art must be such that the effect is convincingly shown to have its origin in the distinguishing feature of the invention. For this purpose it may be necessary to modify the elements of comparison so that they differ only by such a distinguishing feature (supplementing T 181/82, "Spiro Compounds", OJ EPO, 1984, 401).

This was achieved by preparing unclaimed variants of the state of the art carrying no para-cyano substitution anywhere, as exact counterparts of three exemplified compounds in the claimed area, and comparing their differences in effects attributable solely to the cyano group. The Appellant's criticism that the comparison compound cannot be traced in the state of the art is therefore inappropriate since the evidence showed exactly the unexpected improvements which occur on a direct route towards the invention.

6.1.4 The Appellant's submissions at oral proceedings that a particular margin of error should be taken into account cannot be accepted by the Board. If the Appellant had had

criticisms of this kind in mind he should have submitted them in time for the Respondent to file a reply. Furthermore, a simple allegation that the figures may have a particular level of error cannot be accepted without supporting evidence, particularly when, as in the present case, the patent-in-suit has already survived an opposition procedure in the first instance. The figures in question in any case formed part of a submission by the Appellant himself and were not questioned on the basis of accuracy in that submission. Thus, the figures given in the evidence of the Respondent filed on 14 January 1987 and those of the Appellant filed on 22 January 1988 are considered to reflect the true position as they stand.

6.2 The second question has to be put: "Was there any indication or hint in the prior art that a narrowing of HBW with simultaneous maintenance of λ max could be obtained in a phenyl ureido phenolic type coupler such as No. 9 of (d) by means of a paracyano substitution on the phenyl nucleus?" Since none of the documents cited even mention HBW, this question must be answered in the negative. Thus, their particular achievement must be recognised as unexpected.

6.2.1 There then remains a residual question, viz. would the skilled person have been led to combine (c) and (d) for some other reason, and if so would have arrived at a structure falling within the scope of Claim 1? In other words, was the skilled person in a situation where he would have conceived the invention inevitably, in any case, as an improvement, which could not have been obtained otherwise (cf. "one-way street situation" and "bonus effect" in "Moulding composition", T 192/82, OJ EPO, 1984, 415)?

6.2.2 The argument of the Appellant that the technical problem was to be seen exclusively in terms of increasing the wavelength of the absorption maxima (λ_{\max}) and that the promise in Table VII of (c) of a shift to a max of 711 nm associated with a paracyano substitution would have led the skilled person to combine this teaching with that of (d) to obtain a coupler according to Claim 1 is unconvincing. Firstly, the shift in λ_{\max} shown in Table VII of (c) has to be seen in comparison with the λ_{\max} of the unsubstituted coupler. This is 694 nm, giving a bathochromic shift of 17 nm associated with the p-CN group. A similar comparison given in Table III on page 361 of (c) in relation to various benzoylacetyl couplers suggests that the p-CN substitution compared with the unsubstituted coupler gives a shift of 13 nm. Since the closest prior art coupler No. 9 as tested has, depending on the developer used, a max of 666 or 660 nm, the maximum shift promised by the addition of a p-CN group according to (c) would in the best case be $666 + 17 = 683$ nm, i.e. well short of the 700 nm said by the Appellant to be necessary for colour negatives and that actually achieved with the invention.

6.2.3 Furthermore, it is clear to the Board that there were a number of other electron withdrawing groups which could have been used as a substituent by a skilled operative interested only in obtaining the maximum possible bathochromic shift. For instance, an alternative solution to the problem of maximising the bathochromic shift is given in document (b), which teaches para substitution of the phenyl group, but not with a cyano group. Instead (b) teaches para substitution with a group - YR wherein Y is -NHCO-, CONH-, -NHSO₂- or -SO₂NH- and R is hydrogen, an aryl group, an arylaliphatic group or an aliphatic group. The teaching of (b) is in fact more relevant than that of (c) because it deals with ureido-linked phenolic dyestuffs, rather than amido linked naphtholic dyestuffs as in (c).

6.2.4 Thus, the more relevant disclosure of (b) casts a shadow over the attractiveness of the teaching of (c) and presents an alternative option leading away from the invention. There was, consequently, no one-way street leading the skilled person unambiguously to the measure of a p-cyano group substitution as a way of maximizing the bathochromic shift. The somewhat different nature of the couplers referred to in (c) (naphtholic not phenolic character; CONH instead of ureido linking group), and the different λ_{\max} range (around 530 nm) compared with those claimed in the patent-in-suit furthermore makes it extremely doubtful exactly what other combination of features is responsible for the effect shown in (c) i.e. whether other features of the couplers in (c) such as the use of a -CONH- instead of a -NHCONH- linking group would be necessary to reproduce the effect, and whether the same shift could be achieved in the λ_{\max} 660 region. This is quite apart from the lack of any promise of a really substantial and useful boost to the bathochromic shift in (c), which could have made it an attractive avenue for the skilled man to explore. Thus, even with the statement of problem canvassed by the Appellant, it is, in the Board's view, not obvious to combine the teachings of (c) and (d) to arrive at something falling within the subject-matter claimed.

6.3 Alternative attacks on the patentability of the subject-matter claimed were based on documents more remote than (d) as starting point. These were not pursued at the oral hearing and the Board shares the view of the Opposition Division that these are less relevant and can be dismissed with the fall of the stronger attack based on (c) and (d).

6.4 The subject-matter of Claim 1 is therefore based on an inventive step. The same applies to dependent claims and to use claims where the claimed couplers are incorporated.

Thus, the grounds of opposition and appeal do not prejudice maintenance of the patent.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

F.Klein

P.Lançon