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D E C I S I O N
of 23 June 2006

Case Number: T 1264/04 - 3.4.02

Application Number: 02008113.9

Publication Number: 1253445

IPC: G02B 5/20

Language of the proceedings: EN

Title of invention:
Filter for plasma display panel

Applicant:
Asahi Glass Co., Ltd.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (yes - after amendment)"

Decisions cited:
T 0440/91, T 0039/93

Catchword:
-

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Case Number: T 1264/04 - 3.4.02

D E C I S I O N
of the Technical Board of Appeal 3.4.02
of 23 June 2006

Appellant: Asahi Glass Co., Ltd.
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Chiyoda-ku
Tokyo 100-8405 (JP)

Representative: Müller-Boré & Partner
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 16 June 2004 refusing European application No. 02008113.9 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: A. G. Klein
Members: F. J. Narganes-Quijano
B. Müller

Summary of Facts and Submissions

I. The appellant (applicant) has lodged an appeal against the decision of the examining division refusing European patent application No. 02008113.9 (publication No. 1253445) entitled "Filter for plasma display panel" and claiming priority from a previous national application of 27.04.2001.

In the decision under appeal the examining division referred to documents

D1 : WO-A-0043814
D2': WO-A-0023829 (published on 27.04.2000)
D2 : EP-A-1124144 (English translation of the Japanese document D2', published on 16.08.2001 pursuant to Article 158(3) EPC)
D3 : EP-A-0949648
D6 : EP-A-1008871,

and held that the subject-matter of claim 1 according to the requests then on file did not involve an inventive step (Articles 52(1) and 56 EPC) in view of the disclosure of document D6 considered by the examining division as the closest state of the art, and the teaching of documents D1, D2' and D3.

II. With the statements of grounds of appeal the appellant filed an experimental test report containing Tables 1 and 2 and Figures 1 and 1A to 6A, and submitted sets of amended application documents according to a main request and first and second auxiliary requests. The appellant requested that the decision under appeal be set aside and a patent be granted.

In response to telephone consultations with the rapporteur, the appellant filed by letter dated 24.05.2006 amended description pages 1, 1a, 2, 3, 3a, 3b, 4 to 6, 8, 10, 14 to 16, 18, 20 to 22, 32 and 41 and by letter dated 22.06.2006 an amended set of claims 1 to 10 replacing the corresponding documents of the application as filed, as its sole request.

III. Independent claims 1 and 10 according to the present request of appellant read as follows:

" 1. A plasma display panel having a filter disposed in front of the plasma display panel, said filter being provided with an antireflection optical film having a color correction function, the antireflection optical film comprising:

an antireflection film (A) made of a non-crystalline fluoropolymer;

a layer (B) having a self-restoring property and a scratch resistant property and made of a polyurethane resin, positioned between the front of the plasma display panel and the antireflection film (A); and

a layer (C3) of a tackiness or adhesive agent, provided as the outermost layer on the side of the polyurethane layer (B) where the antireflection film (A) is not present;

whereby when red light emitted from the plasma display panel is passed through the filter, the positional relation of the position before the passage and the position after the passage in the CIE xy chromaticity diagram of the red light, satisfies at least one of the following formulae (1) to (4), wherein the formulae (1) and (2) relate to changes in

coordinates x, y, and the following formulae (3) and (4) relate to distances from standard values:

Formulae relating to coordinates x, y:

$\Delta x > 0.003$ (1)

$\Delta y < -0.003$ (2)

where Δx is the change in coordinate x, and Δy is the change in coordinate y,

Formulae relating to distances from standard values:

$\Delta D(rn) < -0.003$ (3)

$\Delta D(rc) < -0.003$ (4)

where $\Delta D(rn)$ is the change in the distance from a point (x, y) = (0.67, 0.33), and $\Delta D(rc)$ is the change in the distance from a point (x, y) = (0.64, 0.33), wherein $\Delta D(rn)$ and $\Delta D(rc)$ take positive values when the distances become longer, and they take negative values when the distances become shorter;

wherein said layer of tackiness or adhesive agent (C3) is a constituting material which contains a color correcting agent, and

said filter further comprises an electrically conductive film laminated on the layer (C3) of a tackiness or adhesive agent on the side of the plasma display panel."

" 10. A method of correcting color emission of a plasma display panel, the method comprising the step of disposing a filter in front of the plasma display panel, said filter being provided with an antireflection optical film having a color correction function, the antireflection optical film comprising:

an antireflection film (A) made of a non-crystalline fluoropolymer;

a layer (B) having a self-restoring property and a scratch resistant property and made of a polyurethane resin, and

a layer (C3) of a tackiness or adhesive agent, provided as the outermost layer on the side of the polyurethane layer (B) where the antireflection film (A) is not present, said layer of tackiness or adhesive agent (C3) being a constituting material which contains a color correcting agent,

whereby when red light emitted from the plasma display panel is passed through the filter, the positional relation of the position before the passage and the position after the passage in the CIE xy chromaticity diagram of the red light, satisfies at least one of the following formulae (1) to (4), wherein the formulae (1) and (2) relate to changes in coordinates x, y, and the following formulae (3) and (4) relate to distances from standard values:

Formulae relating to coordinates x, y:

$$\Delta x > 0.003 \quad (1)$$

$$\Delta y < -0.003 \quad (2)$$

where Δx is the change in coordinate x, and Δy is the change in coordinate y,

Formulae relating to distances from standard values:

$$\Delta D(rn) < -0.003 \quad (3)$$

$$\Delta D(rc) < -0.003 \quad (4)$$

where $\Delta D(rn)$ is the change in the distance from a point (x, y) = (0.67, 0.33), and $\Delta D(rc)$ is the change in the distance from a point (x, y) = (0.64, 0.33), wherein $\Delta D(rn)$ and $\Delta D(rc)$ take positive values when the distances become longer, and they take negative values when the distances become shorter;

said filter further comprising an electrically conductive film laminated on the side of the layer (C3) of a tackiness or adhesive agent opposite the polyurethane layer (B), the filter being disposed with the layer (C3) of a tackiness or adhesive agent facing the front side of the plasma display panel."

The set of claims according to the appellant's request includes dependent claims 2 to 9 all referring back to claim 1.

IV. The arguments of the appellant in support of its requests are essentially the following:

According to the invention, the coloured adhesive layer is arranged on the observer side of the electrical conductive layer. This arrangement results in that the undesired reflection of ambient light on the surface of the electrically conductive layer, which reflects light easily, is reduced since the light reflected from the conductive layer is absorbed by the coloured adhesive layer. Thus, the amount of reflected ambient light is reduced and the contrast of the filter-PDP arrangement is improved while preserving the colour correction characteristics of the filter.

The experimental test report shows that tested filters having a structure in which the coloured adhesive layer is arranged on the observer side of the electrically conductive layer exhibit within the range from 450 to 750 nm a lower average luminous reflectance and a lower minimum value of the luminous reflectance than the tested filters having the adhesive layer on the opposite side of the conductive layer. Therefore,

contrary to the examining division's view that depending on the ambient light no effect at all or only a minor effect is present, the claimed structure has an increased contrast.

In addition, none of the documents suggests the provision of a coloured layer of a tackiness or adhesive agent on the observer's side of the electrically conductive film. In particular, document D1 does not disclose a coloured adhesive layer arranged on the observer side of an electrically conductive layer, and the examples of document D1 exhibiting a colour correction function as claimed have a layer structure that is different from the claimed structure. Document D2 does not specify the position of the electrically conductive film. Document D3 does not disclose coloured adhesive layers. And document D6 fails to disclose the claimed relative arrangement of the coloured adhesive layer and the electrically conductive layer.

Moreover, the skilled person knows that different structures lead to different optical properties, so that single features of the respective structures cannot be combined or transferred without affecting the overall properties.

Reasons for the Decision

1. The appeal complies with the requirements mentioned in Rule 65(1) EPC and is admissible.

2. *Amendments*

After due consideration of the amendments made to the application documents according to the present request of the appellant, the Board is satisfied that the amended application documents comply with the formal requirements of the EPC, and in particular with those set forth in Articles 84 and 123(2) EPC. In particular, claim 1 is based on claims 1, 2, 7 and 8 as originally filed together with the passages on page 1, lines 2 to 5, page 10, line 2 *et seq.*, page 18, line 25 to page 19, line 1, page 22, lines 5 to 7, page 35, lines 7 to 25, and page 38, lines 8 to 20 of the description of the original application; independent claim 10 is a method claim based on page 1, lines 2 to 5 of the original description and on the features of present claim 1; and dependent claims 2 to 9 are based on features and alternatives defined in original claims 3 to 6 and 9 to 11 and in page 15, lines 12 to 20 of the description.

The description has been brought into conformity with the invention as defined in the claims (Article 84 EPC, second sentence, and Rule 27(1)(c) EPC), and the pertinent prior art has been appropriately acknowledged in the introductory part of the description (Rule 27(1)(b) EPC).

3. *The prior art*

The relevant aspects of the available prior art relating to filters for a plasma display panel ("PDP" in the following) are the following:

3.1 Document D1 discloses band-pass filters for enhancing the colour contrast of a PDP (abstract and page 5, lines 15 to 22, and page 21, lines 8 to 13). The filters include a polymer matrix containing red dyes absorbing light of 590 nm (abstract, page 6, lines 9 to 31, Table 1 on page 13, and page 18, line 31 to page 19, line 22), thus improving the colour contrast and the red colour purity of the PDP (abstract, page 5, lines 15 to 30, page 21, lines 8 to 13, and the figures). The document mentions in addition the use of an adhesive for affixing the filter to the PDP (page 19, lines 7 to 16), the use of polyurethane for the polymer matrix (page 18, lines 12 to 20), the provision of an antireflection coating on the side of the filter opposite the PDP, and the electromagnetic shielding properties of the filter (page 7, lines 17 to 28). In addition, the colour correction function of exemplary filters disclosed in the document (see Table 2 on page 34) satisfies at least equations (1) and (2) of the present claimed invention.

3.2 Document D2' (an International application published in Japanese and the content of which is interpreted in the following according to document D2, i.e. the publication pursuant to Article 158(3) EPC of the English translation of the document) discloses a filter for a PDP (document D2, page 67, lines 46 to 48). The filter includes a filter layer with a dye or pigment absorbing light in the wavelength region of 560 to 620 nm (abstract and page 4, line 27 *et seq.*), and improves the colour reproducibility and corrects the colour balance of the PDP in the mentioned wavelength range (page 2, lines 5 to 45, and page 65, lines 46 to 50). The filter further includes an antireflection film

at the opposite side of the PDP (page 65, lines 46 to 50, and page 67, lines 47 and 48), adhesion undercoatings (page 3, line 51 to page 4, line 19), and an electro-conductive layer (page 64, line 46 to page 65, line 9).

3.3 Document D3 discloses a protective plate for a PDP (abstract), comprising among others an electromagnetic shielding conductive layer on a substrate and an antireflection layer (page 3, line 12 *et seq.*, page 6, lines 27 to 42, and page 8, lines 26 to 38). The document specifies the use of adhesive films (page 6, lines 1 to 5, page 7, lines 9 and 10, page 9, lines 29 to 35, and page 11, lines 2 to 17) and the use of colouring agents and of colour layers for adjusting the colour tone of the protective plate (see paragraphs [0014], [0028] to [0031], [0053], [0054], [0099] to [0104], [0133] and [0134]).

3.4 Document D6 is directed to a transparent laminate filter for a PDP (abstract) comprising, among others, a silver type transparent electrical conductive film, an antireflection layer, and pressure sensitive adhesive layers (page 3, lines 5 to 57 and page 6, lines 15 to 31). The document mentions adding a pigment to an adhesive layer for adjusting the colour tone of a transparent colour (paragraph [0042]).

3.5 The remaining prior art documents on file which were not considered by the examining division in the contested decision are less relevant than the documents considered above.

4. *Claim 1*

4.1 *Novelty*

Present claim 1 results from claim 1 of the main request considered by the examining division in the decision under appeal with formal amendments and further amendments clarifying the relative position of the PDP and the layers of the filter. The examining division did not object to novelty of claim 1 of the main request then on file, and - as will become apparent from the following discussion on inventive step - the Board is satisfied that claim 1 defines novel subject-matter over the prior art on file (Articles 52(1) and 54 EPC).

4.2 *Inventive step*

4.2.1 In its decision the examining division considered document D6 as the closest prior art. However, although document D6 discloses a PDP with a filter having electromagnetic-shielding and antireflection characteristics and mentions the problem of the colour tone of the filter itself (point 3.4 above), the document is silent as to any problem associated with the colour emission characteristics of the PDP. On the other hand, each of documents D1 and D2' not only addresses the electromagnetic-shielding and antireflection characteristics of the filter but also the problem associated with the colour emission characteristics of the PDP (points 3.1 and 3.2 above). Thus, unlike document D6, documents D1 and D2' both address the primary problem considered in the application, i.e. improving the colour characteristics

of the colour emission of a plasma display panel having in its front an electromagnetic-shielding and antireflective filter (see page 1, line 4 to page 2, line 13, and page 6, line 8 *et seq*. of the description as filed), and for these reasons the Board considers document D1 and alternatively document D2' as constituting the appropriate closest state of the art for an objective assessment of inventive step (see in this respect "Case Law of the Boards of Appeal", EPO, 4th edition 2001, chapter I, section D.3).

4.2.2 Starting with document D1 as the closest state of the art, the claimed filter-PDP arrangement differs from that disclosed in document D1 (see point 3.1 above), among other features, in that the adhesive layer contains the colour correcting agent, and in that the electromagnetic shielding property of the filter is achieved by means of an electrically conductive film laminated on the PDP side of the adhesive layer.

The main problem addressed in the application, i.e. improving the colour purity of the red colour emission of the PDP (page 2, lines 1 to 13, and page 6, line 8 *et seq*.), has already been solved - at least to the extent required by claim 1 - by the PDP filters disclosed in document D1 (see point 3.1 above). According to the appellant, however, the distinguishing feature identified above has the technical effect of further improving the colour characteristics of the PDP-filter arrangement. More particularly, the electromagnetic shielding property of the filter disclosed in document D1 is generally achieved by means of a conductive layer which reflects ambient light; this undesired reflected light is partially absorbed in

the claimed arrangement by the coloured adhesive layer on the side of the conductive layer opposite the PDP, thus improving the contrast of the arrangement at the wavelengths of corrected colour emission of the PDP. As held by the examining division in its decision, this technical effect does not appear to have been explicitly mentioned in the original application. However, as evidenced by the results of the experimental test report submitted by the appellant with the grounds of appeal, the luminous average reflectance of the tested filters for a C-light source is in the range 3.1 to 3.3 % when the conductive layer is disposed on the PDP side of the colour correcting adhesive layer, and in the range 4.5 to 4.6 % when the conductive layer is disposed on the other side (see the reflectance spectra and the reflectance values in Table 1 and in the figures of the test report). Thus, this effect appears to be inherent to the filter structure and implicit in the mechanism underlying the improved colour correction characteristics disclosed in the original application and should therefore be taken into account in the assessment of inventive step (see in this respect decision T 440/91, point 4.1 of the reasons). The view expressed by the examining division in the decision under appeal that this effect is a secondary, minor effect and consequently would only solve a sub-problem cannot be followed by the Board. The fact that the closest state of the art already achieves the PDP colour emission correction characteristics considered in the application does not prejudice consideration of further effects achieved by the claimed invention over the closest state of the art (see for instance T 39/93, OJ EPO 1997, 134, point 5.3 of the reasons), regardless of whether these further

effects are technically not so significant as the main effect considered in the application and already achieved in the prior art.

Thus, - irrespective of the additional distinguishing features of the claimed subject-matter over the disclosure of document D1 - the claimed subject-matter solves at least the objective problem of further improving the colour characteristics of the filter-PDP arrangement disclosed in document D1.

Document D2' specifies that the conductive layer is provided "on the optical filter or on the anti-reflection layer" (document D2, page 64, lines 50 and 51) without however disclosing any specific arrangement that would result in the conductive layer being positioned between the PDP and a coloured layer of a tackiness or adhesive agent as required by the claimed subject-matter. In addition, the document is silent as to any influence of the position of the conductive layer on the colour characteristics of the filter-PDP arrangement. Thus, document D2' does not give any hint towards the distinguishing features referred to above, let alone towards any improved effect on the resulting colour characteristics of the filter-PDP arrangement.

Document D3 addresses the problem of the colour tone of a protective plate located in front of a PDP (point 3.3 above), but is silent as to the colour characteristics of the PDP and the correction function of the plate on the colour light emission of the PDP. In addition, the document discloses several measures for adjusting the colour tone of the plate and, in particular, of the conductive layer (page 4, lines 48 to 58, and

paragraphs [0099] to [0104], [0133] and [0134]), but fails to disclose or suggest a coloured layer of tackiness or adhesive agent on the side of the conductive layer opposite the PDP.

Document D6 teaches the provision of a pigment in an adhesive layer of the filter laminate for adjusting the colour tone of the transparent filter laminate (paragraph [0042]). However, the document fails to disclose or suggest the potential influence of the conductive layer or of its position on the colour characteristics of the resulting filter-PDP arrangement, the document even fails to specify which of the adhesive layers is to be pigmented and therefore also fails to unambiguously disclose the provision of a coloured adhesive layer on the side of the conductive layer opposite the PDP.

Thus, none of documents D2', D3 and D6 discloses or suggests the distinguishing features identified above, still less the influence of such features in the colour characteristics of the filter-PDP arrangement.

The remaining documents on file are less pertinent.

In view of the above, the claimed subject-matter cannot be derived in an obvious way starting with document D1 as the closest prior art.

4.2.3 No other conclusion can be drawn starting with document D2 as the closest state of the art. In particular, claim 1 also differs from document D2, among others, in that the conductive layer is positioned between the PDP and a coloured layer of an adhesive or tackiness agent.

Thus, when compared with document D2, the claimed subject-matter also achieves the technical effect considered in point 4.2.2 above, and consequently also solves the objective problem formulated there. However, as already concluded in point 4.2.2, neither document D1, nor documents D3 and D6, nor the remaining documents on file disclose or suggest the claimed arrangement.

4.2.4 The Board concludes that the subject-matter of claim 1 involves an inventive step within the meaning of Article 56 EPC with regard to the available prior art.

5. *Independent claim 10 and dependent claims 2 to 9*

Claim 10 is directed to a method of correcting the colour emission of a plasma display panel, the method consisting in essence in the use in front of the plasma display panel of a filter as defined in claim 1. Thus, the features of the method are essentially in one-to-one correspondence with the structural and the functional features of the filter-PDP arrangement defined in claim 1. As regards dependent claims 2 to 9, these claims define particular embodiments of the subject-matter of claim 1.

Thus, dependent claims 2 to 9 and independent claim 10 also define patentable subject-matter under Articles 52(1), 54 and 56 EPC for reasons analogous to those put forward in point 4 above with regard to the subject-matter of claim 1.

6. In view of the above, the decision under appeal is to be set aside. In addition, being satisfied that the

patent application as amended according to the present request of the appellant and the invention to which it relates meet the requirements of the EPC (Article 97(2) EPC), the Board considers appropriate to exercise favourably the power within the competence of the examining division (Article 111(1) EPC) to order grant of a patent.

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 to grant a patent in the following version:
   - claims 1 to 10 filed with the letter dated 22.06.2006,
   - description pages 7, 9, 11 to 13, 17, 19, 23 to 31 and 33 to 40 as originally filed, and pages 1, 1a, 2, 3, 3a, 3b, 4 to 6, 8, 10, 14 to 16, 18, 20 to 22, 32 and 41 filed with the letter dated 24.05.2006, and
   - drawing sheets 1/3 to 3/3 as originally filed.

The Registrar: The Chairman:

M. Kiehl A. G. Klein