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D E C I S I O N
of 15 February 2002

Case Number: T 0479/00 - 3.3.5

Application Number: 95108820.2

Publication Number: 0704411

IPC: C04B 33/14

Language of the proceedings: EN

Title of invention:
Process for colouring ceramics products

Patentee:
Vignali, Graziano

Opponent:
TRUKEM Produktions- und Handelsgesellschaft mbH
W.C.Heraeus GmbH
BK Giulini Chemie GmbH & Co. OHG

Headword:
Colouring ceramics/VIGNALI

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - yes; problem - solution approach should start from a realistic state of the art"

Decisions cited:
-

Catchword:
-



Case Number: T 0479/00 - 3.3.5

D E C I S I O N
of the Technical Board of Appeal 3.3.5
of 15 February 2002

Opponent 01: TRUKEM Produktions- und Handelsgesellschaft mbH
Hafenstrasse 75
D-67547 Worms (DE)

Representative: KEIL & SCHAAFHAUSEN
Patentanwälte
Cronstettenstrasse 66
D-60322 Frankfurt am Main (DE)

Opponent 02: W.C.Heraeus GmbH
Heraeusstr. 12-14
D-63450 Hanau (DE)

Representative: Kühn, Hans-Christian
Heraeus Holding GmbH
Stabsstelle Schutzrechte
Heraeusstrasse 12-14
D-63450 Hanau (DE)

Appellant: BK Giulini Chemie GmbH & Co. OHG
(Opponent 03) Postfach 15 04 80
D-67029 Ludwigshafen (DE)

Representative: Grussdorf, Jürgen, Dr.
Patentanwälte Zellentin & Partner
Rubensstrasse 30
D-67061 Ludwigshafen (DE)

Respondent: Vignali, Graziano
(Proprietor of the patent) Via 4 Novembre, 15
I-40037 Sasso Marconi (Bologna) (IT)

Representative: Gervasi, Gemma, Dr.
NOTARBARTOLO & GERVASI SRL
Corso di Porta Vittoria, 19
I-20122 Milano (IT)

Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 17 March 2000
rejecting the oppositions filed against European
patent No. 0 704 411 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: R. K. Spangenberg

Members: G. J. Wassenaar

J. H. Van Moer

Summary of Facts and Submissions

I. The appeal is from the decision of the Opposition Division to reject the oppositions against European patent No. 0 704 411. The patent was based on the European patent application No. 95 108 820.2. The priority of Italian patent application MI94 A 001965 filed on 27 September 1994 was claimed. The patent was granted with 9 claims. Claim 1 thereof reads as follows:

"Process for colouring articles of ceramic material on surface and inside up to a depth of 2 mm, comprising the application on said articles of an aqueous solution, in amount of 30-600 g/m² of coloured surface, containing a ruthenium salt of mono- or poly-carboxylic organic acid containing 1 to 18 C atoms, with 1 to 3 hydroxylic and/or 1 to 3 aminic substituents, if any, in the aliphatic chain, and subsequent ceramic firing of said articles at temperature up to 1200°C."

II. In the decision under appeal 12 documents were considered, from which the following remained relevant:

D6: JP-A-03-142894 (+ English translation),

D8: Berichte der Deutschen Keramischen Gesellschaft 70 (1993), No. 4, pages 146-150,

D10: Ullmann's Enzyklopädie der technischen Chemie, 2nd ed., Vol. 4 (1929), pages 837-838, and

D11: US-A-2739901.

The sole ground of opposition was lack of inventive

step (Articles 56 and 100(a) EPC). According to the decision under appeal the problem underlying the invention was to provide a method for colouring ceramic articles which enabled a deep colour penetration with intense shades of colours in the finished product, in particular to obtain a deep black colouring. Comparative examples filed by the respondent during the opposition proceedings, showed that for obtaining a deep black colour penetration it was not enough to increase the concentration of known colouring agents. A sufficiently deep black colouring could only be obtained with the claimed amount of organic ruthenium salts. The solution as claimed was considered not to be obvious in view of the cited documents.

- III. In the statement of the grounds of appeal, the appellant (opponent O3) maintained the objections raised before the first instance. No inventive step could be identified in the process according to claim 1 in view of D8 in combination with D10. During oral proceedings, which were held on 15 February 2002, further reference was made to D6 and D11.

The appellant's arguments may be summarized as follows:

The comparative examples filed by the respondent during opposition and appeal proceedings were not appropriate to show that a deep black colour penetration could be obtained throughout the claimed process. The process of the patent in suit differed from the process disclosed in D8 only through the use of ruthenium salts of organic acids and the amount thereof. Such organic salts were disclosed in D6. The use of ruthenium compounds for obtaining black coloured ceramics was known from D10. It was further known from D11 to use

ruthenium oxide for obtaining black coloured glass or brown coloured ceramic stain. In view of D8, disclosing the advantages of organic metal complexes over inorganic metal compounds for the colouration of ceramic articles, it was obvious to replace ruthenium chloride mentioned in D10 with an organic ruthenium compound known from D6. Moreover, it was likely that Metcolour P 100, used in the examples of the patent in suit, was available at the priority date of the patent in suit. It was obvious to use that solution, comprising organic ruthenium complexes, under the conditions as now claimed.

IV. The respondent's (proprietor) arguments may be summarized as follows:

Metcolour P 100 was sold shortly after the priority date of the patent in suit but was not available before that date. The mentioning of its commercial availability in the priority application was only anticipating the situation after the publication date of that document, at which date Metcolour P 100 was available.

Additional comparative examples were filed to show that all the features of claim 1 as granted were necessary for obtaining a deep black colour penetration. It was state of the art to obtain a black colouring of ceramics by compositions comprising iron, cobalt and optionally chromium, such as used in the comparative examples of the patent in suit. It could not be expected that the colour could be intensified by using carboxylic salts of ruthenium and the penetration depth thereof could be improved. Even with respect to inorganic ruthenium salts such as ruthenium chloride,

disclosed in D10, a substantial improvement of the said properties was obtained. By using organic anions a better use of ruthenium oxide could be made. There was no incentive in the available prior art that this improvement could be achieved by ruthenium salts of aliphatic carboxylic acids. An amended claim 1 was submitted as an auxiliary request.

- V. The appellant requested that the decision under appeal be set aside and that the European patent No. 704 411 be revoked.

The respondent requested that the appeal be dismissed, or, in the alternative, that the patent be maintained on the basis of claim 1 filed with the letter dated 11 January 2002.

Reasons for the Decision

Main request, claims as granted

1. None of the available prior art documents discloses a process comprising in combination all the features of present claim 1. Thus the invention must be considered to be new. Novelty was in fact not in dispute.
2. In the patent in suit it is indicated that the aqueous solution of ruthenium organic acid salt used in the examples was available under the trademark Metcolour P 100 from Metco s.r.l. The same information is present in the priority document. There is, however, no document on file from which it can unambiguously be derived that Metcolour P 100 was actually available before the priority date (27 September 1994). The

earliest date on invoices and product information leaflets provided by the respondent was 3 October 1994. The appellant did not provide any evidence in this respect. The appellant's argument, that products must have been available earlier than the corresponding information leaflets so that Metcolour P 100 was likely to have been available before the priority date, cannot be accepted. Indeed products must have been produced before information concerning them can be given. This remains, however, internal knowledge of the producer. Without proof that Metcolour P 100 was actually for sale or its composition otherwise made available to the public before the priority date of the patent in suit, the Board must accept that the mentioning of its commercial availability in the priority document was made in view of the later publication of the application based thereon. Thus the composition of Metcolour P 100 does not belong to the prior art within the meaning of Article 54(2) EPC.

- 3.1 According to the patent in suit the aqueous solution of the organic ruthenium salt is used for colouring ceramic articles in order to obtain black coloured ceramics or, when used in combination with other colouring compositions, deeper-coloured products (page 2, lines 5 to 9 and page 3, lines 3 to 18). Further according to the patent in suit and the submissions made by the respondent, state of the art for providing a black colour to a ceramic article was treating the unfired or prefired article with an aqueous solution of a mixture of iron and cobalt and optionally chromium salts, such as commercial available under the trademarks Metcolour E 285 and Metcolour E 296 (comparative examples 7 to 18). This was not disputed by the appellant. According to the patent in

suit it is also important that the colour penetrates deeply into the ceramic article, especially for ceramic articles which must be smoothed after firing such as smoothed vitrified stoneware tiles, which are abraded by diamond wheels through a thickness of 0.8 to 1.5 mm (page 2, lines 44 to 47).

- 3.2 D10 discloses that an aqueous solution of ruthenium chloride applied to unglazed prefired ceramics can provide a grey black (grauschwarz) colour to the ceramic after glazing and firing. The parties agreed that this teaching published in 1929 was never put into practice on a commercial scale. More recent literature related to the use of ruthenium chloride for this purpose has not been provided.

The issue of inventive step should be considered from the point of view of the skilled person at the priority date of the patent. It is unrealistic to assume that, without hindsight, somebody of average skill in the art of colouring ceramic articles in 1994 would have had the intention to improve a technique which had not received any attention during the last 65 years. The appellant's submission that the skilled person would have turned to D10 shortly before the priority date of the patent in suit, because at that time ruthenium was more readily available than before, is not convincing. It might be true that in 1994 ruthenium, obtained as a by-product in the production of platinum, was relatively less expensive in 1994 than in 1929. Since platinum was used on a large scale as catalyst long before 1994, ruthenium was probably also relatively less expensive many years before 1994. There is no evidence that shortly before 1994 the price of ruthenium was so dramatically reduced that it would

have encouraged a skilled person to use it for applications for which it was rejected earlier for economic reasons only. Moreover, the high cost for noble metals such as gold and platinum has not been a hindrance for their wide technical use. Thus ruthenium was probably not recently used for the colouring of ceramic articles simply because clear technical advantages were not apparent.

In the Board's opinion, therefore, D10, although belonging to the state of the art within the meaning of Article 54(2) EPC, cannot be regarded as a realistic starting point for the evaluation of inventive step.

3.3 D8 discloses the general teaching that corrosion problems during firing of coloured ceramic articles can be avoided if organic metal complexes are used as colouring agent instead of the inorganic metal compounds such as halogens, sulphates and nitrates. Two colouring compositions, indicated by trade marks, are specifically disclosed, one providing a blue colour and the other a grey brown colour. Their chemical compositions are not revealed. Since D8 does not relate to the problem of providing a deep black colour or intensifying other colours, this document can also not be considered to represent the closest prior art. But even if it were taken as such, as proposed by the appellant, it was, for the reasons set out below under point 4, not obvious to combine it with the teaching of D10.

3.4 The Board holds that the processes for colouring ceramic articles using polycarboxylic acid complexes of iron and cobalt and optionally chromium, which according to the patent in suit are available under the

trade names Metcolour E 285 and E 296 (comparative examples 7-18), represent the closest prior art.

Starting therefrom, the problem underlying the invention can be seen in providing a process allowing production of coloured ceramic articles, which are more intensively coloured to a higher penetration depth. The patent in suit proposes to solve this problem by using ruthenium salts of carboxylic acids of the kind and in the amount as specified in claim 1. The comparative examples of the patent in suit show that by proper treatment of the tiles after a 1.2 mm abrasion only the tiles treated with Metcolour P 100 are still black. The appellant has not disputed the results of the comparative examples but argued that colour intensity and penetration depth were not requirements of claim 1 and that the effect could not be reached over the whole ambit of the claim. The Board cannot accept the appellant's position in this respect. A claim should comprise all the essential features for solving the problem; elements of the problem itself, in this case, penetration depth and colour intensity, need not be incorporated in the claim, it is sufficient that they are discussed in the description. It is true that following the process according to claim 1 one does not obtain with any amount of colouring agent, a colour intensity and penetration depth higher than the respective maximum values obtainable with the prior art colouring agent. For deciding whether a claimed process actually solves the stated problem, however, comparison should be made with the prior art process under similar conditions. There is no evidence that when comparing the same amounts of colouring agents under proper process conditions within the scope of claim 1, a ceramic article at any penetration depth is not always

more intensively coloured by the ruthenium salts according to the patent in suit than by the known agents. In view of the comparative examples and the lack of any experimental evidence that the said problem cannot be solved within the limits set by claim 1, the Board therefore accepts that the process according to claim 1 actually solves the said problem.

4. D8 does not disclose any specific metal compound for obtaining a specific colour and thus cannot provide any pointer to the use of organic ruthenium salts for solving the above mentioned problem.

D10 discloses a list of several solutions of metal salts for treating prefired ceramic articles to obtain coloured ceramic articles after glazing and firing under oxidizing conditions. According to the table on page 837 a grey black or black gray colour can be obtained with solutions of ruthenium, rhodium, indium, palladium and platinum chloride. D10 is, however, silent about the penetration depth of the colour. Thus, even assuming the unlikely situation that the skilled person in 1994 would actually have taken this old document into consideration in trying to solve the above-mentioned problem, it did not provide a pointer to the claimed solution. The appellant's argument cannot be accepted that colour shade and penetration depth were simply a matter of the applied amount of ruthenium salt independent of the nature of the anion. With comparative examples filed during the appeal proceedings, the respondent has shown that by using the same amounts of ruthenium, the penetration depth of Ru-glycolate solutions is substantially larger than that of Ru-chloride solutions (Enclosure 3 filed with the letter dated 22 February 2001 and Enclosure 7 filed

with the letter dated 11 January 2002).

5. D6 discloses the printing of a fine pattern on a ceramic base material, firing the ceramic to obtain a pattern of a metallic film with a thickness of only 0,05 to 0.3 μm , and metal plating the pattern thus produced. The printing ink comprises an organometallic complex salt of one or more metals from a group of 10 metals, amongst which ruthenium is cited (claim 3 and pages 3 and 4 of the English translation). Specific ruthenium-comprising inks are not disclosed.

D11 discloses the addition of ruthenium to a glass composition in order to obtain a black coloured glass or to compounds of other elements to obtain a brown-coloured ceramic stain. The ruthenium may be added as a salt but the use of the oxide is preferred (column 1, line 69 to column 2, line 18).

These documents thus relate to remote art and merely show that organic ruthenium salts have been considered as a source of metal for a microscopic pattern on a ceramic, and that ruthenium salts may be transformed into ruthenium oxide to obtain black or brown coloured materials. They do not teach anything about the suitability of aqueous solutions of organic ruthenium salts for in-depth colouration of unfired or prefired ceramics.

The other documents on file do not provide any incentive for the claimed solution either. Since they were not relied on during the appeal proceedings, they need not be discussed here.

6. For these reasons the Board holds that the subject-

matter of claim 1 does not follow in an obvious way from the available prior art and thus involves an inventive step within the meaning of Article 56 EPC.

7. No other conclusion would have been reached if D10 had been considered as closest state of the art, as also proposed by the appellant. Reconsidering such old art in view of a technical problem not explicitly addressed there would, in the Board's judgment, have required from a skilled person in 1994 more than an average degree of imagination and would, in itself, already involve an inventive step (see point 3.2 above).
8. Claims 2 to 9 are subclaims dependent upon claim 1. The inventiveness of their subject-matter follows from this dependency.

Since the respondent's main request is granted there is no need to consider the auxiliary request.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

U. Bultmann

R. Spangenberg