

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SALEM FABRICATION TECHNOLOGIES GROUP, INC.,
Petitioner,

v.

UNIGLASS ENGINEERING OY,
Patent Owner.

IPR2022-01517
Patent 8,479,540 B2

Before DONNA M. PRAISS, ELIZABETH M. ROESEL, and
SHELDON M. MCGEE *Administrative Patent Judges*.

PRAISS, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Salem Fabrication Technologies Group, Inc. (“Petitioner”) filed a Petition requesting *inter partes* review of claims 1–15 (“the challenged claims”) of U.S. Patent No. 8,479,540 B2 (Ex. 1001, “the ’540 patent”). Paper 1 (“Pet.”). Uniglass Engineering Oy (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”).

Under 35 U.S.C. § 314(a), we may not institute an *inter partes* review unless the information presented in the petition “shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.”

For the reasons stated below, we exercise our discretion to deny institution because Petitioner has not established a reasonable likelihood that it would prevail with respect to most of its asserted grounds of unpatentability.

II. BACKGROUND

A. *Related Matters*

The parties indicate that the ’540 patent is the subject of *Glaston Corp. v. Salem Fabrication Techs. Grp., Inc.*, No. 1:21-cv-942-TDS-LPA (M.D.N.C.) (“the parallel district court litigation”). Pet. 1; Paper 4, 1. The following proceeding is also identified as a related matter: IPR2022-01516 (U.S. Patent No. 8,650,911). Paper 7, 1.

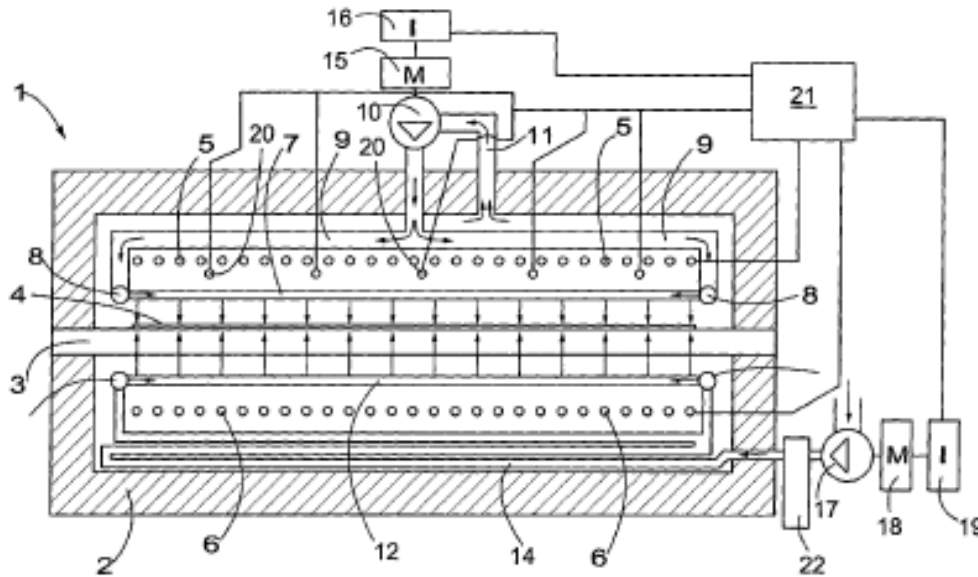
B. *The ’540 Patent*

The ’540 patent is titled “Method and Apparatus for Heating Glass.” Ex. 1001, code (54). The ’540 patent explains that heating glass using an oscillating roll furnace has the problem that edges of the glass tend to curve

upwards at the beginning of heating due to a large heat flow received by the lower surface in comparison to the upper surface. *Id.* at 1:19–25. According to the '540 patent, this problem is due to the ceramic rolls used in the furnace. *Id.* at 1:21–24. The '540 patent states that this problem is particularly difficult when heating selectivity glass, which reflects thermal radiation extremely strongly, because the selective surface is usually facing upwards when heated. *Id.* at 1:28–33.

The '540 patent describes the underlying idea of the invention as heating the upper surface of the glass by hot air jets formed by sucking air from inside the furnace, pressurizing the hot air, and recycling it back to the upper surface of the glass and blowing air from outside the furnace that has been pressurized by a compressor and heated to the lower surface of the glass. *Id.* at 2:11–20. The '540 patent explains that convection blowing on the upper side enables controlled heating of coated glass that reflects thermal radiation and that the temperature at the bottom part of the furnace can be kept low if blowing on the underside is supplied at the correct moment in the middle of the heating cycle when the heat flow from the rolls is decreasing. *Id.* at 2:35–45. According to the '540 patent, “[h]eating blowing on the underside enables quite a high heating rate to be achieved.” *Id.* at 2:37–38.

The '540 patent depicts a cross-sectional end view of a glass tempering furnace in Figure 1, below.



Id. at 2:58–59. Referring to Figure 1 above, the '540 patent states that “pressurization unit 10 sucks hot air from the furnace through an upper side return pipe 11” and feeds the air to upper side feed pipe 9 and upper side delivery pipe 8. *Id.* at 3:43–51. The '540 patent states that air blown to underside feed pipe 14 by compressor 17 is derived from the factory hall and conveyed to pressure tank 22. *Id.* at 4:34–37. Based on measurements carried out by thermometers 20, the '540 patent states control unit 21 determines the desired heating profiles and controls the operation of pressurization unit 10, compressor 17, as well as resistors 5 and 6, which heat the upper and lower surfaces of the glass, respectively. *Id.* at 4:49–57, 2:52–65.

C. Illustrative Claim

Petitioner challenges claims 1–15 (all claims) of the '540 patent. Pet. 14. Claim 1 is the sole independent claim. Ex. 1001, 5:51–7:12. Claim 1 is reproduced below.

1. [1pre] In a method of heating glass, the method comprising

[1a] conveying glass through a tempering furnace during a heating cycle so that the glass is heated from above and below, the improvements consisting essentially of

[1b] heating an upper surface of the glass by hot air jets formed by sucking hot air from inside the furnace,

[1c] pressurizing the hot air and

[1d] recycling the pressurized hot air back to the upper surface of the glass for the heating from above, and

[1e] blowing air which has been taken from outside the furnace and which has been pressurized by a compressor and heated onto a lower surface of the glass for the heating from below.

Id. at 5:51–63 (bracketed designations added and paragraphs adjusted); *see* Pet. vi (Petitioner’s claim listing).

D. *Asserted Grounds of Unpatentability*

Petitioner, supported by the declaration of Renald Bartoe (Ex. 1003), asserts the following seven grounds of unpatentability (Pet. 10–11):^{1,2}

¹ The relevant sections of the Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, took effect on March 16, 2013. The ’540 patent claims priority to applications with filing dates before this date. *See* Ex. 1002, code (60), (63). For the purposes of this Decision, pre-AIA statutes apply.

² The knowledge of a person of ordinary skill in the art plays a significant role in any obviousness analysis, therefore, we do not separately identify it in the table of challenges as does Petitioner. Pet. 10–11; *see Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966) (“Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined.”); *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (“[T]he level of skill in the art is a prism or lens through which a judge, jury, or the Board views the prior art and the claimed invention.”).

Ground	Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1	1–4, 15	103(a)	Plumat, ³ Vehmas ⁴
2	5–14	103(a)	Plumat, Vehmas, Reunamaki ⁵
3	1–4, 15	103(a)	Vitkala, ⁶ Vehmas
4	5–14	103(a)	Vitkala, Vehmas, Reunamaki
5	1–4, 15	103(a)	Vehmas '923, ⁷ Vehmas
6	5–14	103(a)	Vehmas '923, Vehmas, Reunamaki
7 ⁸	1	103(a)	Plumat

III. ANALYSIS

A. Legal Standard

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review

³ US 3,326,654, issued June 20, 1967 (Ex. 1004). Here and throughout this Decision, we use the correct spelling of “Plumat” rather than the misspelling used in the Petition and the Bartoe Declaration.

⁴ WO 01/32570 A1, published May 10, 2001 (Ex. 1007).

⁵ US 2002/0036194 A1, published Mar. 28, 2002 (Ex. 1008).

⁶ US 2002/0134109 A1, published Sept. 26, 2002 (Ex. 1005).

⁷ US 6,282,923 B1, issued Sept. 4, 2001 (Ex. 1006).

⁸ Petitioner raises an alternative challenge based on Plumat alone. Pet. 33–40 (Petitioner states “Plumat renders this limitation obvious” following the subheading for each limitation [1a]–[1e.]); Prelim Resp. 44 (“The Petition alternatively argues that Plumat alone . . . renders Claim 1 invalid.”).

petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)); *see also* 37 C.F.R. § 42.104(b) (requiring a petition for *inter partes* review to identify how the challenged claim is to be construed and where each element of the claim is found in the prior art patents or printed publications relied upon).

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.” *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) when in evidence, objective evidence of nonobviousness. *Graham*, 383 U.S. at 17–18.

Additionally, the obviousness inquiry typically requires an analysis of “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (requiring “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”)). Petitioner cannot satisfy its burden of proving obviousness by employing “mere conclusory statements,” but “must instead articulate specific reasoning, based on evidence of record, to support the legal conclusion of obviousness.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016).

B. Level of Ordinary Skill in the Art

In order to determine whether an invention would have been obvious at the time the application was filed, we consider the level of ordinary skill in the pertinent art at the critical time. *Graham*, 383 U.S. at 17.

Petitioner asserts that a person having ordinary skill in the art (POSITA) “would have at least a two-year technical degree in engineering or science (materials, chemistry, etc.), or at least two years of work experience in the field of materials processing and/or fabrication (such as glass or ceramics), and/or the industrial processes and machinery used for materials processing and/or fabrication.” Pet. 8 (citing Ex. 1003 ¶ 27).

For purposes of the Preliminary Response, Patent Owner does not dispute Petitioner’s description of the level of skill in the art. Prelim. Resp. 27.

For purposes of this Decision, we adopt Petitioner’s definition of a POSITA.

C. Claim Construction

In an *inter partes* review proceeding based on a petition filed on or after November 13, 2018, a patent claim shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b). 37 C.F.R. § 42.100(b) (as amended Oct. 11, 2018). This rule adopts the same claim construction standard used by Article III federal courts, which follow *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc) and its progeny. Under this standard, the words of a claim are generally given their “ordinary and customary meaning,” which is the meaning the term would have to a person of ordinary

skill at the time of the invention, in the context of the entire patent including the specification. *See Phillips*, 415 F.3d at 1312–13.

According to Petitioner, claim 1’s recitation of the transitional phrases “comprising” and “consisting essentially of” permits inclusion of steps not listed in the claim provided they do not materially affect the basic and novel properties of the invention. Pet. 8–9. Petitioner identifies these properties as heating selective glass “reasonably quickly” and in a “controlled manner” via an apparatus that is “reasonably simple” and achieving a “high heating rate.” *Id.* at 9. Patent Owner does not dispute Petitioner’s proposed claim construction at this stage of the proceeding. Prelim. Resp. 27.

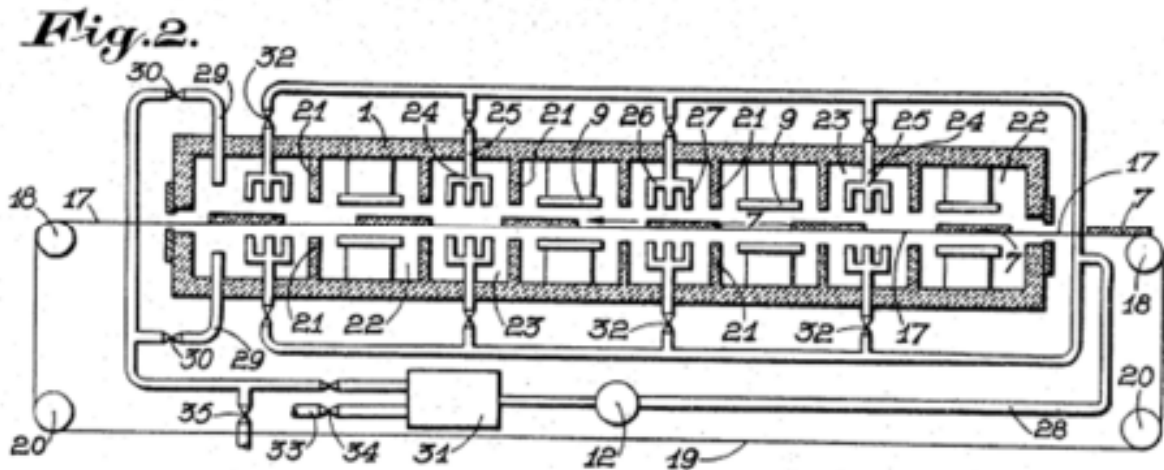
For purposes of this Decision, we apply Petitioner’s proposed claim construction. No further construction of the claims is necessary to resolve the dispute between the parties with respect to institution of trial. *See Nidec Motor Corp. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. *Overview of the Asserted Art*

1. *Plumat (Exhibit 1004)*

Plumat describes “a process and . . . an arrangement for heating glass, which is particularly suitable for the preliminary heating with a view to subsequent thermal treatment of the glass, such as the hardening thereof.” Ex. 1004, 1:11–15. Plumat explains that “[s]imultaneously with the radiated thermal energy, the glass is exposed . . . to the thermal energy acting on the surfaces by convection in a gaseous medium.” *Id.* at 2:38–41. Plumat describes the thermal energy acting by convection on the surface of the glass

elements as being “relatively modest in relation to the quantity of radiated thermal energy.” *Id.* at 3: 3–6. Plumat’s system shown in Figure 2 is reproduced below.



Id. at Fig. 2. Plumat’s Figure 2 above shows glass sheets 7 on a horizontal conveyor 17 driven by rollers 18 being heated by the energy radiated by radiant elements 9 and by convection via circulation of gaseous fluid in a closed circuit. *Id.* at 4:22–37. According to Plumat, gas leaves the furnace through conduits 29 and is supplied to temperature control device 31 from which it is drawn by rotary pump 12 to carry out a fresh circulation through the furnace. *Id.* at 4:43–47. Blowing jets 24 supply gaseous fluid, generally air, to blowing nozzles 24 which are directed to the surfaces of sheets 7. *Id.* at 4:38–41. Pipe 33 with valve 34 enables fresh air to be drawn into control device 31 to be mixed with the closed circuit air circulation; valve 35 in a branch pipe on pipeline system 29 serves for regulating the quantity of circulating air. *Id.* at 4:47–54.

2. Vehmas (Exhibit 1007)

Vehmas describes a glass heating method in which “glass is led through a tempering furnace, . . . the glass is heated from above and

below, . . . air is blown at least onto the upper surface of the glass to heat the glass in such a way that air is sucked from the inside of the tempering furnace, the air being circulated in such a way that it is blown back onto the glass.” Ex. 1007, 1:2–7. Vehmas’s system is shown in Figure 1 reproduced below.

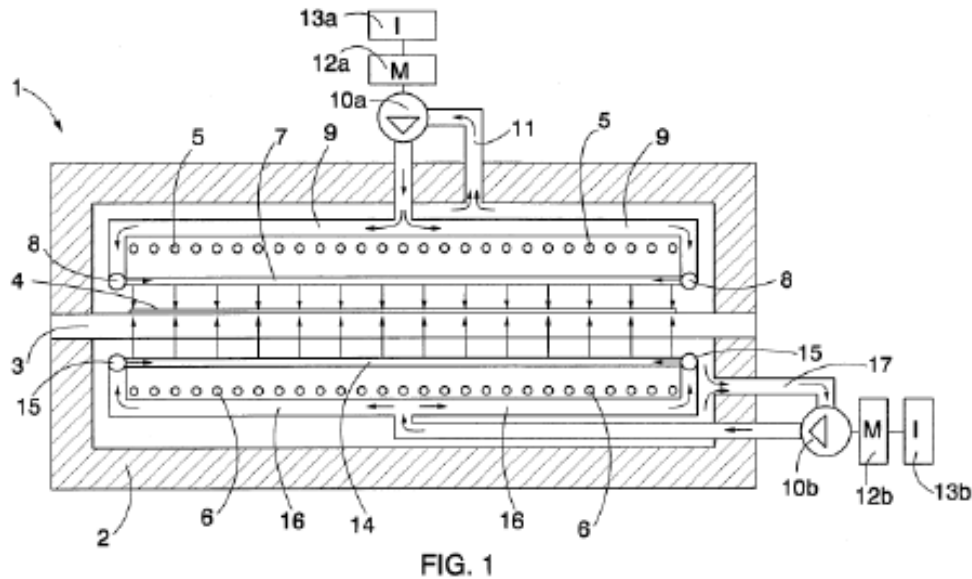


Figure 1 above depicts a schematic cross-sectional end view of tempering furnace 1 in which glass 4 moves forwards and backwards during heating, oscillated by means of rollers 3, which are typically ceramic rollers. *Id.* at 6:2–15. Vehmas explains that upper resistors 5 heat glass 4 from above and lower resistors 6 heat the glass from below. *Id.* at 6:5–7. Vehmas describes blow pipes 7 arranged across the upper side of the furnace and perpendicular relative to the direction of travel of glass 4 blow hot air onto the upper surface of glass 4.” *Id.* at 6:16–21. Vehmas states that air is supplied into the pipes by means of pressurization unit 10a, which may be a turbine of a turbocharger, that sucks hot air from the furnace along upper side return pipe 11. *Id.* at 7:13–21. Vehmas further describes lower side blow pipes 14

supplied with air from lower side delivery pipes 15 supplied by lower side feed pipes 16 that are fed air from pressurization unit 10b, corresponding to the upper side pressurization unit 10a, which sucks air from the lower part of the tempering furnace along lower side return pipe 17. *Id.* at 8:2–21.

3. *Vehmas '923 (Ex. 1006)*

Vehmas '923 describes a method and apparatus for heating glass in a tempering furnace having resistors for heating the glass sheets from above and from blow wherein the lower part of the tempering furnace is cooled at the initial stage of the heating process and the lower surfaces of the glass sheets are heated at the final stage of the heating period by forced convection. Ex. 1006, code (57). *Vehmas '923* explains that this prevents curving of the glass sheets, reduces heat shock from ceramic rollers at the initial heating stage, and “ensures good control over heat equalization in the tempering furnace.” *Id.* *Vehmas '923's* Figure 1 is reproduced below.

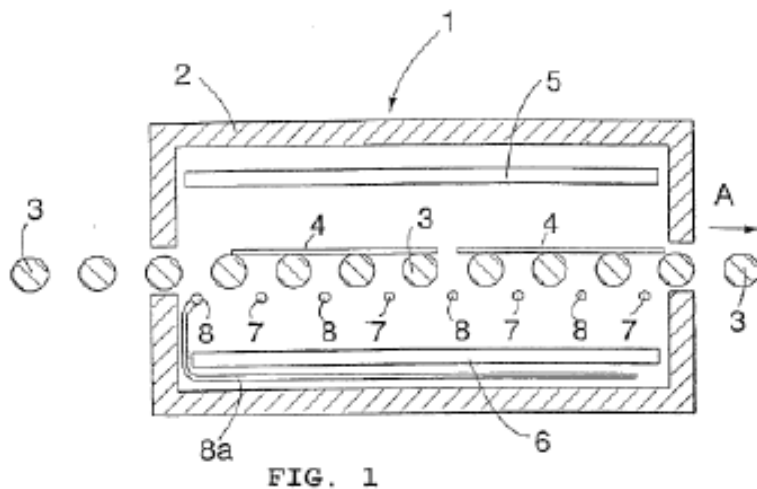


Figure 1 above shows heating pipes 8, which are used for heating at the final stage of the heating period when heating glass sheet 4 is quite slow, ceramic rollers 3, and lower resistors 6 which make air warm up in pipes 8a located below the resistors. *Id.* at 4:4–17.

4. *Vitkala (Ex. 1005)*

Vitkala relates to a tempering furnace that heats glass panels by bottom and top heating radiation elements as well as by bottom and top heating convection elements through which convection air is supplied to the tempering furnace. Ex. 1005, code (57). *Vitkala* states “convection air is supplied into the tempering furnace.” *Id.* ¶ 2. *Vitkala*’s Figure 1 is reproduced below.

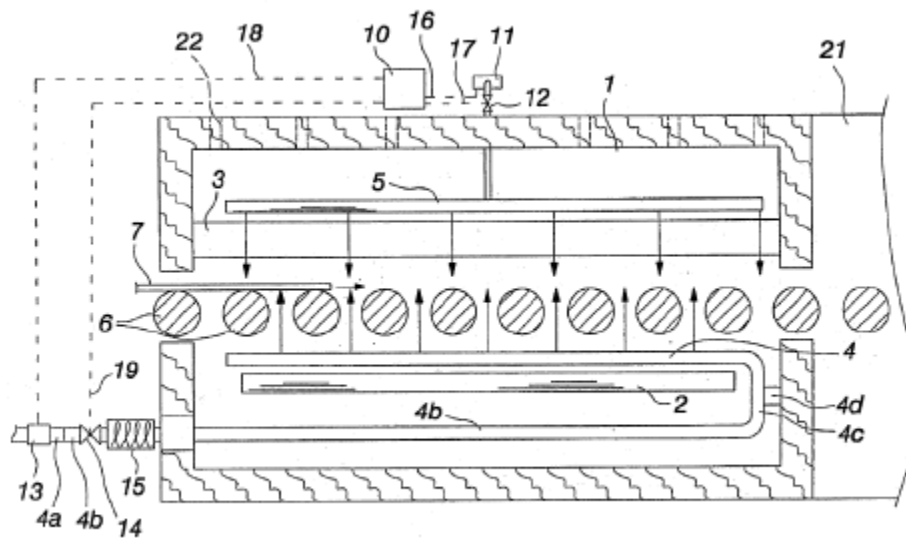


Fig. 1

Figure 1 above is a schematic, cross-sectional, side view of a tempering furnace showing glass panel 7 conveyed by rollers 6, radiation elements 3 mounted above rollers 6, top-heating convection elements 5, bottom-heating radiation elements 2 located below rollers 6, and bottom heating convection elements 4, 4a, 4b, and 4c. *Id.* ¶¶ 7, 13–15.

E. Unpatentability Grounds Relying on Vehmas

1. Independent Claim 1⁹

Petitioner contends that claim 1 is unpatentable as obvious based on (1) Plumat and Vehmas; (2) Vitkala and Vehmas; and (3) Vehmas '923 and Vehmas.

For the reasons discussed below, we find Petitioner's rationale for combining the references does not meet the threshold for institution. The Petition does not provide a sufficient non-hindsight biased rationale for why a POSITA would have combined Vehmas with any of Plumat, Vitkala, or Vehmas '923 (the "base references" in the asserted grounds) in a manner that would have led to the claimed invention. *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1368 (Fed. Cir. 2012) (stating "be careful not to allow hindsight reconstruction of references to reach the claimed invention without any explanation as to how or why the references would be combined to produce the claimed invention").

Petitioner begins its motivation-to-combine analysis for all grounds with the assertion that a "POSITA would have been motivated to modify the glass tempering furnaces disclosed in each of Plumat, Vitkala, or Vehmas '923 to include the pressurized, upper-recycling convection system described in Vehmas." Pet. 22 (citing Ex. 1003 ¶¶ 79, 87, 95). This general introductory statement provides no reason whatsoever for why a POSITA would have modified and combined the references. In the cited testimony, Mr. Bartoe opines that a POSITA would have been motivated to combine the furnace described in each of Plumat, Vitkala, or Vehmas '923 with

⁹ Petitioner's challenge to claim 1 based on Plumat alone is addressed in Section III.F., *infra*.

“technological improvements” disclosed in Vehmas. Ex. 1003 ¶¶ 79, 87, 95. But Mr. Bartoe neither identifies the improvements, nor provides a reason why a POSITA would have modified the furnaces of the base references.

Next, Petitioner asserts that each pair of references is “in the same field of glass tempering furnaces and techniques using hot air convection.” Pet. 22, 26, 29–30 (citing Ex. 1003 ¶¶ 80, 88, 96). Mr. Bartoe elaborates by identifying similarities between the references. Ex. 1003 ¶¶ 80, 88, 96. Petitioner and Mr. Bartoe conclude that “a POSITA would have had a reasonable expectation of success” in combining the references to produce tempered glass and “[i]t was well within the technical ability of a POSITA” to incorporate Vehmas’s improvements into the glass tempering furnace of each base reference. Pet. 23, 26–27, 30; Ex. 1003 ¶¶ 80, 88, 96.

Assuming Petitioner is correct that each pair of references is “in the same field of glass tempering furnaces and techniques using hot air convection,” that fact alone is not enough to demonstrate that a POSITA would have been motivated to combine these references in the manner set forth in Petitioner’s challenges. Our reviewing court has held that merely asserting that references are drawn from the same field of art is “simply too conclusory” to show that a POSITA would have combined the references in the way of the claimed invention. *Securus Techs., Inc. v. Glob. Tel*Link Corp.*, 701 F. App’x 971, 976 (Fed. Cir. 2017); *see also Microsoft Corp. v. Enfish, LLC*, 662 F. App’x 981, 990 (Fed. Cir. 2016) (determining that “the Board correctly concluded” that a petitioner “did not articulate a sufficient motivation to combine” where the only reason given was “that references were directed to the same art or same techniques.”).

At most, the similarities between Vehmas and the base references establish, as a threshold matter, that they would have been considered by a POSITA. *See K-Tec, Inc. v. Vita-Mix, Corp.*, 696 F.3d 1364, 1375 (Fed. Cir. 2012) (to qualify as prior art in an obviousness analysis, references must be analogous art—either in the same field of endeavor, or reasonably pertinent to the problem with which the inventor is involved). But the asserted similarities alone are not sufficient to show that a POSITA would have had a reason to combine the teachings in the manner described in the challenged claims. *Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 994 (Fed. Cir. 2017) (It is not enough that a skilled artisan, once presented with two references, would have understood that they could be combined; Petitioner needs to establish a motivation to pick out the two references and combine them to arrive at the claimed invention.).

Next, Petitioner asserts that a POSITA would have been motivated to modify the glass tempering furnace of each base reference “to temper low-E glass more quickly and efficiently.” Pet. 24, 27, 30 (citing Ex. 1003 ¶¶ 82, 90, 98). As discussed below, Petitioner fails to show a sufficient logical connection between the asserted motivation and the proposed modification(s) of the base references. Stated differently, Petitioner fails to show a sufficient reason why a POSITA would have made the modifications necessary to bridge the gap between the prior art and the claimed subject matter.

Addressing Plumat and Vehmas, Petitioner asserts that a POSITA would have been motivated to combine the references “in order to improve the ability of the glass tempering furnace described in [Plumat] to temper low-E glass more quickly and efficiently.” Pet. 24 (citing Ex. 1003 ¶ 82).

Petitioner also asserts that a “POSITA would have combined these references and had a reasonable expectation of success in modifying the glass tempering furnace of [Plumat] to include Vehmas’s teaching of an air compressor.” Pet. 25 (citing Ex. 1003 ¶ 84). Petitioner does not, however, assert that a desire “to temper low-E glass more quickly and efficiently” would have motivated a POSITA to modify the glass tempering furnace of Plumat to include an air compressor as taught by Vehmas. The Bartoe Declaration suffers from the same deficiency. Ex. 1003 ¶¶ 82–84.

Petitioner asserts that Plumat teaches a rotary pump for pressurizing both air taken from inside the furnace and air taken from outside the furnace. Pet. 12–13, 38–39; Ex. 1004, 4:41–43, Fig. 2 (rotary pump 12). Petitioner does not explain how modifying Plumat’s furnace to include Vehmas’s teaching of an air compressor (Pet. 25) would have improved the furnace’s ability “to temper low-E glass more quickly and efficiently” (Pet. 24), when Plumat already teaches an air compressor. Petitioner fails to provide any persuasive argument or evidence as to how the addition of a second air compressor would have provided any benefit to Plumat’s furnace, let alone would have improved Plumat’s ability to temper low-E glass more quickly and efficiently. *See In re Schweickert*, 676 F. App’x 988, 995 (Fed. Cir. 2017) (reversing Board’s obviousness determination where proposed modification of prior art is “unnecessary” to prior art system that “already” performs function of proposed additional feature and “would do little more than add unwanted cost and complexity to the system”).

Furthermore, even if Petitioner and Mr. Bartoe had shown a sufficient rationale for modifying Plumat to add a second air compressor, they provide no reason for modifying Plumat to pressurize outside air separately from air

drawn from inside the furnace. Petitioner fails to explain persuasively how any such modification would have improved Plumat's system for convection heating the upper and lower glass surfaces with a mixture of recirculated air and fresh air. Ex. 1004, 3:26–33, 4:38–54. Thus, Petitioner's obviousness contentions based on the combination of Plumat and Vehmas suffer from hindsight bias.

Addressing Vitkala and Vehmas, Petitioner contends that a POSITA would have been “motivated to modify the glass tempering furnace described in Vitkala to include Vehmas's air compressor to enable it to temper low-E glass more quickly and efficiently.” Pet. 27 (citing Ex. 1003 ¶ 90). Neither Petitioner nor Mr. Bartoe explains how modifying Vitkala's furnace to include Vehmas's air compressor would have enabled the furnace “to temper low-E glass more quickly and efficiently” (*id.*; Ex. 1003 ¶ 90), when Vitkala already discloses the use of pressurized air for convection heating glass panels from above and below (Ex. 1005 ¶¶ 1, 2, 22, 23). Mr. Bartoe admits that Vitkala achieves the “goals of quick, efficient, controlled heating and tempering of low-E glass.” Ex. 1003 ¶ 89.

Moreover, the addition of Vehmas's air compressor would not have been enough to bridge the gap between Vitkala and claim 1. Petitioner does not explain sufficiently how or why the combination of Vitkala and Vehmas would have led a POSITA to the subject matter of claim 1, which recites that air blown onto the upper surface of the glass is taken from inside the tempering furnace and air blown onto the lower surface of the glass is taken from outside the furnace. Mr. Bartoe testifies that a POSITA “would have understood that the convection air in a glass tempering furnace comes from two possible sources: air recycled from within the furnace, or air taken from

a source outside of the furnace.” *Id.* ¶ 91. Vitkala and Vehmas teach that both upper and lower convection air is taken from the *same source*. Vitkala discloses using air taken from outside the furnace to heat both the upper and lower surfaces of the glass. Ex. 1005, code (57), ¶¶ 1, 2.¹⁰ On the other hand, Vehmas discloses using air taken from inside the furnace to heat the upper and lower glass surfaces. Ex. 1007, code (57), 1:2–12. Neither Petitioner nor Mr. Bartoe provides a reason why a POSITA would have wanted to modify the prior art to use *different sources* for upper and lower convection air.

Petitioner’s element-by-element analysis for Ground 3 and claim 1 relies on Vehmas’s upper side return pipe and compression units 10a, 10b to teach claim element [1b], “heating an upper surface of the glass by hot air jets formed by sucking hot air from inside the furnace;” claim element [1c], “pressurizing the hot air;” claim element [1d] “recycling the pressurized hot air back to the upper surface of the glass for the heating from above;” and claim element [1e], “blowing air which has been taken from outside the furnace and which has been pressurized by a compressor and heated onto a lower surface of the glass for the heating from below.” Pet. 51–53. Petitioner

¹⁰ Petitioner asserts that “Vitkala does not expressly disclose where the hot air is taken—i.e., whether the air comes from outside the furnace, or sucked from within the furnace.” Pet. 52. We disagree. Vitkala states that “convection air is supplied into the tempering furnace” (Ex. 1005 ¶¶ 1, 2) which we understand to mean that the air is source from outside the furnace. The Examiner had the same understanding. Ex. 1002, 300 (Vitkala teaches “a furnace wherein a compressor (3) supplies pressurized air from outside the furnace to convectively heat both the upper and lower faces of a glass sheet.”). Petitioner agrees that at least Vitkala’s bottom-heating convection air is taken from outside the furnace (Pet. 53; Ex. 1003 ¶ 180) and points to no disclosure in Vitkala of using air recycled from within the furnace.

provides no rationale for modifying Vitkala to include “heating an upper surface of the glass by hot air jets formed by sucking hot air from inside the furnace,” as recited in claim element [1b]. The Bartoe Declaration suffers from the same deficiency. Ex. 1003 ¶¶ 90–92.

Addressing Vehmas ’923 and Vehmas, Petitioner contends that a POSITA would have been “motivated to modify the glass tempering furnace described in Vehmas ’923 to include Vehmas’s compressor in order to improve the ability of the glass tempering furnace to temper low-E glass more quickly and efficiently.” Pet. 30 (citing Ex. 1003 ¶ 98). The addition of Vehmas’s compressor would not be enough to bridge the gap between Vehmas ’923 and claim 1. Petitioner does not explain sufficiently how or why the combination of Vehmas ’923 and Vehmas would have led a POSITA to the subject matter of claim 1. Vehmas ’923 teaches convection heating for at least the lower surface of the glass using air taken from outside the furnace. Ex. 1006, 3:63–4:17, 4:43–5:15, Figs. 1, 3; *see* Ex. 1003 ¶ 226 (“The depiction of compressor 10 in [Vehmas ’923 Figure 3] would have been understood by a [POSITA] to show air being taken from outside the furnace.”). Vehmas teaches convection heating for both the upper and lower surfaces of the glass using air taken from inside the furnace. Ex. 1007, code (57), 1:2–12. Although Petitioner directs us to Vehmas ’923’s suggestion to use a “different manner of heating, such as forced convection or a combination of different heating means” (Pet. 31 (quoting Ex. 1006, 3:27–29)), neither Petitioner nor Mr. Bartoe provides a reason why a POSITA would have wanted to modify the prior art to use *different sources* for upper convection air and lower convection air.

In sum, Petitioner’s obviousness contentions based on the combination of Vehmas ’923 and Vehmas suffer from hindsight bias.

2. *Dependent Claims 2–15*

Petitioner’s arguments and evidence for dependent claims 2–15 do not remedy the deficiencies in Petitioner’s challenge to independent claim 1 as discussed above.

3. *Conclusion*

Petitioner has not shown a reasonable likelihood of prevailing on its challenge to claims 1–15 of the ’540 patent over the asserted combinations of Vehmas with any of the base references (i.e., Plummat, Vitkala, or Vehmas ’923).

F. Discretionary Denial: Remaining Challenge Relying on Plummat Alone

Most of Petitioner’s challenges depend on combining Vehmas with one of the base references. For claim 1, however, Petitioner raises an alternative challenge based on Plummat alone. Pet. 33–40 (Petitioner states “Plummat renders this limitation obvious” following the subheading for each limitation [1a]–[1e].); Prelim Resp. 44 (“The Petition alternatively argues that Plummat alone . . . renders Claim 1 invalid.”). Because Petitioner asserts that claim 1’s limitations are rendered obvious by Plummat, this challenge does not suffer from the deficiencies with Petitioner’s motivation to combine the asserted prior art references discussed above.

Patent Owner contends Plummat does not disclose that its process is used for tempering glass (claim element [1a]). Prelim. Resp. 45. Instead, Patent Owner asserts, Plummat discloses “a process and arrangement for

preliminary heating of glass, subsequent to a thermal treatment for hardening (tempering) of the glass.” *Id.* at 44–45 (citing Ex. 1004, 1:11–14). Patent Owner’s argument is unavailing because Plumat’s method and furnace are not limited to a preliminary heating function as Patent Owner asserts. Instead, the cited portion of Plumat states “a process and . . . an arrangement for heating glass, which is *particularly suitable* for the preliminary heating *with a view to* subsequent thermal treatment of the glass, such as the hardening thereof.” Ex. 1004, 1:11–15 (emphasis added). Thus Plumat’s disclosure indicates suitable uses, plural, for its method including “thermal treatment,” which thermal treatment Patent Owner equates with tempering. Therefore, the record supports Mr. Bartoe’s statement that “Plumat describes the ‘base’ glass tempering furnace and method.” Ex. 1003 ¶ 79.

Patent Owner also argues that claim element [1b] is not taught or suggested by Plumat because Plumat provides inside air for both upper and lower convection heating of the glass rather than just the upper surface of the glass. Prelim. Resp. 47–48. Patent Owner’s argument is unavailing because, on this record, claim element [1b] does not appear to require that the hot air for heating the upper surface of the glass be taken solely from inside the furnace. Stated differently, claim element [1b] does not on this record appear to exclude a method like Plumat’s in which the upper surface of the glass is heated by a mixture of fresh air and air recirculated from within the furnace.

Regarding claim limitation [1e], Patent Owner argues that Plumat’s fresh air components, pipe 33 and valve 34, are unrelated to Plumat’s method for heating because they regulate the quantity of air. Prelim. Resp. 50–52 (citing Ex. 1004, 4:47–54, Fig. 2). Patent Owner contends Plumat’s

heating is performed by using circulating air drawn from inside the furnace and recirculated in a closed circuit. *Id.* at 51.

Patent Owner’s argument is unavailing because Plumat discloses “valve 35 in a branch pipe on the pipeline system 29 serves for regulating the quantity of circulating air” not pipe 33 and valve 34, which allow the fresh air to be drawn into temperature control device 31. Ex. 1004, 4:50–54. In addition, Plumat states that the air drawn from outside the furnace is “mixed” with the circulated furnace air and both outside air and recirculated air are supplied to temperature control device 31. *Id.* at 4:43–47, 4:50–52. Thus, on this record, there does not appear to be anything incorrect about Petitioner relying on Plumat’s disclosure of fresh air being temperature controlled and circulated with the furnace air for heating the upper and lower surfaces of glass sheets to satisfy this claim limitation. Pet. 39–40; Ex. 1003 ¶¶ 120, 121).

Although Patent Owner presents serious arguments about the merits of the challenges based on Plumat, we determine that Petitioner’s arguments and evidence are sufficient to meet the threshold for institution solely as to claim 1 based on Plumat alone. In our view, however, the sufficiency of Petitioner’s challenge to one out of fifteen claims based on one out of four grounds is not enough to warrant institution of an *inter partes* review.

Pursuant to 35 U.S.C. § 314(a), an *inter partes* review may not be instituted “unless . . . the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” But even when a petitioner demonstrates a reasonable likelihood of prevailing with respect to one or more claims, institution of review

remains discretionary. *SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1356 (2018) (“[Section] 314(a) invests the Director with discretion on the question whether to institute review” (emphasis omitted)); *Harmonic Inc.*, 815 F.3d at 1367 (“[T]he PTO is permitted, but never compelled, to institute an IPR proceeding.”).

In exercising that discretion, we are guided by the statutory requirement, in promulgating regulations for *inter partes* review, to consider the effect of any regulations on “the efficient administration of the Office [and] the ability of the Office to timely complete proceedings,” 35 U.S.C. § 316(b), as well as the requirement to construe our rules to “secure the just, speedy, and inexpensive resolution of every proceeding,” 37 C.F.R. § 42.1(b). Office guidance, issued June 5, 2018, also explains that the Board may consider the number of claims and grounds that meet the reasonable likelihood standard when deciding whether to institute *inter partes* review under 35 U.S.C. § 314(a).¹¹

Here, Petitioner challenged fifteen claims under seven asserted grounds of unpatentability, with claim 1 being the subject of four separate challenges and the remaining claims being the subject of three separate challenges. At most, Petitioner demonstrates a reasonable likelihood of prevailing with respect to only one claim out of fifteen, and on only one of

¹¹ SAS Q&A’s, Part D, Effect of *SAS* on Future Challenges that Could Be Denied for Statutory Reasons (June 5, 2018), available at https://www.uspto.gov/sites/default/files/documents/sas_qas_20180605.pdf (“[T]he panel will evaluate the challenges and determine whether, in the interests of efficient administration of the Office and integrity of the patent system (*see* 35 USC § 316(b)), the entire petition should be denied under 35 USC § 314(a).”).

four asserted grounds against that single claim. Under the circumstances presented—where instituting review would require reviewing all challenged claims under all grounds even though, at this stage, it appears that Petitioner could at best succeed on 1 of 46 challenges, 1 of 15 claims, and 1 of 7 grounds—we determine it would not be an efficient use of the Board’s time and resources. *See, e.g., Chevron Oronite Co. v. Infineum USA L.P.*, IPR2018-00923, Paper 9 at 10–11 (PTAB Nov. 7, 2018) (informative); *see also Deeper, UAB v. Vexilar, Inc.*, IPR2018-01310, Paper 7 at 41–43 (PTAB Jan. 24, 2019) (informative). Accordingly, we exercise discretion under 35 U.S.C. § 314(a) to decline to institute *inter partes* review.

Because we exercise our discretion to deny institution under 35 U.S.C. § 314(a), we need not address the arguments presented under 35 U.S.C. § 325(d).

IV. CONCLUSION

We have reviewed the Petition and Preliminary Response, and have considered all of the evidence and arguments presented by Petitioner and Patent Owner. We exercise our discretion under 35 U.S.C. § 314(a) to decline institution.

V. ORDER

For the foregoing reasons, it is
ORDERED that, pursuant to 35 U.S.C. § 314, the Petition is *denied*, and no trial is instituted.

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