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Datasheet for the decision of 22 January 2013

Case Number: T 1676/09 - 3.5.02

Application Number: 97122353.2

Publication Number: 0849977

IPC: H05B 3/84, B60S 1/02, H05B 3/86

Language of the proceedings: EN

Title of invention:
Arrangement for heating the wiper rest area of a vehicle windshield

Patent Proprietor:
Pittsburgh Glass Works, LLC

Opponent:
Pilkington Group Limited

Headword:
-

Relevant legal provisions:
EPC Art. 56, 106, 107, 108, 114(2)
EPC R. 99

Keyword:
"Admissibility of the appeal"
"Admissibility of late-filed documents"
"Inventive step - (yes)"

Decisions cited:
G 0007/95, T 0611/90

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1676/09 - 3.5.02

D E C I S I O N
of the Technical Board of Appeal 3.5.02
of 22 January 2013

Appellant: (Opponent)
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Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 8 June 2009 rejecting the opposition filed against European patent No. 0849977 pursuant to Article 101(2) EPC.

Composition of the Board:

Chairman: R. Moufang
Members: M. Rognoni
G. Flyng

Summary of Facts and Submissions

I. The opponent (appellant) appealed against the decision of the opposition division rejecting the opposition against the European patent No. 0 849 977.

II. The opposition had been based on Article 100(a) EPC and, in particular, on the ground that the subject-matter of claim 1 lacked an inventive step within the meaning of Article 56 EPC.

III. The following prior art was referred to in the proceedings before the opposition division:

D1: EP-A-0 155 614
D2: DE-C-739 979
D3: US-A-3 810 184
D4: DE-U-296 06 071
D5: DE-A-0 004 001
D6: US-A-4 373 130.

According to the opponent's submissions, D1 to D4 were prejudicial to the maintenance of the patent in suit.

IV. According to the opposition division, both the subject-matter of claim 1 and the subject-matter of claim 17 involved an inventive step with respect to the prior art documents relied upon by the opponent (Article 56 EPC). Thus, the ground for opposition invoked by the opponent did not prejudice the maintenance of the patent as granted.

V. In the statement of grounds of appeal, the appellant referred to D1 to D6 and, additionally, filed the following documents:

D7: US-A-3 888 711
D8: EP-A-690 665
D9: WO-A-93/18634.

The appellant essentially submitted that the subject-matter of claim 1 lacked novelty over D7. In the event that the Board did not accept the argument of lack of novelty, the appellant argued that the subject-matter of claim 1 was obvious over a combination of D7 and D9 or of D7, D9 and D8. As to the method claim 17, its subject-matter lacked an inventive step with respect to D4 in combination with D7, D8 or D9.

VI. With a letter dated 12 July 2010, the patent proprietor (respondent) expressed the view that D7 to D9 were not so highly relevant to the present case as to be admitted as late-filed documents into the opposition appeal proceedings.

VII. With a letter dated 11 January 2013 filed in response to a communication from the Board summoning the parties to oral proceedings, the respondent contested the admissibility of the appeal.

VIII. Oral proceedings were held before the Board on 22 January 2013.

IX. The appellant requested that the decision under appeal be set aside and that the European patent No. 0849977 be revoked.

The respondent requested that documents D7 to D9 be not admitted into the proceedings and that the appeal be rejected as inadmissible or dismissed.

X. Claim 1 of the patent as granted reads as follows:

"A laminated transparency (10) comprising:

a first transparent rigid sheet (12);
a second transparent rigid sheet (14);
an interlayer (16) positioned between said first and second sheets (12, 14), wherein said interlayer (16) secures said first sheet (12) to said second sheet (14);
a connection area (42) positioned along an edge (32) of said transparency (10)
wherein opposing first and second ends (38, 40) of a wire (34) extend to said connection area (42); and
said wire is a single, continuous resistance heating wire (34) secured between said sheets (12, 14) and making multiple passes through a predetermined portion (22) of said transparency (10), said wire (34) generates a desired power density within said predetermined portion (22) to generate a desired amount of heat to the portion (22) characterized in that, said wire includes an insulating coating to attain a greater flexibility in the type of pattern to be formed by the wire to provide the desired power density."

Claims 2 to 16 are dependent on claim 1.

Claim 17 reads as follows:

"A method of manufacturing a transparency (10), according to any of claims 1 to 16, for a vehicle having a heating arrangement (24) to heat a portion of an outer surface (20) of said transparency (10) which generally corresponds to a wiper rest area (22), comprising the steps of:

securing a single, continuous resistance heating wire (34) including an insulating coating to a thermoplastic interlayer (16) in a predetermined pattern generally corresponding to said wiper rest area (22) and which generates a desired power density within said pattern to heat said wiper rest area (22);
extending first and second opposing ends (38, 40) of said wire (34) to a common area of said interlayer (16);
positioning said interlayer (16) between a first glass sheet (12) and a second glass sheet (14) such that said pattern is aligned with said wiper rest area (22) and said first and second ends (38, 40) of said wire (34) are aligned with a desired connection area (42) of said transparency (10); and
laminating said first and second sheet (12, 14) and said interlayer (16) to secure said wire (34) between said first and second sheets (12, 14) to form said transparency (10)."

Claims 18 and 19 are dependent on claim 17.

XI. The appellant's arguments may be summarized as follows:

In view of the decision of the opposition division, a further search of the prior art had been carried out. This revealed documents D7 and D8 which were considered to be highly relevant and therefore prejudicial to the maintenance of the patent.

D7 related to laminated glass panels, in which the sheet material contained a system of electric conductors in the form of thin metal filaments, and to a method of applying such filaments to surfaces. In particular, these filaments might be coated with a thermoplastic material and with an insulating plastic jacket. The panel disclosed in D7 could be used for automobiles, aircraft or other purposes. One of the objects was to accomplish any desired configuration of the single current conductors. D8 related to laminated windows equipped with an electrostatic protection circuit and an electric heating circuit. The protection circuit could comprise a single wire and a wire could be sheathed in an insulating material to isolate the two circuits. The risk of short circuit was clearly recognised in D8.

It was therefore requested to admit into the appeal proceedings documents D7 and D8, together with D9 which had been identified in the European Search Report and was also highly relevant.
The immediate purpose of the plastic coating covering the heating wire of the transparency shown in D7 was to bond the metal filament to the thermoplastic sheet to preserve the desired waveform of the filaments.
However, taking into account the whole disclosure, it

was evident that bonding the filaments to the thermoplastic sheet was simply a means for accomplishing any desired configuration of the single current conductors. As the metal filaments shown in D7 were coated with plastic to attain greater flexibility in the type of pattern to be formed by the wire, the characterizing features of claim 1 were disclosed in D7.

Another feature of claim 1 was *"a connection area positioned along the edge of said transparency"*. The contested patent did not define a connection area. The term was introduced in paragraph [0027] of the patent specification and three different forms of connection area were described in that paragraph. A connection area was in fact the area along the edge of the windshield at which the ends of the wire were connected to conductors leading from the batteries. These conductors were shown in figure 1 of the patent.

D7 stated that metal filaments were generally connected at the ends of each row with main conductor wires used to supply the current (cf. D7 column 3, lines 50 to 53). From this together with figures 3 and 4 of D7 it was clear that this connection was located along the edges of the window. Thus, the ends of each row constituted connection areas and this feature was indeed disclosed in D7.

The feature that the opposing first and second ends of a wire extended to said connection area was also satisfied in D7 in the sense that each of the ends of the filaments extended to a respective connection area at the edge of the window. However, if this feature in

claim 1 were interpreted as requiring both ends of the wire to extend to the same connection area, then it should be regarded as an obvious variant of the disclosure in D7.

As to the feature that the wire was a single continuous wire, it should be borne in mind that the wire or filament of D7 was described on numerous occasions as being "single". Furthermore, although the drawings of D7 showed filaments connected in parallel with each other by two main conductors, it was stated at column 4, lines 59 to 62 that the filaments could be connected in series, *i.e.* in line with each other, so that the current flowed through the entire extended filament rather than through either one filament or the other. From a functional point of view, there was only one continuous filament in a series arrangement.

Actually, the term "single" was used in paragraphs [0008], [0015] and [0034] of the patent, but no definition or explanation of its intended meaning was given. With reference to the wire, it could mean that the wire was an individual wire, or that there was only one wire present. D7 disclosed the first of these interpretations in its frequent use of the word "single", whereas the second interpretation was supported by the variant described in column 4, lines 59 to 62, according to which the filaments were connected in series thereby making a single filament. In any case, it would be an obvious variant of the embodiments described in D7 to omit one of the filaments shown in figures 3 and 4, so as to heat only part of the window, for instance the lower portion. However, apart from the disclosure in D7, all the

features relating to the heating wire arrangement specified in claim 1 were known from D9.

In fact, although there was no explicit reference to a connection area in the description of D9, figures 1 and 2 clearly showed the ends of the thermal resistance filaments arranged next to each other at one edge of the windshield. Despite being schematic views, it was clear that figure 2 showed "+" and "-" signs adjacent the ends of the filament and that this was a reference to a power source. Therefore, D9 explicitly disclosed a "connection area" for the heating arrangement of a transparency.

Starting from D7, the problem solved by the claimed transparency could be defined as simplifying the electrical connection to the heating circuit and/or the laying-down of the wire on the interlayer, and/or extending the range of wire configurations disclosed in D7 so as to heat only one portion of the window.

The skilled person would consult D9 because this document, like D7, related to an electrically heated laminated window, more specifically to a windshield. Figure 2 of D9 showed that the resistance filament extended continuously from the "+" terminal to the "-" terminal, *i.e.* it was a "single continuous wire". These terminals were closely spaced and constituted a "connection area positioned along an edge of the transparency".

As a result of consulting D9, the skilled person would realise, simply by copying the arrangement shown in figure 2, that the electrical connection of D7 could

easily be improved by moving the two main conductors to the same side of the window and by making the two courses of metal filaments into one. In so doing, the skilled person would arrive at an arrangement with a "single" continuous resistance heating wire, the ends of which both extended to the same connection area. Such an arrangement was within the scope of claim 1 of the patent which therefore did not involve an inventive step.

As to D8, this document recognized the danger of a short-circuit between conductors in a laminated window and taught an insulating coating on the wire to prevent this. In particular, D8 showed that it was also known before the priority date of the patent to attain greater flexibility in the type of wire pattern by using an insulating coating to avoid short-circuits in the event the wires touched or overlapped. Thus, a combination of any document disclosing the pre-characterizing portion of claim 1 with D8 covered all the features of claim 1.

D4, which was the closest prior art to claim 17, disclosed a windshield comprising laminated glass which had a heated wiper rest area. On page 4 of D4, a process was described for manufacturing the windshield which showed all the features of claim 17 except the "single" heating wire and the insulating coating. However, D4 (page 5, lines 8 to 11) taught to use a copper wire coated with black varnish which in all probability acted as an electrical insulator.

The objective technical problem in the light of D4 was how to manufacture a transparency with a heated wiper

rest area having a heating wire of a greater path length than before, and a wire of greater diameter, or made from metal of higher conductivity.

The skilled person seeking to solve this problem would consult D7, D8 or D9, each of which was also in the field of electrically heated laminated transparencies. In particular, D9 disclosed a heated wiper rest area for an automotive windshield. As pointed out above, the skilled person would derive the teaching of a "single" wire from D9. If it was to be assumed that D4 did not disclose a wire with an insulating coating, then it was submitted that the skilled person seeking increased flexibility in the wiring pattern to attain a given power density would also consult D7 or D8 which taught to use a single wire with an insulating coating. The skilled person would thereby arrive at a method of manufacturing a transparency which fell within the scope of claim 17 without the exercise of inventive skills.

In summary, the subject-matter of claims 1 and 17 lacked an inventive step within the meaning of Article 56 EPC and therefore the patent should be revoked.

XII. The respondent argued essentially as follows:

With the grounds of appeal the appellant filed documents D7 to D9 and argued that granted claim 1 was not novel or inventive with respect to these newly filed documents. As the appellant did not contest any of the reasons of the opposition division for rejecting the opposition, the Board of Appeal could not give a

judicial decision upon the correctness of the first instance decision. Under these circumstances, admittance of the appeal and admittance of the newly filed documents would give rise to a fresh case which should be remitted to the opposition division for further consideration. However, this would result in opposition proceedings which were newly initiated well outside the deadline for filing an opposition.
For these reasons, the appeal should be rejected as inadmissible.

A further reason for rejecting the appeal was that the appellant had not filed, within four months of notification of the first instance decision, a statement of grounds of appeal relating to at least one point material to the outcome of the opposition which could, at least in principle, have been decided in the appellant's favour by the opposition division. An appeal could not be an excuse for requesting consideration of points which the instance appealed from had never dealt with. If, as in the present case, the grounds filed by the appellant related only to such points, the requirements of Article 108 EPC were not fulfilled and the appeal had to be rejected as inadmissible.

A further consequence of the fact that the statement of grounds of appeal did not contain any objections against the reasons given in the contested decision was that the appellant could no longer rely on the arguments presented in the opposition proceedings and the findings of the opposition division had to be assumed to be correct.

As to the new documents D7 to D9 submitted by the appellant with the statement of grounds of appeal, it was evident that they related to different problems and in fact did not disclose some essential features of the invention. As they were not "highly relevant" to the present case, they should not be admitted into the appeal proceedings.

In particular, D7 did not disclose a "connection area" positioned along an edge of the transparency to which opposing first and second ends of a wire extended. The opposing ends of the wires of the transparencies known from D7 (figures 1 to 3 and 4) extended to two different connection areas. Furthermore, D7 did not show a "single continuous" resistance heating wire secured between the first and the second rigid sheet which made multiple passes through a predetermined portion of the transparency. Although D7 hinted at the possibility of using metal filaments having a plastic coating, it was not concerned with the technical problem of enabling wire patterns with crossings. In fact, D7 disclosed the use of an insulating jacket as a means for increasing the stiffness of very thin filaments which otherwise might easily break when the wire pattern was manufactured by knitting or sewing.

D8 referred to a transparency having an electrostatic protection circuit for dissipating the electrostatic charges which could accumulate over its surface and was thus far removed from the subject-matter of the contested patent.

D9 related to the problem of snow accumulation at the bottom of a windshield and referred to a transparency

comprising a thermal resistance filament system. However, this document did not specify any feature of the heating arrangement and thus did not disclose or suggest any of the essential features of the present invention.

The person skilled in the art, starting from D7 as the closest prior art document, would have no reason to consider the disclosure of D9. However, even if it were assumed that the skilled person would consult D9, such person would not arrive at the subject-matter of claim 1 because the combination of these two documents did not cover all the features of claim 1.

D4 related to the problem of providing a windshield with a simple structure which was easy and cheap to produce and whose heating arrangement comprised invisible metallic conductor bands coated with a black varnish. There was no reason to suppose that the coating of the metallic conductors had insulating properties. As none of the documents D7 to D9 disclosed a transparency comprising a single continuous wire with an insulating coating as heating arrangement, a combination of D4 with any of these documents would not result in a method according to claim 17.

In summary, both the subject-matter of claim 1 and the subject-matter of claim 17 involved an inventive step within the meaning of Article 56 EPC.

Reasons for the Decision

Admissibility of the Appeal

1.1 The respondent's request for rejecting the appeal as inadmissible is essentially based on the fact that the appellant has not explicitly contested the reasons for rejecting the opposition given by the opposition division, and on the fact that the statement of grounds of appeal filed on 16 October 2009 allegedly did not fulfil the requirements of Article 108 EPC (3rd sentence).

1.2 In particular, the respondent has argued that, as the appellant had not contested any of the findings of the opposition division, the Board of Appeal could not issue a judicial decision relating to the first instance proceedings. On the other hand, the admittance of the appeal and the admittance of the newly filed documents would result in a fresh case which should be remitted to the opposition division for further consideration. This, however, was tantamount to starting new opposition proceedings well after the deadline for filing an opposition.

Furthermore, as the statement setting out the grounds of appeal did not contest any of the reasons of the first instance decision, it did not relate to any point material to the outcome of the opposition proceedings which might have been decided in the appellant's favour. Hence, the appellant's submissions of 16 October 2009 did not meet the requirements of Article 108 and Rule 99 EPC and could not be regarded

as a statement of grounds of appeal filed within the prescribed time limit.

2.1 In the opposition proceedings, the opponent had requested that the patent in suit be revoked in its entirety (see item 2.2 of the contested decision) and essentially argued that the subject-matter of claim 1 lacked an inventive step over the combination of D1 and D2 in the light of D3, or of D4 and D3, or of D4 and D2 in the light of D3. The opposition division did not follow the opponent's objections against the patentability of the present invention and rejected the opposition.

2.2 According to Article 107 EPC (first sentence) any party to proceedings adversely affected by a decision may appeal. It is evident that the decision of the opposition division to reject the opposition has adversely affected the opponent who was seeking revocation of the patent. Hence, the opponent was entitled under Article 107 EPC to file an appeal against the first instance decision.

2.3 A further requirement for admissibility of an appeal is that a statement setting out the grounds of appeal be filed in accordance with the Implementing Regulations (Article 108 EPC). As stipulated in Rule 99(2) EPC, in the statement of grounds of appeal the appellant shall indicate the reasons for setting aside the decision impugned and the facts and evidence on which the appeal is based.

In Sections 4. and 5. of the statement of grounds of appeal, the appellant maintained the objections raised

in the opposition proceedings that the subject-matter of claims 1 and 17 of the patent in suit did not involve an inventive step. As evidence in support of these objections, the appellant submitted two new documents D7 and D8 and referred to a document, D9, identified in the European Search Report but not considered in the opposition proceedings.

2.4 As far as it specifies the reasons for setting aside the decision of the first instance and substantiates these reasons with facts and evidence, the appellant's statement of grounds of appeal meets the requirements of Article 108 EPC and Rule 99 EPC (see T 611/90, OJ EPO 1993, 50 and Case Law of the Boards of Appeal of the EPO, 6th ed. 2010, VII.E.7.6.2b).

2.5 In summary, the Board considers that in the present case the appeal complies with Articles 106 to 108 and Rule 99(1) and (2) EPC and is therefore admissible.

Extent of the appeal

3.1 In the opposition proceedings, the novelty of the subject-matter of claim 1 or of claim 17 was never put into question, whereas the appellant has raised objections both under Article 54 EPC and under Article 56 EPC. According to the case law of the boards of appeal, however, novelty and inventive step are different grounds of opposition and in opposition appeal proceedings a new ground may be considered only with the consent of the patent proprietor (see G 7/95, OJ EPO 1996, 626).

3.2 In the present case, the respondent has not agreed to discuss the objection of lack of novelty. Thus, only the appellant's submissions relating to Article 56 EPC may be considered by the Board.

Admissibility of D7 to D9

4.1 If, in principle, an appellant is not bound to base the appeal on the same facts and evidence put forward in the first instance proceedings, the criteria governing the admission of late-filed facts and evidence are more restrictive in proceedings before the boards of appeal than in opposition proceedings.

According to the case law of the boards of appeal (cf. Case Law of the Boards of Appeal, 6th edition 2010, VII.C.1.2.2), new facts, evidence and related arguments, which go beyond the indication of the facts, evidence and arguments presented in the notice of opposition in support of the grounds of opposition on which the opposition is based should only very exceptionally be admitted into the appeal proceedings if such new material was *prima facie* highly relevant in the sense that it could reasonably be expected to change the eventual result and was thus highly likely to prejudice the maintenance of the contested patent.

4.2 It appears from the contested decision (see section 2.2 of the "Reasons") that one of the essential features of the claimed transparency is that the heating wire includes an insulating coating. This aspect of the invention is not explicitly covered by the prior art cited in the opposition proceedings.

By comparison, D7 relates to laminated glass panels comprising a system of electric conductors in the form of filaments which may be coated with an *"insulating plastic jacket"*. Furthermore, D8, which is concerned with a laminated window equipped with an electrostatic protection circuit and an electric heating circuit, teaches that the wire of the protection circuit may be sheathed in an insulating material to isolate the two circuits.

4.3 Hence, D7 and D8 cover at least an essential aspect of the present invention (insulating covering) which was not explicitly disclosed in the state of the art considered by the first instance. As to D9, this document shows an arrangement for heating the wiper rest area of a vehicle comprising a wire pattern which, at first sight, appears to be similar to the one of the present invention.

As the combinations of D7 and D9, and of D7, D8 and D9 appear, *prima facie*, to cover all the features of claim 1 of the contested patent and thus may, in principle, put into question the inventive step of the claimed transparency, they are to be regarded as highly relevant, in the sense that they may prejudice the maintenance of the patent.

4.4 For the above reasons, the Board decides, in exercising the discretion provided by Article 114(2) EPC and Article 12(4) RPBA, to admit D7 to D9 into the appeal proceedings.

Inventive Step

5.1 Claim 1 of the patent in suit relates to a "*laminated transparency*" comprising the following features:

a) a first transparent rigid sheet;

b) a second transparent rigid sheet;

c) an interlayer positioned between said first and second sheets, wherein said interlayer secures said first sheet to said second sheet;

d) a connection area positioned along an edge of said transparency

wherein

e) opposing first and second ends of a wire extend to said connection area; and

f) said wire is a single, continuous resistance heating wire secured between said sheets and making multiple passes through a predetermined portion of said transparency,

g) said wire generates a desired power density within said predetermined portion to generate a desired amount of heat to the portion,

h) said wire includes an insulating coating

h') to attain a greater flexibility in the type of pattern to be formed by the wire to provide the desired power density.

5.2 There is agreement between the parties that D7 shows a laminated transparency comprising features a), b), c) and g)

6.1 As to feature d) (*"a connection area positioned along the edge of said transparency"*), the appellant has essentially argued that the term *"connection area"* was to be understood as the area along the edge of the windshield at which the ends of the wire were connected to conductors leading from the power source. Such connection area was disclosed in D7.

In the appellant's opinion, also feature e) ("*opposing first and second ends of a wire extend to said connection area*") was known from D7 in the sense that each of the two ends of the metal filament 3 shown in the embodiments of figures 3 and 4 extended to a respective connection area which was located at the edge of the transparency 5 and thus met the terms of feature d).

6.2 According to the respondent, however, figures 3 and 4 of D7 showed rows of metal filaments 3 connected, at the end of each row, with main conductor wires 4. This corresponded to a known arrangement where power was provided through bus bars with leads positioned along opposite sides of the windshield. According to paragraph [0027] of the patent in suit, however, a wire in the heating arrangement of the present invention was configured such that its ends were closely spaced and

extended to the same connection area. Thus, feature d) clearly implied that there was one particular connection area for both ends of the heating wire.

6.3 As submitted by the appellant, the term *"connection area"* is not explicitly defined in the contested patent. However, the Board has no doubt that feature d), read in conjunction with feature e), relates to a spatially well-defined, narrow area along the edge of the transparency where both ends of a heating wire can be connected to a power supply. The particular arrangement specified by features d) and e) is neither disclosed in nor suggested by D7.

7.1 As to feature f), the appellant and the respondent have relied on different interpretations of the term *"single, continuous wire"*.

7.2 The appellant has stressed that, although the word *"single"* was used in paragraphs [0008], [0015] and [0034] of the patent in suit, no definition or explanation of this term was given. With reference to a wire, it could mean that the wire was an "individual" wire, or that there was "only one" wire present. By describing the wire on numerous occasions as being "single", D7 disclosed the first of these interpretations. On the other hand, the second interpretation was implicitly disclosed in the variant in which the filaments were connected in series, thereby making a single filament. In fact, feature f) essentially expressed that there was only one current pathway. For the skilled reader it was immaterial whether a single current pathway was defined by a

single physical wire or by a plurality of wire sections connected in series.

7.3 The Board agrees with the respondent that the term *"single, continuous wire"* should be understood as meaning that the heating element is constituted by a single physical wire. This interpretation is consistent with the patent specification which defines the term "wire" as *"a drawn or formed metal thread or filament"* (column 5, lines 20 and 21 of the patent specification) and teaches that *"the use of a single continuous wire 34 in a wiper heating arrangement 24, as discussed herein, provides several advantages over other wiper area heating systems"* (Patent specification, paragraph [0034]).

7.4 Hence, as far as the combination of features d), e) and f) implies that the heating element of the claimed transparency is a single continuous physical wire whose ends are closely spaced and both located in a connection area at the edge of the transparency, it is not disclosed in D7.

8.1 With respect to features h) and h'), D7 (figure 4 and 5) teaches that the metal filaments 13 can be directly stitched on a transparent thermoplastic sheet 15. *"Instead of stitching the filaments on the sheet, they can also be stapled or crocheted thereto. The sheet 15 may also be perforated beforehand at the stitching locations. In addition, the sheet 15 may also be replaced by a fabric, wither woven, knitted or randomly formed of transparent thermoplastic filamentary material. FIG. 5 shows that during the operation of stitching or crocheting the electrically conducting*

metal filament 13 may be used as the bottom thread, while the upper thread 12 consists of a transparent thermoplastic material or glass, which is subsequently fused or bonded to the sheet by heat. Alternatively, the upper thread can be the metal filament and the bottom thread plastic filament. In addition, the metal filaments can be coated with thermoplastic material. Finally, metal filaments coated with plastic can be used as upper and bottom threads" (D7, column 3, lines 32 to 48 - underlining added).

In other words, D7 envisages the possibility of using a wire including an insulating coating in order to achieve one of the objects specified in column 1, lines 40 to 46 of D7, namely *"to apply electric conductor systems to surface-bodies .... in such a manner that essentially any desired configurations of the single current conductors can be accomplished"* (underlining added).

8.2 The respondent has stressed that feature h') in combination with feature h) expressed the possibility of selecting wire patterns with overlaps and that D7 was not concerned with the technical problem of enabling such wire patterns.

8.3 D7 (column 4, lines 19 to 23) explicitly refers to the link between the pattern formed by the wire in a certain portion of the transparency and the amount of heat generated in that portion. It is furthermore implicit that wire overlaps increase the number of wire patterns suitable for obtaining a desired power density. Hence, it could be argued that the skilled reader would understand the teaching of D7 as directed to all

possible patterns which could be implemented with an insulated heating wire and, in particular, to patterns with wire overlaps.

On the other hand, claim 1 of the patent in suit does not define any particular type of wire patterns. In fact, although it is specified in the description (see column 8, line 53 to column 9, line 1 - underlining added) that *"greater flexibility in the type of pattern that may be formed by the wire to provide the desired power density since the wire may now be crossed within the wire pattern without short circuiting the entire heating system"*, the appellant chose not to specify in the claim 1 any feature of the wire patterns which may be enabled by the use of a coated heating wire.

8.4 It is also questionable how far feature h') may contribute to the definition of a particular transparency, since this feature seems rather to relate to a result, namely increasing the number of possible wire patterns, which is relevant to the manufacturing of a transparency and may or may not have an impact on the characteristics of the final product. In other words, the use of a wire coated with an insulating material seems to remove some constraints which would otherwise limit the designer's choice of wire patterns for a heated transparency. As these constraints are not specified, they could also relate to the mechanical characteristics of a very thin wire used as heating filament. According to this interpretation, however, feature h') would be anticipated by D7 which teaches that coating a thin heating wire with an insulating jacket improves its mechanical properties and adds

flexibility to the type of patterns that could be used (see D7, column 3, line 61 to column 4, line 2).

8.5 For the above reasons, the Board agrees with the appellant that the transparency shown in D7 comprises features falling within the terms of h) and h').

9.1 In summary, the subject-matter of claim 1 differs from the laminated transparency known from D7 in that:

i) it further comprises a *"connection area (42) positioned along an edge of said transparency (10)"*;

ii) the ends of the wire extend to said connection area; and

iii) the wire is a single, continuous wire.

As pointed out above, features i), ii) and iii) imply in the context of the present invention that the heating element is a single physical wire with closely spaced ends extending to the same connection area located along the edge of the transparency.

9.2 The appellant has essentially argued that it would be obvious to a person skilled in the art starting from D7 to consider the teaching of D9 and thus arrive at the claimed subject-matter.

9.3 D7 (column 1, lines 7, 8) is concerned with a *"method for applying metal filaments, metal wires or the like to surfaces"*. The resulting laminated glass panels are used *"for heated windows for automobiles, aircraft,*

apartments, deep-freezing chests or the like, to prevent the formation of ice or frost. Another application of panels of this type are the so-called "alarm glasses," which are used for panelling shop windows, show cases or the like" (D7, column 1, lines 14 to 19).

D7 points out that *"known methods for embedding or applying thin wires onto flat, particularly transparent, bodies have proven to be complicated, labor consuming and, consequently, expensive. A known method of this type consists in rolling wires, stretched in straight lines or laid out in wavy form, into a plastic sheet. Hitherto known methods only permitted the use of wave forms of the type of the so-called "sine wave form," which, however, are so familiar to the human eye that the eye is involuntarily distracted and hampered while looking through the glass.*

Therefore, one object of the invention is to apply electric conductor systems to surface-bodies in a simpler way than by means of the hereto known methods, particularly in such a manner that essentially any desired configurations of the single current conductors can be accomplished. The invention preferably relates to the manufacture of heated glass sheets" (column 1, lines 29 to 36, underlining added).

The method according to D7 comprises the steps of "*combining flexible electric conductors, such as metal filaments, with an electrically insulating support structure to form a surface-element ..., whereby the support structure preferably comprises filaments made of insulating material which is intermingled, knitted,*

stitched, stapled or otherwise entwined with the metal filaments to form the surface-element " (D7, column 1, lines 59 to 67).

As explained in D7 (top paragraph of column 2), the metal filaments are preferably connected with *"main conductors"* at the edges of the surface-element.

9.4 The above manufacturing technique is illustrated in figures 1 to 5. Figure 1 shows a network 1 comprising plastic filaments 2 intertwined with *"electrically conducting metal wires or filaments 3".* The metal filaments 3 are *"generally connected, at the ends of each row, with main conductor wires 4 which are used to supply the current"* (D7, column 2, lines 36 to 39). Figure 2 shows the network 1 fused into a plastic sheet 5 which constitutes the interlayer of the laminated glass panel, whereas figure 3 relates to a laminated panel comprising two glass sheets and the intermediate plastic sheet. Figures 4 and 5 show a modified form of the invention in which the metal filaments 13 are directly stitched on a transparent thermoplastic sheet 15. *"In the same manner as in FIGS. 1-3, the single metal filaments 13 are again connected at the edges of sheet 15 with main conductors 14 which supply the current"* (D7, column 3, lines 51 to 54).

In summary, all the heating elements of the embodiments shown in D7 are constituted of two rows of filaments 3 connected in parallel to two main conductor wires located along two opposite edges of the plastic sheet 5.

9.5 D7 further contains several hints at possible variations in the constitution of the network 3 and of the filaments 3 and 13. In particular, it is pointed out in column 4, lines 57 to 62 that, in most cases, the electric conductor systems embedded in laminated glasses or generally applied to surfaces are connected in parallel. *"However, it is also possible to connect the metal filaments 3, or 13, in series, which can be done by applying suitable knitting or entwining techniques"* (underlining added).

In other words, D7 hints at the possibility of connecting the metal filaments together so as to form a single current path. However, it does not suggest replacing the rows of filaments connected in parallel with a single continuous wire, or disposing of the main conductors 14 by extending both ends of the single continuous wire to a single connection area at the edge of the transparency.

9.6 The appellant has argued that all the features of the claimed invention which might be regarded as not covered by D7 were known from D9. By combining the teachings of D7 and D9 the skilled person would arrive at the claimed subject-matter in an obvious manner.

9.7 Indeed, figure 2 of D9 seems to give some support to the assumption that this document shows all the features of claim 1 which are neither explicitly nor implicitly disclosed in D7 and, in particular, the feature that both connection terminals of the heating element extend to an area at the lower edge of the windshield where they can be connected to a power supply. However, even if the embodiment of D9 seems to

show a single current path, it does not specify whether the current pathway is obtained by means of a single physical wire or by serially connecting a plurality of filaments. As to the description of D9, it consistently refers to the heating element as "*filaments*", *"resistance filament system"* or *"thermal resistance filament 6 disposition"*.

9.8 Even if neither D7 nor D9 suggests replacing a plurality of wires connected in series with a single physical wire, this may indeed seem a straightforward modification for the skilled person. However, in the Board's opinion, the alleged obviousness of this step should be assessed within the context of the actual teaching of D7.

9.9 D7 teaches to produce a heating element by stitching a pattern of heating wires in rows and by connecting each end of the row to a corresponding main conductor. In column 4, lines 59 to 62, D7 hints at the possibility of connecting in series the metal filaments *"by applying a suitable knitting or entwining technique"*, but does not propose realizing the corresponding single current pathway by means of a single continuous wire or disposing of the metal conductors used in D7 for connecting the ends of the heating wire to a power supply.

9.10 Hence, even under the assumption that all the features recited in claim 1 of the patent in suit are separately disclosed in D7 and D9, the Board fails to see what could motivate the skilled person starting from D7 to depart from some of the essential aspects of this document's teaching, such as providing various patterns

of metal filaments which are connected in series or in parallel to a power supply via two *"main conductors"*.

It is finally noted that, in order to arrive at a transparency comprising a continuous wire as heating element and a connection area to which the extremities of the single wire extend, the skilled person would have to incorporate into the embodiments of D7 features which are not explicitly disclosed in D9, but can only be inferred from a schematic diagram (cf. figure 2 of D9). In other words, it is only with the prior knowledge of the invention that D9 appears to disclose features which combined with some of the teaching of D7 may direct to the claimed transparency.

9.11 In summary, the Board comes to the conclusion that the subject-matter of claim 1 does not result from an obvious combination of the teachings of D7 and D9 (Article 56 EPC).

Claim 17

10.1 Claim 17 relates to a *"method of manufacturing a transparency, according to any of claims 1 to 16, for a vehicle having a heating arrangement to heat a portion of an outer surface of said transparency which generally corresponds to a wiper rest area".* The claimed method comprises the following steps:

- securing a single, continuous resistance heating wire including an insulating coating to a thermoplastic interlayer in a predetermined pattern generally corresponding to said wiper rest

area and which generates a desired power density within said pattern to heat said wiper rest area;

– extending first and second opposing ends of said wire to a common area of said interlayer;

– positioning said interlayer between a first glass sheet and a second glass sheet such that said pattern is aligned with said wiper rest area and said first and second ends of said wire are aligned with a desired connecting area of said transparency; and

– laminating said first and second sheet and said interlayer to secure said wire between said first and second sheets to form said transparency.

10.2 According to the appellant, D4 represented the closest prior art to claim 17, as it related to a windshield comprising laminated glass with a heated wiper rest area. In the appellant's view, D4 described on page 4 a process for windshield manufacturing comprising all the features of claim 17 except the single heating wire and the insulating coating. As to the latter feature, D4 taught the use of copper wire coated with black varnish. Since it was highly likely that this paint acted as an electrical insulator, D4 disclosed also the use of a heating wire with an insulating coating. The skilled person seeking increased flexibility in the wiring pattern would consult D7 or D8 which disclosed a single wire with an insulating coating, or derive from D9 the teaching relating to the use of a single wire as heating element of a transparency.

10.3 In the respondent's opinion there was no indication in D4 that the black varnish referred to in D4 was insulating. Furthermore, none of documents cited by the appellant explicitly taught to use a single continuous wire as heating element of a laminated transparency. Thus, the method according to claim 17 involved an inventive step.

11.1 As the embodiments of figures 1 to 5 show, D4 relates to the manufacture of heated transparencies comprising a plurality of heating wires secured to a thermoplastic interlayer. Wires are laid down in loops with their opposing ends extending to metallic bands which can be connected to a power supply.

If it is assumed that the black varnish used to coat the heating wire in D4 is not insulating, the subject-matter of claim 17 differs from the method according to D4 essentially in that the heating arrangement is constituted by a *"single, continuous resistance heating wire"* including an insulting coating and by laying down the single wire in a pattern which corresponds to the wiper rest area and generates a desired power density to heat the wiper area.

11.2 As shown above (cf. points 9.3 to 9.5), D7 discloses the use of heating wires comprising an insulating coating, but does not suggest using a single continuous wire as heating element. As D7 does not teach to manufacture a transparency by securing a *"single continuous wire"* to a thermoplastic interlayer in a predetermined pattern corresponding to the wiper rest area, the method according to claim 17 does not result from a combination of D4 and D7.

11.3 On the other hand, if it is assumed that the black varnish used to coat the copper wire of the transparency disclosed in D4 forms an insulating coating, the combination of D4 and D9 may appear to cover all the features of claim 17.

However, there is no suggestion in the prior art that the skilled person would consult D9 and extract from some schematic figures of this document features relating to a particular constitution of the heating element, in order to combine them with the method disclosed in D4 (cf. point 9.7 above).

11.4 Hence, the Board considers that the subject-matter of claim 17 involves an inventive step also over the combination of D4 and D9 (Article 56 EPC).

12.1 As to D8, the appellant has pointed out that this document was submitted because it recognized the danger of short circuits between conductors in a laminated window and taught to use an insulating coating on the heating wire to prevent this. D8 also recognized the desirability of greater flexibility of the heating wire network and thus disclosed features h) and h') of claim 1.

12.2 However, as the Board has accepted the appellant's view that features h) and h') are known from D7, D8 is not required in support of the appellant's arguments relating to the lack of inventive step of claims 1 and 17.

13. Dependent claims 2 to 16 and dependent claims 18 and 19 relate to particular embodiments of the transparency according to claim 1 and of the method for manufacturing a transparency specified in claim 17. Hence, their subject-matter also satisfies the requirements of Article 56 EPC.

14. In conclusion, the Board finds that the objections under Article 56 EPC raised by the appellant against the inventive step of the subject-matter of claims 1 and 17 do not prejudice the maintenance of the patent as granted. Consequently, the appeal is dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

U. Bultmann R. Moufang