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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte THERESA CHANG, DAVID FERRUGHELLI,
ROBERT RANDALL HANCOCK JR., TRISTA NICOLE HESCH,
RANDALL D. PARTRIDGE, and EMMANUEL ULYSSES

Appeal 2018-006268
Application 13/907,126
Technology Center 1700

Before ELIZABETH M. ROESEL, MONTÉ T. SQUIRE, and
BRIAN D. RANGE, *Administrative Patent Judges*.

SQUIRE, *Administrative Patent Judge*.

DECISION ON APPEAL¹

Appellant² appeals under 35 U.S.C. § 134(a) from the Examiner’s final decision rejecting claims 1–10 and 14–20, which are all of the claims pending in this application.³ We have jurisdiction under 35 U.S.C. § 6(b).

¹ In this Decision, we refer to the Specification filed May 31, 2013 (“Spec.”); Final Office Action dated May 1, 2017 (“Final Act.”); Advisory Action dated July 31, 2017 (“Advisory Act.”); Appeal Brief filed Dec. 6, 2017 (“Appeal Br.”); Examiner’s Answer dated Mar. 22, 2018 (“Ans.”); and Reply Brief filed May 22, 2018 (“Reply Brief”).

² We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42(a). Appellant identifies Corning Incorporated as the real party in interest. Appeal Br. 2.

³ Claims 11–13 are cancelled. *See* Claims Listing entered July 17, 2017.

We AFFIRM.

CLAIMED SUBJECT MATTER

Appellant's claimed subject matter relates to methods for coating polymeric membranes onto porous ceramic supports. Spec. ¶¶ 2, 6; Abstract. Claim 1, the sole independent claim, illustrates the claimed subject matter on appeal and is reproduced below from the Claims Appendix to the Appeal Brief:

1. A method for preparing a polymer membrane on a porous support, the method comprising:

providing a porous support having an outer wall, a first end, a second end, and porous channel surfaces that define a plurality of channels through the porous support from the first end to the second end, the plurality of channels comprising membrane channels defined by membrane-channel surfaces;

placing the porous support in a coating vessel comprising a vessel wall extending from a first end plate of the coating vessel to a second end plate of the coating vessel, wherein the vessel wall comprises ***at least one port such that fluidic communication between the at least one port and the plurality of channels occurs only through the outer wall of the porous support;***

applying a vacuum to the at least one port on the vessel wall thereby establishing a pressure differential between the outer wall and the plurality of channels that draws a fluid from the plurality of channels through the outer wall of the porous support;

drawing a pre-polymer coating solution through the membrane-channel surfaces, thereby applying the pre-polymer coating solution to at least the membrane-channel surfaces while maintaining the

pressure differential to form a pre-polymer layer on the membrane-channel surfaces; and
curing the pre-polymer layer to form the polymer membrane.

Appeal Br. 19 (key disputed claim language italicized and bolded).

REFERENCES

The Examiner relies on the following prior art references as evidence in rejecting the claims on appeal:

Name	Reference	Date
Craun et al. (“Craun”)	US 5,252,637	Oct. 12, 1993
Okajima et al. (“Okajima”)	US 6,403,224 B1	June 11, 2002
Jiang et al. (“Jiang”)	US 2009/0110873 A1	Apr. 30, 2009
Pattil et al. (“Pattil”)	US 2010/0059441 A1	Mar. 11, 2010
Komoda et al. (“Isomura”)	EP 1070533 A1	Jan. 24, 2001

REJECTIONS

On appeal, the Examiner maintains (Ans. 3) the following rejections:

1. Claims 1–10 are rejected under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Jiang in view of Isomura in view of Pattil. (“Rejection 1”). Final Act. 3.

2. Claims 14–20 are rejected under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Jiang in view of Isomura in view of Pattil in view of Craun in view of Okajima (“Rejection 2”). *Id.* at 6.

OPINION

Having considered the respective positions advanced by the Examiner and Appellant in light of this appeal record, we affirm the Examiner’s rejections based on the fact-finding and reasoning set forth in the Answer,

Advisory Action, and Final Office Action, which we adopt as our own. We add the following primarily for emphasis.

Rejection 1

The Examiner rejects claims 1–10 under § 103(a) as obvious over the combination of Jiang, Isomura, and Pattil (Final Act. 3–5), which we refer to as Rejection 1. In response to the Examiner’s rejection, Appellant presents argument for the patentability of claims 1–10 as a group. Appeal Br. 7. We select claim 1 as representative and claims 2–10 stand or fall with claim 1. 37 C.F.R. § 41.37(c)(1)(iv).

The Examiner determines that the combination of Jiang, Isomura, and Pattil suggests a method for manufacturing an inorganic/organic hybrid membrane structure satisfying all of the limitations of claim 1 and concludes the combination would have rendered the claim obvious. Final Act. 3–4. The Examiner relies on the combination of Jiang and Pattil for suggesting the majority of the limitations of the claim. *Id.* at 3–4 (citing Jiang, Abstract, Figs. 2A, 2B, 4, ¶¶ 64, 69, 77, 78, 108, 110; Pattil, Abstract, ¶¶ 20, 26).

Regarding the “at least one port such that fluidic communication between the at least one port and the plurality of channels occurs only through the outer wall of the porous support,” recitation of claim 1, the Examiner relies on Isomura for teaching or suggesting that element of the claim. *Id.* at 3–4. In particular, the Examiner finds Isomura teaches a coating apparatus used in the manufacture of a filter, which comprises a

pump for supplying coating material into a substrate and a port⁴ that only has fluid communication with the interior of the substrate via the outer wall of the substrate. *Id.* at 3–4 (citing Isomura ¶¶ 1, 83–87).

Based on the above findings, the Examiner concludes

it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the coating apparatus of Jiang with that of Isomura because both are used to successfully deposit a coating on the interior of a porous substrate.

Id. at 4.

Appellant argues principally the Examiner’s rejection should be reversed because the Examiner has not provided reasoning or rationale for one of ordinary skill in the art to modify Jiang in view of Isomura and Pattil to arrive at the claimed invention. Appeal Br. 9–14; Reply Br. 3–9.

Appellant argues that, in contrast to the Examiner’s rejection, one of ordinary skill would not have modified Jiang in view of Isomura because the references are not directed to applying the same types of materials to the same types of substrate. Appeal Br. 10. In particular, Appellant contends Jiang is directed to applying a polymer membrane to a substrate with small pore sizes, generally a pore size less than 3 μm ; while Isomura, on the other hand, is directed to applying a ceramic coating to a substrate with relatively large pore sizes, ranging from 0.05 to 50 μm . *Id.* at 10–11.

⁴ At page 4 of the Final Office Action, it appears the Examiner incorrectly identifies element 13 of Figure 4 of Isomura as a “port” (*but see* Isomura ¶ 7 (referencing “vacuum pump 13”). We note, however, Appellant does not specifically raise this as an issue or argue the Examiner’s finding in this regard in either the Appeal or the Reply Briefs.

Appellant further argues that Isomura does not comprise a “plurality of channels,” as recited in the claim and “there is no reason or rationale for one of ordinary skill in the art to have expected that the pressure differential disclosed in Isomura would provide any benefit to an interior channel of a substrate.” *Id.* at 11.

Appellant also argues one of ordinary skill in the art would have recognized the “fundamental differences between Jiang and Isomura” and “conclude[d] that there is no reason or rationale to have modified the method of Jiang with the method and apparatus of Isomura.” *Id.* at 11; *see also id.* at 13 (arguing the Examiner does not “provide reasoning with any technical underpinning to address how this result is predictable given the fundamental differences between Jiang and Isomura”).

We do not find Appellant’s arguments persuasive of reversible error in the Examiner’s rejection based on the Examiner’s fact-finding and reasoning provided at pages 3–5 of the Answer and pages 3–4 of the Final Office Action, which we find is supported by a preponderance of the evidence. Jiang, Abstract, Figs. 2A, 2B, 4, ¶¶ 64, 69, 77, 78, 108, 110; Isomura, Fig. 4, ¶¶ 1, 83–87; Pattil, Abstract, ¶¶ 20, 26.

Contrary to what Appellant argues, we find the Examiner does provide a reasonable basis to evince why one of ordinary skill in the art would have combined the teachings of the cited art to arrive at the claimed invention. As the Examiner finds (Final Act. 3–4), both Jiang and Isomura teach analogous processes for applying a coating material onto an interior channel of a porous substrate utilizing a vacuum. Jiang, Abstract, Figs. 2A, 2B, 4, ¶ 108; Isomura, Fig. 4, ¶¶ 1, 83–87. As the Examiner further finds (Ans. 3), Isomura teaches, in the context of forming a filter, a process that

utilizes a vacuum applied to the outer circumference side of the substrate 1 to assist in deposition (Isomura ¶ 86), which is an alternative to Jiang's process whereby a vacuum is applied to the end of the substrate to form a filter (Jiang ¶ 108).

As the Examiner explains (Ans. 3–5; Final Act. 4), it would have been obvious to one of ordinary skill in the art to have modified Jiang's coating process to utilize a vacuum applied to the outer circumference side of the substrate, as taught by Isomura, because both Jiang and Isomura are analogous processes known in the art for depositing a coating on the interior of a porous substrate, and one of ordinary skill would have had a reasonable expectation of success in doing so. Indeed, it is well-settled that the mere substitution of one equivalent for another known in the art is likely to be obvious when it does no more than yield predictable results. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 416 (2007) (“The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.”).

Appellant fails to direct us to persuasive evidence or provide an adequate technical explanation to establish why the Examiner's articulated reasoning lacks a rational underpinning or is otherwise based on some other reversible error.

Appellant's argument that Jiang and Isomura are not directed to applying the same types of materials to the same types of substrate (Appeal Br. 10) is not persuasive because it is premised on what Appellant contends each reference teaches individually, and not the combined teachings of the cited references as a whole and what the combined teachings would have suggested to one of ordinary skill in the art. One cannot show

non-obviousness by attacking references individually where the rejection is based on a combination of references. *See In re Keller*, 642 F.2d 413,425 (CCPA1981).

Contrary to what Appellant’s argument seems to imply, the Examiner’s rejection does not require applying the coating material used in Isomura to Jiang’s substrate. Rather, as previously discussed, the rejection involves modifying Jiang’s coating process to utilize a vacuum applied to the outer circumference side of the substrate, as taught by Isomura.

Appellant’s contentions that “Jiang is directed to applying a coating to a substrate with small pore sizes” (Appeal Br. 10) and “Isomura is directed to applying a coating to a substrate with large pore sizes” (*id.* at 10–11) are not well-taken because they are unsupported by persuasive evidence in the record. Rather, as Appellant seems to acknowledge in footnote 1 at the bottom of page 10 of the Appeal Brief, Jiang and Isomura actually disclose substrates having pore size ranges, which overlap. *See* Jiang ¶ 44 (disclosing “a median pore size of 25 microns or less”); Isomura ¶ 25 (disclosing a “pore size of 0.05 to 50 μm ”).

Moreover, as the Examiner finds (Ans. 3–4), because both Jiang’s and Isomura’s deposition processes are analogous, one of ordinary skill would have reasonably expected the vacuum to be capable of acting on the coating material through the substrate pores. *See* Jiang ¶ 108 (disclosing the “vacuum can be applied until a suitable pressure (e.g., 150 mmHg) is achieved”); Isomura ¶ 86 (disclosing that “a differential filtration pressure was applied between the outer circumference side of the substrate **1** and the inside of the through-hole **17** by evacuating the inside of the vacuum chamber **6** at a reduced pressure of 0.1 atm”).

Appellant’s argument that “the substrate of Isomura does not comprise a ‘plurality of channels’” (Appeal Br. 11) is misplaced and not persuasive of reversible error in the Examiner’s rejection because the Examiner does not rely on Isomura for teaching that element of the claim. *Keller*, 642 F.2d at 425. Rather, as the Examiner finds (Final Act. 3), Jiang is relied upon for teaching the “plurality of channels” recitation claim 1. *See* Jiang, Figs. 2A, 2B, ¶ 89 (identifying a “plurality of inner channels **12**”).

We find equally unpersuasive Appellant’s assertions that “there is no reason or rationale for one of ordinary skill in the art to have expected that the pressure differential disclosed in Isomura would provide any benefit to an interior channel of a substrate” (Appeal Br. 11) and “no reason or rationale to have modified the method of Jiang with the method and apparatus of Isomura” (*id.* at 11) because they are conclusory and unsupported by persuasive evidence in the record. *In re De Blauwe*, 736 F.2d 699, 705 (Fed. Cir. 1984).

Accordingly, we affirm the Examiner’s rejection of claims 1–10 under pre-AIA 35 U.S.C. § 103(a) as obvious over the combination of Jiang, Isomura, and Pattil.

Rejection 2

The Examiner rejects claims 14–20 under § 103(a) as obvious over the combination of Jiang, Isomura, Pattil, Craun, and Okajima (Final Act. 6–8), which we refer to as Rejection 2.

In response to the Examiner’s rejection, Appellant presents arguments for the patentability of claims 14–20 as a group. Appeal Br. 15. We select claim 14 as representative and claims 15–20 stand or fall with claim 14. 37 C.F.R. § 41.37(c)(1)(iv).

Claim 14 is reproduced below from the Claims Appendix to the Appeal Brief:

14. The method of claim 10, ***wherein the pre-polymer coating solution is an oil-in water emulsion*** comprising:
- an aqueous phase;
 - an oil phase dispersed in the aqueous phase and containing the polymer precursor in the water-immiscible organic solvent; and
 - a surfactant.

Appeal Br. 21 (Claims Appendix) (key disputed claim language italicized and bolded).

The Examiner determines that the combination of Jiang, Isomura, Pattil, Craun, and Okajima suggests a method satisfying all of the limitations of claim 14 and concludes the combination would have rendered the claim obvious. Final Act. 6.

Appellant argues the Examiner's rejection of claim 14 should be reversed for the same reasons previously presented above in response to the Examiner's rejection of claim 1. Appeal Br. 15–16; Reply Br. 10. We do not find this argument persuasive for principally the same reasons discussed above for affirming the Examiner's rejection of claim 1.

Appellant further argues that the Examiner's rejection of claim 14 should be reversed because "Craun and Okajima do not provide any reason or rationale for one of ordinary skill in the art to use the coatings disclosed in these references on a porous support" and one of ordinary skill in the art would not have had a reasonable expectation of success in doing so. Appeal Brief 16; *see also* Reply Br. 11–12 (same).

Appellant's argument is not persuasive because it is premised on what Appellant contends the Craun and Okajima references teach individually and not the combined teachings of the cited references as a whole and what the combined teachings would have suggested to one of ordinary skill in the art. *Keller*, 642 F.2d 413,425 (CCPA1981).

As the Examiner explains (Ans. 5), Craun and Okajima are relied upon for teaching the form of the coating, i.e. an aqueous emulsion, and as evidentiary support to explain why it would have been preferable to one of ordinary skill in the art to have used an aqueous emulsion as an alternative to using an organic solvent. Craun 2:47–53, 3:23–26; Okajima 11:41–58; *see also KSR*, 550 U.S. at 420 (explaining that any need or problem known in the art can provide a reason for combining the elements in the manner claimed).

Moreover, based on the Examiner's fact-finding and reasoning provided at page 5 of the Answer and page 6 of the Final Office Action, we find a preponderance of the evidence and sound technical reasoning support the Examiner's findings and determination that it would have been obvious to one of ordinary skill to have arrived at the claimed invention based on the combined teachings of the cited art. Jiang, Abstract, Figs. 2A, 2B, 4, ¶¶ 64, 69, 77, 78, 108, 110; Isomura, Fig. 4, ¶¶ 1, 83–87; Pattil, Abstract, ¶¶ 20, 26; Craun 2:47–53, 3:23–26, 4:36–68, 5:34–52; Okajima 11:41–58.

Appellant's mere disagreement as to the Examiner's factual findings and reasoning for combining the references, without more, is insufficient to establish reversible error. *SmithKline Beecham Corp. v. Apotex Corp.*, 439 F.3d 1312, 1320 (Fed. Cir. 2006) (“[M]ere statements of disagreement . . . as to the existence of factual disputes do not amount to a developed

argument.”); *see also In re Geisler*, 116 F.3d 1465, 1470 (Fed. Cir. 1997) (explaining that mere lawyer’s arguments or conclusory statements, which are unsupported by concrete factual evidence, are entitled to little probative value).

Accordingly, we affirm the Examiner’s rejection of claims 14–20 under 35 U.S.C. § 103(a) as obvious over the combination of Jiang, Isomura, Pattil, Craun, and Okajima.

CONCLUSION

In summary:

Claim(s) Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1–10	103(a)	Jiang, Isomura, Pattil	1–10	
14–20	103(a)	Jiang, Isomura, Pattil, Craun, Okajima	14–20	
Overall Outcome			1–10, 14–20	

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a) (1)(iv).

AFFIRMED