BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

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File No.: T 0662/92 - 3.2.3

Application No.: 88 307 257.1

Publication No.: 0 303 411

Classification: E06B 3/66, C03C 17/36

Title of invention: Glazing units

D E C I S I O N
of 15 December 1993

Applicant: Pilkington PLC

Proprietor of the patent: -

Opponent: -

Headword:

EPC: Art. 56

Keyword: "Inventive Step (yes)"

Headnote
Catchwords

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0662/92 - 3.2.3

D E C I S I O N
of the Technical Board of Appeal 3.2.3
of 15 December 1993

Appellant: Pilkington PLC
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Decision under appeal: **Decision of the Examining Division 2.3.03.109 of the European Patent Office dated 3 February 1992 refusing European patent application No. 88 307 257.1 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: C.T. Wilson
Members: F. Brösamle
W. Moser

Summary of Facts and Submissions

I. With the decision of 3 February 1992 the Examining Division has refused European patent application No. 88 307 257.1 for lack of inventive step in the light of the following documents:

(D1) GB-A-2 068 442
(D2) US-A-4 610 115
(D3) EP-A-233 003
(D5) GB-A-1 364 712
(D6) EP-A-104 870
(D7) GB-A-1 152 691 and
(D9) GB-A-1 307 642.

II. Claim 1 underlying that decision was filed with the letter of 13 July 1990 and has the following wording:

"1. A double glazing unit comprising an outer pane of toughened or partly toughened body coloured heat absorbing glass and an inner pane of annealed glass with a coating including a silver layer having a thickness in the range 15 nm to 40 nm on its face turned towards the outer pane."

III. Starting from document (D2) the Examining Division argued that the further documents (D3), (D5) (D6) (D9), (D7) and (D1) would render obvious the teaching of Claim 1, namely to use an inner pane of annealed glass and a silver coating having a thickness in the range of 15 nm to 40 nm on the face of the inner pane turned toward the outer pane. Concerning document (D3) it was argued that nothing is said about the coated glass to be toughened so that a skilled person would combine the prior art documents and would thus arrive at the

subject-matter of claim 1 without the exercise of inventive skill.

IV. On 4 April 1992 the Appellant (Applicant) lodged an appeal against the decision to refuse the European application and paid the fee on the same date. On 12 June 1992 (telecopy) the Appellant filed the Statement of Grounds of Appeal and requests:

- to set aside the impugned decision;
- to grant the patent on the basis of Claims 1 to 6 underlying the impugned decision (i.e. claims filed with the letter of 13 July 1990) and a new page 4 filed with the Statement of Grounds of Appeal (main request) or
- to grant the patent according to a first auxiliary request on the basis of Claims 1 to 5 and pages 3b and 4 according to the Statement of Grounds of Appeal;
- oral proceedings in the case that neither the main request nor the first auxiliary request is found allowable by the Board.

V. The Appellant pointed to the fact that the inner pane of the invention according to Claim 1 of the main request is of **annealed** glass so that the expense and inconvenience of toughening the inner pane can be avoided. Due to the existence of a (silver) coating on that inner pane there is no tendency for the pane to heat up and cause breakage thereof. The Appellant pointed out that only a hindsight consideration of the prior art documents could lead to the claimed subject-matter, since these documents - without knowledge of the invention - teach away from the claimed invention; the problem of Appellant's invention is not disclosed in the cited prior art so that it is unjustifiable to conclude

that the subject-matter of present Claim 1 involves no inventive step.

The request to overturn the impugned decision and to grant a patent as requested would therefore be justified.

Reasons for the decision

1. The appeal is admissible.

2. *Article 123 EPC*

2.1 Main request:

Claim 1 comprises all features of originally filed Claim 1 plus the feature disclosed in column 2 line 51 of EP-A2-0 303 411 ("toughened or partly toughened"). Claims 2 to 5 correspond to originally filed Claims 2, 4, 5 and 6.

Summarising the main request is not open to an objection under Article 123(2) EPC.

2.2 First auxiliary request:

Claim 1 differs from the main request in the term "non-opacified" which can be seen from originally filed Claim 4 ("clear") or column 3 line 2 and column 4, lines 9 and 10 of EP-A2-0 303 411.

Claims 2 to 5 are identical with the main request.

The first auxiliary request is thus also not open to an objection under Article 123(2) EPC.

3. *Documents to be considered*

3.1 Document (D3), i.e. EP-A-233 003, published on 19 August 1987, is a document falling under the provisions of Article 54(3) EPC. That means that this document cannot be used for assessing the question of inventive step, Article 56 EPC.

3.2 The impugned decision, see pages 3 to 5 (remarks 3. to 6.), deals, however, with the assessment of inventive step (" ...taking into account the teachings of documents (D3) and (D5) it would be obvious to the skilled man to combine the known features ...").

3.3 Since Article 56 EPC literally excludes the possibility of considering a European application (not prepublished) falling under the provisions of Article 54 (3) EPC the impugned decision cannot be maintained as it is, since its reasoning - see above remark 3.2 - is not supported by the EPC.

3.4 In this context it is pointed out, however, that document (D4) i.e. AU-B-67 991/87, corresponds to the Article 54(3) EPC document (D3), **and is prepublished** (30 July 1987). In the following, document (D4) is therefore relied upon.

4. *Main request*

4.1 Novelty

Novelty of the subject-matter of Claim 1 was not disputed in the impugned decision; the Board shares this opinion so that this issue needs no further argument. It should only be added that document (D4) teaches a silver layer of 5 to 30 nm thickness, whereas a silver layer of 15 to 40 nm is claimed in Claim 1. This feature makes

the subject-matter of Claim 1 already novel *vis-à-vis* document (D4).

4.2 Inventive step

4.2.1 Claim 1 is drafted in a one-part form so that the claim itself does not give any direct information as to the starting point of the invention.

4.2.2 Documents (D7) and (D2) appear to be the most relevant documents, since in document (D7), see column 1, lines 22 to 29 and column 6, lines 32 to 36, it is already discussed that glazings are liable to break by virtue of the absorption of radiant energy and since in document (D2) a double glazing unit comprising an outer pane of toughened or partly toughened body coloured heat absorbing glass, see Claims 11 and 14 and column 3, lines 20 to 22 and column 6, lines 25 to 26, and an inner pane of glass which is metal-coated towards the outer pane, see column 3, lines 45 and 47 and also column 6 lines 17 to 223 ("may alternatively ... be applied to the No. 3 surface 34") is disclosed.

The Board agrees with the Examining Division that under the given circumstances document (D2) is the nearest prior art document.

4.2.3 Claim 1 differs therefrom by the features:

(a) the inner pane is of annealed glass and
(b) the metal-coating on the inner pane is a silver layer having a thickness in the range of 15 nm to 40 nm.

4.2.4 The double glazing unit according to document (D2) is based on at least two layers, namely a transparent reflection coating applied to the outer pane and an

opacifier applied to one of the surfaces of the inner pane, see Claim 1 and column 2, lines 23 to 39 thereof.

Background of the known double glazing unit is to minimize the visibility of the inner substrate "24" and its integral vision and spandrel areas "46, 48" respectively.

4.2.5 Starting from this prior art it is the object of the present invention to avoid the use of expensive panes - be it their heat treatment or their coating - in double glazing units, whereby there is no tendency in use to break when exposed to solar radiation.

4.2.6 The invention lies in the provision of two panes, whereby the outer is of toughened or partly toughened body coloured heat absorbing glass and the inner pane is of annealed glass with a silver coating of 15 to 40 nm thickness turned toward the outer pane.

4.2.7 The solution of the above problem of the invention is based on an outer pane which absorbs solar heat - because it is body coloured and specifically prepared for absorbing solar heat - whereas the inner pane is prepared to reflect and not to absorb the radiation transmitted through the outer pane, this being achieved by the silver coating turned towards the outer pane. In other words the outer pane is solar control glass whereby it is essential that the **outer** pane is of solar control glass, because its use as the inner pane would be far less efficient in reducing solar gain, see "Declaration" of John Bernard Colvin filed with the Statement of Grounds of Appeal under remarks 5. and 6.

As a consequence of the foregoing arrangement of panes the inner pane **remains cool** so that **annealed glass** can be used without running a risk that the inner pane in

use breaks under thermal stresses. Annealed glass means nothing other than ordinary and **cheap glass**. The solution of the above problem according to Claim 1 thus meets the aspects of costs and the avoidance of the tendency to break.

4.2.8 It has now to be assessed whether or not documents (D1), (D2), (D4), (D5), (D6) (D7) and (D9) singly or in combination give a direct lead to the double glazing unit according to Claim 1.

4.2.9 Document (D2) teaches away from the subject-matter of Claim 1 since according to column 3, lines 20 to 22 **both** panes should be heat-strengthened. Heat strengthened glass is, however no longer a cheap and ordinary glass in the meaning of Claim 1, because its production comprises heating of annealed glass to a point at which it begins to soften and then rapidly cooling it whereas **annealed** glass is only slowly cooled after it has been solidified into the required form.

Without knowing the invention a skilled person would not therefore be led to the subject-matter of Claim 1 by document (D2) despite the disclosure of a metal coating on the face of the inner pane turned toward the outer pane, see column 6, lines 17 to 26 (coating the surface No. 3 or 4 of the inner pane).

Whilst it is known from document (D2) to apply a **metal** coating to the panes, see column 3, line 45 or column 4, lines 16 to 25, it is not known to apply **silver** to the pane-surfaces, so that document (D2) cannot be considered to be prior art leading a skilled person to the subject-matter of Claim 1.

4.2.10 This is also true for document (D1), see page 2, lines 28 to 29 and table on page 6 (**oxides** as coating

materials) or Claim 6 thereof, which teaches the use of metal oxide coatings, which coatings are not claimed in Claim 1. Document (D1) teaches therefore also away from Claim 1, even if a double glazing unit is disclosed in this document.

The use of a silver coating *per se* is known for instance from document (D9), see Figure 1 and tables on pages 5 and 6 as well as Claim 1; the thickness thereof is partly overlapping with the claimed range, since values of 20 to 30 nm are disclosed, see Claim 1 for instance. Background of document (D9) is, however, an electrically conductive glass article and not a double glazing unit. In document (D9) only one reference to a double glazing unit is made, see page 3, lines 13 to 15, without, however, dealing with the problems of the present invention (cost reduction and avoidance of the tendency to break under thermal stresses).

Another document from which a silver coating is known is document (D6), see Claim 1 and page 4, lines 1 to 5, but again the thickness range disclosed there is 5 to 30 nm, whereas in Claim 1 the range is up to 40 nm which upper limit is well above the known maximum thickness. Apart from this information document (D6) is completely silent about the claimed arrangement of an outer and an inner pane as well as the problem underlying the present invention.

Still another example of a document which discloses a silver coating on glass is document (D4), see Claim 1, in which document again a silver coating of 5 to 30 nm is taught. It must therefore be concluded that 30 nm is a maximum thickness, since disclosed in two documents, namely (D6) and (D4) as the upper value of the silver coating. Table 1 of document (D4) makes it absolutely clear that the normally used thicknesses are far below

the lower value of Claim 1, namely 15 nm, so that it is clear that document (D4) teaches away from the subject-matter of Claim 1 and that the higher values mentioned in Claim 1 of (D4) are likely to be speculative.

On page 7 last and page 8 first paragraph of document (D4) it is set out that the coating is applicable to body coloured glass and also to clear glass. This disclosure is a clear sign that the importance of the choice of specific types of glasses for the outer and the inner pane of a double glazing unit has not been recognised in document (D4), since present Claim 1 makes it clear - see above remark 4.2.7 - that the skilled person cannot choose the panes freely, if the wished effect of keeping solar heat out of a building should be achieved.

Document (D5) relates to multiple glazed windows and is *prima facie* relevant, since the panes carry coatings, for instance silver coatings. It must, however, be observed that document (D5) teaches more than **one** coating on the different panes, see in Figure 3 reference signs "25" for electroconductive coating and "29" for heat reflective film or see Figure 4. A skilled person would therefore derive from document (D5) to provide at least two layers on neighbouring panes i.e., one layer on the **outer** "9". This teaching is, however, contradictory to present Claim 1 in which the outer pane is free from any coating. On page 3, lines 84 to 85 of document (D5) it is again set out that the outer pane may either be coloured or **clear** glass; this again is a clear indication that the teaching of present Claim 1 is not to be derived from document (D5) since a clear pane as the outer pane is in direct contradiction to the teaching of present Claim 1.

Only by knowing the invention - by an *ex post facto* analysis - could document (D5) be used as a document which discloses a silver coating on the inner pane in combination with a coloured outer pane, since in document (D5), see page 2 lines 65 to 73, the outer pane may be clear or coloured. With a clear outer pane the teaching of present Claim 1 is not affected, however, so that overall document (D5) is not likely to lead a skilled person to the invention laid down in Claim 1.

4.2.11 It can be summarised that the prior art does not teach a **silver** coating in the range of 15 to 40 nm as a reflection coating. Though the inner pane of a double glazing unit could, in principle, be coated following the prior art no clear and unambiguous teaching is derivable from the prior art that this coating has to be carried out in combination with an annealed glass - i.e. cheap and normal glass - and with an outer pane of toughened or partly toughened, body coloured and heat absorbing glass in order to consider the aspect of costs - toughened and heat strengthened glasses are more expensive than annealed glasses- and the aspect of liability to breakage under thermal influence.

4.2.12 If therefore a skilled person would consider a combination of documents he would *inter alia* be taught to use a **clear** glass as the **outer** pane and a **heat strengthened** or body coloured heat absorbing glass as the **inner** pane respectively and that coatings can be applied to **all** faces of the inner and outer panes. From this consideration it follows that the combination of documents would lead to teachings which are contradictory to Claim 1 and that only picking out specific features and rearranging them in the way known from Claim 1 would offer the combination of features of the claimed invention.

Hindsight is, however, not compatible with the assessment of inventive step.

4.2.13 The Board is therefore convinced that the double glazing unit according to Claim 1 of the main request is based on an inventive step in the meaning of Article 56 EPC so that grant of a patent is justified on that basis.

The impugned decision has therefore to be set aside and the case has to be sent back to the first instance with the order to grant the patent on the basis of the main request.

5. *First auxiliary request*

The main request already being allowable the (first) auxiliary request has not to be dealt with.

6. *Oral proceedings*

Since the main request is allowable the request for oral proceedings has no basis so that a direct decision can be issued.

Order

For these reasons, it is decided that:

1. The impugned decision is set aside.

2. The case is remitted to the first instance with the order to grant a patent on the basis of the following documents:

   - Claims 1 to 5 received on 18 July 1990;
   - pages 1,2 and 5 to 9 received on 5 August 1988;
   - pages 3, 3a, 3b received on 18 January 1991 (telecopy);
   - page 4 received on 12 June 1992 (telecopy);
   - drawing sheet "1/1" received on 5 August 1988.

The Registrar: The Chairman:

N. Maslin C.T. Wilson