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**D E C I S I O N**  
**of 3 December 2003**

**Case Number:** T 0455/01 - 3.3.5

**Application Number:** 95904797.8

**Publication Number:** 0736073

**IPC:** C09C 1/00

**Language of the proceedings:** EN

**Title of invention:**

Coating composition containing optically-variable dichroic pigment and interference mica pigment

**Patentee:**

BASF CORPORATION

**Opponent:**

DuPont Performance Coatings GmbH & Co.KG  
Ciba Specialty Chemicals Holding Inc.  
SICPA S.A.

**Headword:**

Coating composition/BASF

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

"Inventive step - no, obvious use of known pigment, no technical prejudice

**Decisions cited:**

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**Catchword:**

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## Summary of Facts and Submissions

I. European patent No. 0 736 073 was opposed on the grounds of lack of novelty, lack of inventive step and insufficient disclosure (Article 100(a) and (b) EPC). The ground of lack of inventive step was based on several documents of which the following remain relevant for this decision:

D1: US-A-4 434 010

D3: US-A-5 171 363

V4: Kontakte (Merck, Darmstadt), 1992 (2)

V8: US-A-3 438 796

V12: The Santa Rosa Press Democrat, August 12, 1998,  
Flex's Colorful Pigments.

II. The opposition division maintained the patent in amended form. With respect to the issue of inventive step it was held that the problem underlying the invention as formulated in the patent in suit was solved by the use of the pigment composition according to claim 1 as maintained and that the claimed solution was not obvious in view of the prior art cited by the opponents. That the problem was actually solved was at least partly based on comparative samples shown during oral proceedings before the opposition division (point 4.c.5 of the contested decision).

III. The appellant (opponent 3) lodged an appeal against the decision of the opposition division to maintain the patent in amended form. With the grounds of appeal the respondent (proprietor) submitted a new set of claims. During the oral proceedings, which took place on 3 December 2003, two new sets of claims were filed as main and auxiliary requests, which form the basis of this decision.

Claim 1 of the main request reads as follows:

"Use of a layer of a coating composition comprising

- a polymer resin binder and
- optically variable thin film dichroic 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 in this order, at least one transparent dielectric layer and at least one semi-opaque metal layer, this layer structure being symmetrical on both sides of the metal reflecting layer, the said optically variable thin film 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 so as to produce flakes of the multilayer thin film interference structure, and processing of the flakes if necessary to provide the desired average particle size of 5 to 40  $\mu\text{m}$  and the desired particle size distribution where no more than 10% of the particles have a particle size of greater than 50  $\mu\text{m}$  and substantially none of the particles have a particle size of greater than 125  $\mu\text{m}$ ,

- and interference mica pigment having an interference color that is similar to one of the dichroic colors of the optically variable thin film pigment, such similar color falling within the same quadrant of the color wheel, as the colored layer of the color-plus-clear composite coating on an automotive body panel."

Claim 1 of the auxiliary request differs therefrom only in that after "...color wheel", "as defined in figure 2" is inserted.

The appellant and the party as of right (opponent 2) did not maintain the novelty objection but maintained that the subject-matter of claim 1 according to both the main and the auxiliary requests lacked an inventive step. They also raised clarity objections against the amended claims, in particular with respect to the colour relationship between the optically variable thin-film dichroic pigment (OVP) and the interference mica pigment. Opponent 2 further maintained its original objection of insufficient disclosure of the invention.

IV. The arguments with respect to lack of inventive step can be summarised as follows:

It was common in the art of car painting to use a colour-plus-clear composite coating and to use as the colour coating an interference mica together with a pigment having a better hiding power. OVP flakes were known in the art of effect pigments for their intensive variable interference colours and their great hiding power. On the basis of the additive mixing law for

interference pigments it was evident to the skilled person to use OVP flakes as an additional pigment to interference mica in order to provide sufficient hiding power and to intensify the interference colour perception of the coating. The respondent did not show any surprising effect for the claimed combination of pigments. It was only the high price and limited availability of the OVP flakes which prevented the skilled person from using these flakes for coating large objects such as automotive body panels before the priority date of the patent in suit. There was no technically-based prejudice which had to be overcome.

- V. The arguments of the respondent with respect to inventive step can be summarised as follows:

Until the priority date of the patent in suit, OVP flakes were only used for printing purposes, especially in anti-counterfeiting inks. Although D1 and D3 mentioned other applications as well, such as the painting of small metal articles, there was no suggestion in the prior art that OVP flakes be used for the coating of automotive body panels. Before the priority date of the patent in suit, the skilled person would have rejected the use of OVP flakes for that purpose because of the intense dichroic effect, which would have been regarded as too dramatic. The problem of providing a coating with dichroic character having a less dramatic visual effect was solved by the claimed invention as demonstrated by Example 1 of the patent in suit. Claim 1 not only required a mixture of OVP and interference mica pigment but also the selection of an OVP with a specific particle size distribution and a specific colour relationship between the mica pigment

and the OVP. The colour impression was also dependent on the substrate so that knowledge valid for paper printing could not be transferred to the coating of cars. The prior art did not provide any incentive for the combination of features as now claimed. The article in V12, published many years after the publication date of the patent in suit, proved that only after the invention became public was OVP used for the coating of cars and that the appellant's arguments were based on hindsight.

- VI. The appellant and the party as of right, opponent 2, requested that the decision under appeal be set aside and the patent be revoked. Opponent 1, who did not attend the oral proceedings, did not present any requests in writing.

The respondent requested that the decision under appeal be set aside and that the patent be maintained on the basis of the main or the auxiliary request, both filed during the oral proceedings.

### **Reasons for the decision**

1. The appeal is admissible.
  
2. The clarity of the additional feature in claim 1 of the main request, namely that the similar colour of the interference mica pigment falls within the same quadrant of the colour wheel, is in dispute. According to the respondent's submissions during oral proceedings, the quadrants of the colour wheel are the quadrants formed by the diagonal lines in the colour wheel as

shown in Figure 2 of the patent. The board accepts that this is a plausible interpretation and has taken it into consideration for the inventive step issue. Since claim 1 of the auxiliary request is in conformity with this interpretation and does not contain any further limitation, the findings with respect to inventive step of the subject-matter of claim 1 according to the main request apply equally to claim 1 of the auxiliary request.

3. Contrary to the claims as granted, which were directed to a coating composition in general, the claims are now directed to the use of a coating composition as the coloured layer of a colour-plus-clear composite coating on an automotive body panel. In the board's view, therefore, a document relating to the coating of automobiles is a more appropriate starting point for inventive step than the documents cited in the patent in suit, such as D1 and D3, which relate to OVP comprising compositions in general but without a direct relationship to the use as now claimed. The closest prior art document is considered to be V4, comprising several articles concerning effect pigments with a direct or indirect reference to the coating of automobiles.

V4 discloses that in typical base-coat/clear-coat systems for automotive coatings with interference mica pigments such as Iriodin®/Afflair™, the interference mica pigments are usually combined with other colorants because of the limited hiding power of the mica pigments (page 49, paragraph 3.1). As an example it is indicated that chromium oxide-coated mica together with platelet phthalocyanine blue pigment provides a very



intense colour flop, travelling from deep blue to bluish green (page 50, right-hand column). To improve hiding power, the mica-based compositions may comprise small amounts of aluminium flakes. The formulation may also contain a blend of two interference mica pigments (page 50, paragraph bridging left-hand and middle column; page 50, right-hand column and page 51, paragraph 3.3). It is also stressed that effect pigmented automotive colours require a clear coat as the final finish (page 50, middle column). V4 further discloses that blends of different interference colours obey an additive colour mixing law (page 7, left-hand column and page 33, paragraph headed "additive colour mixing"). Interference pigments not based on mica are disclosed in another article of V4. Particularly disclosed are OVP flakes consisting of an opaque reflective aluminium core, symmetrically coated with a non-absorbing dielectric layer and a semi-transparent chromium top layer (pages 19, 21 and 22, paragraph 3.4 and Figures 14 to 16). In said paragraph (page 22, last line), reference is made to D1 in connection with the manufacturing process of this product, the basic OVP patent, according to which the OVP flakes are prepared by coating the layers of the multilayer thin film interference structure onto a flexible web and separating the web from the multilayer coating (D1, claim 1).

4. The respondent has not indicated which technical problem is solved by the coating used according to claim 1 with respect to the known colour-plus-clear composite coatings for automotive panels comprising interference micas and showing a colour flop. In this context the board observes that the respondent

indicated at the oral proceedings that it no longer relied on the comparative samples enclosed with the letter dated 29 January 2002 or on the declaration concerning these samples. Accordingly no further comments were presented on these samples after the opponents had questioned whether they met the requirement of claim 1 concerning the similarity of colours. The advantage of the coloured layer used according to claim 1 with respect to coatings comprising a pigment composed of 100% OVP flakes (see the example of the patent in suit), is of no relevance when starting from compositions comprising interference mica as the effect pigment.

Starting from V4, the problem underlying the invention can be seen in providing further effect pigment containing coating compositions for use as the coloured layer in a colour-plus-clear composite coating for automotive applications (see in this context appellant's letter of 31 October 2003, point 3.6.2). The respondent proposes solving this problem according to claim 1 by using OVP flakes of a specified particle-size distribution and prepared by a specific process in addition to the interference mica pigment. It is uncontested and credible that the claimed use actually solves the said problem.

5. As already mentioned above, interference mica pigment to be used in automotive coatings is usually mixed with other colorants because of its limited hiding power. To increase hiding power aluminium flakes may be added (V4, pages 49 to 51, paragraphs 3.1 to 3.3, in particular the examples in paragraph 3.3 on page 51). The OVP flakes disclosed in V4 contain an opaque, highly

reflecting, aluminium core (thickness of 300 nm), covered by two dielectric layers and two semitransparent (5 nm) chromium layers ensuring a high reflectivity of the dielectric layers. These flakes exhibit deep colours, high gloss and a high colour dependence on the viewing angle. They are also said to exhibit a high hiding power (see page 22, Figure 14). D1, referred to in V4, not only discloses the preparation of the OVP flakes but also that these flakes may be combined with certain dye colours added to the suspension of these flakes in a paint medium in order to produce other colours with colour-shifting effects. In addition D1 discloses that the dichroic paint flakes produced in accordance with the design of Figure 3C (i.e. OVP flakes having a structure according to Figure 14 on page 22 of V4) may be incorporated with other matching or contrasting standard paint pigments to achieve other colour effects using mixing techniques well-known in the paint industry (column 9, lines 3 to 14). D1 further discloses that paint solutions comprising OVP flakes have been used to coat, amongst other substrates, metal articles (column 9, lines 63 to 68). It can be inferred from D1 that the OVP flakes may be mixed with other standard paint pigments. Neither V4 nor D1 contain information suggesting that the OVP flakes might not be compatible with the components of known formulations used in automotive coatings and comprising interference mica pigment. Because of their strong hiding power (V4, page 22, Figure 14), the skilled person would have expected that OVP flakes could effectively compensate the limited hiding power of interference mica pigments to obtain in combination paint formulations for automotive coatings having sufficient hiding power. In view of these teachings in

- both V4 and D1, the skilled person confronted with the technical problem stated above would have contemplated trying the OVP flakes in formulations for automotive applications known from V4 and comprising interference mica pigment in order to provide further coating compositions for use in automotive applications.
6. Moreover a skilled person interested in effect pigments would also have been aware of V8, a document disclosing flake pigments of brilliant colour having the same kind of multilayer structure as the OVP flakes of D1 but prepared by a different process. These coloured flake pigments exhibit brilliant interference colours and excellent hiding power. In a suitable fine particle size range, for example less than 325-mesh ( $< 44 \mu\text{m}$ ) they are said to be useful in automotive enamels as well as in other coating compositions such as paints, lacquers and finishes (column 1, line 61, to column 2, line 21; column 3, lines 3 to 16). Since the OVP flakes have the same kind of structure as the flake pigment according to V8, the teaching of V8 provides the skilled person with a further incentive to use OVP flakes in paint formulations for automotive coatings. In view of V4 and D1, or V4, D1 and V8, it was thus obvious to the skilled person to solve the above-mentioned problem by adding OVP flakes, as prepared according to D1, to an interference mica containing coating composition for automobiles known from V4.
7. The respondent's argument that OVP flakes form a special class of effect pigments, which until the priority date of the patent in suit had only been used for printing purposes, so that it was not obvious to

use them in the completely different art of automotive coatings, cannot be accepted for the following reasons:

8. The board does not dispute that, together with the flakes disclosed in V8, the OVP flakes of D1/V4 form a special class of effect pigments, but considers that OVP flakes are discussed in detail in document V4, which comprises many references to the use of mica-based interference pigments in automotive coatings (V4, pages 4, 5, 10, 12, 15, 46-51). In such a context the skilled person would also have considered the use of OVP flakes for the same purpose. Furthermore, V8 comprises an explicit reference to the use of pigment flakes having the same kind of structure as the OVP flakes in automotive coating compositions (column 2, lines 18 to 21). Thus there was a clear incentive to use the OVP flakes for that purpose as well.
  
9. The board does not dispute that in D1 reference is made to "small metal articles" (column 9, line 68) but considers that the adjective "small" has been used in the context of small-scale experiments as is evident from the other painted objects "paper file cards" and "wooden tongue depressors" mentioned in the same paragraph. No prejudice against painting larger objects, such as automotive body panels, can be derived therefrom. The board is also aware that D1 indicates that on glass and metal materials the adhesion and coverage are not as good as on porous substrates, but it is said in the same sentence that it could readily be improved through the use of initial primer coats or different paint formulations (column 10, lines 8 to 13). Since the use of a primer is known in the art of automotive coatings (see for example V4, page 50,

middle column), the skilled person is not discouraged by D1 from using OVP flakes for the claimed purpose. The board further observes in this context that in the example of the patent in suit the coating composition is also sprayed onto a primed metal panel (page 6, line 38).

10. A possible reason why a skilled person might have hesitated to use OVP flakes for automotive coatings before the priority date of the patent in suit was their high cost and limited availability (V4, page 22, middle column, last sentence; declaration by Dr Anton Bleikolm, sent with the appellant's letter dated 31 October 2003; and V12). According to V12, a newspaper article published after the publication date of the patent in suit, OVP was sold exclusively to Flex's minority owner, SICPA Holding S.A. According to the declaration by Dr Anton Bleikolm, managing director of SICPA S.A, FLEX OVP was not generally available on the open market; close to 100% of the Flex OVP production was used in SICPA inks. The price of the type of OVP specified in the claims was said to be forty to fifty times the price of interference mica pigment.

In the board's view it appears therefore that essentially economical reasons and a special business relationship between Flex and SICPA but not technical reasons prevented the wide-spread use of OVP flakes in car paints.

11. The alleged too dramatic visual effect of the OVP flakes, mentioned in the patent in suit (page 2, lines 16 to 22), is also unlikely to deter the skilled

person from using OVP flakes in automotive coatings. Adding a small amount of OVP flakes to the state-of-the-art interference mica pigments is unlikely to produce a too dramatic effect. Small amounts of OVP flakes in the coating composition would also not substantially increase the price thereof. It is observed in this respect that the amount of OVP present in the composition is not stated in claim 1 and may be very small. Moreover, for people interested in customised cars a dramatic visual effect might in fact be desirable.

12. The preparation of OVP flakes according to claim 1 has been disclosed in D1 (column 2, lines 44 to 55; column 7, line 64, to column 8, line 28, and Figure 3c), which document is referred to in V4 (reference 24 on page 24). D1 does not disclose the particle size distribution of the OVP flakes. However, the OVP flakes according to D1 are also disclosed in D3, which is a continuation in part of D1. According to D3, in the case of optically variable inks for high-resolution printing, the OVP flakes have a size in the range of approximately 2 to 20  $\mu\text{m}$ . For other types of application such as paints or in wide-area printing, the size of the flakes may range up to 200  $\mu\text{m}$  (see column 4, lines 61 to 68).  
For interference mica to be used in automotive coatings V4 discloses a particle size range of 10 to 40  $\mu\text{m}$  (page 51, examples under point 3.3).

According to V8 a particle size of the pigment flakes of less than 325 mesh ( $< 44 \mu\text{m}$ ) is particularly suitable for use in automotive enamels, paints and lacquers (column 2, lines 18 to 21).

The particle size distribution for the OVP flakes mentioned in claim 1 lies therefore within the usual range for interference pigment flakes used in automotive coatings. The determination of the optimal size distribution for the claimed purpose is a matter of routine experimentation which does not involve an inventive step.

13. Claim 1 further requires that the interference mica pigment has an interference colour that is similar to one of the dichroic colours of the optically variable thin-film pigment and that such similar colour falls within the same quadrant of the colour wheel, i.e. within the same quadrant as defined in Figure 2 (see point 2 above).

Documents D1/D3 disclose that the dichroic paint flakes produced in accordance with Figure 3C may be incorporated with other matching or contrasting standard paint pigments to achieve other colour effects (D1, column 9, lines 7 to 11; D3, column 10, lines 31 34).

During the proceedings the respondent tried to show a surprising effect for the claimed colour matching feature by the submission of colour samples and a declaration by Mr Stuart Kendall Scott relating thereto. In the oral proceedings it became questionable whether the samples presented as being according to the invention were actually in conformity with present claim 1. Thereupon the respondent no longer relied on this evidence. The only example in the patent in suit is also not suitable for demonstrating any technical



effect for this colour matching feature because it does not disclose the dichroic colours of the OVP flakes. The colour of the interference mica can only fall within the same quadrant of the colour wheel as one of the dichroic colours of the OVP flakes or be outside such a quadrant. In view of the teaching of D1/D3 that matching pigments may be mixed with the OVP flakes, the claimed choice out of only two possibilities, for which no surprising effect has been made credible, does not involve an inventive step.

14. For these reasons, the board holds that the use of the coating composition according to claim 1 of the main request and the auxiliary request does not involve an inventive step within the meaning of Article 56 EPC.

## **Order**

### **For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. European patent No. 0 736 073 is revoked.

The Registrar:

The Chairman:

E. Goergmaier

M. M. Eberhard