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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte LAWRENCE A. CLEVENGER, RAINER KRAUSE, ZHENGWEN LI, GERD PFEIFFER, KEVIN PRETTYMAN, BRIAN C. SAPP

Appeal 2015-000199
Application 12/887,121[1]
Technology Center 1700

Before TERRY J. OWENS, RICHARD M. LEBOVITZ, and JULIA HEANEY, *Administrative Patent Judges*.

LEBOVITZ, *Administrative Patent Judge*.

DECISION ON APPEAL

This appeal involves claims drawn to methods of illuminating and annealing a photovoltaic cell. Appellants appeal from the Examiner's final rejection of the claims under 35 U.S.C. § 112 and 35 U.S.C. § 103. We have jurisdiction under 35 U.S.C. § 134. The rejections are reversed.

STATEMENT OF CASE

The '121 Application describes a method of restoring photovoltaic cell efficiency comprising steps of illuminating and annealing the cell. The step of illuminating degrades the photovoltaic cell and the step of annealing

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[1] "The '121 Application."

recovers the degraded performance. '121 Application, ¶ 13. Annealing is accomplished by heating the photovoltaic cell at a temperature above 90 degrees Celsius for a minimum of ten minutes. *Id.*, ¶¶ 6, 8.

Claims 1–6, 9, 10, and 25–28 are pending and stand finally rejected by the Examiner as follows:

1. Claims 1–6, 9, 10, and 25–28 under 35 U.S.C. § 112, first paragraph, for failing to meet the written description requirement. Final Rej. 3.

2. Claim 1–6, 9, 10, and 25–28 under 35 U.S.C. § 112, second paragraph, for being indefinite. Final Rej. 6.

3. Claims 1–6, 9, 10, and 25–27 under 35 U.S.C. § 103(a) as obvious in view of Guha et al., (US 4,555,586, issued Nov. 26, 1985; hereinafter "Guha"); and Osawa, et al., (JP 59-211287 A, published Nov. 30, 1984; hereinafter "Osawa"). Final Rej. 8.

4. Claim 28 under 35 U.S.C. § 103(a) as obvious in view of Guha, Osawa, and King et al., (US 3,496,029, issued Feb. 17, 1970; hereinafter "King"). Final Rej. 14.

Claim 1, the only independent claim on appeal, is reproduced below:

> 1. A method comprising:
>
> illuminating, during a manufacturing process, a photovoltaic cell to receive a time integrated irradiance, such that the cumulative power of electromagnetic radiation received by the photovoltaic cell is equivalent to at least 5 hours of solar illumination; and
>
> annealing, during the manufacturing process, the photovoltaic cell at a temperature above 90 degrees Celsius for a minimum of 10 minutes, wherein annealing the photovoltaic cell further comprises illuminating the photovoltaic cell during the annealing, the annealing in response to illuminating the photovoltaic cell.

1. WRITTEN DESCRIPTION REJECTION

The Examiner rejected the claims as lacking a written description of "annealing during the manufacturing process, the photovoltaic cell at a temperature above 90 degrees Celsius for a minimum of 10 minutes wherein annealing the photovoltaic cell further comprises illuminating the photovoltaic cell during the annealing." Final Rej. 3. The Examiner stated that there is "no description describing the illuminating and the annealing steps to restore a photovoltaic cell during a manufacturing process in the originally filed disclosure." *Id.* The Examiner found that the disclosure in paragraphs 9, 74, and 76 of the '121 Application describes annealing and illuminating of photovoltaic cells in a manufactured state, but not during the manufacturing process. *Id.* The rejection turns on the proper interpretation of "manufacturing process."

During patent examination, the "PTO applies to the verbiage of the proposed claims the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in applicant's specification." *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997).

In this case, the '121 Application describes "applying an aging or burn in of the [photovoltaic] cell at the end of the manufacturing line." '121 Application, ¶ 74. The Application also discloses that an aging chamber can be provided "after production" where the "degraded performance can now be recovered using thermal treatment during light exposure, to accelerate

aging." *Id.*, ¶ 75. In view of this disclosure, the broadest reasonable interpretation of "manufacturing process" is one which includes illuminating and annealing steps after the photovoltaic cell has been made, but before it has been packaged for shipment to a customer. For this reason, Appellants' construction that "recitation of illumination and annealing during a manufacturing process refers to a manufacturing process prior to shipment to a customer instead of illumination and annealing while the photovoltaic cell is in use by a consumer" is supported by a preponderance of the evidence. Appeal Br. 13.

"[A] claim interpretation that excludes a preferred embodiment from the scope of the claim is rarely, if ever, correct." *On-Line Techs., Inc. v. Bodenseewerk Perkin-Elmer GmbH*, 386 F.3d 1133, 1138 (Fed. Cir. 2004). This principle applies here because the disclosure in paragraphs 74 and 75 of the '121 Application is the only guidance in how the illuminating and annealing steps are conducted by the manufacturer. The Examiner's narrow interpretation of "manufacturing process" to require illuminating and annealing prior to completion of the photovoltaic cell excludes the only direction in the Application on how to recover degraded performance during photovoltaic manufacture and thus is not the broadest most reasonable interpretation of this term.

The Examiner also stated that the written description is defective because the originally filed Specification does not describe two illumination steps as recited in claim 1. Final Rej. 4. We do not agree. Original claim 1 recites separate illuminating and annealing steps. Original claim 3, which depends from claim 1, recites "wherein annealing the photovoltaic cell

further comprises illuminating the photovoltaic cell." Thus, claim 3 clearly supports the description of two illuminating steps.

The Examiner also stated that the written description is deficient because the '121 Application does not describe "annealing the photovoltaic cell about 90 degrees Celsius for a minimum of 10 minutes." Final Rej. 4.

To satisfy the written description requirement, the inventor "must also convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession *of the invention*." *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64 (Fed. Cir. 1991). In describing the claimed invention, there is no requirement that the wording be identical to that used in the specification as long as there is sufficient disclosure to show one of skill in the art that the inventor "invented what is claimed." *Union Oil Co. of California v. Atlantic Richfield Co.*, 208 F.3d 989, 997 (Fed. Cir. 2000). Thus, so long as a person "of ordinary skill in the art would have understood the inventor to have been in possession of the claimed invention at the time of filing, even if every nuance of the claims is not explicitly described in the specification, then the adequate written description requirement is met." *In re Alton*, 76 F.3d 1168, 1175 (Fed. Cir. 1996).

As pointed out by Appellants, the '121 Application contains express disclosure of illuminating during the annealing step. '121 Application ¶¶ 19, 78. While these disclosures perform annealing above 130 degrees Celsius, the Application discloses annealing at temperatures above 90 degrees Celsius in response to illuminating (¶ 8) and not all the illuminating while annealing methods described in the Application disclose the annealing temperature (¶¶ 80, 81). The Application also states that the "described embodiments are to be considered in all respects only as illustrative and not

restrictive." *Id.*, ¶ 89. Original claim 3 expressly recites annealing at 90 degrees Celsius. Thus, this evidence establishes the inventors were in possession of the recited limitation of annealing at 90 degrees Celsius while illuminating.

The Examiner also found the claims 2, 3, and 26 lacked a written description (Final Rej. 4–5), but it appears the rejection was based on the same rationale as for claim 1 that we found deficient.

Claim 9

Claim 9 recites "wherein the photovoltaic cell is illuminated at the end of a manufacturing process of the photovoltaic cell such that the photovoltaic cell produces electricity when illuminated." The Examiner stated there is no support for this claim. Answer 11. All this claim requires is that a manufactured photovoltaic cell produces electricity after illumination, its normal function. Original claim 9 has the same language. It is not clear how the '121 Application would lack support for the specific purpose for which the photovoltaic cell is manufactured.

Claims 25 and 26

With respect to claims 25 and 26, the Examiner finds the claims are not supported by the original disclosure because the recited time and temperature limitations are "combining random steps from different methods." Answer 12–13. We do not agree. The temperature limitations recited in claims 25 and 26 were part of original claims 2 and 6, each which depends from claim 1.

Summary

For the foregoing reasons, we reverse the written description rejection of claims 1–6, 9, 10, and 25–28.

2. § 112 SECOND PARAGRAPH REJECTION

The Examiner rejected the claims under as indefinite under 35 U.S.C. § 112, second paragraph, because:

> The meet [*sic*, metes] and bound of the manufacturing process cannot be determined, e.g. what is the start and stop of the "manufacturing process" in the claim. It is unclear exactly what manufacturing process is being referred to, e.g. a manufacturing process of a photovoltaic cell or a manufacturing process of something else.

Final Rej. ¶ 6.

We do not agree. First, for the reasons discussed above, we construed manufacturing process to mean illuminating while annealing at any time prior to shipment of a photovoltaic cell to a customer instead of illumination and annealing while the photovoltaic cell is in use by a consumer. Consequently, the claim scope is definite. Second, while the claim does not expressly state that manufacturing process is of a photovoltaic cell, this would be understood from the claim and the '121 Application since the photovoltaic cell is the point of reference.

Claim 1 recites "illuminating, during a manufacturing process, a photovoltaic cell to receive a time integrated irradiance, such that the cumulative power of electromagnetic radiation received by the photovoltaic cell is equivalent to at least 5 hours of solar illumination." The Examiner states that this phrase is indefinite because the photovoltaic cell must be "complete" while the claim reads on an incomplete cell. Answer 14. The

Examiner also stated that the claim is indefinite because the illumination value is open-ended and could read on any value. *Id.*

It is unclear why the state of manufacture of the photovoltaic cell makes the claim indefinite. The claim simply calls for at least 5 hours of solar illumination during the manufacturing process. As far as the value of at least 5 hours, the skilled worker would understand that the claimed process covers operable values of electromagnetic radiation during the manufacturing process.

The Examiner rejected claims 25–28 as indefinite because they refer to an "apparatus" and there is no apparatus in claim 1 from which they depend. Answer 16. As indicated by Appellants, this is an obvious typographical error which is readily overcome by making an appropriate amendment upon return of this case to the Examiner.

The rejections under § 112, second paragraph, are reversed.

3, 4. OBVIOUSNESS REJECTIONS

The Examiner found that Guha "discloses a method of evaluating photodegradation in photovoltaic cells comprising" illuminating and then annealing a photovoltaic cell. Final Rej. 8. The Examiner found that Guha does not "does not specifically disclose the annealing the photovoltaic cell comprising illuminating the photovoltaic cell *during* the annealing." *Id.*, 9 (emphasis added). The Examiner also found that Guha "does not disclose the evaluation comprising steps of illuminating and annealing above being performed during a manufacturing process." *Id.* However, the Examiner found that Guha teaches "discloses the photovoltaic cell is produced to use the sunlight to anneal the photovoltaic cell" while it is operational. *Id.* The

Examiner determined that it would have been obvious to one of ordinary skill in the art to modify Guha by illuminating the photovoltaic cell at the same time because Guha "explicitly suggests illuminating the photovoltaic cell during the annealing or illuminating and annealing the photovoltaic cell at the same time." *Id.*, 10. The Examiner further determined it would have been obvious to perform the annealing and illuminating steps during the manufacturing process because "Osawa et al. teaches evaluating the product (or photovoltaic cell) during the manufacturing process would efficiently manufacture the product in good productivity and improved characteristic." *Id.*, 9.

We agree with Appellants that the Examiner did not provide an adequate reason for determining that claim 1 would have been obvious to one of ordinary skill in the art. Guha teaches evaluating photovoltaic material during manufacture by first degrading samples with white light and then annealing at 100°C, where the efficacy of each step is evaluated by measuring photoconductivity. Guha, col. 12, ll. 34–40. The illumination is not performed during annealing, but it is carried out as a subsequent separate step. Guha also teaches that its photovoltaic cells can be annealed while the cell is operational, *e.g.,* on a rooftop in tropical or sub-tropical environment, while exposed to sunlight. *Id.*, col. 16, ll. 57–68. However, there is no suggestion in Guha that this step be performed during the evaluation process.

Osawa is a general teaching about evaluating a product during manufacture, but it does not guide one of ordinary skill in the art on how such evaluation and testing would be performed. Guha specifically teaches evaluating photovoltaic material by degrading it with light, measuring

photoconductivity, annealing the material to restore its efficiency, and then measuring photoconductivity again. *Id.*, col. 12, ll. 34–40. The step in which illuminating and annealing are performed at the same time is not to evaluate photoconductivity, but it is done by the consumer to anneal defects when the cell is operational. *Id.* at col. 16, ll. 58–68. The Examiner did not provide a reason for performing the annealing and illuminating steps carried out during the operation of the photovoltaic cell in a manufacturing process as an evaluation step, particularly when Guha teaches measuring the extent of photoconductivity after illuminating and after annealing to evaluate the efficacy of the photovoltaic material.

The obviousness rejection of independent claim 1, and dependent claims 2–6, 9, 10, and 25–28, is reversed.

REVERSED