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**Datasheet for the decision
of 10 November 2009**

Case Number: T 1829/06 - 3.4.03

Application Number: 99124055.7

Publication Number: 1041647

IPC: H01L 31/048

Language of the proceedings: EN

Title of invention:

Photovoltaic module and power generation system

Patentee:

KANEKA CORPORATION

Opponent:

SCHOTT Solar GmbH

Headword:

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Relevant legal provisions:

-

Relevant legal provisions (EPC 1973):

EPC Art. 54(1), (2), 56

Keyword:

"Public prior use (yes)"

"Novelty (yes)"

"Inventive step (yes)"

Decisions cited:

-

Catchword:

-



Case Number: T 1829/06 - 3.4.03

D E C I S I O N
of the Technical Board of Appeal 3.4.03
of 10 November 2009

Appellant:
(Opponent)

SCHOTT Solar GmbH
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Representative:

Haft, von Puttkamer, Berngruber, Karakatsanis
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Respondent:
(Patent Proprietor)

KANEKA CORPORATION
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Osaka 530-8288 (JP)

Representative:

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Decision under appeal:

Decision of the Opposition Division of the
European Patent Office posted 27 October 2006
rejecting the opposition filed against European
patent No. 1041647 pursuant to Article 102(2)
EPC 1973.

Composition of the Board:

Chairman: G. Eliasson
Members: R. Q. Bekkering
T. Bokor

Summary of Facts and Submissions

- I. This is an appeal against the rejection of the opposition against EP 1 041 647.
- II. The opposition had been filed against claims 1 to 5 as granted directed at a photovoltaic module and a power generation system having the photovoltaic module, on the grounds of lack of inventive step, claim 6 as granted directed at a method of manufacturing a photovoltaic module being unaffected.
- III. The appellant opponent requested that the decision under appeal be set aside and that the patent be revoked.
- IV. The respondent proprietor requested as a main request that the appeal be dismissed, or in the alternative, the decision under appeal be set aside and the patent be maintained in an amended form on the basis of the claim requests filed with letter dated 9 October 2009, titled first to third auxiliary request.

Furthermore, the respondent requested that the late-filed evidence relating to the sale of the EPV-module not be admitted into the proceedings.

- V. Claims 1 and 4 as granted read:

*"1. A photovoltaic module with a plurality of photovoltaic cells, comprising:
a transparent substrate (11);*

the photovoltaic cells (12) arranged on a back surface of the transparent substrate (11) and made of amorphous cells;

an electrical insulating filler (14) covering a back surface of the photovoltaic cells (12);

a cover film (16) covering the electrical insulating filler (14);

a busbar (13) connected to the photovoltaic cells (12), said busbar (13) including a busbar body (13a) which is electrically connected to the photovoltaic cells (12), extends along a longitudinal direction of the photovoltaic cells, has substantially the same length as the photovoltaic cells, and is embedded in the electrical insulating filler (14), and confined within an outer peripheral contour of the transparent substrate (11), and an extension (13b) which is extending integrally from the busbar body (13a) and long enough to project from one end (11a) of the transparent substrate (11), and a spacer (15) put on an end portion of the busbar body (13a) and interposed between the photovoltaic cells (12) and the extension (13b), said extension (13b) being bent along the spacer (15) and serving as an output fetching line as it is drawn out through the cover film (16)."

"4. A power generation system having a photovoltaic module according to any of claims 1 to 3."

VI. Reference is made to the following documents:

D2: Patent Abstracts of Japan, vol. 1998, no. 04,
31 March 1998 & JP 09 326497 A

D2a: English translation of D2

- A0: Bill from Mr. G. H. dated 3 February 1999 (filed by the appellant opponent with letter dated 16 December 2004)
- A3: Data sheet from EPV, I/V-curve of module no. 326-17 ("Anlage 3" filed by the appellant opponent with letter dated 25 July 2006)
- A4: E-mail exchange between Mr. G. H. and Mrs. C. of EPV ("Anlage 4" filed by the appellant opponent with letter dated 25 July 2006)
- A6: Declaration by Mr. E. H. with annexes ("Anlage 6" filed by the appellant opponent with letter dated 25 July 2006)
- A7: Declaration by Mr. S. ("Anlage 7" filed by the appellant opponent with letter dated 22 February 2007)
- A9: Declaration by Mr. G. with annexes ("Anlage 9" filed by the appellant opponent with letter dated 23 July 2008)
- A10: Letter from the appellant opponent to EPV Energy Photovoltaics Inc. with annexes ("Anlage 10" filed during the oral proceedings)

VII. The appellant opponent submitted in substance the following:

The evidence on file established that the photovoltaic module manufactured by EPV Energy Photovoltaics Inc.

no. 326-17 was made available to the public before the priority date of the patent. The module, thus, belonged to the state of the art. The module was prejudicial to the novelty of the subject-matter of claim 1 as granted. Furthermore, the subject-matter of claim 1 as granted lacked an inventive step over document D2.

VIII. The respondent proprietor argued in substance as follows:

The late-filed evidence relating to the alleged public prior use of the photovoltaic module manufactured by EPV should not be admitted into the proceedings. Furthermore, public prior use of the module was not proven beyond reasonable doubt, so that the module was not comprised in the state of the art. Notwithstanding the above, the subject-matter of claim 1 as granted was at any rate new and inventive with respect to this module. Moreover, the subject-matter of claim 1 as granted involved an inventive step over document D2.

Reasons for the Decision

1. The appeal is admissible.
2. *Evidence relating to public prior use*
 - 2.1 The respondent proprietor objected to the belated and piecemeal submission by the appellant opponent of the evidence relative to the alleged public prior use of the photovoltaic module produced by EPV Energy Photovoltaics Inc. Some of the evidence, in particular document A9, was submitted as late as July 2008, almost

four years after the filing of the opposition. In the respondent's view the appellant should have been aware that the evidence supplied in the course of the first instance opposition proceedings was inadequate to prove the alleged public prior use. The late-filed new evidence, thus, should not be admitted into the proceedings.

2.2 The appellant opponent submitted that the evidence supplied in the course of the first instance opposition proceedings was believed by the appellant to be sufficient for proving the public prior use of the module. Only after having received the negative decision of the opposition division, the necessity of further evidence arose. As demonstrated by document A10, the appellant engaged in further investigations without delay. The belated filing of the declaration of Mr. G. (document A9) was due to difficulties in obtaining support from EPV as apparent from the correspondence between the appellant and EPV (document A10). The evidence should, thus, be admitted in the proceedings.

2.3 Generally, the filing of new evidence is justified and thus not considered late, provided it constitutes an appropriate and timely reaction to the course of the proceedings. In the present case the board is satisfied that the evidence in question, complementing the chain of evidence relative to the appellant's contended public prior use, constitutes an appropriate and timely reaction to the negative decision of the opposition decision on the matter. Furthermore, the evidence in question was on file over a year before the oral proceeding before the board, leaving ample opportunity

for the proprietor and the board to deal with it. The evidence is thus admitted into the proceedings.

The respondent's request not to admit the late-filed evidence relating to the sale of the EPV-module is accordingly rejected.

3. *Public prior use*

3.1 The appellant opponent contended that a photovoltaic module produced by the company EPV Energy Photovoltaics Inc., Princeton (US) ("EPV-module" hereinafter) and supplied to the EPO as evidence had been made available to the public by use before the priority date of the application in suit and thus was comprised in the state of the art, pursuant to Article 54(2) EPC 1973.

In particular, the appellant contended that the EPV-module number 326-17, supplied to the EPO as evidence, had been produced by EPV on 15 January 1999. As confirmed by the declaration of Mr. G., executive vice president of EPV Solar, the successor of EPV (document A9), the date "01-15-99" engraved in the module corresponded to the manufacturing date, the number "326" to the run number and the number "17" to the serial number of the plate in the run. Document A3 was an accompanying data sheet relative to I/V measurements performed by EPV on this module no. 326-17, as confirmed by document A9.

The predecessor of the opponent at that time, the company ASE GmbH, became aware of the existence of the EPV-module and was interested in analysing it. However, being a competitor to EPV, it feared that EPV would be

reluctant to deliver and thus instructed one of its employees, Mr. G. H., to order the module as a private person, thereby acting as a straw man for the opponent (cf document A7).

Thereupon Mr. G. H. contacted EPV and ordered three modules including the above EPV-module no. 326-17, as confirmed by the email exchanges between Mr. G. H. and Mrs. C. from EPV (document A4), the customer order dated 14 January 1999 (document A9) and the corresponding invoice dated 17 February 1999 (document A9).

Mr. G. H. billed ASE for his expenses incurred in the purchase on 3 February 1999 (document A0).

The modules, including module no. 326-17 were analysed and tested by ASE on 2 February 1999 and thereafter (document A6).

Accordingly, by the sale of the EPV-module no. 326-17 to Mr. G. H., the module was made available to the public before the priority date of the patent.

- 3.2 The respondent argued that the sale to a straw man, as in the present case, did not render the module available to the public, as not the whole public had access to it. In particular, the opponent would not have been able to buy the module. Moreover, no evidence was provided of any further sales of the module.

Furthermore, an agreement of confidentiality between EPV and Mr. G. H. had to be assumed as the copies of the e-mail correspondence submitted (document A4) were

incomplete and an early e-mail from EPV stated "We would be happy to work with you".

Moreover, the evidence provided of the sale contained a number of oddities, casting sufficient doubts for it to be dismissed. In particular, the bill issued by Mr. G. H. was dated earlier than the invoice, it had no receipts annexed to it and there was no apparent reason for the VAT ("MwSt") to appear on it. Furthermore, it was unclear why the customer order contained handwritten details of the products and who made them. Finally, little was known about Mr. G. who provided a declaration regarding EPV (document A9).

- 3.3 According to established jurisprudence, information is considered to be made available to the public even if only one member of the public had access to it and there was no bar of confidentiality restricting the use or dissemination of such information. The fact that this member of the public acted as a straw man or that the opponent itself may have had difficulties in obtaining the module from EPV is immaterial. Furthermore, in the board's opinion, based on the evidence on file there can be no reasonable doubt that the sale of the EPV-module to Mr. G. H. took place before the priority date of the patent and was free of any obligation to maintain confidentiality.

Accordingly, the EPV-module no. 326-17 was made available to the public by use before the priority date of the patent. The EPV-module thus is comprised in the state of the art in accordance with Article 54(2) EPC 1973.

4. *Main request of the respondent proprietor - patent as granted*

4.1 *The EPV-module*

4.1.1 *Novelty*

The EPV-module no. 326-17 is a photovoltaic module with a plurality of photovoltaic cells in the form of long lines extending in the longitudinal direction of the module.

In particular, having regard to claim 1 as granted, the module comprises a transparent substrate (glass) with photovoltaic cells arranged on a back surface of the transparent substrate made of amorphous cells. The efficiency of the above EPV-module (about 6.8 %), as can be calculated from the data sheet provided by EPV accompanying the module (document A3), is indicative of cells made of amorphous silicon (see also document A6).

Furthermore, the module comprises an electrical insulating filler covering the back surface of the photovoltaic cells and a cover film (glass) covering the electrical insulating filler.

A busbar (flat conductor) is connected to the photovoltaic cells. The busbar includes a busbar body (portion of the busbar up to the position where the busbar is bent in a direction transverse to the longitudinal direction of the module) which is electrically connected to the photovoltaic cells, extends along a longitudinal direction of the photovoltaic cells, is embedded in the electrical

insulating filler and confined within an outer peripheral contour of the transparent substrate.

Moreover, the busbar includes an extension which is extending integrally from the busbar body and long enough to project from one end of the transparent substrate.

Furthermore, the module comprises a spacer (transparent tape) interposed between the photovoltaic cells and the extension, the extension being bent along the spacer and serving as an output fetching line as it is drawn out through the cover film.

The subject-matter of claim 1 as granted firstly differs from the EPV-module in that the busbar body has substantially the same length as the photovoltaic cells.

In the EPV-module the busbar body is shorter than the length of the photovoltaic cells. In fact, in order to collect the current from the remaining portion of the photovoltaic cell not connected to the busbar body, a second busbar is provided extending from the position where the (first) busbar is bent in a direction transverse to the longitudinal direction of the module to the end of the photovoltaic cell. The length of this second busbar is not insignificant, as it provides an appreciable contribution to the power delivered by the module. Hence, the busbar body is not considered to have substantially the same length as the photovoltaic cells.

Furthermore, in the EPV-module the spacer is not "put on" an end portion of the busbar body.

Claim 1 is considered to define the module with its various parts in the sequence it is built up starting from the back surface of the transparent substrate. In this sequence the busbar body is provided first and the spacer is "put on" an end portion of the busbar body. Following this definitional approach, the busbar body in the EPV-module is put on the spacer.

Hence, the subject-matter of claim 1 as granted differs from the EPV-module in that the busbar body has substantially the same length as the photovoltaic cells, and in that the spacer is put on an end portion of the busbar body.

Accordingly, the subject-matter of claim 1 is new over the EPV-module above (Article 54(1) and (2) EPC 1973).

4.1.2 *Inventive step*

Regarding the position of the spacer, the appellant argued that it would be obvious for a person skilled in the art to modify the EPV-module so that the spacer was put on the end portion of the busbar body. In particular, it would be readily apparent to the skilled person that the provision of the (insulating) spacer under the busbar body, as was the case in the EPV-module, had the disadvantage of locally preventing the busbar body from contacting the photovoltaic cell. Putting the spacer on the busbar would overcome this disadvantage, thereby improving the busbar body contact to the photovoltaic cell.

However, in the EPV-module the spacer serves to insulate the extension of the busbar from the underlying photovoltaic cells, thereby preventing the extension from short-circuiting the underlying cells. By putting the spacer on the busbar body, and as a consequence on the extension of the busbar, this insulation would no longer be provided.

The skilled person seeking to maximize the contact between the busbar body and the photovoltaic cell would at most consider omitting the portion of the spacer underlying the busbar body. However, there is nothing to suggest putting the spacer of the EPV-module or any further spacer on the end portion of the busbar body.

4.2 *Document D2*

Document D2, cited in the patent application as originally filed (page 2, lines 9 to 19 and figures 24A to 24C), discloses a photovoltaic module with a plurality of photovoltaic cells in the form of long lines extending in the longitudinal direction of the module (D2, figure 3). Busbars (7, 8) extend along the length of the photovoltaic cells. Lead wires (11, 12) extending in the direction transverse to the longitudinal direction of the module are soldered to the busbars (D2a, paragraph [0012]).

Due to the soldering, however, the manufacturing process is complicated, the manufacturing costs are high and the connection is not very reliable (see also application page 2, lines 27 to 35). Accordingly, the objective problem to be solved by the patent is to improve the quality and yield, and lower the

manufacturing costs relative to the lead wires of the module.

In the module according to claim 1, this problem is solved by providing an extension which is extending integrally from the busbar body and long enough to project from one end of the transparent substrate, and by providing a spacer put on an end portion of the busbar body and interposed between the photovoltaic cells and the extension, the extension being bent along the spacer and serving as an output fetching line as it is drawn out through the cover film.

There is nothing in D2 or elsewhere suggesting this solution which eliminates the solder connection to the busbar on the cells and provides a spacer put on the end of the busbar facilitating bending of the busbar extension.

4.3 Accordingly, the subject-matter of claim 1 involves an inventive step in the sense of Article 56 EPC 1973.

4.4 Claim 4 is directed at a power generation system having a photovoltaic module according to any of claims 1 to 3. The subject-matter of claim 4, thus, also involves an inventive step.

Claims 2, 3 and 5 are dependent on claims 1 or 4 and concern particular embodiments. The subject-matter of these claims, thus, also involves an inventive step.

4.5 Claim 6 directed at a method of manufacturing a photovoltaic module has not been opposed and, thus, is not to be examined.

5. Accordingly, the grounds for opposition invoked do not prejudice the maintenance of the patent unamended.

Order

For these reasons it is decided that:

The appeal is dismissed.

Registrar:

Chair:

S. Sánchez Chiquero

G. Eliasson