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Datasheet for the decision of 30 June 2011

Case Number: T 1239/08 - 3.3.01

Application Number: 99950192.7

Publication Number: 1123358

IPC: C09D 11/00

Language of the proceedings: EN

Title of invention:
Dispersions having improved stability

Patentee:
E.I. DU PONT DE NEMOURS AND COMPANY

Opponent:
Avv. Guido Cipriani

Headword:
Cross-linked polymer dispersant/DU PONT

Relevant legal provisions:
EPC Art. 54, 123(2), 56

Relevant legal provisions (EPC 1973):
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Keyword:
"Late-filed document (admitted): confirmation of previously submitted document"
"Main and first auxiliary request: novelty (yes) - no clear and unambiguos disclosure"
"Inventive step (no) - self cross-linking obvious measurement"
"Second auxiliary request (admitted): amendments (not allowable) - combination of features not disclosed"
"Third auxiliary request: inventive step (yes) - cross-linking via external cross-linker not obvious"

Decisions cited:
T 0666/89, T 0565/90, T 0941/98, T 0332/87, T 0153/85, T 0479/00, T 0870/96

Catchword:
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Case Number: T 1239/08 - 3.3.01

D E C I S I O N
of the Technical Board of Appeal 3.3.01
of 30 June 2011

Applicant: (Opponent)
Avv. Guido Cipriani
C & C Brevetti e Marchi s.r.l.
Via Prisciano 28
IT-00136 Roma (IT)

Representative:
Gill Jennings & Every LLP
The Broadgate Tower
20 Primrose Street
London EC2A 2ES (GB)

Respondent: (Patent Proprietor)
E.I. DU PONT DE NEMOURS AND COMPANY
1007 Market Street
Wilmington, DE 19898 (US)

Representative:
Heinemann, Monica
Abitz & Partner
Patentanwälte
Postfach 86 01 09
D-81628 München (DE)

Decision under appeal:
Interlocutory decision of the Opposition Division of the European Patent Office posted 29 April 2008 concerning maintenance of European patent No. 1123358 in amended form.

Composition of the Board:

Chairman: P. Ranguis
Members: G. Seufert
L. Bühler

Summary of Facts and Submissions

I. The Appellant (Opponent) lodged an appeal against the interlocutory decision of the Opposition Division dispatched on 29 April 2008 on the amended form in which European patent No. 1 123 358 could be maintained.

II. In this decision the following numbering will be used to refer to the documents:

(1) EP 0 732 381
(2) US 3,393,162
(4) JP 9-104834
(5) US 5,708,095
(11) Source-base nomenclature for copolymers, Pure & Appl. Chem., vol. 57, No. 10, 1427-1440
(13) Additional data to Support Graft > Block >> Random; Comparison of Random linear, AB Block and Graft submitted by the Respondent
(14) Pigment Encapsulation, Presentation by Karyn B. Visscher, October 2007

III. Opposition was filed requesting revocation of the patent in suit in its entirety on the grounds of lack of novelty and inventive step and insufficiency of disclosure (Articles 100(a) and (b) EPC).

IV. The decision under appeal was based on the main request filed on 21 December 2007 and first auxiliary request filed on 28 February 2008 during oral proceedings before the Opposition Division.

The Opposition Division held that
- the invention was sufficiently disclosed,

- the main request was novel over document (2), but lacked novelty over document (1),
- the subject-matter of the first auxiliary request was novel and involved an inventive step over document (5), either alone or in combination with documents (2) or (1).

V. Claim 1 of the set of claims filed on 28 February 2008, which the Opposition Division decided met the requirements of the EPC reads as follows:

"1. A dispersion of particles in a liquid vehicle, comprising:

(a) a liquid vehicle selected from the group consisting of water and combinations of water and organic solvents, wherein the vehicle comprises at least 50% water by weight;
(b) particles that are at least substantially insoluble in the liquid vehicle;
(c) a polymer dispersant having at least one segment soluble in the liquid vehicle and at least one segment insoluble in the liquid vehicle, wherein the polymer is a graft copolymer;
(d) wherein said at least one insoluble segment has cross-1inking moieties that are cross-linked to at least one cross-linkable component which is insoluble in the liquid medium and is selected from the group consisting of itself, a polyfunctional monomer, a polyfunctional oligomer, and a polyfunctional polymer to form a encapsulation network which entraps the particles."

VI. In its statement of grounds of appeal the Appellant contested novelty over document (2) and inventive step over document (2) alone or document (5) in combination with document (4). The ground for opposition under Article 100(b) EPC was no longer relied upon.

VII. With its reply to the statement of grounds of appeal submitted 13 March 2009 the Respondent (Patent Proprietor) defended the maintenance of the patent in suit on the basis of the set of claims filed on 28 February 2008 (hereinafter referred to as the Respondent's main request), which were held to meet the requirement of the EPC, and filed first to third auxiliary requests. Furthermore, the Respondent resubmitted additional experimental data which was filed with letter of 21 September 2007 during the opposition proceedings (document (13)).

VIII. Claim 1 of the first auxiliary request differs from claim 1 of the main request in that the graft copolymer is further defined as having an insoluble backbone and soluble arms.

In the second auxiliary request the claims of the main request were transformed into use claims for inkjet printing.

Claim 1 of the third auxiliary request differs from claim 1 of the main request in that the expression "itself" has been deleted from the group of cross-linkable components in step (d).

IX. By letter of 11 April 2011 the Appellant withdrew its request for oral proceedings. The request for revocation of the patent in suit was maintained.

X. At the oral proceedings before the Board, held as scheduled on 30 June 2011 in the absence of the Appellant, the Respondent filed a new second auxiliary request replacing the second auxiliary requests previously on file and a new fourth auxiliary request, which was withdrawn during the oral proceedings. The Respondent also filed three pages from a presentation by Karyn B. Visscher, one of the inventors of the patent in suit (document (14)).

Claim 1 of the second auxiliary request reads as follows:

"1. Use of a pigment dispersion of particles in a liquid vehicle, wherein the particle comprises a pigment comprising:

(a) a liquid vehicle selected from the group consisting of water and combinations of water and organic solvents, wherein the vehicle comprises at least 50% water by weight;
(b) particles that are at least substantially insoluble in the liquid vehicle;
(c) a polymer dispersant having at least one segment soluble in the liquid vehicle and at least one segment insoluble in the liquid vehicle, wherein the polymer is a graft copolymer;
(d) wherein said at least one insoluble segment has cross-1inking moieties that are cross-linked to at least one cross-linkable component which is insoluble

in the liquid medium and is selected from the group consisting of itself, a polyfunctional monomer, a polyfunctional oligomer, and a polyfunctional polymer to form a encapsulation network which entraps the particles
in inkjet printing."

XI. The arguments of the Appellant provided in the written procedure, to the extent that they are relevant for the decision, can be summarised as follows:

Claim 1 of the main request lacked novelty in view of document (2), in particular example 12 in combination with the teaching in column 3, line 58 to page 4 line 2 of the description. Example 12 was directed to an aqueous particle dispersion using a graft polymer having soluble and insoluble segments. Cross-linking of the insoluble segment to itself by means of heat, which, contrary to the Respondent's view, was not incompatible with aqueous dispersions, was disclosed in the description

The subject-matter of the main request lacked inventive step over document (2) alone or over document (5) in combination with document (4). Example 12 of document (2) had all the features of claim 1 except for the presence of a cross-linking agent. Cross-linking of the insoluble segment with itself and means to achieve it were, however, taught in the description. The skilled person merely had to follow the teaching of document (2) in order to arrive at the claimed subject-matter. The additional experimental data submitted by the Respondent in support of the presence of a surprising effect was vague and inconsistent with the

contents of the application as filed and the admissions made during US prosecution. Moreover, it was not credible that the alleged advantages were present in all claimed graft polymers. Example 1 of document (5) differed from the presently claimed subject-matter in that the insoluble segments were not cross-linked. In the light of document (5) the problem to be solved was the provision of aqueous particle dispersions having improved stability. Cross-linking as a solution to this problem was obvious from document (4), which belonged to the same technical field, was directed to the same technical problem of providing stable particle dispersions and taught cross-linking as a mandatory feature of its technical solution.

The amendments in claim 1 of the third auxiliary request contravened Article 123(2) EPC. The deletion of "block" polymers along with the deletion of "itself" generated a new selection, which had no basis in the application as filed. Furthermore, claim 1 of the third request did not involve an inventive step over document (2). The use of external cross-linkers as opposed to self cross-linking was well known, as could be seen from document (4). Claim 1 of the third auxiliary request also lacked inventive step over the combination of documents (5) and (4). Document (4) already taught the use of external cross-linkers and since example 1 of document (5) did not contain co-reactive groups, cross-linking using an external cross-linker was an obvious choice.

XII. The arguments of the Appellant provided in the written procedure, to the extent that they are relevant for the decision, can be summarised as follows:

Claim 1 of the main request was novel over document (2). The Appellant purposively combined separate embodiments of this document which were not linked in any way. Moreover, the heat treatment for the cross-linking disclosed in document (2) was not applicable to aqueous dispersions and the copolymer of example 12, lacking self cross-linkable groups, could not be cross-linked.

The subject-matter of claim 1 of the main request was inventive over document (2) or the combination of document (5) with document (4). Document (2), published well before inkjet printing was available, was not a suitable starting point considering that the patent aimed at providing pigment dispersions usable in aqueous dispersions for inkjet application. In any case, with a cross-linking temperature of about 150°C the skilled person would not consider cross-linking in an aqueous system. In addition, the unexpected effect that cross-linked graft polymers were superior to cross-linked random and block polymers were not obvious from document (2). There was also no indication in document (2) regarding improved flocculation or temperature stability. The claimed subject-matter was not obvious from the combination of documents (5) and (4), because according to the latter, excellent stability was achieved by virtue of acid precipitation, not cross-linking.

The amendments in the second auxiliary request found their basis in the application as filed. The use of pigment dispersions in inkjet printing was disclosed on page 2, lines 7-20 of the original description. The

feature concerning the amount of water present in the liquid vehicle was based on original claim 2 as well as page 3, lines 32-34. The latter in its context also provided the link to inkjet printing. The graft polymer was a further preferred embodiment.

The subject-matter of claim 1 of the third auxiliary request involved an inventive step. Document (2) failed to teach the use of external cross-linkers. It also failed to recognise the superior stabilising effects of the graft polymer and the improved temperature stability. Document (4) could not provide a motivation for the use of external cross-linkers, since the excellent stability was not the result of cross-linking, which led to dispersion with poor stability, but acid precipitation. This was apparent from table 2 as well as paragraph [0207] of document (4). Moreover, document (4) was not related to polymer dispersants having soluble and insoluble segments.

XIII. The Appellant requested in writing that the decision under appeal be set aside and that the patent be revoked in its entirety.

XIV. The Respondent requested that the appeal be dismissed or alternatively that the patent be maintained on the basis of the first auxiliary request filed with letter of 13 March 2009, or the second auxiliary request filed during oral proceedings, or the third auxiliary request filed with letter of 13 March 2009.

XV. At the end of the oral proceedings the decision of the Board was announced.

Reasons for the Decision

1. The appeal is admissible.

2. Admissibility of late-filed document

Document (14) was submitted by the Respondent during oral proceedings as confirmation of data submitted with the Respondent's letter of 13 March 2009 (document (13)) concerning the stability of the cross-linked pigment dispersions in relation to the dispersant architecture. Document (13) had already been submitted during the opposition proceedings and the Appellant had already presented its comments and arguments with regard to this document in its statement of grounds of appeal and took the opportunity of providing further comments on this issue with its reply to the Respondent's letter of 13 March 2009. Since document (14) did not provide additional evidence, on which the Appellant would not have had an opportunity to comment, the Board admitted this document into the proceedings.

Main request

3. Amendments and sufficiency of disclosure

The amendments in claim 1 of the main request are based on original claim 2 and page 5, lines 10-12 of the original application and limit the claims as granted. The Board therefore concurs with the findings of the Opposition Division that the requirements of Article 123(2) and (3) EPC were met. No objections

concerning this issue were raised by the Appellant in the opposition or appeal proceedings.

Furthermore, the Opposition Division held that the patent in suit disclosed the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art. The Appellant no longer raised objections with respect to this issue and the Board sees no reason to deviate from the Opposition Division's findings. It is therefore not necessary to give detailed reasons in this respect.

4. Novelty

4.1 According to the Appellant, claim 1 of the main request lacked novelty over document (2), particularly over example 12 in combination with the general disclosure in column 3, line 58 to page 4, line 2 and more particularly the disclosure in column 3, lines 66-73.

4.2 Claim 1 of the main request is directed to a dispersion of insoluble particles in a liquid vehicle with the features (a) to (d) (see point V above). According to feature (d) the insoluble segment of the polymer dispersant has cross-linking moieties which are cross-linked to at least one cross-linkable component which is insoluble in the liquid vehicle and is selected from itself or a polyfunctional mono-, oligo- or polymer to form an encapsulation network.

4.3 Example 12 of document (2) discloses the preparation of a predominantly aqueous pigment dispersion using as a polymer dispersant a copolymer with a relatively hydrophobic main chain (corresponding to the insoluble

segment(s) in step (c) of the presently claimed subject-matter) derived from methyl methacrylate, a small amount of methacrylic acid and the acrylate part of the Carbowax 750, and pendent relatively hydrophilic side chains (corresponding to the soluble segment(s) in step (c) of the presently claimed subject matter) of the polyethylene blocks derived from Carbowax 750, which provide water-dispersibility. In a first step a copolymer solution in isopropanol and methyl ethyl ketone is prepared. Into this solution are ground titanium dioxide pigments. Then water is slowly added under vigorous stirring (i.e. the polarity is changed from "strong polar" to "intensely polar", which is sufficient to precipitate the less polar polymeric component (see document (2), page 3, lines 6-33) and a fine stable pigment dispersion is obtained, which does not flocculate upon addition of further quantities of water. The copolymer of example (12) is a graft polymer according to the IUPAC definition provided in document (11), which was not disputed by the Respondent during oral proceedings. Thus, example 12 discloses a particle dispersion with the features (a) to (c).

The feature that is clearly missing however, is the cross-linking in the precipitated (i.e. insoluble) component, as required for the insoluble segments in the feature (d) of claim 1 of the main request. This was acknowledged by the Appellant (statement of grounds of appeal, page 3, first paragraph under section 6.2.4).

4.4 The part of the description of document (2) relied on by the Appellant describes as a further embodiment of the invention the possibility of cross-linking the

precipitated component with itself. This requires the presence of cross-linkable groups within the precipitated component. In column 3, lines 66-73 of document (2), it is disclosed that for this purpose a suitable precipitated component of the block or graft polymer would be a random copolymer of methyl methacrylate, methacrylic acid and glycidyl methacrylate, which is subsequently cross-linked by heating the dispersion to approximately 150°C. An alternative component would be a random copolymer of acrylate and methylol acrylamide which can be cross-linked by the same heat treatment.

4.5 The Board notes that it is indeed established jurisprudence of the Boards of Appeal regarding the examination of novelty that the teaching of a document is not limited to the detailed information given in the examples, but embraces the disclosure of that document as a whole (see e.g. T 666/89, OJ EPO 1993, 495; T 565/90 or T 941/98, neither published in OJ EPO). Nevertheless, it is a general and consistently applied principle of the Boards of Appeal that for deciding lack of novelty there must be a direct and unambiguous disclosure in the state of the art which inevitably leads the skilled person to subject-matter falling within the scope of the claims. Thus, for the examination of novelty, different passages in a document can only be combined if there is a clear disclosure leading the skilled person to combine them.

4.6 In the present case there is no such disclosure. The Board notes that the precipitated component in the copolymer of example 12 of document (2) cannot be cross-linked within itself due to the absence of

suitable cross-linkable groups, like glycidyl methacrylate or methylol acrylamide. Furthermore, the Board notes that the cross-linking procedure of heating the particle dispersion to 150°C as described in column 3, lines 66-73 and illustrated in example 7 of document (2) would not be directly applicable to the aqueous dispersion of example 12 in view of the temperature of 150°C in the cross-linking procedure. Without additional adaptation this cross-linking temperature is incompatible with the liquid vehicle disclosed in example 12 comprising water, isopropanol and methyl ethyl ketone with boiling points well below 150°C. The skilled person therefore had no reason to apply the specific embodiment of cross-linking the precipitated component disclosed in columns 3/4 of document (2) to the specific embodiment of example 12 in which neither the polymer nor the liquid vehicle are suitable for the described cross-linking process.

4.7 In support for its argument that the combination of example 12 and the general teaching regarding cross-linking is permissible, the Appellant cited the decision T 332/87. In this decision it is stated that "In general the technical teaching of examples may be combined with that disclosed elsewhere in the same document, e.g. in the description of a patent document, provided that the example concerned is indeed representative for the general technical teaching disclosed in the respective document" (T 332/87, not published, second paragraph of point 2.2. of the Reasons). The Appellant argued that example 12 is in perfect accordance with the general teaching in document (2) and thus perfectly combinable with the disclosure of cross-linking. It further pointed out

that the Opposition Division has used an analogous reasoning in point 5.2, and especially 5.2.3, of the decision under appeal with regard to lack of novelty of the then pending main request in view of document (1).

4.8 In the Board's view, the case underlying the decision T 332/87 cannot be compared with the present case. In decision T 332/87 all examples including those which as a result of a combination with the description were considered as anticipating the claimed subject-matter were considered to be equivalent and directly compatible with the teaching of the description. In the present case, with regard to the embodiment of cross-linking not all examples are equivalent. Example 12 as explained in point 4.6 above cannot be cross-linked according to the process disclosed in the description without requiring additional modifications. Whether or not such modifications would be obvious for the skilled reader, i.e. whether or not, as argued by the Appellant, the skilled person would be taught how to modify example 12 to render it cross-linkable, if desired, is not a question related to novelty, but an issue to be examined in the assessment of inventive step. Decision T 332/87 cannot, therefore, support the Appellant's case. Nor is the Opposition Division's decision concerning lack of novelty of previously claimed subject-matter in view of a different prior document relevant in this context.

4.9 In this context, the Appellant also submitted that there were no technical reasons why the cross-linking temperature was inappropriate given the fact that the claimed scope covered liquid vehicles containing up to 50% of any organic solvent including those with high

boiling points and that the duration for the cross-linking was only 15 minutes. In addition, the Appellant referred to document (4) which suggested cross-linking of aqueous dispersions under increased pressure "at on the order of 100°C to 150°C in some cases".

4.10 The fact that high boiling solvents are included in the presently claimed scope is immaterial for the examination of whether or not example 12 of document (2), which uses low boiling solvents, in combination with the disclosure in columns 3/4 directed to cross-linking anticipates the claimed subject-matter.

With regard to the Appellant's reference to document (4) the Board notes that according to established case law, when examining novelty combining separate pieces of prior art is only permissible in exceptional cases, such as for example when there is a specific reference in one prior art document (primary document) to a second prior art document, construing the primary document (see T 153/85, published OJ EPO 1988, 1, point 4.2 of the reasons). Document (4) is, however, not mentioned in document (2).

4.11 For the reasons set out above, the Board concludes that the subject-matter of claim 1 of the main request is novel within the meaning of Article 54 EPC.

5. Inventive step

5.1 In the contested decision the Opposition Division considered document (5) to be a more promising starting point than document (2) and, therefore, based its assessment of inventive step on document (5) as the

closest state of the art. This finding was challenged by the Appellant, who also considered document (2) as a suitable starting point.

5.2 The Board notes that documents (2) and (5) both concern dispersions of pigments using a graft copolymer comprising water-soluble segments and water-insoluble segments. Furthermore, both documents are concerned with improving the stability of dispersions (see document (2), claim 1 and column 1, lines 52-58 and document (5), claim 1, column 1, lines 15-21). Document (5) is directed to aqueous pigment dispersions, while document (2) relates to pigment dispersions in general. Aqueous pigment dispersions are, however, clearly within the ambit of document (2) for the following reasons:

Document (2) relies on the principle that pigments are coated with a block or graft polymer having components of different degrees of polarity. The polarity of the polymer solution is modified by the addition of a liquid of different polarity in order to precipitate one component on the surface of particles while the other component is solvated by the liquid. The solvated component enhances the stability of the particles in the dispersion (document (2), column 1, lines 29-58, column 3, lines 19-22). The liquids to be used in document (2) are roughly divided into groups of different polarity and water is mentioned as belonging to the group of intensely polar liquids (column 3, lines 9-18). Column 3, lines 37-38 of document (2) refers to "**more specific forms** of the invention shown by way of example in the following table". In this table a block or graft copolymer with its respective

stabilising (i.e. water-soluble) and precipitated (i.e. water-insoluble) component is dispersed in acetone/ethanol and water is added as the modifying liquid. According to column 3, lines 38-41, the modifying liquid is added in **excess** thus resulting in a predominantly aqueous vehicle. In addition, this specific form of the invention is illustrated in detail in example 12. The Board, therefore, does not share the Opposition Division's doubts that example 12 might be a comparative example.

Contrary to document (5), which is entirely silent on this subject, document (2) also suggests cross-linking of the precipitated, i.e. insoluble, component of the copolymer.

5.3 The Opposition Division also considered that the patent in suit was concerned with aqueous dispersions which were to be stable when water is replaced by an organic liquid; while in the only system of document (2) dealing with water, namely example 12, an organic liquid is replaced by water.

5.4 In this context the Board notes the following: In example 12 of document (2) an aqueous pigment dispersion is prepared starting from a dispersion of copolymer in isopropanol and methyl ethyl ketone. The aqueous dispersions of the patent in suit are prepared in the same way. For example, in example 2 of the patent, which is structurally closest to example 12 of document (2) as it refers to a graft copolymer with non ionic water-soluble side arms (i.e. Bisomer S20W, a polyethyleneglycol methacrylate like Carbowax), a graft copolymer solution in methyl ethyl ketone and

isopropanol is prepared. To this solution, water and the pigment are added to obtain a uniform, transparent waterborne, stable and deflocculated pigment dispersion. Thus, in the patent in suit as well as in document (2) an organic liquid is "replaced" by water.

The "replacement" of water by an organic liquid, namely 2-butoxyethanol (cellusolve), which was noted by the Opposition Division, merely represents a solvent challenge test for demonstrating the flocculation stability of the aqueous pigment dispersion of the patent in suit (see patent in suit, paragraph [0042]). Such a solvent challenge test is not described in document (2), but this does not mean that there is an essential difference between the aqueous particle dispersion of document (2) and the patent in suit. In this context, the Board also notes that document (2) already indicates that cross-linking allows the use of liquid vehicles with a polarity similar to that of the copolymer solution in which the particles where originally dispersed (document (2), column 3, lines 58-65), in other words that the cross-linked precipitated component of a copolymer in a particle dispersion prepared from an organic liquid with water as the modifying liquid (as in example 12) would remain insoluble in organic liquids with a polarity similar to the one from which it has been prepared. Without cross-linking, the precipitated component would tend to become re-solvated, with the consequence that the dispersion will not be stable. The issue of stability of aqueous particle dispersions when increasing the amount of organic solvent or replacing water by the organic solvent is therefore also addressed in document (2).

5.5 The Board is also not convinced by the Respondent's arguments that document (2) is not suitable as the closest state of the art.

5.5.1 The Respondent pointed out that the provision of aqueous pigment dispersions for inkjet printing ink was clearly one of the most important aspects of the present invention as could be seen from paragraph [0006] of the patent in suit. This paragraph also referred to the very unique and demanding requirements of the pigment dispersion to be used in inkjet printing applications. Document (2) was published in 1968, well before the inkjet printing technology was even available. According to the Respondent, such a document would therefore be an unrealistic starting point as it could not provide the skilled person with any guidance and information on pigment dispersions suitable for inkjet printing ink. In support of its arguments the Respondent cited the decisions T 479/00 and T 870/96.

5.5.2 The Board notes that the patent in suit is concerned with stable aqueous particle dispersions (paragraphs [0001] and [0007] of the patent in suit). Inkjet printing inks are apparently an important area for the application of such dispersions. However, the claimed subject-matter is not limited to inkjet printing inks. On the contrary, claim 1 of the main request relates in general to a dispersion of particles in a liquid vehicle. Furthermore, in paragraph [0002] of the patent in suit other application areas are mentioned, such as **coatings** (**paints** and inks), magnetic and optical recording media (tapes and disks), cosmetics (lipstick or nail polish), agriculture (insecticides) or

pharmaceutical preparations. Moreover, example 8 of the patent in suit is concerned with the preparation of a tint suitable in the manufacture of paints. **Coating compositions** such as **paints** and lacquers are also mentioned in document (2) as an area in which the dispersion of particles disclosed in this document can be applied (document (2), column 1, lines 17-19, 59-60 and 70-71). This was also conceded by the Respondent in the oral proceedings before the Board. Being directed to the same purpose, namely providing stable particle dispersions useful in coating compositions like paints and sharing the maximum number of identical technical features, document (2), in the Board's view, does not represent an unrealistic starting point for the assessment of inventive step.

The decisions T 479/00 and T 870/96 can not support the Respondent's case. In decision T 479/00 the Board considered a 65 year-old document which had not received any attention and which, as admitted by both parties, referred to a teaching which had never been put into practice on a commercial scale, as an unrealistic starting point. In the present case, as explained above, the Respondent's argument concerning the age of document (2) are not convincing and document (2) being directed to the same purpose is not considered to be an unrealistic starting point. In T 870/96 the Board pointed out that a generically different document cannot normally be considered as a realistic starting point for the assessment of inventive step. In the present case, document (2) referring to stable particle dispersions intended for the same use, namely coating compositions, like paints,

cannot be considered as a generically different document.

5.5.3 The Respondent also argued that the skilled person would not even remotely have considered cross-linking in an aqueous system in view of the teaching in document (2) referring to a cross-linking temperature of 150°C. In addition, according to the Respondent, the unexpected effect that cross-linked graft-polymers are superior to cross-linked block or random copolymers was not derivable from document (2).

5.5.4 These arguments, however, are related to the question of whether or not the present invention shows unexpected properties **over** the prior art which might support an inventive step or whether or not the claimed subject-matter would be obvious for the skilled person **in the light** of the prior art. They cannot be used to discard document (2), which has the same purpose and shares the maximum number of technical features with the claimed subject-matter, as a suitable starting point for the assessment of inventive step.

5.6 For the above reasons the Board, in accordance with the Appellant, considers document (2) as the closest prior art and hence takes it as the starting point for the assessment of inventive step.

5.7 The technical problem underlying the patent in suit was to improve the stability of aqueous particle dispersions, so that as a result the particles are less likely to settle under certain conditions, like changes in the composition of the liquid vehicle or changes in

temperature (paragraphs [0004] and [0020] of the patent in suit).

5.8 To solve this problem, the patent in suit proposes cross-linking the insoluble polymer segments. This results in the formation of a network or matrix around the particle which is resistant to changes in the liquid vehicle composition, temperature and other factors known to destabilize dispersions (paragraph [0020] of the patent in suit).

5.9 In view of the examples provided in the patent in suit the Board is satisfied that the technical problem is solved. Examples 1-4 refer to the preparation of various aqueous particle dispersions using graft copolymers. The dispersions were cross-linked using a water-insoluble diisocyanate/catalyst system or a water-insoluble diamine/catalyst system. Tested for flocculation stability with butyl cellusolve, the "encapsulated", i.e. cross-linked, samples proved to be more stable. The Board notes the same result, namely an improvement of stability of the cross-linked copolymer over the corresponding non cross-linked copolymer is also obtained with block and random copolymers (examples 4 and 5 of the patent in suit). Whether the order of magnitude for the improvement in stability is the same or worse compared to the graft polymer is of no relevance in this context.

5.10 According to the Appellant, the additional data provided by the Respondent was not sufficient to demonstrate that the problem was solved for the near infinite number of graft polymers covered by the claims. The alleged superiority of the graft copolymers was

shown for only one graft copolymer of one chemical type and there was no evidence that the technical problem could also be successfully solved by using copolymers of a different chemical type such as polyester or polyurethanes.

5.11 The Board observes that the Appellant has not provided any evidence for its assertion. In this context, the Board notes that for the invention to work it is essential that the polymer dispersant contains segments which are soluble in the liquid vehicle and segments which are insoluble. This allows the polymer, when placed in the liquid vehicle, to orient itself in such a way as to form a liquid adverse core with the soluble segments aligned away from the core. The insoluble particles tend to migrate into the core, and in order to avoid their movement out of the core if the composition of the liquid vehicle or the temperature is changed, the insoluble segments are cross-linked (patent in suit paragraph [0019]). In view of this concept and in the absence of evidence to the contrary, the Board considers it plausible that polymers with such soluble and insoluble segments, as required in claim 1, regardless of their chemical type will solve the technical problem underlying the patent in suit.

5.12 It then remains to be decided whether the proposed solution was obvious to the skilled person in view of the prior art.

5.13 The skilled person, starting from document (2) as the closest prior art and faced with the problem of improving the stability of aqueous particle dispersions would already be provided with information by

document (2) of how this technical problem could be solved, namely by cross-linking the precipitated (water-insoluble) component of the copolymer used as dispersant with itself. This renders the insoluble segments even more insoluble and provides stability even in liquids, which are similar in polarity to that of the copolymer solution in which the particles were originally dispersed (see point 5.4 above). Document (2) also provides information on how this can be achieved, namely by including glycidyl methacrylate or methylol acrylamide as monomers with suitable cross-linkable groups in the insoluble component of the block or graft copolymer. Modifying the copolymer in the aqueous dispersion of example 12 by introducing such a monomer into the water-insoluble component and cross-linking it once it has precipitated on, or in other words encapsulated the particles, does therefore not require inventive skills.

5.14 According to the Respondent, document (2) taught away from the presently claimed subject-matter. It was not related in general to aqueous particle dispersions. Water was merely mentioned as a modifying liquid in example 12. Furthermore, there was no clear preference in document (2) for graft polymers. This type of polymers, as has been shown by document (13), was superior to random or block copolymers. Furthermore, the Respondent argued that in view of the high temperature in the cross-linking process disclosed in column 3/4 of document (2), the skilled person would not even remotely consider cross-linking in an aqueous system. Finally, document (2) did not mention improved flocculation or temperature stability and could

therefore not provide the skilled reader with information on how to improve these properties.

5.15 The Board is not convinced by the Respondent's arguments. As explained in point 5.2 above, aqueous particle dispersions as illustrated by example 12 are well within the ambit of document (2). Although most of its examples are directed to non-aqueous dispersions, there is no deterrent teaching in that document against the use of aqueous particle dispersions. The Board also fails to see any difference between the aqueous dispersion of example 12 of document (2) and the aqueous dispersions of the patent in suit as explained in point 5.4 above. Like in document (2), the aqueous particle dispersions of the patent in suit are prepared by "modifying" the copolymer dissolved in an organic liquid with water in order to build the network entrapping the particles inside a water-insoluble core formed by the water-insoluble segments.

5.16 The Board also does not share the Respondent's view that the skilled person would not even remotely have considered carrying out a cross-linking process in an aqueous dispersion. There is nothing in document (2) that supports this assertion. Although it is obvious to the skilled person that an aqueous system could not be directly heated to a temperature of 150°C like in example 7 where a high boiling organic liquid is used, it would also be immediately obvious to him that such a temperature could nevertheless be easily achieved by working under increased pressure. Thus, a cross-linking temperature of 150°C in an aqueous dispersion is not technically unfeasible.

5.17 With regard to the alleged superiority of the graft polymer (document (13)) and the improved flocculation and temperature stability, the Board notes the following: As explained in points 5.4 and 5.13 above, it would have been obvious for the skilled person to improve the stability of particle dispersions by cross-linking the precipitated component. By applying this feature to the graft and block copolymers, in particular example 12 of document (2), which, undisputed by the Respondent, refers to a graft copolymer, the skilled person would have inevitably arrived at an aqueous particle dispersion comprising this allegedly superior polymer dispersant. This alleged effect, even if unforeseen, can therefore not support an inventive step. For this reason, the Board does not consider it necessary to examine the validity of the data presented in document (13) or its consistency with submissions made during the prosecution of the corresponding US patent. Concerning flocculation stability, or more precisely flocculation stability of the aqueous dispersion when the amount of organic solvent is increased, the skilled person, as explained in point 5.4 above, would already expect such an effect in view of the teaching of document (2) (column 3, lines 58-65). The temperature stability merely represents a different aspect of the expected improvement in stability. It follows inevitably from the use of the same obvious measure, namely the cross-linking of the precipitated component, and is obtained by the skilled person without any inventive effort on his part.

5.18 In view of the above, the Board concludes that the subject-matter of claim 1 of the Respondent's main

request does not involve an inventive step within the meaning of Article 56 EPC.

First auxiliary request

6. Inventive step

6.1 Claim 1 of the first auxiliary request differs from the main request in that the graft copolymer used as polymer dispersant has an insoluble backbone and soluble arms.

6.2 Such a polymer is already described in example 12 of document (2). Thus, the same considerations and conclusion as in points 5.13 to 5.18 above with respect to the main request also apply to claim 1 of the first auxiliary request, with the consequence that this request must also be refused for lack of inventive step pursuant to Article 56 EPC.

Second auxiliary request

7. Admissibility

An amended second auxiliary request was filed by the Respondent in an attempt to address the Board's concern with regard to the support in the application as filed (Article 123(2) EPC) for the subject-matter of the previously filed second auxiliary requests. The amendments carried out during oral proceedings before the Board did not amount to creating a fresh case. The objections and evidence brought forward by the Appellant in the written procedure against the patentability of the previously filed second auxiliary

request, in particular novelty and inventive step, still apply and do not necessitate reconsideration. Thus, the Board in exercising its discretion to accept amended claims even at a late stage of the proceedings admitted the amended second auxiliary request into the proceedings.

8. Amendments

8.1 Claim 1 of the second auxiliary request differs from claim 1 of the main request in that it is directed to the use of a dispersion of particles where the particle comprises a pigment, comprising the steps a) to d) in inkjet printing.

According to the Appellant, these amendments were supported by page 2, lines 7-20 of the application as filed referring to inkjet printing, original claim 2 as well as page 3, lines 32-34 of the application as filed, disclosing aqueous based liquid vehicles. Furthermore, graft copolymers were preferred embodiments of the invention as disclosed on page 5, lines 10-12.

8.2 The Board is not convinced by the Respondent's arguments. The application as originally filed is directed in general to dispersion of particles in a liquid vehicle which can be used in a wide variety of industries and processes such as coatings (e.g. paint and ink), magnetic or optical recording materials, cosmetics, agriculture etc. (page (1, lines 8-15 of the application as filed). The particles, depending on the ultimate use, include pigments, insoluble dyes, metallic particles, etc. (page 4, lines 2-10 of the

application as filed). The polymer dispersant is not particularly limited but structured polymers like block or graft polymer are preferred (page 5, lines 2-3 and 10-12). The liquid vehicle is an aqueous or non-aqueous vehicle, preferably an aqueous based vehicle comprising at least 50% water (claim 2 and page 3, lines 32-34 of the application as filed). However, **the combination** of using a particle dispersion, wherein the particle comprises a pigment for a particular use namely in inkjet printing with a graft polymer and an aqueous based liquid vehicle is not clearly and unambiguously derivable from the application as filed. In this context the Board notes that the content of an application must not be considered to be a reservoir from which features pertaining to separate embodiments of the application could be combined in order to artificially create a particular embodiment.

Concerning the disclosure on page 2, lines 7-20 the Board notes that this section belongs to the background information of the invention and refers to pigment dispersions in inkjet printing inks and their unique and demanding requirements. There is, however, no indication in the application as filed that this separate passage should be read in combination with other separated passages disclosed elsewhere in the application as filed, for example with a particular type of polymer dispersant.

Nor can the last paragraph on page 3 of the application as filed, which was referred to by the Respondent, provide a basis for the amendments. In lines 32-34 of this paragraph a liquid vehicle comprising at least 50% by weight of water is mentioned as a preferred

embodiment. In the same paragraph, i.e. lines 27-30, inkjet ink applications are mentioned. However, this paragraph does not refer to inkjet printing inks comprising a pigment as opposed to a, for example, insoluble dye. Neither does it refer to particular polymer dispersants, i.e. graft copolymers.

8.3 The Board therefore concludes that claim 1 of the Respondent's second auxiliary request contravenes Article 123(2) EPC.

Third auxiliary request

9. Amendments

9.1 The amendments made in claim 1 of the third auxiliary request are based on original claim 2 and page 5, lines 10-12 of the description as originally filed. In addition, the alternative of cross-linking the insoluble segments with themselves has been removed from the claims.

According to the Appellant the "deletion" of block polymers along with the deletion of "itself" amounts to selecting candidates from two lists which results in a new selection from two list for which there is no basis in the application as filed.

9.2 The Board is not convinced by the Appellant's arguments. Graft copolymers as suitable polymer dispersants are clearly supported by the original application (page 5, lines 10-12). Their selection as opposed to block copolymers, therefore, does not generate novel subject-matter for the skilled reader. The additional deletion

of the expression "itself" merely eliminates a single alternative from the list of four originally disclosed alternatives for the cross-linkable components. This slightly shortens the list of alternatives but does not single out a particular alternative. Nor does this shrinking of the list of alternatives by merely one element in combination with the selection of graft copolymers lead to particular, individual combinations of features which were not originally disclosed.

9.3 The requirement of Article 123(2) EPC is therefore satisfied. The amendments lead to a restriction in the scope of the claims as granted. Consequently, the requirement of Article 123(3) EPC is also satisfied.

10. Novelty

In view of the Board's findings with respect to the main request indicated in point 4 above, the Board considers that the requirement of Article 54 EPC is also met with respect to claim 1 of the third auxiliary request which is narrower in scope than claim 1 of the main request. Novelty of the subject-matter of the third auxiliary request was not disputed by the Appellant.

11. Inventive step

11.1 Claim 1 of the third auxiliary request differs from claim 1 of the main request in that the cross-linkable component which is insoluble in the liquid medium is limited to a polyfunctional monomer, a polyfunctional oligomer or a polyfunctional polymer.

11.2 For the reasons set out in points 5.1 to 5.6 above, the Board considers document (2) as the closest state of the art. In the light of this document the problem to be solved was the provision of further aqueous particle dispersions with good stability. In view of the examples of the patent in suit the Board is satisfied that the problem is solved.

11.3 According to the Appellant the claimed subject-matter was obvious from the combination of document (2) with document (4), which taught the skilled person that self-cross linking and cross-linking via an external cross-linker were obvious alternatives.

11.4 The Board is not convinced by the Appellant's argument. Document (4) is directed to aqueous pigment dispersions based on an entirely different concept compared to those of document (2). According to document (4) stable aqueous pigment dispersions are obtained by using a specific resin, i.e. a polymeric resin having a carboxyl group which renders the resin water-soluble or dispersible, in combination with specific acid precipitation and re-dispersion steps, while document (2) relies on the presence of graft or block polymers with components that are soluble and those that are insoluble in the liquid vehicle. **In combination** with the specific polymeric resin and the specific precipitation and re-dispersion steps, document (4) discloses cross-linking, which for its purpose can be achieved by self cross-linking or via the use of an external cross-linker (document (4), paragraphs [0097] and [0099]. However, this does not justify the assumption that self cross-linking and cross-linking via an external cross-linker are

equivalent in general. Moreover, document (4) clearly discloses that the stability of the aqueous dispersions disclosed therein is the result of the use of the particular polymeric resin and the specific precipitation and re-dispersion steps not the cross-linking as can be seen from table 2 of document (4) and the subsequent paragraph [0186]. Comparative examples 1, 3, 5, 7 and 9, which were cross-linked via an external cross-linkable compound, showed a poor dispersion stability (i.e. formation of larger particles, which further increased over a period of 30 days; document (4) paragraph [0186], lines 4-6). Document (4) also advises against the use of **insoluble** external cross-linking agents as presently required, because these cannot be dispersed well in the aqueous medium risking the formation of large particles (document (4), paragraph [0100]) and, consequently, aqueous pigment dispersions with poor stability. The skilled person faced with the problem of providing further aqueous dispersions with good stability therefore had no reason to consider cross-linking with an external insoluble cross-linkable component as an obvious alternative to the self cross-linking in the aqueous pigment dispersions disclosed in document (2). The Appellant's arguments are based on hindsight.

11.5 Although the Appellant considered document (2) as the more appropriate starting point for assessing inventive step, it also argued lack of inventive step in view of the combination of document (5) with document (4). It is, therefore, necessary to examine whether or not the claimed subject-matter is rendered obvious in respect to these documents.

11.5.1 Document (5) is directed to an aqueous particle dispersion comprising a graft copolymer dispersant having a water-soluble segment (backbone) and water-insoluble segments (side chain). It is entirely silent on the issue of cross-linking. According to the Appellant the problem to be solved in the light of document (5) was the provision of aqueous particle dispersions with improved stability.

11.5.2 The Appellant tries to overcome the absence of cross-linking in document (5) by asserting that the skilled person would have considered document (4). It essentially contended that document (4) was related to the same problem of providing stable particle dispersions and taught cross-linking as a mandatory feature of the technical solution.

11.5.3 As explained in point 11.4 above, it is clear from document (4) that the excellent stability of its aqueous pigment dispersions is provided by the specific precipitation and re-dispersion steps of a particular polymeric resin. Cross-linking alone leads to dispersions with poor stability (document (4), table 2, paragraph [0186], lines 4-6). This is also confirmed by paragraph [0207] of document (4), which states that excellent storage stability is obtained "by virtue of acid precipitation" (paragraph [0207], lines 1-3), while cross-linking was responsible for water resistance. The skilled person faced with the problem of improving the stability of polymers of document (5) had thus no reason to consider applying a cross-linking step as disclosed in document (4). In the Board's view, if considering the teaching of document (4) at all, the skilled person would consider the possibility of

applying the precipitation and re-dispersion steps to the polymers of document (5) in order to further improve their stability, leaving out the cross-linking step, so as not to compromise any improvement in stability that will be achieved.

11.5.4 Nor does paragraph [0103] of document (4), as alleged by the Appellant, provide the skilled person with a motivation for cross-linking in order to improve the stability of the dispersions of document (5). This paragraph describes a preferred way of adding the cross-linking agent, namely before the pigment is kneaded in, which appears to help prevent the formation of large particles. This, however, cannot detract from the clear teaching of document (4) that the acid precipitation step and not the cross-linking provides the stability of the dispersions and that cross-linking leads to dispersions with poor stability (document (4), table 2 and paragraph [0186]). The skilled person would therefore understand paragraph [0103] as a way to ensure that the detrimental effect of cross-linking is kept low. It does not provide a motive for using cross-linking as a way to improve the stability of the aqueous dispersions of document (5).

11.5.5 In addition, as explained in point 11.4 above, document (4) advises against the use of an insoluble cross-linking agent as required according to the present invention (document (4), paragraph [0100]) since it increases the risk of formation of large particles, i.e. dispersions with insufficient stability. The Appellant's argument that the expression "insoluble" in claim 1 should be understood as including "partially insoluble" cannot be followed,

since there is nothing in the description of the patent in suit that would support such an interpretation.

11.6 Following from the above, the Board concludes that the subject-matter of claim 1 of the third auxiliary request, and by the same token, that of dependent claims 2-7, involves an inventive step in the sense of Article 56 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to maintain the patent with the following claims and a description to be adapted thereto:

Claims: No. 1 to 7 filed as third auxiliary request with letter of 13 March 2009

The Registrar: The Chairman:

M. Schalow P. Ranguis