NOTE: This disposition is nonprecedential.

United States Court of Appeals for the Federal Circuit

THOMAS BECKMANN, ALEXANDER MASSNER,
Appellants

v.

HAREN S. GANDHI, JOHN VITO CAVATAIO, ROBERT HENRY HAMMERLE, YISUN CHENG,
Appellees

2015-1765

Appeal from the United States Patent and Trademark Office, Patent Trial and Appeal Board in Interference No. 105,822.

Decided: April 29, 2016

MICHAEL H. JACOBS, Crowell & Moring, LLP, Washington, DC, argued for appellants. Also represented by VINCENT JOHN GALLUZZO; CHIEMI SUZUKI, New York, NY.

EDWARD ANTHONY FIGG, Rothwell, Figg, Ernst & Manbeck, P.C., Washington, DC, argued for appellees. Also represented by ROBERT DANNY HUNTINGTON, BRETT ALAN POSTAL.

Before LOURIE, BRYSON, and DYK, *Circuit Judges*.

Opinion for the court filed by *Circuit Judge* LOURIE.

Opinion dissenting in part filed by *Circuit Judge* BRYSON.

LOURIE, *Circuit Judge*.

This patent appeal arises as one of a dying breed of interference proceedings before the United States Patent and Trademark Office Patent Trial and Appeal Board ("the Board") between Thomas Beckmann and Alexander Massner (collectively, "Beckmann"), the named inventors of U.S. Patent 7,584,605 ("the '605 patent"), and Haren S. Gandhi, John Vito Cavataio, Robert Henry Hammerle, and Yisun Cheng (collectively, "Gandhi"), the applicants of U.S. Patent Application 12/877,901 ("the '901 application"). Beckmann appeals from the Board's decision, which held that all of Beckmann's claims involved in the interference, *viz.*, claims 1–4 of the '605 patent, are unpatentable over the cited prior art, and that claims 5, 7, 8, and 10–17 of Gandhi's '901 application satisfy the written description requirement. *See Beckmann v. Gandhi*, Interference No. 105,822, Paper No. 114 (P.T.A.B. July 8, 2013) ("*Decision on Motions*"); *Beckmann v. Gandhi*, Interference No. 105,822, Paper No. 117 (P.T.A.B. Mar. 9, 2015) ("*Rehearing Decision*").

For the reasons that follow, we *affirm* the Board's determination that claims 3 and 4 of the '605 patent are unpatentable as obvious over the cited prior art, and that the '901 application contains an adequate written description of the "transitioning" limitation of claims 12–17, as well as the "minimizing the oxygen content" limitation of claims 7, 10, and 16. However, because the Board erred in construing claim 1 of the '605 patent as not requiring a separate and distinct third "supplying" step, we *vacate* its determination that claims 1 and 2 of the '605 patent are

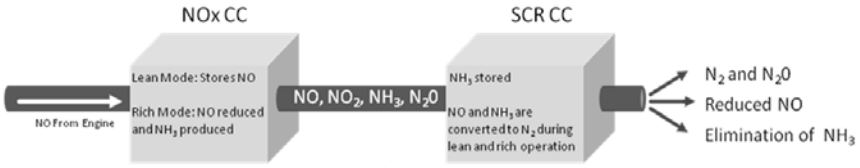
unpatentable over the cited prior art and *remand* for further proceedings under the proper claim construction. Moreover, because the Board's finding that the '901 application contains an adequate written description of the "minimizing the oxygen content . . . prior to a rich cycle" limitation of claims 5, 8, 11, and 17 is unsupported by substantial evidence, we *vacate* that finding and *remand* for further proceedings consistent with this opinion.

BACKGROUND

I

The technology at issue relates to methods of reducing nitrogen oxide ("NO_x") emissions from internal combustion engines. When an engine operates in a lean mode, a reduced amount of fuel is provided to the cylinders, which improves fuel efficiency. But operating in the lean mode produces an exhaust gas with an excess of oxidizing constituents ("lean exhaust gas"), which decreases the effectiveness of the exhaust gas purification system, leading to NO_x emissions. In contrast, a "rich exhaust gas" is one that has an excess of reducing constituents.

According to Beckmann, a prior-art solution for reducing NO_x emissions involved operating the engine alternately in lean and rich modes to produce lean and rich exhaust gases. Appellants' Br. 10. In the engine, an NO_x catalytic converter (or "lean NO_x trap") stores NO_x produced during the lean cycle, and then converts the stored NO_x to ammonia ("NH_3") during the rich cycle. A downstream selective catalytic reduction ("SCR") catalytic converter then stores the NH_3 and reacts it with any NO_x released from the NO_x catalytic converter to produce nitrogen gas N_2 for release into the atmosphere.



J.A. 1453.

When the engine switches from lean to rich mode, however, the sudden change in exhaust gas composition from lean to rich causes the direct mixing of oxidizing and reducing constituents inside the cavities of the NO_x catalytic converter. '605 patent col. 2 ll. 15–27. Such mixing impedes the efficient reduction of NO_x to NH_3, and also causes the release of a large amount of NO_x from the NO_x catalytic converter. *Id.* col. 2 ll. 27–35. That problem was known as "NO_x spike."

Beckmann's '605 patent purportedly solves the NO_x spike problem by interposing a third operating mode between the lean and rich modes. *Id.* col. 2 ll. 35–45. The third operating mode takes place after the lean mode and before the rich mode, *id.* col. 2 ll. 7–10, during which the NO_x catalytic converter is supplied with an exhaust gas that has a lower content of oxidizing constituents than the lean exhaust gas and a lower content of reducing constituents than the rich exhaust gas ("intermediate exhaust gas"), *id.* col. 2 ll. 10–14. In the third operating mode, the intermediate exhaust gas replaces the lean exhaust gas inside the cavities of the NO_x catalytic converter, which mitigates the NO_x spike problem. *Id.* col. 2 ll. 46–61.

The '605 patent has four claims, among which claims 1 and 3 are independent. Claims 2 and 4 depend from claims 1 and 3, respectively. Claim 1 reads as follows:

> 1. A method for purifying the exhaust gas from an internal combustion engine having an exhaust-gas purification system including a nitrogen oxide storage catalytic converter and an SCR catalytic converter downstream of the nitrogen

> oxide storage catalytic converter, comprising the *steps* of:
>
> *supplying* the nitrogen oxide storage catalytic converter with exhaust gas containing an excess of oxidizing constituents ["the lean step"];
>
> *supplying* the nitrogen oxide storage catalytic converter with exhaust gas containing an excess of reducing constituents ["the rich step"]; and
>
> *supplying* the nitrogen oxide storage catalytic converter, *between the oxidizing constituents supplying step and the reducing constituents supplying step, with an exhaust gas which has a lower content of oxidizing constituents than in the oxidizing constituents supplying step and a lower content of reducing constituents than in the reducing constituents supplying step* ["the intermediate step"],
>
> *wherein the step between the oxidizing constituents supplying step and the reducing constituents supplying step is terminated at the earliest when the nitrogen oxide storage catalytic converter is predominantly filled by exhaust gas delivered in step between the oxidizing constituents supplying step and the reducing constituents supplying step*.

Id. col. 13 ll. 15–39 (emphases added).

Claim 3 recites the same preamble and lean and rich steps as claim 1, but a different intermediate step and wherein clause, which are reproduced below.

> 3. . . .
>
> *supplying* the nitrogen oxide storage catalytic converter, between the oxidizing constitu-

> ents supplying step and the reducing constituents supplying step, for *a predetermined period* with *a constant exhaust gas composition* which has a lower content of oxidizing constituents than in the oxidizing constituents supplying step and a lower content of reducing constituents than in the reducing constituents supplying step ["the intermediate step"],
>
> *wherein* in step of supplying the nitrogen oxide storage catalytic converter between the oxidizing constituents supplying step and the reducing constituents supplying step, an *air/fuel ratio which set to control exhaust gas composition* is set to be slightly greater than 1, such that the oxidizing constituents in the exhaust gas have an oxygen excess of 1% or less.

Id. col. 14 ll. 11–36 (emphases added).

II

In 2010, Gandhi filed the '901 application, which is a continuation in a series of applications, including U.S. Patent Application 10/065,470 ("the '470 application"). The '470 application was issued as U.S. Patent 7,332,135 ("Gandhi '135"), which is prior art to Beckmann's '605 patent. Gandhi's '901 application and Gandhi '135 share the same specification in relevant part.

In the Background section, the '901 application describes the NO_x spike problem that "occurs during the short period in which the NO_x trap transitions from lean to rich," and states that "FIG. 1a [shows] that during this lean-rich transition, NO_x spikes, the large peaks of unreacted NO_x," account for significant NO_x emissions. J.A. 502. Then, in the Summary of the Invention section, the '901 application states that the NO_x spike problem was

solved "with the use of an NH_3-SCR catalyst placed downstream of the lean NO_x adsorber catalyst."[1] J.A. 503. The '901 application explains that "[t]he advantage of the catalyst system of this invention is the use of a combination of a lean NO_x trap and an NH_3-SCR catalyst." J.A. 505. Additionally, in paragraph 41, the '901 application states that: "For this invention, the lean NO_x trap is optimized for ammonia generation by *removing oxygen storage capacity* (OSC) and thereby enhancing the rich cycle and thus creating a greater quantity of ammonia for reaction with the NO_x in the downstream NH_3-SCR catalyst." *Id.* (emphasis added).

When filing the '901 application, Gandhi added claims 3–17, seeking to provoke an interference with Beckmann. Gandhi's claim 3 was copied from, and thus is identical to, claim 1 of the '605 patent. Although none of Gandhi's other claims, *viz.*, claims 4–17, is completely identical to any of Beckmann's claims, Gandhi stated that claims 4–11 "are substantially identical to, and have been copied from," Beckmann's claim 1, and that claims 12–17 "correspond substantially to" Beckmann's claim 1. J.A. 515.

Claims 5, 8, 11, and 17 of the '901 application each contain a "minimizing the oxygen content . . . prior to a rich cycle" limitation. J.A. 507–08, 510–13. Claim 5 is illustrative and reads as follows:

> 5. A method for reducing pollutants in the exhaust gas of an engine having a system including a nitrogen oxide adsorber and a NH_3-SCR catalyst downstream of the nitrogen oxide adsorber, comprising the steps of:

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[1] Here, the '901 application refers to the NO_x catalytic converter as a lean NO_x adsorber catalyst, and the SCR catalytic converter as an NH_3-SCR catalyst.

> supplying the nitrogen oxide adsorber with exhaust gas while the engine operates under lean conditions, wherein the exhaust gas is a lean exhaust gas;
>
> transitioning the engine operations from lean to rich conditions[;]
>
> supplying the nitrogen oxide adsorber with exhaust gas during said transitioning;
>
> *minimizing the oxygen content of the nitrogen oxide adsorber prior to rich conditions* to facilitate the reduction of NO_x to NH_3;
>
> completing the transition from lean to rich conditions; and
>
> supplying the nitrogen oxide adsorber with exhaust gas while the engine operates under rich conditions, wherein the exhaust gas is a rich exhaust gas.

J.A. 507, 510 (emphasis added). Claims 7, 10, and 16 each contain the limitation "the oxygen content of the lean NO_x trap is minimized to facilitate the reduction of NO_x to NH_3," but those claims do not include any "prior to a rich cycle" language. J.A. 508, 511–12. Claims 8, 11, and 17 depend from claims 7, 10, and 16, respectively.

Claim 12 and its dependent claims 13–17 require "transitioning" between a lean exhaust gas supplying step and a rich exhaust gas supplying step and "completing said transition." Claim 12 reads as follows:

> 12. A method for purifying the exhaust gas from an engine, comprising:
>
> supplying a zoned catalyst system with a lean exhaust gas, wherein said zoned catalyst system comprises a first zone of lean NO_x

> trap and a second zone of SCR catalyst downstream of the first zone;
>
> supplying the zoned catalyst system with a rich exhaust gas;
>
> *transitioning between said lean exhaust gas supplying step and said rich exhaust gas supplying step, wherein exhaust gas is supplied to said zoned catalyst system during said transition*; and
>
> *completing said transition from said lean exhaust gas supplying step to said rich exhaust gas supplying step*.

J.A. 508, 512 (emphases added).

III

In July 2011, the Board declared Interference No. 105,822 between Gandhi's '901 application and Beckmann's '605 patent. The interference involves a sole count corresponding to claims 1–4 of the '605 patent and claims 3–17 of the '901 application. The Count is identical to Beckmann's claim 1 and Gandhi's claim 3. When declaring the interference, the Board accorded Gandhi the benefit of the '470 application, filed in October 2002, and accorded Beckmann the benefit of an application filed in October 2003.[2] *Id.* Based on those filing dates, the Board designated Gandhi as the senior party.

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[2] Because both the '901 application and the '605 patent have effective filing dates before the enactment of the Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284 (2011), the pre-AIA versions of 35 U.S.C. §§ 102, 103, and 112 apply in this appeal. *See* Pub. L. No. 112-29, § 3(n)(1), 125 Stat. at 293.

The parties then filed several preliminary motions, including: (1) Beckmann's motion alleging that Gandhi's claims 3–5, 7, 8, and 10–17 are unpatentable for lack of written description support ("Beckmann Motion 1"); (2) Beckmann's motion alleging that Gandhi's claims 3, 4, 6, 9, and 12 are unpatentable in view of European Patent Publication EP 0 814 241 ("Kinugasa '241"), U.S. Patent 6,109,024 ("Kinugasa '024"), and U.S. Patent Publication 2003/0056499 ("Binder '499") ("Beckmann Motion 2"); and (3) Gandhi's motion alleging that Beckmann's claims 1–4 are unpatentable in view of Gandhi '135 and U.S. Patent 6,604,504 ("Surnilla '504") ("Gandhi Motion 1"). The Board decided the parties' motions in the following order: (1) Beckmann Motion 1; (2) Beckmann Motion 2; and (3) Gandhi Motion 1. *Decision on Motions* at 4.

First, the Board denied Beckmann Motion 1, finding that Gandhi's claims 3–5, 7, 8, and 10–17 are not unpatentable for lack of written description support. *Id.* at 7–24. Beckmann raised three separate written description challenges: (1) that Gandhi's claims 3 and 4, copied from Beckmann, must be construed in light of the '605 patent as requiring a third exhaust gas supplying step that is (a) separate and distinct from the lean and rich exhaust gas supplying steps and (b) controlled in terms of exhaust gas composition and duration, and that Gandhi's '901 application lacks an adequate written description of such a third supplying step; (2) that Gandhi's '901 application lacks an adequate written description of the "transitioning" limitation of claims 12–17; and (3) that Gandhi's '901 application lacks an adequate written description of the "minimizing the oxygen content" limitation of claims 5, 7, 8, 10, 11, 16, and 17.

With respect to Gandhi's claims 3 and 4, the Board recognized the differences between Beckmann's and Gandhi's disclosures, and agreed with Beckmann that Gandhi's '901 application does not contain a written description of a separate and distinct third exhaust gas

supplying step that is controlled in terms of exhaust gas composition and duration. *Id.* at 14–15. But the Board concluded that Gandhi's claims 3 and 4, as construed in light of Beckmann's '605 patent, *see Agilent Techs., Inc. v. Affymetrix, Inc.*, 567 F.3d 1366, 1375 (Fed. Cir. 2009), do not require such a third supplying step. *Decision on Motions* at 15–16.

Instead, the Board concluded that the claims only require that, between the lean and rich exhaust gas supplying steps, the NO_x catalytic converter "is supplied with an exhaust gas having less oxidizing constituents than lean operations and less reducing constituents than rich conditions, and that this supplying step terminates at the earliest when the lean NO_x trap is predominantly full of exhaust gas supplied during this step." *Id.* at 16. The Board also noted that the differences between Beckmann's claim 1 (which is identical to Gandhi's claim 3) and Beckmann's claim 3 (which requires "a constant exhaust gas composition" and "a predetermined period" for the third supplying step) further support its construction of Gandhi's claim 3. *Id.* at 16–19.

The Board then found that the '901 application provides an adequate written description of Gandhi's claims 3 and 4 because it describes "the short period in which the NO_x trap transitions from lean to rich," and because the claims only require "the transition between lean and rich supplying steps in which an exhaust gas having less oxidizing constituents than lean operations and less reducing constituents than rich conditions is supplied, and that this supplying step (transition step) terminates at the earliest when the lean NO_x trap is predominantly full of the exhaust gas supplied." *Id.* at 19–20.

With respect to Gandhi's claims 12–17, the Board reasoned that claim 12 does not require "a separate and distinct transition step between the supply of lean and rich exhaust gases," and that the claim "merely requires

transitioning between lean and rich conditions and completing the transition to rich conditions, as described by Gandhi's disclosure." *Id.* at 21. The Board again relied on the '901 application's description of "the short period in which the NO_x trap transitions from lean to rich" and its Figure 1a to find that the '901 application adequately describes "transitioning" between lean and rich conditions and "completing" that transition. *Id.* at 21–22.

With respect to Gandhi's claims 5, 7, 8, 10, 11, 16, and 17, the Board noted that those claims require "the minimization [of] the oxygen content in the NO_x catalytic converter *prior to the rich cycle*." *Id.* at 23 (emphasis in original). The Board found that the '901 application, especially its paragraph 41, which describes "removing oxygen storage capacity" of the lean NO_x trap, adequately describes the "minimizing" limitation. *Id.*

Next, the Board granted Beckmann Motion 2 in part, holding that Gandhi's claims 3, 4, 6, and 9, as construed in light of Gandhi's '901 application, *see Agilent*, 567 F.3d at 1375, are anticipated by, or would have been obvious over, Kinugasa '241 and Kinugasa '024. *Decision on Motions* at 24–35. The Board denied the motion as to Gandhi's claim 12, however, finding that the cited reference, Binder '499, is not prior art to Gandhi's claim 12. *Id.* at 35–41.

Pursuant to 37 C.F.R. § 41.207(c), the Board then considered whether Beckmann rebutted the presumption of cross-applicability of the prior art to its own claims, *viz.*, claims 1–4 of the '605 patent. The Board concluded that Beckmann failed to do so as to claims 1 and 2. *Id.* at 42–44. Specifically, the Board noted that Beckmann sought to overcome the presumption by making the same claim construction argument, namely, that Beckmann's claims, as construed in light of the '605 patent, require a separate and distinct third exhaust gas supplying step that is controlled in terms of exhaust gas composition and

duration. Recognizing that Beckmann's claims 3 and 4 indeed require a constant exhaust gas composition and a predetermined period for the third exhaust gas supplying step, the Board concluded that Beckmann successfully overcame the presumption as to those claims. But because the Board, when deciding Beckmann Motion 1, rejected Beckmann's proposed construction of Gandhi claim 3 and Beckmann claim 1, the Board concluded here that Beckmann failed to rebut the § 41.207(c) presumption as to its claims 1 and 2. The Board therefore held that claims 1 and 2 of the '605 patent are unpatentable over Kinugasa '241, Kinugasa '024, and Binder '499.

Last, the Board granted Gandhi Motion 1 as to Beckmann's claims 3 and 4, concluding that those claims would have been obvious over Gandhi '135 and Surnilla '504. *Id.* at 45–52. The Board acknowledged that claims 3 and 4 require a constant exhaust gas composition, a predetermined period, and a specific air/fuel ratio for the third exhaust gas supplying step. *Id.* at 48. As discussed below, the Board implicitly found that those claims require a separate and distinct third step. But it found that those features were taught or suggested by Surnilla '504. *Id.* at 48–50. In particular, the Board found that Surnilla '504 taught a stepwise transition from lean to rich conditions, which resulted in constant intermediate exhaust gas compositions over a predetermined period and reduced NO_x emissions. *Id.* at 49–50. The Board reasoned that one of ordinary skill would have been motivated to implement the stepwise transition taught by Surnilla '504 in the system disclosed by Gandhi '135 to further reduce NO_x emissions. The Board therefore concluded that claims 3 and 4 of the '605 patent would have been obvious over Gandhi '135 and Surnilla '504.

Gandhi also argued that Beckmann's claims 1 and 2 are unpatentable over Gandhi '135 and Surnilla '504. But the Board did not reach that issue because it found

Beckmann's claims 1 and 2 unpatentable over Kinugasa '241, Kinugasa '024, and Binder '499. *Id.* at 44.

Because the Board found all of Beckmann's involved claims to be unpatentable, it terminated the interference and entered judgment. *Beckmann v. Gandhi*, Interference No. 105,822, 2013 WL 3788515 (P.T.A.B. July 8, 2013). Beckmann timely requested rehearing, which the Board denied. *Rehearing Decision* at 13. Beckmann then appealed to this court. We have jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

DISCUSSION

We review the Board's legal determinations *de novo*, *In re Elsner*, 381 F.3d 1125, 1127 (Fed. Cir. 2004), and its factual findings for substantial evidence, *In re Gartside*, 203 F.3d 1305, 1316 (Fed. Cir. 2000). A finding is supported by substantial evidence if a reasonable mind might accept the evidence to support the finding. *Consol. Edison Co. v. NLRB*, 305 U.S. 197, 229 (1938).

On appeal, Beckmann argues that the Board erred in construing claims 1–4 of the '605 patent and in determining that those claims are unpatentable over the cited prior art. Beckmann also argues that the Board erred in construing claims 12–17 of Gandhi's '901 application and in finding that the '901 application provides adequate written description support for the "transitioning" limitation of those claims. Finally, Beckmann argues that the Board erred in finding that the '901 application contains an adequate written description of the "minimizing the oxygen content" limitation of claims 5, 7, 8, 10, 11, 16, and 17.[3] We address each of those arguments in turn.

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[3] Beckmann did not appeal the Board's finding that the '901 application provides adequate written description

I

We first consider whether the Board erred in construing claims 1 and 2 of the '605 patent. We review the Board's ultimate claim construction *de novo* and its underlying factual determinations involving extrinsic evidence for substantial evidence. *Microsoft Corp. v. Proxy-Proxyconn, Inc.*, 789 F.3d 1292, 1297 (Fed. Cir. 2015). Here, because the intrinsic record fully determines the proper construction, we review the Board's construction *de novo*. *See id.*

"Interference counts are given the broadest reasonable interpretation possible." *Davis v. Loesch*, 998 F.2d 963, 968 (Fed. Cir. 1993); *see also Yorkey v. Diab*, 605 F.3d 1297, 1300–01 (Fed. Cir. 2010) (stating that claims are given their broadest reasonable interpretation in an interference proceeding). "In determining the true meaning of the language of the count, the grammatical structure and syntax thereof may be instructive." *Credle v. Bond*, 25 F.3d 1566, 1571 (Fed. Cir. 1994).

When deciding Beckmann Motion 1, the Board construed Gandhi's claim 3, which is identical to Beckmann's claim 1, in light of the '605 patent specification, *see Agilent*, 567 F.3d at 1375, and rejected Beckmann's argument that the claim requires a separate and distinct third

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support for Gandhi's claims 3 and 4. *See* Appellants' Br. 2–3. That finding is therefore not at issue here. Moreover, this appeal is premised on the Board's determination that claims 1–4 of the '605 patent and claims 3–17 of the '901 application correspond to the Count. We need not decide what impact the revised construction of claim 1 of the '605 patent (which is also the interference count) would have on these issues. That is a matter for the Board in the first instance.

exhaust gas supplying step that is controlled in terms of exhaust gas composition and duration. *Decision on Motions* at 15–16. Based on that construction, when deciding Beckmann Motion 2, the Board found Beckmann's claim 1 and dependent claim 2 to be unpatentable over the cited prior art. *Id.* at 42–44.

Beckmann argues that the Board erred in construing its claim 1 as not requiring a *separate and distinct* third exhaust gas supplying step. According to Beckmann, the structure and wording of the claim demonstrate that each of the three "supplying" steps is distinct from the other two. Beckmann contends that the Board's construction improperly reads the third supplying step out of the claim and is inconsistent with the '605 patent's specification, which describes three distinct operating modes (*viz.*, lean, intermediate, and rich), solves the NO_x spike problem by supplying an intermediate exhaust gas between the lean and rich modes, and distinguishes the claimed method from prior-art methods that involved only lean and rich modes and direct transitions between those two modes.

Beckmann additionally argues that the Board erred in construing claim 1 as not requiring the third exhaust gas supplying step to be *controlled* in terms of both exhaust gas composition and duration. According to Beckmann, the claim specifies the exhaust gas composition, *viz.*, an intermediate exhaust gas with a lower level of oxidizing constituents than the lean exhaust gas and a lower level of reducing constituents than the rich exhaust gas, as well as the duration of the third supplying step, *viz.*, that the third step be "terminated" when the NO_x catalytic converter is "predominantly filled" with the intermediate exhaust gas. Beckmann contends that those limitations imply control over the exhaust gas composition and duration. Finally, Beckmann argues that the Board misapplied the principles of claim differentiation when analyzing the differences between Beckmann claim 1 and Beckmann claim 3.

Gandhi responds that the Board's construction is consistent with the plain meaning of the claim language, as well as the specification of the '605 patent. According to Gandhi, the Board properly declined to import limitations from the specification into the claim. Gandhi contends that Beckmann chose to draft its claim broadly, and that nothing in the grammar, structure, or wording of the claim requires that there be three separate and distinct exhaust gas supplying steps or that the exhaust gas composition be controlled over time during the third step. Gandhi also responds that the Board's construction does not read the third step out of the claim because the construction clearly requires that the third supplying step occur between the first and second supplying steps. Finally, Gandhi responds that the Board did not misapply claim differentiation by recognizing that Beckmann claim 1 is broader than Beckmann claim 3.

We agree with Beckmann that its claim 1 requires a third exhaust gas supplying step that is *separate and distinct* from the lean and rich exhaust gas supplying steps, but we conclude that the claim does not require that the third supplying step be *controlled* in terms of exhaust gas composition and duration.

Beginning with the language of the claim, claim 1 is directed to a method "comprising the *steps* of . . . ." '605 patent col. 13 l. 19 (emphasis added). The claim then lists three parallel "supplying" clauses, separated by line indentation, *id.* col. 13 ll. 20–32, and followed by a "wherein" clause that refers back to the three "supplying" clauses as steps, *id.* col. 13 ll. 33–39 ("wherein the *step* between the oxidizing constituents supplying *step* and the reducing constituents supplying *step* . . . delivered in *step* between the oxidizing constituents supplying *step* and the reducing constituents supplying *step*" (emphases added)). The structure of the claim thus indicates that the claimed method comprises three different supplying steps.

Moreover, both the third "supplying" clause and the "wherein" clause require the third supplying step to be *between* the first step (the oxidizing constituents supplying step or the lean step) *and* the second step (the reducing constituents supplying step or the rich step). *Id.* col. 13 ll. 26–39. Accordingly, the claim imposes a sequential requirement that the third step occur between the first and second steps.

The claim language also requires that the supplying steps be separate and distinct from each other. In each step, a *different* exhaust gas is supplied to the NO_x catalytic converter: a lean exhaust gas is supplied in the first step; a rich exhaust gas is supplied in the second step; and an intermediate exhaust gas is supplied in the third step. Each step is therefore distinctly characterized by a different exhaust gas composition that is being supplied to the NO_x catalytic converter. Moreover, the "wherein" clause requires that the intermediate exhaust gas supplying step, occurring between the lean and rich steps, be "terminated at the earliest when" the NO_x catalytic converter is "predominantly filled by exhaust gas delivered" in the step between the lean and rich steps. Thus, the "wherein" clause imposes a further limitation that the intermediate supplying step does not end, and the next supplying step does not begin, until the NO_x catalytic converter is "predominantly filled" with the intermediate exhaust gas. *Id.* col. 13 ll. 33–39.

Notably, the claim uses different terms, "supply[ ]" and "fill[ ]," and those terms carry different meanings when read in the context of the surrounding claim language. For example, during the third supplying step, an intermediate exhaust gas is "suppl[ied]" to the NO_x catalytic converter, meaning that the intermediate exhaust gas is introduced through an inlet into the NO_x catalytic converter. Inside the cavities of the NO_x catalytic converter, that exhaust gas is then mixed with the existing exhaust gas, and shortly after the intermediate exhaust

gas "predominantly fill[s]" the NO_x catalytic converter, the third supplying step terminates. This interpretation of "supply[ ]" and "fill[ ]" is consistent with the plain meaning of the claim and the specification of the '605 patent. *See, e.g.*, '605 patent col. 2 ll. 15–61, col. 4 l. 48–col. 5 l. 16, col. 7 l. 63–col. 8 l. 6, col. 8 ll. 47–59.

In rejecting Beckmann's proposed claim construction, the Board reasoned that "when operations are transitioned from lean to rich, there will be mixing between the leading edge of the rich exhaust gas and the lean exhaust gas preceding it such that intermediate exhaust gas will have a composition varying between lean and rich." *Rehearing Decision* at 4. But the Board failed to properly consider the "wherein" clause, which requires that the intermediate exhaust gas supplying step not end, and the rich exhaust gas supplying step not begin, until the NO_x catalytic converter is "predominantly filled" with the intermediate exhaust gas.

It is true that when an engine transitions directly from lean to rich, a natural consequence of that transition is the mixing of lean and rich exhaust gases at the interface to form a small amount of intermediate exhaust gas, which is then supplied transitorily into the NO_x catalytic converter. But there is no evidence that such a small amount of intermediate exhaust gas would inevitably "predominantly fill[ ]" the NO_x catalytic converter *before* the rich exhaust gas is beginning to be supplied into the converter. In those circumstances, the cavities of the NO_x catalytic converter may still be predominantly filled with the lean, rather than the intermediate, exhaust gas. As the '605 patent specification explains, a direct transition from lean to rich modes leads to the direct mixing of lean and rich exhaust gases inside the cavities of the NO_x catalytic converter, which causes the undesirable NO_x spike problem. '605 patent col. 2 ll. 21–27 ("Since the nitrogen oxide storage catalytic converter used is either a honeycomb body with passages passing through it or a

bulk bed of shaped bodies, in the event of a sudden change in the exhaust-gas composition from oxidizing to reducing, the exhaust gases of different compositions become mixed with one another in the cavities formed by these catalyst converter structures.").

We therefore conclude that the Board failed to properly consider the structure and wording of the claim and erred in construing claim 1 in an unreasonably broad manner as not requiring a separate and distinct third exhaust gas supplying step.

We agree with the Board, however, that claim 1 of the '605 patent does not require *control* over exhaust gas composition and duration of the third supplying step. Although the specification of the '605 patent describes various means for controlling the exhaust gas composition and duration of the exhaust gas supplying steps, *see, e.g.*, '605 patent col. 2 l. 62–col. 3 l. 3, col. 10 l. 59–col. 11 l. 50, those descriptions are not part of claim 1. Indeed, the language of claim 1 does not specify any means by which to *control* the exhaust gas composition and duration beyond the requirement that the NO_x catalytic converter be "suppl[ied]" with a certain type of exhaust gas in each of the supplying steps.

For the foregoing reasons, we conclude that Beckmann's claims 1 and 2 require a third exhaust gas supplying step that is separate and distinct from the other two exhaust gas supplying steps, but that the claims do not require control over exhaust gas composition and duration of the third supplying step. Accordingly, we reverse the Board's construction of claims 1 and 2 of the '605 patent.

II

We next consider whether the Board erred in construing claims 3 and 4 of the '605 patent. On appeal, Beckmann alleges that the Board erred in construing claim 3 and its dependent claim 4 as not requiring a *separate and*

distinct third exhaust gas supplying step. Appellants' Br. 20–28 (same argument as that raised for claims 1 and 2). Beckmann does not allege, however, that the Board erred by failing to construe claims 3 and 4 as requiring a third exhaust gas supplying step *controlled* in terms of both exhaust gas composition and duration. *See id.* at 28–30.

The Board did not formally construe claim 3 of the '605 patent, but the record shows that it recognized that claim 3, unlike claim 1, requires a third exhaust gas supplying step that has a constant exhaust gas composition, a specific air/fuel ratio, and a predetermined duration. *Decision on Motions* at 17, 19, 45, 48. Indeed, relying on those limitations of claim 3 not present in claim 1, the Board concluded that Beckmann overcame the presumption under 37 C.F.R. § 41.207(c) for claims 3 and 4, but not for claims 1 and 2. *Id.* at 43–44.

By correctly recognizing that claim 3 requires a third exhaust gas supplying step with a constant exhaust gas composition, a specific air/fuel ratio, and a predetermined duration, the Board implicitly construed claim 3 as requiring a third intermediate exhaust gas supplying step that is separate and distinct from the lean and rich steps. Beckmann's argument to the contrary is without merit.

We therefore conclude that the Board did not err in construing claims 3 and 4 of the '605 patent.

III

We next consider whether the Board erred in concluding that claims 3 and 4 of the '605 patent would have been obvious over Gandhi '135 and Surnilla '504. Obviousness is a question of law based on underlying factual findings. *In re Baxter*, 678 F.3d 1357, 1361 (Fed. Cir. 2012). Those factual inquiries include what a reference teaches, *In re Beattie*, 974 F.2d 1309, 1311 (Fed. Cir. 1992), and the existence of a reason to combine references, *In re Hyon*, 679 F.3d 1363, 1365–66 (Fed. Cir. 2012).

The Board found that Gandhi '135 discloses the lean and rich exhaust gas supplying steps, but does not disclose a third exhaust gas supplying step with a constant exhaust gas composition, a predetermined duration, and a specific air/fuel ratio as required by claim 3. *Decision on Motions* at 48. The Board nevertheless found that Surnilla '504 discloses or suggests those features. *Id.* The Board also found that one of ordinary skill in the art would have been motivated to combine those references to achieve the claimed invention. *Id.* at 51.

On appeal, Beckmann argues that Surnilla '504 does not disclose the exact composition of exhaust gas supplied to the lean NO_x trap. According to Beckmann, Surnilla '504 only discloses the composition of exhaust gas supplied to an "emission control device" 32 upstream to the NO_x trap 34. Beckmann argues that emission control device 32 is an unknown device, and that the Board erred in finding that component 32 is necessarily a three-way catalyst. Gandhi responds that substantial evidence supports the Board's finding on what the prior art teaches and the Board's finding that there would have been a reason to combine Gandhi '135 and Surnilla '504.

We conclude that substantial evidence supports the Board's finding that Surnilla '504 teaches or suggests a third exhaust gas supplying step with a constant exhaust gas composition, a predetermined period, and a specific air/fuel ratio as required by claim 3. In particular, the Board correctly found that Surnilla '504 discloses controlling engine operations to achieve constant compositions of intermediate exhaust gas when transitioning between lean and rich conditions. Surnilla '504 col. 6 ll. 8–37; *id.* fig.3 & fig.4. Surnilla '504 achieves this by sequentially stepping down the air/fuel ratio provided to each of four cylinders from a lean ratio to a rich ratio. *Id.* col. 4 l. 64–col. 5 l. 6; *id.* fig.2. As the Board correctly found, in the Surnilla '504 process, when three of the four cylinders are stepped down, the combined air/fuel ratio is slightly

greater than 1, and at that point, the exhaust gas necessarily has an excess oxygen content of 1% or less. Further, the Board properly found that Surnilla '504 discloses that each of the down-steps involves a specific, predetermined wait period. Those factual findings are all supported by substantial evidence.

We are also unpersuaded by Beckmann's argument that the Board made a reversible error by finding that Surnilla '504 discloses that component 32 is a three-way catalyst. As the Board noted, Surnilla '504 explains that three-way catalysts are also referred to as emission control devices, *id.* col. 1 ll. 31–32, and then refers to component 32 as an emission control device, *id.* col. 4 l. 52. Substantial evidence therefore supports the Board's finding that emission control device 32 is a three-way catalyst.

It is true that Surnilla '504 also refers to component 34 as an emission control device, *id.*, and later refers to 34 as an NO_x trap, *id.* col. 6 ll. 11–12, suggesting that an emission control device could be an NO_x trap. But for obviousness, we consider not only what a reference necessarily discloses, but also what that reference would have suggested to one of ordinary skill in the art. Here, in view of the teachings of Surnilla '504 as a whole, we conclude that the Board did not err in finding that Surnilla '504 teaches or suggests the limitations of claim 3 not otherwise disclosed by Gandhi '135.

Accordingly, for the foregoing reasons, the Board did not err in concluding that claims 3 and 4 would have been obvious over Gandhi '135 and Surnilla '504.

IV

We next consider whether the Board erred in finding claims 1 and 2 of the '605 patent to be unpatentable over Kinugasa '241, Kinugasa '024, and Binder '499. When granting Beckmann Motion 2 in part, the Board deter-

mined that Beckmann's claims 1 and 2 are also unpatentable because Beckmann failed to rebut the presumption of cross-applicability of prior art to those claims under 37 C.F.R. § 41.207(c). But that determination is premised on an erroneous construction that claim 1 and dependent claim 2 do not require a separate and distinct third exhaust gas supplying step. Because we reverse the Board's construction of claim 1, we vacate its determination that claims 1 and 2 are unpatentable over Kinugasa '241, Kinugasa '024, and Binder '499, and remand for further proceedings under the proper claim construction.

The Board did not decide whether claims 1 and 2 of the '605 patent would have been obvious over Gandhi '135 and Surnilla '504, an issue raised by Gandhi. On remand, the Board will have an opportunity to address that issue.

V

We next consider whether the Board erred in construing claims 12–17 of the '901 application and in finding that the '901 application has an adequate written description of the "transitioning" limitation of those claims.

Sufficiency of written description is a question of fact, which we review for substantial evidence. *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc). Claims must be sufficiently supported by the written description of a patent, such that the disclosure "reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Id.* "[W]hen a party challenges written description support for an interference count or the copied claim in an interference, the originating disclosure provides the meaning of the pertinent claim language." *Agilent*, 567 F.3d at 1375. "When a party challenges a claim's validity under § 102 or § 103, however, this court and the Board must interpret the claim in light of the specification in which it appears." *Id.*

Beckmann argues that, when deciding the written description motion, the Board made a legal error by construing Gandhi's claims 12–17 in light of the specification and prosecution history of Gandhi's '901 application, contrary to *Agilent*. Beckmann contends that the proper construction requires the "transitioning" step to be separate and distinct. Under that construction, Beckmann argues, the '901 application lacks an adequate written description of the "transitioning" limitation because the application does not contain any express or inherent disclosure of a separate third exhaust gas supplying step controlled in terms of both exhaust gas composition and duration.

Gandhi responds that the Board's construction is consistent with Beckmann's '605 patent specification. Gandhi argues that the Board referred to extrinsic evidence only to support its understanding as to the plain meaning of the claim terms and to find written description support in the '901 application. Gandhi also responds that the Board properly declined to import limitations from the specification into the claims, and properly construed the claims as not requiring a separate and distinct transition step. Finally, Gandhi responds that substantial evidence supports the Board's finding that Figure 1a and its related description in the '901 application provide an adequate written description of the "transitioning" limitation as the Board properly construed it.

We agree with Gandhi and the Board that claim 12 does not require a separate and distinct transitioning step between the lean and rich exhaust gas supplying steps, and that the plain language of the claim merely requires "transitioning" between lean and rich supplying steps and "completing" the transition from lean to rich. Here again, because the intrinsic record fully determines the proper construction, we review the Board's construction *de novo*. *See Microsoft*, 789 F.3d at 1297.

Unlike claim 3 of the '901 application, which is identical to Beckmann's claim 1, claim 12 of the '901 application only refers to "supplying" the lean and rich exhaust gases as "supplying step[s]," but does not refer to "transitioning" between the lean and rich supplying steps or "completing" the transition as a step. J.A. 508 ("*transitioning* between said lean exhaust gas *supplying step* and said rich exhaust gas *supplying step*, wherein exhaust gas is supplied to said zoned catalyst system during said transition; and *completing* said transition from said lean exhaust gas *supplying step* to said rich exhaust gas *supplying step*" (emphases added)). Moreover, claim 12 does not impose any limitation on the composition of exhaust gas being supplied during the transition to distinguish it from the lean and rich supplying steps; rather, the claim only requires that "exhaust gas [be] supplied . . . during said transition." *Id.* Accordingly, unlike Beckmann's claim 1 and Gandhi's claim 3, Gandhi's claim 12 does not require a separate and distinct transitioning step. Nor does it require a separate and distinct third exhaust gas supplying step that is controlled in terms of exhaust gas composition and duration.

The specification of the '605 patent does not compel a different conclusion. On appeal, the parties do not dispute that claim 12, purportedly copied from Beckmann, should be construed in light of the specification of the '605 patent. *See Agilent*, 567 F.3d at 1375. The '605 patent repeatedly refers to the third intermediate exhaust gas supplying step as a "third method step." '605 patent col. 4 l. 48–col. 5 l. 67. The written description of the '605 patent uses the term "transition" only once, and that isolated usage does not define the term differently from its plain meaning. *Id.* col. 5 l. 2 ("during the transition to the second method step"). Accordingly, in light of the plain claim language and the '605 patent specification, we conclude that claim 12 of the '901 application does not require a separate and distinct transitioning step.

We also agree with Gandhi that substantial evidence supports the Board's finding that the '901 application provides adequate written description support for the "transitioning" limitation of claims 12–17. Figure 1a of the '901 application illustrates the NO_x output when the engine transitions from lean to rich operations. J.A. 495. The '901 application further describes "the short period in which the NO_x trap transitions from lean to rich" and refers to Figure 1a as showing the NO_x spikes during the "lean-rich transition." J.A. 502. Indeed, on appeal, Beckmann only challenges the Board's written description finding under its proposed narrower construction.

We therefore affirm the Board's finding that the '901 application contains an adequate written description of the "transitioning" limitation of claims 12–17.

VI

Finally, we consider whether the Board erred in finding that the '901 application contains an adequate written description of the "minimizing the oxygen content" limitation of claims 5, 7, 8, 10, 11, 16, and 17.

Beckmann argues that the Board erred by relying on paragraph 41 of the '901 application, which describes "removing oxygen storage capacity" of a lean NO_x trap, to find support for the "minimizing" limitation. According to Beckmann, the Board conflated the physical characteristics of a lean NO_x trap, which is described by paragraph 41, with a method step that takes place "prior to rich conditions," which is what the claims require. Beckmann argues that, reading paragraph 41 and the following paragraphs in their entireties, one of ordinary skill would understand that the description of "removing oxygen storage capacity" refers to how a lean NO_x trap could be constructed, not how it could be used during engine operation. Gandhi responds that substantial evidence supports the Board's finding that the '901 application provides adequate written description support for the

"minimizing" limitation, and that the Board did not err in not crediting Beckmann's expert testimony on that issue, which did not specifically address paragraph 41.

We conclude that substantial evidence supports the Board's written description finding regarding the "minimizing the oxygen content" limitation of claims 7, 10, and 16, but not as to claims 5, 8, 11, and 17. The claims at issue are all directed to "a method . . . comprising" a list of actions, including "minimizing the oxygen content" of the NO_x trap. But those claims differ in that claims 5, 8, 11, and 17 contain a "minimizing the oxygen content . . . prior to a rich cycle" limitation, whereas claims 7, 10, and 16 recite that "the oxygen content of the lean NO_x trap is minimized" without requiring that the minimization occur "prior to" a rich cycle. Notably, claims 8, 11, and 17 respectively depend from claims 7, 10, and 16, suggesting that the "prior to" language imposes a temporal requirement that "minimizing" take place "prior to" rich conditions as part of the claimed method.

The Board did not consider and analyze whether the '901 application provides an adequate written description of the "prior to" limitation. We therefore vacate its written description decision as to claims 5, 8, 11, and 17.

We do agree with the Board, however, that paragraph 41 of the '901 application provides an adequate written description of the "minimizing the oxygen content" limitation of claims 7, 10, and 16 because those claims do not require that "minimizing" occur before a rich cycle. Even if the disclosures in paragraph 41 of the '901 application are limited to designing and constructing an NO_x trap to minimize its oxygen storage capacity, that description is sufficient to support the "minimizing" limitation of claims 7, 10, and 16. We therefore affirm the Board's decision that the '901 application contains an adequate written description of the "minimizing the oxygen content" limitation of claims 7, 10, and 16.

CONCLUSION

We have considered the parties' remaining arguments, but find them unpersuasive. For the foregoing reasons, we reverse the Board's construction of claims 1 and 2 of the '605 patent, but we affirm the Board's decision that claims 3 and 4 of the '605 patent would have been obvious over the cited references and that the '901 application contains an adequate written description of the "transitioning" limitation of claims 12–17 and the "minimizing the oxygen content" limitation of claims 7, 10, and 16. Additionally, we vacate the Board's determination that claims 1 and 2 of the '605 patent are unpatentable over the cited references and its finding that the '901 application contains an adequate written description of the "minimizing the oxygen content . . . prior to a rich cycle" limitation of claims 5, 8, 11, and 17, and remand for further proceedings consistent with this opinion.

AFFIRMED IN PART, REVERSED IN PART, VACATED IN PART, AND REMANDED

COSTS

No costs.

NOTE: This disposition is nonprecedential.

United States Court of Appeals for the Federal Circuit

THOMAS BECKMANN, ALEXANDER MASSNER,
Appellants

v.

HAREN S. GANDHI, JOHN VITO CAVATAIO, ROBERT HENRY HAMMERLE, YISUN CHENG,
Appellees

2015-1765

BRYSON, *Circuit Judge,* dissenting in part.

I concur in all parts of the majority opinion except for Part I of the Discussion section, which holds that the Board erred in construing claims 1 and 2 of the '605 patent. I would sustain the Board's construction of those claims and the invalidity ruling based on its construction of those claims.

Claims 1 and 2 of the '605 patent (copied in Gandhi's claims 3 and 4) recite three steps: (1) supplying the catalytic converter with exhaust gas containing an excess of oxidizing constituents; (2) supplying the catalytic converter with exhaust gas with exhaust gas containing an excess of reducing constituents; and (3) during the period between those two steps, supplying the catalytic converter

with exhaust gas that has a lower content of oxidizing constituents than in the oxidizing step and a lower content of reducing constituents than in the reducing step. The intermediate step ends at the earliest when the catalytic converter is filled by exhaust gas delivered during that step. In other words the three steps of the claims consist of two distinct endpoint states and a transition phase between those endpoints.

The Board found that the claims did not require that the exhaust gas supplying steps be separate and distinct from each other or that the intermediate step be controlled in terms of composition and duration. The majority agrees with the Board that the intermediate step is not controlled in any way, but it concludes that Board erred in finding that the steps were not required to be separate and distinct. I believe that the issues are interrelated and would hold that the Board was correct on both points.

The logic of the Board's position can be explained by using a simple analogy: consider a first step consisting of supplying an acidic solution; a second step consisting of supplying a basic solution; and a third step consisting of supplying a neutral solution during the transition time between the first and second steps. In that example, the neutral solution would simply be a natural and inevitable consequence of the mixture created by transitioning between the acidic and basic states. The same principle applies here. As the Board explained, the claim language is broad enough to read on a system that transitions smoothly from a predominantly oxidizing mixture to a predominantly reducing mixture. The Board explained that the third step requirement is satisfied as long as the quantity of oxidizing constituents is lower than in the first step and the quantity of reducing constituents is lower than in the second step. That means that the intermediate step will naturally occur during the transition between the oxidizing and reducing states. The

Board is therefore correct that the transition step necessarily occurs between the other two steps.

Beckmann argues that the claims "require the supply of three separate and distinct gases, where the composition of the third exhaust gas and the amount of time the third exhaust gas is supplied are both controlled." That is, Beckmann argues that the transition phase constitutes a separate and distinct step because transition phase requires that a specific composition of gas be present for a specific amount of time. As the majority acknowledges, however, claims 1 and 2 of the '605 patent contain no requirement that the amount of time that the third exhaust gas is supplied be controlled. Thus, the claims place no constraints on the transition; they only require the transition to occur. And while it is true that the claimed exhaust gases in the three steps differ in composition, that is simply the necessary product of transitioning from an oxidizing to a reducing mixture.

The majority characterizes the three claimed steps as separate and distinct in part because the structure of the claims identifies them as "three different supplying steps," and states that the third step occurs between the first and second steps, such that the claim "imposes a sequential requirement that the third step occur between the first and second steps." But the fact that the claims identify three steps does not mean that the steps necessarily constitute separate and distinct states. As discussed above, the intermediate step lacks the controlled composition or duration that would allow it to be an identifiable state. Without a substantive way of characterizing the intermediate state, the three states are "separate and distinct" only by virtue of the claim characterizing them as such. Although the gas in the three states differs—lean, rich, and in between—the characterization of the gas as having three distinct states is entirely arbitrary. The gas could as easily be divided into five stages—lean, mostly lean, intermediate, mostly rich, and

rich. The claims would still not capture anything other than transitioning between two distinct levels.

The majority notes that the claims use the terms "supply" and "fill" with reference to the gases of each step, which the majority concludes is consistent with the steps being separate and distinct. The use of those terms, however, is entirely consistent with the construction of the claims adopted by the Board and does not add an additional limitation. As the gas supply transitions from lean to rich, the mixture of the gas that is supplied to—and fills—the catalytic converter will necessarily begin lean, transition to intermediate, and then end up as rich. Nothing defines those states as separate and distinct except Beckmann's characterization of them as such.

Finally, the fact that claim 1 of the '605 patent recites that the intermediate step "is terminated at the earliest" when the catalytic converter "is predominantly filled by exhaust gas delivered in [the] step between the oxidizing constituents supplying step and the reducing constituents supplying step" contributes nothing to defining the intermediate step as "separate and distinct," because the gas that is delivered in the step between the oxidizing and reducing steps simply consists of gas that is less oxidizing than the gas of the first step and less reducing than the gas of the second step. All that is required of the second stage gas, therefore, is that the converter be predominantly filled with gas that is in transition from the lean to the rich state. For the reasons given by the Board, that does not define a "separate and distinct step," as opposed to a transient transition phase.

With regard to the issue of the construction of claims 1 and 2 of the '605 patent (and thus the corresponding Gandhi claims 3 and 4), I therefore respectfully dissent.