Internal distribution code:

(A) [-] Publication in OJ
(B) [-] To Chairmen and Members
(C) [-] To Chairmen
(D) [X] No distribution

Datasheet for the decision of 18 September 2024

Case Number: T 3217/19 - 3.3.05

Application Number: 09716064.2

Publication Number: 2262741

IPC: C03C1/00

Language of the proceedings: EN

Title of invention:
FINING AGENTS FOR SILICATE GLASSES

Patent Proprietor:
Corning Incorporated

Opponent:
Schott AG

Headword:
FINING AGENTS FOR SILICATE GLASSES/Coring

Relevant legal provisions:
RPBA 2020 Art. 13(1), 13(2)
EPC Art. 123(2), 83, 84, 54(1), 54(2), 54(3), 56

Keyword:
Amendment to appeal case - amendment overcomes issues raised (yes) - amendment gives rise to new objections (no) - taken into account (yes)
Amendment after notification of Art. 15(1) RPBA communication - exceptional circumstances (yes)
Amendments - extension beyond the content of the application as filed (no)

Decisions cited:
G 0001/22, G 0002/22, T 0219/83, T 0293/87, T 0459/87, T 0200/94

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0

Case Number: T 3217/19 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 18 September 2024

Appellant: (Opponent)	Schott AG Hattenbergstrasse 10 55122 Mainz (DE)
Representative:	Fuchs Patentanwälte Partnerschaft mbB Tower 185 Friedrich-Ebert-Anlage 35-37 60327 Frankfurt am Main (DE)
Respondent: (Patent Proprietor)	Corning Incorporated 1 Riverfront Plaza Corning, NY 14831 (US)
Representative:	Elkington and Fife LLP Prospect House 8 Pembroke Road Sevenoaks, Kent TN13 1XR (GB)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 26 September 2019 rejecting the opposition filed against European patent No. 2262741 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chair	P. Guntz
Members:	J. Roider
	G. Glod

Summary of Facts and Submissions

I. The appeal of the opponent (appellant) lies from the decision of the opposition division to reject the opposition against European patent No. EP 2 262 741 B1.

II. The following documents, which were cited in the opposition proceedings, are relevant here too:

D1 US 5,895,768

D2 James E. Shelby, "Introduction to Glass Science and Technology", 2nd edn., The Royal Society of Chemistry, 2005, 26-47

D4 H.O. Mulfinger in "Glastechnische Fabrikationsfehler", 3rd edn., Springer Verlag, 1980, 199-201, 234-235

D7 WO 2008/143999 A1

Claim 1 of the main request reads as follows:

"1. A silicate glass, the silicate glass having a seed concentration of less than 1 seed/cm^3, wherein the silicate glass consists of:

60-70 mol% SiO_2;

6-14 mol% Al_2O_3;

0-15 mol% B_2O_3;

0-20 mol% Na_2O;

0-10 mol% K_2O;

0-8 mol% MgO;

0-10 mol% CaO;

0-5 mol% ZrO_2;

0-1 mol% SnO_2;

0-1 mol% CeO_2;

less than 50 ppm As_2O_3; and

less than 50 ppm Sb_2O_3;
wherein the silicate glass is substantially free of lithium;
wherein 12 mol% ≤ Li_2O + Na_2O + K_2O ≤ 20 mol%,
0 ≤ mol% MgO + CaO ≤ 10 mol%; and
wherein the silicate glass is formed from a batch of raw materials that includes one fining agent, wherein the fining agent consists of at least one multivalent metal oxide that acts as a source of oxygen and further at least one inorganic compound that acts as of [sic] *a source of water at a temperature where a melt is formed and optionally an oxidiser, and wherein the fining agent is free of arsenic and antimony."*

Dependent claims 2 to 8 relate to particular embodiments of claim 1.

III. The key arguments of the appellant (opponent) can be summarised as follows.

Admission

The deletion of the feature *"wherein the silicate glass and the at least one fining agent are substantially free of antimony and arsenic"* from the subject-matter of claim 1 was central to the opposition proceedings. The feature should have been reintroduced into claim 1 earlier.

Article 123(2) EPC

In the application as originally filed, both the glass and the fining agent had to be free of As and Sb, whereas in the main request the glass could contain up to 50 ppm of As and Sb, respectively.

Moreover, the glass had to be free of As_2O_3 and Sb_2O_3 only. No limitation was included for As_2O_5 and Sb_2O_5.

Thus, the subject-matter of claim 1 allowed for an amount of As and Sb in the glass which therefore could not be considered essentially free of these elements. The skilled person was familiar with means for determining the amounts of As_2O_3, Sb_2O_3, As_2O_5, and Sb_2O_5.

Claim 1 of the main request was a combination of claims 1, 5 (multivalent metal oxide) and 8 (glass composition) as originally filed and a general statement in paragraph [0014] as originally filed. However, there was no relationship between claims 5 and 8. In addition, several selections had been made from paragraph [0014] (amendment of "at least one" to "one"; amendment of "comprising" to "consisting of"). Moreover, these only applied to some, not all, of the features of the subject-matter of claim 1 for which these limitations were originally disclosed.

Furthermore, claim 8 was only dependent on claim 7, which is not included in claim 1 of the main request. A silica glass with only 6% Al_2O_3 did not qualify as aluminosilicate glass. Therefore, the original claim 7 restricted the subject-matter of the original claim 8. This restriction was not present in claim 1 of the main request, resulting in the subject-matter of claim 1 extending beyond that of the application as originally filed.

The examples could not provide a pointer in this regard because they also contained Fe_2O_3, which was not part of the composition according to the subject-matter of claim 1 of the main request.

Article 83 EPC

The composition could be free of both Ce and Sn.

Therefore, no connection between the composition and the fining agent was apparent.

It was not possible to obtain a silicate glass with 1 ppm As and Sb if the As and Sb content in the raw materials exceeded that value.

Article 84 EPC

A product-by-process claim was allowable only if the impact of the process steps leading to the product was clear, which was not the case here.

The amounts of elements not mentioned in the subject-matter of claim 1 that were to be considered impurities were not clear.

The significance of *"includes one fining agent"* was not clear, either. Although it could be interpreted as meaning exactly one, the word *"includes"* left room for another fining agent.

Article 54(1) and (2) EPC and Article 54(3) EPC

The subject-matter of claim 1 lacked novelty under Article 54(1) and (2) EPC in view of D1, Example L9, and under Article 54(3) EPC in view of D7, in particular in view of paragraphs [0040] and [0023] of that document.
In the case of both documents, the seed concentration of less than 1 seed/cm^3 was implicit in view of the envisaged application.

Article 56 EPC

The subject-matter of claim 1 did not involve an inventive step starting from D1, Example L1, in view of D4, and from D1, Example L9, in view of D2.

IV. The key arguments of the patent proprietor (respondent) can be summarised as follows.

Admission

In the communication under Article 15(1) RPBA, the board held that the fining agent constituted only a small proportion of the batch of raw materials. For this reason, the board declared that it agreed with the opponent's objection. In response, the patent proprietor argued that the opponent had not itself raised the issue; the board had done so in its communication.

Article 123(2) EPC

The silicate glass of claim 1 contained As and Sb at the level of unavoidable impurities. It was therefore substantially free of As and Sn, as claimed in claim 1 as originally filed.

The examples supported the limitation contained in the subject-matter of claim 1 of the main request. Fe_2O_3 was contained in the glass at very low levels and thus was an impurity. The batch of raw materials did not contain a raw material which purposively added Fe.

Claim 8 was a subset of the glass covered by claim 7. Silicate glass containing 6% Al_2O_3 was also an aluminosilicate glass.

It was not possible to determine the amount of As_2O_3, Sb_2O_3, As_2O_5 or Sb_2O_5 at the low concentrations in question. Therefore, the amount of As and Sb in silicate glass was commonly indicated as As_2O_3- and Sb_2O_3-equivalent.

Article 83 EPC
If Ce or Sn was comprised in the fining agent, the oxides remained in the silicate glass.
Although the effort involved in purification was considerable, silicate glass with no As or Sb was achievable.

Article 84 EPC
Since the oxides of the multivalent metal oxide remained in the silicate glass, the impact of the process steps were observable in the glass.

Whether or not a certain amount of an element in the glass was to be considered an impurity depended on the specific element. It was different for Fe, F and As.

It was clear from the language of claim 1 that only one fining agent was to be used in the manufacturing steps.

Article 54(1) and (2) EPC and Article 54(3) EPC
Neither D1 nor D7 disclosed the concentration of bubbles as being less than 1 seed/cm^3. Moreover, D1 disclosed a fluorine content above the level of an impurity.

Article 56 EPC
There was no motivation for the skilled person to replace the fluorine in the composition of Example L9 with something else. D1, Example L1, was a comparative example and was therefore not suitable as a starting point for an inventive-step objection.

V. Substantive requests

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

The respondent requested that the patent be maintained on the basis of the main request, submitted as auxiliary request 2B during oral proceedings.

Reasons for the Decision

1. Admission of the main request

In the communication under Article 15(1) RPBA, the board noted that the fining agent constituted only a small proportion of the batch of raw materials. Consequently, if raw materials other than the fining agent had a low concentration of As and Sb, the fining agent could have a significant concentration of As and Sb even though the final glass did not exceed 50 ppm of As and Sb, respectively. A process of adding a fining agent containing significant amounts of Sb and As was encompassed by the amended claim but not disclosed in the patent application as originally filed.

Therefore, the board agrees with the opponent, for reasons which only the board has raised, which, in this case, leads to the acknowledgement of exceptional circumstances (Article 13(2) RPBA).

The amendment overcomes the objections raised by the opponent and does not give rise to new objections, as shown below.

The main request is therefore taken into account and is part of the proceedings.

2. Amendments, Article 123(2) EPC

2.1 Claim 1 originates from a combination of claims 1, 5 and 8 as originally filed, plus further amendments. Specifically, claim 1 as originally filed allows for more than one fining agent, one of which is defined by an open-ended definition and which must be substantially free of antimony and arsenic.
Claim 1 of the main request is further limited to the presence of only one fining agent, which is defined as a closed composition and which must be free of antimony and arsenic.

2.2 As regards the ability to quantitatively determine the amount of As_2O_5, the parties provided contradictory and unsubstantiated arguments.

Since the material facts cannot be proven, a decision has to be made on the basis of the arguments of the party that bears the burden of proof. This is to the detriment of the party in whose favour the alleged fact had been submitted, in this case the opponent (T 219/83, headnote; T 293/87, point 3.5; T 459/87, point 8.2.3; T 200/94, point 4.5.5; Case Law of the Boards of Appeal, 10th ed., 2022, III.G.5.1.1).

It is therefore accepted that the amount of As and Sb in the silicate glass is expressed as As_2O_3- and Sb_2O_3-equivalents.

2.3 In the present case, at least Examples 12-16 and 18 provide a pointer to the combination of claims 1, 5 and 8 as originally filed, as well as to the limitation to the composition of the glass and the fining agent.

It is noted that the concentration of seeds is only

disclosed for Examples 11-19, and therefore these examples can potentially provide a pointer to the claimed combination of claims. However, Examples 11 and 19 do not achieve the claimed maximum concentration of seeds and Example 17 does not use an inorganic compound that acts as a source of water (NaOH or $Al(OH)_3$).

Examples 12-16 and 18 show $Al(OH_3)$ or NaOH as the inorganic compound acting as the source of water, oxides of Ce and Sn as the multivalent metal oxide acting as the source of oxygen, and no Li, As or Sb. The small amounts of Fe_2O_3 also present in the examples are not the result of a deliberate addition of Fe. Moreover, Fe_2O_3 is not toxic and, as acknowledged by the appellant, only changes the colour of the silicate glass at much higher concentrations. Fe must therefore be regarded as an impurity.

2.4 A silicate glass with only 6% Al_2O_3 still has a significant amount of Al_2O_3. Without evidence to the contrary, which is not available, it is not convincing that such a silicate glass would not qualify as an aluminosilicate glass.

The requirements of Article 123(2) EPC are met.

3. Sufficiency of disclosure, Article 83 EPC

The appellant essentially argued that the subject-matter of claim 1 could not be carried out over the whole claimed range.

The patent in suit contains a number of examples of silicate glass falling within the definition of

claim 1. The appellant has not provided any evidence showing that the claimed silicate glass cannot be obtained essentially over the entire claimed range, nor is this apparent.

The requirements of Article 83 EPC are met.

4. Clarity, Article 84 EPC

4.1 The appellant argued that in view of the examples of the patent in suit, 200 ppm of Fe_2O_3 was considered an impurity while claim 1 limited the content of As_2O_3 and Sb_2O_3 to 50 ppm, which was inconsistent.

The subject-matter of claim 1 only limits the amount of As and Sb in the silicate glass composition. This is independent of the possible impurity level of Fe. Furthermore, the amount of an element that is considered an acceptable impurity in a silicate glass depends on the element being considered. It is higher for Fe, which is a non-toxic element, than for As or Sb.

4.2 Claim 1 reads *"... wherein the silicate glass is formed from a batch of raw materials that includes one fining agent, wherein the fining agent comprises ..."*

Claim 1 therefore only allows for one fining agent. This fining agent has the properties defined in claim 1. It does not allow for another fining agent with different properties because the batch of materials would then have two fining agents.

The requirements of Article 84 EPC are fulfilled.

5. Novelty, Article 54(1) and (2) EPC and Article 54(3) EPC

The appellant was of the opinion that D1 anticipated the novelty of the patent in suit under Article 54(1) and (2) EPC and that D7 anticipated the novelty of the patent in suit under Article 54(3) EPC.

Neither of these documents discloses a seed concentration of less than 1 seed/cm^3.

5.1 D1 discloses in Example L9 a silicate glass with the composition according to claim 1 of the patent in suit.

The appellant argued that in view of the application of the silicate glass in D1 as a hard disk substrate, a seed concentration in the claimed range was implicitly contained in D1 (D1: col. 2, first paragraph).

According to D1, L9 contains 320 bubbles in the range between 1-20 µm and 11 bubbles in the range of 80-150 µm per litre of silicate glass. However, the number of bubbles with a size of 20-80 µm and >150 µm is not disclosed. There is no doubt that at least some bubbles in the range of 20-80 µm are contained in the sample.

It thus cannot be excluded that the total number of bubbles exceeds 1 000 in the sample of one litre, thus one bubble per cm^3.

The appellant argued that by suitably reducing the considered region, in view of the relatively few seeds a seed concentration of less than one seed per cm^3 can evidently be achieved.

This would not, however, appropriately characterise the material. A skilled person would thus understand that only representative sample volumes are to be considered when measuring the seed concentration.

Furthermore, D1, Example L9, discloses that the silicate glass contained F_2 in a concentration of 1.08 mol%. This amount of F_2 cannot be considered to constitute an impurity. F_2 was deliberately added for fining purposes (D1: col. 4, lines 35-40).

Therefore, the subject-matter of claim 1 is novel over document D1, Example L9.

5.2 D7 does not disclose at least the seed concentration.

The appellant referred to D7, paragraph [0040], which disclosed methods for avoiding gas inclusions, and paragraph [0023], which disclosed low levels of gaseous inclusions. A definition of the wording "low levels" is not provided.

Furthermore, an individualised embodiment showing the claimed seed concentration is not disclosed.

Therefore, the subject-matter of claim 1 is novel over document D7.

5.3 Further novelty objections initially based on the allegation that the patent's priority had not been validly claimed were not reiterated and would have been without merit in any case, since no evidence has been submitted to rebut the presumption that the patent proprietor, when filing the application, was entitled to claim the priority (see G1/22 and G2/22).

6. Inventive step, Article 56 EPC

The patent in suit is directed to a silicate glass (paragraph [0001]).

Examples L1 and L9 of D1 were cited as forming the closest prior art.

D1 is also directed to silicate glass and constitutes a suitable starting point for an inventive-step objection.

The technical problem the patent in suit aims to solve is to provide a higher quality, arsenic-free glass (reply to the appeal, page 19, paragraph 103).

6.1 Starting from D1, Example L9

It is proposed that this technical problem be solved with the features of claim 1, which differ from Example L9 of D1 in that the glass has less than 1 seed/cm^3, in that it contains no fluorine, and in that the fining agent has a source of water.

Table 2 of D1 shows variations of the refining agent and refining aid of the composition according to the glass of Example 3 of Table 1. The composition of Example L9 of D1 does not contain As but does contain CeO_2 and SnO_2.

Therefore, the technical problem as stated by the respondent must be reformulated as being to provide an alternative silicate glass.

D1 states in column 4, lines 35-40, that the silicate glass must contain F_2. Fluorine is deliberately added

for fining purposes.
The omission of fluorine would go against the teaching of D1. This cannot be overcome by D2, a handbook, which discloses on page 38 of the chapter "Melting Accelerants" that water reduces the viscosity of oxide melts. However, D2 does not mention the use of water in the fining process. Therefore, only in the knowledge of the patent in suit would the skilled person seek to entirely avoid fluorine.

Although much of the fluorine may evaporate, as the parties acknowledge, significant amounts remain in the silicate glass. The process step of adding fluorine for fining can therefore be seen in the product.
If the product of Example L9 of D1 had been produced without the addition of fluorine for fining purposes, fluorine would not have been present in the quantities indicated in D1, Example L9, but would have been present at the level of an impurity.

Thus, when providing an alternative silicate glass starting from D1, Example L9, the skilled person would not arrive at a silicate glass according to claim 1 of the main request.

6.2 Starting from D1, Example L1

Example L1 is a comparative example in D1, which comprises As.

The technical problem the patent in suit aims to solve is to provide a higher quality, arsenic-free glass (reply to the appeal, page 19, paragraph 103).

It is proposed that this technical problem be solved with the features of claim 1, which differ from

Example L1 of D1 in that the glass has less than 1 seed/cm^3, in that it contains less than 50 ppm of As_2O_3, and in that the fining agent has a source of water.

The proposed solution obviously solves the technical problem, so there is no need to reformulate the technical problem.

If the skilled person were to substitute As, they would at least add fluorine in accordance with the specific teaching of D1, column 4, lines 35-40, for fining purposes, thereby increasing the fluorine content above the level of an impurity.

There is no reason to replace the specific teaching of D1, column 4, lines 35-40, with the general teaching of D4, page 234, chapter 4.4.3.5, without a pointer to do so. Such a pointer has not been indicated by the opponent, nor is one apparent.

Thus, when providing a solution to the above technical problem starting from D1, Example L1, the skilled person would not arrive at a silicate glass according to claim 1 of the main request.

6.3 Regarding further inventive-step attacks based on an allegedly invalid priority claim, reference is made to point 5.3 above.

6.4 Therefore, the subject-matter of claim 1 involves an inventive step over document D1.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the opposition division with the order to maintain the patent in amended form on the basis of claims 1 to 8 of the main request, submitted as auxiliary request 2B during oral proceedings, and a description to be adapted.

The Registrar: The Chair:

A. Wille P. Guntz

Decision electronically authenticated