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**Datasheet for the decision
of 9 April 2019**

Case Number: T 0226/15 - 3.2.03

Application Number: 07704826.2

Publication Number: 1994202

IPC: C23C16/455, A44C27/00,
C03C17/36

Language of the proceedings: EN

Title of invention:
PROTECTIVE COATING OF SILVER

Patent Proprietor:
BENEQ OY

Opponents:
Picosun Oy
C. HAFNER GmbH & Co.
Münze Österreich AG

Headword:

Relevant legal provisions:
EPC Art. 54, 56, 83
EPC R. 99(2)

Keyword:

Admissibility of appeal (yes)

Sufficiency of disclosure - (yes)

Novelty - main request (yes) - public prior use (no) -
insufficient evidence

Inventive step - main request (yes)

Decisions cited:

T 0304/08, T 2111/13, T 0848/93, T 0268/13

Catchword:



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Case Number: T 0226/15 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 9 April 2019

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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 3 December 2014
revoking European patent No. 1994202 pursuant to
Article 101(3) (b) EPC.**

Composition of the Board:

Chairman G. Ashley
Members: B. Miller
 G. Weiss

Summary of Facts and Submissions

- I. European patent No. 1 994 202 relates to a method for protecting silver products.

- II. Three oppositions were filed against the patent, based on the grounds of Article 100(b) EPC and Article 100(a) EPC together with Articles 54 and 56 EPC.
The patent was revoked by the opposition division, since the opposition division concluded that the grounds of opposition according to Article 100(a) EPC prejudiced the maintenance of the patent.

This decision was appealed by the patent proprietor ("the appellant").

- III. With the summons to oral proceedings, the Board sent a communication pursuant to Article 15(1) of the Rules of Procedure of the Boards of Appeal (RPBA) indicating to the parties its preliminary, non-binding opinion of the case.

- IV. Opponent 1 (respondent 1) withdrew its opposition with a letter dated 28 April 2016.

- V. With letters dated 2 January 2019 and 5 March 2019 respondent 2 (opponent 2) and respondent 3 (opponent 3) respectively, indicated that they would not attend the oral proceedings.

- VI. In preparation for the oral proceedings, the appellant submitted auxiliary requests 4 to 8 with a letter dated 9 January 2019.

VII. Oral proceedings were held on 9 April 2019 in the absence of the remaining respondents 2 and 3 in line with Article 15(3) RPBA and Rule 115(2) EPC. During the oral proceedings the appellant filed an amended eighth auxiliary request which was maintained as the only request at the end of the oral proceedings.

At the end of the oral proceedings the appellant's requests were that the decision under appeal be set aside and that the patent be maintained on the basis of claims 1 to 7 of the main request filed during the oral proceedings and formerly labelled as amended eighth auxiliary request.

The respondents 2 and 3 requested in their written submissions that the appeal be dismissed.

VIII. The sole independent claim according to the main request reads as follows (amendments compared to claim 1 as granted in bold):

"A method for **providing a thin coating on surfaces of silver product preventing tarnishing for** protecting silver products, articles or parts against tarnish, characterized by applying ~~a~~**the** thin coating of **aluminium oxide** ~~protective material~~ having thickness between **60 nm to 90 nm** ~~1 nm to 100 nm~~ on at least a part of the surface of a silver product, article or part using an ALD (Atomic Layer Deposition) method."

Claims 2 to 7 of the main request relate to preferred embodiments of the method according to claim 1.

IX. State of the art

The following documents of the opposition proceedings were cited by the parties in the appeal proceedings and are relevant for this decision:

- R1: US 2004/0159830 A1;
- R2: "Grazing incidence absorption measurements", Report by Spectra Technology Inc., 1989, pages 1-1 to 3-1;
- R3: M. Ritala et al., "Atomic Layer Deposition", Handbook of Thin Film Materials, 2002, pages 103 to 159;
- R4: R. Matero et al., "Atomic layer deposition thin films for corrosion protection", J. Phys. IV France 9, 1999, pages Pr8-493 to Pr8-499;
- R7: DE 44 25 122 A1;
- R8: T. Pilvi, "Atomic Layer Deposition for optical applications: metal fluoride thin films and novel devices", Dissertation, Helsinki 2008, pages 1 to 103;
- R9: Extract from a laboratory logbook from 2004;
- R12: US 6 897 119 B1;
- R15: US 4,495,254;
- R18: A.V. Whitney et al., "Localized Surface Plasmon Resonance Nanosensor: A High-Resolution Distance-Dependence Study Using Atomic Layer Deposition", J. Phys. Chem. B 2005, 109, pages 20522 to 20528;
- R20: US 2006/0007677 A1.

The following documents, which had not been admitted into the oppositions proceedings, were cited in the appeal proceedings by respondent 1.

- R23: Declaration by Jarmo Järvinen, CEO of Nanoscale Oy in 2003 and translation;
- R24: Declaration by Sven Lindfors, Employee of Nanoscale Oy in 2003 and translation including 3 sheets of attachments;
- R25 Invoice from Nanoscale Oy to Kultakeskus Oy concerning coating of silver products.

The following documents were cited by respondent 1 in appeal proceedings for the first time:

- R27: EP 2 468 921 A1;
- R28: Declaration signed by PhD Tero Pilvi of 14 August 2015;
- R29: Declaration of 12 August 2015 by Ilkka Ruohola, CEO of Kultakeskus Oy.

The following document was cited by the appellant in appeal proceedings for the first time:

- R30: Declaration of Markku Leskelä and translation.

X. The appellant's arguments, as far as they are relevant for this decision, can be summarised as follows.

None of the documents cited by the respondents disclosed a method of protecting silver products by applying a coating of aluminium oxide having a thickness of 60 to 90 nm.

Starting from R2 as the closest prior art the objective technical problem was the provision of a protective coating having improved optical properties.

None of the cited prior art documents taught that a coating of aluminium oxide having a thickness between 60 and 90 nm achieved good optical properties due to blue interference which made the coating appear brighter to the human eye.

Therefore the subject-matter of claim 1 was not obvious in view of the cited prior art.

XI. The respective arguments of the respondents can be summarised as follows.

The appeal was not admissible, since it was not clear which of the requests filed in opposition proceedings were being addressed in the grounds of appeal.

The skilled person was confronted with an undue burden when repeating the method of claim 1 as granted, since there was insufficient information in the contested patent as to how to obtain a coating having a thickness of 1 nm, and how to obtain a protection for silver articles by coating only a part thereof.

As reasoned in the contested decision, the subject-matter of claim 1 as granted lacked novelty over R1, R18, R27 and the public prior use disclosed in R8/R9 or R23 to R25 in combination with R29.

Starting from any of the documents R2, R7, R15, R20, or from common general knowledge, it was obvious to use the ALD process such as described in R3, R4 or R18 to achieve a thin coating on silver. Therefore the subject-matter of claim 1 as granted was obvious.

Reasons for the Decision

1. Admissibility of the appeal

During oral proceedings in opposition several versions of the auxiliary requests 1 to 3 were submitted. In the statement setting out the grounds of appeal the appellant did not specify in detail, which version of the requests it intended to pursue in appeal proceedings, but merely requested that the impugned decision be set aside and the patent be maintained as granted, alternatively on the basis of one of the three auxiliary requests filed during oral proceedings before the opposition division.

The statement setting out the grounds of appeal is read in the context of the opposition proceedings. In the absence of any indication to the contrary, it is concluded that the appellant was referring to the latest requests, which form the subject of the impugned decision.

Hence, the statement setting out the grounds of appeal fulfils the requirements of Rule 99(2) EPC.

The Board therefore reaches the conclusion that the appeal is admissible.

2. Admissibility of the main request

The main request was filed in reaction to the communication of the Board and to the discussion during the oral proceedings before the Board.

It is based on the set of claims according to former auxiliary request 8 which had been filed with the letter dated 9 January 2019. Compared to the claims of that former request, the subject-matter of claim 1 has been further limited by defining that the protective coating material is aluminium oxide.

This further amendment is reasonable, since all specific embodiments described in paragraphs [0015] to [0021] of the contested patent describe a protective coating made of aluminium oxide.

In particular, the specific limited range for the thickness of 60 to 90 nm of the protective coating, that had already been defined in previous auxiliary requests, is described in the description of the contested patent in paragraph [0021] only in the context of aluminium oxide as the coating material. Furthermore the embodiment illustrated in the figures of the contested patent is only based on a coating made of aluminium oxide.

The addition of a feature, which reflects the sole specific embodiment described in detail in the contested patent, is a reasonable amendment and is not regarded as an abuse of the procedure.

The Board therefore admitted the new main request during the oral proceedings by exercising its discretion under Article 13(3) RPBA.

3. Main request - Article 100(b) EPC

3.1 Claim 1 is directed to a method for preventing tarnishing of silver products by applying a coating using the ALD (atomic layer deposition) process.

3.2 Although respondent 3 argued that the ALD process is not suitable for achieving a uniform coating having a thickness as low as 1 nm, this argument is no longer relevant, since claim 1 of the main request requires the coating to have a thickness of 60 nm to 90 nm.

Furthermore, ALD is a well known method for providing a thin uniform coating having a thickness in the claimed range, see R3 (page 103, see introduction), R4 (page P8-493, first paragraph of the introduction) or R18 (page 20522, right column, last 6 lines).

3.3 Respondent 3 further argued that tarnishing of a silver article cannot be prevented when the coating is only applied to a part thereof.

Although claim 1 only requires that the coating be applied on a part of the surface, it is clear to the skilled person that this would not prevent tarnishing of the entire product. This, however, does not mean that the claimed subject-matter cannot be reworked.

3.4 In summary, the ground of opposition pursuant to Article 100(b) EPC does not prejudice the maintenance of the patent on the basis of the main request.

4. Main request - Article 100(a) in conjunction with Article 54 EPC

4.1 Claim 1 of document R1 defines a device comprising a matrix of particles comprising a non-conductive coating having a thickness of about 0.5 to about 100 nm. According to claim 6 the particles can be made of silver and according to claim 7 the coating can be made of aluminium oxide formed by atomic layer deposition.

The subject-matter of claim 1 differs from the disclosure of R1 in that silver and aluminium oxide are selected as particle and coating material respectively, and in that the particle coating has a thickness of 60 to 90 nm.

4.2 R8 is a dissertation by Mr. Pilvi. It was published in 2008, hence was not publically available before the priority date (2 February 2016) of the contested patent.

R9 is an extract from a laboratory book from 2004. It relates to tests concerning the anti-tarnishing coating described on page 74 of R8, which took place at the university of Helsinki.

Laboratory books are in general not publically available, since members of the public usually have no permission to enter university labs and read laboratory note books. This applied to tests performed at the university of Helsinki in relation to the dissertation of Mr. Pilvi, as was confirmed by the declaration of Mr. Leskelä (R30), one of the supervisors of Mr. Pilvi during his dissertation (see R8, page 2).

Since it was not clearly established that R8 and R9 were publically available before the priority date of the contested patent, these documents are not prior art in accordance with Article 54(2) EPC.

- 4.3 R18 discloses a method of applying a thin coating of aluminium oxide on silver nanotriangles (R18, Figure 2) using atomic layer deposition (ALD) (R18, page 20524, right column, Figure 3). According to page 20524, left column, paragraph "SEM of Ag Nanotriangles", the silver is coated in 100, 200, 400 or 600 cycles, wherein each cycle increases the thickness by 0.9 Å. The ALD process according to R18 therefore results in a coating having a thickness of 9 nm, 18 nm, 36 nm or 54 nm.

Hence, the subject-matter of claim 1 differs from the disclosure of R18 in that the aluminium oxide coating has a thickness of 60 to 90 nm.

- 4.4 With reference to R23 to R25 and R29, all filed with the reply to appeal, former respondent 1 argues that claim 1 as granted lacks novelty over a public prior use and that this evidence should be admitted into the proceedings.

R24 describes a method of protecting silver articles by applying a coating of aluminium oxide by ALD. However, the thickness of the coating is presented inconsistently. According to the declaration R24 itself the coating is 15 nm thick. However, according to the header of the log file, which is annexed thereto, the thickness of the coating is 150 nm.

Notwithstanding the doubt as to which of the two thicknesses indicated in R24 was obtained during manufacture of the articles, the subject-matter of

claim 1 differs from the method described in R24 in that the aluminium oxide coating is applied in a thickness range of 60 to 90 nm.

It follows that the alleged public prior use described in R23 to R25 and R29 is not relevant for the subject-matter of claim 1 of the main request. The question whether or not documents R23 to R25 and R29 should be admitted into the appeal proceedings can therefore remain unanswered.

4.5 R27 is a divisional application stemming from the application of the contested patent. It benefits from the same priority as the contested patent. Therefore either the priority is valid for both or none. In either case, R27 is not prior art for the contested patent according to Article 54(2) EPC.

4.6 In summary the Board concludes, that the ground of opposition pursuant to Article 100(a) in conjunction with Article 54 EPC does not prejudice the maintenance of the patent on the basis of the main request.

5. Main request - Article 100(a) in conjunction with Article 56 EPC

5.1 Starting from R2

5.1.1 R2 discloses a silver mirror coated with aluminium oxide and teaches that a coating having a thickness of 1 nm (10 Å) is already effective for preventing tarnishing (page 2-4).

Therefore R2, similarly to the contested patent, discloses a method of protecting silver articles from

tarnishing and can be considered as a suitable starting point for the assessment of inventive step.

- 5.1.2 The subject-matter of claim 1 differs from the method of R2 in that the coating is applied by ALD in a thickness of 60 to 90 nm.
- 5.1.3 According to paragraph [0021] of the contested patent a coating of aluminum oxide having a thickness of 60 to 90 nm not only achieves a sufficient protective effect but also appears brighter to the human eye due to blue interference created by having a coating of that particular thickness.

Applying an aluminium oxide coating having a thickness of 60 to 90 nm therefore achieves the desired high protection and the further desired optical appearance of the silver product.

The objective technical problem can therefore be regarded as to provide a method of improving the protection of silver articles without compromising the optical properties.

- 5.1.4 It is well known that ALD is a suitable method for providing a thin uniform coating, see R3 (page 103, see introduction), R4 (page P8-493, first paragraph of the introduction) or R18 (page 20522, right column, last 6 lines).

However, none of the cited prior art documents teaches that applying a coating by ALD in a thickness of 60 to 90 nm not only achieves good protection but also results in a coating having better optical properties.

This effect is also not obvious in view of common general knowledge, which is reflected for example by the teaching in R15 from column 5, line 54 to column 6, line 4. It confirms that interference is generated when the coating has a thickness in the same order of magnitude as the wavelength of visible light. R15 further teaches in this context that interferences can be avoided by keeping the thickness of the coating below 50 nm and above 1500 nm.

The common general knowledge therefore does not motivate the skilled person to expect that increasing the minimum thickness of 1 nm disclosed in R2 to 60 to 90 nm would not only improve the protection but would also achieve an optically attractive coating despite the fact that the coating has a thickness in the same order of magnitude as the wavelength of visible light.

Therefore the subject-matter of claim 1 of the main request is not obvious when starting from document R2.

5.2 Starting from any of documents R7, R15 and R20

5.2.1 None of the documents R7, R15 and R20 teaches a method which is more relevant for the subject-matter of claim 1 than R2.

(a) R7 deals with the same general problem as both the contested patent and R2, namely protecting silver against tarnishing (R7, column 1, lines 7 to 11 and claim 1). It discloses a method of applying a thin coating of protective material having a thickness of 100 to 10000 nm on the surface of the silver tableware or ornaments (column 2, line 49 and claim 8) by reactive sputtering (column 1, line 61 to

column 2, line 13). The coating material can be aluminium oxide (column 1, line 57 and claim 2).

(b) R15 describes a method for protecting silver articles by applying a silicone dioxide coating (column 11, line 50 to column 6, line 9).

(c) R20 discloses a method for protecting the silver surface of a lamp reflector against tarnish by applying a protective layer (claim 1) which can be a thin coating of silicone dioxide having a thickness of 15 nm or higher (paragraph [0033]).

5.2.2 The subject-matter of claim 1 therefore differs from each of the methods disclosed in R2, R15 and R20 at least by the same features as with regard to R2, namely in that the protective coating is applied by ALD in a thickness of from 60 to 90 nm.

Therefore the arguments discussed above in points 5.1.3 and 5.1.4 with regard to R2 apply in the same manner when starting from any of documents R2, R15 and R20.

5.3 It can further be accepted that it is within the common general knowledge, that silver can be protected from tarnishing by applying a coating as argued by the former respondent 1 in point 9.1.2 of the reply to appeal.

However, this common general knowledge is not closer to the claimed subject-matter than the teaching of R2.

Therefore the same arguments as indicated above in points 5.1.3 and 5.1.4 apply when considering the common general knowledge as a starting point for the assessment of inventive step.

5.4 In summary the Board concludes, that the ground of opposition pursuant to Article 100(a) in conjunction with Article 56 EPC does not prejudice the maintenance of the patent on the basis of the main request.

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 as amended in the following version:
 - description pages 2 to 5 received during oral proceedings of 9 April 2019;
 - claims 1 to 7 received during oral proceedings on 9 April 2019;
 - figures 1 and 2 of the granted patent specification.

The Registrar:

The Chairman:



C. Spira

G. Ashley

Decision electronically authenticated