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**Datasheet for the decision
of 22 January 2021**

Case Number: T 1446/17 - 3.3.03

Application Number: 11193971.6

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Language of the proceedings: EN

Title of invention:
Improvements relating to laser marking

Patent Proprietor:
Siltech Limited

Opponent:
Ferro Corporation

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - (no: all requests)



Beschwerdekammern

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Case Number: T 1446/17 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 22 January 2021

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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 10 April 2017
rejecting the opposition filed against European
patent No. 2465691 pursuant to Article 101(2)
EPC.**

Composition of the Board:

Chairman D. Semino
Members: O. Dury
C. Brandt

Summary of Facts and Submissions

- I. The appeal by the opponent lies from the decision of the opposition division posted on 10 April 2017 rejecting the opposition filed against European patent No. 2 465 691.
- II. Claim 1 of the granted patent read as follows:
- "1. A composition for application to a substrate to render the substrate laser-markable, which composition comprises molybdenum trioxide, the molybdenum trioxide being dispersed in a carrier, wherein the composition further comprises a saccharide or a derivative thereof, [sic]"
- III. A notice of opposition to the patent was filed, requesting revocation of the patent in its entirety.
- IV. In the decision under appeal the following documents were *inter alia* cited:
- D1: US 2005/0032957
 - D2: WO 2005/068207
 - D5: WO 2007/012578
 - D7: US 5 053 440
 - D9: US 2003/0191223
 - D11: A.F. Hollemann - E. Wiberg: Lehrbuch der Anorganischen Chemie, 37.-39. Edition, W. de Gruyter, 1956; page 516
 - D12: E. Riedel: Anorganische Chemie, 2. Edition, W. de Gruyter, 1990; page 716

V. In that decision, the opposition division held that the claims as granted satisfied the requirements of Article 123(2) EPC and Article 76 EPC as well as those of sufficiency of disclosure. The subject-matter of the claims as granted was further considered to be novel over each of D1, D2 and D5 and to be inventive, in particular in view of document D2 as the closest prior art. In addition, D11 and D12 were not admitted into the proceedings.

Regarding inventive step starting from D2 (reasons of the contested decision: sections 6.3 to 6.9), the following points were made:

- D2 was the closest prior art document, in particular in view of the compositions prepared in example 9 thereof.
- The composition according to claim 1 as granted differed from the disclosure of D2 in that it comprised molybdenum trioxide.
- The technical problem to be solved was to provide an alternative laser-markable composition. In that respect, it was stated that "an alternative solution means that the alternative composition has to provide at least equally good performance in comparison to the already known composition".
- According to the teaching of D2, the compositions claimed therein either comprised copper(II) hydroxy phosphate (CHP) and a saccharide material - as in the compositions prepared in example 9 of D2 - or CHP and another metal salt, such as molybdenum trioxide, as indicated on page 13, lines 8-10, 22 of D2. The passage on page 14, lines 3-13 of D2 in

particular made it clear that the additional metal salt and the saccharide material should be used as alternatives. Therefore D2 itself did not provide a motivation to add molybdenum trioxide to the compositions of example 9. The examples of D7 and D9 further showed that the skilled person would not replace CHP in D2 with molybdenum trioxide or add the latter to the compositions of example 9 of D2 since it would be expected that the marking would not have as good properties as the ones according to D2.

- It was therefore concluded that the subject-matter of claim 1 as granted involved an inventive step.

VI. The opponent (appellant) appealed against the above decision. With the statement setting out the grounds of appeal the appellant requested that the decision of the opposition division be set aside and that the patent be revoked. In addition, D11 and D12 were filed anew (with inverted numbering) together with an additional document GH14 (which is not relevant for the present decision) and the admittance into the proceedings of these three documents was requested.

VII. With its rejoinder to the statement of grounds of appeal, the patent proprietor (respondent) requested that the appeal be dismissed (main request) or, in the alternative, that the patent be maintained in amended form according to any of the first to the third auxiliary requests filed therewith. In addition, it was requested that D11, D12 and GH14 be not admitted into the proceedings.

Claim 1 of the first, second and third auxiliary requests differed from claim 1 as granted in that the

expression "a saccharide or a derivative thereof" was replaced by

"a reducing sugar",

"a saccharide in the form of a simple sugar selected from the group consisting of fructose, glucose, sucrose, galactose, and maltose", and

"a saccharide in the form of a simple sugar selected from the group consisting of glucose and fructose",

respectively.

- VIII. In a communication sent by the Board, issues to be discussed at the oral proceedings were specified.
- IX. With the explicit agreement of both parties, oral proceedings were held on 22 January 2021 in the form of a videoconference (the board was in a room at the premises in Haar and both parties were connected via video link).
- X. The appellant's arguments, as far as relevant to the present decision, were essentially as follows:

Main request (patent as granted) - Inventive step

- (a) It was agreed with the opposition division that the composition according to claim 1 as granted differed from the ones prepared in example 9 of D2, which constituted the closest prior art, in that it required the additional mandatory presence of molybdenum trioxide. In that respect, due to the open formulation of claim 1 as granted, the claimed compositions could comprise further components in

addition to the ones specified therein, in particular the component copper (II) hydroxy phosphate (CHP) which was present in the compositions of example 9 of D2.

In the absence of any evidence demonstrating a technical effect in relation to the presence of molybdenum trioxide, the problem effectively solved resided in the provision of another laser-markable composition in alternative to the ones of the closest prior art. The effect of reduced charring relied upon by the respondent during the oral proceedings before the Board was not supported by any evidence and could not be taken up in the formulation of the problem solved.

It was obvious to solve the above problem by adding molybdenum trioxide to the compositions of example 9 of D9 or by replacing the CHP compound present therein by molybdenum trioxide in view of the teaching of D2 itself or of its combination with the one of D7 or D9. In that respect, the examples of D7 and D9 would not prevent the skilled person from solving the above problem by either replacing CHP with molybdenum trioxide in the compositions of example 9 of D2, or by merely adding molybdenum trioxide thereto, contrary to the opposition division's view.

- (b) For these reasons, the subject-matter of granted claim 1 was not inventive.

Auxiliary requests - Inventive step

- (c) The same arguments as outlined above in respect of the inventive step of the main request were equally

valid for each of the first to the third auxiliary requests.

XI. The respondent's arguments, as far as relevant to the present decision, may be summarised as follows:

Main request (patent as granted) - Inventive step

(a) It was agreed with the opposition division that the composition according to claim 1 as granted differed from the ones prepared in example 9 of D2, which constituted the closest prior art, in that it required the mandatory presence of molybdenum trioxide.

(b) In one approach developed in the statement of grounds of appeal, the technical problem solved was held to reside in the provision of a laser-markable composition that achieved a good quality, high contrast mark, and did so at low laser power. In particular, the compositions according to the patent in suit enabled the use of low power laser sources, leading to high reliability and hence low maintenance costs.

D2 taught that the metal salt used therein as an IR-absorber (such as CHP used in example 9 of D2) was an essential component of the compositions disclosed therein. In addition, D2 taught that molybdenum trioxide was a suitable alternative for the saccharide present in the composition of example 9, not an alternative to CHP. Therefore, in view of the teaching of D2 alone, the skilled person would have had no motivation to replace CHP by molybdenum trioxide in the compositions according to example 9 of D2.

Although D7 and D9 taught that CHP and molybdenum trioxide constituted alternative components in laser marking compositions, i.e. that they could be interchanged in the particular applications described in those documents, this did not mean that they were also interchangeable in compositions of the type with which the patent was concerned. In addition, as stated by the opposition division, both D7 and D9 taught that substituting molybdenum trioxide for CHP resulted in inferior marking, not that it led to an equivalent or better result. Therefore, neither D7 nor D9 provided a motivation to use molybdenum trioxide instead of CHP in the compositions of example 9 of D2.

- (c) In an alternative approach followed during the oral proceedings before the Board, it was argued that whereas in D2 the laser marking was obtained by using a saccharide as a charring material, the colour change of the compositions claimed in the patent in suit occurred due to the formation of new components or complexes formed as a result of an interaction between the molybdenum trioxide and the saccharide present in the composition claimed. Therefore, the laser marking processes involved in the patent in suit and in D2 were completely different. Under these circumstances, the problem effectively solved was to provide further laser marking compositions wherein the saccharide charring was minimised or even avoided.

Considering that none of the cited documents provided a hint related to the formation of components/complexes due to the interaction between the molybdenum trioxide and the saccharide, it was

not obvious to solve the above problem by adding molybdenum trioxide to the compositions of example 9 of D2.

(d) For these reasons, the subject-matter of claim 1 as granted was inventive.

Auxiliary requests - Inventive step

(e) At the oral proceedings before the Board it was stated that the same arguments as outlined above in respect of the inventive step of the main request were equally valid for each of the first to third auxiliary requests. In particular, it was acknowledged that the amendments made in each of these auxiliary requests were not suitable to overcome an objection of inventive step that would be retained against the main request.

XII. The appellant requested that the decision under appeal be set aside and that the patent be revoked. It was further requested that documents D11 and D12 be admitted into the proceedings. During the oral proceedings before the Board, it was stated that it was no longer requested that also document GH14 be admitted into the proceedings.

The respondent requested that the appeal be dismissed (main request), or, in the alternative, that the patent be maintained in amended form on the basis of any of the first to third auxiliary requests filed with the rejoinder to the statement of grounds of appeal. It was further requested that documents D11 and D12 not be admitted into the proceedings.

Reasons for the Decision

Main request (patent as granted) - Inventive step

1. Closest prior art

Both parties, as the opposition division, considered that D2 represents the closest prior art document and that the laser-markable compositions prepared in example 9 thereof were particularly relevant and constituted an appropriate starting point for the assessment of the inventive step. The Board has no reason to deviate from that view.

2. Distinguishing feature(s)

2.1 The novelty objection in view of D2 put forward during the opposition proceedings was not further pursued by the appellant in appeal. Rather, both parties agreed with the opposition division's finding according to which the subject-matter of claim 1 as granted differed from any of the compositions prepared in example 9 of D2 in that it contained molybdenum trioxide.

2.2 In that respect, the laser-markable compositions prepared in said example 9 are described in table 9 of D2 as follows:

Example 9

This example illustrates N-IR absorber in combination with functional hydroxylated sugar.

Table 9

Texicryl 13-567 (% nv)	21.7	21.7	21.7
D(-)-Fructose	20.8	-	-
D-(+)-Glucose	-	20.8	-
D-(+)-Saccharose	-	-	20.8
CHP	20.8	20.8	20.8
Water	36.7	36.7	36.7
Unimaged	Off-White Green	Off-White Green	Off-White Green
Exposed (~830 nm)	Dark Brown	Dark Brown	Dark Brown
Exposed (10,000nm)	Dark Brown	Dark Brown	Dark Brown

in which the figures are percentages by weight (D2: page 17, lines 7-8) and:

"Texicryl 13-567" is a carrier according to claim 1 as granted. It was not contested by the respondent at the oral proceedings before the Board that said carrier was identical to the one mentioned in paragraph 10 and used in examples 2 and 3 of the patent in suit (see paragraphs 57 and 59);

"Fructose/Glucose/Saccharose" is a saccharide or derivative thereof according to claim 1 as granted. It is further noted that fructose and glucose are specified in claims 3 and 4 as granted and in paragraph 32 of the patent in suit (whereby mention is also made of D and L isomeric forms of sugars);

"CHP" is copper (II) hydroxy phosphate (D2: page 16, line 8);

"Unimaged" is the colour of the composition before irradiation with a laser; and

"Exposed" is the colour of the composition after irradiation with a laser, whereby use is made of either

a diode laser (~ 830 nm) or a CO₂ laser (10,000 nm)
(D2: page 17, lines 3-6).

- 2.3 The respondent argued that the subject-matter of claim 1 as granted differed from the compositions according to example 9 of D2 in that CHP was "replaced" by molybdenum trioxide (rejoinder to the statement of grounds of appeal: page 4, second paragraph of the section "Inventive step"; page 5, last sentence of third paragraph).

However, it is agreed with the appellant that the open formulation of claim 1 as granted ("which composition comprises ...") does not forbid the presence of any further component in addition to the ones explicitly mentioned in that claim, including CHP as used in the compositions of example 9 of D2. Therefore, it cannot be held that the subject-matter of claim 1 as granted differs from the compositions of example 9 of D2 in that CHP is "replaced by" molybdenum trioxide, as argued by the respondent in its rejoinder to the statement of grounds of appeal (which means that CHP and molybdenum trioxide could not be simultaneously present in the compositions being claimed).

- 2.4 In view of the above, the Board has no reason to deviate from the opposition division's view that the subject-matter of claim 1 as granted differs from the compositions according to example 9 of D2 in that molybdenum trioxide must be present (which is not the case in example 9 of D2).

3. Problem effectively solved over the closest prior art

- 3.1 Different formulations of the problem effectively solved over the closest prior art were relied upon by

the respondent either in its rejoinder to the statement of grounds of appeal or during the oral proceedings before the Board. Indeed, the respondent first considered in writing that the problem solved resided in the provision of a laser-markable composition that achieved a good quality, high contrast mark and did so at low laser power (reply to the statement of grounds of appeal: last paragraph on page 4). However, during the oral proceedings, the problem solved was formulated as residing in the provision of laser-markable compositions wherein the saccharide charring was minimised or even avoided.

3.2 According to the established case law of the Boards of Appeal, an improvement as compared to the closest prior art may be demonstrated on the basis of comparative tests, whereby the nature of the comparison with the closest state of the art must be such that the alleged advantage or effect is convincingly shown to have its origin in the feature distinguishing the invention from the closest state of the art (Case Law of the Boards of Appeal of the EPO, 9th edition, 2019, I.D.10.9).

3.2.1 In that respect, it was not disputed by the respondent that no evidence were on file to illustrate the comparison between a composition according to claim 1 as granted and any of the ones according to example 9 of D2, as argued by the appellant (see e.g. statement of grounds of appeal: section 89). In particular no comparison was made between compositions as claimed and compositions which differ therefrom only in the feature identified above to distinguish the claimed subject-matter from the closest prior art, namely the mandatory presence of molybdenum trioxide.

- 3.2.2 No evidence was further provided to illustrate any beneficial effect, in particular not in terms of reduced charring as put forward by the respondent at the oral proceedings before the Board. In that respect, it is agreed with the appellant that according to accepted case law, alleged advantages to which the patent proprietor merely refers, without offering sufficient evidence to support the comparison with the closest prior art, cannot be taken into consideration in determining the problem underlying the invention and therefore in assessing inventive step (Case Law, *supra*, I.D.4.2). In the case in hand, it is in particular noted that according to the patent in suit itself, charring of the saccharide is mentioned as a process which can enhance laser markability (paragraphs 22 and 31).
- 3.2.3 For these reasons, no improvement as compared to the closest prior art, in particular in terms of charring of the saccharide, may be acknowledged.
- 3.3 Regarding the provision of good quality, high contrast marks at low laser power, the respondent has not indicated how said problem was to be formulated as compared to the closest prior art, i.e. over the compositions prepared in example 9 of D2 (either as an alternative or an improvement). In particular no reply was given in reaction to the Board's communication in which said issue was specifically identified (section 8.3.2).

However, as explained in section 3.2 above, in the absence of a fair comparison with the closest prior art, no improvement can be acknowledged in the present case. In particular, in the absence of such comparison between the compositions being claimed and the ones of

example 9 of D2, it is not possible to distinguish between the quality of the laser marking obtained in both cases, in particular when using low energy lasers. Also, it cannot be held whether or not the "good brown/black" or "good black mark" mentioned in paragraphs 58, 60 and 62 of the patent in suit (in relation to examples 2 to 4) may be distinguished from the rating "dark brown" indicated in Table 9 of D2 (in relation to the rating of the compositions after irradiation). Therefore, the arguments of the respondent in that respect (rejoinder to the statement of grounds of appeal: page 4, penultimate paragraph) fail to convince.

It is further noted that the laser-markable compositions of example 9 of D2 were suitably used with two different lasers, namely a diode laser and a CO₂ laser, working at significantly different wavelengths (D2: page 17, lines 3-6), both of which are taught as suitable in the patent in suit (paragraph 27, in which diode lasers are in particular mentioned as low-energy lasers; CO₂ lasers operating at 2-6 W are used in the examples). Under these circumstances, there is no reason for the Board to consider that the compositions prepared in example 2 of D9 cannot already provide good quality, high contrast marks at low laser power.

- 3.4 In view of the above, the technical problem effectively solved over example 9 of D2 can only be seen as residing in the provision of further laser-markable compositions, in alternative to the ones prepared in example 9 of D2.
- 3.5 In that respect, in the decision under appeal it was held by the opposition division that "an alternative solution means that the alternative composition has to

provide at least equally good performance in comparison to the already known composition". However, in the absence of a fair comparison between the compositions being claimed and the ones of example 9 of D2, it cannot be concluded that the compositions claimed effectively provide "equally good performance" as the ones according to the closest prior art. Therefore, the Board does not share the view of the opposition division in that respect.

4. Obviousness

4.1 The question remains to be answered if the skilled person, desiring to solve the problem indicated in section 3.4 above, would, in view of the closest prior art, possibly in combination with other prior art or with common general knowledge, have modified the disclosure of the closest prior art in such a way as to arrive at the claimed subject matter. This means, in view of section 2.3 above, that it has to be assessed whether or not the skilled person would have added molybdenum trioxide to the compositions prepared in example 9 of D2 and/or replaced at least part of the CHP used therein by molybdenum trioxide when looking for further laser-markable compositions.

4.2 In that respect, D2 (page 13, lines 8-11 and 22), D7 (column 2, lines 47-56 and example 5) and D9 (paragraphs 27 and 36) all teach that molybdenum trioxide may be used as marker in laser-markable polymeric compositions.

4.2.1 Regarding D2, the Board does not share the view of the opposition division that the skilled person would understand that D2, in particular in view of page 13, lines 8-10 and page 14, lines 3-13 thereof, only

teaches the use of a laser-marker such as molybdenum trioxide or a saccharide as two separate alternatives but not the combination thereof. In particular, the Board can identify no teaching in D2 (also not in the paragraph on page 14, lines 3-13 which was relied upon by the opposition division) that would prevent the skilled person from using an additional laser-marker such as the ones on page 13, lines 8-31 of D2, including molybdenum trioxide which is explicitly disclosed at line 22, in the compositions according to example 9 of D2 which already comprise both CHP and a saccharide. Under these circumstances, it would be obvious to either add molybdenum trioxide, which is indicated on page 13 of D2 (lines 10 and 22) to be a known laser marking material, and/or to replace at least part of the CHP by molybdenum trioxide when aiming at providing a mere alternative to the compositions of example 9 of D2.

4.2.2 The same conclusion is reached when further considering the teaching of D7 and D9, which both disclose the use of molybdenum trioxide as laser-marker in polymeric materials.

a) In particular, D7 teaches in its example 5 that molybdenum trioxide provides good laser marking upon irradiation with a laser at an energy level of 5 W (column 3, lines 54-57). In that respect, as argued by the appellant at the oral proceedings before the Board, D7 teaches that good marking corresponds to a contrast ratio K as defined therein of at least 3 (column 2, line 63 to column 3, line 1), which is satisfied in said example 5 ($K = 3.8$). Under these circumstances, and although example 1 of D7 carried out with CHP as laser-marker indeed led to a better rating of the marking ($K = 7.6$) under conditions similar to the ones

of example 5, it cannot be agreed with the opposition division's finding that the examples of D7 would have led the skilled person away from solving the above problem by merely adding molybdenum trioxide to the compositions of example 9 of D2 and/or by replacing at least part of the CHP used therein by molybdenum trioxide. To the contrary, D7 shows that molybdenum trioxide is a known efficient laser-marker for polymeric compositions. Therefore, it would be obvious to add molybdenum trioxide and/or to replace at least part of the CHP by molybdenum trioxide when aiming at providing a mere alternative to the compositions of example 9 of D2.

b) Regarding D9, the general teaching thereof concerns the use of laser-markers in polymeric compositions (claim 1), whereby said markers are selected from copper hydroxide phosphate (i.e. CHP), alkaline copper phosphates, molybdenum trioxide and/or titanium dioxide (D9: paragraphs 27 and 36). Such compositions are prepared in examples 2 to 4 of D9 using either a component called "Budite 322" (example 2), titanium dioxide (example 3) or a combination thereof (example 4). In that respect, it is agreed with the appellant that, as put forward at the oral proceedings before the Board, the exact nature of "Budite 322" is not derivable from D9 itself and that there is no evidence on file to conclude that Budite 322 is mandatorily CHP, as held by the opposition division (section 6.7 of the reasons: second paragraph). In particular, paragraph 36 of D9 only specifies that Budite 322 corresponds to "phosphate salts", which is not limited to CHP but could encompass other phosphate salts also mentioned in the fourth to sixth lines of paragraph 35 of D9. Therefore, it cannot be concluded that the examples of D9 illustrate that CHP provides

better results in terms of laser marking as compared to the other markers taught in D9, as held by the opposition division. Nor can it be concluded that these examples teach away from solving the above problem by adding molybdenum trioxide to the compositions of example 9 of D2 and/or by replacing part of the CHP used therein by molybdenum trioxide, as also concluded in section 6.7 of the reasons of the decision under appeal. To the contrary, D9 rather shows that combinations of laser-markers were known in the art and provided satisfying marking (see use of the term "and/or" in paragraph 27 of D9 and example 4 of D9, in which a combination of laser-markers taught in D9 is used) and that molybdenum trioxide was one of the available options. Therefore, for the same reasons as outlined above in respect of D7, it would be obvious to add molybdenum trioxide and/or to replace at least part of the CHP by molybdenum trioxide when aiming at providing a mere alternative to the compositions of example 9 of D2.

- 4.2.3 In view of the above, the subject-matter of claim 1 as granted is not inventive in view of D2 alone or in combination with D7 or D9. Therefore, the main request is not allowable (Article 100(a) and 56 EPC).

First to third auxiliary requests - Inventive step

5. Claim 1 of each of the first to the third auxiliary requests only differs from claim 1 of the main request in that the saccharide contained therein is defined in a more limited manner. However, it was not disputed by the respondent, in particular at the oral proceedings before the Board, that as indicated in section 10 of the Board's communication, in claim 1 of each of these auxiliary requests, the saccharide (derivative) is

limited to components such as fructose or glucose, which are both components already used in some of the compositions prepared in example 9 of D2. Therefore, the amendments made do not introduce any further difference with respect to the compositions of example 9 of D2 carried out with fructose or glucose and therefore do not contribute to an inventive step. Further considering that the respondent did not put forward any additional argument in respect of the inventive step of the first to third auxiliary requests as compared to the main request, the same conclusion in respect of inventive step as for the main request has to be reached for each of these auxiliary requests. Therefore, none of these requests is inventive in view of D2, taken alone or in combination with D7 or D9.

6. Considering that none of the respondent's requests is inventive, the patent is to be revoked. Also, in view of that decision, there is no reason for the Board to deal with any other issue.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent No. 2 465 691 is revoked.

The Registrar:

The Chairman:



B. ter Heijden

D. Semino

Decision electronically authenticated