

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BUTAMAXTM ADVANCED BIOFUELS LLC
Petitioner

v.

GEVO, INC.
Patent Owner

Case IPR2013-00215
Patent 8,283,505 B2

Before JENNIFER S. BISK, RAMA G. ELLURU, and
CHRISTOPHER L. CRUBMLEY, *Administrative Patent Judges*.

ELLURU, *Administrative Patent Judge*.

DECISION
Institution of *Inter Partes* Review
37 C.F.R. § 42.108

ButamaxTM Advanced Biofuels LC (“Butamax”) filed a Petition (Paper 2) (“Pet.”) to institute an *inter partes* review of claims 1-18 of Patent 8,283,505 B2 (the “’505 patent”) pursuant to 35 U.S.C. § 311 *et seq.* Patent Owner Gevo, Inc. (“Gevo”) filed a preliminary response (Paper 7) to the Petition. We have jurisdiction under 35 U.S.C. § 314. For the reasons that follow, the Board has determined to institute an *inter partes* review.

I. BACKGROUND

The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a):

THRESHOLD – The Director may not authorize an *inter partes* review to be instituted unless the Director determines that the information presented in the petition filed under section 311 and any response filed under section 313 shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.

Butamax challenges claims 1-18 as unpatentable under 35 U.S.C. § 103(a). Pet. 10-59. We grant the Petition as to claims 1-18 on all asserted grounds.

The ’505 patent, entitled “Recovery of Higher Alcohols from Dilute Aqueous Solutions,” was issued on October 9, 2012, based on Application 13/344,460 (“the ’460 application”), filed January 5, 2012. The ’460 application is a continuation of Application 12/342,992 (“the ’992 application”), filed on December 23, 2008 (U.S. Patent No. 8,101,808 (“the ’808 patent”)). Pet. 3. In addition to its present petition, Butamax concurrently filed a petition for *inter partes* review of U.S. Patent No. 8,304,588 (“the ’588 patent”) (IPR2013-00214), which issued from an application that is also a continuation of the ’992 application. Pet. 3.

Butamax informs us of related litigations captioned *Butamax(TM) Advanced Biofuels LLC v. Gevo, Inc.*, No. 12-1301 (SLR) (D. Del. Oct. 8, 2012), involving the '505 patent; and *Gevo, Inc. v. Butamax(TM) Advanced Biofuels LLC*, No. 12-70 (SLR) (D. Del. Jan. 24, 2012), involving the '808 patent. *Id.* at 3.

A. *Statutory Threshold Issues*

1. *Real Party-in-Interest*

Gevo argues that Butamax fails to identify Dupont as a real party-in-interest pursuant to 35 U.S.C. § 312(a)(2). Prelim. Resp. 3-8. According to Gevo, “DuPont is a real party in interest because . . . DuPont is a privy of [Butamax] based on the fact that [Butamax] is a wholly owned joint venture between DuPont and BP Biofuels North America LLC, an indirect subsidiary of BP p.l.c.” Prelim. Resp. 4.

We are not persuaded that DuPont is a “real party-in-interest” with respect to this proceeding. Whether a non-party is a “real party-in-interest” or “privy” for purposes of an *inter partes* review proceeding is a “highly fact-dependent question” that takes into account how courts generally have used the terms to “describe relationships and considerations sufficient to justify applying conventional principles of estoppel and preclusion.” *Office Patent Trial Practice Guide*, 77 Fed. Reg. 48756, 48759 (Aug. 14, 2012) (“Trial Practice Guide”). The *Trial Practice Guide* provides guidance regarding factors to consider in determining whether a party is a real party-in-interest. A primary consideration includes whether a non-party exercises control over a petitioner’s participation in a proceeding. *Id.* at 48759-60. Other considerations may include whether a non-party, in conjunction with control, funds the proceeding and directs the proceeding. *Id.* at 48760.

Gevo has not set forth persuasive evidence that DuPont exercises control over or is funding this proceeding. While Gevo contends that, for example, Gevo “believes” DuPont exercised or could have exercised control over Butamax’s participation in this proceeding through its involvement in the filing of the Petition (Prelim. Resp. 6); that Butamax’s board of directors includes at least one or more members that are also directors at DuPont (*id.* at 7); and that Butamax’s declarant has an ongoing relationship with DuPont (*id.*), these allegations do not establish DuPont’s control over or funding of this proceeding.

Furthermore, the mere fact that DuPont and Butamax may have a mutual interest in the Board’s review of the ’505 patent (Prelim. Resp. 5-6) does not necessarily make DuPont a real party-in-interest. *Trial Practice Guide*, 77 Fed. Reg. 48759 (the Office’s prior application of real party-in-interest principles in the *inter partes* reexamination context offers additional guidance); *see, e.g.*, Reexamination of U.S. Patent No. 6,374,180, Reexamination Control No. 95/001,852, (Dec. 13, 2011) at p. 4 (“[C]ommon interest among litigation defendants seeking to invalidate or defend against enforcement of a patent,” the USPTO explained, “does not translate *ipso facto* into each defendant being a real party in interest where a request for reexamination is filed by only one of the defendants in the litigation.”).

In the alternative, Gevo requests that the Board: (1) issue a show cause order to Butamax to establish the real parties-in-interest of the current proceeding, or (2) authorize Gevo to file a motion to take discovery to establish that DuPont is a real party-in-interest. Prelim. Resp. 8, n.3. We determine that Gevo’s Patent Owner Preliminary Response has not justified granting such a request at this juncture.

2. *Prior Consideration of References by Examiner*

Gevo maintains that the Petition should be denied because “each of the [asserted] grounds is based on the same, or substantially the same, prior art and arguments considered by the Examiner previously presented to the Office by, and considered by the Examiner, during prosecution of the ’505 patent” pursuant to 35 U.S.C. § 315(d)¹. Prelim. Resp. 15-16.

Pursuant to section 315(d), we have the discretion to determine to how an *inter partes* review may proceed. We decline to exercise our discretion to reject the petition based upon Butamax’s asserted reason because, as explained in more detail below, we conclude that Butamax’s arguments with respect to the asserted prior art have merit and that Butamax has demonstrated a reasonable likelihood that the prior art references render the challenged claims unpatentable.

3. *The Declaration of Andrew J. Daugulis, Ph.D., P.Eng.*

Butamax presents testimony of Dr. Andrew J. Daugulis to support the proposed grounds of unpatentability. Ex. 1007 (“Daugulis Decl.”). Gevo maintains that Dr. Daugulis’ declaration lacks credibility because of his relationship with DuPont and the declaration’s omission of aspects relating to this relationship. Prelim. Resp. 13-15. This argument is not persuasive. Dr. Daugulis’ qualifications include receiving a Ph.D. in Chemical Engineering from Queen’s University in Kingston, Ontario, Canada. Ex. 1007 ¶ 8. In addition, he has been a Professor in the Department of Chemical Engineering at that University since 1989. *Id.* at ¶ 10. Dr.

¹ The Board interprets Gevo’s argument with respect to section 325(d), which governs post grant review proceedings, as referring to section 315(d), which governs *inter partes* review proceedings.

Daugulis also has published more than 150 papers in peer-reviewed international journals in the areas of chemical engineering, biofuel production, and fermentation processes. *Id.* at ¶ 11. In light of Dr. Daugulis's qualifications, that Dr. Daugulis has a business relationship with DuPont (not a real party-in-interest, as discussed above) does not convince us that Dr. Daugulis's opinion on the patentability of the challenged claims lacks credibility.

Gevo also contends that Dr. Daugulis' testimony provides no analysis or articulated technical rationale to support its conclusions and, therefore, is entitled to little or no weight. Prelim. Resp. 9-12. On the record before us, we find that the portions of Dr. Daugulis's declaration that we rely upon in this decision are supported by credible analysis and technical rationale and further are consistent with the teachings in the prior art. Furthermore, to the extent Gevo disagrees with Butamax's declarant, Gevo may submit the testimony of its own declarant and/or cross-examine Butamax's declarant.

B. The '505 Patent (Ex. 1001)

The '505 patent relates to a method for recovering C3-C6 alcohols, including isobutanol, from dilute aqueous solutions, such as fermentation broths. Ex. 1001, Abstract; 9:57-58. The Specification discloses several embodiments that, for example, include culturing a microorganism in a fermentation medium to produce the C3-C6 alcohol. *Id.* at 4:9-11. In some embodiments, the aqueous solution (*e.g.*, fermentation medium) can be distilled wherein the alcohol and water are vaporized to form an alcohol-depleted liquid phase and an alcohol-enriched vapor phase comprising alcohol and water. *Id.* at 12:36-41; 23:17-21. The method may include condensing the alcohol-enriched vapor phrase to form an alcohol-rich liquid

phase and a water-rich liquid phase and separating the two phases. *Id.* at 4:5-7, 5:19-23, 17:27-29, 45:66-67, 46:26-27. The alcohol-depleted liquid phase may be returned to the fermentation unit. *Id.* at 13:17-20.

C. Exemplary Claims

Claim 1 of the '505 patent is the only independent claim, while claims 2-18 depend directly from claim 1. Claim 1 is representative of the challenged claims and is reproduced below:

1. A method for producing isobutanol comprising:
 - (a) culturing a microorganism capable of producing isobutanol in a fermentor, thereby forming a fermentation broth comprising microorganisms and isobutanol;
 - (b) removing a portion of the fermentation broth from the fermentor;
 - (c) distilling the portion, thereby forming an isobutanol-depleted liquid phase and an isobutanol-enriched vapor phase comprising water and isobutanol;
 - (d) condensing the isobutanol-enriched vapor phase formed in step (c), thereby forming an isobutanol-rich liquid phase and a water-rich liquid phase; and
 - (e) separating the isobutanol-rich phase liquid from the water-rich liquid phase using a liquid-liquid separator;wherein:
 - (1) said steps (b)-(e) are conducted simultaneously with step (a);
 - (2) the isobutanol-depleted liquid phase comprises viable microorganisms; and
 - (3) the isobutanol-depleted liquid phase is returned to the fermentor.

D. The Prior Art

Butamax relies on the following prior art:

English US 4,349,628 Sep. 14, 1982 (Ex. 1002)

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Bramucci US 2008/0124774 A1 May 29, 2008 (Ex. 1004)
D'Amore US 2008/0132741 A1 Jun. 05, 2008 (Ex. 1003)

B.L. Maiorella et al., "Economic Evaluation of Alternative Ethanol Fermentation Processes," *Biotechnology and Bioengineering*, vol. XXVI, 1003-1025 (1984). (Ex. 1005)

Glenn Hess, "BP and DuPont Plan 'Biobutanol,'" *Chemical & Engineering News*, June 26, 2006, at 9. (Ex. 1006)

Further, as noted above, Butamax relies upon declaration testimony of its witness, Andrew J. Daugulis, Ph.D. Ex. 1007.

E. The Asserted Grounds

Butamax challenges claims 1-18 of the '505 patent on the following grounds:

Claims 1, 9, 10, and 13-17 under 35 U.S.C. § 103(a) as unpatentable over English and D'Amore;

Claims 2-8, 11, 12, and 18 under 35 U.S.C. § 103(a) as unpatentable over English, D'Amore, and Bramucci;

Claims 1, 9, 10, and 13-17 under 35 U.S.C. § 103(a) as unpatentable over Maiorella, Hess, and D'Amore; and

Claim 2-8, 11, 12, and 18 under 35 U.S.C. § 103(a) as unpatentable over Maiorella, Hess, D'Amore, and Bramucci. Pet. 10.

Gevo's arguments include that Butamax's petition should be denied because the four proposed grounds of unpatentability are cumulative and duplicative of each other. Prelim. Resp. 22-23. We decline to exercise our discretion to deny any of the asserted grounds for that reason.

II. ANALYSIS

A. Claim Interpretation

Consistent with the statute and legislative history of the America Invents Act (AIA), the Board interprets claims using the “broadest reasonable construction in light of the specification of the patent in which [they] appear[.]” 37 C.F.R. § 42.100(b); *see also Trial Practice Guide*, 77 Fed. Reg. 48766. There also is a “heavy presumption” that a claim term carries its ordinary and customary meaning. *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002).

For purposes of this decision, we construe terms in claims 1-18 according to their ordinary and customary meaning and determine that no term needs further construction at this time.

B. Asserted Grounds of Unpatentability

Butamax contends that under 35 U.S.C. § 103(a), claims 1-18 are unpatentable based on the four asserted grounds identified above. Pet. 11-59. We conclude that Butamax has established a reasonable likelihood of prevailing on all four grounds for the reasons explained below.

1. Obviousness of claims 1, 9, 10, and 13-17 over the Combination of English and D’Amore

Butamax contends that the combination of English and D’Amore renders obvious claims 1, 9, 10, and 13-17. Based on the evidence of record and Butamax’s detailed argument, we are persuaded that there is a reasonable likelihood that Butamax will prevail in establishing that claims 1, 9, 10, and 13-17 would have been obvious over those references. Pet. 11-26.

English discloses a process for the manufacture of ethanol, or a like volatile organic compound such as butanol. Ex. 1002, Abstract. English’s

disclosure includes the production of ethanol, or a like volatile compound, by fermenting a carbohydrate with a microorganism. *Id.* at 1:57-61, 3:47-52. English further teaches continuously transferring a portion of the fermentation broth to a separator where the ethanol or like volatile compound is evaporated from the fermentation broth at a temperature which is not deleterious to the microorganisms. *Id.* at 1:57-2:3, 7:50-8:5. In addition, English describes recycling the residual liquid in the separator, which contains viable microorganisms, back to the fermenter. *Id.* at 1:57-2:3, 7:61-63; Ex. 1007, ¶ 29.

D'Amore discloses producing isobutanol by culturing microorganisms in the presence of carbohydrates. Ex. 1003, ¶¶ 0023, 0056. Moreover, D'Amore specifically teaches recovering isobutanol from a fermentation medium by using azeotrope distillation to produce a vapor phase comprising an isobutanol-water azeotrope, condensing the vapor phase to form isobutanol-rich and water-rich phases, and separating the two phases. *Id.* at ¶¶ 0039, 0057.

Gevo maintains that Butamax has failed to establish a reasonable likelihood that claims 1, 9, 10, and 13-17 are unpatentable over the combination of English and D'Amore. Prelim. Resp. 27-36. Gevo makes the following arguments.

Claim 1

Gevo argues that Butamax's declarant "take[s] the position that English in isolation is sufficient to recover isobutanol from a fermentation broth" but that that statement is false because English's processes would not be capable of purifying a heterogeneous aqueous azeotrope, such as isobutanol. Prelim. Resp. 28-30. Gevo mischaracterizes Butamax's

argument. Butamax maintains that claims 1, 9, 10 and 13-17 are unpatentable under 35 U.S.C. § 103 (a) over the *combination* of English and D'Amore. Pet. 11-26.

Gevo also argues that modifying English's processes by condensing the alcohol/water vapor produced after English's flash distillation, followed by separating the liquid-liquid phases "would change the fundamental principles of operation of the process, and thereby result in a fundamentally different type of process." Prelim. Resp. 29. Gevo describes the proposed ground of unpatentability as "combining one portion of the English process, as shown in English Figure 2, with another portion of the process of D'Amore Figure 2, to arrive at the invention of claim 1." *Id.* at 33. Gevo contends that such a modification disregards the heat integration and intended concentration of ethanol taught by English. *Id.* at 32-35. Thus, Gevo maintains that the proposed modification would render the prior art invention inoperable for its unintended purpose, thereby obviating a motivation by a person of ordinary skill to combine the references. *Id.* at 34-35. Gevo's argument is unpersuasive.

Gevo's argument improperly is based on what each reference teaches separately, and not on the teachings of the combined references. As the Federal Circuit has explained, "[t]he test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference Rather, the test is what the combined teachings of those references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). Both English and D'Amore teach distilling a fermentation medium to recover their respective alcohols. Ex. 1002, 4:26-33, 7:50-62; Ex. 1003, ¶ 0039. Importantly,

D'Amore specifically teaches that “[f]or fermentation processes in which isobutanol is the predominant alcohol, dry *isobutanol can be recovered by azeotropic distillation.*” *Id.* (emphasis added). D'Amore's distillation forms a vapor phase comprising isobutanol and water. *Id.* D'Amore further describes the claimed steps of condensing the vapor phase to form isobutanol-rich and water-rich phases and separating the two phases. *Id.* at ¶¶ 0039, 0057. Gevo has not demonstrated that it was beyond the skill of a person of ordinary skill to modify English's alcohol recovery processes with the processes for recovering isobutanol, as taught by D'Amore.

Furthermore, Gevo's argument that the proposed modification would render the English process inoperative for its intended purposes is unavailing. The purpose of English is to recover an alcohol from a fermentation medium, and as discussed further below, Butamax identifies a reason to combine the teachings of English and D'Amore to recover isobutanol as required by claim 1.

Reason to Combine

We credit Dr. Daugulis' opinion that a person of ordinary skill would have had reason to combine the teachings of English and D'Amore in a manner that yields the claimed invention. For example, both references are directed to the production and recovery of volatile alcohols, such as ethanol or isobutanol, from a fermentation medium. Ex. 1007, ¶ 41. Therefore, we conclude that the claims merely combine known elements (fermenting and distilling volatile alcohols) for their known purpose to achieve a predictable result (recovering alcohol). *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007).

For the foregoing reasons, we conclude that there is a reasonable likelihood that Butamax will prevail on the ground that independent claim 1 is unpatentable as obvious over English and D'Amore. We further conclude that there is a reasonable likelihood that Butamax will prevail on the ground that dependent claims 9, 10, and 13-17, the patentability of which Gevo has not argued separately (prelim. resp. 36), are unpatentable for the same reasons.

2. Obviousness of claims 2-8, 11, 12, and 18 over the Combination of English, D'Amore, and Bramucci

Butamax contends that the combination of English, D'Amore, and Bramucci renders obvious claims 2-8, 11, 12, and 18. Based on the evidence of record and Butamax's detailed argument, we are persuaded that there is a reasonable likelihood that Butamax will prevail in establishing that claims 2-8, 11, 12, and 18 would have been obvious over those references. Pet. 27-34.

Claims 2-8, 11, and 12

Dependent claims 2-8 require that the isobutanol-enriched vapor phase recited in claim 1 has a specific isobutanol concentration that is greater than the isobutanol concentration of the portion of the fermentation broth. Dependent claims 11 and 12 require that the ratio of isobutanol to water in the isobutanol-rich liquid phase is greater than the ration of isobutanol to water in the fermentation broth by a specified amount.

The disclosures of English and D'Amore are discussed above. Bramucci explains that butanol toxicity to host microorganisms limits the production of butanols by fermentation. Ex. 1004, ¶ 0005. We credit Dr. Daugulis's testimony that a person of ordinary skill would have had a reason

to optimize the ratio of isobutanol to water in the fermentation medium to a level that maintains the viability of the host microorganisms. Ex. 1007, ¶¶ 64-65. In addition, a skilled artisan would have known to use microorganisms, which produce isobutanol and grow in 2.4% w/v isobutanol, as taught by Bramucci. *Id.* at ¶¶ 65-66. Furthermore, D'Amore discloses an isobutanol-enriched vapor leaving a distillation process having a 67% by weight isobutanol. Ex. 1003, ¶ 0038. We are persuaded that based on the teachings of the prior art, a person of ordinary skill in the art would have been able to achieve the isobutanol concentrations and ratios required by dependent claims 2-18, 11, and 12 by routine optimization. Ex. 1007, ¶¶ 68-71. *See In re Boesch*, 617 F.2d 272, 276 (CCPA 1980) (“[D]iscovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art.” (citation omitted)); *In re Aller*, 220 F.2d 454, 456 (CCPA 1955) (citing *In re Dreyfus*, 73 F.2d 931 (CCPA 1934)); *Id.* (“[W]here the general conditions of a claims are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” (citing *In re Swain*, 156 F.2d 239 (CCPA 1946); *Minnesota Mining & Mfg. Co. v. Coe*, 99 F.2d 986 (D.C. Cir. 1938); *Allen v. Coe*, 135 F.2d 11 (D.C. Cir. 1943))).

Claim 18

Claim 18 requires that: (1) the distilling of claim 1 is carried out at a certain pressure and temperature, (2) the isobutanol-enriched vapor phase comprises an azeotrope of isobutanol and water and has a certain isobutanol concentration, and (3) the isobutanol-rich liquid phase has a certain ratio of isobutanol to water. English teaches the claimed pressure and temperature. Ex. 1002, 1:64-68, 7:50-60; Ex. 1007, ¶ 74. Furthermore, D'Amore

describes distilling a fermentation medium, wherein isobutanol is the predominant alcohol, to remove a vapor phase comprising an isobutanol-water azeotrope. Ex. 1003, ¶ 0039. Thus, when the English process is modified to produce isobutanol, it operates under similar conditions to the flash tank of Figure 2 of the '505 patent. Ex. 1002, 7:50-58; Ex.1001, 25:27-36; Ex. 1007, ¶ 73. We credit the opinion of Dr. Daugulis that a skilled artisan would have had reason to optimize the ratio of isobutanol to water in the fermentation medium and the distillation conditions of the modified English process to maximize the amount of isobutanol recovered and minimize the amount of water in the isobutanol-rich liquid phase. Ex. 1007, ¶¶ 36, 68, 71, 74. Thus, the optimized English process would achieve the claimed concentration and ratio of isobutanol. Pet. 32-34. *See In re Boesch*, 617 F.2d at 276; *In re Aller*, 220 F.2d at 456.

Gevo maintains that Butamax has failed to establish a reasonable likelihood that dependent claims 2-8, 11, 12, and 18 are unpatentable over the combination of English, D'Amore, and Bramucci. Prelim. Resp. 37-38. Gevo asserts the same arguments against the instant asserted ground as discussed above with respect to the patentability of independent claim 1 over the combination of English and D'Amore. *Id.* For the reasons discussed above, we determine that Gevo's arguments lack merit.

For the foregoing reasons, we conclude that there is a reasonable likelihood that Butamax will prevail on the ground that claims 2-8, 11, 12, and 18 are rendered unpatentable as obvious over English, D'Amore, and Bramucci.

*3. Obviousness of claims 1, 9, 10, and 13-17 over the Combination of
Maiorella, Hess, and D'Amore*

Butamax contends that the combination of Maiorella, Hess, and D'Amore renders obvious claims 1, 9, 10, and 13-17. Based on the evidence of record and Butamax's detailed argument, we are persuaded that there is a reasonable likelihood that Butamax will prevail in establishing that claims 1, 9, 10, and 13-17 would have been obvious over those references. Pet. 35-49.

Maiorella discloses a fermentation process for the manufacture of ethanol. Ex. 1005, Abstract. Maiorella further describes cycling the fermenting medium through a selective ethanol recovery device to recover a concentrated ethanol product for distillation and an ethanol depleted fermentation medium for recycling to the fermentor for further reaction. Ex. 1005, 1005:1, ¶ 3; 1010:1 ¶ 1; 1015:2, ¶ 2; Fig. 17.

Hess discloses converting an ethanol fermentation facility to produce butanol. Ex. 1006, 9:1, ¶ 2. D'Amore teaches that butanol and isobutanol share many common features that allow separation schemes devised for butanol to be applied to isobutanol. Ex. 1003, ¶¶ [0037]. Moreover, a person of ordinary skill in the art would have understood that isobutanol is an isomer of butanol. Ex. 1007, ¶ 26. Thus, we determine that based on Hess, a person of ordinary skill in the art would have understood that an ethanol production process could be modified to produce isobutanol. The D'Amore disclosures are discussed above.

Gevo maintains that Butamax has failed to establish a reasonable likelihood that independent claims 1, 9, 10, and 13-17 are unpatentable over the combination of Maiorella, Hess, and D'Amore. Prelim. Resp. 38-41. Gevo makes the following arguments, which are similar to the arguments

made in support of the patentability of the claims 1, 9, 10, and 13-17 over English and D'Amore.

Claim 1

Gevo argues that Maiorella “does not provide sufficient data to allow any meaningful economic comparisons between the different ‘fermentation schemes’ disclosed therein, or between different process conditions for a particular ‘scheme.’” Prelim. Resp. 38-39. Gevo’s argument is misplaced because the challenged claims do not require an economic comparison of fermentation schemes. *See Oakley, Inc., v. Sunglass Hut Int’l*, 316 F.3d 1331, 1339 (Fed. Cir. 2003) (Both anticipation and obviousness are two step inquiries; the first step is to determine the scope and meaning of the claims being challenged, and the second step in the analysis requires a comparison of the properly construed claim to the prior art.).

Gevo also argues that Maiorella does not describe processes commercially suitable for purifying a heterogeneous azeotrope, such as isobutanol. Prelim. Resp. 39. Gevo further contends that:

[M]odifying any of the processes disclosed in Maiorella to include condensing the alcohol/water vapor produced after (flash) distillation, followed by feeding the condensed alcohol/water vapor to a liquid-liquid separator (*e.g.*, decanter) would, as discussed above for English, result in a fundamentally different type of process which would not be capable of purifying ethanol to a purity of 95 wt. % (*i.e.*, inoperable and unsuitable for its intended purpose).

Prelim. Resp. 40.

As discussed above, this argument lacks merit because Gevo refers to what each reference teaches separately. Rather, the obviousness test is what the *combined* teachings of those references would have suggested to those of

ordinary skill in the art. *In re Keller*, 642 F.2d at 425. Gevo has not demonstrated that it was beyond the skill of a person of ordinary skill to modify Maiorella's alcohol recovery processes with the processes for recovering isobutanol, as taught by D'Amore. In addition, the proposed modification would not render the Maiorella process inoperative for its intended purpose of recovering an alcohol. As discussed further below, Butamax identifies a reason to combine the teachings of Maiorella, Hess, and D'Amore.

Reason to Combine

We credit Dr. Daugulis' opinion that a person of ordinary skill would have had reason to combine the teachings of Maiorella, Hess, and D'Amore in a manner that yields the claimed invention. For example, all three references are directed to the production and recovery of volatile alcohols, such as ethanol or isobutanol, from a fermentation medium. Ex. 1007, ¶ 77. Therefore, we conclude that the claims merely combine known elements (fermenting and distilling volatile alcohols) for their known purpose to achieve a predictable result (recovering alcohol). *See KSR Int'l Co.*, 550 U.S. at 416.

For the foregoing reasons, we conclude that there is a reasonable likelihood that Butamax would prevail on the ground that independent claim 1 is unpatentable as obvious over Maiorella, Hess, and D'Amore. We further conclude that there is a reasonable likelihood that Butamax would prevail on the ground that dependent claims 9, 10, and 13-17, the patentability of which Gevo has not argued separately (Prelim. Resp. 41), are unpatentable for the same reasons.

4. Obviousness of claims 2-8, 11, 12, and 18 over the Combination of Maiorella, Hess, D'Amore, and Bramucci

Butamax contends that the combination of Maiorella, Hess, D'Amore, and Bramucci renders obvious claims 2-8, 11, 12, and 18. Based on the evidence of record and Butamax's detailed argument (Pet. 49-57), we are persuaded that there is a reasonable likelihood that Butamax will prevail in establishing that claims 2-8, 11, 12, and 18 would have been obvious over those references.

Gevo maintains that Butamax has failed to establish a reasonable likelihood that independent claims 2-8, 11, 12, and 18 are unpatentable over the combination of Maiorella, Hess, D'Amore, and Bramucci. Prelim. Resp. 42. Gevo asserts the same arguments against the instant asserted ground as discussed above with respect to the patentability of independent claim 1 over the combination of Maiorella, Hess, D'Amore, and Bramucci. *Id.* For the reasons discussed above, we determine that Gevo's arguments lack merit.

For the foregoing reasons, we conclude that there is a reasonable likelihood that Butamax would prevail on the ground that claims 2-8, 11, 12, and 18 are rendered unpatentable as obvious over Maiorella, Hess, D'Amore, and Bramucci.

C. Hindsight

Gevo contends that the asserted combinations of references are deficient because they are based on the hindsight combination of arbitrarily selected processes within the asserted references. Prelim. Resp. 31-32, 36. We are not persuaded by this argument. As set forth above, Butamax has established that person of ordinary skill would have had reason to select the identified teachings from the references.

D. Conclusion

We conclude that Butamax has demonstrated a reasonable likelihood of prevailing on the following grounds of unpatentability asserted in the Petition:

Claims 1, 9, 10, and 13-17 under 35 U.S.C. § 103(a) as unpatentable over English and D'Amore;

Claims 2-8, 11, 12, and 18 under 35 U.S.C. § 103(a) as unpatentable over English, D'Amore, and Bramucci;

Claims 1, 9, 10, and 13-17 under 35 U.S.C. § 103(a) as unpatentable over Maiorella, Hess, and D'Amore, and;

Claims 2-8, 11, 12, and 18 under 35 U.S.C. § 103(a) as unpatentable over Maiorella, Hess, D'Amore, and Bramucci.

III. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that the Petition is granted as to claims 1-18 of the '505 patent;

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(a), *inter partes* review of the '505 patent is hereby instituted commencing on the entry date of this Order, and pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial;

FURTHER ORDERED that the trial is limited to the grounds and claims identified above and no other grounds are authorized as to these claims as they currently stand; and

FURTHER ORDERED that an initial conference call with the Board is scheduled for 2:00pm Eastern Time on October 21, 2013. The parties are

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directed to the Office Patent Trial Practice Guide, 77 Fed. Reg. 48756, 48765-66 (Aug. 14, 2012), for guidance in preparing for the initial conference call, and should come prepared to discuss any proposed changes to the Scheduling Order entered herewith and any motions the parties anticipate filing during the trial.

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