

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

3M COMPANY,
Petitioner,

v.

WESTECH AEROSOL CORPORATION,
Patent Owner.

Case IPR2018-00576
Patent 7,705,056 B1

Before JON B. TORNQUIST, JEFFREY W. ABRAHAM, and
AVELYN M. ROSS, *Administrative Patent Judges*.

ROSS, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

3M Company (“Petitioner”)¹ filed a Petition requesting an *inter partes* review of claims 1–28 of U.S. Patent No. 7,705,056 B1 (Ex. 1001, “the ’056 patent”). Paper 2 (“Pet.”). Westech Aerosol Corporation (“Patent Owner”) filed a Preliminary Response to the Petition. Paper 5 (“Prelim. Resp.”).

Upon consideration of the Petition, the Preliminary Response, and the parties’ evidence, we determined that Petitioner had demonstrated a reasonable likelihood that it would prevail with respect to at least one claim of the ’056 patent. Paper 6 (“Decision on Institution”). Thus, pursuant to the Supreme Court’s decision in *SAS Institute Inc. v. Iancu*, 138 S. Ct. 1348, 1355 (2018), and the USPTO Guidance², we instituted review of all challenged claims on all challenged grounds. *Id.*

Following institution of trial, Patent Owner filed a Patent Owner Response (Paper 10, “PO Resp.”), Petitioner filed a Reply (Paper 26, “Pet. Reply”), and Patent Owner filed a Surreply (Paper 32, “Surreply”). In support of their respective positions, Petitioner relies on the testimony of Dr. Robert K. Prud’homme (Ex. 1003, “Prud’homme Decl.”; Ex. 1055, “Supp. Prud’homme Decl.”), and Patent Owner relies on the testimony of Dr. Robert A. Wanat (Ex. 2034, “Wanat Decl.”; Ex. 2055, “Supp. Wanat Decl.”).

¹ The Petition also identifies GTA-HNT, Inc. d/b/a Northstar Chemical as a real party in interest. Pet. 2.

² In accordance with USPTO Guidance, “if the PTAB institutes a trial, the PTAB will institute on all challenges raised in the petition.” See USPTO, Guidance on the Impact of SAS on AIA Trial Proceedings (April 26, 2018) (available at <https://www.uspto.gov/patents-application-process/patent-trial-and-appeal-board/trials/guidance-impact-sas-aia-trial>) (“USPTO Guidance”).

After institution, Patent Owner filed a contingent Motion to Amend, proposing substitute claims 29–56. Paper 11 (“Motion to Amend” or “MTA”). Subsequently, Petitioner filed an Opposition to Patent Owner’s Motion (Paper 27, “MTA Opp.”), Patent Owner filed a Reply in Support of its Motion (Paper 36, “MTA Reply”), and Petitioner filed a Surreply (Paper 40, “MTA Surreply”).

An oral hearing was held on May 1, 2019, and a transcript of the hearing is included in the record (Paper 46, “Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed below, we determine that Petitioner has shown by a preponderance of the evidence that claims 1, 2, 5–8, and 12–28 of the ’056 patent are unpatentable, but has *not* shown by a preponderance of the evidence that claims 3, 4, and 9–11 are unpatentable. We also deny Patent Owner’s Motion to Amend with respect to proposed substitute claims 29–56.

A. Related Proceeding

The parties identify a co-pending district court action in which Patent Owner asserts the ’056 patent against Petitioner. Pet. 2 (citing *Westech Aerosol Corp., v. 3M Co., et al.*, No. 3:17-cv-05067-RBL, in the Western District of Washington). The district court action was dismissed without prejudice on December 6, 2017, for failure to establish proper venue and a notice of appeal was filed with the Court of Appeals for the Federal Circuit on January 8, 2018. *Id.* On July 5, 2019, the Court of Appeals for the Federal Circuit affirmed the decision of the district court. *Westech Aerosol Corp. v. 3M Co.*, 927 F.3d 1378 (Fed. Cir. 2019).

B. The '056 Patent

The '056 patent is titled “Aerosol Adhesive and Canister-Based Aerosol Adhesive System.” Ex. 1001, 1:1–2. The '056 patent describes a canister-based aerosol system to deliver a spray adhesive. *Id.* at 2:31–34. The claimed system “features an aerosol adhesive blend used for spray applications, including a solvent mixture, chosen to have volatility characteristics for producing a specific spray pattern, a polymeric base in the solvent mixture and a compressed gas dissolved in the solvent mixture.” *Id.* at 2:38–43. The '056 patent uses a combination of two propellants, a liquefied propellant and a compressed inert gas. *Id.* at 8:18–20, 9:10–21 (Examples 6 and 7).

C. Illustrative Claims

Claims 1 and 28 are the only independent claims of the '056 patent. Claims 1 and 28 are reproduced below:

1. [Preamble] An aerosol adhesive canister system, comprising:
 - [a] a gas cylinder canister;
 - [b] a hose connected to said canister;
 - [c] a spray gun connected to said hose;
 - [d] a hydrocarbon propellant held within said canister; and
 - [e] an aerosol adhesive held within said canister, said aerosol adhesive comprising:
 - [f] a solvent mixture selected to have volatility characteristics for producing a specific spray pattern;
 - [g] a polymeric base in said solvent mixture; and
 - [h] a compressed gas dissolved in said solvent mixture.

Ex. 1001, 9:30–40 (bracketed headings added to identify elements of claim 1).

28. A spray adhesive canister system, comprising:

[a][i] a combination of compressed inert gas and liquefied propellant usable together in said canister,

[a][ii] wherein the relative volume and concentration of liquefied propellant is minimal relative to the relative volume and concentration of compressed inert gas,

[b][i] wherein said combination and relative concentrations of compressed inert gas and liquefied propellant enables said spray adhesive canister system to maintain a consistent spray delivery pressure and a consistent spray coarseness irrespective of the volume of spray adhesive remaining to be dispensed from said canister, and

[b][ii] wherein said spray adhesive is a high solids, high viscosity, low solvent and low voc blend.

Id. at 10:52–65 (bracketed headings added to identify elements of claim 28).

D. Instituted Grounds of Unpatentability

We instituted trial to determine whether claims 1–28 of the '056 patent would have been obvious³ in view of the following grounds of unpatentability:

Claims	Basis	References
1, 2, 14–19, 21, and 24–27	35 U.S.C. § 103	Takashima ⁴ and Braud ⁵
3–13, 20, 22, 23, and 28	35 U.S.C. § 103	Takashima, Braud, and knowledge of skilled artisan

³ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), revised 35 U.S.C. § 103, effective March 16, 2013. Because the application from which the '431 patent issued was filed before this date, the pre-AIA version of § 103 applies.

⁴ Japanese Application Publication No. H11–349917, to Kosuke Takashima, et al., published December 21, 1999 (“Takashima”) (Ex. 1005 (English translation); Ex. 1006 (original Japanese publication)).

⁵ US 5,931,354, to John W. Braud, et al., issued August 3, 1999 (“Braud”) (Ex. 1004).

Claims	Basis	References
1, 2, 5, 6, 8, 12, 14–22, and 24–27	35 U.S.C. § 103	Carnahan Publication ⁶ and Braud
3, 4, 7, 9–11, 13, 23, and 28	35 U.S.C. § 103	Carnahan Publication, Braud, and knowledge of skilled artisan

Decision on Institution 5, 37–38.

II. ANALYSIS

A. *Level of Ordinary Skill in the Art and Dr. Prud’homme’s Testimony*

1. Level of Ordinary Skill in the Art

Relying on the testimony of Dr. Prud’homme, Petitioner contends one of ordinary skill in the art would have had a bachelor’s degree in chemical engineering or related field, such as chemistry, and three to five years of experience in the design of aerosol adhesives. Pet. 16 (citing Ex. 1003 ¶ 16). Petitioner also contends that a person of ordinary skill in the art may alternatively have had an advanced degree in chemical engineering (or related discipline) and less industry experience. *Id.*

Patent Owner initially argued that an individual “having a bachelor’s degree in a chemical field with 2–3 years of industry experience in aerosol formation or some college-level education with courses in math and chemistry, and 3–5 years industry experience in aerosol formation” would possess the level of ordinary skill in the art. Prelim. Resp. 26–27; *see also* Ex. 2001, 43–44 (Declaration of Kenneth Brown). In its Patent Owner Response, Patent Owner refined its view and now contends a “POSA in this

⁶ US 2002/0161056 A1, to David W. Carnahan, published October 31, 2002 (“Carnahan Publication”) (Ex. 1013).

field at the time of the invention had approximately 3–5 years of adhesive formulation experience and a bachelor’s degree in chemistry or a related science or engineering field.” PO Resp. 11 (citing Ex. 2034 ¶¶ 72–78 (Wanat Decl.)); *but see* Ex. 2034 ¶ 75 (Dr. Wanat opining that 2–5 years of experience are sufficient). According to Patent Owner, emphasis on industry experience is important because academics may be unaware of problems in industry, the changing regulatory landscape, and cost of manufacturing. PO Resp. 9.

The parties’ positions primarily differ in that Petitioner suggests an advanced degree in chemical engineering or related field may be a substitute for some (and perhaps all) industry experience (*see, e.g.*, Ex. 2021, 121:15–122:19), whereas Patent Owner contends that a bachelor’s degree *and* a minimum of 2 or 3 years of industry experience is required. In addition, Patent Owner no longer contends experience in *aerosol* formulation was required but rather contends that experience in *adhesive* formulation is sufficient. *Compare* Prelim. Resp. 26–27, with PO Resp. 11.

Upon review of the arguments set forth by Drs. Prud’homme and Wanat, we adopt Dr. Prud’homme’s description of one of ordinary skill in the art, as it is consistent with the prior art of record and persuasively considers the relevant field, that is, aerosol adhesives, as well as how the necessary level and type of education may be offset by practical experience.

2. Dr. Prud’homme’s Testimony

Patent Owner asserts that because “Dr. Prud’Homme has little to no relevant experience[,] . . . his views on what a POSA would have known at the time of the invention should carry very little weight.” PO Resp. 9. This

argument is not persuasive as we have declined to adopt Patent Owner's proposed level of ordinary skill in the art. Even if we were to adopt Patent Owner's proposed definition of the ordinarily skilled artisan, however, we do not agree that Dr. Prud'homme's testimony should carry diminished weight.

Dr. Prud'homme has a Ph.D. in Chemical Engineering and relevant work experience. For example, Dr. Prud'homme has served on the scientific advisory boards for several companies, including American Cyanamid's board on water soluble polymers, Dow Chemical's boards for material science and formulation sciences, and Lubrizol Chemical Company's board for research strategy in polymer materials. Ex. 1003 ¶¶ 5, 7.

Dr. Prud'homme also has experience in the spraying of polymer formulations. *Id.* ¶ 9.

Patent Owner discounts Dr. Prud'homme's work experience because "the work was unrelated to the subject matter of the '056 Patent" and indicates "a dearth of relevant experience in the subject matter of the '056 Patent." PO Resp. 12–13. Dr. Prud'homme testifies, however, that he has experience in the aerosolization and atomization of solutions containing solids and dissolved polymers (Ex. 2021, 29:8–30), has authored articles on the adhesion of polymeric systems, and has teaching experience with the identified topics (*id.* at 44:5–55:15). Moreover, Patent Owner has not shown, through elicited testimony or otherwise, that Dr. Prud'homme was unaware of issues confronting the industry. In any event, as we noted in our Decision on Institution, "a declarant's expertise and experience need not match perfectly the experience and education of a person of ordinary skill in the art in order to provide testimony," and we are persuaded that there is an

adequate relationship between Dr. Prud'homme's experience and education and the claimed invention. Decision on Institution 8–9 (citing *SEB S.A. v. Montgomery Ward & Co., Inc.*, 594 F.3d 1360, 1373 (Fed. Cir. 2010)).

B. Claim Construction

In this *inter partes* review, claim terms in an unexpired patent are construed according to their broadest reasonable interpretation in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b) (2017).⁷ In determining the broadest reasonable construction, we presume that claim terms carry their ordinary and customary meaning. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). A patentee may define a claim term in a manner that differs from its ordinary meaning; however, any special definitions must be set forth in the specification with reasonable clarity, deliberateness, and precision. *See In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

The parties dispute the meaning of two claim phrases—(1) solvent mixture and (2) specific spray pattern—but do not propose any specific construction for either term. We address each term below.

⁷ A recent amendment to this rule does not apply here, because the Petition was filed before November 13, 2018. *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018) (amending 37 C.F.R. § 42.100(b) effective November 13, 2018). At the time of the filing of the Petition in this proceeding, the applicable claim construction standard was set forth in 37 C.F.R. § 42.100(b) (2017).

1. “Solvent Mixture”

At the institution stage, the Petitioner proposed a construction for “polymeric base ***in*** said solvent mixture” to mean the “polymeric base is ***suspended, dissolved, emulsified, or otherwise dispersed*** in said solvent mixture.” Pet. 11. Patent Owner disagreed, contending that “*in* said solvent mixture” does not include an emulsion. Prelim. Resp. 32–33 (emphasis added).

We construed the term “polymeric base in said solvent mixture” to mean a “polymeric-based adhesive that is suspended, dissolved, emulsified, or otherwise dispersed in said solvent mixture.” Decision on Institution 13–15. As discussed at the institution stage, the ’056 patent details that the polymeric base may be dissolved *or suspended* in the solvent mixture. *Id.* at 14 (citing Ex. 1001, 3:22–25, 10:23–26 (claim 19)). By contrasting dissolved polymeric bases with suspended polymeric bases, the ’056 patentee indicated complete dissolution of the base in the solvent was not required.⁸

Patent Owner does dispute, though not overtly, our construction of “polymeric base in said solvent mixture” as including systems where the polymeric base is not completely dissolved. Patent Owner contends that the term “solvent mixture,” within the claim phrase “polymeric base in said

⁸ Notably, express language requiring complete dissolution of the adhesive component in the solvent was removed from the body of the parent application to the ’056 patent and moved to the background section discussing the prior art. See Ex. 1014, 6 (relocating language requiring that “[t]he solvent *must dissolve* all of the components of the adhesive. One *necessary ability* of the solvent is the *ability to dissolve* the polymer and resin.” (emphasis added)).

solvent mixture,” excludes water. PO Resp. 15. In support of this construction, Patent Owner argues that *none* of the solid materials listed in the ’056 patent as part of the adhesive are soluble in water and, because water cannot dissolve any of the solid components identified in the ’056 patent, water must necessarily be excluded from the claimed “solvent mixture.” *Id.* at 16.

Patent Owner further contends that the ’056 patent indicates an intent to disclaim water-based systems by describing a formulation that has a “rate of evaporation . . . *greater than water based systems.*” *Id.* (quoting Ex. 1001, 5:10–11). Patent Owner urges that because this statement appears in the summary of the invention and describes “the formulation,” as opposed to various “implementations,” it applies to the invention as a whole. *Id.* at 16–17. As further evidence of the disclaimer, Patent Owner directs our attention to portions of the specification that indicate manufacturers have converted to water-based formulations because they cannot manufacture compliant adhesive formulations, and contends the ’056 patent uses terms “solvent based” and “concentrate” when describing the “blend” to indicate a dissolved system. *Id.* at 17 (citing Ex. 1001 1:61, 5:47; Ex. 2034 ¶ 44; Ex. 2016, 7, 10; Ex. 2021, 77:14–18).

Lastly, Patent Owner contends that Braud and other extrinsic evidence supports a construction of “solvent mixture” that excludes water. *Id.* at 18–19. For example, Braud states that “solvent-based” systems are often used because of their solvency, tackiness, quick drying rates, and economy, but then criticizes “solvent-based” systems, asserting that the object is “to provide high-solids, *solvent-free, water-based* adhesive[s]” sprayed by a nonflammable propellant. *Id.* (citing Ex. 1004, 1:25–29, 1:34–35, 3:29–34,

8:58). Patent Owner also points to Dr. Prud'homme's testimony and articles that indicate solvent-based adhesive systems exclude water. *Id.* at 18–19 (citing Ex. 2010; Ex. 2021, 278:20–284:23, 287:19–290:2; Ex. 2011; Ex. 2015; Ex. 2034 ¶ 130).

Petitioner contends Patent Owner's construction of "solvent mixture" excluding water is "a transparent attempt to exclude inconvenient references like *Braud*." Pet. Reply 2. Petitioner asserts that Patent Owner's first argument—that the polymers taught in the '056 patent are not miscible in water—ignores the fact that the '056 patent does not require the polymer be dissolved, but rather explicitly indicates that it may be suspended. *Id.* at 2–3 (citing Exs. 3001–3003; Ex. 1055 ¶¶ 25, 27–36; Ex. 1001, 3:24–25, claim 19). Petitioner further argues that the descriptions in the specification purportedly disclaiming water are not sufficiently clear or unambiguous to amount to a true disclaimer. *Id.* at 4. Petitioner also contends that *Braud* (as well as other extrinsic evidence) does not provide support for construing solvent to include only organic solvents. *Id.* at 4–5 (citing Ex. 1005 ¶ 22; Ex. 1020, 7:28–33; Ex. 1055 ¶¶ 29–36; Ex. 1017, 3:65–67; Ex. 1004, 2:23–25; Ex. 1003 ¶¶ 42–43, 70, 87). Lastly, Petitioner argues that "the Board need not construe 'solvent mixture' beyond the construction discussed [above] because the grounds of unpatentability set forth in the petition render the claims obvious regardless of whether or not the term excludes water." *Id.* at 5.

Based on our review of the '056 patent, we are not persuaded that the term "solvent mixture" must exclude water as Patent Owner urges. First, Patent Owner's primary basis for alleging that the term "solvent mixture" must exclude water is that the exemplary adhesives of the '056 patent cannot

be dissolved in water, but instead require an organic solvent to completely dissolve. But, as discussed above and in our Decision on Institution, the '056 patent does not require complete dissolution. That the '056 patent may prefer dissolved systems is not sufficient to disclaim suspensions that are expressly identified as part of the invention. *See, e.g.*, 3:24–25 (describing a “polymeric base [that] is suspended in the solvent mixture”), claim 19 (contrasting polymeric bases that are dissolved or suspended in the solvent mixture). Second, Patent Owner’s arguments equate the claim term “solvent mixture” with the unclaimed term “solvent-based” system. We find no support in the record—and Patent Owner does not direct our attention to any evidence—that these terms are interchangeable.

Therefore, consistent with our Decision on Institution, we maintain our construction of “polymeric base in said solvent mixture” to mean a “polymeric-based adhesive that is suspended, dissolved, emulsified, or otherwise dispersed in said solvent mixture.” We further conclude the term “solvent mixture” does not exclude water.⁹

2. “Specific Spray Pattern”

The relevant claim language recites “a solvent mixture selected to have volatility characteristics for producing a specific spray pattern.” Ex. 1001, 9:35–37. On institution, we construed the term “specific spray

⁹ Furthermore, we observe that each asserted ground, relying on either Takashima or the Carnahan Publication as a primary reference, describes the use of organic solvents in conjunction with their aerosol adhesive spray systems. *See, e.g.*, Pet. 31 (relying on Takashima disclosing that “[a] **volatile organic solvent** is used for the adhesive composition”), 51 (relying on Example 1 (¶¶ 56–62) of the Carnahan publication as teaching a solvent, in this case 50 % hexane and 50 % acetone).

pattern” to mean “a spray pattern effective for the desired application or purpose.” Decision on Institution 12. We observed that the ’056 patent does not define “specific spray pattern.” *Id.* at 11. But rather, the ’056 patent explains that the volatility of the solvent blend *as well as* the use of compressed gas may be responsible for producing certain spray patterns. *Id.* at 12 (citing Ex. 1001, 4:62–5:2, 5:25–30, 6:6–20, 6:31–37, 7:65–67). We declined Patent Owner’s invitation to further limit “specific spray pattern” to those patterns that are “web-shaped, fan-shaped, or any other spray pattern typical of high-VOC adhesive formulations,” as such a construction would be inconsistent with the breadth of the claim language and was not supported by the disclosure of ’056 patent. *Id.*; see *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993) (explaining that limitations should not be read from the specification into the claims).

Patent Owner asserts the Board’s definition “was properly tethered to the context of the ’056 patent,” but contends Petitioner has improperly taken the Board’s construction to include “any spray pattern that works for any purpose, be that purpose to coat the threads of the screws mentioned in Takashima, or any other purpose, so long as the spray pattern is ‘effective’ for some purpose.” Surreply 15; PO Resp. 20. Patent Owner asserts “[i]t is self-evident that any construction that ignores the ‘volatility characteristics’ of the solvent mixture in terms of its function, i.e., ‘for producing a specific spray pattern,’ improperly ignores these terms by reading them out of the claims.” PO Resp. 21. Accordingly, Patent Owner contends the “application or purpose has to be one contemplated by the ’056 patent’s POSA” (Surreply 15), and “spray patterns substantially different in function

from the spray patterns identified in the '056 Patent . . . would not meet the claimed 'specific spray pattern'" (PO Resp. 20).

Petitioner argues that Patent Owner improperly attempts to narrow the meaning of specific spray pattern. Pet. Reply 1. According to Petitioner, Patent Owner improperly and "obliquely" seeks to read limitations from the specification into the claims under the guise of construing the term "spray pattern" within the context of the '056 patent. *Id.* at 1–2; *see also* Tr. 13:19–21 ("Patent Owner attempts to introduce limitations into the definition under the guise of an effectiveness that is defined by a high VOC system.").

We are not persuaded we should depart from our original construction that "specific spray pattern" means "a spray pattern effective for the desired application or purpose." Decision on Institution 12. We further decline to import "in the context of this patent" into the claims, or to require some unidentified function attributable to spray patterns described in the '056 patent. We understand "spray pattern effective for the desired application or purpose," read in context with the broader claim term, to be a spray pattern that results from the selection of a solvent having a particular volatility characteristic. Ex. 1001, 2:39–41, claim 1. Notably, however, no particular volatility characteristics are required by the claims (except for arguably claims 22 and 23). *See generally id.* at 9:30–10:65 (claims). Patent Owner, in the '056 patent, described webbed spray patterns (*id.* at 5:30, 6:11–13, 6:36), fan-shaped spray patterns (*id.* at 8:49), and desired, effective spray patterns that "can match up the spray pattern of liquefied gases" (*id.* at 4:65, 5:25–27), but chose not to include these limitations within the claims or to expressly define "specific spray pattern" as including these descriptions.

C. Principles of Law

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) if in the record, objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

D. Obviousness of Claims 1–28 in view of Takashima and Braud

Petitioner contends the subject matter of claims 1, 2, 14–19, 21, and 24–27 would have been obvious over the combined disclosures of Takashima and Braud (Pet. 25) and claims 3–13, 20, 22, 23, and 28 would have been obvious over Takashima, Braud, and the knowledge of the ordinarily skilled artisan (*id.* at 38).

1. Prior Art

a. Takashima

Takashima discloses an aerosol-type spray adhesive composition that can be used as an adhesive to coat “screws, nuts, or bolts, to prevent these fasteners from loosening due to rotation after they are set at places to be fastened.” Ex. 1005 ¶ 1. Takashima describes dissolving a resin-based adhesive, such as SBR (styrene butadiene rubber), and a propellant in a volatile organic solvent, such as “toluene, xylene, and acetone, or methyl

alcohol, ethyl alcohol, and butyl alcohol, or isopropyl alcohol, or mixtures of two or three types of the aforementioned solvents.” *Id.* ¶¶ 13, 17; Ex. 1003 ¶ 64 (explaining the chemical name of SBR as used in Takashima).

Takashima recognizes that “it is also possible to prepare an adhesive composition for aerosol-type spray by using water as [a] solvent instead of the organic solvent.” Ex. 1005 ¶ 22. Examples of the propellant that can be partially dissolved in the organic solvent include n-butane and isobutene. *Id.* ¶ 19. Takashima also teaches that

[i]t is also possible to fill a pressurization gas into the aerosol container filled with the composition of the present invention in order to provide aid to the compressed gas generated from the propellant. This pressurization gas is filled in a compressed state in the aerosol container, and is used to apply a gas pressure from the top of the adhesive liquid in the container in a state without having contact with the adhesive liquid.

Id. ¶ 26. According to Takashima, nitrogen and carbon dioxide are useful compressed gases. *Id.* Takashima describes embodiments where either the adhesive resin composition or a curing agent component is microencapsulated, so that when force is applied to the screw or bolt during tightening, the compressive forces break the microcapsules and release the catalyst to react with the polymer and create a stronger locking bond. *Id.* ¶¶ 13, 22, 47, 52. Takashima explains that the aerosol application of the adhesive is particularly useful where only a small number of screws need to be pre-coated so that a large-scale, expensive, and wasteful factory methods, (like flow coating or roller coater methods) can be avoided. *Id.* ¶¶ 6–7. But, “when the adhesive composition of [Takashima] is filled into a large-sized aerosol spray device, the adhesive can be coated in a large scale while

workpieces to be coated in a large number of lots are moved on, for example, a belt conveyor.” *Id.* ¶ 28.

b. Braud

Braud describes a water-based aerosol adhesive system packaged in pressurized canisters. Ex. 1004, 1:15–22. Figure 1 of Braud, reproduced below, illustrates an exemplary canister of Braud.

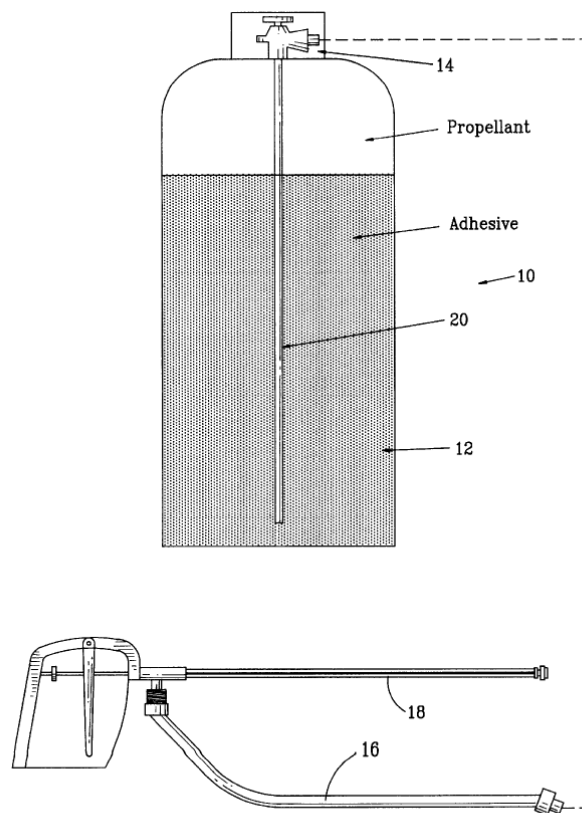


FIG. 1

Figure 1 “is a substantially schematic view of the adhesive application system . . . wherein a pressure cylinder is shown as containing an adhesive and propellant therein.” *Id.* at 4:43–46. Figure 1 depicts a gas canister 12 connected via valve 14 to hose 16, which is connected to a spray gun (not labeled) having spray wand 18. *Id.* at 8:45–48. The canister houses a

propellant and an aerosolized adhesive. *Id.* at 8:62–64; *see id.* at 3:49–51, 4:32–34. Braud describes SBR as the preferred adhesive polymer, which is added to water to make a latex emulsion and form the adhesive. *Id.* at 4:19–26. Braud packages the sprayable adhesive with a non-flammable, non-polluting delivery propellant, or pressurized gas. *Id.* at 4:31–34. According to Braud,

[i]t has been determined, in developing this spray-based adhesive application system, that a highly desirable propellant is a combination of a first propellant that will modify the character of the adhesive to better adapt it for spraying and a second propellant constituting an inert gas that is used to boost the pressure inside the cylinder to the desired overall level.

Id. at 8:66–9:5. The first propellant is preferably HFC 134A and the second propellant is preferably an inert gas such as nitrogen. *Id.* at 9:6–10, 9:22–26, 10:30, 10:42–43. According to Braud, its aerosol adhesive system allows for large surfaces to be quickly and evenly sprayed (*id.* at 9:40–50) and provides “improved drying rates and faster application characteristics over prior art water-based adhesives” (*id.* at 3:12–13).

2. Analysis of Claim 1

Petitioner identifies Braud’s adhesive application system, depicted in Figure 1, and argues system 10, canister 12, hose 16 and spray wand 18 correspond to the claimed adhesive canister system limitations 1[Preamble]–1[c]. Pet. 30–31. Petitioner contends that Takashima describes a liquefied hydrocarbon propellant which may include butane and isobutene as claimed in limitation 1[d]. *Id.* at 31 (citing Ex. 1005 ¶ 19). Petitioner also argues that each of Takashima and Braud describe an aerosol adhesive, comprising a solvent mixture, a polymeric base, and a compressed gas relevant to ’056

patent claim limitations 1[e]–[h]. *Id.* at 31–34 (citing Ex. 1004, 1:16–29, 3:49–51, 6:56–66, 7:1–10, 8:45–52, 8:62–9:9, 10:20–35, Fig. 1; Ex. 1005 ¶¶ 12–14, 22–23, 26, 36, claim 1; Ex. 1003 ¶¶ 102–104). Petitioner contends that an ordinarily skilled artisan would be motivated to scale-up Takashima’s smaller container to the larger canister of Braud “which connects to a spray gun through a hose” to achieve the convenience and cost-effectiveness provided by a larger container. *Id.* at 26 (citing Ex. 1003 ¶¶ 57, 82–84, 86 and relying on *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1368 (Fed. Cir. 2006) (“motivation to combine exists” when the “combination of references results in a product” that is “more desirable, for example because it is stronger, cheaper, cleaner, faster,” or “more efficient”)). Petitioner contends that a person of ordinary skill in the art would have had a reasonable expectation of success in scaling up the can-based aerosol of Takashima to the canister-based system of Braud “because the behavior of the system was predictable and well understood by a POSA.” Pet. 28–29 (citing Ex. 1003 ¶¶ 53–54, 86–91).

Patent Owner contends Takashima and Braud fail to disclose “a solvent mixture selected to have volatility characteristics for producing a specific spray pattern,” and disputes Petitioner’s assertion that a person skilled in the art would have had a reason to combine the teachings of Takashima and Braud to obtain the claimed aerosol adhesive canister system. PO Resp. 14, 21–37. We discuss Patent Owner’s arguments below.

a. whether Takashima or Braud disclose a “solvent mixture selected to have volatility characteristics for producing a specific spray pattern”

Patent Owner contends the solvent mixture of the '056 patent excludes water (discussed above) and, because Braud includes water as a solvent, it cannot meet the requirement of claim 1. PO Resp. 20. Patent Owner further contends that, although Takashima describes use of a solvent mixture, it does not disclose a solvent mixture “selected to have volatility characteristics for producing a specific spray pattern,” as required by claim 1. *Id.* According to Patent Owner, the “claim language calls for a spray pattern that is effective *within the context of the '056 Patent . . .* [and] spray patterns substantially different in function from the spray patterns identified in the '056 Patent would not be effective because they would not meet the claimed ‘specific spray pattern.’” *Id.*

Petitioner contends that “[u]nder the broadest reasonable interpretation of ‘*specific spray pattern*,’ every prior art reference relied on by Petitioner discloses this limitation.” Pet. Reply. 2.

We find Petitioner’s evidence, that a solvent mixture for producing a “specific spray pattern” is suggested by Takashima and Braud, persuasive. Petitioner asserts that Takashima discloses a volatile organic solvent, which among other components, was “adjusted and studied” to obtain an atomized aerosol adhesive spray. Pet. 31 (citing Ex. 1005 ¶¶ 12, 22; Ex. 1003 ¶¶ 12, 62). Takashima’s system purports to overcome the difficulties experienced in prior art systems because of adhesive thickness, precipitation, or caking. Ex. 1005 ¶ 11; *see also id.* ¶ 7 (“the adhesive cannot be coated in a prescribed thickness”). Petitioner also contends that Braud describes

solvent-based adhesives have been used because of “quick drying rates.” Pet. 32 (citing Ex. 1004, 1:25–29, 1:39–46, 8:45–52; Ex. 1003 ¶¶ 12, 74). Braud further describes a system “such that the application of the adhesive can be effected by spraying, which permits a fast, even application of adhesive over large areas” and “to permit the wand to be moved about to spray a desired pattern of adhesive.” Ex. 1004, 8:38–52.

Patent Owner’s counter-argument is not persuasive because it is premised on a claim construction we do not adopt. In particular, for the reasons discussed in Section II.A above, we do not agree that “solvent mixture” excludes water, nor do we construe “specific spray pattern” to include only those applications discussed within the ’056 patent or to spray patterns that function differently from those identified in the ’056 patent.

b. whether a person of ordinary skill in the art would have had a reason to combine Takashima and Braud

Patent Owner contends that the skilled artisan would have no reason to combine the teachings of Takashima and Braud because (1) Braud teaches away from a solvent-based system (PO Resp. 22–24), (2) no reason exists to scale-up Takashima’s formulation (*id.* at 24–27), (3) a person skilled in the art would not scale up Takashima using a water-based adhesive because of technical differences between water-based and solvent-based adhesives (*id.* at 27–31), (4) only through hindsight reasoning can Takashima and Braud be combined (*id.* at 32–33), and (5) there is no reasonable likelihood of success in the combination (*id.* at 33–39).

(1) whether Braud teaches away from a solvent-based invention

Patent Owner contends that because Braud describes a water-based, non-reactive system that excludes organic solvents and anything flammable, such as hydrocarbon propellants, Braud follows a path divergent from the '056 patent. PO Resp. 22–24. Patent Owner contends that Braud's teachings are more than just an expression of a preference for reducing VOCs, rather, Braud represents a clear “teaching away from the use of VOCs.” Surreply 2–3. Petitioner disagrees and asserts that Braud's stated preference that its aerosol adhesive be free of organic solvents, does not amount to a teaching away. Pet. Reply 21.

Patent Owner's argument is not persuasive. To teach away, a reference must discourage one of ordinary skill in the art from following the path set out in the reference, or lead that person in a direction divergent from the path taken by the applicant. *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994). “A reference does not teach away . . . if it merely expresses a general preference for an alternative invention but does not ‘criticize, discredit, or otherwise discourage’ investigation into the invention claimed.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009) (quoting *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004)). “A statement that a particular combination is not a preferred embodiment does not teach away absent clear discouragement of that combination.” *Syntex (U.S.A.) LLC v. Apotex, Inc.*, 407 F.3d 1371, 1380 (Fed. Cir. 2005).

Here, Braud explains that prior art aerosol adhesive systems employ volatile organic solvents “almost exclusively because of their ease of use, solvency in the propellants, wide range of tackiness, quick drying rates[,]”

and economy.” Ex. 1004, 1:25–30. Braud acknowledges that these organic solvent-based adhesives “have a number of undesirable characteristics such as being health hazards, their flammability, and they release large amounts of harmful volatile organic compounds into the atmosphere.” *Id.* at 1:35–37. Braud explains that in order to overcome the shortcomings of conventional adhesive systems, Braud eliminates the need for volatile organic compounds by first dissolving the adhesive resin in an oil without using an organic solvent. *Id.* at 3:54–4:18. To that end, Braud characterizes its low VOC and low solvent system as *preferred*. See Ex. 1004, 8:64–66 (“The *preferred* propellant for this adhesive application system is non-flammable and nonpolluting (ozone friendly).” (emphasis added)); see also *id.* at 8:58 (the adhesive composition “is preferably solvent-free”). However, such a preference does not constitute a teaching away from the proposed combination, but instead distinguishes the prior art in order to illustrate the novel aspects of Braud. See *Ricoh Co. v. Quanta Computer Inc.*, 550 F.3d 1325, 1332 (Fed. Cir. 2008); *Syntex*, 407 F.3d at 1380. Furthermore, Petitioner introduces Braud into the combination to scale-up the Takashima system from a can to a larger canister with a hose and a spray gun. Pet. 30–31; see also Ex. 1004, 8:44–46 (characterizing the canister or cylinder as a conventional design). Where “a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond that person’s skill.” *KSR*, 550 U.S. at 401.

(2) whether a reason exists to “scale up”
Takashima’s formulation because it was
developed for small scale operations

Patent Owner contends that “[a] POSA would not be motivated to scale-up Takashima at all [as] Takashima was designed for the specific purpose of coating ‘a small number of screws or the like.’” PO Resp. 24 (citing Ex. 1005 ¶ 6). Patent Owner also argues that significant technical barriers would prevent scaling up the Takashima system. *Id.* (citing Ex. 2034, ¶¶ 104–113). In particular, Patent Owner asserts that because Takashima employs a microcapsule design, “[i]t would not be practical to agitate a cannister [sic] filled with Takashima’s microencapsulated formulation.” *Id.* at 26.

Petitioner argues that Patent Owner’s argument “misses the point because the proposed combination does not require microcapsules.” Pet. Reply 21; Pet. 29. Petitioner also asserts that Takashima itself provides the necessary motivation to scale-up its aerosol adhesive system.

We are not persuaded by Patent Owner’s arguments and agree with Petitioner that Takashima itself provides ample motivation to scale-up its system. While Takashima does explain that dipping, flow coating, and roll coater methods “are optimal methods in practical application for coating the adhesive in large quantity at low cost,” it also states that such methods are not useful for coating a small number of work pieces or where work pieces have a special shape. Ex. 1005 ¶¶ 5–7. Takashima also states that in methods involving dipping, flow coating, or roller applications “the cost becomes high, the adhesive cannot be coated in a prescribed thickness in a prescribed part, and a fully satisfactory adhesive coating film cannot be

obtained.” *Id.* ¶ 7; *see also id.* ¶ 6 (further stating that “it is expensive to prepare the apparatus and waste of the adhesive liquid is increased”). However, Takashima explains that “when the adhesive composition of the present invention is filled into a *large-sized aerosol spray device*, the adhesive can be coated *in a large scale* while workpieces to be coated *in a large number of lots* are moved on, for example, a belt conveyor.” *Id.* ¶ 28 (emphasis added); *see also id.* (explaining that “[i]n this way, the adhesive composition can be used efficiently”). Therefore, Takashima itself provides ample reason to scale-up the Takashima system and utilize a larger canister like that of Braud.

We similarly agree with Petitioner that the skilled artisan, employing Takashima’s formulation, would not include a microencapsulated curing agent where a pre-coated workpiece was not desired. *Ex Parte Wu*, 10 USPQ2d 2031 (BPAI 1988) (holding that it would have been obvious to omit an element where the function of that element is not desired or required); *see also In re Kuhle*, 526 F.2d 553, 555 (CCPA 1975) (agreeing that the deletion of an element, and by extension its function, was an obvious expedient). The “person of ordinary skill is also a person of ordinary creativity, not an automaton.” *KSR*, 550 U.S. at 421.

(3) whether there was no reason to “scale-up”
Takashima’s formulation using water because
of technical differences between water-based
and solvent-based adhesives

Patent Owner argues that an ordinarily skilled artisan would not have had a reason to scale-up the Takashima system using water. PO Resp. 27. According to Patent Owner, Petitioner’s reasoning that the organic solvent

used could be substituted with water is only “possible” using certain adhesive polymers and not borne out in the examples of Takashima. *Id.* Furthermore, Patent Owner argues that water is a non-solvent for most adhesive polymers, most water-based adhesives are emulsions, and water-based adhesives risk corrosion and freezing. *Id.* at 28–29.

Petitioner asserts that it does not propose to replace the organic solvents of Takashima with the water as in Braud. Pet. Reply 20. “Rather, Petitioner simply pointed out that one reason that would motivate a POSA to look to the teachings of *Braud* was *Takashima*’s teaching that its organic solvents could be substituted with water.” *Id.* (citing Pet. 27).

We are unpersuaded by Patent Owner’s argument because it is premised on a position Petitioner does not advance, i.e., using water as the solvent in the combination of Takashima and Braud. See Pet. 31; see Decision on Institution 16–18. Notably, both primary references, Takashima and the Carnahan Publication (discussed later), describe the use of organic solvents in their aerosol adhesive system. See Ex. 1005 ¶ 17; Ex. 1013 ¶¶ 6, 25, 27.

(4) whether a POSA would have “scaled-up”
Takashima’s formulation using high solids to
control VOCs

Patent Owner asserts that “[a] POSA looking to formulate a solvent-based aerosol adhesive like that claimed in the ’056 Patent would not look to a water-based reference like Braud given the significant differences in the formulation of water-based emulsion adhesives versus solvent-based adhesives.” PO Resp. 29–30. Patent Owner contends that scaling-up the Takashima formulation by using a “high solids approach” suggested in

Braud to control VOC emissions “would be unlikely or difficult to achieve” because viscosity poses a limitation. *Id.* (citing Ex. 2034 ¶ 53). Patent Owner explains that as solids content increases so does viscosity, which in turn lowers the sprayability of the formulation. *Id.* at 30 (citing Ex. 1001, 7:27–30; Ex. 2034 ¶¶ 47–54).

Petitioner asserts that the person of ordinary skill in the art “would target the viscosity and the pressure of the canister system of *Braud*” and “[i]f the given application required minimization of VOCs, a POSA would know to apply the high-solids teaching of *Braud* (Pet. 28) with the understanding that the viscosity threshold as a function of solids concentration would be predictably lower for an organic solvent system versus a water-based system.” Pet. Reply 20–21 (citing Ex. 1003 ¶¶ 89–93; Ex. 1055 ¶¶ 78–81).

Patent Owner’s arguments are based on an erroneous understanding of the Petitioner’s reason to combine the teachings of Takashima and Braud. As explained above, Petitioner explains that ordinarily skilled artisan would have reason to scale-up Takashima’s smaller container to the larger canister of Braud, where larger batches or surfaces need to be coated on an assembly line. Pet. 26. The additional features of Braud, including a spray gun and hose, were well-known in the art and add to the overall convenience and cost-effectiveness of the larger container. *Id.* (citing Ex. 1003 ¶¶ 57, 82–84, 86). Petitioner further explains that *should* low VOC emission applications be desired, Braud provides known methods of controlling emissions in aerosol adhesive systems—that is high solids or water-based systems. *Id.* at 28 (citing Ex. 1003 ¶¶ 51, 69–70, 72–73, 84–85; Ex. 1004, Abstract, 1:15–22, 5:11–14).

(5) whether Dr. Prud'homme's testimony is based on hindsight

Patent Owner challenges Petitioner's positions and the testimony of Dr. Prud'homme, arguing that absent hindsight, Petitioner has not demonstrated that a person of ordinary skill in the art would have scaled-up Takashima's system to utilize the canister system described in Braud. PO Resp. 32. Central to Patent Owner's argument is its position that "Dr. Prud'Homme clearly 'started with the ['056 Patent], picked and chose from' the references, and 'worked backwards using improper hindsight.'" *Id.* at 33. Patent Owner asserts that it is improper to take teachings from Braud, "namely 'the large-scale compressed gas to enhance atomization,'" and ignore the remaining teachings of Braud, such as the use of non-volatile and non-flammable materials. *Id.* at 32.

It is improper to base a conclusion of obviousness upon facts gleaned only through hindsight. "The invention must be viewed not after the blueprint has been drawn by the inventor, but as it would have been perceived in the state of the art that existed at the time the invention was made." *Sensonics, Inc. v. Aerosonic Corp.*, 81 F.3d 1566, 1570 (Fed. Cir. 1996) (citing *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1138 (Fed. Cir. 1985)). Therefore, "to establish a *prima facie* case of obviousness based on a combination of elements disclosed in the prior art, the [Petitioner] must articulate the basis on which it concludes that it would have been obvious to make the claimed invention." *Id.* Impermissible hindsight is inferred when the specific understanding or principle within the knowledge of one of ordinary skill in the art that would motivate one (with no

knowledge of the claimed invention) to make the proposed combination has not been explained. *In re Rouffet*, 149 F.3d 1350, 1358 (Fed. Cir. 1998).

In weighing the evidence before us, we do not find Patent Owner’s position persuasive. Petitioner has provided sufficient reasoning with rational underpinnings to explain why one of ordinary skill in the art would have modified the teachings of the applied references. *See KSR*, 550 U.S. at 418. Each of the modifications proposed by Petitioner is supported by the record. Pet. 26. In particular, Takashima itself describes “scaling-up” its system for larger applications, and describes disadvantages with large-scale factory applications of known non-aerosol spray methods. Ex. 1005 ¶¶ 6–7, 28. Dr. Prud’homme explains that a person scaling-up Takashima would have been aware of issues associated with emissions from organic solvents and propellants and would have taken advantage of known methods to reduce VOC emissions—i.e., increasing solids concentrations. Ex. 1003 ¶¶ 51, 69–73, 76–78, 84–85, 88 (“[I]ncreasing solids content would necessarily reduce the amount of solvent, which contributes to VOC emissions.”); Ex. 1004, 2:13–15. And although increasing solids requires higher pressures to impart good sprayability to the adhesive, both Braud and Takashima disclose that utilizing a liquefied propellant and a compressed gas in combination is one method of boosting pressure within the cylinder. *Id.* ¶¶ 61, 66–68, 69–73, 76–78; Ex. 1004, 8:66–9:30; Ex. 1005 ¶ 26. Accordingly, we find no evidence of hindsight reconstruction.

(6) whether there is a reasonable expectation of success

Patent Owner contends that the experimental evidence it obtained illustrates a person of ordinary skill in the art would not have had a

reasonable expectation of successfully combining the teachings of Braud and Takashima. PO Resp. 33. Dr. Wanat designed three different experiments to test whether the combination of Braud and Takashima would work. In the first experiment, the microcapsules of Takashima were placed in toluene and the solids concentration increased to the levels suggested by Braud. *Id.* at 34. In the second experiment, the microcapsules of Takashima were placed in water and the experiment was conducted at both high-solids and low-solids levels. *Id.* at 35–36. In the final experiment, SIS (styrene-isoprene-styrene) rubber (Ex. 2034 ¶ 41 (defining SIS rubber)) was dissolved in toluene with high solids and packed in a canister with HFC-134A (PO Resp. at 36). According to Patent Owner, none of the experiments produced a successful result and support its assertion that one of ordinary skill in the art would not have had a reasonable expectation of success in combining the identified disclosures of Takashima and Braud. *Id.* at 34–37.

Patent Owner's experiments, however, do not overcome Petitioner's evidence regarding a reasonable expectation of successfully combining the teachings of Takashima and Braud to arrive at the claimed invention. See Ex. 1003 ¶¶ 53, 54, 86–91. Fatal to Patent Owner's experiments is the use of Takashima microcapsules (experiments 1 and 2) and HFC-134A as a liquefied propellant (experiment 3)—neither of which are proposed by Petitioner. See Pet. Reply 21 (citing Pet. 29; Ex. 1055 ¶¶ 84–89).

Therefore, we determine that Petitioner has demonstrated by a preponderance of the evidence that each limitation of claim 1 is taught or suggested by the combination of Takashima and Braud and further that the skilled artisan would have had reason to make the suggested combination with a reasonable expectation of success.

3. Analysis of Claims 2, 14–19, 21, and 24–27

With respect to dependent claims 2, 14–19, 21, and 24–27, Petitioner identifies where the combination of Takashima and Braud suggests each limitation of these claims. Pet. 34–38. For example, Petitioner demonstrates that Braud describes a compressed inert gas with a minimum pressure in the cylinder of 220 psi (claim 2) (Pet. 34 (citing Ex. 1004, 9:22–25)), a high solids adhesive with a solids concentration equal to or greater than 20 % (claims 16 and 17) (*id.* at 35 (citing Ex. 1004, 3:1–2, 7:20–37, 7:42–45)), and where the high solids adhesive is propelled by a compressed gas (claim 27) (*id.* at 38 (citing Ex. 1004, 4:1–3, 8:53–59, 8:66–9:5)). Petitioner further demonstrates that Takashima describes the use of a hydrocarbon propellant, including isobutene (claim 14) (*id.* at 34 (citing Ex. 1005 ¶ 19)), where the solvent mixture is acetone (claim 24) (*id.* at 37 (citing Ex. 1005 ¶ 17)) and where the polymeric base is dissolved in a solvent with the compressed gas (claim 25) (*id.* at 37 (citing Ex. 1005 ¶¶ 23, 26, 36, claim 6)). Petitioner further demonstrates that each of Takashima and Braud teach a polymeric base that is a styrene block polymer such as styrene butadiene (claim 15) (*id.* at 34 (citing Ex. 1005 ¶ 14; Ex. 1004, 4:20–26; Ex. 1003 ¶ 64), a compressed gas, such as nitrogen or carbon dioxide (claims 18 and 26) (*id.* at 35 (citing Ex. 1005 ¶¶ 26, 36, claim 6; Ex. 1004, 9:22–25, claim 5), and where the base is either dissolved or suspended in the solvent mixture with the compressed gas (claims 19 and 25) (*id.* at 36–38 (citing Ex. 1005 ¶¶ 23, 26, 36, claim 6; Ex. 1004, 6:56–67, 7:1–10, 1:29–34; Ex. 1003 ¶ 104). And lastly, relevant to claim 21, Petitioner demonstrates that each of Takashima and Braud describes a solvent mixture that supports a plurality of drying constraints and where the application of pressure in the canister is achieved

by the dissolved, compressed gas. *Id.* at 36–37 (citing Ex. 1005 ¶ 17; Ex. 1004, 4:1–3, 8:53–59, 9:18–29; Ex. 1003 ¶ 105).

Patent Owner does not address Petitioner’s arguments with respect to claims 2, 14–19, 21, and 24–27 in its Patent Owner Response. *See generally* PO Resp.

Upon review of the arguments and evidence of record, we determine that Petitioner has demonstrated by a preponderance of the evidence that each of the limitations recited in claims 2, 14–19, 21, and 24–27 are present in the combination of Takashima in view of Braud and the skilled artisan would have had reason to make the combination with a reasonable expectation of success.

4. Analysis of Claims 3–13, 20, 22, 23, and 28

Petitioner argues that “[c]laims 3–13, 20, 22, and 23 recite obvious variations of compressed pressure (Claims 3–4), relative solids/solvent concentrations (Claims 5–7), solvent proportions (claims 8–13), concentrations of polymeric base and viscosity of aerosol adhesive (Claim 20), and drying times based on solvent (Claims 22 and 23).” Pet. 38–39. Petitioner urges that varying these parameters amounts to routine optimization that is within the knowledge of a person of ordinary skill in the art. *Id.* at 39. Petitioner further asserts that the subject matter of independent claim 28, beyond that described in claim 1—“wherein the relative volume and concentration of liquefied propellant is minimal relative to the relative volume and concentration of compressed inert gas”—“was within POSA knowledge to arrive at a small amount of liquefied propellant

relative to the amount of inert compressed gas in order to minimize VOC emissions.” *Id.* at 44 (Ex. 1003 ¶ 112).

Patent Owner argues that “there appears to be no support for the proposition that routine optimization of a process that is *not generally known*, i.e., the routine optimization of a process that is not disclosed in a single reference, is normally obvious.” PO Resp. 37–38. Further, Patent Owner asserts that the “petition is silent regarding whether or to what extent the variables in the Ground-2 challenged claims are ‘recognized to be result-effective’” variables such that the parameter could be optimized. *Id.* at 38–39.

For optimization of a variable to be effective, there must be “[a] recognition in the prior art that a property is affected by the variable.” *In re Applied Materials, Inc.*, 692 F.3d 1289, 1297 (Fed. Cir. 2012); *see also 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.”); *In re Aller*, 220 F.2d 454, 456 (CCPA 1955) (“where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.”).

a. claims 3 and 4 (200 psi)

Claims 3 and 4 require that “said compressed gas is pressurized in said canister to about 200 psi” or “in a range of about 160–200 psi,” respectively. Ex. 1001, 9:40–42, 9:45. Petitioner asserts that Braud describes adding nitrogen to increase the pressure in the cylinder to a minimum of 220 psi. Pet. 34 (citing Ex. 1004, 9:22–25). Petitioner further asserts that “[i]t was within POSA knowledge to lower the 220–250 psi

range disclosed in *Braud* to about 200 psi as part of routine optimization.” *Id.* at 39 (citing Ex. 1003 ¶¶ 107–108). Dr. Prud’homme testifies that “*Braud* teaches that the vapor pressures generated by a liquefied propellant alone would be insufficient to ‘allow the entire quantity of adhesive to be emptied from the cylinder under pressure’” and that a person skilled in the art would have understood that pressurization of a system depends on the desired solids concentration which also affects the viscosity of the system. Ex. 1003 ¶ 108.

Patent Owner contends that a pressure of 200 psi is not taught in *Braud* and that “the optimum pressure in an aerosol system is dependent on many factors including viscosity, solvent type and mixture, propellant type and amount, the kind of compressed gas used, among other factors.” PO Resp. 39–40 (citing Ex. 2034 ¶¶ 157–158; Ex. 2021, 238:16–230:5). Patent Owner, relying on the testimony of Dr. Wanat, testifies that “given the number of variables at play that impact spray pattern, a [design of experiment] would quickly ‘blow up’ into an unreasonably large number.” *Id.* (citing Ex. 2034 ¶¶ 77, 151–154).

We are not persuaded by Petitioner’s argument. Here, the claimed range and those described in *Braud* do not overlap and therefore, no presumption of obviousness exists. *In re Peterson*, 315 F.3d 1325, 1329 (Fed. Cir. 2003). And, while we agree that there *may* be some evidence of record to support Petitioner’s position that the amount of pressure in the canister is a result effective variable subject to optimization, critically absent from Petitioner’s arguments is *why* the ordinarily skilled artisan would have made the adjustment in the first instance. *Braud* explains that the amount of propellant is important to impart good sprayability properties to the aerosol

adhesive. Ex. 1004, 9:17–22. Braud continues to state that “it is preferable to further add *a sufficient quantity of an inert gas*, preferably nitrogen, to increase the pressure in the cylinder to a *minimum of 220 psi*; and preferably to about 240–250 psi.” *Id.* at 9:22–25 (emphasis added). Thus, Braud, at a minimum requires 220 psi to maintain sufficient pressure for its high solids system and Petitioner has offered no reason for the skilled artisan to depart from Braud’s express teachings to adopt a pressure lower than the *minimum* satisfactory amount. *E.I. DuPont de Nemours & Co. v. Synvina C.V.*, 904 F.3d 996, 1006 (explaining that the presumption may be overcome by evidence of teaching away). Though we can envision an acceptable explanation, none is present in the record. Accordingly, Petitioner has *not* shown by a preponderance of the evidence that claims 3 and 4 would have been obvious over Takashima, Braud, and the knowledge of the ordinarily skilled artisan.

b. claims 5–7 (solids conc. 20–50 % and solvent conc. 50–80 %)

Claim 5 additionally requires that the solids concentration of the aerosol adhesive is about 20–50 % by weight, claim 6 requires that the solvent concentration is about 50–80 % by weight¹⁰, and claim 7 requires that the solids concentration is 28 % and the solvent concentration is 72 % by weight. Ex. 1001, 9:48–57. Petitioner asserts that Braud prefers a solids content in the range of 72–76 % but explains that a solids content of less than 72 % may be obtained by adjusting the amount of water. Pet. 40 (citing

¹⁰ The parties do not dispute that a solvent concentration of about 50–80 % equates to a solids content of about 20–50 %. Pet. 39; *see generally* PO Resp. 40–41.

Ex. 1004, 7:50–57). Petitioner also draws our attention to Braud’s teaching that a solids content of 50–60 % was known. *Id.* (citing Ex. 1004, 7:45–50). Dr. Prud’homme testifies that, like Braud, Takashima also “discloses variations in solvent content to achieve, for example, desired aerosol adhesive viscosities.” Ex. 1003 ¶ 109. He continues to attest that “a person of ordinary skill in the art . . . would be motivated to vary the solids concentrations as disclosed in *Braud* to achieve the desired characteristics of the *Takashima* aerosol adhesive designed for a larger container.” *Id.*

Patent Owner argues that “nothing in Braud suggests that solvent or solids concentration can or should be ‘optimized.’” PO Resp. 40. Patent Owner further argues that “[a]djusting solids concentration and solvent concentration in an emulsion system like Braud’s is a relatively simple matter but that is not the case in a solvent based system” which would require substantial experimentation. *Id.* at 41 (citing Ex. 2034 ¶¶ 53, 150, 161–162, 164).

With respect to claims 5 and 6, we are persuaded by Petitioner’s evidence and argument. Claims 5 and 6 each require an aerosol adhesive having a solids content of about 20–50 % by weight. Ex. 1001, 9:49–54. Braud suggests a solids range of 50 % or more (Ex. 1004, 7:45–47) and therefore a presumption of obviousness exists because the claimed range overlaps with that of the prior art at the endpoint, i.e., 50 %. *Peterson*, 315 F.3d at 1329. Petitioner further relies on Braud’s teachings that “if solids content of . . . less than 72 % are required, the water can be accordingly adjusted to arrive at the desired solids level.” Pet. 40 (citing Ex. 1004, 7:50–57; Ex. 1003 ¶¶ 107, 109). Thus, Braud provides instructions to the skilled artisan regarding how to adjust solids content to achieve desired levels.

While the presumption may be rebutted through evidence of a teaching away, unexpected results, or other pertinent evidence indicating criticality of the claimed range, Patent Owner here offers none. *DuPont*, 904 F.3d at 1006 (quoting *Galderma Labs., L.P. v. Tolmar, Inc.*, 737 F.3d 731, 738 (Fed. Cir. 2013)).

We are not persuaded, however, by Petitioner’s position with respect to claim 7. Claim 7 requires a solids content of 28 % (Ex. 1001, 9:55–58) which does not overlap with Braud’s express teachings suggesting a range of 50 % or more. Ex. 1004, 7:45–47. Thus, a presumption of obviousness does not exist. Furthermore, one of Braud’s implied purposes is to increase solids content. Ex. 1004, 7:45–47 (“Previously, it was believed that *the highest possible solids* content for sprayable adhesives was in the range of 50–60% solids.”). Thus, while it may have been within the skilled artisan’s expertise to adjust the solids content to the claimed ranges of 50 % or less, Petitioner has offered no reason why *lowering* the solids content, below those described in Braud, would have been desirable given Braud’s teachings. *DuPont*, 904 F.3d at 1006.

Therefore, Petitioner has established by a preponderance of the evidence that the additional limitations of claims 5 and 6 are present in the combination of Takashima, Braud, and the knowledge of those skilled in the art but has *not* established that claim 7 would have been obvious over the same prior art.

c. claims 8–13 (solvent type and concentration)

Claims 8–13 depend from claim 1 and recite varying solvent types and concentrations—where the solvent is 50:50 acetone and hexane (claim

8), 50:50 acetone and cyclohexane (claim 9), 5:95 hexane and acetone (claim 10), 5:95 acetone and cyclohexane (claim 11), and 100 % hexane or cyclohexane (claim 12 or claim 13 respectively). Ex. 1001, 9:59–10:7. Petitioner demonstrates that Takashima teaches acetone as an exemplary volatile organic solvent and that Braud acknowledges volatile organic solvents like hexane have been used in the art. Pet. 40–41 (citing Ex. 1005 ¶ 17; Ex. 1004, 1:25–35). Petitioner further asserts that “[t]he use of cyclohexane as a solvent was well known in the prior art as a finite number of solvents used to dissolve polymeric bases.” *Id.* at 41 (citing Ex. 1003 ¶¶ 107, 110). Petitioner contends that “[i]t was well within POSA knowledge to arrive at [the recited solvent types and concentrations] as part of routine optimization” and based on the polymer selected. *Id.* at 40–42 (citing Ex. 1003 ¶¶ 107, 110). On behalf of Petitioner, Dr. Prud’homme testifies that

[i]t was within the knowledge of a person of skill in the art to arrive at a solvent mixture comprising [cyclo]hexane as part of optimization of drying times since it was known that [cyclo]hexane has a lower volatility than other solvents (e.g. hexane) and therefore a slower drying time (relative to hexane). Ex. 1003 ¶ 110 (citing *id.* ¶ 62).

Patent Owner argues that “polystyrene is insoluble in hexane, and polystyrene, polyisoprene, and polybutadiene are all insoluble in acetone” which weighs against their selection as a solvent under Dr. Prud’homme’s reasoning. PO Resp. 41–42 (citing Ex. 1026, 9, 15; Ex. 2021, 204:2–207:5). Further, Patent Owner explains that “[t]he fact that both hexane and acetone are *non-solvents* for the preferred polymer supports a finding that their performance as solvents is unexpected and therefore unobvious.” *Id.* at 42.

We are unpersuaded by Petitioner's showing with respect to claims 8–11. While we agree there is evidence to suggest the choice of solvent and the relative concentration of the solvent may be result effective variables, the variable being drying time, there is no reason of record for the skilled artisan to select the very *particularized* combination of solvents in the *proscribed* amounts of claims 8–11. In circumstances where the Petitioner urges an obviousness finding by “merely throw[ing] metaphorical darts at a board” in hopes of arriving at a successful result, and “the prior art gave either no indication of which parameters were critical or no direction as to which of many possible choices is likely to be successful,” courts should reject “hindsight claims of obviousness.” *In re Kubin*, 561 F.3d 1351, 1359 (Fed. Cir. 2009) (quoting *In re O'Farrell*, 853 F.2d 894, 903 (Fed. Cir. 1988).

Claims 12 and 13, however, are a different matter. Takashima provides that exemplary volatile organic solvents include “toluene, xylene, and acetone, or methyl alcohol, ethyl alcohol, and butyl alcohol, or isopropyl alcohol, or mixtures of two or three of the aforementioned solvents,” the implication being that 100 % of a volatile organic solvent may be used. Ex. 1005 ¶ 17. Braud similarly acknowledges use of “volatile organic solvents such as hexane, pentane, toluene, xylene, methylene chloride, 1, 1, 1, trichloroethane, naphtha and methyl ethyl ketone” similarly implying that a 100 % of the identified organic solvents may be used. Ex. 1004, 1:31–34 (emphasis added). Dr. Prud'homme testifies that “[i]t was well-known before April 2001 that polystyrene is soluble in cyclohexane.” Ex. 1003 ¶ 110 (citing Ex. 1026, IV-248); *see also* Ex. 1001, 5:61–63 (explaining that “[t]ypically, hexane and cyclohexane have similar properties that allow the two to be interchanged in separate embodiments.”). Patent Owner does not

dispute these aspects of Dr. Prud'homme's testimony.¹¹ *See generally* PO Resp. 41–42 (discussing claims 8–13).

We are also not persuaded by Patent Owner's argument that evidence of unexpected results is shown because hexane and acetone are non-solvents for the preferred polymers. *Id.* at 42. As discussed above (*supra* § II.B.a), complete dissolution within the solvent mixture is not required.

Furthermore, the evidentiary showing necessary to establish unexpected results must be commensurate in scope with the claimed subject matter. *In re Klosak*, 455 F.2d 1077, 1080 (CCPA 1972). Here, *only* claim 15 requires a particular polymer base and claim 15 does *not* require any particular solvent mixture. Ex. 1001, 9:30–10:65 (claims).

Therefore, Petitioner has established, by a preponderance of the evidence, that additional limitations of claims 12 and 13 are suggested by the combination of Takashima, Braud, and the knowledge of those skilled in the art, and further that the skilled artisan would have had reason to make the suggested combination with a reasonable expectation of success. Petitioner, however, has *not* shown by a preponderance of the evidence that claims 8–11 would have been unpatentable as obvious over the same combination.

d. claims 22 and 23 (drying times)

Claim 22 requires that the solvent mixture is non-chlorinated hexane, where the application requires a minimized drying time and claim 23 requires that the solvent mixture is non-chlorinated cyclohexane, where the

¹¹ Patent Owner's argument based upon "both hexane and acetone [being] non-solvents for the preferred polymer" of the '056 patent, are not relevant as they are premised on a claim construction we did not adopt, that is, solubility is not required.

application requires a maximized drying time. Ex. 1001, 10:36–41.

Petitioner contends that “[i]t was within POSA knowledge to arrive at a solvent mixture comprising hexane as part of optimization of drying times since it was known that hexane has a relatively high volatility and therefore relatively fast drying time” and conversely, a person of ordinary skill in the art would have reason to “arrive at a solvent mixture comprising [cyclo]hexane as part of optimization of drying times since it was known that [cyclo]hexane has a lower volatility than other solvents (e.g. hexane) and therefore a slower drying time (relative to hexane).” Pet. 42–43 (citing Ex. 1003 ¶¶ 107, 110).

Patent Owner states that if Dr. Prud’homme intended for the skilled artisan to choose hexane when shortened drying times are desired and cyclohexane when longer drying times are desired, Dr. Prud’homme fails to account for the fact that hexane is a non-solvent for polystyrene and therefore is unexpected and nonobvious. PO Resp. 42–43 (citing Ex. 1026, 5; Ex. 2021, 204:2–207:5).

We find Petitioner’s evidence and argument persuasive. The record adequately correlates drying time to the solvent selection, such that if a minimized drying time is desired, hexane is chosen and where a longer drying time is desired, cyclohexane is chosen. Ex. 1003 ¶¶ 107, 110. Furthermore, the breadth of claims at issue here do not require any particular polymeric adhesive. Therefore, we determine that Petitioner has shown by a preponderance of the evidence that the additional elements of claims 22 and 23 would have been suggested by the combination Takashima, Braud, and the knowledge of those skilled in the art.

e. claim 20 (% polymeric base and viscosity)

Claim 20 further recites a system where the concentration of the polymeric base is approximately 20 % and the adhesive has a viscosity of approximately 1000 centipoise. Ex. 1001, 10: 26–29. Petitioner argues that Braud describes “a ‘preferred embodiment . . . in which no filler is used’ having a SBR latex at a concentration of ‘**35.0-45.0**’ in ‘wt %’ of which ‘68–70%’ is the SBR polymeric base (*i.e., 23.8-31.5% by weight*).” Pet. 42 (citing Ex. 1004, 6:48–7:10; Ex. 1003 ¶ 111). According to Petitioner, Braud also describes an aerosol adhesive having a viscosity in a range of 800–1200 centipoise. *Id.* (citing Ex. 1004, 7:58–60, claim 2). Relying on the testimony of Dr. Prud’homme, Petitioner asserts that “[i]t was within POSA knowledge to lower **polymer base** from 23.8% disclosed in **Braud** to 20% as part or routine optimization.” *Id.* (citing Ex. 1003 ¶¶ 107, 110, 111).

Patent Owner asserts that because Braud is a water-based system, as the solids concentration is increased, “the impact on viscosity is negligible until very high solids content” is reached. PO Resp. 43 (citing Ex. 1034 ¶¶ 47, 52). Therefore, Patent Owner reasons, “Braud does not disclose or render obvious the claimed solids concentration and viscosity in Claim 20 which is for the claimed solvent-based system.” *Id.*

Petitioner’s arguments are unpersuasive. Braud, at best, describes a polymer base concentration of 23.8 % by weight. Ex. 1004, 6:48–7:10; Ex. 1003 ¶ 111. Absent from Petitioner’s and Dr. Prude’homme’s discussion is what variable is being optimized and what reason the skilled artisan would have for modifying Braud’s concentration. On this record, Petitioner has *not* established by a preponderance of the evidence that claim

20 would have been unpatentable as obvious over the combination Takashima, Braud, and the knowledge of those skilled in the art.

f. claim 28

Independent claim 28 is similar to claim 1 and recites a spray adhesive canister comprising:

a combination of compressed inert gas and liquefied propellant usable together in said canister, wherein the relative volume and concentration of liquefied propellant is minimal relative to the relative volume and concentration of compressed inert gas,

wherein said combination and relative concentrations of compressed inert gas and liquefied propellant enables said spray adhesive canister system to maintain a consistent spray delivery pressure and a consistent spray coarseness irrespective of the volume of spray adhesive remaining to be dispensed from said canister, and wherein said spray adhesive is a high solids, high viscosity, low solvent and low voc blend.

Ex. 1001, 10:52–65. Petitioner asserts that claim 28 is obvious over Takashima, Braud, and the knowledge of those skilled in the art, relying on much of the same evidence advanced for claim 1. Pet. 43–45. For example, Petitioner contends that Braud teaches the use of a combination of compressed inert gas and liquefied propellant together in a canister (*id.* at 43 (referring to evidence supporting claim limitations 1[d] and 1[h] and citing Ex. 1004, 8:62–64, 9:6–8, Fig 1.; Ex. 1003 ¶ 112)) and that a person of skill in the art would know how to minimize the concentration of liquefied propellant relative to the concentration of compressed inert gas in order to lower VOC emissions. *Id.* at 44 (citing Ex. 1003 ¶ 112). Petitioner relies on the teachings of both Takashima and Braud to show the use of a liquefied propellant in combination with an inert gas (*id.* (referring to evidence

supporting claim limitations 1[d] and 1[h])) and on Braud for the teaching that the propellant combination imparts good sprayability and maintains consistent pressure within the canister. *Id.* (citing Ex. 1004, 9:17–25; Ex. 1003 ¶ 112). Petitioner further asserts that Braud’s “invention relates to water-based adhesives and in particular to a **high solids content**, low viscosity, **low volatile organic compound (VOC)** adhesive suitable for packaging in pressurized containers to be later sprayed,” as claimed. *Id.* (citing Ex. 1004, 1:16–22).

Patent Owner contends that Petitioner’s “challenge to claim 28 rests mainly on Dr. Prud’Homme’s testimony which is not supported by prior art showing or suggesting each element.” PO Resp. 44. In particular, Patent Owner contends “[n]o evidence even remotely suggests Claim 28 claims an ‘optimum value of a variable in a known process.’” *Id.* And, Patent Owner asserts that “Braud does not disclose a ‘low-solvent’ or ‘low-voc’ blend where the formulation contains *no* solvents and *no* VOCs.” *Id.*

We are persuaded Petitioner has shown by a preponderance of the evidence that the subject matter of claim 28 is taught or suggested by Takashima, Braud, and the knowledge of those skilled in the art. With respect to Patent Owner’s argument that no evidence supports optimizing the relative values of the compressed gas to be greater than that of the liquefied hydrocarbon, we disagree. Braud explains that when using only the liquefied propellant, there “is generally *not* a sufficient amount of gas to allow the entire quantity of the adhesive to be emptied from the cylinder under pressure.” Ex. 1004, 9:17–22. Therefore, Braud describes adding an inert compressed gas to increase the pressure in the cylinder, from 70–80 psi to about 220–250 psi. *Id.* at 9:17–25. Dr. Prud’homme testifies that Braud

describes a formulation where “the relative volume and relative concentration of liquefied propellant to compressed gas . . . is calculated to 0.118 and 10.2 respectively,” thereby meeting the limitations of claim 28. Ex. 1003 ¶¶ 78, 112 (citing Ex. 1004, 9:6–25, 9:17–22). We credit Dr. Prud’homme’s un rebutted testimony in this regard.

As to Patent Owner’s contention that Braud’s disclosure of an adhesive with *no solvents* and *no VOCs* fails to suggest a low-solvent and low-VOC adhesive formulation, we also disagree. Braud expressly states that “[t]he present invention relates to water-based adhesives and in particular to a high solids content, low viscosity, low volatile organic compound (VOC) adhesive suitable for packaging in [a] pressurized container to be later sprayed.” Ex. 1004, 1:16–19. Further, a teaching of an adhesive formulation having no solvents and no VOCs is the epitome of a low-solvent and low-VOC adhesive formulation.

Accordingly, we determine that Petitioner has demonstrated by a preponderance of the evidence that each of the limitations of claim 28 of the ’056 patent would have been suggested by the disclosures of Takashima, Braud, and the knowledge base of the skilled artisan, and that the person of ordinary skill in the art would have had reason to make the combination with a reasonable expectation of success.

E. Obviousness of Claims 1–28 in view of the Carnahan Publication and Braud

Petitioner contends the subject matter of claims 1, 2, 5, 6, 8, 12, 14–22, and 24–27 would have been obvious over the combined disclosures of the Carnahan Publication and Braud (Pet. 45) and claims 3, 4, 7, 9–11, 13,

23, and 28 would have been obvious over the Carnahan Publication, Braud, and the knowledge of the ordinarily skilled artisan. *Id.* at 55.

The '056 patent is a continuation-in-part of Application No. 10/132,620, i.e., the application leading to the Carnahan Publication (“Parent Application”). The parties do not dispute the fact the Carnahan publication teaches much of the subject matter of many claims of the '056 patent. Rather, the parties’ primary dispute centers on whether the Carnahan Publication is prior art to the '056 patent. If the Carnahan Publication is *not* prior art, the Petitioner’s grounds based on the Carnahan Publication must fail.

1. The Carnahan Publication

“It is elementary patent law that a patent application is entitled to the benefit of the filing date of an earlier filed application only if the disclosure of the earlier application provides support for the claims of the later application as required by 35 U.S.C. § 112.” *In re Chu*, 66 F.3d 292, 287 (Fed. Cir. 1995). “This requires that the written description actually or inherently disclose the claim element.” *PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1306 (Fed. Cir. 2008). And, “[e]ntitlement to a filing date does not extend to subject matter which is not disclosed, but would be obvious over what is expressly disclosed. It extends only to that which is disclosed.” *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1571–1572 (Fed. Cir. 1997); *see PowerOasis*, 522 F.3d at 1310 (explaining that “[o]bviousness simply is not enough; the subject matter must be disclosed to establish possession.”); *Tronzo v. Biomet, Inc.*, 156 F.3d 1154, 1158 (Fed. Cir. 1998) (same). “Subject matter that arises for the first time in [a] CIP

application does not receive the benefit of the filing date of the parent application.” *Augustine Medical, Inc. v. Gaymar Industries, Inc.*, 181 F.3d 1291, 1302 (Fed. Cir. 1999).

The dispositive issue before us is whether the Parent Application describes the combination of a liquefied propellant and compressed gas as propellants for an aerosol adhesive system or whether such combination was newly-added subject matter.¹²

Petitioner asserts that the Carnahan Publication fails to provide written description support for a combination of a liquefied propellant and a compressed inert gas (’056 patent, claims 1 and 28) and that this subject matter was added later by way of the continuation-in-part application. See Pet. 7 (citing Ex. 1014, 1012); see also *id.* 45–46; Pet. Reply 11. More particularly, Petitioner contends that while the Carnahan Publication describes the use of compressed and liquefied propellants individually, they are described as alternatives to one another and not used together as part of a dual-propellant system. Pet. 8; Pet. Reply 12. Petitioner contends that only in the application leading to the ’056 patent does a dual-propellant system appear. Pet. 7 (citing Ex. 1001, Examples 6, 7, 8:16–19; Ex. 1012, claims 47, 48).

¹² Petitioner also argues that claims reciting pressure ranges (claims 3 and 4), relative solids and solvent concentrations (claims 5–7), cyclohexane as a solvent (claims 9, 11, 13, and 23), solvent mixture proportions (claims 9–13), and maximized/minimized drying times (claim 22 and 23) are not supported by the Carnahan Publication. Pet. 46; see Ex. 1015 (comparing the Carnahan Publication to the ’056 patent). Patent Owner does not address these contentions in the Patent Owner Response. See generally PO Resp.

In response, Patent Owner presents two primary arguments¹³:

(1) only claim 28 requires a liquefied propellant and a compressed gas be “usable together in said canister,” all remaining claims simply require “a hydrocarbon propellant held within said canister,” an element all parties agree is disclosed in both priority documents, and (2) any argument that the Parent or Provisional applications fail to disclose the use of a liquefied gas in combination with a compressed gas propellant is squarely contradicted by the evidence, including the testimony of Dr. Prud’Homme.

PO Resp. 47. Patent Owner first argues that only claim 28 requires a “combination” of a liquefied propellant and compressed gas and therefore claim 1 is fully supported by the Parent Application. According to Patent Owner, “Claim 1 recites ‘a hydrocarbon propellant held within said canister,’ but includes no language that might require a combination, interaction or blend with compressed gas.” *Id.* at 48. Patent Owner reasons that “a hypothetical aerosol adhesive canister having all elements of Claim 1 would still infringe if the hydrocarbon propellant were somehow separated from the rest of the adhesive mixture but still ‘held within said canister.’” *Id.* In contrast, claim 28 requires that the inert gas and liquefied propellant are “usable together in said canister” thereby showing that claim 28 alone requires a “combination.” *Id.* at 48–49. Patent Owner argues that the doctrine of claim differentiation supports its interpretation of the scope of claims 1 and 28. *Id.* at 49. Patent Owner also contends that Petitioner’s

¹³ Patent Owner also contends that the testimony of Dr. Wanat supports the position that the claims find written description support in the parent application. PO Resp. 54 (citing Ex. 2034 ¶¶ 178–204). Patent Owner does not expand upon this argument, leaving it to us ferret out the basis and evidence supporting Dr. Wanat’s position. We decline to do so.

interpretation of claim 1 as requiring a hydrocarbon propellant combined with an inert gas “relies on a misapplication of the doctrine of prosecution disclaimer.” *Id.* Patent Owner argues that it did not take the position during prosecution that it was the combination of a liquefied propellant with a compressed gas that “made the claims novel,” but instead explained that such combinations were “well-known systems [that] were not effective at ‘achieving acceptable spray patterns as the canister is emptied.’” *Id.* at 50 (citing Ex. 1002, 102 and discussing *Principles of Aerosol Technology*, Ex. 1034). Patent Owner explains that when rejecting then-pending claims (one of which ultimately issued as claim 28), the Examiner noted that “[propellant] gas is used broadly by applicants *and appears to include both compressed gas and hydrocarbon gas.*” *Id.* at 51 (emphasis in original).

Petitioner argues that the doctrine of claim differentiation does not support Patent Owner’s arguments as compressed gas propellants and liquefied propellants were described as alternatives. Pet. Reply 12. Petitioner also explains that claim differentiation is not applicable here because the components “cannot be somehow magically isolated from each other.” *Id.* at 15. Furthermore, Petitioner asserts that Patent Owner argued, “no fewer than 11 times” during prosecution, that the combination of two types of propellants was not taught in the prior art. *Id.* at 13–14 (citing Ex. 1002, 101–104, 165, 167). Petitioner explains that *Principles of Aerosol Technology*, while describing a combination of liquefied propellants with inert gases, was a general reference and is “not specifically directed to *aerosol adhesives.*” *Id.* (citing Ex. 1034, 4–5). Lastly, Petitioner urges that

[t]he fact that the term ‘propellant’ or ‘propellant gas’ may have been used in the Parent Application (as the Board noted at

institution, see ID, 30) to refer to *either* compressed inert gas *or* to a liquefied propellant does not mean that the Parent Application discloses them together in combination or as a blend. *Id.* at 12–13 (citing Ex. 1055 ¶¶ 46–54).

We are not persuaded that claim 28 is the only claim requiring a combination of a propellant gas and a liquefied propellant. First, the doctrine of claim differentiation does not appear applicable. “Under the doctrine of claim differentiation, each claim in a patent is presumptively different in scope.” *Wenger Mfg., Inc. v. Coating Machinery Sys., Inc.*, 239 F.3d 1225, 1233 (Fed. Cir. 2001). Here, claim 1 and claim 28 are indeed of different scope. For example, claim 1 requires certain structural aspects (i.e., a hose and a spray gun) not recited in claim 28. *Compare* Ex. 1001, 9:30–40, *with* 10:51–65. Further, claim 28 includes limitations not present in claim 1 including, for example, the relative volumes and concentrations of the compressed gas to solvent, and a spray adhesive blend that is high solids, high viscosity, low solvent, and low in VOCs. *Id.* In addition, claim 28 eliminates the requirement that the propellant be a hydrocarbon. *Id.* Furthermore, we observe that the breadth of claim 1 allows for hydrocarbon propellant to be both *in combination* or “somehow separated from the rest of the adhesive mixture.” *See* PO Resp. 48.

Furthermore, the overwhelming weight of the statements made during prosecution indicates the Patent Owner’s position, and the Examiner’s understanding, that the inventive aspect of the ’056 patent was the use of a

compressed gas and a liquefied propellant together in an aerosol adhesive spray system. For example, Applicant explained¹⁴:

That is, unlike Applicant, *Masuzaki '925 does not teach, describe, or otherwise suggest that compressed gases and liquefied propellants may be mixed an[d] effectively utilized together. Masuzaki '925 simply states that preferred aerosol agents include liquefied propellants, and recognized in an alternative that “other suitable aerosol agents may be selected from compressed gases.” Applicant’s invention is unique in its combination of these two previously alternative propellant categories. [Ex. 1002, 101 (emphasis added)]*.

Applicant respectfully notes that *Carnahan’s '112* disclosure is distinct from the present disclosure, wherein the only aerosol propellant discussed is dimethyl ether. That is, there is no discussion of adaptability with compressed gases, and, as with *Masuzaki '925*, *there is no mention of any combination of liquefied propellants with compressed gases. [Id. (emphasis added)]*.

Like the foregoing, and *unlike Applicant’s invention, Saidman '894 does not mention a combination of liquefied propellants and compressed gases for aerosol delivery of adhesive. [Id. (emphasis added)]*.

Applicant respectfully asserts that *it would not have been obviously [sic] to one of ordinary skill in the art at the time of Applicant’s invention to utilize a combination of liquefied propellants and compressed gases for aerosol delivery of*

¹⁴ The claim at issue when Patent Owner advanced these statements did not include the “usable together” language Patent Owner urges distinguishes claim 1. See Ex. 1002, 96, 158. Notably, it was not until Patent Owner revised claim 34 (issuing as claim 1) to include a separate recitation of both a hydrocarbon propellant and a compressed gas, that the claim became allowable. *Id.* at 194, 216.

adhesives. Neither was such a combination utilized for delivery of foams. [*Id.* at 102 (emphasis added)].

Unlike any of the references, Applicant's invention, as claimed, is able to deliver a consistent spray pattern as the canister is emptied, wherein the previous drawbacks of unacceptably coarse spray are overcome, and wherein VOC limits are met. *It is Applicant's combination of inert gases and a small amount of hydrocarbon propellant coupled with the gas cylinder canister system that enables this achievement.* [*Id.* at 103–104 (emphasis added)].

Applicant's system allows for compressed gases and liquefied propellants to be mixed and effectively utilized together, wherein previously each was categorized as an alternative propellant choice. Carnahan's '112 disclosure discusses only the aerosol propellant dimethyl ether. That is, there is no discussion of adaptability with compressed gases, and, as with Masuzaki '925, there is no mention of any combination of liquefied propellants with compressed gases. [Ex. 1002, 165 (emphasis added)].

Hydrocarbon propellant gases beneficially function as both propellant and also act as solvent because when compressed, they become liquids, or liquefied gases. Use of compressible gases as propellants is also recognized, but the solvent function has not been supported because these gases, carbon dioxide, nitrous oxide, nitrogen, and air, do not form liquids under pressure. *These two categories of propellants have been consistently viewed as alternatives, each with pros and cons.* [*Id.* at 166 (emphasis added)].

And, in allowing the claims that ultimately issued, the Examiner explained “the prior art does not disclose a canister system employing the adhesive compositions as claimed *with both compressed gas and a liquefied hydrocarbon as a propellant system.*” *Id.* at 219 (emphasis added).

Second, Patent Owner argues that Dr. Prud'homme testified that “[t]he Carnahan Publication not only disclosed the use of liquefied propellants, but that it also disclosed their use *in combination with compressed gas*.” PO Resp. 52–53. Patent Owner relies on the following excerpted testimony in support of its arguments:

So I think that The Carnahan Publication discloses all of those [referring to a list of liquefied gases including hydrocarbons], which can serve as liquefied propellants *and help maintain pressure*. And, as I said, *both help maintain pressure but also help in the atomization process* when they volatilize out of the solvent phase that contains the polymeric adhesive. [Ex. 2021,] 305:14–21 (emphasis added).

The statement I’m trying to make here is that a liquefied propellant of any of the type listed in paragraph 54 of Carnahan as an example *would help address, complement, the compressible gases which are used in this*. *Id.* at 307:22–309:11 (emphasis added).

I believe that certainly Braud says that one can add HFC 134 and it improves the performance of the spraying. *Carnahan similarly describes in paragraph 54 that you can add propellants and that will contribute to the performance of what he describes in this publication*. *Id.* at 309:12–22 (emphasis added).

See PO Resp. 53. Patent Owner contends that based on this testimony, “[t]he Carnahan Publication clearly discloses the use of both compressed gas and liquefied gas *in combination*.” *Id.* at 54.

Petitioner argues that Patent Owner “improperly characterized Dr. Prud'homme’s testimony to argue admissions where none exist.” Pet. Reply. 15. Petitioner contends that when Dr. Prud'homme testified that “**both** help maintain pressure but also help in the atomization process,” he

was referring to “the two qualities of a hydrocarbon propellant.” *Id.* (citing Ex. 2021, 305:10–307:21; Ex. 1055 ¶ 56). And, according to Petitioner, when Dr. Prud’homme testified “that the liquefied propellant of any of the type listed in paragraph 54 of *Carnahan* as an example would help address, complement, the compressible gases which are used in *this*,” “[t]he word ‘this’ is not referring to the *Carnahan Publication* in isolation, but to ¶100 of Ex-1003 where Dr. Prud’homme describes the key teaching of *Braud* that the *Carnahan Publication* lacks—the combination of a liquefied propellant with a compressed gas.” *Id.* at 16 (citing Ex. 2021, 307:22–309:11; Ex. 1055 ¶ 57). Petitioner also urges that “Dr. Prud’homme’s statement that ‘Carnahan similarly describes in paragraph 54 that you can add propellants and that will contribute to the performance of what he describes in this publication’ (POR, 53) cannot by any stretch be understood as an admission that the *Carnahan Publication* discloses the combination of a compressed gas with a hydrocarbon propellant.” *Id.*

Our review of the record and understanding of Dr. Prud’homme’s testimony is consistent with Petitioner’s explanations above. In addition to the evidence discussed above, we are convinced by the significance of the new matter describing a dual-propellant system that was added to the CIP Application (the application leading to the ’056 patent). *See e.g.*, Ex. 1012, 9–10, 13, examples 6–7, claims 47–48. Having considered the parties’ argument and evidence, we are persuaded that the Parent Application does not clearly allow “persons of ordinary skill in the art to recognize that the inventor ‘invented what is claimed,’” i.e., a dual-propellant system using a combination of liquefied propellant and compressed gas. *See Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1136, 1351 (Fed. Cir. 2010) (en banc).

Therefore, we determine that the '056 patent is not entitled to the filing date of the Carnahan Publication.

2. Analysis of Claim 1

Having determined that the Carnahan Publication fails to demonstrate possession of the combination of a liquefied hydrocarbon propellant and a compressed gas, and therefore is prior art to the '056 patent, we now address Petitioner's assertion that the combination of the Carnahan Publication and Braud renders claim 1 unpatentable as obvious.

Petitioner argues that the Carnahan Publication describes a canister-based aerosol adhesive system having a hose connected to the canister and a spray gun connected to the hose. Pet. 50 (citing Ex. 1013 ¶¶ 3, 25, 62).¹⁵ The Carnahan Publication also teaches that hydrocarbons are well-known aerosol propellants and can be used to spray an aerosol adhesive from a canister. Ex. 1013 ¶¶ 6, 25; *see also* Ex. 1004, 9:6–16 (describing a liquefied propellant). Petitioner additionally asserts that the Carnahan Publication describes use of a solvent mixture, e.g., acetone and hexane, and that another advantage of the invention is that the “solvent evaporates almost as quickly as the high toxicity chlorinated solvents such as methylene chloride” (Ex. 1013 ¶¶ 36, 47) and the system results in a spray pattern similar to that produced by liquefied gas propellants. *See id.* ¶ 48; *see also id.* ¶¶ 10, 62–66 (achieving acceptable spray patterns with disclosed formulations). According to Petitioner, the Carnahan Publication describes a

¹⁵ As discussed above, Petitioner has established that these features are similarly described in Figure 1 of Braud. *See* Ex. 1004, Fig. 1, 8:45–48, 8:62–64.

polymeric base that is suspended or dissolved in the solvent mixture. Pet. 51 (citing Ex. 1013 ¶¶ 23–24). Petitioner argues that the Carnahan Publication uses a propellant gas dissolved in the aerosol adhesive/solvent mixture and further stresses the importance of solubility of the inert gas in the solvent mixture to assist with pressure recovery as adhesive is discharged from the container. *Id.* (citing Ex. 1013 ¶¶ 48, 54–55). And, Petitioner contends that Braud provides the suggestion to use a liquefied propellant in combination with an inert gas to increase pressure within the canister. *Id.* at 52 (citing Ex. 1004, 8:66–9:5). Petitioner reasons that one of skill in the art would have recognized that the solubility of the inert gas depends on the solvent used. *Id.* at 47 (citing Ex. 1013 ¶¶ 54–55 (explaining that CO₂ is relatively soluble in acetone and hexane while other compressed gases “have low solubility in most solvents”). For example, when N₂ is used as the compressed gas, the volume of the vapor phase increases when the adhesive product is discharged which results in a decrease in the pressure exerted by the N₂ gas and a noticeable difference in the spray pattern. *Id.* (citing Ex. 1033, 138; Ex. 1034, 31–32). Therefore, an ordinarily skilled artisan, desiring to improve the aerosol spray adhesive system disclosed in the Carnahan Publication, would have had a reason to look to Braud’s teachings that combining liquefied propellant “**will modify the character of the adhesive to better adapt it for spraying** and a second propellant constituting an inert gas” can be used to boost the pressure inside the canister. *Id.* at 48 (citing Ex. 1004, 8:66–9:5, 9:6–43; Ex. 1003 ¶ 97). Petitioner asserts that “[a] POSA would have recognized that applying the known technique of utilizing a combination of liquefied hydrocarbon propellant and compressed gas would yield predictable results and improve the system disclosed in the

Carnahan Publication.” *Id.* at 49; *see also* Ex. 1003 ¶ 100 (“Based on the known technique of employing a combination of liquefied propellant and compressed gas taught in *Braud*, a person of ordinary skill in the art would reasonably predict that the application of this known technique would successfully yield a canister-based aerosol adhesive with low VOCs and desired sprayability properties.”).

Patent Owner does not dispute that the *Carnahan Publication* describes the above enumerated limitations. Rather, Patent Owner argues that (1) *Braud* does not teach a hydrocarbon propellant (PO Resp. 54), (2) a person of ordinary skill in the art would not have combined the teachings of the *Carnahan Publication* and *Braud* because of technical differences (*id.* at 55), (3) *Braud* teaches away from combinations with solvent-based references like the *Carnahan Publication* (*id.* at 56), and (4) the combination of the *Carnahan Publication* and *Braud* is unlikely to succeed. *Id.* at 57. We discuss each of Patent Owner’s arguments below.

a. whether Braud discloses a hydrocarbon propellant

Patent Owner argues that *Braud* does not teach a *hydrocarbon* propellant because the only propellant described in *Braud* is R134A, which is not a hydrocarbon but rather a fluorocarbon. PO Resp. 54 (citing Ex. 1004, 9:6–16; *see also* Ex. 2016, 147 (defining “hydrocarbon” as containing only hydrogen and carbon)). According to Patent Owner, *Braud* expressly selects this propellant because it does not cause ozone depletion. *Id.* (citing Ex. 1004, 9:9–10).

Petitioner replies that it does not rely on *Braud* to supply the hydrocarbon propellant limitation as alleged by Patent Owner. Pet. Reply

22. Rather, Petitioner argues that Braud teaches the combination of a liquefied propellant and compressed gas to enhance the characteristics of the aerosol spray. *Id.* Petitioner explains that it relies on the Carnahan Publication which describes hydrocarbons such as propane, butane, and isobutene as propellants for aerosols. *Id.* (citing Ex. 1055 ¶¶ 92–93); Pet. 51 (citing Ex. 1013 ¶ 6).

We are unpersuaded by Patent Owner’s argument because it is premised on a position Petitioner does not advance, that is, using R134A as the liquefied propellant in the combination of the Carnahan Publication and Braud. As the Petitioner explains, the

Carnahan Publication teaches that it was known in the prior art that “hydrocarbons typically include propane, butane and isobutane” and “[t]hese propellant gases are widely used in aerosols.” Ex. 1013 at [0006]. *Braud* teaches the use of a liquefied propellant in combination with an inert gas propellant. Ex. 1004 at 8:62–64, 9:6–8, Fig. 1. Thus, it would have been obvious to a POSA to combine the liquefied hydrocarbon propellants with the inert gas propellants disclosed in the *Carnahan Publication*. See Ex. 1003 at ¶100.

Pet. 51. Dr. Prud’homme testifies that “[t]he *Carnahan Publication* teaches that *liquefied propellants*, including hydrofluorocarbons, *hydrocarbons*, dimethyl ether, chlorofluorocarbons, and hydrochlorofluorocarbons, were commonly used in aerosol adhesive formulations.” Ex. 1003 ¶ 100 (emphasis added) (citing Ex. 1013 ¶ 6; Ex. 1033, 97, 131, 134; Ex. 1034, 25). Therefore, it is clear that Petitioner relies on the hydrocarbon propellants described in the Carnahan Publication and uses Braud to provide for a dual-propellant system.

b. whether there would have been no reason to combine the Carnahan Publication and Braud because of the differences between solvent-based and water-based technologies

Patent Owner asserts that, because of the “numerous technical differences between water-based and solvent-based technologies,” a person of ordinary skill in the art would not consider the teachings of Braud in combination with the Carnahan Publication. PO Resp. 55. Patent Owner relies on the same reasoning proffered in arguing against the merits of a combination of Takashima and Braud above—that is, water is a non-solvent for the adhesive materials in the Carnahan Publication, the polymer types that can be emulsified are limited, and water-based adhesives risk corrosion and freezing. *Id.* at 55–56 (referring to PO Resp. §§ V.D.2 and V.D.3).

For the reasons discussed above in Sections II.D.2.b.(3) and (4), we do not find Patent Owner’s arguments, in this regard, persuasive.

c. whether Braud teaches away from a combination with solvent-based references

Patent Owner asserts that “[t]he idea that a POSA would look to the teachings of Braud and conclude from those teachings that they should use a *hydrocarbon propellant* to help break up the spray pattern improperly ignores the clear teaching of Braud seeking to avoid the use of any flammable materials and any VOCs.” PO Resp. 56–57. Patent Owner relies on the same reasoning proffered in arguing that Braud teaches against a combination with Takashima and away from the ’056 patent. *Id.* at 56 (referring to PO Resp. § V.B.).

For the reasons discussed above in Section II.D.2.b.(1), we do not find Patent Owner’s arguments, in this regard, persuasive.

d. whether the combination of the Carnahan Publication and Braud is unlikely to succeed

Patent Owner contends that experimental evidence it obtained illustrates a person of ordinary skill in the art would not have had a reasonable expectation of successfully combining the teachings of Braud and the Carnahan Publication. PO Resp. 57. Dr. Wanat designed two feasibility experiments to test whether the combination of the Carnahan Publication and Braud would be successful: (1) an SIS polymer was prepared with water (*id.* at 34 (citing Ex. 2034 ¶ 17; Ex. 2039, 10)), and (2) an SIS polymer was dissolved in a hexane/acetone solution and R134A was added as a liquefied propellant. *Id.* (citing Ex. 2034, ¶¶ 218–220; Ex. 2039, 10–11). Patent Owner asserts that neither experiment produced a successful result because of high viscosity or clumping. *Id.* at 58–59.

Patent Owner's feasibility experiments do not fairly establish that the combination of the Carnahan Publication and Braud, as proposed by Petitioner, would have no likelihood of success because Patent Owner's experiments used water as a solvent (experiment 1) and HFC-134A as a liquefied propellant (experiment 2)—neither of which are proposed by Petitioner. Therefore, Patent Owner's arguments do not overcome Petitioner's evidence regarding the likelihood of successfully combining the teachings of the Carnahan Publication and Braud to arrive at the claimed invention. See Ex. 1003 ¶ 100.

Therefore, we determine that Petitioner has demonstrated by a preponderance of the evidence that each limitation of claim 1 is taught or suggested by the combination of the Carnahan Publication and Braud, and

further that the skilled artisan would have had reason to make the suggested combination with a reasonable expectation of success.

3. Analysis of Claims 2, 5, 6, 8, 12, 14–22, and 24–27

With respect to dependent claims 2, 5, 6, 8, 12, 14–22, and 24–27, Petitioner identifies where the combination of Takashima and Braud suggest each limitation of these claims. Pet. 52–55. For example, Petitioner demonstrates that the Carnahan Publication describes a compressed inert gas with a final pressure ranges of 120 psi and 300 psi (claim 2) (Pet. 52 (citing Ex. 1013 ¶¶ 62, 65; Ex. 1004, 9:22–25)), a high solids adhesive with a solids concentration equal to or greater than 20 % (claims 5, 6, 8, 16 and 17) (*id.* (citing Ex. 1013 ¶¶ 46, 56–61, 66, Abstract; Ex. 1003 ¶¶ 18, 35; Ex. 1004, 3:1–2, 7:20–37, 7:42–45), and where the high solids adhesive is propelled by a compressed gas (claim 27) (*id.* at 55 (citing Ex. 1013 ¶ 48; Ex. 1004, 4:1–3, 8:53–59, 8:66–9:5). Petitioner further demonstrates that the Carnahan Publication describes use of a hydrocarbon propellant, including propane, butane, and isobutene (claim 14) (*id.* at 51, 53 (citing Ex. 1013 ¶ 6), where the solvent mixture includes hexane and acetone (claims 12, 22, and 24) (*id.* at 52, 54–55 (citing Ex. 1013 ¶¶ 27–28, 36; Ex. 1003 ¶¶ 107, 110; Ex. 1004, 1:29–34)), where the polymeric base is dissolved in a solvent with the compressed gas (claim 25) (*id.* at 55 (citing Ex. 1013 ¶¶ 11, 23)), and where the concentration of the polymeric base is 20 % of the aerosol adhesive and the adhesive has a viscosity of 1000 centipoise (claim 20) (*id.* at 53–54 (citing Ex. 1013 ¶¶ 41, 46)). Petitioner further demonstrates that each of the Carnahan Publication and Braud teach a polymeric base that is a styrene block polymer such as styrene butadiene (claim 15) (*id.* at 53

(citing Ex. 1013 ¶ 50; Ex. 1004, 4:20–26)), a compressed gas, such as nitrogen or carbon dioxide (claims 18 and 26) (*id.* at 53–54 (citing Ex. 1013 ¶¶ 32, claims 6–9; Ex. 1004, 9:22–25, claim 5)), and where the base is either dissolved or suspended in the solvent mixture with the compressed gas (claims 19 and 25) (*id.* 53, 55 (citing Ex. 1013 ¶¶ 23–24; Ex. 1004, 1:29–34, 6:56–66, 7:1–10)). And lastly, relevant to claim 21, Petitioner demonstrates that the Carnahan Publication and Braud each describe a solvent mixture that supports a plurality of drying constraints and where the application of pressure in the canister is achieved by the dissolved, compressed gas. *Id.* at 54 (Ex. 1013 ¶¶ 36, 48; Ex. 1004, 4:1–3, 8:53–59, 9:18–29; Ex. 1003 ¶ 62).

Patent Owner does not address Petitioner’s arguments with respect to claims 2, 5, 6, 8, 12, 14–22, or 24–27 in its Patent Owner Response. *See generally* PO Resp.

Upon review of the arguments and evidence of record, we determine that Petitioner has demonstrated by a preponderance of the evidence that additional limitations of claims 2, 5, 6, 8, 12, 14–22, and 24–27 are present in the combination of the Carnahan Publication and Braud and that the skilled artisan would have had reason to make the combination with a reasonable expectation.

4. Analysis of Claims 3, 4, 7, 9–11, 13, 23, and 28

Patent Owner asserts that “[f]or the same reasons asserted above [in] addressing [Petitioner’s] Ground 2, the POSA would not arrive at the variables claimed in these claims through routine optimization.” PO Resp. 59 (referring to PO Resp. § VI.A–F.).

Petitioner's arguments for claims 3, 4, or 9–11 here do not remedy the deficiencies noted above for those claims (*see infra* §§ II.D.3.a. and c.). Therefore, Petitioner has not demonstrated by a preponderance of the evidence that the subject matter of dependent claims 3, 4, and 9–11 would have been obvious over the combined disclosures of the Carnahan Publication and Braud. For the reasons discussed above, however, we determine that Petitioner has shown by a preponderance of the evidence that each limitation of claims 13 and 23 is taught or suggested by the combination of the Carnahan Publication, Braud, and the knowledge of those skilled in the art. The remaining claims, claims 7 and 28, are discussed below.

Claim 7 requires that the relative solids and relative solvent concentration of the adhesive composition be 28 % and 72 % respectively. Ex. 1001, 9:55–58. Petitioner argues that both the Carnahan Publication and Braud suggest relative solids and relative solvent concentrations in the claimed amounts and that “[i]t was within a POSA knowledge to lower relative solids to 28 %, which results in a relative solvent concentration of 72 % as part of routine optimization.” Pet. 56 (citing Ex. 1004, 1:50–57, 7:45–50; Ex. 1003 ¶ 18), 52 (citing Ex. 1013 ¶¶ 46, 56–61, 66; Ex. 1003 ¶¶ 18, 35). Patent Owner does not address Petitioner's arguments with respect to claim 7 separate from its position that “the POSA would not arrive at the variables claimed through routine optimization.” *See* PO Resp. 59 (referring to PO Resp. § VI.A–F).

We are persuaded by Petitioner's evidence and arguments. Specifically, the Carnahan publication describes a relative solids concentration of between 20 % and 40 % and a relative solvent

concentration of between 60 to 80 %. Ex. 1013 ¶¶ 46 (“solids of the concentrate is approximately 20 percent”), 56–61 (disclosing adhesive mixtures having between 31.9 % and 33.5 %), 66 (increasing the solids concentration to 40 %); Ex. 1003 ¶¶ 18, 35, 106–107, 109–110).

With respect to claim 28, Petitioner contends that claim 28 is obvious over the Carnahan Publication, Braud, and the knowledge of those skilled in the art, relying on much of the same evidence advanced for claim 1. Pet. 57–58. For example, Petitioner contends that Braud teaches the use of a combination of compressed inert gas and liquefied propellant together in a canister (*id.* (referring to evidence supporting claims 1[d] and 1[h] and citing Ex. 1004, 8:62–64, 9:6–8, Fig 1; Ex. 1003 ¶ 112)) and that a person of skill in the art would have known how to minimize the concentration of liquefied propellant relative to the concentration of compressed inert gas in order to lower VOC emissions (*id.* at 58 (citing Ex. 1003 ¶ 112)). Petitioner relies on the teachings of Braud to show the use of a liquefied propellant in combination with an inert gas (*id.* (referring to evidence supporting claims 1[d] and 1[h])) and on Braud for the teaching that the propellant combination imparts good sprayability and maintains consistent pressure within the canister (*id.* (citing Ex. 1004, 9:17–25, Ex. 1003 ¶ 112)). Petitioner further asserts that the Carnahan Publication discloses an aerosol adhesive system having low VOC emissions, having a spray pattern and low viscosity suitable for aerosol adhesive systems, and is a high solids formulation, as claimed (*id.* (citing Ex. 1013 ¶ 37; Ex. 1004, 1:16–22, 7:58–61, claim 2; Ex. 1003 ¶¶ 111–112)).

Patent Owner does not address Petitioner’s arguments with respect to claim 28 in its Patent Owner Response, apart from disputing Petitioner’s

contention regarding optimization of a variable. See PO Resp. 59 (referring to PO Resp. § VI.A–F). For the reasons discussed above (*infra* § II.D.3.d), we find Petitioner’s evidence persuasive and are not convinced by Patent Owner’s arguments to the contrary.

Upon review of the arguments and evidence of record, we determine that Petitioner has demonstrated by a preponderance of the evidence that all limitations of claims 7 and 28 are present in the combination of the Carnahan Publication, Braud, and the knowledge of the skilled artisan, and that the skilled artisan would have had reason to make the combination with a reasonable expectation of success.

F. Objective Evidence of Nonobviousness

The fourth *Graham* factor instructs that we must consider—apart from what the prior art itself would have suggested—whether objective evidence of nonobviousness (i.e., secondary considerations) may lead to a conclusion that the challenged claims would not have been obvious. See, e.g., *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538–39 (Fed. Cir. 1983) (instructing that evidence of secondary considerations, when present, must always be considered in determining obviousness). It is only a part of the “totality of the evidence”; its mere existence does not control the conclusion of obviousness. See *Richardson-Vicks Inc. v. Upjohn Co.*, 122 F.3d 1476, 1483 (Fed. Cir. 1997) (citations omitted). Objective evidence of nonobviousness “may often be the most probative and cogent evidence in the record” and “may often establish that an invention appearing to have been obvious in light of the prior art was not.” *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349

(Fed. Cir. 2012). Objective evidence of nonobviousness may include evidence of commercial success, licensing, copying, praise by others, long-felt but unresolved need, and failure by others. *Graham*, 383 U.S. at 17–18. Objective evidence of nonobviousness “is only relevant to the obviousness inquiry ‘if there is a nexus between the claimed invention and the [objective indicia of nonobviousness].’” *In re Affinity Labs of Tex., LLC*, 856 F.3d 883, 901 (Fed. Cir. 2017) (quoting *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1312 (2006)). A “nexus” is a legally and factually sufficient connection between the objective evidence and the claimed invention such that the objective evidence should be considered in the determination of obviousness. *Paulsen*, 30 F.3d at 1482. There is a “presumption of a nexus” when a product is “coextensive” with a patent claim. *Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 723 F.3d 1363, 1372 (Fed. Cir. 2013).

Here, Patent Owner offers evidence of long-felt need and industry skepticism as well as industry praise. See PO Resp. 60–63.

1. Long-felt Need and Skepticism

According to Patent Owner, “[s]ome of the strictest regulations for air-quality were from the South Coast Air Quality Management District, or SCAQMD in Southern California,” which proposed changes in the 1990s to Rule 1168, governing VOC emissions. PO Resp. 60–61 (citing Ex 2034 ¶ 228). Patent Owner contends that 3M’s public commentary “suggest[ed] that 3M ‘cannot meet these [VOC] limits [proposed in amended Rule 1168] with currently available technology.’” *Id.* at 61 (citing Ex. 2030, 41). Other commentary by industry participants confirmed the difficulty in meeting the requirements of Rule 1168. *Id.* at 61 (citing Ex. 2029, 10, 11; Ex. 2028, 6;

Ex. 2034 ¶ 232). Further, a competitor of 3M stated that “the proposed phase out of methylene chloride adhesives . . . would effectively mandate the use of water-based contact adhesives” and “*water-based adhesives do not work for all uses and all applications.*” *Id.* at 61–62. According to Patent Owner, these meeting minutes and commentary reflected a need for low-VOC adhesives that were not water-based, and showed skepticism in the art that a compliant, non-water-based product could be developed. *Id.*

Petitioner argues that 3M’s comments in 1992 have not been shown to be related to canister-based aerosol adhesives at issue here. Pet. Reply. 25 (citing Ex. 1060, 140:4–24; Ex. 1055 ¶¶ 139–142).

In order to show a long-felt but unmet need for the claimed invention, the objective evidence must show that the need was a persistent one that was recognized by those of ordinary skill in the art. *In re Gershon*, 372 F.2d 535, 538 (CCPA 1967). Patent Owner’s evidence shows that there was a regulatory need to reduce VOC emissions in aerosol adhesives. See PO Resp. 60. Patent Owner’s evidence, however, is insufficient to show there was a long-felt need for the claimed invention. For example, Dr. Prud’homme testifies that much of the concerns raised by the new amendments to Rule 1168 were not because of technical difficulties, but rather based on the short implementation time and costs of implementing formulation changes. Ex. 1055 ¶¶ 141–142. Dr. Prud’homme’s understanding is confirmed by Petitioner’s “commentary” to the SCAQMD in 1992—10 years before the filing date of the ’056 patent—that additional time was necessary. For example, Petitioner stated:

We are requesting additional time . . . based on the progress and direction of technology development.

[A] new spray modified dispersion line, now being introduced in California, is an example of our continuing commitment to develop products with reduced emissions. Our preliminary lab tests indicate that changes in the active ingredient and delivery system will result in significantly less emissions because of increased efficiency.

Ex. 2030, 41.

2. Industry Acclaim

Patent Owner also contends that its aerosol adhesive canister has been positively recognized by the industry. PO Resp. 62. Patent Owner asserts this industry acclaim is reflected in its receipt of the Sequoia Award, in September 2003, given by the largest trade association in the home and commercial furnishings industry. *Id.* (citing Ex. 2031). Through the testimony of Dr. Wanat, Patent Owner asserts that Patent Owner's HSC13 formulation, the subject of the award, meets all of the requirements of claims 1 and 28 of the '056 patent. *Id.* at 62–63 (citing Ex. 2034 ¶ 237); *see also* Exs. 2044 (product brochure), 2045 (batch record illustrating the HSC13 formulation).

Petitioner asserts that the batch record, forming the nexus for purported industry acclaim of Patent Owner's invention, should be given no weight because "Dr. Wanat admitted in his deposition that he had no knowledge of its contents nor could he verify them." Pet. Reply 24 (citing Ex. 1060, 135:2–137:22). Accordingly, Petitioner asserts Dr. Wanat's testimony is conclusory. Further, Petitioner argues that neither expert has heard of the supposed Sequoia Award prior to this proceeding, and the fact that the award was given on September 9, 2003, for a product purportedly

produced on September 8, 2003, “defies credulity.” *Id.* at 25 (citing Ex. 1055 ¶ 148; Ex. 1060, 132:15–18, 136:13–137:22; Ex. 2031; Ex. 2045).

Industry praise for an invention may provide evidence of nonobviousness where the industry praise is linked to the claimed invention. *See Geo. M. Martin Co. v. Alliance Mach. Sys. Intern. LLC*, 618 F.3d 1294, 1305 (Fed. Cir. 2010); *Asyst Tech’n, Inc. v. Emtrak, Inc.*, 544 F.3d 1310, 1316 (Fed. Cir. 2008). Patent Owner presents sufficient evidence that the *HSC13-27* or *HSC27* formulation embodies the claimed invention. Exs. 2034 ¶ 237; 2044; 2045. Thus, we conclude that Patent Owner has shown that it is entitled to a presumption of a nexus between the *HSC13-27* and the claimed invention. However, like Petitioner, we find suspect an award given on September 9, 2003, for a product whose production run completed on September 8, 2003. We observe that the batch record, forming the nexus between the product and the patent, refers to *HSC13-27* while the Sequoia Award announcement refers to *HSC13*. *Compare* Ex. 2045, with Ex. 2031. The differing product designations coupled with the timing of the award suggest that Patent Owner was awarded praise for an earlier formulation that may or may not have embodied the claimed invention. However, even assuming a nexus between the Sequoia Award and the invention claimed in the ’056 patent, an environmental leadership award from an isolated and admittedly little-known source, while laudable, is not significant evidence industry acclaim.

Having considered each of the *Graham* factors, we determine that the first two *Graham* factors—the scope and content of the prior art and differences between the prior art and the challenged claims—significantly outweigh the marginal evidence of industry praise. Accordingly, we

conclude that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claims 1, 2, 5–8, and 12–28 would have been obvious over the prior art identified by Petitioner in the challenges.

III. CONTINGENT MOTION TO AMEND

Patent Owner filed a contingent Motion to Amend original claims 1–28 and replace them with substitute claims 29–56. MTA 2–4, 27–33. We have determined that original claims 1, 2, 5–8, and 12–28 of the '056 patent have been shown to be unpatentable by a preponderance of the evidence; therefore, we proceed to address Patent Owner's contingent Motion to Amend. But because we determined claims 3, 4, and 9–11 of the '056 patent have *not* been shown to be unpatentable by a preponderance of the evidence, we do not consider Patent Owner's contingent request to replace those claims with substitute claims 31, 32, and 37–39. *See* MTA 2 (requesting that the Board “not consider this motion for each original claim it finds patentable”).

Before considering the patentability of any substitute claims, we first must determine whether the motion to amend meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121. As part of this showing, Patent Owner must demonstrate (1) the amendment responds to a ground of unpatentability involved in the trial; (2) the amendment does not seek to enlarge the scope of the claims of the patent or introduce new subject matter; (3) the amendment proposes a reasonable number of substitute claims; and (4) the proposed claims are supported in the original disclosure. 37 C.F.R. § 42.121; *Lectrosonics, Inc. v. Zaxcom, Inc.*, Case IPR 2018-01129 (PTAB Feb. 25, 2019) (Paper 15) (precedential).

Although Patent Owner must demonstrate that the statutory and regulatory requirements for a motion to amend are met, Patent Owner “does not bear the burden of persuasion to demonstrate the patentability of [the proposed] substitute claims.” *Lectrosonics*, slip op. at 4 (citing *Aqua Prods. Inc. v. Matal*, 872 F.3d 1290 (Fed. Cir. 2017); *Bosch Auto. Serv. Sols. LLC v. Iancu*, 878 F.3d 1027 (Fed. Cir. 2017)). “Rather, as a result of the current state of the law and [U.S. Patent and Trademark Office] rules and guidance, the burden of persuasion will ordinarily lie with the petitioner to show that any proposed substitute claims are unpatentable by a preponderance of the evidence.” *Lectrosonics, Inc.*, slip op. at 4.

Patent Owner proposes substantive amendments to only claims 1, 2, 5, and 28 by way of proposed substitute claims 29, 30, 33, and 56. MTA 2–4; *see also id.* at 27 (claim 29), 28 (claims 30 and 33), 32–33 (claim 56), (illustrating amendments to proposed claim language). The remaining proposed substitute claims are simply amended to reflect proper dependency. *Id.* at 4–5 (explaining that the remaining “substitute dependent claims correspond to the original dependent claims and are amended only to reflect their new dependency from the substitute claim 29”); *see generally id.* at 28–32 (Claims Appendix). Accordingly, we limit our discussion below to proposed substitute claims 29, 30, 33, and 56.

A. Requirements Under 35 U.S.C. § 316 (d) and 37 C.F.R. § 42.121

Patent Owner asserts that proposed substitute claims 29, 30, 33, and 56 do not present new matter or enlarge the scope of the originally issued claims, are supported by the original specification (as well as the Parent Application), and are responsive to the grounds of unpatentability involved

in the proceeding. MTA 3–6. Petitioner does not dispute Patent Owner’s contentions. *See generally* MTA Opp.

We determine that Patent Owner has met the above-identified requirements of 35 U.S.C. § 316 (d) and 37 C.F.R. § 42.121. Patent Owner proposes a single substitute claim for each cancelled claim (i.e., one-for-one), and therefore, meets this requirement. *See* 37 C.F.R. § 42.121(a)(3); *see also Lectrosonics*, slip op. at 4 (“There is a rebuttable presumption that a reasonable number of substitute claims per challenged claim is one (1) substitute claim.”). Patent Owner proposes narrowing limitations in proposed substitute claims 29, 30, 33, and 56 in direct response to the grounds of unpatentability involved in this trial. Moreover, based on the citations to the ’056 patent provided in the motion we find sufficient written description support for Patent Owner’s proposed substitute claims. *See* MTA 13–14, 19–20, 23–24. But, for the reasons discussed above (*supra* § II.E.1), we do not find adequate written description support for the proposed amended claims in the Provisional or Parent Application. Therefore, the Carnahan Publication is available as prior art to the proposed amended claims.

Having determined that the contingent Motion to Amend meets the requirements of 35 U.S.C. § 316 (d) and 37 C.F.R. § 42.121, we analyze whether proposed substitute claims 29, 30, 33, and 56 are unpatentable by a preponderance of the evidence based on the entirety of the record. For the reasons discussed below, we determine that Petitioner has shown by a preponderance of the evidence that proposed claims 29, 30, 33, and 56 are unpatentable over the combination of Takashima and Braud as well as the combination of the Carnahan Publication and Braud.

B. Obviousness of Proposed Substitute Independent Claim 29

As a replacement for independent claim 1, Patent Owner proposes claim 29. MTA 2–3. Proposed substitute independent claim 29 is reproduced below with annotations showing amendments to original claim 1:

29. An aerosol adhesive canister system, comprising:
a gas cylinder canister;
a hose connected to said canister;
a spray gun connected to said hose;
a hydrocarbon propellant held within said canister;
an aerosol adhesive held within said canister, said aerosol adhesive comprising:
 an organic solvent mixture selected to have volatility characteristics for producing a specific spray pattern;
 a polymeric base in said solvent mixture; and
 a compressed gas dissolved in said solvent mixture;
wherein said hydrocarbon propellant is liquefied under pressure and dissolved in said solvent mixture.

Id. at 27 (Claims Appendix). Relevant to the patentability over the prior art, proposed claim 29 adds “the following limitations to original claim 1: (1) a limitation to “organic” solvent mixture, rather than simply a “solvent mixture,” and (2) “a limitation that clarifies that the hydrocarbon propellant is liquefied under pressure and dissolved in the solvent mixture.” *Id.* at 3.

With respect to the limitations of claim 29 present in original claim 1, Petitioner relies on the same arguments and evidentiary support we determined supported, by a preponderance of the evidence, a conclusion of obviousness. *Compare* Pet. 25–29, 30–34, 47–52, *with* MTA Opp. 12–17, 19–20. Petitioner contends that none of the additional limitations included

in proposed amended claim 29 avoid a conclusion of obviousness because each is disclosed or suggested by the prior art. MTA Opp. 18. Petitioner argues that the use of organic solvents was described in each of Takashima and the Carnahan Publication, as well as Braud. *Id.* at 18, 20 (citing Ex. 1005 ¶¶ 12, 17, 22; Ex. 1013 ¶¶ 15, 27–28, 31, 36, 46–47, 62–66; Ex. 1004, 1:25–29; Ex. 1003 ¶¶ 102, 114; Ex. 1055 ¶¶ 152–153). Further, Petitioner asserts that Braud describes an adhesive system that produces a desired spray pattern. *Id.* (citing Ex. 1004, 8:45–52). Petitioner also asserts that “both *Takashima* and the *Carnahan Publication* disclose hydrocarbon propellants that liquefy under pressure and dissolve in the solvent mixture.” *Id.* at 18, 20 (citing Ex. 1005, Abstract ¶¶ 13, 19; Ex. 1013 ¶¶ 6, 40, 54; Ex. 1055 ¶ 154).

Patent Owner, for its part, asserts that Petitioner failed to establish a motivation to combine Takashima with Braud or the Carnahan Publication with Braud. MTA Reply 11–12. With reference to the combination of Takashima and Braud, Patent Owner contends that (1) a person of ordinary skill in the art would not have had reason to exclude the microcapsules of Takashima, (2) Braud teaches away from a combination using organic solvents and flammable VOCs, (3) there is no disclosure regarding how this combination might occur, and (4) there would be no reasonable expectation of success in the combination of Takashima and Braud. *Id.* (citing Ex. 2055, ¶¶ 33–34, Ex. 2034 ¶¶ 105, 122–127; Ex. 2039). And, according to Patent Owner, the combination of the Carnahan Publication and Braud similarly fails because Braud expressly teaches away from the use of any VOC’s, “3M has not explained *how* the POSA would combine the teachings of Braud with The Carnahan Publication,” and because “[a]ny attempt to combine the

teachings of The Carnahan Publication with Braud would not be met with success.” *Id.* at 11 (citing Ex. 2055 ¶¶ 31–39; Ex. 2034 ¶¶ 207–208, 215–221; Ex. 2039).

Patent Owner does not present any argument to counter Petitioner’s position that the two additional limitations of proposed amended claim 29 are found in either of the Takashima/Braud combination or the Carnahan Publication/Braud combination.¹⁶ As we determined above (*supra* n.8, §§ II.D.1.a and II.E.4), both primary references, i.e., Takashima and the Carnahan Publication, describe using volatile organic solvents as part of an aerosol spray adhesive system. Furthermore, Takashima teaches an “adhesive composition includ[ing] a . . . resin-based adhesive . . . in a solution prepared by dissolving a resin-based adhesive and a resin-based binder in a volatile organic solvent, and *a propellant that can be partially dissolved in the organic solvent*,” described in the further limitation of claim 29. *See* Ex. 1005 ¶ 13; *see also id.* at Abstract, ¶¶ 19, 35, claims 1 and 5 (same). Similarly, the Carnahan Publication explains that “[t]ypically, liquefied gases dissolve in the concentrate.” Ex. 1013 ¶ 40; *see also id.* ¶ 54 (“the propellant goes from being dissolve[d] in the concentrate” and “the hydrocarbon propellants liquify [sic] and mix with low solubility solvents”). Therefore, we find that Petitioner has demonstrated that each of the primary

¹⁶ Patent Owner does contend that the combination of Takashima and Braud does not disclose a solvent mixture “selected to have volatility characteristics for producing a specific spray pattern” and that “Takashima is not an effective spray pattern within the context of the ’056 patent.” MTA Reply 12 (citing Ex. 2034 ¶ 141; Ex. 2055 ¶¶ 56–60). We previously considered and found unpersuasive Patent Owner’s arguments in this regard. *See supra* § II.D.2.a.

references describes the additional limitations of proposed claim 29. Patent Owner's arguments regarding whether a reason exists for the skilled artisan to have combined Braud with Takashima or the Carnahan Publication, have been considered and found unpersuasive. *See supra* §§ II.D.2 and II.E.2–5.

In view of the foregoing, we find Petitioner has established, by a preponderance of the evidence, that the combination of Takashima and Braud as well as the combination of the Carnahan Publication and Braud would have rendered proposed substitute claim 29 obvious.

C. Obviousness of Proposed Substitute Claim 30

Patent Owner proposes substitute claim 30 as a replacement for original claim 2. MTA 23. Proposed substitute claim 30 is reproduced below with annotations showing amendments:

30. The system as claimed in claim ~~429~~ wherein said compressed gas is pressurized in said canister in a range of about ~~150–350~~ 120–300 psi.

Id. at 28 (Claims Appendix). In proposing amended claim 30, Patent Owner modifies the pressurization range in the canister from about 150–350 psi to about 120–300 psi. *Id.*

Petitioner contends that Braud teaches pressurization of its aerosol adhesive canister to a minimum of 220 psi. MTA Opp. 20 (citing Ex. 1004, 9:22–30). In addition, Petitioner argues that the Carnahan Publication describes several compressed gas pressures ranging from about 120–300 psi. *Id.* (citing Ex. 1013 ¶¶ 2, 65; Ex. 1004, 9:22–30). Patent Owner asserts, however, that “Braud teaches a *minimum* 220 psi” and “Takashima’s

pressures are all far lower than the claimed range.” PO Reply 12 (citing Ex. 1004, 9:24–25; Ex. 1005 ¶¶26).

We are not persuaded by Patent Owner’s arguments. As we discussed above, the Carnahan Publication describes a compressed inert gas with a final pressure range of 120 psi to 300 psi, the precise range for the amended claims. See Ex. 1013 ¶¶ 62, 65.

In view of the foregoing, we determine that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of proposed substitute claim 30 would have been obvious over the Carnahan Publication/Braud combination.

D. Obviousness of Proposed Substitute Claim 33

Patent Owner proposes substitute claim 33 as a replacement for original claim 5. MTA 23–24. Proposed amended claim 33 is reproduced below with annotations showing amendments:

33. The system as claimed in claim ~~4~~29 wherein the relative solids concentration of said aerosol adhesive is about 20–~~50~~ 40% by weight.

Id. at 28 (Claims Appendix). Patent Owner proposes to narrow the claimed concentration of relative solids from about 20–50 % to about 20–40 %. *Id.*

Petitioner argues that both the combination of Takashima with Braud and the combination of the Carnahan Publication with Braud suggest a relative solids concentration of about 20–40 %. MTA Opp. 20 (Ex. 1004, 7:45–57; Ex. 1003 ¶¶ 107, 109; Ex. 1013 ¶¶ 46, 56–61, 66). Patent Owner asserts that “Braud’s specified solids ranges *begins* at 50%.” MTA Reply 12 (citing Ex. 1004, 7:47).

We agree with Patent Owner that Braud does not fairly suggest a relative solids range of about 20–40 % because the relative solids concentrations described in Braud do not overlap with those recited in the proposed substitute claim. Further, and unlike the challenged grounds, Petitioner in opposing the Motion to Amend does not avail itself of the knowledge of a person of ordinary skill in the art in combination with the teachings of Takashima and Braud. *Compare* Pet. 40, with MTA Opp. 20. Furthermore, as we discussed above (*supra* § II.D.4), we find no reason of record, and Petitioner directs us to none, for a skilled artisan to have lowered the solids content to less than 50 %. That said, the Carnahan Publication describes a high solids adhesive with a solids concentration equal to or greater than 20 % and as high as 40 %, the range recited in substitute claim 33. *See* Ex. 1013 ¶¶ 46 (“[I]n aerosol adhesives the solids of the concentrate is approximately 20 percent.”), 66 (“The solution solids was increased to 40 percent”); *see also id.* ¶ 8 (“[A] typical formula for aerosol adhesives is 28 lb. of adhesive (30 percent solids . . .).”).

Therefore, we determine that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of proposed substitute claim 33 would have been obvious over the combination of the Carnahan Publication with Braud.

E. Obviousness of Proposed Substitute Independent Claim 56

As a replacement for independent claim 28, Patent Owner proposes claim 56. MTA 3–4. Proposed substitute independent claim 56 is reproduced below with annotations showing amendments:

56. A spray adhesive canister system, comprising:
 a spray adhesive comprising an organic solvent mixture selected to have volatility characteristics for producing a specific spray pattern and a polymeric base in said solvent mixture;
 a canister having a head space; and
 a combination of compressed inert gas and liquefied propellant usable together in said canister, the compressed inert gas dissolved in said solvent mixture wherein the ~~relative volume and concentration~~ pressure of liquefied propellant in the head space of the canister is minimal relative to the relative less than the pressure ~~volume and concentration~~ of compressed inert gas,
 wherein said combination and relative concentrations of compressed inert gas and liquefied propellant enables said spray adhesive canister system to maintain a consistent spray delivery pressure and a consistent spray ~~coarseness~~ pattern irrespective of the volume of spray adhesive remaining to be dispensed from said canister, and
 wherein said spray adhesive is a high solids, high viscosity, low solvent and low voc blend that, in combination with said compressed inert gas, provides an aerosol adhesive product that reduces VOC emissions in comparison to an aerosol adhesive product formed using liquefied propellant without a compressed inert gas.

Id. at 32–33 (Claims Appendix). Relevant to the patentability over the prior art, proposed claim 56 adds five additional limitations, two of which are expressly recited in original claim 1 and proposed amended claim 29—that is, “a solvent mixture [*organic* solvent mixture, amended claim 29] selected to have volatility characteristics for producing a specific spray pattern and a polymeric base in said solvent mixture” and “where the ‘compressed gas [is] dissolved in said solvent mixture.’” *Id.* at 3–4. Additionally, claim 56 requires (1) “a canister having a head space,” (2) “the pressure of liquefied propellant in the head space of the canister is less than the pressure of compressed inert gas,” and (3) “in combination with said compressed inert

gas, provides an aerosol adhesive product that reduces VOC emissions in comparison to an aerosol adhesive product formed using liquefied propellant without a compressed gas.” *Id.*

With respect to the limitations of claim 56 present in original claim 1, Petitioner relies on the same arguments and evidentiary support we have determined support, by a preponderance of the evidence, a conclusion of obviousness. *Compare* Pet. 25–29, 31–32, 51, with MTA Opp. 12–17, 20–21. Petitioner contends that none of the additional limitations included in proposed amended claim 56 avoid a conclusion of obviousness because each is disclosed or suggested by the prior art. MTA Opp. 18. Petitioner argues that a canister having a head space is taught by Braud and the Carnahan Publication. MTA Opp. 21 (citing Ex. 1004, 9:17–32; Ex. 1013 ¶¶ 45, 54). Petitioner further argues that it was within the knowledge of the ordinarily skilled artisan to arrive at a pressure of liquefied propellant in the head space of the canister that is less than the pressure of compressed inert gas. *Id.* (citing Ex. 1003 ¶ 112; Ex. 2041 ¶¶ 21, 28; Ex. 1055 ¶ 167). Lastly Petitioner asserts that a person of ordinary skill in the art would have understood that the combination of a compressed inert gas and liquefied hydrocarbon propellant provides an aerosol adhesive product that reduces VOC emissions in comparison to an aerosol adhesive product formed using a liquefied propellant without a compressed gas. *Id.* at 21–22 (citing MTA, 12, 18–19; Ex. 2041, 21, 31; Ex. 1055 ¶ 167). Patent Owner does not present any argument to counter Petitioner’s position other than those advanced in support of substitute claim 29.

Petitioner’s positions are supported by the record as a whole. The Carnahan Publication describes head space within the canister. For

example, the Carnahan Publication states that “[a]s the aerosol can is emptied, the dissolve[d] propellant boils from the concentrate to the head space of the aerosol is [sic] can.” Ex. 1013 ¶ 54. Braud likewise (as illustrated in Figure 1, reproduced *supra* p. 17) depicts head space in an exemplary canister. Ex. 1004, Fig. 1; *see also* 9:1–30 (explaining that as the aerosol canister is emptied, there “is generally not a sufficient amount of [liquefied] gas to allow the entire quantity . . . to be emptied” therefore, an inert gas is pumped into the cylinder under pressure to boost the pressure inside the cylinder). And as noted above (*see supra*, §§ II.D.5 and II.D.8), Petitioner’s position that a person of ordinary skill in the art would have understood Braud to disclose an aerosol adhesive spray system where the volume and concentration of the compressed inert gas is greater than the volume and concentration of the liquefied propellant is supported by the record evidence and testimony of Dr. Prud’homme. Ex. 1003 ¶ 112; Ex. 1004, 8:66–9:25; *see also* Ex. 1005 ¶ 26 (implying the inert gas pressure is greater where “it is appropriate to use nitrogen gas, carbon dioxide, or the like as the *pressurization gas*” (emphasis added)). Finally, Petitioner’s position that the ordinarily skilled artisan would have understood that a dual-propellant system using both compressed inert gas and liquefied hydrocarbon propellant would possess reduced VOC emissions as compared to a system using only a liquefied hydrocarbon propellant, appears admittedly true and indisputable given that the compressed inert gas (at a higher pressure) would allow less liquefied propellant to be used while maintaining adequate pressure within the canister. *See e.g.*, MTA, 12, 18–19; Ex. 2041, 21, 31; *see* Ex. 1004, 8:66–9:25; Ex. 1005 ¶ 26; Ex. 1013 ¶ 54.

Therefore, we determine that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of proposed substitute claim 56 would have been obvious over the combinations of Takashima with Braud as well as the Carnahan Publication with Braud.

CONCLUSION

We conclude that Petitioner has satisfied its burden of demonstrating, by a preponderance of the evidence, that the subject matter of claims 1, 2, 5–8, and 12–28 of the '056 patent is unpatentable. Petitioner, however, has *not* satisfied its burden of demonstrating, by a preponderance of the evidence, that the subject matter of claims 3, 4, and 9–11 of the '056 patent is unpatentable. We further conclude that Petitioner has demonstrated by a preponderance of the evidence that proposed substitute claims 29, 30, 33–36, and 40–56 are likewise unpatentable.

ORDER

Accordingly, it is:

ORDERED that Petitioner has established, by a preponderance of the evidence, that claims 1, 2, 5–8, and 12–28 of the '056 patent are unpatentable; and

FURTHER ORDERED that Petitioner has failed to establish, by a preponderance of the evidence, that claims 3, 4, and 9–11 of the '056 patent are unpatentable; and

FURTHER ORDERED that Patent Owner's Motion to Amend is denied; and

FURTHER ORDERED that because this is a final written decision, parties to the proceeding seeking judicial review must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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