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Datasheet for the decision of 27 January 2014

Case Number: T 0586/11 - 3.3.05

Application Number: 02009226.8

Publication Number: 1238950

IPC: C03C17/36, C23C14/34

Language of the proceedings: EN

Title of invention:
Heat treatable low-E coated articles and methods of making same

Patent Proprietor:
GUARDIAN INDUSTRIES CORP.
Centre Luxembourgeois de Recherches pour le Verre et la Céramique S.A.

Opponent:
SAINT-GOBAIN GLASS FRANCE

Headword:
REDUCING HAZE/GUARDIAN

Relevant legal provisions:
EPC Art. 56, 83, 84, 123(2)

Keyword:
Clarity (yes) - technical term - meaning commonly known to the skilled person
Sufficiency of disclosure (yes) - appellant failed to meet its burden of proof - no reproduction of any example
Amendments - extension beyond the content of the application as filed (no)
Inventive step - non-obvious alternative

Decisions cited:

Catchword:

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Case Number: T 0586/11 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 27 January 2014

Appellant: (Opponent)	SAINT-GOBAIN GLASS FRANCE 18, avenue d'Alsace 92400 Courbevoie (FR)
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Representative:	Hess, Peter K. G. Bardehle Pagenberg Partnerschaft mbB Patentanwälte, Rechtsanwälte Postfach 86 06 20 81633 München (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 12 January 2011 concerning maintenance of the European Patent No. 1238950 in amended form.**

Composition of the Board:

Chairman:	G. Raths
Members:	J.-M. Schwaller
	P. Guntz

Summary of Facts and Submissions

I. The present appeal lies from the decision of the opposition division maintaining European patent No. 1 238 950 on the basis of claims 1 to 7 of the second auxiliary request dated 16 November 2010, independent claim 1 of which reads as follows:

"*1. A heat treatable coated article comprising: a layer system supported by a glass substrate, the layer system comprising from the substrate outwardly:*
- *a Si-rich silicon nitride Si_xN_y layer where x/y is from 0.85 to 1.2 in the entire layer;*
- *a first contact layer; and*
- *an IR reflecting layer including silver (Ag) or gold.*"

Claims 2 to 7 represent specific embodiments of the coated article according to claim 1.

II. In its decision, the opposition division held that claim 1 above fulfilled the requirements of Articles 54, 84 and 123(2) EPC. Its subject-matter was in particular novel, as none of the cited documents disclosed a coated article comprising an Si-rich silicon nitride Si_xN_y layer with an x/y ratio comprised between 0.85 to 1.2.

The closest state of the art was document

A7: WO 00/37382

which disclosed a heat-treatable glazing panel which achieved the same technical effect as the invention, namely a reduced haze of 0.2.

Starting from this document, the technical problem was seen in the provision of an alternative heat-treatable coated article yielding the desired haze.

The skilled person consulting document

A8: E. Paule et al., "*Optical properties of reactively sputtered silicon nitride films*", Vacuum, vol. 37, pages 395 to 397 (1987)

would not find any hint therein to the specific range of x/y ratio defined in claim 1, because A8 was simply concerned with Si_xN_y films for any use in any context. A8 was furthermore not concerned with heat-treatable coated articles, let alone with reducing haze in these articles.

III. With its grounds of appeal dated 27 April 2011, the opponent (hereinafter "the appellant") contested the decision of the first instance. In summary, it argued as follows:

The term "heat treatable" was not clear.

The patent did not sufficiently disclose the manner in which the x/y ratio was achievable over the whole range claimed.

The combination of features defined in claim 1 did not fulfil the requirements of Article 123(2) EPC.

The subject-matter of claim 1 lacked inventive step in view of the combined teachings of documents A7 and A8.

It also submitted document

A13: G. Bräuer et al., "*New developments in high rate sputtering of dielectric materials*", Proceedings of the 3rd ISSP (Tokyo 1995),

which however is not relevant for the present decision.

IV. With letter dated 25 August 2011, the patentees (hereinafter "the respondents") filed observations in response to the grounds of appeal, along with four auxiliary requests.

V. On 20 December 2013, the appellant submitted further observations along with a new document

A14: WO 99/64362,

also not relevant for the present decision.

VI. At the oral proceedings, which took place on 27 January 2014, the appellant developed its objections under Articles 84, 83, 123(2) and 56 EPC. Regarding in particular the issue of sufficiency of disclosure, it further referred to the

Declaration of Mr Reymond dated 29 October 2010

and document

A11: EP 1 155 816 A1.

The discussion about inventive step focused on the combination of documents A7 and A8.

VII. After closure of the debate, the chairman established the parties' requests as follows:

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

The respondents requested that the appeal be dismissed or, alternatively, that the patent be maintained in amended form on the basis of one of the sets of claims according to the first to fourth auxiliary requests dated 25 August 2011.

Reasons for the Decision

Reasons for the Decision

1. Main request - Clarity

For the board, the claimed subject-matter, in particular the term "heat-treatable" that the appellant objected to as being not clear, meets the requirements of Article 84 EPC.

Admittedly, the term "heat-treatable" has a broad meaning. However, this does not mean that it is not clear for the person skilled in the art of glass manufacturing. In the present case, the meaning of said term is in fact derivable from the contested patent, which at paragraph [0070] defines the terms "heat treatment" and "heat treating" as meaning that "the article is heated to a temperature sufficient to enabling thermal tempering, bending, or heat strengthening of the glass inclusive article". The definition further includes a temperature range of "from about 550°C to 900°C".

Document A7 - also closest state of the art to the present invention - confirms that this term is commonly known to the skilled person, since one of the inventions of A7 is defined using this term (see independent claim 4 which relates to "a **heat treatable** or substantially haze free heat treated glazing panel").

2. Main request - Sufficiency of disclosure of the invention

2.1 According to the case law of the boards of appeal, in order to establish insufficiency of disclosure, the burden of proof is upon the opponent to show that the skilled reader of a disputed patent, using his common general knowledge, would be unable to carry out the invention therein claimed.

2.2 In the present case, the appellant argued that the patent, in particular its examples, did not disclose sufficient details for carrying out the invention. The examples did in particular not disclose any x/y value, thus it was unclear whether the examples concerned the present invention or one of the inventions disclosed in the three other divisional applications into which the original application had been split. In the case the examples of the patent concerned the present invention, they did not provide any information about the layers thickness and so they were not reproducible. There was furthermore a contradiction between paragraph [0053] and the second part of the tables of the patent which disclosed both that **more argon** than nitrogen and **more nitrogen** than argon was used in the sputtering process. From paragraph [0095] of document A11, it was clear that the information in paragraph [0053] of the patent in suit was wrong. The patent furthermore did not

provide any guidance as to how the Si_xN_y layer was to be prepared over the whole claimed range of x/y ratio.

2.3 The board cannot agree for the following reasons.

First of all, the patent provides extensive details, in particular in its examples, regarding the apparatus and process features to be used in the preparation of the different layers and in particular the controversial Si_xN_y layer. The thickness of the different layers is in particular derivable - at least for one example - from the fourth column of Table 1 of the patent, which discloses that the thickness of e.g. the Si_xN_y layer is 170 Å.

Concerning the alleged contradiction between paragraph [0053] and the second part of the tables in the contested patent, paragraph [0053] clearly discloses that the ratio Ar/N was about 225/165 (or 1.36) in the examples, which means that the sputtering gas contained more argon than nitrogen. Claim 14 of the contested patent further defines the ratio of Ar/N proximate the target to be from about 1.20 to 1.50, which confirms that proximate the target the sputtering gas is also supposed to contain more argon than nitrogen. The allegation that the second part of the tables in the contested patent disclosed a sputtering gas containing more nitrogen than argon cannot be accepted, because there is no evidence that the alleged additional nitrogen delivery through the so-called "Trim Gas", "Tr Console", "Tr Mid" or "Tr Pump" resulted in more nitrogen than argon in the sputtering gas proximate the target. The affidavit of Mr Reymond of 29 October 2010 which is supposed to provide evidence of this is based on theoretical considerations which, in the board's view, cannot replace a reproduction of the examples at

the ratio indicated in paragraph [0053] of the contested patent.

The disclosure in document A11, paragraph [0095] that Si_3N_4 was prepared with an Ar/N ratio of about 2.3 is also not contradictory to the disclosure in paragraph [0053] because even if this ratio falls within the broad range of from 1.15 to 3.0 disclosed in paragraph [0053], this simply proves that this range is very broad, but not that the ratio of "about 225/165" (1.36) indicated in paragraph [0053] for the preparation of the Si_xN_y layer in the examples is wrong and would not lead to an Si_xN_y layer as defined in the claims.

2.4 It follows from the above considerations that in the absence of any reproduction of at least one example of the contested patent, the appellant failed to meet its burden of proof.

2.5 Concerning the alleged lack of guidance as to how further Si_xN_y compounds might be prepared so as to cover the whole scope of protection claimed, the opponent, which had the burden of proof, again failed to provide any piece of evidence in support of its allegations. In the board's view, it seems plausible - as argued by the respondent - that a mere variation of the nitrogen content in the Ar/N gas mixture can lead to a different x/y ratio. Thus, it appears to be within the competence of the skilled person to prepare further compounds falling within the scope of protection of claim 1 at issue.

2.6 It follows from the above considerations that the board is not satisfied that the requirements of Article 83 EPC have not been met.

3. Main request - Amendments

In the board's view, claims 1 to 7 of this request meet the requirements of Article 123(2) EPC in the following respects:

Claim 1 results from the combination of claims 70, 71 and the passage at page 13, lines 11 and 12 of the application as filed in its version as published in WO 02/04375.

The appellant's argument that the passage at page 13, lines 11 and 12, reading "*Infrared (IR) reflecting layers 9 and 19 are preferably metallic and conductive, and may be made of or include silver (Ag), gold, or any other suitable IR reflecting material*" concerned a specific embodiment with two IR reflecting layers is correct. However, in the board's view, it is trivial that materials which are suitable for two IR reflecting layers are also plainly suitable as IR reflecting materials in embodiments consisting of only one such layer. Furthermore, the feature inserted into claim 1, namely "an IR reflecting layer including silver (Ag) or gold", is not inextricably linked with the other features of said specific embodiment, because the choice of the material of the IR reflecting layer can be made independently of the other layers and their composition. It follows that the choice of two specific elements (silver or gold) from the list of IR materials defined at page 13 can be made independently of the other features of the specific embodiment referred to above.

Dependent claim 2 has its basis in e.g. page 1, first lines of the application as filed, and dependent claims 3 to 7 in claims 74 to 78 thereof, respectively.

4. Main request - Novelty

The board is satisfied that none of the cited documents anticipates the claimed subject-matter. Novelty, by the way, has not been contested.

5. Main request - Inventive step

The board, applying the problem-solution approach, comes to the conclusion that claim 1 of this request meets the requirements of Article 56 EPC for the following reasons:

5.1 The invention concerns heat-treatable (low-E) coated articles which may be used e.g. as vehicle windshields or as insulating glass (see paragraph [0001] of the contested patent).

5.2 The closest state of the art is represented - as acknowledged by the parties - by document A7 which discloses (claim 1) a glazing panel carrying a coating stack comprising in sequence at least:
- a glass substrate
- a base antireflective layer
- an infra-red reflecting layer, and
- a top antireflective layer,

with at least the base antireflective layer comprising at least one mixed nitride layer which is a mixture of Al and at least one additional material X, with the atomic ratio X/Al being greater or equal to 0.05 and less or equal to 6 and in which X is one or more of the materials selected from the group comprising the elements of Groups 3a, 4a, 5a, 4b, 5b, 6b, 7b, 8 of the periodic table.

The mixed nitride layer is believed to be effective in blocking oxygen and sodium ions and other ions that can diffuse from the glass and cause a deterioration of optical and electrical properties, particularly if the glazing panel is subjected to heat treatment (A7: page 2, lines 21 to 25).

In the specific embodiment of claim 4, A7 discloses a heat-treatable or substantially haze free heat-treated glazing panel carrying a coating stack comprising in sequence at least:
- a glass substrate
- a base antireflective layer
- an infra-red reflecting layer, and
- a top antireflective layer comprising at least one mixed nitride layer which is a mixture of Al and at least one additional material X, with the atomic ratio X/Al being greater than or equal to 0.05 and less than or equal to 6 and in which X is one or more of the materials selected from the group comprising the elements of Groups 3a, 4a, 5a, 4b, 5b, 6b, 7b, 8 of the periodic table.

In the examples of A7, the mixed nitride antireflective layers are made of $AlSi_xN_y$ (which can be partially oxidised during the heat treatment) with an Si/Al atomic ratio varying from 0.3 (example 1) to 3 (examples 3, 5 to 12).

5.3 In the contested patent (paragraphs [0008] and [0011]), the problem to be solved is defined as the provision of a heat-treatable low-E coated article which has reduced haze tendency upon heat treatment.

5.4 As a solution to this problem, the contested patent proposes the heat-treatable coated article according to

claim 1 at issue, which is in particular characterised in that between the glass substrate and the first contact layer is arranged an Si-rich silicon nitride Si_xN_y layer where x/y is from 0.85 to 1.2 in the entire layer.

5.5 As to the success of the solution, the contested patent states that the silicon-rich type of silicon nitride is better at reducing haze and/or improving mechanical durability than Si_3N_4 in certain coated articles (paragraph [0020]). Further, in examples 1 to 3 of the patent, it has been shown that the haze of the coated glasses can drop to values of from 0.15 to 0.28 after heat treatment.

The appellant argued that owing to the fact that the patent was silent as regards the x/y value obtained in the examples, the skilled person did not know whether the examples were according to the invention or not, and so there was no evidence in the contested patent that any problem had been solved. The problem therefore boiled down to the provision of an alternative coated article.

The board cannot accept these arguments because the appellant had the burden of proof and - as explained in point 2.3 above - it did not reproduce at least one example of the patent, so that it failed to provide the necessary evidence that the examples of the patent had no effect.

For the board, in the absence of evidence to the contrary, the patent shows that the coated glasses according to the examples of the patent give rise to haze values after treatment (0.15 to 0.28) comparable

to those in the examples of document A7, which are close or equal to 0.2 after heat treatment.

The problem underlying the contested patent (point 5.3 above) has thus already been solved in A7, and so the problem underlying the present invention is to be reformulated in less ambitious terms, namely in the provision of an alternative heat-treatable low-E coated article which has reduced haze tendency upon heat treatment.

5.6 On the question whether the solution proposed by the contested patent is obvious from document A8, the board concludes as follows:

5.6.1 A8 is a scientific publication which describes (abstract) the deposition of SiN_x films (with x ranging from 0.1 to 1.4) by dc reactive magnetron sputtering from a silicon target in nitrogen/argon atmospheres. The dispersion curves of the refractive index and the absorption coefficient were determined in the 0.5 to 2.5 microns wavelength range from transmittance and reflectance measurements at different angles. A strong correlation was observed between the above optical constants and the compositional analysis of the films. In its introduction, A8 discloses that such nitride films are used as effective diffusion barriers in semiconductor technology, for the passivation of microelectronic circuits and the formation of antireflection coatings in infra-red detectors and solar cells.

5.6.2 The board observes that A8 is totally silent on the potential use of such SiN_x films for reducing haze in heat-treatable coated articles. Accordingly, the skilled person faced with the problem of providing an

alternative heat-treatable low-E coated article which has reduced haze tendency upon heat treatment would not turn to document A8 and, if he did so, he would not find in this document any hint of how this problem could be solved.

5.6.3 The appellant argued that certain data in the dispersion curves of the refractive index and the absorption coefficient indicated that the SiN_x films thus produced would be suitable for the purpose sought. The board cannot follow this argument. A8 simply indicates that passing from an Si/N ratio of 0.7 to 3 decreases both the refractive index and the absorption coefficient. So, even if document A8 discloses that the SiN_x films can be used as antireflection coatings, it has not been shown that there exists any correlation between these optical properties and the reduction of haze in such coatings, in particular when inserted in heat-treatable low E-coated articles. The respondent by the way stated that no such correlation existed.

5.6.4 In the absence of evidence of such a correlation, it follows from the above considerations that the skilled person cannot arrive in an obvious manner at the process according to claim 1 at issue by combining the teachings of documents A7 and A8.

5.6.5 The remaining documents cited during the opposition and appeal proceedings were not relied upon by the appellant at the appeal stage, and in particular at the oral proceedings, with the exception of document A11 which was quoted only with respect to the sufficiency of disclosure issue. In the board's judgment, none of these documents contain further information which would point towards the claimed solution of the problem stated above.

5.7 Accordingly, for the reasons indicated above, the subject-matter of claim 1 and by the same token that of dependent claims 2 to 7, which include all the features of claim 1, involves an inventive step within the meaning of Articles 52(1) and 56 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

C. Vodz G. Raths

Decision electronically authenticated