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Datasheet for the decision of 23 January 2018

Case Number: T 0220/14 - 3.2.03

Application Number: 03708593.3

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Language of the proceedings: EN

Title of invention:

TREATING SOLUTION FOR FORMING BLACK HEXAVALENT CHROMIUM-FREE CHEMICAL COATING ON ZINC OR ZINC ALLOY PLATED SUBSTRATE, AND METHOD FOR FORMING BLACK HEXAVALENT CHROMIUM-FREE CHEMICAL COATING ON ZINC OR ZINC ALLOY PLATED SUBSTRATE

Patent Proprietor:

DIPSOL CHEMICALS CO., LTD.

Opponent:

Atotech Deutschland GmbH

Headword:

Relevant legal provisions:

EPC Art. 56

Keyword:
Inventive step - (yes) - ex post facto analysis

Decisions cited:

Catchword:

Europäisches Patentamt
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Case Number: T 0220/14 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 23 January 2018

Appellant: (Patent Proprietor)	DIPSOL CHEMICALS CO., LTD. 3-9, Ginza 1-Chome, Chuo-Ku Tokyo 104-0061 (JP)
Representative:	Bawden, Peter Charles Bawden & Associates 4 The Gatehouse 2 High Street Harpenden, Hertfordshire AL5 2TH (GB)
Appellant: (Opponent)	Atotech Deutschland GmbH Erasmusstrasse 20 10553 Berlin (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 26 November 2013 concerning maintenance of the European Patent No. 1484432 in amended form.**

Composition of the Board:

Chairman	G. Ashley
Members:	B. Miller
	E. Kossonakou

Summary of Facts and Submissions

I. European patent No. 1 484 432 relates to a treating solution for forming a black, hexavalent chromium-free chemical coating on zinc or zinc alloy plated substrates.

II. An opposition was filed against the patent, based on Article 100(a) together with Articles 54 and 56 EPC. In the interlocutory decision the opposition division found that the contested patent met the requirements of the EPC on the basis of the claims of auxiliary request 1 submitted with the letter dated 10 January 2012.

This interlocutory decision was appealed by both parties. As the proprietor and the opponent are both appellants and respondents in this appeal, for simplicity, the Board will refer to the parties as the proprietor and the opponent in the following. Both parties focused on the ground of opposition pursuant to Article 100(a) together with Article 56 EPC,

III. The opponent requested that the decision under appeal be set aside and the patent be revoked in its entirety.

The patent proprietor requested that the decision under appeal be set aside and the patent be maintained as granted (main request) or, subsidiarily, on the basis of one of auxiliary requests 1 to 3 submitted with its statement setting out the grounds of appeal.

IV. The main request contains three independent claims directed to a treating solution (claim 1), a method for forming a film (claim 10) and a method for rust-proofing zinc (claim 13).

Claim 1 according to the main request reads as follows:

"A processing solution for forming a hexavalent chromium free, black conversion film on a zinc or zinc alloy plating layer(s), the processing solution comprising:
nitrate ions and trivalent chromium in a mole ratio (NO_3^-/Cr^{3+}) of less than 0.5/1, wherein the trivalent chromium is present in the form of a water-soluble complex with a chelating agent; and
cobalt ions and / or nickel ions, wherein cobalt ions and / or nickel ions are stably present in the processing solution without causing any precipitation by forming a hardly soluble metal salt with the chelating agent; wherein the solution reacts with zinc when it is brought into contact with the zinc or zinc alloy plating to form a hexavalent chromium free, black conversion film containing zinc, chromium, cobalt and / or nickel, and the chelating agent on the plating layer(s)."

Claims 2 to 9 of the main request relate to preferred embodiments of the solution according to claim 1.

Claim 10 of the main request reads as follows:

"A method for forming a hexavalent chromium free, black conversion film, which comprises the step of bringing a zinc or zinc alloy plating layer(s) into contact with the processing solution of any of claims 1 to 9."

Claims 11 to 12 of the main request relate to preferred embodiments of the process according to claim 10.

Claim 13 of the main request reads as follows:

"A method for rust-proofing zinc and zinc alloy plating, which comprises the step of subjecting a hexavalent chromium free, black conversion film formed by the method according to any of claims 10 to 12 to an overcoating treatment."

V. With the summons to oral proceedings, the Board sent a communication pursuant to Articles 15(1) and 17(2) of the Rules of Procedure of the Boards of Appeal (RPBA) indicating to the parties its preliminary, non-binding opinion on the case.

VI. Evidence

The following evidence, relevant for this decision, was submitted by the parties:

D1b: English translation of WO-A-02/07902 (D1), cited already in the contested decision;

D6: Modern Electroplating, 4th edition, 2000, pages 791 to 813, submitted by the opponent as an annex to the statement setting out the grounds of appeal;

Annex 3: experimental data, submitted by the proprietor as an annex to the statement setting out the grounds of appeal.

VII. Oral proceedings took place on 23 January 2018.

VIII. The arguments of the proprietor, as far as relevant for this decision, can be summarised as follows.

D1b described a processing solution for providing a conversion film on a zinc alloy. The ratio of NO_3^- to Cr^{3+} ions was not addressed by D1b. Moreover, it taught in the examples that the corrosion resistance of the conversion layer got worse when adding cobalt ions into the processing solution.

IX. The respective arguments of the opponent can be summarised as follows.

Example 3 described the most effective Cr^{3+} solution of the invention disclosed in D1b. Therefore the skilled person would start from this example in order to develop further the treating solutions.

Paragraph [13] of D1b described that adding further ions from elements such as cobalt or nickel improved the anti-corrosion protection of the treated zinc alloy plated metal. Therefore it was obvious to add these ions into the solution of example 3 in order to improve further the corrosion resistance. The ratio of NO_3^- to Cr^{3+} as defined in claim 1 was already fulfilled by the composition of example 3 and would not be influenced when adding cobalt or nickel in form of their chloride or sulfate salts.

Reasons for the Decision

Inventive step - Main request

1. D1b deals with the problem of providing an anti-corrosion coating which does not contain hexavalent chromium (see paragraph [02] of D1b) and therefore is directed to the same technical problem as the contested patent.

   Hence, the Board sees no reason to deviate from the opinion of both parties that D1b forms a suitable starting point for the assessment of inventive step.

2. The opponent based its arguments on example 3 of D1b. Example 3 describes an acidic solution for forming an anti-corrosive coating on a zinc alloy comprising 9.35 g/l chromium (III) ions, complexing agents (phosphate, hypophosphite and citric acid) and 0.9 g/l nitric acid. The molar ratio of nitrate (NO_3^-) to chromium (III) ions (Cr^{3+}) is 0.08, which meets the ratio defined in claim 1 of the main request.

3. The subject-matter of claims 1 differs from the treating solution disclosed in example 3 in that the treating solution contains cobalt (Co) and/or nickel (Ni) ions.

4. The contested patent describes preferred ranges for the amounts of Ni and Co ions in the treating solution in paragraph [0023] but does not suggest any particular technical effect which is linked to the presence of Ni or Co ions.

5. The objective technical problem starting from D1b can therefore be regarded as providing an alternative treating solution forming an anti-corrosion coating on zinc or zinc alloys.

6. Paragraph [13] of D1b teaches that adding further ions from elements such as Ni and Co improves the anti-corrosion protection and colour uniformity of the passivation layer.

Therefore D1b provides a hint that Ni and Co ions can be added into the treating solution for improving these effects.

7. However, the question arises whether the ratio of NO_3^- to Cr^{3+} is necessarily maintained in the range as required by claim 1 when adding a nickel or cobalt salt.

7.1 The ratio of NO_3^- to Cr^{3+} as defined in claim 1 is essential for achieving good anti-corrosion properties, as demonstrated in the examples of the contested patent and in Annex 3.

7.2 The opponent argues in this context that example 3 of D1b describes a treatment solution which achieves the best anti-corrosion properties and which respects the ratio of NO_3^- to Cr^{3+} as defined in claim 1 of the contested patent. Therefore the skilled person would inherently pay attention to the ratio of NO_3^- to Cr^{3+} when adding further ingredients.

7.3 However, the relevance of this ratio for the anti-corrosion properties is not mentioned or at least hinted at in D1b, since it does not specify any counter

ions for the cobalt and nickel ions mentioned in paragraph [13].

A clear teaching concerning the amount of nitrate ions is also not derivable from the examples of D1b. Besides example 3, only example 5 discloses a composition where the ratio of NO_3^- to Cr^{3+} is within the range indicated in claim 1 of the main request. The compositions according to examples 1 and 4 contain no nitrate ions at all and the compositions according to examples 2 and 6 comprise nitrate in an amount which leads to a ratio of NO_3^- to Cr^{3+} ions which is substantially higher than required by claim 1.

The skilled person therefore does not get any hint from the examples of D1b that the ratio of NO_3^- to Cr^{3+} ions is of any relevance. The argument of the opponent indicated in the paragraph above is therefore considered to be based on hindsight.

7.4 Nickel nitrate and cobalt nitrate are frequently used salts of these metals. This is confirmed by D1b, which proposes in example 6 to add cobalt ions in form of cobalt nitrate.

Should the skilled person add cobalt nitrate, the salt used in example 6, into the composition of example 3 in an amount corresponding to 0.1 mol/l of cobalt ions as proposed in paragraph [13] of D1b, he would not arrive at the subject-matter of claim 1 of the contested patent, since the ratio would then be above 0.5/1 ((0,014 mol HNO_3 + 0,1 mol $CoNO_3$)/ 0,18 mol Cr^{3+}=0.63).

7.5 Hence, starting from example 3 of D1b the skilled person could possibly arrive at a processing solution according to claim 1 of the contested patent by

considering the teaching of paragraph [13] of D1b but would not necessarily arrive there, since he would not be aware of the fact that he ought to respect the ratio of NO_3^- to Cr^{3+}.

Therefore starting from example 3 of D1b the subject-matter of claim 1 is not considered to be obvious.

7.6 Should the skilled person starting from D1b decide to use cobalt or nickel as suggested in paragraph [13] of D1b, the skilled person would turn to one of the examples, such as 4 or 6, which correspond to the teaching of said paragraph and which describe solutions containing the addition of Co ions.

In light of this, selecting the composition of example 3, on the basis that it contains chromium (III) ions and nitrate in a molar ratio as defined in claim 1 of the main request, is already based on hindsight.

7.7 The opponent argues in this context that the composition according to example 3 achieves the best anti-corrosion properties (320 hours without white corrosion). Therefore the skilled person would not start from any other example for further development.

At the same time it argues that the results achieved according to examples 4 (300 hours without white corrosion) and 6 (200 hours without white corrosion) cannot lead to the conclusion that the addition of Co ions is detrimental to the anti-corrosion properties, since the compositions of the solutions of the various examples differ to such an extent that the test results cannot be directly compared.

However, if the examples differ to such an extent that the corrosion resistance cannot be compared properly when focusing on the effects derived from the addition of cobalt ions, then there is no reason to start explicitly from example 3, since it cannot be concluded either, that a solution made in accordance with this example would provide the best overall performance.

7.8 Compared to examples 4 and 6, which reflect the teaching concerning the presence of nickel and cobalt ions in paragraph [13] of D1b, the subject-matter of claim 1 of the main request differs in that the processing solution comprises NO_3^- to Cr^{3+} ions in a ratio as defined in claim 1.

7.9 None of the cited documents gives any hint that the ratio of NO_3^- to Cr^{3+} as defined in claim 1 is essential for achieving good anti-corrosion properties as demonstrated in the examples of the contested patent and in Annex 3.

The subject-matter of claim 1 of the main request is therefore not obvious when starting from examples 4 and 6 of D1b.

8. In summary the Board concludes that the subject-matter of claim 1 of the main request is not rendered obvious by the teaching of D1b and therefore fulfils the requirements of Article 56 EPC.

9. Concerning the remaining independent claims no further arguments have been submitted by the parties. Therefore it can be concluded that also the subject-matter of claims 10 and 13 fulfils the requirements of Article 56 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is maintained as granted.

The Registrar: The Chairman:

C. Spira G. Ashley

Decision electronically authenticated