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**Datasheet for the decision
of 4 November 2021**

Case Number: T 2030/18 - 3.3.05

Application Number: 12180124.5

Publication Number: 2546209

IPC: C03C21/00, C03C3/093,
C03C3/064, C03C3/085,
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Language of the proceedings: EN

Title of invention:
Strengthened glass articles and methods of making

Patent Proprietor:
Corning Incorporated

Opponent:
Nippon Electric Glass Co., Ltd.

Headword:
Glass articles/CORNING

Relevant legal provisions:
EPC Art. 56, 87(1), 116(1)
RPBA 2020 Art. 25, 13(1)
RPBA Art. 12(4)

Keyword:

Oral proceedings - videoconference - COVID-19

Priority - (no)

Inventive step - closest prior art - reformulation of the technical problem - main request (no) - auxiliary request (no)

Amendment after summons - taken into account (no)

Decisions cited:

G 0001/21, T 1443/16, T 0967/97

Catchword:



Beschwerdekammern

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Case Number: T 2030/18 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 4 November 2021

Appellant: Corning Incorporated
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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 8 June 2018
revoking European patent No. 2546209 pursuant to
Article 101(3) (b) EPC.**

Composition of the Board:

Chairman E. Bendl
Members: T. Burkhardt
R. Winkelhofer

Summary of Facts and Submissions

- I. The patent proprietor's (appellant's) appeal lies from the decision of the opposition division to revoke European patent 2 546 209 B.
- II. The following documents were among those submitted at the opposition stage:
- D1 WO 2008/143999 A1
 - D8 Declaration by K Kawamoto dated 24 August 2015, Annex: Tests 1 to 66
 - D13 Experimental tests filed by the patent proprietor on 1 December 2017
 - D14 Statement by T M Gross dated 30 November 2017
- III. The opposition division admitted D13 and D14 and held, among other things, that the priority of the patent in suit was not valid and that all the then pending requests contravened Article 56 EPC in view of D1.
- IV. With the statement of grounds of appeal, the patent proprietor submitted a main request as well as auxiliary requests 1, 2 and 3, which are all identical to the requests underlying the decision under appeal.
- V. In the reply to the appeal, the opponent (respondent) raised, among other things, objections for lack of clarity, novelty and inventive step against the main request and objections for lack of inventive step against the auxiliary requests. They also submitted the following documents:

D15 Test Report for samples A and B

D16 Declaration by K Kawamoto dated 30 January 2019

- VI. In a first communication under Article 15(1) RPBA 2020, the board informed the parties that the requests did not appear to fulfil the requirements of Article 84 EPC and, in view of the apparently invalid priority of the patent in suit, Article 56 EPC.
- VII. In response, the appellant submitted further requests, namely main request A as well as auxiliary requests 1A, 2A, 3A and 4.
- VIII. In view of the COVID-19 pandemic, oral proceedings scheduled for 7 and 8 May 2020 were cancelled.
- IX. In a second communication, the board informed the parties that the new requests did not appear to overcome all the objections raised and would probably not be considered.
- X. Newly scheduled oral proceedings were also postponed because of the COVID-19 pandemic.
- XI. In a third communication, the parties were informed that the oral proceedings, which had been re-scheduled for 27 and 28 May 2021, would be held as a videoconference.
- XII. The appellant did not agree to the oral proceedings being held by videoconference and requested an in-person hearing. It was referred to the then pending referral G 1/21 before the Enlarged Board of Appeal, concerning the question of holding oral proceedings by videoconference even without the consent of all the parties, and it was further requested to stay the

proceedings until the decision in G 1/21 had been handed down.

XIII. In a fourth communication, the board confirmed that the oral proceedings would be held in the form of a videoconference and set out more detailed reasons in this regard.

XIV. Oral proceedings were held as a videoconference on 27 May 2021. No decision was announced there.

XV. On 28 October 2021, the written reasoning of the referral decision G 1/21 was published.

XVI. Independent claim 1 of the main request and of main request A reads as follows:

"1. A strengthened glass article comprising an alkali aluminosilicate glass free of arsenic, the strengthened glass article having a thickness t between 0.2 mm and 0.5 mm and comprising:

an outer region, the outer region extending from a surface of the article to a depth of layer DOL within the article, wherein the outer region is under a compressive stress CS, wherein the DOL is at least 30 μm and the CS is at least 600 MPa; and

an inner region, wherein the inner region is under a central tension CT, wherein $CT(\text{MPa}) > -15.7(\text{MPa}/\text{mm}) \cdot t(\text{mm}) + 52.5(\text{MPa})$ and $CT \leq -38.7 \ln(t) + 48.2$, and wherein the strengthened glass article is substantially non-frangible when subjected to a point impact that is sufficient to break the strengthened glass article, wherein the strengthened glass article has a frangibility index of less than 3, and wherein CT is

calculated by the equation $CT = (CS * DOL) / (t - 2 DOL)$."

XVII. As compared with the main request, independent claim 1 of auxiliary requests 1 and 1A contains the requirement that the alkali aluminosilicate glass is also "free of ... antimony".

XVIII. As compared with the main request, independent claim 1 of auxiliary requests 2 and 2A contains the further requirement that "the strengthened glass article [is] selected from a cover plate for a portable electronic device, an information terminal device and a display for a computer".

XIX. Independent claim 1 of auxiliary requests 3 and 3A combines the amendments of auxiliary requests 1/1A and 2/2A.

XX. As compared with auxiliary requests 3 and 3A, claim 1 of auxiliary request 4 contains the further requirement that "the alkali aluminosilicate glass comprises $64 \text{ mol}\% \leq \text{SiO}_2 \leq 68 \text{ mol}\%$; $12 \text{ mol}\% \leq \text{Na}_2\text{O} \leq 16 \text{ mol}\%$; $8 \text{ mol}\% \leq \text{Al}_2\text{O}_3 \leq 12 \text{ mol}\%$; $0 \text{ mol}\% \leq \text{B}_2\text{O}_3 \leq 3 \text{ mol}\%$; $2 \text{ mol}\% \leq \text{K}_2\text{O} \leq 5 \text{ mol}\%$; $4 \text{ mol}\% \leq \text{MgO} \leq 6 \text{ mol}\%$; and $0 \text{ mol}\% \leq \text{CaO} \leq 5 \text{ mol}\%$, wherein: $66 \text{ mol}\% \leq \text{SiO}_2 + \text{B}_2\text{O}_3 + \text{CaO} \leq 69 \text{ mol}\%$; $\text{Na}_2\text{O} + \text{K}_2\text{O} + \text{B}_2\text{O}_3 + \text{MgO} + \text{CaO} + \text{SrO} > 10 \text{ mol}\%$; $5 \text{ mol}\% \leq \text{MgO} + \text{CaO} + \text{SrO} \leq 8 \text{ mol}\%$; $(\text{Na}_2\text{O} + \text{B}_2\text{O}_3) - \text{Al}_2\text{O}_3 \leq 2 \text{ mol}\%$; $2 \text{ mol}\% \leq \text{Na}_2\text{O} - \text{Al}_2\text{O}_3 \leq 6 \text{ mol}\%$; and $4 \text{ mol}\% \leq (\text{Na}_2\text{O} + \text{K}_2\text{O}) - \text{Al}_2\text{O}_3 \leq 10 \text{ mol}\%$ ".

XXI. The appellant's arguments as far as relevant to the present decision may be summarised as follows:

The appellant did not consent to the oral proceedings being held by videoconference. Since the appellant

aimed at overturning the decision under appeal, a videoconference would "put [them] at a significant disadvantage compared to an in person hearing".

D1 was not suitable as the closest prior art since it was not primarily concerned with frangibility. Moreover, samples 1 to 3 of D1 could only be chosen as the starting point with hindsight. The skilled person would not omit arsenic, as demonstrated by D13 and D14, *inter alia*.

The submission of auxiliary request 4 was a reaction to the indication in the board's communication that the requirements of Article 56 EPC were not fulfilled. This request should therefore be considered.

All the pending requests fulfilled the requirements of the EPC.

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

As the priority of the patent in suit was invalid, the main request, main request A, auxiliary requests 1, 2 and 3 and auxiliary requests 1A, 2A and 3A did not fulfil the requirements of Article 56 EPC.

In particular, D15 and D16 demonstrated that the omission of arsenic did not lead to gas bubbles when the experiments from D1 were reproduced.

Auxiliary request 4 should have been filed earlier and should therefore not be considered.

XXIII. On substance, the appellant requests that the decision under appeal be set aside and that the patent be

maintained as amended on the basis of the main request submitted with the statement of grounds of appeal.

As an alternative, the appellant requests that the patent be maintained as amended on the basis of:

- main request A filed with the submission dated 6 April 2020,
- auxiliary request 1, 2 or 3, all submitted with the statement of grounds of appeal, or
- auxiliary request 1A, 2A, 3A or 4, all filed with the submission dated 6 April 2020.

The respondent requests that the appeal be dismissed.

Reasons for the Decision

1. Format of the oral proceedings

For the reasons set out below the appellant's request that the oral proceedings be held as an in-person hearing could not be granted.

- 1.1 The appellant had argued in favour of oral proceedings being held as an in-person hearing, as they would "attemp[t] to overturn the decision of the Opposition Division" and a videoconference would "put [them] at a significant disadvantage compared to an in person hearing". According to the appellant, videoconference and in-person hearing were not equivalent because additional layers, such as body language, had more impact at in-person hearings and because an in-person hearing allowed for different ways to react.

However, the appellant did not demonstrate for which specific and precise reasons they were put at a "significant disadvantage" by the hearing held as videoconference. The complexity of the case is not such that a videoconference was inadequate.

Moreover, due to the ongoing COVID-19 pandemic, an in-person hearing on the EPO premises on the scheduled dates was not appropriate, since the journey to and from Haar as well as the presence of at least five people in the same conference room would have considerably increased the risk of infection.

Given, moreover, that the oral proceedings in the present case had already been postponed by a year, and also for reasons of procedural economy, a further postponement was not appropriate.

1.2 The conclusion to hold the oral proceedings as a videoconference is in line with Article 15a(1) RPBA 2020.

1.3 Moreover, it is in line with the Enlarged Board of Appeal's decision G 1/21, the order of which reads:

"During a general emergency impairing the parties' possibilities to attend in-person oral proceedings at the EPO premises, the conduct of oral proceedings before the boards of appeal in the form of a videoconference is compatible with the EPC even if not all of the parties to the proceedings have given their consent to the conduct of oral proceedings in the form of a videoconference."

According to the Enlarged Board's reasoning, the COVID-19 pandemic is a "general emergency impairing the

parties' possibilities to attend in-person oral proceedings at the EPO premises", thus constituting "good reasons" for the conduct of oral proceedings by videoconference, despite the appellant's explicit wish to go for in-person oral proceedings instead (G 1/21, Reasons 45, 49). Even more so, the continued delay of oral proceedings during a pandemic is a further ground to overrule a party's wish to hold oral proceedings in person (G 1/21, Reasons 51).

In the present case, all these considerations apply and justify to hold oral proceedings by videoconference.

2. Priority

It has not been contested that the thickness range from 0.2 mm to 0.5 mm, the inequality $CT(\text{MPa}) > -15.7(\text{MPa}/\text{mm}) \cdot t(\text{mm}) + 52.5(\text{MPa})$ and the frangibility index in claim 1 do not have a basis in the priority document, i.e. in US provisional application US 61/087,324.

Consequently, the opposition division was correct in concluding that the priority of the patent in suit was not valid (Article 87 EPC).

As a consequence, D1 is prior art under Article 54(2) EPC.

Main request

3. Novelty

During the appeal proceedings, the respondent acknowledged that samples 1 to 3 in Table 3 of D1 are

not "free of arsenic" and withdrew their novelty objection.

4. Inventive step

4.1 The invention in the present case relates to a strengthened glass article.

4.2 In the respondent's view, any one of samples 1 to 3 in Table 3 of D1 was the prior art closest to the subject-matter of claim 1 of the main request. The composition of the glass was disclosed in paragraph [0044].

In the appellant's view, the choice of D1 itself was an inadmissible *ex post facto* approach since the focus of D1 was the manner in which the glass was produced, i.e. its down-drawability (paragraphs [0004], [0005] and [0024]), rather than its strengthening and frangibility behaviour.

Moreover, even if the skilled person considered D1, they would certainly not consider one of samples 1 to 3 in Table 3, since paragraph [0029] recommended a long-duration strengthening process through ion exchange, but samples 1 to 3 in D1 were only subjected to a relatively short ion exchange time.

4.3 This view is not persuasive. According to established case law, the closest prior art is normally conceived for the same purpose or tries to achieve the same objective and has the most relevant technical features in common (Case Law of the Boards of Appeal, 9th edition 2019, I.D.3.1).

Moreover, there is no need for special justification for the choice of the closest prior art if inventive step is denied (T 967/97, headnote II).

In this regard the board notes that, while D1 puts emphasis on the down-drawability of the glass, it is also directed to glass articles, such as a "cover plate" of portable mobile devices, that have to be "resistant to shock, breakage, and scratching" (paragraph [0035]). D1 is hence a document that is conceived for the same purpose as the invention in this case.

More particularly, samples 1 to 3 in Table 3 of D1, which are examples according to the invention, undergo ion exchange, and are thus strengthened (see paragraphs [0037] and [0045]). It has not been contested that these samples disclose all the features of claim 1, apart from the fact that the aluminosilicate glass is free of arsenic.

According to T 1443/16 (reasons 4.3.2), "the issue of hindsight is immaterial to the selection of the closest prior art. Given that the closest prior art is selected on the basis of its proximity to the invention, its selection necessarily requires the knowledge of the invention".

This view is shared by this board.

The situation would perhaps be different if samples 1 to 3 in Table 3 of D1 were declared as being particularly frangible. In this event, it might be argued that the skilled person would probably not start from particularly disadvantageous embodiments if the problem to be solved was precisely to improve the

frangibility behaviour. This is, however, not the case, since D1 does not provide any information regarding the frangible behaviour of samples 1 to 3.

Consequently, samples 1 to 3 in Table 3 of D1 are a suitable starting point for assessing inventive step.

4.4 According to the patent in suit, the problem to be solved is to provide a strengthened glass article which is substantially non-frangible and offers increased design flexibility (see paragraphs [0002], [0006] and [0026]).

4.5 However, the strengthened samples 1 to 3 in Table 3 of D1 disclose all the features of claim 1, with the exception that the alkali aluminosilicate glass has to be free of arsenic. In particular, the parameters t , DOL, compressive stress CS of the outer region and central tension CT of the inner region are disclosed. Therefore, the problem is already solved in D1, which has not been contested.

4.6 Consequently, the technical problem to be solved has to be reformulated to be that of providing a glass article using a less toxic fining agent.

This formulation of the problem to be solved has not been contested.

4.7 The main request proposes solving this problem by means of a strengthened glass article according to claim 1, characterised in that the alkali aluminosilicate glass is free of arsenic.

By contrast, the glass plates in Example 3 of D1, on which samples 1 to 3 are based, contain 0.33 mol% As_2O_3 (paragraph [0044]).

- 4.8 It now remains to be seen whether the skilled person would have omitted arsenic on the filing date when starting from samples 1 to 3 in order to solve the technical problem.

The answer to this is yes. While it has not been contested that arsenic is the most efficient fining agent, D1 itself teaches in paragraph [0023] that "arsenic and antimony are generally regarded as hazardous materials".

The same passage hints at replacing arsenic and antimony with a "nontoxic component such as tin, halides, or sulfates to produce a fining effect. Tin (IV) oxide (SnO_2) and combinations of tin (IV) oxide and halides are particularly useful as fining agents in the present invention". The skilled person would therefore replace arsenic with one of the preferred alternatives, SnO_2 or combinations of SnO_2 and halides.

Moreover, paragraph [0040] of D1 indicates that "arsenic is present only as a fining agent, and adds nothing to the physical properties or ion exchange capability of the glass". Consequently, the parameters compressive stress CS, central tension CT and the frangibility index would remain within the ranges of claim 1 after replacing the fining agent arsenic and/or antimony with one of the less toxic fining agents mentioned in paragraph [0023].

To conclude, the skilled person would arrive at the subject-matter of claim 1 in an obvious manner.

4.9 D13 and D14, submitted by the appellant at the opposition stage, demonstrate that gas bubbles are formed in the glass article under certain conditions when SnO₂ is used as a fining agent.

The respondent acknowledged that the presence of gas bubbles in the glass was undesirable.

The fining agent is used to remove gaseous inclusions (D1: paragraph [0023]). However, the treatment at a relatively low temperature of 1500°C for 6 hours followed by 1600°C for only 1 hour, which was applied in D13 according to the statement D14, is less favourable for removing gas bubbles than the treatment "from about 1575°C up to and including about 1650°C, and held at temperature for 4 to 16 hours" in paragraph [0041] of D1, which sets out a longer stage at a higher temperature.

Moreover, it has not been contested that the skilled person knew that arsenic was the most efficient fining agent. They would therefore prolong the fining treatment and/or increase the fining temperature in the event that another fining agent was used if the glass still contained gas bubbles at the end of the fining process.

Consistently, the experiments in D15 in combination with the declaration in D16 demonstrate that glass articles free of gas bubbles are obtained with SnO₂ when following the procedure in paragraphs [0041], [0044] and [0045] of D1.

4.10 In the appellant's view it would not be that simple to replace arsenic with a less toxic fining agent, and to

adapt the operating parameters during the fining step. On the contrary, other problems would have to be overcome.

The board notes, however, that the patent in suit does not provide any information regarding these problems or any specific measures for overcoming them, and therefore this argument is not convincing.

- 4.11 The appellant also held that an important aspect of the invention was the findings relating to how the breakage of the glass article occurred and which parameters were involved, such as the compressive stress of the outer region, the central tension CT of the inner region and their relationship, but that D1 does not provide any information regarding these aspects.

This argument is not convincing either. As long as samples 1 to 3 in D1 have these properties within the claimed ranges *already*, merely determining the boundaries of the parameter ranges cannot confer an inventive step.

Even though D1 does not provide any information regarding the specific frangibility behaviour of the glass in samples 1 to 3, this is at most a discovery of a new property and thus is not patentable as long as no technical problem is solved in a non-obvious manner (Case Law of the Boards of Appeal, 9th edition 2019, I.A.2.2.1).

- 4.12 Consequently, claim 1 of the main request does not involve an inventive step within the meaning of Article 56 EPC.

Main request A, auxiliary requests 1 to 3 and 1A to 3A

Notwithstanding the question of the admission and consideration of the requests submitted after the issuance of the board's communication, none of the requests is allowable.

5. Inventive step

5.1 Claim 1 of main request A is identical to claim 1 of the main request.

Consequently, the subject-matter of claim 1 of main request A is obvious for the same reasons (Article 56 EPC).

5.2 Claim 1 of auxiliary requests 1 to 3 and 1A to 3A differs from claim 1 of the main request in that:

- the alkali aluminosilicate glass is additionally "free of ... antimony" and/or
- "the strengthened glass article is one of a cover plate for a portable electronic device, an information terminal device, and a display for a computer".

However, the glass composition used in samples 1 to 3 in Table 3 of D1 does not contain antimony (paragraph [0044]), and D1 also discloses an application as a cover plate of a mobile portable electronic device (paragraph [0035]). This has not been disputed.

Consequently, the subject-matter of the independent claims of auxiliary requests 1 to 3 and of auxiliary requests 1A to 3A does not involve an inventive step either (Article 56 EPC).

Auxiliary request 4

6. Admission/consideration

6.1 With regard to the newly filed auxiliary request 4, the appellant submitted that it was based on paragraph [0037] of the application as originally filed. Their submission was a direct reaction to the board's preliminary opinion (expressed in their first communication under Article 15(1) RPBA 2020) that the then pending requests did not appear to fulfil the requirements of Article 56 EPC.

The appellant was, moreover, of the opinion that the compositional ranges inserted into claim 1 were narrower than the ranges of claim 4 of the other pending requests and thus would not significantly increase the complexity of the case.

The appellant was also of the opinion that the respondent has had sufficient preparation time between the submission of auxiliary request 4 and the oral proceedings.

Finally, in their view auxiliary request 4 would overcome the remaining objections.

6.2 The board, however, notes the following:

- Objections concerning lack of novelty and inventive step were already raised at opposition stage. All amended claims could and should have already been filed during this stage. As a consequence of the objections then raised, also the decision under appeal had already concluded that the requests then

on file lacked inventive step in view of D1 (see points 5, 6.2, 7.2 and 8.1).

- The respondent had raised objections for lack of novelty and/or inventive step in view of D1 against the then pending requests in the reply to the appeal.

- The newly added features originate from the description and not from a granted claim. The respondent and the board would therefore be confronted with claims not examined by the opposition division. Filing such claims at a very late stage of the appeal proceedings contradicts procedural economy.

Hence, the submission of auxiliary request 4 only after the board's communication does not fulfil the requirement that both sides set out their complete case at the outset of the appeal proceedings (Article 12(3) RPBA 2020).

In addition, as explained above, the appellant did not provide convincing reasons for the late submission of this request.

Auxiliary request 4 is therefore not considered/ admitted (Articles 13(1) and 25(2) RPBA 2020 and 12(4) RPBA 2007).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



C. Vodz

E. Bendl

Decision electronically authenticated