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Datasheet for the decision of 28 March 2007

Case Number: T 1065/03 - 3.3.01

Application Number: 95903670.8

Publication Number: 0736077

IPC: C09D 5/29

Language of the proceedings: EN

Title of invention:
Coating composition containing optically-variable pigment

Patentee:
BASF CORPORATION

Opponent:
Ciba Specialty Chemicals Holding Inc.
Akzo Nobel N.V.
SICPA S.A.

Headword:
Optically variable coatings/BASF

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (main and auxiliary request): no - obvious solution of the techical problem"

Decisions cited:
-

Catchword:
-

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Case Number: T 1065/03 - 3.3.01

D E C I S I O N
of the Technical Board of Appeal 3.3.01
of 28 March 2007

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Decision under appeal:

Interlocutory decision of the Opposition Division of the European Patent Office posted 22 August 2003 concerning maintenance of the European Patent No. 0736077 in amended form.

Composition of the Board:

Chairman: A. Nuss
Members: J. Jonk
D. S. Rogers

Summary of Facts and Submissions

I. The Appellants I and II (Opponents I and III, respectively) lodged an appeal against the interlocutory decision of the Opposition Division maintaining the European patent No. 0 736 077 (European patent application No. 95 903 670.8) on the basis of a set of ten claims filed on 5 August 2003. Claim 1, the sole independent claim, reading as follows:

"1. Wet-on-wet process for preparing a color-plus-clear composite coating over precoated steel or plastic substrates in automotive applications by applying on a automotive body panel a basecoat coating composition, drying the basecoat layer, applying a clearcoat composition, and curing the basecoat and the clearcoat layers, thereby obtaining the color-plus-clear composite coating, wherein a basecoat coating composition is used comprising a polymer resin binder and optically variable thin pigment flakes, said pigment flakes having a multilayer thin film interference structure comprising a metal reflector layer having first and second parallel planar surfaces and, disposed on both of said first and second planar surfaces, at least one transparent dielectric layer, said pigment flakes further having an average particle size of 5 to 40 μm and a particle size distribution where no more than 10% of the particles have a particle size of greater than 50 μm and substantially none of the particles have a particle size of greater than 125 μm, particle sizes being determined by means of laser diffraction"

II. Notices of opposition had been filed requesting revocation of the patent as granted in its entirety on the grounds of lack of novelty and lack of inventive step (Article 100(a) EPC), as well as on the grounds of insufficient disclosure (Article 100(b) EPC) and added subject-matter (Article 100(c) EPC. The Opponent relied on several documents including:

(1) US-A-4 434 010
(5) Kontakte 1992(2), pages 47 to 50
(9) US-A-5 059 245
(12) EP-A-0 235 646
(62) Journal of Dispersion Science and Technology, Vol. 23, No. 5 (2002), pages 631 to 662, and
(66) Baudet et al., Particulate Science and Technology, 11 (1993), pages 73 to 96.

III. The Opposition Division held that the subject-matter of Claim 1 then on file met the requirements of the EPC.

Concerning inventive step, it considered that document (12) represented the closest prior art differing from the subject-matter of said Claim 1 in that the mica pigments of document (12) did not satisfy the condition that the pigment flakes must have a multilayer thin film interference structure comprising a metal reflector layer having first and second parallel planar surfaces and, disposed on both of said surfaces, at least one transparent dielectric layer.

With respect to inventive step, the Opposition Division held that starting from document (12) as the closest state of the art the technical problem to be solved could be seen in the provision of basecoat/clearcoat

coatings on automotive body panels having a special optical effect, i.e. a dichroic optical effect. Furthermore, it considered that the skilled person would not have tried to replace the pigments of document (12) by those of documents (1) and/or (9) to obtain said effect, since said documents dealt with problems associated with completely different applications.

IV. Oral proceedings before the Board were held on 28 March 2007.

V. The Respondent (Proprietor of the patent) defended the maintenance of the patent in suit on the basis of a new main request or an auxiliary request both submitted on 15 July 2004.

Claim 1 of the new main request corresponded to Claim 1 as maintained by the Opposition Division (indicated above under point I), except that after the wording

> "…, the particle sizes being determined by means of laser diffraction"

the following wording had been introduced:

> ", and said pigment flakes having been prepared by coating the layers of the multilayer thin film interference structure onto a flexible web, separating the web from the multilayer coating whereby flakes of the multilayer thin film interference structure are produced, and processing the flakes if necessary to provide said

average particle size and particle size distribution"

Claim 1 of the auxiliary request was directed to the use of a basecoat coating composition comprising a polymer resin binder and optically variable thin film pigment flakes as defined in Claim 1 of the new main request in a wet-on-wet process for preparing a colour-plus-clear composite coating over precoated steel or plastic substrates in automotive applications by applying on a automotive body panel a basecoat coating composition, drying the basecoat layer, applying a clearcoat composition, and curing the basecoat and the clearcoat layers, thereby obtaining the colour-plus-clear composite coating.

VI. The Appellants did not maintain their objections with respect to extension of the claimed subject-matter beyond the content of the application as filed or the patent as granted (Article 123(2) and (3) EPC), and with respect to novelty (Article 54 EPC) and sufficiency of disclosure (Article 83 EPC).

Concerning inventive step they considered essentially that document (12) represented the closest state of the art, that the process of this closest prior art only differed from that of the claimed invention in that a different pigment had been used, that with respect to this prior art no improvement had been shown and that the skilled person faced with the technical problem to provide a further process for preparing a colour-plus-clear composite coating over precoated steel or plastic substrates in the automotive industry having an optically variable dichroic effect would have found a

clear incentive in document (9) to solve this problem by applying a pigment as disclosed in said document.

VII. The Respondent argued in the oral proceedings that the claimed process gave coatings having an improved optically variable effect as shown by the examples of the patent in suit. Moreover, he argued that, although it was true that document (9) disclosed pigments falling under the scope of the present claim, the skilled person faced with the technical problem underlying the patent in suit would not consider document (9) for its solution, because it related to a totally different technical problem, namely the provision of optically variable inks. In view of the state of the art as a whole making available to the skilled person numerous effect pigments, the decisive question was not whether the skilled person could have selected a pigment as, for instance, disclosed in document (9), but whether he would have done so when trying to solve the technical problem underlying the patent in suit. Furthermore, he noted by referring to documents (62) and (66) that a proper comparison of the particle sizes indicated in documents (12) and (9) with the particle sizes of the patent in suit being determined by means of laser diffraction was not possible, since said documents (12) and (9) did not disclose a method for their determination. He concluded that in the present circumstances the skilled person would not have any reason to select a pigment of document (9) and that therefore the present process involved an inventive step.

VIII. The Appellants (Opponents I and III) requested that the decision under appeal be set aside and that the present European patent be revoked.

The Respondent (Patentee) requested that the appeals be dismissed and that the patent be maintained on the basis of a main or an auxiliary request both filed on 15 July 2004.

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

Reasons for the Decision

1. The appeal is admissible.

Main request

2. The Board has come to the conclusion (i) that the claimed subject-matter does not extend beyond the content of the application as filed and also does not extend the protection conferred by the present patent, (ii) that it has been disclosed in the patent application in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art, and (iii) that it is novel over the cited prior art. In view of the fact that these matters were no longer in dispute between the parties to the proceedings, it is not necessary to give reasons for these findings.

3. *Inventive step*

3.1 According to the established jurisprudence of the Boards of Appeal it is necessary, in order to assess inventive step, to establish the closest state of the art, to determine in the light thereof the technical problem which the invention addresses and successfully solves, and to examine the obviousness of the claimed solution to this problem in view of the state of the art. This "problem-solution approach" ensures assessing inventive step on an objective basis and avoids an *ex post facto* analysis.

According to the jurisprudence of the Boards of Appeal the "closest state of the art" is normally a prior art document disclosing subject-matter aiming at the same objectives as the claimed invention and having the most relevant technical features in common.

3.2 Accordingly, the Board considers in agreement with the parties to the proceedings that document (12) is the closest state of the art to start from in assessing inventive step.

This document discloses, like the patent in suit, a wet-on-wet process for preparing a multilayer coating in automotive applications by applying on an optionally precoated panel a base coat layer comprising a polymer resin binder and optically variable thin pigment flakes, drying the base coat layer, applying a clear coat composition, and curing the base coat and clear coat layers (see page 6, lines 15 to 25, and Example 1 with respect to the wet-on-wet process in automotive applications providing a colour-plus-clear coating;

Example 1 regarding the composition of the base coat paint composition and the clear coat paint composition; page 1, line 24 to page 2, line 14, and page 4, line 19 to page 5, line 12, concerning the optically variable pigment; and page 6, lines 1 to 7, regarding the application of the colour-plus-clear coating on a precoated substrate). According to the technical teaching of this document it is essential for obtaining optimum properties of the coatings to apply pigments having an average particle size of between 15 and 35 μm and a relatively narrow particle size distribution such that preferably at least 75% have a narrower particle size of between 25 and 35 μm and preferably less than 0.5% of the particles have a diameter of more than 40 μm (see page 3, line 4 to page 4, line 18).

3.3 The Respondent argued that the process of present Claim 1 provided coatings having improved properties in that they exhibited a more clean, transparent, and intense colour at viewing angles near the specular reflexion or a lighter, chalkier appearance at viewing angles far away from the specular reflection as has been shown by Examples 1-2 making use of pigments having an average particle size of 24 μm and 12 μm, respectively. However, said effects had been found by way of comparison with a similar coating where the pigment flakes had an average particle size of 39 μm, with 22% of the particles having a size greater than 50 μm (see column 8, lines 33 to 38, of the patent in suit). Therefore, the purported effects had not been achieved with respect to the closest prior art and actually resulted from a comparison with coatings comprising pigments, which according to the teaching of document (12) provide inferior coating properties by

not meeting the particle size and particle distribution needed.

3.4 Consequently, in accordance with the established case law of the Boards of Appeal, purported and unproven effects cannot be used for defining the technical problem in view of the closest prior art document (12) and a less ambitious technical problem must be formulated.

3.5 Accordingly, the Board finds that the technical problem to be solved vis-à-vis document (12) may only be seen in the provision of an alternative wet-on-wet process for preparing a colour-plus-clear composite coating having satisfying variable optical properties over precoated steel or plastic substrates in automotive applications.

3.6 According to present Claim 1 this technical problem is solved by using optically variable pigment flakes as defined in the claim, i.e. pigments having

(a) a multilayer thin film interference structure, preferably having layers in the following order: a metal reflecting layer, at least one transparent dielectric layer and at least one semi-opaque metal layer, whereby the layer structure is symmetrical on both sides of the metal reflecting layer; and

(b) an average particle size and a particle size distribution as indicated in the claim, the particle sizes being determined by means of laser diffraction; and

(c) whereby the pigment flakes have been prepared by coating the layers of the multilayer thin film interference structure onto a flexible web, separating the web from the multilayer coating whereby flakes of the multilayer thin film interference structure are produced, and processing the flakes if necessary to provide said average particle size and particle size distribution.

Having regard to the technical information provided in the patent in suit, in particular in the examples, the Board considers it plausible that this technical problem has indeed been solved. Also the Appellants did not raise objections in this respect.

3.7 It remains to be decided whether or not the proposed claimed solution was obvious in view of the prior art cited.

3.8 Looking for a solution to the above defined technical problem, the person skilled in the art would have considered further prior art dealing with optically variable pigment flakes being *prima facie* suitable for providing coatings on automotive panels and in doing so he could have considered documents (9) and (5).

3.9 Document (9) discloses the production of optically variable pigment flakes, the preparation of paints containing said pigment flakes and the use of dichroic paints for preparing a decorative coating e.g. on a metal substrate, whereby the adhesion could be readily improved by the use of initial primer coats (see

column 3, lines 24 to 30 and 41 to 44; and column 11, lines 12 to 17 and 27 to 30).

In producing the optically variable paint flakes the method involves:

(i) the formation of an optical coating, typically having an optical multilayer structure, on a flexible web of soluble material (see column 10, lines 33 to 45),

(ii) an optional step of shredding the flexible web in order to reduce the size of the web so that it could be readily dissolved in a smaller container (see column 10, lines 46 to 56),

(iii) dissolving the web in a predetermined solvent (see column 10, lines 57 to 61),

(iv) separating the optically variable thin film particles from the solution in which they are dispersed and then drying the flakes (see column 11, lines 31 to 42), and

(v) reducing the particle size without destroying their colour characteristics to a size of about 2 to 20 μm (see column 14, lines 10 to 32 and column 4, lines 57 to 65).

According to a specific embodiment the multilayer optical coating on the flexible web as indicated above under point (i), which may be utilised to produce strongly dichroic optical effects, has a symmetrical design comprising a thin, semi-opaque chromium layer

formed on the flexible web followed in sequence by a dielectric layer formed from silicon dioxide, a thick aluminium reflecting layer, another dielectric layer formed from silicon dioxide and a final semi-opaque chromium layer (see column 9, lines 8 to 27). Specific examples of such a multilayer coating show variable colour effects as indicated in column 9, line 51 to column 10, line 20.

The optically variable flakes are then placed in a liquid vehicle and after that the liquid is applied to a substrate and dried to provide a film which has a light reflecting character which is substantially provided by the optically variable flakes (see column 4, lines 52 to 56, and column 5, lines 57 to 60).

3.10 The Respondent argued that the skilled person would not combine the teaching of document (12) with that of document (9), since document (9) does not relate to coatings for automotive applications. Moreover, document (9) does not provide an incentive to use the particle size and particle distribution as claimed in the patent in suit. In this context, he noted that a proper comparison of the particle sizes indicated in documents (12) and (9) with the particle sizes of the patent in suit was not possible, since said documents (12) and (9) did not disclose a method for their determination.

However, it was known to the skilled person from the prior art indicated in the present application as filed and also from document (12) that optically variable thin pigment flakes are suitable for a broad variety of applications including coating compositions e.g. for

automotive applications (see the application as filed under "Background of the Invention" and under point 3.2 above). Furthermore, document (9) itself does not provide any reason that the optical variable pigments as disclosed therein would not be applicable for this purpose. Therefore, the Respondent's contention in this respect cannot be accepted by the Board. The Board's view is confirmed by document (5) indicating the suitability of optically variable pigment flakes consisting of an opaque highly reflecting Al-core, an interference layer of a non-absorbing dielectric (e.g. SiO_2) and a very thin semi-transparent layer of chromium on both sides, i.e. pigment flakes corresponding to those of document (9), for automotive applications (see document (5) page 19, right column, last 2 lines and page 22, lines 1 to 5, in combination with page 15, left column, first paragraph; and the considerations concerning document (9) indicated under point 3.9 above, penultimate paragraph).

Concerning the non-obviousness of the use of pigments having the particular particle size and particle distribution as claimed in the patent in suit, the Board notes that document (12) being the starting point for assessing inventive step clearly teaches that for obtaining coatings for automotive applications having optimal colour properties it is essential to apply pigments having an average particle size of substantially between 15 and 35 μm and having a relatively narrow particle size distribution such that preferably at least 75% have a narrower particle size of between 25 and 35 μm and preferably less than 0.5% of the particles have a diameter of more than 40 μm (see point 3.2 above, last paragraph). Therefore, the

skilled person trying to solve the technical problem underlying the patent in suit as defined above (see under point 3.5) would have had no reason to apply different particle sizes. Moreover, document (9) discloses that particle sizes being essential according to document (12) can be obtained without destroying the colour characteristics of the flakes (see column 14, lines 10 to 36, in particular lines 30 to 32), so that the skilled person trying to solve the present technical problem would also have had no reason to consider the pigments of document (9) as *prima facie* not suitable for that purpose.

It is true that documents (12) and (9) do not indicate how the particle sizes had been determined. However, in view of the disclosed importance of the particle sizes and the exactness of the specified values and ranges, it is the Board's position that the skilled person knew how to determine the particle sizes. Moreover, it follows from documents having been cited by the Respondent itself in this respect, namely document (62) and in particular document (66) referred to in said document, that measuring results achieved by means of laser diffraction at particle sizes to be applied according to the patent in suit substantially correspond to those obtained with other known methods (see document (62), page 650, left column to page 651, left column, second paragraph, line 7; and document (66), page 95, in particular under "Conclusions"). Therefore, the Board finds that the particle size conditions as disclosed in document (12) fall under the scope of present Claim 1 of the patent in suit.

3.11 Having regard to these considerations, and in view of the technical problem to be solved, it would therefore have been obvious for a skilled person to modify the process of document (12) by using optically variable pigment flakes as disclosed in document (9), and as a result to arrive at the claimed solution. For this reason the subject-matter of Claim 1 of the patent in suit does not involve an inventive step within the meaning of Article 56 EPC.

3.12 Since the Board can only decide on a request as a whole, the main request is rejected for lack of inventive step.

Auxiliary request

4. Claim 1 of this request differs from that of the main request in that Claim 1 has been formulated as the use of a basecoat coating composition comprising a polymer resin binder and optically variable thin film pigment flakes as defined in Claim 1 of the present main request in a wet-on-wet process for preparing a colour-plus-clear composite coating over precoated steel or plastic substrates in automotive applications by applying on an automotive body panel a basecoat coating composition, drying the basecoat layer, applying a clearcoat composition, and curing the basecoat and the clearcoat layers, thereby obtaining the colour-plus-clear composite coating.

4.1 However, although this claim has been formulated as a use claim, its subject-matter actually corresponds to a wet-on-wet process for preparing a colour-plus-clear composite coating making use of the defined optically

variable pigment flakes as claimed in Claim 1 of the present main request.

4.2 Under these circumstances, the Board has come to the conclusion that the subject-matter of present Claim 1 lacks inventive step for the same reasons as set out above for the main request.

4.3 As a result, this auxiliary request is not allowable either.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar The Chairman

N. Maslin A. Nuss