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**Datasheet for the decision
of 25 July 2016**

Case Number: T 1513/11 - 3.3.05

Application Number: 05100826.6

Publication Number: 1535886

IPC: C04B28/02, C04B14/30, C04B40/00

Language of the proceedings: EN

Title of invention:
Architectural concrete comprising photocatalyst particles

Patent Proprietor:
ITALCEMENTI S.p.A.

Opponent:
KRONOS INTERNATIONAL, INC.

Headword:
Photocatalytic concrete/ ITALCEMENTI SPA

Relevant legal provisions:
EPC Art. 54, 56, 83, 84, 123(2), 123(3)

Keyword:
Novelty - (yes) - novelty of use - second (or further) non-
medical use - public prior use (no)
Inventive step - (yes)

Decisions cited:

G 0002/88, G 0001/95

Catchword:



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Case Number: T 1513/11 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 25 July 2016

Appellant: KRONOS INTERNATIONAL, INC.
(Opponent) Postfach 10 07 20
D-51307 Leverkusen (DE)

Respondent: ITALCEMENTI S.p.A.
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Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted on
17 May 2011 concerning maintenance of the
European Patent No. 1535886 in amended form.

Composition of the Board:

Chairman A. Haderlein
Members: H. Engl
C. Vallet

Summary of Facts and Submissions

- I. In the interlocutory decision posted on 17 May 2011, the opposition division found that European patent EP-B-1 535 886 met the requirements of the EPC, on the basis of the claims of the main request filed at the oral proceedings held on 3 May 2011.
- II. The sole independent claim 1 of said main request reads:
- "1. Use of an architectural concrete composition containing in bulk photocatalyst particles to oxidize polluting substances in the presence of light, air and environmental humidity, said composition comprising water, coarse and fine aggregates, a hydraulic binder and photocatalyst particles, and having binders/aggregates ratio by weight ranging from 1/3 to 1/6, where the photocatalyst particles are particles of titanium dioxide, at least 5% by weight of said particles of titanium dioxide have the anatase structure, said photocatalyst particles being present in an amount from 0.01 to 10.0% by weight with respect to the hydraulic binder."
- III. The appeal of the opponent (henceforth "the appellant") was filed with letter dated 1 July 2011. The statement of grounds of appeal, filed with letter dated 16 September 2011, included the following new documents:
- E8: GB-A-849 175
- E9a-d: Photographs of the court building ("Amtsgericht") in Veibert
- E10: First expert opinion by Prof. Detlef Bahnemann
- E11: T. Ibusuki et al., *"Removal of low concentration air pollutants through*

photoassisted heterogenous catalysis", J. Molec. Catalysis 88 (1994), pages 93 to 102

- E12: M.R. Hoffmann et al., *"Environmental Applications of Semiconductor Photocatalysis"*, Chem. Rev. 95., 1995, pages 69 to 96
- E13: Technical Report Dyckerhoff AG
- E14: Declaration of Mr Matthias Goldschmidt

Documents filed by the appellant with letter dated 8 November 2012 were:

- E15: EP-A-0 633 064
- E16: Second expert opinion by Prof. Detlef Bahnemann
- E17: G. Kaempf et al., *"Degradation Processes in TiO₂-pigmented Paint Films on Exposure to Weathering"*, J. Paint Technol. 46 (1974), pages 56 to 63.

The following document was *inter alia* cited in opposition proceedings:

- D1: Könneker K., *"Titandioxid in Sichtbeton-fertigteilen"*, Kronos Information 6.7, Betonwerk + Fertigteil-Technik (1979).

- IV. The patentee (henceforth "the respondent") filed its observations with letter dated 30 March 2012. It submitted claims in accordance with a main request (corresponding to the claims allowed by the opposition division; see point II) as well as first, second and third auxiliary requests, and Exhibits C, D and E.
- V. The board issued a preliminary opinion dated 15 April 2016, addressing the issues of added subject-matter (Article 123(2) EPC), extension of scope of protection (Article 123(3) EPC), clarity (Article 84 EPC), novelty

and inventive step (Articles 54 and 56 EPC, respectively). The board's provisional opinion was that none of the objections raised by the appellant was prejudicial to the maintenance of the opposed patent in the version allowed by the opposition division and that, consequently, the appeal was likely to be dismissed.

VI. In a letter dated 17 May 2016, the appellant announced that it would not attend the oral proceedings.

The board informed the parties that the oral proceedings were cancelled and that the proceedings were to be continued in writing.

VII. With letter dated 27 May 2016, the respondent requested a different apportionment of costs. This request was withdrawn by letter dated 20 June 2016.

VIII. The appellant mainly argued that:

- Claim 1 was unclear and contravened Article 123(2) and (3) EPC;
- The patent did not meet the requirements of Article 83 EPC (sufficiency of disclosure), novelty and inventive step.

IX. Requests of the parties

The appellant (opponent) requested that the decision under appeal be set aside and the patent be revoked.

The respondent (patentee) requested that the appeal be dismissed (main request) or in the alternative, that the patent be maintained on the basis of the claims of the auxiliary requests I to III, filed with letter

dated 30 March 2012.

Reasons for the Decision

1. Insufficiency of disclosure - Article 83 EPC

This objection was neither raised by the opponent in opposition proceedings nor introduced by the opposition division. It cannot be introduced into the appeal proceedings without the consent of the patentee (G 1/95, OJ EPO 1996, 615). Such a consent was not given.

The board therefore disregards this ground of opposition.

2. Article 84 (clarity) and Articles 123(2) and (3) EPC

The appellant argued that use claim 1 as amended was rendered unclear by the omission of the word "able". This amendment would also contravene Article 123(2) and (3) EPC.

These objections were already dealt with by the opposition division in the contested decision. The board finds the reasoning of the opposition division correct. The objection of the appellant is based on a semantic analysis, not on a technical interpretation. To the board, the claim feature "(use of) a concrete composition containing ... photocatalytic particles to oxidize polluting substances" is in essence the same as "a concrete composition, containing ... photocatalytic particles able to oxidize polluting substances", so that no violation of Article 123(2), (3) EPC can be seen.

A clarity problem does not arise, either. Clearly, claim 1 of the main request relates to the use of an architectural concrete composition, used to oxidize polluting substances, in the presence of light, air and environmental humidity, due to the presence in the bulk of TiO₂ photocatalyst particles. According to the appellant, the purpose of the claimed use was not clearly stated in the claim. However, in the board's view, this objection is unfounded, as the purpose of "oxidizing polluting substances" is clearly indicated in the claim.

The requirements of Articles 84 and 123(2), (3) EPC are thus met.

3. Article 54 - Novelty

- 3.1 The appellant already conceded in first instance proceedings that D1 did not explicitly disclose the oxidation of polluting substances by titanium oxide in anatase form present in the bulk of the concrete. However, it maintained that such a photocatalytic activity was an inherent property of the TiO₂-doped concrete composition, and that therefore the claimed use was anticipated by D1.

The board is not convinced by this argument. As already pointed out by the opposition division, the claim feature *"use ... to oxidise polluting substances in the presence of light, air and environmental humidity"* must be interpreted as a technical feature in the sense of G2/88 (OJ EPO 1990, 93). D1 deals with improvements of the aesthetic appearance of the concrete surface by the addition of titanium dioxide as a pigment and is silent on using TiO₂ for the oxidation of polluting airborne

substances. The documents E8, E9a-d, E10, E13 and E14 referred to by the appellant in this respect fail to show that D1 discloses the use of titanium dioxide particles with the specific purpose of oxidising polluting airborne substances. In particular, in the report E13, dated 2011, the photocatalytic activity of concrete surfaces containing 3% of KRONOS 1001 TiO₂ pigment was examined. A reduction of NO_x was observed when the concrete surface was illuminated with UV light. The appellant argued that a similar effect would take place in concrete mixtures according to D1 and E8, containing cement, water aggregate and TiO₂ (anatase). However, in the board's view, E13 cannot be used for the assessment of novelty to supplement information on photocatalytic activity of TiO₂ which is not present in documents E8 and D1.

- 3.2 E8 discloses a white coating composition, suitable for facing concrete, containing finely divided titanium dioxide particles and Portland cement. Under action of atmospheric influences the coating is converted into hydrated titanium dioxide which wets and covers dirt particles, thereby giving rise to a self-cleaning and brightening effect of the surface (see page 1, lines 9 to 11 and 80 to 91; page 2, lines 1 to 15).
- 3.3 E11 relates the removal of nitrogen oxides through photocatalytic reaction on powdery mixtures of titanium oxide, activated carbon and iron or cobalt oxide (see Abstract; page 95, Figure 2; page 97, second paragraph; page 98, second paragraph; and page 101, Conclusion). E11 is silent about concrete containing titanium oxide in bulk.
- 3.4 E12 is an article about semiconductor photocatalysis and formation of reactive oxygen species on the surface

of illuminated TiO_2 . The document does not disclose incorporation of TiO_2 into concrete or similar hydraulic mixtures.

- 3.5 E14 relates to an alleged public disclosure of the photocatalytic activities of a concrete article which contained in its one centimetre thick surface region 4% by weight of TiO_2 (Bayertitan A Anatas). The concrete article had been produced in 1994 by Betonwerk Linden and stored in the open air until it was examined in 2009 with respect to its photocatalytic activity. Under irradiation with ultraviolet light, photocatalytic degradation of NO was indeed found to occur (see attachment A to document E14). The appellant argued that E14 thus provided evidence for a public prior use of the claimed subject-matter in accordance with claim 1 of the main request.

According to established jurisprudence, a case of public prior use is only adequately substantiated when the essential circumstances have been clarified, that is, the questions of what was made available, when, where, how and by whom. The appellant's submission fails to establish the circumstances of how the article's photocatalytic activity was made available to the public. Supposing, for the sake of completeness, that it were the case, the photocatalytic activity of the concrete article would have been made available to the public, such disclosure took place in 2009, considerably after the priority date of the opposed patent. The appellant's submission must therefore be disregarded by the board for this reason alone.

- 3.6 The board thus arrives at the conclusion that the subject-matter of claim 1 as amended is new (Article 54

EPC).

4. Inventive step

4.1 The appellant identified D1 or E8 as the document representing the closest prior art. It defined the technical problem of the patent in suit as providing further advantageous functions of an exposed concrete surface containing titanium dioxide. The appellant argued that claim 1 was obvious in view of D1 or E8 alone, or in view of D1 or E8 taken in combination with E11, E12 or E15. In the appellant's view, the use of photocatalytic titanium dioxide in concrete was only a bonus effect in view of the prior art.

4.2 The board does not find these arguments convincing.

As mentioned above, D1 is concerned with the aesthetic appearance of exposed surface concrete ("Sichtbeton") by the addition of titanium dioxide (anatase or rutile) as a pigment. There is no disclosure or suggestion in D1 of said titanium oxide pigments having photocatalytic activity, in particular oxidizing polluting substances in the presence of light, air and environmental humidity. The board cannot, therefore, accept the appellant's argument that the claimed subject matter was obvious in view of D1 alone.

E8 deals with titanium dioxide as a white pigment and is silent about any kind of photocatalytic activity of titanium dioxide (see point 3.2 above). It cannot provide a hint towards the claimed subject-matter.

As to the combination of D1 or E8 with various other documents, including E11, E12 or E15, the appellant has not brought forward plausible arguments as to why the

skilled person should consider any of them at all. In particular, the board is not convinced that D1 and E15 can be combined in an obvious manner, in view of the problem set out in paragraphs [0008] and [0009] of the patent in suit. E15 discloses a photocatalytic composite comprising a substrate having photocatalytic particles (e.g. TiO_2) adhered to it via an adhesive (inter alia cement). Neither is the TiO_2 incorporated into the bulk of the composite article, nor is there any mention of a concrete article.

Prof. Bahnemann in his second opinion (E16) asserted that when using the concrete compositions described in D1 (which comprise anatase) in the construction of buildings, the same effects would be expected to be seen as those described in the patent in suit, i.e. the conservation of the concrete's original appearance and the degradation of polluting substances in the vicinity in the presence of light, air and humidity.

Prof. Bahnemann held the view that these photocatalytic effects would last for a long time (e.g. up to 15 years). Whether that is correct on the facts of the case is in the board's view not relevant, because the salient point is that Prof. Bahnemann does not (and cannot) assert that document D1 made available to the skilled reader anything relating to the photocatalytic activity of TiO_2 in bulk concrete. As a consequence, the skilled person would not be motivated by D1 to look for such signs of photocatalytic activity in architectural concrete compositions made with TiO_2 pigments.

E17 (published in 1974) is an article investigating the degradation of TiO_2 -pigmented paint films on exposure to weathering. The passages cited by the appellant (page 56, right hand column, last paragraph, page 57,

left hand column, second paragraph) relate to UV degradation of the binder of TiO₂-pigmented paints by the photo-activity of the TiO₂ (so-called chalking). There is no disclosure or suggestion of incorporating TiO₂ into concrete, or of TiO₂ to oxidize polluting substances in the presence of light, air and environmental humidity. Therefore, even a combination of D1 or E8 with E17 cannot lead to the claimed invention.

4.3 In summary, the subject-matter of claim 1 of the main request is considered to involve an inventive step (Article 56 EPC). The same applies to dependent claims 2 to 11.

4.4 As the main request is allowable, there is no need to consider the auxiliary requests.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



C. Vodz

A. Haderlein

Decision electronically authenticated