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**Datasheet for the decision
of 16 October 2015**

Case Number: T 0809/12 - 3.3.05

Application Number: 07018599.6

Publication Number: 1961712

IPC: C03C17/36

Language of the proceedings: EN

Title of invention:

Low-E matchable coated articles and methods of making same

Applicant:

Guardian Industries Corp.

Headword:

Matchable coated articles/GUARDIAN

Relevant legal provisions:

EPC 1973 Art. 84
EPC 1973 R. 29(1)

Keyword:

Feature defined by the result to be achieved
Result to be achieved corresponding to problem to be solved
underlying the application
Claims - essential features missing

Decisions cited:

T 0032/82, T 0068/85, G 0002/88, T 0409/91, T 0484/92,
T 0573/03, G 0001/04, T 0383/04, T 1787/08, T 2065/10

Catchword:

If an independent claim contains a feature defined by a result to be achieved which essentially corresponds to the problem underlying the application, to comply with Article 84 EPC 1973 the remaining features of the claim must comprise all essential features necessary for achieving that result (see reasons 2.2 to 2.9.2).



**Beschwerdekammern
Boards of Appeal
Chambres de recours**

European Patent Office
D-80298 MUNICH
GERMANY
Tel. +49 (0) 89 2399-0
Fax +49 (0) 89 2399-4465

Case Number: T 0809/12 - 3.3.05

**D E C I S I O N
of Technical Board of Appeal 3.3.05
of 16 October 2015**

Appellant: Guardian Industries Corp.
(Applicant) 2300 Harmon Road
Auburn Hills, MI 48326-1714 (US)

Representative: Hess, Peter K. G.
Bardehle Pagenberg Partnerschaft mbB
Patentanwälte, Rechtsanwälte
Postfach 86 06 20
81633 München (DE)

Decision under appeal: Decision of the Examining Division of the
European Patent Office posted on 25 November
2011 refusing European patent application
No. 07018599.6 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman J.-M. Schwaller
Members: A. Haderlein
P. Guntz

Summary of Facts and Submissions

- I. The present appeal lies from the examining division's decision to refuse European patent application No. 07 018 599.

- II. The examining division refused the patent application in particular on the grounds that the requirement of clarity set forth in Article 84 EPC was not met. It held that defining the product claimed by referring to the result to be achieved led to a lack of clarity. The following document was referred to in the proceedings before the examining division:

D1: US 5 376 455.

- III. With its statement setting out the grounds of appeal, the applicant ("the appellant") filed a main and three auxiliary requests.

- IV. Observations by a third party were received.

- V. In a response dated 26 October 2012 to these observations, the appellant withdrew its main request, the first to third auxiliary requests dated 26 March 2012 becoming the main request and first and second auxiliary requests respectively.

- VI. In a communication, the board informed the appellant about its preliminary non-binding opinion.

- VII. Under cover of its letter dated 16 September 2015, the appellant filed auxiliary requests 0a, 1a, 1b, 2a and 2b.

VIII. At oral proceedings before the board on 16 October 2015, the appellant filed auxiliary requests 3 and 4.

IX. Claim 1 of each request is reproduced below (amendments with respect to claim 1 of the main request in bold):

Main request (dated 26 March 2012)

"1. A coated article comprising:
a layer system supported by a glass substrate, said layer system comprising an infrared (IR) reflecting silver (7) layer located between first and second dielectric layers (3 and 11), said coated article being characterized in that:
said coated article has a ΔE^* value (glass side) no greater than 2.5 after or due to heat treatment, wherein said layer system further includes a first layer including Ni or NiCr (5) located between said silver layer (7) and said first dielectric layer, and a second layer (9) including Ni or NiCr located between said silver layer and said second dielectric layer, and wherein each of said first and second Ni or NiCr inclusive layers is at least 20 angstroms (Å) thick."

Auxiliary request 0a (dated 16 September 2015)

"1. A coated article comprising:
a layer system supported by a glass substrate, said layer system comprising an infrared (IR) reflecting silver (7) layer located between first and second dielectric layers (3 and 11), said coated article being characterized in that:
said coated article has a ΔE^* value (glass side) no greater than 2.5 after or due to heat treatment, wherein said layer system further includes a first

layer including Ni or NiCr (5) located between said silver layer (7) and said first dielectric layer, and a second layer (9) including Ni or NiCr located between said silver layer and said second dielectric layer, and wherein each of said first and second Ni or NiCr inclusive layers is at least 20 angstroms (Å) thick, **wherein heat treatment means heating the coated article to a temperature above 593°C for a sufficient period of time to enable thermal tempering of the coated article.**"

Auxiliary requests 1 and 2 (dated 26 March 2012)

"1. A coated article comprising:
a layer system supported by a glass substrate, said layer system comprising an infrared (IR) reflecting silver (7) layer located between first and second dielectric layers (3 and 11), said coated article being characterized in that:
said coated article has a ΔE^* value (glass side) no greater than 2.5 after or due to heat treatment, **wherein said first and second dielectric layers comprise silicon nitride and** wherein said layer system further includes a first layer including Ni or NiCr (5) located between said silver layer (7) and said first dielectric layer, and a second layer (9) including Ni or NiCr located between said silver layer and said second dielectric layer, and wherein each of said first and second Ni or NiCr inclusive layers is at least 20 angstroms (Å) thick."

Auxiliary requests 1a, 1b, 2a and 2b (dated 16 September 2015)

"1. A coated article comprising:
a layer system supported by a glass substrate, said

layer system comprising an infrared (IR) reflecting silver (7) layer located between first and second dielectric layers (3 and 11), said coated article being characterized in that:

said coated article has a ΔE^* value (glass side) no greater than 2.5 after or due to heat treatment,

wherein said first and second dielectric layers comprise silicon nitride and wherein said layer system further includes a first layer including Ni or NiCr (5) located between said silver layer (7) and said first dielectric layer, and a second layer (9) including Ni or NiCr located between said silver layer and said second dielectric layer, and wherein each of said first and second Ni or NiCr inclusive layers is at least 20 angstroms (Å) thick,

wherein heat treatment means heating the coated article to a temperature above 593°C for a sufficient period of time to enable thermal tempering of the coated article."

Auxiliary request 3 (dated 16 October 2015)

"1. A coated article comprising:
a layer system supported by a glass substrate, said layer system comprising an infrared (IR) reflecting silver (7) layer located between first and second dielectric layers (3 and 11), said coated article being characterized in that:

said coated article has a ΔE^* value (glass side) no greater than 2.5 after or due to heat treatment,

wherein said first and second dielectric layers comprise silicon nitride and wherein said layer system further includes a first layer including Ni or NiCr (5) located between said silver layer (7) and said first dielectric layer, and a second layer (9) including Ni or NiCr located between said silver layer and said

second dielectric layer, and wherein each of said first and second Ni or NiCr inclusive layers is at least 20 angstroms (Å) thick,

wherein heat treatment means heating the coated article to a temperature above 593°C for a sufficient period of time to enable thermal tempering of the coated article, wherein the second dielectric layer (11) has a thickness of from 400 - 500 angstroms, wherein the first dielectric layer (3) is located closer to the glass substrate than the second dielectric layer (11)."

Auxiliary request 4 (dated 16 October 2015)

"1. A coated article comprising:

a layer system supported by a glass substrate, said layer system comprising an infrared (IR) reflecting silver (7) layer located between first and second dielectric layers (3 and 11), said coated article being characterized in that:

said coated article has a ΔE^* value (glass side) no greater than 2.5 after or due to heat treatment,

wherein said first and second dielectric layers comprise silicon nitride and wherein said layer system further includes a first layer including Ni or NiCr (5) located between said silver layer (7) and said first dielectric layer, and a second layer (9) including Ni or NiCr located between said silver layer and said second dielectric layer, and wherein each of said first and second Ni or NiCr inclusive layers is at least 20 angstroms (Å) thick,

wherein heat treatment means heating the coated article to a temperature above 593°C for a sufficient period of time to enable thermal tempering of the coated article, wherein the first dielectric layer (3) has a thickness of from 300 - 380 angstroms and wherein the second

dielectric layer (11) has a thickness of from 400 - 500 angstroms, wherein the first dielectric layer (3) is located closer to the glass substrate than the second dielectric layer (11)."

- X. The arguments of the appellant may be summarised as follows:

The feature "heat treatment" in claim 1 of the main request and auxiliary requests 1 and 2 was clear since its meaning was well-known for the person skilled in the art in the relevant area. This meaning was explicitly specified e.g. in claim 1 of auxiliary requests 0a, but did not actually have to be included in the claim.

The feature relating to the " ΔE^* value" put a limitation to the other features present in claim 1. In other words, the skilled person faced with claim 1 would know that the other features of claim 1, i.e. the other layers, needed to be adapted such that the ΔE^* value was complied with. The inclusion of specific details such as the thickness of each layer was not necessary. According to consistent case law, it was not necessary to include structural features in a claim if this would unduly restrict its scope. This was the case here. The passage on page 10 was to be construed that by changing at least one of the features referred to, a ΔE^* value equal or below 2.5 could be obtained. It did not mean that all changes were necessary to achieve this result. It was credible that a decrease in the ΔE^* value with respect to D1 was achieved due solely to the thicker Ni layer. This was evidenced in particular by the examples 1 and 2, wherein the only change was an increase in the power of the NiCr cathodes

corresponding to an increase in the thickness of the NiCr layer and leading to a decrease of the ΔE^* value.

With respect to auxiliary requests 3 and 4, essentially the same reasoning applied. Moreover, preferred values for the thicknesses of the dielectric layers were now included in claim 1.

XI. Requests

The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request or, in the alternative, on the basis of one of auxiliary requests 0a to 2b, as listed in the letter of 16 September 2015, or auxiliary requests 3 or 4 as submitted during the oral proceedings of 16 October 2015.

Reasons for the Decision

1. Main request and auxiliary requests 1 and 2
 - 1.1 Claim 1 of these requests contains the feature "said coated article has a ΔE^* value (glass side) no greater than 2.5 after or due to heat treatment". Apart from the question of the compliance of this feature with the provisions of Article 84 EPC 1973 in general (see *infra* point 2.), the question arises whether the reference to "heat treatment" in claim 1, without further specifying the conditions under which such treatment is to be carried out, is sufficiently clear.
 - 1.2 The board can agree with the appellant that "heat treatment" in the field of glass manufacture will normally imply treatments such as tempering, bending and heat strengthening as set out in the description,

page 36, first full paragraph, and will normally not be understood by the skilled person in the field of glass manufacture to refer to heating the glass substrate to a temperature slightly above room temperature.

Nevertheless, the expression "heat treatment" does not imply a specific temperature which would be needed to clearly define the subject-matter for which protection is sought. For instance, according to the above-cited passage of the description, this expression includes "heating a coated article to a temperature of at least about 1100 degrees F (e.g., to a temperature of from about 550 degrees C to 900 degrees C)". The temperature of "at least about 1100 degrees F" is thus only an exemplary value and it cannot be said that the expression "heat treatment" in claim 1 necessarily implies temperatures of 1100°F and more. It follows that the temperature at which the heat treatment of claim 1 is to be carried out is not limited to temperatures of 1100°F and more, but also includes for instance significantly lower temperatures. In conclusion, the expression "heat treatment" in claim 1 is not clear, which is in contravention of Article 84 EPC 1973.

2. Auxiliary request 0a

2.1 In claim 1 of auxiliary request 0a, the expression "heat treatment" is further defined by stating that "heat treatment means heating the coated article to a temperature above 593°C for a sufficient period of time to enable thermal tempering of the coated article". The board is satisfied that this amendment overcomes the clarity objection regarding the expression "heat treatment" (see *supra* point 1.). However, this request does not comply with Article 84 EPC 1973 for other

- reasons as set out below.
- 2.2 Claim 1 contains, apart from structural features such as the thickness of the first and second Ni or NiCr inclusive layers, the feature "said coated article has a ΔE^* value (glass side) no greater than 2.5 after or due to heat treatment". The question to be answered by the board is whether this feature leads to non-compliance with Article 84 EPC 1973.
- 2.3 The application concerns low-E coated articles and methods of making the same. According to the description, page 3, second paragraph, "*there ... exists the need in the art for a low-E coating or layer system which after heat treatment substantially matches in color ... its non-heat treated counter part. In other words, there exists a need in the art for a low-E matchable coating or layering system*". Further according to the description, page 13, lines 4 et seq., "*The value ... ΔE^* ... [is] important in determining whether or not there is matchability, or substantial matchability, in the context of the invention*". The contentious feature relating to the ΔE^* value thus amounts in essence to claiming the effect aimed at by the invention, i.e. improved matchability of the coated article. Put differently, the feature relating to the ΔE^* value is defined as a result to be achieved corresponding essentially to the problem underlying the application.
- 2.4 According to the case law of the boards of appeal, functional features defining a technical result may be permissible under certain circumstances as long as the clarity of a claim as required by Article 84 EPC 1973 is not jeopardised (see the Case Law of the Boards of

Appeal, 7th ed., II.A.3.4).

- 2.5 A particular situation arises when a product is defined by the result to be achieved, the result corresponding in essence to the problem underlying the application. The boards of appeal have dealt with such situation on several occasions.
- 2.5.1 For instance, in T 573/03 the independent process claim did not contain any physical process step and was defined only by the final result of the process, which final result corresponded to the problem underlying the application (see reasons 2, 3 and 7.3.3). The board concluded that the requirements of Article 84 and Rule 29(1) EPC 1973 were not complied with (see reasons 2.5).
- 2.5.2 In T 383/04 it was held that a definition amounting merely to claiming the underlying technical problem without including all technical features which were essential for solving the problem was not permissible under Article 84 EPC 1973 (see reasons 3.1 to 3.3).
- 2.5.3 In T 1787/08, the feature in question defined a result to be achieved which corresponded to the problem underlying the application. The independent claim did not give a complete indication as to which structural measures would have to be taken in order to achieve the result. The board concluded that there was a lack of clarity (see reasons 4.1, first and second paragraphs).
- 2.5.4 In T 2065/10, a decoder was claimed which was merely defined by its input and output parameters and by a result to be achieved, rather than in terms of structural features allowing the technical problem underlying the application to be actually solved. The

result to be achieved corresponded to the problem underlying the application as filed. The board concluded that this led to a lack of clarity (see reasons 2.2.1 and 2.2.2).

- 2.6 It is also established case law that an independent claim must indicate all the essential features of the object of the invention in order to comply with the requirements of Article 84 EPC 1973 (see G 2/88, reasons 2.5 and G 1/04, reasons 6.2; see also the Case Law of the Boards of Appeal, 7th ed., II.A.3.2). All those features have to be regarded as essential which are necessary to obtain the desired effect or, differently expressed, which are necessary to solve the technical problem with which the application is concerned (see in particular T 32/82, reasons 15).
- 2.7 Furthermore, the requirements of Article 84 EPC 1973 also reflect the general legal principle that the extent of the monopoly conferred by a patent, as defined in the claims, should correspond to the technical contribution to the art and should not extend to subject-matter which, after reading the description, would still not be at the disposal of the person skilled in the art (see T 409/91, reasons 3.3).

The board is of the opinion that the technical contribution does not normally reside in the fact that the problem is solved, but rather in the combination of features by which it is solved, i.e. by the essential features necessary to solve the technical problem underlying the application.

- 2.8 The board thus concludes that, if an independent claim contains a feature defined by a result to be achieved which essentially corresponds to the problem underlying

the application, to comply with Article 84 EPC 1973 the remaining features of the claim must comprise all essential features necessary for achieving that result.

2.9 According to the appellant, in line with consistent case law it was not necessary to include structural features in a claim when this would unduly restrict the scope of the claim.

2.9.1 The appellant referred to decision T 68/85 and subsequent citing case law such as T 484/92 cited in the proceedings before the examining division (see the Case Law of the Boards of Appeal, 7th ed., II.A.3.4). According to this jurisprudence, functional features defining a technical result are permissible in a claim, if from an objective viewpoint such features cannot otherwise be defined more precisely without restricting the scope of the invention, and if these features provide instructions which are sufficiently clear for the skilled person to reduce them to practice without undue burden, if necessary with reasonable experiments (see T 68/85, reasons 8.4.1 to 8.4.3).

2.9.2 The board observes that this decision indeed does concern functional features defining a technical result. The feature in question was "in an amount generating a synergistic herbicidal effect" (see reasons 8.4.4: "*in einer eine synergistische Herbizidwirkung erzeugenden Menge*"), whereas the problem underlying the application was said to be "the economically and ecologically desirable decrease of the applied herbicide amount and in addition the increase of the safety margin on grain and soy bean cultures" (see reasons 5: "*die ökonomisch und ökologisch wünschenswerte Senkung der herbiziden Aufwandmenge und zudem die Erhöhung der*

Sicherheitsmarge auf Getreide- und Sojabohnenkulturen"). Thus, the claimed technical result did not in fact correspond to the problem underlying the application. Therefore, the facts underlying this decision are substantially different from the ones underlying the present case. Therefore and in the light of the above considerations (see *supra* points 2.5 to 2.8), the board does not agree with the appellant that it is not necessary to state in the independent claim all essential features necessary to achieve the result claimed. The board remarks however that these essential features may in turn of course be structural or functional in nature.

2.10 Applying the conclusions reached *supra* in point 2.8, the board needs to establish whether claim 1, apart from stating the result to be achieved corresponding to the problem underlying the application, comprises all the features necessary to achieve the result.

2.10.1 Uncontestedly, the central passage of the description relevant for determining the essential features, i.e. the features necessary to achieve matchability, is on page 10, lines 3 to 19, which reads: "*... the preferred thicknesses and materials for the respective layers on the glass substrate 1 are as follows:*

Table 1 (Thicknesses)

<u>Layer</u>	<u>Preferred Range</u>	<u>More Preferred</u>
<i>Si₃N₄ (layer 3)</i>	<i>300-380 Å</i>	<i>320-360 Å</i>
<i>NiCr (layer 5)</i>	<i>20-150 Å</i>	<i>20-90 Å</i>
<i>Ag (layer 7)</i>	<i>40-120 Å</i>	<i>60-80 Å</i>
<i>NiCr (layer 9)</i>	<i>20-150 Å</i>	<i>20-90 Å</i>
<i>Si₃N₄ (layer 11)</i>	<i>400-500 Å</i>	<i>420-480 Å</i>

As can be seen from Table 1 above, the upper Ni or NiCr layer 9 has been substantially thickened relative to embodiments of [D1]. Moreover, dielectric layer(s) 3 and/or 11 has/have been thinned relative to [D1]. Surprisingly, it is believed that one or more of these changes results in the matchability or lower ΔE^ values ... associated with certain embodiments of this invention (i.e., improved stability with heat treatment)".*

2.10.2 While this passage may be considered vague and ambiguous (cf. "*it is believed that ...*"), it at least teaches that not only the Ni or NiCr layer 9 needs to be "substantially thickened" relative to embodiments of D1, but also at least one of the dielectric layers 3 and 11 needs to be "thinned" relative to D1 in order to achieve matchability, i.e. improved stability with heat treatment. The reference to the passage that "*it is believed that one or more of these changes results in the matchability*" is not sufficient to argue, as submitted by the appellant, that it is sufficient to "*substantially thicken*" the Ni or NiCr layer 9. The skilled person would construe this passage such that, since it was not clear which one of the two changes was responsible for the improved matchability, **both changes were necessary in order to achieve improved matchability**, i.e. it was necessary (i) to make the Ni or NiCr layer 9 thicker relative to the embodiments of D1 **and** (ii) to make at least one of the dielectric layers 3 and 11 thinner relative to D1.

2.10.3 There is also no evidence in the application that would support the appellant's contention that it was sufficient to increase the thickness of the Ni or NiCr layer 9 with respect to the embodiments of D1.

It is true that in examples 1 and 2 the only change is an increase in the power of the NiCr cathodes, corresponding to an increase in the thickness of the NiCr layer and to a ΔE^* value of 0.8 compared to 1.9. This can be seen from Table 6. But in the examples no information is given about the thicknesses, and no comparative example is given that could be considered representative for D1. In the light of the above passage on page 10 it is therefore not excluded that in the examples also the second change, i.e. decreasing the thickness of at least one of the dielectric layers 3 and 11 relative to D1, is implemented and that the matchability in these examples is (also) caused by that decreased thickness of at least one of the dielectric layers.

2.10.4 The board thus concludes that the essential features that need to be present in claim 1 at least include the features (i) that the Ni or NiCr layer 9 is thicker relative to the embodiments of D1 and (ii) that at least one of the dielectric layers 3 and 11 is thinner relative to D1.

2.10.5 In the embodiments of D1, the highest value for the thickness of the NiCr layer is 15 Å (see column 14, lines 30 to 32 and 36 to 39 and column 18, lines 11 to 15). In claim 1 of auxiliary request 0a, the lower limit of Ni or NiCr layer 9 is 20 Å (cf. "*each of said first and second Ni or NiCr inclusive layers is at least 20 angstroms (Å) thick*"). Thus, the essential feature (i) above is present in claim 1.

2.10.6 In claim 1 of this request the first and second dielectric layers are not limited in their thickness. Thus, they also encompass embodiments wherein neither

of them is made thinner relative to D1. Hence, the essential feature (ii) above is missing from claim 1.

2.10.7 As a consequence, claim 1 at issue does not comprise all essential features necessary for obtaining the result whose achievement is claimed.

2.11 The requirements of Article 84 EPC 1973 are therefore not met for auxiliary request 0a.

3. Auxiliary requests 1a, 1b, 2a and 2b

3.1 Auxiliary requests 1a, 1b, 2a and 2b all contain the same claim 1. This claim differs from claim 1 of auxiliary request 0a in that the first and second dielectric layers comprise silicon nitride.

3.1.1 In claim 1 of these requests the first and second dielectric layers are not limited in their thickness. Thus, they do not comply with the requirements of Article 84 EPC 1973 for the same reasons as for auxiliary request 0a (see in particular *supra* point 2.10.6).

4. Auxiliary requests 3 and 4

4.1 Claim 1 of auxiliary request 3 is further restricted by the feature "wherein the second dielectric layer (11) has a thickness of from 400 - 500 angstroms". Claim 1 of auxiliary request 4 contains, apart from the latter feature, the restriction that "the first dielectric layer (3) has a thickness of from 300 - 380 angstroms".

4.2 D1 discloses an embodiment wherein the first dielectric layer has a thickness of 375 Å and the second dielectric layer has a thickness of 450 Å (column 18,

lines 11 to 16). Thus, neither in claim 1 of auxiliary request 3 nor in claim 1 of auxiliary request 4 is at least one of the first and second dielectric layers thinner relative to the embodiments of D1. Hence, the essential feature (ii) above is missing from claim 1.

4.3 As a consequence, claim 1 of auxiliary request 3 and auxiliary request 4 does not comprise all essential features necessary for obtaining the result whose achievement is claimed in the claim.

4.4 The requirements of Article 84 EPC 1973 are therefore not met for auxiliary requests 3 and 4.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



C. Vodz

J.-M. Schwaller

Decision electronically authenticated