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D E C I S I O N
of 26 June 2003

Case Number: T 0047/00 - 3.4.2

Application Number: 94112159.2

Publication Number: 0640876

IPC: G03F 7/033

Language of the proceedings: EN

Title of invention:

Aqueous developable flexographic printing plate

Patentee:

E.I. DU PONT DE NEMOURS AND COMPANY

Opponent:

BASF Aktiengesellschaft Patente, Marken und Lizenzen

Headword:

-

Relevant legal provisions:

EPC Art. 54, 56

Keyword:

"Main request - novelty and inventive step (no)"
"Auxiliary request - novelty and inventive step (yes)"

Decisions cited:

T 0561/94, T 0141/93, T 0412/91, T 0020/81, T 0583/93

Catchword:

-



Case Number: T 0047/00 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 26 June 2003

Appellant: BASF Aktiengesellschaft
(Opponent) Patente, Marken und Lizenzen
D-67056 Ludwigshafen (DE)

Representative: -

Respondent: E.I. DU PONT DE NEMOURS AND COMPANY
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Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted
29 November 1999 concerning maintenance of
European patent No. 0640876 in amended form.

Composition of the Board:

Chairman: E. Turrini
Members: M. A. Rayner
B. J. Schachenmann

Summary of Facts and Submissions

I. The present appeal was lodged by the opponent (appellant) against the interlocutory decision of the opposition division that taking account of the amendments made by the proprietor, European patent number 640 876 (application number 94 112 159.2) and the invention to which it relates meets the requirements of the Convention. The patent concerns a process for preparing a photosensitive element, a photosensitive element and a process for preparing a flexographic printing plate.

II. Evidence in the Proceedings

Reference has been made during the proceedings to, amongst others, the following documents, to which the board will make reference according to the notation given:

D1: EP-A-0 356 953,

D2: US-A-5 075 192,

D3: "Emulsion Polymers and Emulsion Polymerization",
DR Basset, AE Hamielec, eds., ACS symposium
Series, Vol. 165 (Washington DC, 1981) especially
pages 371 and 387,

D4: DE-A-21 63 461,

A1: Declaration of Paul Thomas Shea (named as co-inventor in the patent in dispute) dated 15 November 1995 and submitted during prosecution of a parallel U.S. case, and

A2: Declaration of Paul Thomas Shea dated 6 October 1999, referring to document A1 and submitted during the opposition proceedings.

III. Reasoning for the Decision of the Opposition Division

The opposition division found that a feature in claim 1 of the appellant's main request pertaining to at least 10% of monomer remaining unpolymerised could not be found in document D1, so that the subject matter of claim 1 was novel. With reference to the photosensitive element according to claim 5 involving a shell copolymer obtainable from a polymerisation reaction as claimed in claim 1, the division considered that the opponent had not shown that it would be possible to provide the same properties (Shore A hardness, resilience) using the teaching of document D1, the division thus considering the subject matter of this claim also novel. Furthermore, the division considered it surprising that incomplete polymerisation of the core and the immediate production of the shell with the remaining core polymers and additional shell polymers avoided excessive cross linking of the core, leading to excellent melt processability and printing properties. Thus the division reached the view the subject matter of claims 1 and 5 can be considered to involve an inventive step within the meaning of Article 56 EPC. In the process of claim 19, a photosensitive element according to claim 5 is imagewise exposed, so that this

claim can be considered directed to subject matter involving an inventive step for the same reasons as claim 5.

IV. Appeal Proceedings

A notice of appeal and a statement setting out grounds therefore were filed and the views of the parties exchanged in writing. In its submissions, the appellant posed a number of questions to the board. Oral proceedings were appointed consequent to auxiliary requests filed by both parties. In a communication annexed to the summons to oral proceedings, the board commented that one point for discussion seemed to be what exactly is meant by the claim terminology concerning "elastomeric monomer". Furthermore, points of law involved with the questions raised by the appellant in the written statements setting out the grounds for appeal were not as such subject of the proceedings but seemed only to be relevant as far as the specific circumstances of the present case were concerned. During the oral proceedings, claims according to a main and auxiliary request of the patentee (respondent) were discussed.

V. Independent Claims of the Patent in dispute

Main Request

"1. A process for preparing a photosensitive element comprising:

(a) polymerizing an elastomeric monomer as a latex dispersion to form an elastomeric core, wherein at

least 10% by weight of the elastomeric monomer is unpolymerized;

(b) copolymerizing the unpolymerized elastomeric monomer with an ethylenically unsaturated monomer or oligomer having acidic functionality to form a shell over the elastomeric core;

(c) substantially removing the water;

(d) mixing the binder with (i) at least one ethylenically unsaturated monomer or oligomer, and (ii) a photoinitiator system;

and

(e) applying the mixture from step (d) to a support to form a layer,

wherein step (c) can be carried out after step (b) or step (d), or simultaneously with step (d).

5. A photosensitive element comprising a support and a photosensitive layer, said photosensitive layer comprising:

(a) an elastomeric microgel binder having a core comprising a homopolymer or copolymer of an elastomeric monomer and a shell comprising a copolymer of unreacted elastomeric monomer and a monomer having acidic functionality;

(b) at least one ethylenically unsaturated monomer or oligomer; and

(c) a photoinitiator system,

wherein the shell copolymer is obtainable from a polymerization reaction between the remaining core monomer from the core polymerization and a monomer having acidic functionality, said polymerization reaction being as defined in claims 1 to 4.

19. A process for preparing a flexographic printing plate comprising:

- (a) imagewise exposing to actinic radiation a photosensitive element comprising a support and a photosensitive layer according to claim 5;
- (b) removing the unexposed areas of the photosensitive layer by washing with an aqueous solution;
- (c) optionally applying a post-development treatment selected from the group consisting of drying, post-exposing to actinic radiation, light finishing, and combinations thereof."

Auxiliary Request

Claim 1 differs from that of the main request by recitation of "wherein the elastomeric monomer is selected from butadiene, isoprene, neoprene, urethanes and mixtures thereof," after the second reference to elastomeric monomer in feature (a) thereof. Claim 5 differs from that of the main by recitation of "being selected from butadiene, isoprene, neoprene, urethanes and mixtures thereof," after the first reference to elastomeric monomer in feature (a) thereof. Claim 19 is the same as that of the main request.

VI. The case of the appellant can be summarised as follows:

Requests

Setting aside of the decision under appeal and revocation of the patent.

Arguments

According to the appellant, examples K and L of document D1 (Table I), involving elastomeric monomers, disclose that the core monomer and one of the shell monomers are the same, more than 10% of this monomer being polymerised in the shell, this disclosure resulting in lack of novelty of the photosensitive element of claim 5. The process according to claim 1 is not inventive as the patent in dispute simply concerns a basically known method (see documents D3 and D4) for producing the known material. Moreover, no support for inventive step is offered by a technical effect of low cross linking as this has not been adequately demonstrated even in respect of butadiene, let alone over the whole range claimed (including acrylates or methacrylates - see decisions T 20/81 and T 583/93). The skilled person would not expect that all initiators would, independently of the chemical structure, penetrate just as well into the microgel core, but would expect differences. Other parameters of the reaction, such as temperature or concentration also affect the result.

The appellant also asked whether (1) the tests according to documents A1 and A2 are in accordance with decisions T 561/94 and 141/93; (2) it is permissible to depart in a decisive parameter in comparative tests, if just this parameter should be shown in the prior art; (3) it is possible in principle to base patentability of the claim on the non-reproducibility of the prior art, even when this non-reproducibility is not apparent (see decision T 412/91); and (4) the patentee and opponent have the same burden of proof as to non-

reproducibility and non reproducibility is proven in the present case.

VII. The case of the respondent can be summarised as follows:

Requests

Dismissal of the appeal, i.e. the main request is that the patent be maintained in amended form on the basis of the claims filed according to main request filed on 11 October 1999. On an auxiliary basis, maintenance of the patent on the basis of the set of claims filed according to the sole auxiliary request before the board (corresponding to the second auxiliary request filed on 11 October 1999).

Arguments

The process for preparing the microgel according to document D1, including examples K and L is significantly different and this document does not disclose the critical value of 10% residual monomer. A product with a core/shell configuration deriving from 2-ethylhexylacrylate and 2-ethylhexylacrylate/methacrylic acid would not involve an elastomeric monomer. During the opposition proceedings (see for example the penultimate paragraph on page 4 of the letter dated 11 October 1999) and the written appeal proceedings (see middle paragraph on page 3 of the letter dated 12 October 2000), the patentee/respondent had argued that acrylates are not elastomeric monomers according to the definition of the patent. This led to the respondent concluding that the allegation that the technical effect does not exist for the whole breadth

of the claimed subject matter is based on ignoring the definition of elastomeric monomer (page 3, lines 46 to 48 of the patent). It is moreover incorrect that documents D3 and D4 disclose a process according to the invention.

The respondent modified its position during the oral proceedings before the board by submitting that according to its research department, a product deriving from 2-ethylhexylacrylate and 2-ethylhexylacrylate/methacrylic acid as core/shell configuration and made according to the claimed process would also be expected to have advantageous properties and such a configuration was included in the claims of the main request.

VIII. At the end of the oral proceedings, the board gave its decision.

Reasons for the Decision

1. Admissibility of the appeal

The appeal complies with the provisions mentioned in Rule 65(1) EPC and is therefore admissible.

2. Amendments (Article 123 EPC)

Claims 1, 5 and 19 of the main request derive from claims 15, 1 and 19 as granted. Claim 5 contains the further "product by process" limitation, "said polymerization reaction being as defined in claims 1

to 4" (the word "obtainable" being used instead of "formed"). A consequential change of reference to claim 5 instead of claim 1 is made in claim 19. The monomers claimed in claims 1 and 5 of the auxiliary request limit the claim and can be found on page 3 of the granted specification (lines 47 to 48) and the corresponding part of the original application.

Therefore, the amendments are in compliance with Article 123 EPC.

3. *Pertinent content of documents in proceedings*

3.1 Prior art Documents

Document D1

Document D1 discloses photosensitive compositions useful in preparing flexographic printing plates by forming of a layer (see the introduction). An aqueous processible solid photosensitive composition for making relief plates comprises an addition photopolymerizable ethylenically unsaturated monomer; a photoinitiator or photoinitiating system activated by actinic light; and a core shell microgel binder; wherein the core shell microgel binder has two domains, a core having less than 10% crosslinking and an aqueous processible non-crosslinked outer shell consisting of an acid-modified copolymer, the monomer partitioning in the shell of the microgel (see for example claim 1). Washing takes place (e.g. page 12, line 51)

Among the microgels shown in Table 1 as produced and tested and found useful are included microgels K and L. The core of microgel K is given as 98 parts by weight of 2-ethylhexyl acrylate, the shell being given as 80 parts by weight of 2-ethylhexyl acrylate and 20 parts methacrylic acid. Core shell ratio is 2:1. The core of microgel L is given as 98 parts by weight of n-butyl acrylate, the shell being given as 80 parts by weight of n-butyl acrylate and 20 parts methacrylic acid. Butadiene (100 parts) is used as core for microgel compositions D and E, the shells in both cases being 80 parts by weight of n-butyl acrylate and 20 parts methacrylic acid.

Document D1 also mentions that a known microgel synthesis can be modified by beginning the reaction with one set of monomers and by varying the ratios for the final part of the reaction in order to produce spherical microgels in which the part of the polymer, i.e., the core is different monomeric composition than the outer part of the polymer, i.e., shell (see page 5, lines 32 to 37).

Document D2

Document D2 is a continuation in part US patent, with a pertinent disclosure analogous to that of document D1.

Document D3

Page 371 of this document mentions that emulsion polymers can properly be called products by process since the process details exert such a powerful effect on the properties of the particles and resultant films.

One way of altering the properties of latex particles is to change the monomer feed composition during the polymerisation. It is reported that much work had been carried out on multistage processes in which the composition of each stage differs from that of the preceding stage. Not only are the multistage processes cumbersome to carry out in practice, but often incompatibility of the copolymers produced in the various stages leads to poor end use properties, especially in thin films. A process is reported in document D3 for continuously changing the composition of the monomer mix fed into a reactor producing thereby copolymers, instantaneous compositions of which vary as the polymerization proceeds.

Document D4

Document D4 discloses graded polymer particles comprising a core of a cross-linked acrylic polymer derived from a major proportion of a monofunctional acrylate and a minor proportion of a cross-linking agent; an outer shell of a polymer derived from methyl methacrylate or a mixture of methyl methacrylate and one or more ethylenically unsaturated monomers polymerizable therewith and containing at least 30 mole percent of methyl methacrylate and an intermediate layer of a polymer derived from the monomer components of said core and said shell. Polymer particles are prepared in a first stage, where a major amount of a monofunctional monoacrylate is emulsion copolymerized with a minor amount of a crosslinking monomer. Before this reaction reaches substantial completion, i.e. when the conversion of monomers is from 50 to 90, preferably from about 70 to 89, weight percent complete, the

second stage monomeric component, i.e. methyl methacrylate or a monomer mixture comprising methyl methacrylate, is slowly added to the reaction mixture. The latex is coagulated, washed, and dried to yield a finely divided powder suitable for conventional methods of moulding, e.g. compression or injection. Document D4 also mentions use as modifiers of thermoset polymers and as intermediates for forming other rubber-like and/or rubber modified materials.

3.2 Declarations of Paul Thomas Shea

Document A1 and A2 have a similar content, pertinent points of which are that experiments were conducted to prepare flexographic printing plates made from photosensitive elements containing microgels similar to microgels D and E of document D1. These materials could not be melt processed as the microgels were crosslinked well above the 10% limit for elasticity. The resulting polymer could not be milled and would crumble into a powder instead of melting. It was determined that the catalyst used to polymerize the shell (tert butyl hydroperoxide) imbibed into the core causing further crosslinking of the butadiene core. Torque rheometer experiments showed conclusively that butadiene core microgel when treated with shell catalyst would render polybutadiene core microgel un-processible. This had not been a problem when making microgels from 2-ethylhexylacrylate. It was believed that the teachings of document D1 were accurately followed when forming butadiene core microgels, since formation of 2-ethylhexyl acrylate core microgels was successful. These 2-ethylhexyl acrylate core microgel materials were able to be melt processed for a photosensitive

element. Hardness and resilience of flexographic plates of the examples in the instant patent (butadiene core, Shore a hardness greater than 66 and resilience no less than 24%) are a significant improvement over the flexographic printing plates made according to example 2 of document D1 (Shore a hardness 89 and resilience 22%) with ethylhexyl acrylate as core.

4. *Main request*

- 4.1 A photosensitive element comprising a support and photosensitive layer and a photoinitiator system is disclosed by document D1 and both the known photosensitive element and that as claimed in claim 5 comprise a binder of a core shell structure and, for instance, example K of document D1 provides microgels with a constituent common to core and shell (2-ethylhexylacrylate). Claim 5 also includes a reference to the shell copolymer being "obtainable" from a polymerization reaction as defined in claims 1 to 4 and, as the other claimed features do not enable the skilled person to differentiate between the claimed element and that of document D1, the context for consideration of the claimed subject matter is that of a "product by process" claim, i.e. the product as such must satisfy the requirements for patentability. The key feature then becomes that identified by the opposition division, namely the part after the comma of the feature in claim 1 "polymerizing an elastomeric monomer as a latex dispersion to form an elastomeric core, wherein at least 10% by weight of the elastomeric monomer is unpolymerized", which feature is, in particular, not disclosed by the reference on page 5 of document D1 to varying the ratios for the final part of the reaction.

4.2 The initial line of argument pursued by the respondent in written submissions was simply that, for instance the 2-ethylhexylacrylate used according to example K of document D1 could not be considered compatible with the term "elastomeric monomer" used in the patent in dispute, which would mean that this example is not included in the claim, thus indicating presence of novelty, even without showing any difference in properties between the photosensitive element as claimed in claim 5 and as disclosed in document D1. However, during the oral proceedings, the respondent modified its position by taking the line that 2-ethylhexyl acrylate was indeed included in the claim. This modified position is therefore that to be dealt with by the board.

4.3 In reaching to its decision, the board first came to the view that in the case of microgels with butadiene in the core/shell, the tests performed according to documents A1 or A2 do indeed show different hardness and resilience properties in relation to the disclosure of document D1. The tests indicate that the method of document D1 could not even be carried out effectively according to the teaching of document D1 due to cross-linking of the butadiene core consequent to shell initiator. However, documents A1 and A2 also make clear that 2-ethylhexyl acrylate was able to be processed for a photosensitive element as further cross-linking of the core, which had caused the problems with butadiene, is indicated as not having been a problem (see especially the middle paragraph on page 2 of A1, for example). The respondent did not offer any other specific evidence as to properties of a photosensitive

element with a binder comprising 2-ethylhexylacrylate as elastomeric monomer when synthesised according to claim 1, but relied only on a general statement that it would, as shown in documents A1 and A2, have better properties than when formed as in document D1, which statement was not sufficient to counter its own results in documents A1 and A2 indicating there was no crosslinking problem with 2-ethylhexyl acrylate. Thus, once the respondent had made clear during the oral proceedings just how much it understood to be within the ambit of the term "elastomeric monomer" the board was no longer in a position to consider documents A1 and A2 as sufficient for establishing a difference over document D1 upon which a positive view on substantive patentability could be based. Therefore, as far as the main request is concerned, the board had to conclude the appeal is successful.

5. *Auxiliary Request*

5.1 Novelty

Novelty of the subject matter of claim 5 is present because in the disclosure of document D1 specific selection of monomers common to core and shell does not include butadiene, isoprene, neoprene, urethanes and mixtures thereof. Claim 1 also refers to specific monomers and contains the novel feature relating to "at least 10% by weight of the elastomeric monomer is unpolymerized". The reference in claim 19 to a photosensitive element according to claim 5 being imagewise exposed, means that claim 19 can be considered directed to novel subject matter for the same reasons as claim 5.

The board is therefore satisfied that the subject matter of claims 1, 5 and 19 meet the requirements of Article 54 EPC.

5.2 Inventive step

Since document D1 (or D2), unlike documents D3 and D4, is concerned with photosensitive compositions useful in preparing flexographic printing plates which can be made from these photosensitive compositions, the board considers this document to represent the closest prior art. The problem solved by the novel features pertaining to selection of elastomeric monomer and 10% thereof unpolymerised is that of providing an improved photosensitive element.

It can be seen from documents A1 and A2 that the method of document D1 leads to excessive crosslinking of a (butadiene) core owing to imbibing of the catalyst used to polymerise the shell into the core. This problem does not occur with 2-ethylhexyl acrylate as taught by examples in document D1. The flexographic plate produced in accordance with the claims in dispute is improved in relation to document D1 by having greater resilience and lower Shore A hardness. The improvement cannot be considered obvious from document D1 because, while butadiene is mentioned in a general way as a possible monomer and present explicitly only in the cores of microgels D and E, no hint is given either towards better properties than the 2-ethylhexyl acrylate examples consequent to monomer selection or towards difficulties associated with excessive cross linking.

The submissions of the appellant in relation to documents D3 and D4 are not specific to the monomers claimed in the patent in dispute and the appellant has failed to provide a link between these documents and document D1. Why should the skilled person expect from any of documents D1, D3 or D4 that difficulties with photosensitive elements occur because a crosslinking problem of the selected elastomeric monomers in the microgel binder? The board can see no reason for an adaptation of the teaching of document D1 to use methods disclosed in document D3 or D4 other than using hindsight. Thus, although the skilled person could try aspects of the processes disclosed in documents D3 and D4, the board's view is thus that this approach falls squarely in the "could" part of the "could/would" question often posed in relation to inventive step and thus does not amount to a successful challenge to inventive step. Accordingly, the appellants' argument fails. Moreover, more general remarks of the appellant about the possibility of varying process parameters such as temperature and concentration or nature of initiator, such that a situation is created where difficulties with the photosensitive element as claimed would exist, do not weaken the inventive step, since the respondent has shown that a problem exists which the invention solves.

Since the monomers claimed no longer include for instance example K of document D1, the line of argument of the appellant against the main request and involving reference to decisions T 20/81 and T 583/93 in relation to proving the technical effect for such monomers is no longer relevant.

The questions posed by the appellant amount to generalisations going beyond what is necessary for reaching a decision on the present case. So far as pertinent to the present case, the board observes in relation to questions 1 and 2 that crosslinking is shown as avoided in the case of a claimed monomer (butadiene) by documents A1 and A2, i.e. the relationship between the effect and distinguishing feature is shown. Thus, the board has not identified any inconsistency with decisions T 141/93 (see point 3.2.4, properties not shown as deriving from to chalk premix method step) and T 561/94 (see point 4.4 of the reasons - nature of comparison must be such that the effect is convincingly shown to have its origin in the distinguishing feature and alleged but unsupported advantages cannot be taken into account).

Problems associated with butadiene and excessive cross linking were not recognised in the teaching of document D1, so the skilled person would have understood document D1 simply as teaching that, amongst others, microgels D and E were tested and found useful. This understanding does not detract from the assessment of inventive step of the presently claimed subject matter made above and thus so far as questions 3 and 4 in relation to reproducibility of the teaching of document D1 relating to butadiene are concerned, the board can, in the present case, see no reason in the light of decision T 412/91 for further investigation as part of its examination of inventive step.

No other document in the proceedings presents any reason for calling the inventive step of the subject matter of the claims into question.

Therefore, the process for preparing a photosensitive element as claimed in claim 1 and the photosensitive element according to claim 5 can be considered as subject matter involving an inventive step. The same applies to the process for preparing a flexographic plate as claimed in claim 19 as this involves exposing a photosensitive element as claimed in claim 5. The requirements of Article 56 EPC are therefore met by the independent claims of the auxiliary request.

6. *Further procedure*

Consequent to the introduction into claims 1 and 5 of the feature concerning the elastomeric monomer being "selected from butadiene, isoprene, neoprene, urethanes and mixtures thereof", attention must be given to the remaining patent specification to ensure that it is adapted for consistency with the amended independent claims (see, for example, page 3a, lines 46 and 47 or page 4, line 29 of the pages upon which the decision of the opposition division was based).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent in amended form on the basis of claims 1, 5 and 19 of the auxiliary request (former second auxiliary request of October 11, 1999) with the remaining patent specification to be adapted.

The Registrar:

The Chairman:

P. Martorana

E. Turrini