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 564/89 - 3.3.1

Application No.: 82 306 513.1

Publication No.: 0 081 964

Title of invention: Photosensitive polymer composition

Classification: G03C 1/68

D E C I S I O N
of 10 February 1993.

Applicant: TORAY INDUSTRIES, INC.

Opponent: BASF Aktiengesellschaft, Ludwigshafen

Headword: Printing plates/TORAY

EPC Article 56

Keyword: "Inventive step (confirmed)"
"Problem-solution approach: redefinition of the technical problem"

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number : T 564/89 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 10 February 1993

Appellant : (Opponent)
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Respondent : (Proprietor of the patent)
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Decision under appeal :
Interlocutory decision of the Opposition Division of the European Patent Office dated 8 August 1989 concerning maintenance of European patent No. 0 081 964 in amended form.

Composition of the Board :

Chairman : K. Jahn
Members : P. Krasa
J. Stephens-Ofner

Summary of Facts and Submissions

I. The mention of the grant of patent No. 0 081 964 in respect of European patent application No. 82 306 513.1 filed on 7 December 1982, was published on 5 November 1986 (c.f. Bulletin 86/45) on the basis of seventeen claims.

II. A notice of opposition was duly filed by BASF within the prescribed period (Article 99) requesting revocation of the patent on the ground of insufficient disclosure of the subject-matter of Claim 1 and, furthermore on the grounds of lack of novelty and inventive step.

The opposition was based on:

(1) GB-A- 834 337
(2) DE-A-2 722 421
(3) DE-A-2 846 647
(4) R Mowiol Polyvinylalkohol, Hoechst Aktiengesellschaft, September 1978.

After expiry of the opposition period the Appellant (Opponent) referred also to

(5) DE-A-2 749 639.

III. The Opposition Division maintained the patent in amended form on the basis of an amended independent Claim 1 submitted in the course of Oral Proceedings on 1 February 1989, and dependent Claims 2 to 9, submitted on 30 January 1988.

Claim 1 as amended reads:

"A photosensitive polymer composition containing partially saponified polyvinyl acetate, a polyfunctional unsaturated

compound and a photosensitizer characterized in that said composition comprises:

A. 100 parts by weight of partially saponified polyvinyl acetate having a saponification degree of 60 to 99 mole %;

B. 20 to 200 parts by weight of polyfunctional acrylate or methacrylate having a molecular weight of not more than 2000 and having at least two acryloyl or methacryloyl groups in the same molecule and a number of hydroxy groups equal to the number of acryloyl and methacryloyl groups in the same molecule, said polyfunctional acrylate or methacrylate being selected from the group consisting of:

(a) a reaction product of (i) a glycidyl ether of a polyhydric alcohol having 2 to 30 carbon atoms and 2 to 5 hydroxyl groups with (ii) an unsaturated carboxylic acid having 3 to 15 carbon atoms; and

(b) a reaction product of (i) an unsaturated alcohol having 4 to 15 carbon atoms with (ii) a glycidyl ether of a polyhydric alcohol having 2 to 30 carbon atoms and 2 to 5 hydroxyl groups;

C. 1 to 60 parts by weight of a saturated compound selected from ethylene glycol, diethylene glycol, triethylene glycol, glycerine, diglycerine, trimethylol ethane and trimethylol propane;

D. 0.01 to 10% by weight, based on the total weight of the composition, of a photosensitizer."

IV. In its decision the Opposition Division held that the subject-matter of the said Claim 1 was novel and also involved an inventive step in view of document (5), which was deemed to represent the closest state of the art.

In the absence of any data from the Appellant, the Opposition Division accepted the Respondent's statement that the printing plates according to the invention were superior to those described in former Example 3 of the patent in suit which example, after amendment, was no longer within the scope of the subject-matter of the amended claims.

V. An appeal was lodged against this decision on 23 August 1989 with payment of the prescribed fee. A Statement of Grounds of Appeal was filed on 9 December 1989. The Appellant's arguments may be summarised as follows:

The photosensitive polymer compositions of the patent in suit were already obvious from document (1) alone, which disclosed compositions comprising the following components (the designations A, B, C and D, respectively, will be adopted in this decision in order to facilitate comparison with the components disclosed in the patent in suit):

A. 40%-90% by weight of a neutral non-ionisable polyvinyl alcohol ester, ester or acetal, in which at least 70% of the structural units are vinyl alcohol units with a molecular weight of at least 5 000 and which has a solubility in water at 25°C of at least 2% by weight;

B. 10%-60% by weight of an addition polymerisable ethylenically unsaturated compound having a boiling point above 100°C; and

D. 0.01 to 5% (based on the weight of the unsaturated compound) of an addition polymerisation initiator which is essentially compatible with said unsaturated compound and said polyvinyl alcohol compound, and is activatable by actinic light (page 2, lines 5 to 25),

and also, optionally, low molecular polyols as compatible plasticisers in amounts of 10 to 15% by weight. Whether these low molecular polyols were designated as "compatible plasticizers" (document (1)) or as "compatibilizers" (as in the patent in suit) made, in the Appellant's opinion, no difference, since when used in the same chemical environment, they would have shown one and the same effect.

According to the Appellant, document (1) disclosed on page 5, lines 24 to 45, as particularly preferred component B the esters of omega-methylene carboxylic acids or of substituted acids with those polyols having a molecular chain interrupted by oxygen, and further disclosed that the compatibility of component B with the known photosensitive polymer compositions could be improved by strongly polar substituents such as OH-groups. Thus, document (1) would have led the skilled person to the subject-matter of the patent in suit.

He also argued that citation (5) disclosed the use of exactly such compounds as components B(a) of the present Claim 1, which complied with the recommendation of document (1), together with components A, D and, optionally, plasticisers C in photosensitive polymer compositions.

According to the Appellant, the use of plasticisers such as ethylene glycol, glycerol, etc., with poly vinyl

alcohols was known from citation (4). If the skilled person followed the technical teaching of this document, and used those plasticisers together with the photosensitive compositions disclosed in document (5), he would have obtained the compositions of the patent in suit.

It was also known from citations (2) and (3) to use polyvinyl alcohol or its derivatives, together with di(meth)acrylates of 1,1,1-trimethylol propane, glycerol or pentaerythrit.

In relation to the technical problem, which was put forward by the Respondent only with his submission dated 29 January 1988, namely the avoidance of fine cracks when printing plates according to the alleged invention were used for more than 500 000 prints, the gist of the Appellant's argument was that either the change of the technical problem amounted to an amendment containing subject-matter which extended beyond the content of the application as filed (contrary to Article 123(2) EPC), or that the problem was fictitious, as it was already solved by compositions according to the original Examples 3 and 4 of the patent in suit which had been deleted on the ground that they belonged to the state of the art. In the latter case, the Respondent could not, of necessity, demonstrate a surprising technical effect.

Furthermore, the Appellant criticised that no technical effect at all was shown by the Respondent for the compositions of present Claim 1 comprising component B(b).

The Appellant further submitted that even if the avoidance of crack formation in long-run printing were to be acknowledged, such additional effect could not render non-

obvious compositions which were otherwise obvious. He referred to Decision T 21/81 in this context.

No objections under Articles 83 and 54 were maintained against the claims as amended.

VI. In a written statement the Respondent submitted that the problem of crack formation was considered already in the description of the patent as granted and that in respect to crack formation component B of present Claim 1 yielded superior results as compared with other forms of component B originally claimed. The Respondent contested that the cited documents rendered obvious the claimed subject-matter.

VII. The Appellant requested that the decision under appeal be set aside and that the patent be revoked; the Respondent requested that the decision of the Opposition Division be upheld.

VIII. Both parties requested oral proceedings in the event of an unfavourable decision. Such oral proceedings were scheduled for 30 July 1991 but were cancelled as the Appellant withdrew his request on 22 June 1991 in writing and requested a decision to be rendered according to the facts and arguments on file.

Reasons for the Decision

1. The appeal is admissible.

2. Amendments

There are no objections to be raised against the amendments of the claims under Article 123 EPC because

they do not extend the scope of protection of the claims as granted and are supported by the application documents as originally filed: See page 14, lines 16 to 24 with respect to the photosensitiser (component D) and page 8, lines 18 to 33 with respect to the definition of component B, corresponding to page 6, lines 5 to 9, and page 4, lines 35 to 44, respectively, of the patent as granted.

3. Novelty

After examination of the cited prior art, the Board reached the conclusion that the claimed subject matter is novel. Since novelty of the present claims was not contested, it is not necessary to give detailed reasons for this finding.

4. Problem and Solution

The patent in suit is concerned with water-developable photosensitive polymer compositions comprising the components defined in Claim 1 (see above point III), in particular partially saponified polyvinyl acetate as a base polymer. Its underlying technical problem was said to consist in the improvement of the image producibility of water-developable relief image and gravure plates manufactured from compositions known from the state of the art as exemplified by document (5) (see page 3, lines 34 to 39 in combination with page 2, lines 3 to 4 and 15 to 16 of the disputed patent).

4.1 Document (1), which was not cited in pre-grant proceedings, discloses compositions for the manufacture of printing plates with very good wear characteristics. The printing plates are obtained by water-developing after exposure to light and avoiding the use of volatile organic

solvents (see page 1, line 76 to page 2, line 5, and page 2, lines 50 to 54). Their composition is similar to that of the presently claimed one and was already given (see above point V). As this citation addresses the wear characteristics of the respective printing plates, the Board accepts the Appellant's view that it should be the starting point for evaluating inventive step.

In view of this document, a redefined technical problem has to be taken as the basis for such an assessment.

4.2 The Respondent has submitted that no cracks are generated in the printing plates manufactured from compositions according to Claim 1 of the present patent after more than 500 000 consecutive printing tests whereas, by contrast, fine cracks are often generated under such conditions in printing plates according to the state of the art, e.g. in plates according to original Example 3 (see the submissions dated 29 January 1988, No. 7, and of 21 December 1988, Nos. 8 and 16). Having regard to these figures, which were not disputed by the Appellant, this submission is evidently based on experiments and is therefore accepted by the Board. The former Example 3, now deleted from the scope of the claimed invention, is representative for the state of the art, i.e. for document (1), as was also pointed out by the Appellant (Grounds for Appeal, page 6, paragraph 2).

Therefore, for the purpose of assessing inventive step, the technical problem can be redefined as being the improvement of the image producibility of the known printing plates in long-run printing of more than 500 000 prints.

4.3 The Appellant has submitted that any amendment of the technical problem has to be in line with Article 123(2)

EPC. This Article, however, governs amendments of a European patent application or - as in the present case - of a European patent. It is not concerned with the issue, whether or not an objectively reformulated technical problem may be used in the course of the so-called "problem-solution approach" which was developed by the Boards as a tool for achieving objectivity and to avoid ex post facto analysis in the assessment of inventive step. Therefore, Article 123(2) would only come into play if an amended technical problem was incorporated into the description itself, which is not the case here. Thus, the Appellant's objection fails on this ground.

4.4 Inventive step can be assessed on the basis of the amended technical problem, as defined in the paragraph 4.2 above, as it amounts only to a more elaborated formulation of the problem stated in the disputed patent, and in the application documents originally filed, where the problem of crack formation was already addressed (see page 5, lines 13 to 14 and lines 60 to 61 of the patent in suit, corresponding to page 10, lines 19 to 20, and the sentence bridging pages 13 and 14 of the application documents as originally filed). Thus, in the Board's judgment, this problem was clearly derivable from the application as filed.

4.5 According to the disputed patent, this technical problem is essentially solved by making printing plates from a photosensitive polymer composition as specified in Claim 1, for which the Examples 1 and 2 are representative.

No facts or arguments were submitted by the Appellant, or are otherwise known to the Board, which could call in question the beneficial effect advanced by the Respondent for these compositions. This also holds for such

compositions of Claim 1 as comprise the components as defined under B(b). For this reason, the Appellant's objection in this respect is disregarded by the Board, applying the principles laid down in T 219/83, in particular paragraph 12 of the Reasons for the Decision (OJ EPO 1986, 211).

Hence, the Board is satisfied that the subject-matter of Claim 1 plausibly solves the problem as defined.

5. Inventive Step

It still remains to be decided whether the requirement of inventive step is met by the claimed subject-matter.

5.1 As previously mentioned, document (1) discloses photopolymerisable compositions comprising components A, B, and D, and, optionally, low molecular polyols (page 2, lines 5 to 26, in combination with page 2, line 83 to page 4, line 21, in particular page 2, lines 83 to 97, page 3, lines 67 to 91, and page 3, lines 103 to 115; page 4, lines 22 to page 5, line 57, in particular page 5, lines 24 to 45; page 6, lines 70 to 80; page 5, lines 58 to 121). Components A and D are basically the same as in the disputed patent and the optional polyols (disclosed on page 6, lines 78 to 80) correspond to component C of present Claim 1.

The addition-polymerisable compounds of component B contain one or, preferably, a plurality of ethylenic linkages (page 4, lines 24 to 31). Examples of suitable components B are disclosed on page 4, lines 95 to 110 and those with a plurality of addition polymerisable ethylenic linkages, particularly in conjunction with ester or amide structures, are given in the paragraph bridging pages 4 and 5. Particularly preferred are the esters and amides of

alpha-methylene carboxylic acids and substituted acids with polyols or polyamines, where the chain of carbon atoms between the hydroxy or amino groups may be interrupted by oxygen (page 5, lines 24 to 30). Component B should preferably be compatible with and desirably exhibit plasticising or solvent action for the components A and D (page 4, lines 69 to 75). Such compatibility could be improved by the presence of strongly polar substituents, inter alia hydroxy, in the compounds of component B (page 5, lines 24 to 40). There is neither a generic disclosure, nor an example in reference (1) of the particular structural feature of the components B in present Claim 1, i.e. that in the molecule the number of hydroxy groups is the same as the number of the (meth)acryloyl groups.

Hence, there is no hint in reference (1) to this particular structural feature, let alone that this feature could be useful to reduce crack formation in the printing plates and, thus, to improve the picture producibility in long-run printing.

The Board, of its own motion (Article 114(1) EPC), has also considered the fact that Examples 1 and 2 differ from former Example 3 not only in component B, but also in component C: The plasticiser used in the latter example is ethylene glycol (about 5%; page 9, line 27) while it is diethylene glycol in Examples 1 and 2 (about 10% and 5% respectively; page 7, line 44 and page 8, line 35). Neither did the Appellant submit, nor can the Board find - in view of the disclosure of documents (3) and (4) - that this difference has a technical bearing (see also point 5.4, below). Therefore, in the absence of evidence to the contrary, the said beneficial effect obtained with the photopolymerisable compositions in question can be plausibly related to component B.

It follows that it is irrelevant in this context whether the low molecular polyols disclosed in (1) as possible additives act as a "compatible plasticizer" or as a "compatibilizer".

5.2 Similarly, no hint can be found relating to the above mentioned particular structural feature of the components B as required by present Claim 1 in documents (2) and (3). While these citations disclose the use of low molecular compounds having at least one olefinic photopolymerisable double bond, inter alia, of di- or tri(meth)acrylates of di- or polyols, their technical teaching does not go beyond that what was known already from reference (1) in this respect (document (2), page 6, second paragraph, in particular lines 29 to 32, page 7, fourth paragraph, in particular lines 27 to 32, and page 8, second paragraph; document (3), Claims 1 and 4 in combination with page 4, line 5 to page 6, line 28, and page 8, lines 9 to 13).

5.3 Reference (5) discloses, inter alia, compounds of the formula (after amendment of obvious clerical errors) $[CH_2 = C(CH_3)COOCH_2CH(OH)CH_2O]_2 = R$ wherein R is a polyalkylen glycol residue derivable from a glycol with 2 to 5 carbon atoms as component B in photosensitive polymeric compositions (see Claim 1, alternative 1a, and Claim 3 in combination with page 7, No. 5 and Claim 11). The only disclosure regarding the quantitative amount of component (B) is that generally one mole equivalent of unsaturated groups are required per 100 g to 100 000 g of the photopolymerisable composition (page 10, lines 7 to 10). This, in the Board's judgment, gives no hint as to the particular amounts now being claimed.

This document relates to the technical problem to increase the heat-resistance and shelf life of photopolymerisable

polymer compositions which can be used as printing plates without impairing their photosensitivity (page 5, last paragraph), and not to the problem of how to increase the image producibility. Therefore, in the Board's judgment, a person skilled in the art would not have considered this document when looking for the envisaged improvement, since it does not relate to the problem of image producibility in long-run printing at all.

5.4 The lack of crack-formation is linked to the increase in flexibility of the polymer as the Respondent explained in his submission of 29 January 1988. This increase of flexibility was said to be due to the incorporation of the ether linkages of component B into the polymer chains (page 2, point 7).

Referring to documents (3) and (4), the Appellant stated that it was already known to increase the flexibility of such compositions by incorporation of compounds containing ether linkages into the PVA polymer (submission dated 31 May 1988, pages 6 and 7). The Appellant, therefore, concluded that it was clear to the skilled man that the flexibility of the plates manufactured from these compositions could be controlled also by the incorporation of photopolymerisable monomers comprising ether linkages.

Citation (4) indeed discloses that anhydrous PVA is brittle and that, accordingly, the use of plasticisers is unavoidable for certain applications (see page E2, right-hand column). It also discloses the use of plasticisers with polar and hydrophilic groups to avoid "bleeding". However, while polyethylene glycols with a molecular weight of up to about 400 are mentioned as plasticisers, these polyethylene glycols with ether linkages are put on an equal footing with polyhydroxy compounds having no ether linkages such as ethylene glycol, glycerol, etc.

(page E3, right-hand column, second paragraph and page G22). Thus, document (4) gives no information about the effect of incorporating ether linkages either into the PVA-polymer or into the plasticiser.

Similarly, document (3) teaches that the desired hardness of the printing reliefs, and their compatibility with the polymer, induce the selection of the photopolymerisable monomers, together with the requirement that the composition remains soluble or dispersible in water (page 7, lines 22 to 29). Photopolymerisable monomers with ether linkages are on a par with those comprising no ether linkages in the list on page 8, lines 2 to 10; polyethylene glycol di(meth)acrylates being only one of several possibilities.

Hence, neither document (3) nor document (4) can be construed as supporting the Appellant's above conclusion, since none of these two documents foreshadows the particular structural features of the photopolymerisable monomers of present Claim 1, and its effect on the properties of the respective printing plates in long-run printing.

5.5 It is appropriate to point out that, according to the established jurisprudence of the Boards of Appeal, the decisive question is not whether a skilled person could have performed the subject of the patent in suit but rather whether he would have done so in the expectation to solve the underlying technical problem. It is often possible to show after an invention has been made that a skilled person could have been led to it by combining separate pieces of prior art, but such considerations must be disregarded as resulting from an ex post facto analysis.

In the Board's judgment, the Decision T 21/81 relied upon by the Appellant is not relevant to the present case, because it relates to an apparatus which a skilled person would have made having regard to the cited prior art, even if he was not aware of all the advantages which were inherent to it. As has already been explained, the compositions of Claim 1 would not have been found by a skilled person and, hence, this decision is not applicable to the present case.

5.6 It follows from the above that the subject-matter of the present Claim 1 would not have been obvious to the notional skilled person in the light of the cited documents.

Dependent Claims 2 to 9 relate to particular embodiments of the subject matter of Claim 1; they too involve an inventive step.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

E. Görgmaier K. Jahn