BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

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

Datasheet for the decision of 26 January 2009

Case Number: T 0661/06 - 3.3.05

Application Number: 00116958.0

Publication Number: 1057795

IPC: C03C 17/00

Language of the proceedings: EN

Title of invention:
Film in particular for use in a laminated glass

Patentee:
CENTRAL GLASS COMPANY, LIMITED

Opponent:
SOLUTIA INC.

Headword:
Kuraray Europe GmbH

Relevant legal provisions:
EPC Art. 56, 123

Relevant legal provisions (EPC 1973):
-

Keyword:
"Inventive step (yes): evidence for effects"

Decisions cited:
-

Catchword:
-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0661/06 **-** 3.3.05

D E C I S I O N
of the Technical Board of Appeal 3.3.05
of 26 January 2009

Appellant: (Patent Proprietor)
CENTRAL GLASS COMPANY, LIMITED
5253, Oaza Okiube
Ube-shi
Yamaguchi 755 (JP)

Representative:
Manitz, Finsterwald & Partner GbR
Martin-Greif-Strasse 1
D-80336 München (DE)

Respondent I: (Opponent I)
SOLUTIA Inc.
575 Maryville Centre Drive
St. Louis
Missouri 63141 (US)

Representative:
Beckmann, Claus
Kraus & Weisert
Patent- und Rechtsanwälte
Thomas-Wimmer-Ring 15
D-80539 München (DE)

Respondent II: (Opponent II)
Kuraray Europe GmbH
Mülheimer Strasse 26
D-53840 Troisdorf (DE)

Representative:
Kisters, Michael Marcus
c/o profine GmbH Patentabteilung
Gebäude 56
D-53839 Troisdorf (DE)

Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 21 April 2006 revoking European Patent No. 1057795 pursuant to Article 102(1) EPC 1973.

Composition of the Board:

Chairman: G. Raths
Members: J.-M. Schwaller
C. Vallet

Summary of Facts and Submissions

I. This appeal was lodged by the patentee against the decision of the opposition division revoking the European patent 1 057 795.

II. The following documents were *inter alia* relied upon during the opposition proceedings:

D1: European patent 0 459 967 A2

D5: English translation of JP 02022 152

D6: English translation of JP 04 160 041.

III. The contested decision concerned nine sets of amended claims. Claim 1 of the last request - auxiliary request 5b - read as follows:

"1. Use of an interlayer film as an interlayer of a laminated glass for use as an automotive windshield in which the interlayer film is interposed between and bonded with first and second glass plates, the interlayer film comprising functional ultra-fine particles that have a particle diameter of up to 0.2 µm and are dispersed therein, said interlayer film having a thickness from 0.2 to 1.2 mm, a raw material of said interlayer film comprising a resin in which said functional ultra-fine particles are added and dispersed, said functional ultra-fine particles comprising at least one member selected from the group consisting of

(1) ATO, which is defined as being an antimony-doped tin oxide, SnO_2 doped with Sb, SnO_2 doped with Sb_2O_3, a conductive antimony-containing tin oxide or a solid solution of tin oxide and antimony oxide,

(2) ITO, which is defined as being a tin-doped indium oxide, a mixture of In_2O_3 and SnO_2, an indium tin oxide, a conductive tin-containing indium oxide, In_2O_3 doped with Sn or a solid solution of indium oxide and tin oxide,

(3) a mixture of Co_2O_3 and Al_2O_3,

(4) a mixture of TiO_2, NiO, Co_2O_3 and ZnO, and

(5) a mixture of Fe_2O_3, ZnO and Cr_2O_3,

wherein said functional ultra-fine particles amount to a range from 0.01 to 2.0 wt% based on the total weight of the interlayer film, such that said interlayer film provides insulation against heat caused by solar radiation wherein the solar radiation transmittance Ts (340—1,800 nm) of the laminated glass is up to 65% and that the visible light transmittance of Tv (380—780 nm) of the laminated glass is at least 65%."

The opposition division held this claim as lacking an inventive step. Starting from D5 - which concerned protection against UV-rays - as the closest prior art, the interlayer film according to above claim 1 differed therefrom by the size and the nature of the particles.

The technical problem in the light of D5 was seen in the provision of an interlayer film providing

protection against heat, which problem was solved by incorporating ultra fine particles of specific metal oxides as defined in above claim 1.

As D6 proposed to use such ultra fine functional particles for this purpose, it was obvious for the skilled person to incorporate these particles into the interlayer film according to D5 in order to obtain both a good UV protection and IR reflection.

Adjusting the concentration of the ultrafine particles to the desired level of IR reflection (Ts) while safeguarding the transparency to visible light (Tv) would come within the customary routine of the skilled person. Therefore, defining a range for the amount of ultrafine particles did not contribute to an inventive step.

IV. With its statement setting out the grounds of appeal dated 16 August 2006, the appellant submitted three sets of amended claims as a main, 1st and 2nd auxiliary request.

V. In response thereto, the respondents I and II (i.e. Opponents I and II) filed observations on 1 March 2007 and 8 December 2006, respectively.

Respondent I *inter alia* submitted that the subject-matter of claim 1 of each of the three requests then on file, on the one hand, extended beyond the content of the application as filed and, on the other hand, was obvious in view of a combination of the prior art documents D5 and D6.

Respondent II *inter alia* held the subject-matter of the claims 1 then on file as not meeting the requirements of Articles 84 and 56 EPC .

VI. On 20 September 2007, the appellant submitted three new sets of amended claims as a main request and as 1st and 2nd auxiliary requests, respectively, in replacement for the previous sets of claims on file, with claim 1 of the main request being identical to claim 1 of the auxiliary request 5b on which the contested decision was based.

VII. Under cover of the letter dated 8 February 2008, respondent II argued that these claims would still lack an inventive step in the light of document D5 taken in combination with the teaching of document D6.

VIII. Oral proceedings took place on 26 January 2009. After the discussion, which concerned essentially Articles 123(2) and 56 EPC issues, the appellant filed an amended set of claims 1 to 7 as a main request, claim 1 of which reads as follows:

"1. Use of a laminated glass as an automotive windshield in which an interlayer film is interposed between and bonded with first and second glass plates, the interlayer film comprising functional ultra-fine particles that have a particle diameter of up to 0.2 µm and are dispersed therein, said interlayer film having a thickness from 0.2 to 1.2 mm, a raw material of said interlayer film comprising a resin in which said functional ultra-fine particles are added and dispersed, said functional ultra-fine particles comprising at least one member selected from the group

consisting of

(1) SnO_2 doped with Sb_2O_3,

(2) a mixture of In_2O_3 and SnO_2, an indium tin oxide, a conductive tin-containing indium oxide or In_2O_3 doped with Sn

(3) a mixture of Co_2O_3 and Al_2O_3,

(4) a mixture of TiO_2, NiO, Co_2O_3 and ZnO, and

(5) a mixture of Fe_2O_3, ZnO and Cr_2O_3,

wherein said functional ultra-fine particles amount to a range from 0.01 to 2.0 wt% based on the total weight of the interlayer film, such that said interlayer film provides insulation against heat caused by solar radiation, wherein the solar radiation transmittance Ts (340—1,800 nm) of the laminated glass is up to 65%, and wherein the visible light transmittance of Tv (380—780 nm) of the laminated glass is at least 65%."

IX. The appellant requested 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 at the oral proceedings, or alternatively on one of the sets of claims according to the 1st or 2nd auxiliary request, both filed on 20 September 2007.
The respondents requested that the appeal be dismissed.

Reasons for the Decision

1. Main request - Amendments

The basis in the application as filed for the amended claims of the present request is as follows:

- claim 1: page 9, lines 26 to 30; page 11, lines 8 to 16; page 13, lines 3 to 4; page 14, line 31 to page 15, line 1; claims 36, 7, 13 to 17 and 38;

- claims 2/3: claims 4/5, respectively;

- claims 4 to 7: claims 9 to 12, respectively.

As the scope of protection conferred by these claims has furthermore not been extended over that of the claims of the patent as granted, the requirements of Article 123(2) and (3) EPC are fulfilled.

2. *Main request - Novelty*

The novelty of the amended claims has not been contested. The board is satisfied that the requirements of Article 54 EPC are met. So, further comments on this matter need not to be made.

3. *Main request - Inventive step*

3.1 The patent in suit relates to a laminated glass to be used as an automotive windshield, said glass having a radio transmittance equivalent to that of the glass plate itself, a solar radiation transmittance Ts of up to 65%, a visible light transmittance Tv of at least

65% and a very low visible light reflectance (paragraph [0025].

3.2 At the oral proceedings before the board, the parties agreed that D6 represented the closest prior art because - like the patent in suit - this document relates to automotive window glasses possessing good infrared reflecting properties (D6, page 6, first full paragraph), in contrast to D5 which relates to glass laminates which allow the passage of infrared light (D5, page 3, lines 1 to 4 and 14 to 18).

3.3 Specifically, D6 concerns automotive window glass for use as transparent conductive IR-reflective glass (page 6, lines 1 and 2).

Claim 3 discloses an automotive window glass having a plastic-intermediate layer between transparent plate members and a mixed layer formed between the intermediate layer and each of the plate members, said mixed layer consisting of a glass component and of ultrafine particles having an average particle size of 0.1 µm or less.

Such a laminated glass with a plastic interlayer is in particular illustrated in Figure 4 and manufactured in Example 2 by dipping a polyvinylbutyral sheet into a solution containing *inter alia* particles of (SnO_2 + 10 wt% Sb_2O_3) having an IR reflecting function and a particle size of 0.015 µm, as well as ultrafine particles having a particle size of 0.3 µm and a spacer function, and tetraethoxysilane as the glass component. After the dipping operation, which allows a uniform application of the particles on both surfaces of the

interlayer sheet, a drying is performed and plate members are laminated onto both surfaces to prepare a laminated glass.

Such an automotive window glass is, among others, used as a windshield (D6, page 17, second full paragraph).

3.4 The appellant submitted that the problem to be solved with respect to the laminated glasses disclosed in D6 might be seen in the provision of a laminated glass having in particular good radio transmittance and improved insulation against heat caused by solar radiation. It argued in this respect that the laminated glass prepared according to D6 (page 16 and Figure 3) had a reflectance of 10% in the visible light region (400-700 nm) and a reflectance for the IR region of approximately 45%, which corresponded to a solar radiation transmittance Ts as defined in claim 1 of approximately 72,5 %, i.e. a percentage worse than the upper Ts value defined in claim 1 (up to 65%); therefore an improvement as regards the heat insulation should be acknowledged.

The board observes that owing to the fact that several parameters (for instance the type of glass or the type of ultrafine particles used) might differ between the Examples of D6 and those of the patent in suit, a fair comparison between these embodiments is not possible. It follows that an improvement over D6 as regards the heat insulation capacity cannot be taken into consideration when assessing inventive step.

The fact that the problem directed to an improved heat insulation is not solved however does not mean that a

less ambitious goal is not met. As a matter of fact, the problem to be solved can be seen in the provision of a laminated glass having a good radio transmittance and providing a good insulation against heat caused by solar radiation while safeguarding the visible light transmittance.

3.5 As a solution to this problem, the patent in suit proposes the use of a laminated glass according to claim 1, which is in particular characterized by:

- functional ultra-fine particles amounting to a range of 0.01 to 2.0 wt% based on the total weight of the interlayer film and being dispersed in the interlayer film; and

- the interlayer film having a thickness from 0.2 to 1.2 mm.

3.6 Concerning the alleged effects, it has in particular not been contested that the laminated glasses of the patent in suit have a good radio transmittance. Furthermore, the Examples give evidence that laminated glasses satisfying the Ts and Tv requirements defined in present claim 1 can be manufactured on the basis of an interlayer film having a thickness as claimed and having dispersed therein ultrafine particles selected from at least one member selected from the types (1) to (5) at the specified low concentration. For these reasons, the board is satisfied that the technical problem underlying the patent in suit has been successfully solved by the proposed solution over its whole breadth.

3.7 It remains to be decided whether the proposed solution to the problem underlying the patent in suit is obvious or not in view of the state of the art. In this respect, the board cannot share the respondents' views that said solution would be suggested by each one of documents D5 or D1 for the following reasons.

3.7.1 D5 concerns glass laminates having an intermediate film composed of polyvinyl butyral resin and having dispersed therein a fine granular inorganic substance (claim 1). However, these laminates - in contrast to the problem identified in item 3.4 above - are supposed to allow the passage of light having a wavelength of at least 450 nm (second half of page 6), i.e. also the infrared wavelengths, so that the skilled person looking for a good insulation against heat caused by solar radiation would not at all be prompted to find a solution to the above problem in document D5.

3.7.2 The same argumentation applies to D1, which also does not deal with the problem of providing insulation against heat caused by solar radiation, its object being in particular to reduce haze and improve the color consistency of pigment/plasticizer dispersions used in synthetic thermoplastic sheets for laminated safety glass window applications (column 3, lines 37 to 41), i.e. a problem different to the one identified in item 3.4 above.

3.8 The board can also not accept the other arguments put forward by the respondents for the following reasons:

3.8.1 Respondent I argued that the skilled person knew that the transmittance (T) of an absorbing layer (at a given

wavelength), its thickness (l) and the concentration (c) of the species responsible for the absorption in said layer were related in terms of the Beer-Lambert law:
— log T= ε . c . l, ε being the (wavelength dependent) absorption coefficient of the absorbing species. It was therefore clear that a thicker layer containing an absorbing species at a lower concentration would result in the same transmittance as a thinner layer containing a higher concentration, as long as the product c . l remained the same. Thus, it was a trivial consideration for the skilled person that the ultra-fine particles used in D6 might also be incorporated into a thicker interlayer film without substantially affecting the visible light transmittance, provided the concentration was lowered accordingly. For this reason, the fact that D6 envisaged the application of the ultra-fine particles in the form of a relatively thin but highly concentrated layer could not have deterred the skilled person from considering the incorporation of those particles into a thicker layer as defined in claim 1.

The board notes that the Beer-Lambert law concerns the absorption of a monochromatic light by a transparent medium containing an absorbing species, however it is questionable whether the relationship:
— log T= ε . c . l,
which concerns solutions, is directly applicable to the interlayer of D6 which contains dispersed solid particles - i.e. a species which inevitably scatters an incident light - instead of dissolved species, which do not scatter the light.

3.8.2 Anyway, independently of whether the Beer-Lambert law is applicable or not to the interlayer of D6, the board

is of the opinion that the introduction into a plastic film of the particles known from D6 at a lower concentration than in D6 cannot be seen as an obvious alternative because, even if it is uncontested that introducing additives in plastic films is conventional, it is not common knowledge - and hence not obvious for a skilled person faced with the above problem - that at the low concentration claimed (0.01 to up to 2.0 wt%), said particles would still provide an efficient insulation against heat to the extent defined in claim 1, i.e. limiting the solar radiation transmittance Ts (340-1800 nm) to a maximum of 65%.

3.8.3 Concerning the argument that the Ts and Tv values defined in claim 1 concerned not exclusively the interlayer film, and that said Ts and Tv values would be obtainable for instance with coloured glasses or by depositing a metallized film on transparent glasses, the board observes that such features are indeed not excluded from the claims, but the Examples of the patent in suit clearly demonstrate that it is possible to achieve the Ts and Tv values with the interlayer claimed only. Hence there is evidence for a causal link between the effects and the characterizing features identified under item 3.5 supra.

3.8.4 That the laminated glass defined in claim 1 would have the same appearance when seen from above as the one from Figure 4 of D6, and that the laminated glass claimed would therefore have the same effects as the laminated glass from D6 is purely speculative as no evidence has been provided in support of this allegation.

Furthermore, as submitted by the appellant, the dispersion behaviour of light through a film containing dispersed particles - such as the film presently claimed - would be substantially different to that observed with the substantially opaque interlayer films of D6, so that even if the appearance of both films would be the same when seen from above, no conclusion can be held as to the capacity of such dispersed particles to insulate against heat, let alone as to their capacity to transmit radio waves.

3.9 The remaining documents cited were no longer relied upon by the respondents at the oral proceedings. In the board's judgment, they do also not contain further information which would point towards the claimed solution of the problem stated above.

3.10 Accordingly, for the reasons indicated above, the subject-matter of claim 1 is not obvious to a person skilled in the art in view of the cited prior art and, therefore, it involves an inventive step.

As claims 2 to 7 represent particular embodiments of the subject-matter of claim 1, they derive their patentability from claim 1 on which they depend, and thus the set of claims according to the present request meets the requirements of Article 56 EPC.

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 that the patent be maintained on the basis of the claims 1 to 7 according to the main request filed at the oral proceedings, and a description to be adapted.

The Registrar: The Chairman:

C. Vodz G. Raths