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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/182,436	02/18/2014	Bo Ki Hong	48268-261D01US	4676
100807	7590	01/30/2019	EXAMINER	
Mintz Levin/Special Group One Financial Center Boston, MA 02111 UNITED STATES OF AMERICA			FITZSIMMONS, ALLISON G	
			ART UNIT	PAPER NUMBER
			1778	
			NOTIFICATION DATE	DELIVERY MODE
			01/30/2019	ELECTRONIC

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte BO KI HONG and KOOK IL HAN

Appeal 2018-001196
Application 14/182,436
Technology Center 1700

Before MARK NAGUMO, JEFFREY B. ROBERTSON, and
JENNIFER R. GUPTA, *Administrative Patent Judges*.

GUPTA, *Administrative Patent Judge*.

DECISION ON APPEAL¹

Appellant² appeals under 35 U.S.C. § 134(a) from the Examiner's final decision rejecting claims 9–17.³ We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

¹ In this Decision, we refer to the Specification filed February 18, 2014 (“Spec.”), the Final Office Action dated December 29, 2016 (“Final Act.”), the Appeal Brief filed June 30, 2017 (“Br.”), and the Examiner’s Answer dated September 15, 2017 (“Ans.”).

² Appellant is the Applicant, Hyundai Motor Company, which, according to the Appeal Brief, is the real party in interest. Br. 1.

³ Independent claim 18 is withdrawn from consideration by the Examiner as directed to a non-elected invention. Final Act. 2.

The subject matter on appeal relates to a method for manufacturing a gas diffusion layer (GDL) for fuel cell applications. Spec. 1, ll. 8–9. Independent claim 9, reproduced below from the Claims Appendix with emphasis to highlight a key disputed limitation, is illustrative of the claims on appeal.

9. A method of manufacturing a compressible gas diffusion layer (GDL) for fuel cell applications, the fuel cell comprising a polymer electrolyte membrane, catalyst layers, gas diffusion layers and bipolar plates, wherein each of the gas diffusion layers is attached to an outer surface of each of the catalyst layers coated on both sides of the polymer electrolyte membrane, each of the bipolar plates is attached to an outer surface of each of the gas diffusion layers and is composed of a major flow field having a longer accumulated length of the flow field channels and a minor flow field having a shorter accumulated length of the flow field channel than the major flow field, and each of the gas diffusion layers has a width direction perpendicular to a major flow field direction of each of the bipolar plates and a length direction which is in parallel with the major flow field direction of each of the bipolar plates, the method comprising:

a first step of providing, by a GDL material supply means, a rolled compressible GDL material having a dual layer structure including a microporous layer and a macroporous substrate which is formed of carbon fiber felt, or carbon fiber paper, *wherein a machine direction of the rolled compressible GDL material is an inherent high stiffness direction and a cross-machine direction thereof is a low stiffness direction,*

a second step of determining, by an angle determining means, a certain angle (q) formed by the machine direction of the inherent high stiffness of the compressible GDL material and the major flow field direction of each of the bipolar plates such that the machine direction of the inherent high stiffness of the compressible GDL material is not in parallel with the major flow field direction of the bipolar plate to reduce the

compressible GDL's intrusion into flow field channels of the bipolar plate being in contact with the compressible GDL, and

a third step of cutting, by a cutting means, the rolled compressible GDL material according to the certain angle determined in the second step, to make the compressible GDL in which the inherent high stiffness direction of the compressible GDL is arranged in one direction and the inherent high stiffness direction of the compressible GDL is not parallel with the length direction of the compressible GDL.

Br. 14 (Claims App.).

Independent claim 17 is similar to independent claim 9. *Id.* at 16 (Claims App.). Appellant's arguments are directed to features common to both independent claims 9 and 17. Br. 8–12.

REJECTIONS

The Examiner maintains the following rejections on appeal (Final Act. 3–18; Ans. 2–18):

Rejection 1: Claims 9–17 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement;

Rejection 2: Claims 9–17 under 35 U.S.C. § 112, second paragraph, as indefinite;

Rejection 3: Claims 9–11, 16, and 17 under 35 U.S.C. § 103(a) over U.S. DEP'T OF ENERGY FLORIDA SOLAR ENERGY CENTER, DOE CONTRACT NO. DE-FC36-06G016028, PROCEDURE FOR PERFORMING PEM SINGLE CELL TESTING, (2009) ("DOE") and Mathias et al. (US 2005/0042500 A1, published February 24, 2005) ("Mathias") or over Mathias and DOE in view of WO 97/13287 (published April 10, 1997) ("WO '287"), and Zuber et al. (US 2002/0051901 A1, published May 2, 2002) ("Zuber");

Rejection 4: Claims 12 and 13 under 35 U.S.C. § 103(a) over DOE and Mathias or alternatively over Mathias and DOE in view of WO '287, Zuber, and Beattie et al. (US 2002/0058180 A1, published May 16, 2002) (“Beattie”); and

Rejection 5: Claims 14 and 15 under 35 U.S.C. § 103(a) over DOE and Mathias or alternatively over Mathias and DOE in view of WO '287, Zuber, and Connors et al. (US 2007/0087120 A1, published April 19, 2007) (“Connors”).

DISCUSSION

We review the appealed rejections for error based upon the issues identified by Appellant and in light of the arguments and evidence produced thereon. *Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential) (cited with approval in *In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011) (“[I]t has long been the Board’s practice to require an applicant to identify the alleged error in the examiner’s rejections”). After considering the evidence presented in this Appeal and each of Appellant’s arguments, we are not persuaded that Appellant identifies reversible error except where otherwise explained below. Thus, where we affirm the Examiner’s rejection, we do so for the reasons expressed in the Final Office Action, the Answer, and below.

Rejection 1

The Examiner finds that claims 9–17 fail to comply with the written description requirement because there is no support in the original disclosure for the terms “GDL material supply means,” “an angle determining means,” and “a cutting means.” Final Act. 3.

Appellant argues that the terms “GDL material supply means,” “an angle determining means,” and “a cutting means” are not new matter because “[t]hese terms can be considered well-known or conventional process within the related arts, which needs not to be disclosed in detail.” Br. 8.

Appellant’s argument is not persuasive of reversible error. As the Examiner explains, to comply with the written description requirement, the Appellant’s Specification must “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.” *Carnegie Mellon Univ. v. Hoffmann-La Roche Inc.*, 541 F.3d 1115, 1122 (Fed. Cir. 2008) (quoting *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563–64 (Fed. Cir. 1991)).

Appellant does not substantively dispute that the terms “GDL material supply means,” “an angle determining means,” and “a cutting means” recited in claims 9 and 17 are means-plus-function limitations not disclosed in the Specification. *See* Br. 8. Nor do Appellants demonstrate with sufficient factual evidence that the disputed terms are generally understood terms of art. *See id.* Thus, we sustain the rejection of claims 9–17 under 35 U.S.C. § 112, first paragraph.

Rejection 2

Claims 9 and 17 recite “each of the gas diffusion layers is attached to an outer surface of each of the catalyst layers coated on both sides of the polymer electrolyte membrane” and “each of the bipolar plates is attached to an outer surface of each of the gas diffusion layers.” Ans. 5–6. The Examiner determines that these recitations are indefinite because it is unclear how every gas diffusion layer can be attached to the outer surface of

every catalyst layer and also unclear how every bipolar plate can be attached to an outer surface of every gas diffusion layer. *Id.*

Appellant persuasively argues that the language identified by the Examiner is not indefinite because when read in light of the Specification it is clear that the language refers to one of the diffusion layers being attached to an outer surface of one of the catalyst layers and to one of the bipolar plates being attached to an outer surface of one of the diffusion layers, which is sufficiently disclosed and exemplified by Appellant's Specification.

Br. 8–9. Thus, we do not sustain this portion of the Examiner's indefiniteness rejection.

Additionally, the Examiner concludes that claims 9–17 are indefinite because claims 9 and 17 recite means-plus-function language invoking pre-AIA 35 U.S.C. 112, sixth paragraph, for example, a “GDL material supply means,” “an angle determining means,” and “a cutting means,” but the Specification fails to provide an adequate description of any structure for performing the recited function. Final Act. 6.

Appellant does not dispute this portion of the Examiner's indefiniteness rejection or direct us to any structure associated with the function recited in independent claims 9 and 17. *See* Br. 8–9. Thus, we sustain this portion of the Examiner's indefiniteness rejection.

Although we sustain the rejection of claims 9–17 as indefinite, as will be seen, we need not speculate about the meaning of the indefinite language in order to consider the merits of the rejection under 35 U.S.C. § 103(a).

Rejections 3–5

We focus our discussion on independent claims 9 and 17, each of which is directed to a method of manufacturing a compressible gas diffusion

layer (GDL) for fuel cell applications, and each of which requires that “a machine direction of the rolled compressible GDL material is an inherent high stiffness direction.”

The dispositive issue with regard to the Examiner’s § 103(a) rejections is: Has the Examiner reversibly erred in finding that Mathias teaches that “a machine direction of the rolled compressible GDL material is an inherent high stiffness direction,” as required by independent claims 9 and 17? We answer this question in the affirmative.

The Examiner finds that Mathias teaches a rolled gas diffusion layer (GDL) material that is cut at an angle such that the machine direction of the inherent high stiffness of the GDL is not parallel with the major flow field direction of the intended bipolar plate to reduce the compressible GDL’s intrusion into the flow field channels of the bipolar plate. Final Act. 9–11. Specifically, the Examiner finds that Mathias teaches a GDL that “has a stiffness in a width direction perpendicular to a major flow field direction of a bipolar plate.” *Id.* at 10–11 (citing Mathias ¶ 8 (disclosing the stiffness is the rigid (transverse) axis in the cross-machine direction); Mathias ¶ 21 (disclosing the x-direction (transverse axis, i.e. high-stiffness) is perpendicular to the flow field channels); Mathias ¶¶ 25, 35 (disclosing that the x-direction (i.e., the low flexibility, low stiffness direction) is aligned with the predominant direction (i.e., parallel with the flow channel)). The Examiner finds that it is clear from Mathias’s teachings that “a major flow field direction of the bipolar plate is not parallel with the high stiffness direction (transverse direction) of the gas diffusion layer.” Final Act. 11.

Appellant argues that Mathias teaches that the cross machine direction rather than the machine direction of the gas diffusion layer is the high stiffness direction. Br. 11.

Appellant's argument is persuasive of reversible error. Although the Examiner's findings discussed above are supported by Mathias's disclosure, the Examiner fails to appreciate that Mathias also teaches that the cross-machine direction of its gas diffusion layer material is a high stiffness direction. Mathias ¶ 29 (teaching that the tensile modulus of elasticity property aligned with the cross-machine direction is high). Thus, we are persuaded that the Examiner erred in finding that Mathias teaches that the machine direction of the rolled compressible GDL material is the inherent high stiffness direction, as required by independent claims 9 and 17. The Examiner does not provide a reason to modify Mathias's diffusion media production process to meet the claimed recitation. *See* Final Act. 9–18.

Each of the Examiner's § 103(a) rejections rely on the deficient teachings of Mathias discussed above. *Id.* The Examiner does not make any findings that DOE, WO '287, Zuber, Beattie, and/or Connors cure the deficiency of Mathias. *See id.* Accordingly, we do not sustain the rejections of claims 9–17 under 35 U.S.C. § 103(a).

DECISION

The rejection of claims 9–17 under 35 U.S.C. § 112, first paragraph, is affirmed.

The rejection of claims 9–17 under 35 U.S.C. § 112, second paragraph, is affirmed.

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The rejection of claims 9–11, 16, and 17 under 35 U.S.C. § 103(a) over DOE and Mathias in view of WO '287, and Zuber is reversed.

The rejection of claims 12 and 13 under 35 U.S.C. § 103(a) over DOE and Mathias in view of WO '287, Zuber, and Beattie is reversed.

The rejection of claims 14 and 15 under 35 U.S.C. § 103(a) over DOE and Mathias in view of WO '287, Zuber, and Connors is reversed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED