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**Datasheet for the decision  
of 18 June 2021**

**Case Number:** T 2273/15 - 3.4.01

**Application Number:** 09723307.6

**Publication Number:** 2257120

**IPC:** H05B3/84, C03C17/22, C03C17/06

**Language of the proceedings:** EN

**Title of invention:**  
HEATING ELEMENT AND MANUFACTURING METHOD FOR SAME

**Patent Proprietor:**  
LG Chem, Ltd.

**Opponent:**  
Pilkington Group Limited

**Relevant legal provisions:**  
EPC Art. 56, 111(1)

**Keyword:**  
Inventive step - (no)  
Appeal decision - remittal to the department of first instance  
(no)

**Decisions cited:**  
T 0966/95



**Beschwerdekammern**

**Boards of Appeal**

**Chambres de recours**

Boards of Appeal of the  
European Patent Office  
Richard-Reitzner-Allee 8  
85540 Haar  
GERMANY  
Tel. +49 (0)89 2399-0  
Fax +49 (0)89 2399-4465

Case Number: T 2273/15 - 3.4.01

**D E C I S I O N**  
**of Technical Board of Appeal 3.4.01**  
**of 18 June 2021**

**Appellant:**

(Opponent)

Pilkington Group Limited  
NSG European Technical Centre  
Hall Lane  
Lathom  
Ormskirk  
Lancashire L40 5UF (GB)

**Representative:**

Pilkington Group Limited  
Intellectual Property  
NSG European Technical Centre  
Hall Lane  
Lathom  
Ormskirk  
Lancashire L40 5UF (GB)

**Respondent:**

(Patent Proprietor)

LG Chem, Ltd.  
128, Yeoui-daero  
Yeongdeungpo-gu  
Seoul 07336 (KR)

**Representative:**

Goddar, Heinz J.  
Boehmert & Boehmert  
Anwaltspartnerschaft mbB  
Pettenkoferstrasse 22  
80336 München (DE)

**Decision under appeal:**

**Decision of the Opposition Division of the  
European Patent Office posted on 8 September  
2015 rejecting the opposition filed against  
European patent No. 2257120 pursuant to Article  
101(2) EPC.**

**Composition of the Board:**

**Chair** P. Fontenay  
**Members:** B. Noll  
R. Winkelhofer

## **Summary of Facts and Submissions**

- I. The opponent (appellant) appealed the Opposition Division's decision by which the opposition against European Patent 2257120 was rejected
- II. With the statement of grounds of appeal, the appellant cited new documents
- A8: US 6,914,224 B2 and  
A9: JP 2006 24500 A.
- III. The appellant requests that the decision under appeal be set aside and the patent revoked.
- IV. The patent proprietor (respondent) requests that the appeal be rejected as inadmissible or be dismissed, i.e. the patent be maintained as granted (main request) or that the decision under appeal be set aside and the patent be maintained in amended form on the basis of one of three auxiliary requests filed with the statement of grounds of appeal. The respondent further requests that the documents submitted by the appellant with the statement of grounds of appeal be not admitted in the proceedings as late filed.
- V. The parties' submissions, in so far as relevant to the Board's decision, are given in detail in the reasons, below.
- VI. Claim 1 of the main request reads as follows:

*A method for manufacturing a heating element, the method comprising:  
determining a form of a pattern in which a line width*

*is 50 micrometers or less and an opening ratio is in the range of 70% to 99%;*  
*printing a paste (5) that includes the conductive heating material according to the determined pattern on at least one side of a transparent substrate (4);*  
*forming a conductive heating pattern by sintering the printed paste (5) that includes the conductive heating material;*  
*forming bus bars on both sides of the conductive heating pattern; and providing a power portion that is connected to the bus bars;*  
*wherein the pattern is configurated so that spacing or line thickness is irregular,*  
*the printing uses an offset printing method, and a visible light transmittance deviation of the heating element is 5% or less in respects to a predetermined circle that has the diameter of 20 cm.*

VII. Claim 1 of auxiliary request 1 adds to claim 1 of the main request the feature

*[... is irregular,]*  
*wherein the pattern comprises one or more combination patterns of diamond, lattice, circle, grid and 2-dimensional grid,*  
*[the printing ...]*

VIII. Claim 1 of auxiliary request 2 adds to claim 1 of the main request the following feature:

*[... has the diameter of 20 cm], and*  
*after the heat emission, the standard deviation of the surface temperature of the transparent substrate is within 10% for 5 min.*

IX. Claim 1 of auxiliary request 3 adds to claim 1 of the main request the following feature:

*[... has the diameter of 20 cm], and wherein the heating element includes at least two areas that have different conductive heating patterns.*

### **Reasons for the Decision**

*The request to hold the appeal inadmissible*

1. The respondent submitted that the appeal was inadmissible since the appellant, instead of dealing with the reasons of the impugned decision, based the objection of lack of inventive step solely on new documents submitted with the statement of grounds of appeal.
2. In the present case, the statement of grounds of appeal contests the assessment of the Opposition Division regarding inventive step as a whole and gives reasons for this. On page 2 of the statement of grounds of appeal, the features relating to the opening ratio and the deviation of visible light transmittance, i.e. the features on which an inventive step was affirmed in the impugned decision, are argued as being obvious to the skilled person having regard to A9. Thus, the appellant's submission addresses the findings in the impugned decision relating to inventive step.
3. To conclude, the degree of reasoning on lack of inventive step does not call into question the admissibility of the appeal as a whole. For this

reason, the respondent's request to hold the appeal inadmissible cannot be successful.

*The request to not consider A8 and A9 in the appeal proceedings*

4. A8 and A9 submitted on 8 January 2016 with the statement of grounds of appeal are not part of the opponent's appeal case in the sense of Article 12(2) RPBA 2020. Pursuant to the transitional provisions as set out in Article 25(2) RPBA 2020, the provisions of Article 12(4) to (6) RPBA 2020 are not yet applicable here. Instead, Article 12(4) RPBA 2007 is to be applied.
5. According to this provision, the Board has the power to hold inadmissible, by exception, evidence which could have been presented in the first instance proceedings.
6. The respondent's argument that the sole point to consider is that it was the - then - opponent's duty to find documents A8 and A9 from the national proceedings in Japan and to submit them early in the opposition proceedings, is not persuasive. In the present case, it is rather decisive that A8 and A9 led to the refusal of the Japanese family member of the patent in suit on lack of inventive step and are therefore *prima facie* relevant for the validity of the patent. Under these circumstances, it is appropriate that these documents are considered even as they were submitted only with the statement of grounds of appeal. Further, taking into account A8 and A9 in the appeal proceedings does not run counter to procedural economy. These documents were known to the respondent from the national proceedings and, therefore, do not put an extra burden

on the respondent. There was also no unreasonable effort for the Board to study these documents.

7. Therefore, in the exercise of the discretion under Article 12(4) RPBA 2007, A8 and A9 are considered in the appeal proceedings for the assessment of inventive step.

*The request for remittal*

8. The respondent also requests that the case be remitted to the Opposition Division to give the respondent the benefit of an examination of inventive step vis-à-vis A8 and A9 by two instances.
9. However, the Board issued a preliminary opinion on the matter with the summons to oral proceedings and also considered itself in a position to make a final assessment of inventive step. Moreover, there is no automatic right to two instances to assess inventive step if a new document is cited in the appeal proceedings (T 0966/95, reasons, point 2). Nor does the citation of A8 and A9 result in a substantial change in the factual framework of the case that would have justified remitting the case to the Opposition Division.
10. For these reasons, pursuant to Article 111(1) EPC, there is no reason that the case be remitted to the department of first instance.

*Main request - Articles 100(a) and 56 EPC*



11. The patent is about manufacturing a heating element on a transparent substrate, and the heating element obtained by such method. Such heating elements find particular application in the vehicle industry where they contribute to de-icing or de-fogging the window of a vehicle.
  
12. A8 discloses a method of fabricating a heatable window. The fabrication of the heating element in A8 may be "monolithic", i.e. the heating element and the busbars are screen-printed as patterns of a conductive ceramic paste on a glass window and "baked" so as to form a heating pattern. Accordingly, A8 discloses steps of determining a form of a pattern of lines (shown as the heating wires 2 in figure 1), printing a paste that includes conductive heating material according to the predetermined pattern on a side of a transparent window and forming a heating pattern by "baking" the printed paste that includes the conductive heating material (column 2, lines 42 to 49), forming bus bars 3, 4 such that respective end of heating lines are contacted to a respective bus bar, and providing a power portion that is connected to the busbars (shown as extensions of the busbars rightwards in figure 1).
  
13. The Board does not concur with the respondent that the manufacturing method of claim 1 differs from A8 by indicating the printed paste is "sintered" whereas it is "baked" in A8. In the field of material process engineering, sintering is understood as a process in which fine-grained, solid material particles are heated so that they form bonds with each other. This is what happens when the conductive paste in A8 is "baked". So there is only a difference in the wording, but not in substance.

14. The Board does further not concur with the respondent that A8 does not disclose an irregular spacing of the pattern. A3 discloses at column 3, lines 49 that diffraction phenomena may occur if the conductors of the pattern are straight and arranged in parallel at a short distance from each other, and that these phenomena can be prevented by a *wavy arrangement* of the conductors. The skilled reader infers that any deviation from arranging the conductors strictly parallel is beneficial for suppressing diffraction phenomena. The wavy arrangement in A8 is therefore *irregular* in line spacing in the wording of claim 1.
  
15. The Board does finally not concur with the respondent that by defining that the busbars are formed on both sides of the conductive heat pattern further distinguishes the claimed method from that of A8. The claim does not define "sides" of a heating pattern as the physical borders of a geometry. Therefore, within the broad meaning of the word "sides", the ensemble of one ends contacted to busbar 3 in A8 is one "side", and the ensemble of ends contacted to busbar 4 a second "side" of the pattern.
  
16. Accordingly, the method of claim 1 differs from that of A8 in that A8 does not disclose a line width of the heating pattern of 50  $\mu\text{m}$  or less, an opening ratio in the range of 70% to 99%, a visible light transmittance deviation of 5% or less in respect to a circle of a diameter of 20 cm, and that the printing uses an offset printing method.
  
17. The respondent argued that the technical effect associated with these features was that a heating element was obtained by the fabrication method which

had a low resistance and excellent heating performance at a low voltage.

18. The Board is not persuaded that this effect is linked to the distinguishing features identified above. Whilst resistance and heating performance inherently depend on electrical properties of the pattern (its length, cross-section, the conductivity of the conducting material) and the voltage applied via the bus bars, claim 1 does not define any such properties by which the electrical or heating properties of the pattern be affected. The features in claim 1 relating to the pattern only define such geometric and optical properties of the pattern which are apparently not related to heating and electrical properties of the pattern. Therefore, an effect may only consist in that, by the claimed method, a heatable transparent substrate may be obtained which has a high optical transmission and for which the optical transmission is substantially uniform over the whole surface. The same effect is, however, already obtained in A8, see column 3 lines 35 and 36 (*"To ensure that vision through the laminated window is hindered as little as possible ..."*). The further effect of using offset printing is to use a simple way of applying the conductive paste on the transparent substrate. The integral effect obtained by the distinguishing features identified above is therefore to obtain a heatable transparent sheet having high and uniform optical transmission by a simple manufacturing process.
19. The technical problem is therefore to define an alternative manufacturing process to the process known from A8.

20. Starting from A8, the skilled person would dimension the conductor width of the pattern according to the specifications given for conducting wires in A8, column 3, lines 35 to 37, i.e. in the range between 20 and 100  $\mu\text{m}$ , as it could be reasonably expected that a width in this range would not impair the sight through the transparent sheet. The range of 50  $\mu\text{m}$  or less as defined in claim 1 partially coincides with the known range and does not contribute to inventive step.
  
21. The skilled person would further select the opening ratio for the pattern such that the transmission of the transparent sheet would be as high as possible, ideally close to 100%. This would lead the skilled person to design the opening ratio, within the limits imposed by the feasibility of the pattern, as close to 100% as possible, to minimize those regions by which light transmission is impaired. Selecting an opening ratio up to 99% would therefore be considered by the skilled person as a desirable value and does therefore not contribute to inventive step.
  
22. With regard to the feature of a visible light transmittance deviation of the heating element of 5% or less in respects to a predetermined circle that has the diameter of 20 cm, the Board interprets this feature in view of its support in the description in the notion of permeability (cf. paragraphs 46 to 48 of the patent specification) as actually referring to the opening ratio. However, even if it were to be construed in favour of the respondent as relating to the uniformity of light transmission over the whole area of the heating element, the following is noted.
  
23. The skilled person would undoubtedly further aim at affecting the uniformity of transmission of the

transparent sheet by the heating pattern as little as possible. The skilled person would therefore strive for a variation which is less than 5% deviation within a circle of a diameter of 20 cm without the exercise of inventive skill.

24. Finally, seeking for a simple way to apply the paste for the heating pattern on the transparent substrate, the skilled person would be led by A9, paragraph 39, to take into account the various possibilities mentioned there for applying a conductive paste on a substrate and would consider selecting offset printing without the exercise of inventive skill. This is certainly true considering that the patent specification is silent as to the advantages resulting from this particular technique and that the effects to be expected, in terms of costs or feasibility, are inherent to the technique of offset printing itself and do not appear to be the result of its application to the manufacturing of heating elements.
25. To conclude, starting out from A8 and having regard to A9, the skilled person would arrive at the method of claim 1. The main request does therefore not comply with Article 56 EPC.

*The auxiliary requests*

26. As regards auxiliary request 1, the skilled person would, as stated above, be led by A8 to design the conductor pattern such that straight, parallel conductors are prevented. The skilled person would expect that any arbitrary choice of "irregular" configuration of the line spacing of the pattern would be beneficial to preventing undesired diffraction and

would consider any of the patterns defined in claim 1 as suitable without the need of exercising inventive skill. None of the claimed configurations has been shown or is expected to have any particular effect as regards the suppression of diffraction extending beyond what may be expected from the wavy arrangement explicitly envisaged in A8 (cf. column 3, lines 52-54). The recited patterns are thus considered to constitute an arbitrary selection of "irregular" patterns, as envisaged in said cited passage of A8 by reference to "*certain irregularities in the alignment of the heating wires...*" in order to prevent phenomena of diffraction.

27. As regards auxiliary request 2, no clearly identified process step can be recognised for the manufacturing method by the additional feature in claim 1. Therefore, claim 1 of auxiliary request 2 is not further distinguished vis-a-vis A8 and fails on lack of inventive step for the same reasons as claim 1 of the main request.
  
28. As regards auxiliary request 3, A8 discloses several heating fields provided on the heatable window to provide different heating powers to different zones (column 2, lines 1 to 7). Providing different heating powers in different zones implies that the heating patterns are different. The respondent's argument that A8 discloses separate heating elements, each having a single heating pattern, whereas the patent in suit relates to a single heating element having several different conductive patterns is not persuasive. Claim 1 does not define any details on a concrete layout of the heating element and is therefore not further distinguished vis-a-vis A8.

29. For these reasons, none of auxiliary requests 1 to 3 complies with Article 56 EPC

*Conclusion*

30. As there is no request on which the patent may be maintained, the patent has to be revoked.

**Order**

**For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The patent is revoked

The Registrar:

The Chair:



B. Brückner

P. Fontenay

Decision electronically authenticated