

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CMS CEP COR LTD. and
CMS CEP COR AMERICAS LLC,
Petitioner,

v.

SANDVIK INTELLECTUAL PROPERTY AB,
Patent Owner.

IPR2024-01380
Patent 9,827,568 B2

Before CYNTHIA L. MURPHY, RICHARD H. MARSCHALL, and
ARTHUR M. PESLAK, *Administrative Patent Judges*.

PESLAK, *Administrative Patent Judge*.

JUDGMENT

Final Written Decision – Cancelling Original Claims 1–10
Granting Patent Owner’s Motion to Amend (Papers 13, 23)
35 U.S.C. § 318(a)

Dismissing Petitioner’s Motion to Exclude Evidence (Paper 40)
37 C.F.R. § 42.64(c)

I. INTRODUCTION

CMS Cepcor Ltd. and CMS Cepcor Americas LLC (collectively, “Petitioner”) filed a Petition requesting inter partes review of claims 1–10 (“the Challenged Claims”) of U.S. Patent No. 9,827,568 B2 (Ex. 1001, “the ’568 patent”). Paper 2 (“Pet.”). Sandvik Intellectual Property AB (“Patent Owner”) did not file a Preliminary Response. On March 18, 2025, we instituted *inter partes* review of the Challenged Claims. Paper 8.

After institution, Patent Owner filed a Non-Contingent Motion to Amend (“MTA”) requesting cancellation of claims 1–10 and proposing substitute claims 11–19. Paper 13, 1. Petitioner filed an Opposition to the Motion to Amend. Paper 15. We issued Preliminary Guidance as to Patent Owner’s Non-Contingent Motion to Amend. Paper 20.

Thereafter, Patent Owner filed a Revised Non-Contingent Motion to Amend proposing revised substitute claims 11–19 (the “Substitute Claims”). Paper 23 (“RMTA”). Petitioner filed an Opposition to Patent Owner’s Revised Motion to Amend (Paper 28, “RMTA Opp.”) to which Patent Owner filed a Reply in support of its Revised Motion to Amend (Paper 34, “RMTA Reply”), and Petitioner filed a Sur-reply (Paper 43, “RMTA Sur-reply”) and an Amended RMTA Sur-reply (Paper 46, “Amended RMTA Sur-reply”).¹

¹ Petitioner filed the Amended RMTA Sur-reply, after Patent Owner objected to the RMTA Sur-reply, because, *inter alia*, it was filed with “the fourth declaration of Mr. Smith [Ex. 1056].” Tr. 4:12–17. The Amended RMTA Sur-reply does not reference Ex. 1056. *See generally* Amended RMTA Sur-reply. Patent Owner objects to the Amended RMTA Sur-reply for including “new arguments.” Tr. 4:16–17. We authorized the parties to each file a paper addressing the propriety of the Amended RMTA Sur-reply. *Id.* at 7:7–12. The parties’ papers are in the record. *See* Papers 50, 51.

Petitioner filed a Motion to Exclude (“MTE”) certain exhibits. Paper 40. Patent Owner filed an opposition (“MTE Opp.”). Paper 41. Petitioner filed a Reply in support of its Motion (“MTE Reply”). Paper 42.

An oral hearing was held on January 13, 2026, and the transcript is of record. Paper 52 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of the Challenged Claims of the ’568 patent. For the reasons discussed below in section II, Patent Owner’s Revised Non-Contingent Motion to Amend (Papers 13, 23) is granted as to the cancellation of the Challenged Claims and granted as to adding the Substitute Claims. We also dismiss the MTE as moot.

A. Real Parties in Interest

Petitioner identifies CMS Cepcor Ltd. and CMS Cepcor Americas LLC as real parties-in-interest. Pet. 45. Patent Owner identifies Sandvik Intellectual Property AB, Sandvik Mining and Construction USA LLC, and Sandvik Rock Processing Solutions AB as real parties-in-interest. Paper 4 (“Patent Owner’s Mandatory Notices”), 1.

B. Related Matters

Petitioner filed a petition for *inter partes* review of a related patent, U.S. Patent No. 11,014,090 B2 (“the ’090 patent”), in IPR2024-01381. Pet. 45. The ’568 patent at issue here and the ’090 patent are also the subject of an infringement action, *Sandvik Mining and Construction USA LLC v. CMS Cepcor Ltd.*, Case No. 1:24-cv-00481-JLH (D. Del.). Pet. 45; Paper 4, 1.

C. The ’568 Patent

The ’568 patent relates to “[g]yratory crushers . . . used for crushing ore, mineral and rock material to smaller sizes.” Ex. 1001, 1:19–20. Specifically, the ’568 patent discloses “a sleeve for a main shaft of a

gyratory crusher that enables convenient attachment and detachment at the shaft,” where the sleeve has an “internal facing surface that tapers inwardly in the axial direction towards a longitudinal axis of the sleeve from a first (lower) end to a second (upper) end.” *Id.* at 1:66–2:6.

Figure 2 shows a representative embodiment and is reproduced below.

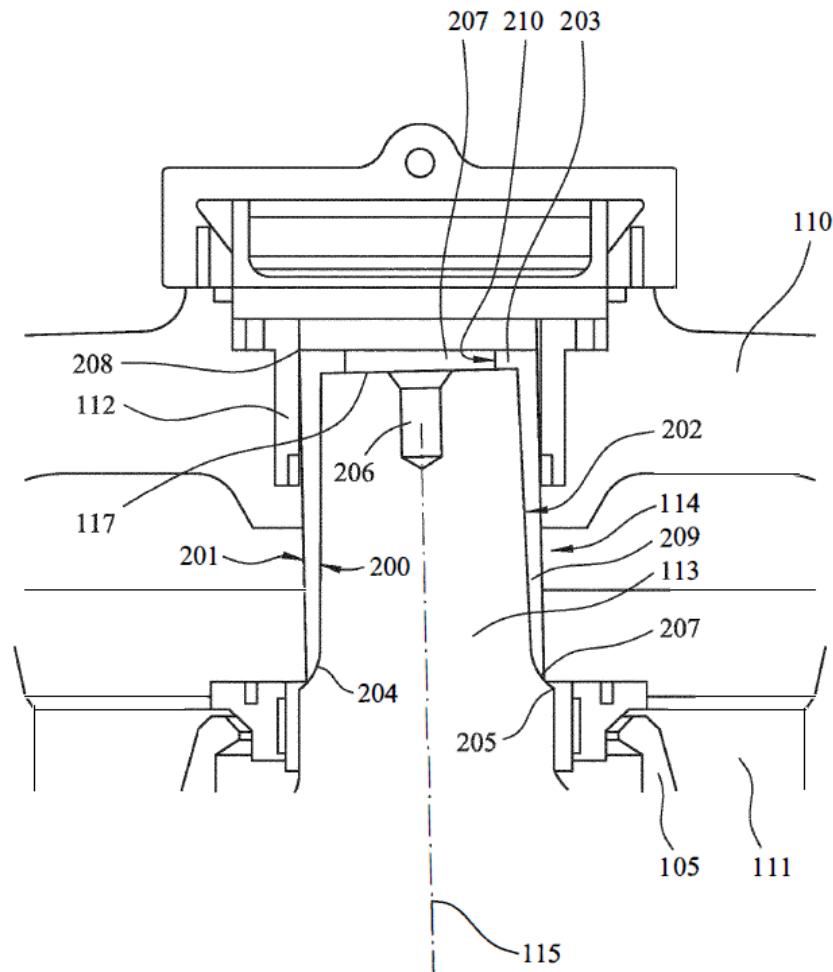


Figure 2 depicts part of a crusher, where “sleeve 114 comprises an external facing surface 201 and an internal facing surface 200,” where orientation of the external and internal facing surfaces is “relative to the longitudinal axis 115 extending through shaft region 113 and sleeve 114.” Ex. 1001, 4:13–17. “Internal facing surface 200 is secured in direct contact against an external facing surface 202 of conical [shaft] region 113.” *Id.* at 4:17–18.

The '568 patent emphasizes the tapered nature of the mating surfaces of sleeve 114 and shaft region 113. Ex. 1001, 3:63–65 (“An upper end region of a shaft 113 comprises an axial taper to define an upper conical section.”), 4:19–22 (“internal facing surface 200 tapers inwardly”). More specifically, “internal surface 200 tapers inwardly towards longitudinal axis 115 from a first end 207 and a second end 208, where the first end 207 is positioned below second end 208 within the crusher during normal use.” *Id.* at 4:17–22. “[A]nnular axial wall 209 of the sleeve 114 that is defined between apposed surfaces 200, 201, comprises a thickness that tapers and reduces in a direction from second upper end 208 to first lower end 207.” *Id.* at 4:29–33. “[T]o enable sleeve 114 to fit in close shrink-fit contact with conical end portion 113, the taper angle of inner surface 200 is substantially equal to the taper angle of the external facing surface 202 of shaft region 113 relative to axis 115.” *Id.* at 4:33–37.

D. The Challenged Claims

Patent Owner’s Non-Contingent Motion to Amend requests cancellation of the Challenged Claims. Paper 13, 1 (“Patent Owner proposes cancelling challenged claims 1–10 and substituting claims 11–19.”). Patent Owner’s Revised Non-Contingent Motion to Amend similarly proposes substitute claims 11–19. RMTA 40–43 (App. A). Petitioner does not oppose Patent Owner’s request to cancel claims 1–10. Papers 15, 25. Consequently, we grant Patent Owner’s request to cancel original claims 1–10 of the '568 patent.

E. Substitute Claims 11–19

Substitute claim 11 is an independent claim, and substitute claims 12–19 depend, directly or indirectly, from substitute claim 11. RMTA 40–43

(App. A). Claim 11 is proposed as a substitute for original claim 1 and is set out below, showing added language underlined.

11. [11P] A gyratory crusher comprising:

[11a] a main shaft including a shaft body having a first end for positioning at a lower region of the crusher and a second end for positioning at an upper region of the crusher relative to the first end, a thickness of the shaft body being tapered in an axial direction of the main shaft at a tapered region of the second end so as to taper and decrease in cross-sectional area, wherein the tapered region extends from an uppermost extremity of the shaft; and

[11b] a sleeve fitted over the tapered region at the second end of the main shaft, the sleeve including an elongate axial wall extending around a longitudinal axis of the sleeve, the axial wall having an internal facing surface for positioning in contact with an outward facing surface of the main shaft, and an external facing surface relative to the longitudinal axis, the axial wall extending between the internal and external facing surfaces, the axial wall having a first sleeve end for positioning at a lower region of the main shaft and a second sleeve end for positioning at an upper region of the main shaft relative to the lower region,

[11c] wherein a thickness of the axial wall at a region between the first and second sleeve ends tapers and decreases in a direction from the second sleeve end to the first sleeve end, wherein the first sleeve end is a lowermost extremity of the sleeve,

[11d] in the axial direction the internal facing surface at said region between the first and second sleeve ends extending transverse to the longitudinal axis so as to taper inwardly towards the longitudinal axis of the sleeve in the direction from the first sleeve end to the second sleeve end, and

[11e] wherein the external facing surface from the first sleeve end to the second sleeve end is parallel to the longitudinal axis of the sleeve such that the external facing surface of the sleeve when viewed externally has a cylindrical geometry, and

[11f] wherein the second end of the shaft body is configured to be supported by a top bearing assembly such that the second end is rotatable eccentrically and freely rotatable about a longitudinal axis of the shaft within the bearing assembly

RMTA 40–41 (App. A) (bracketed nomenclature added to reflect Petitioner’s nomenclature, *see* RMTA Opp. 9–19).

F. Prior Art and Asserted Grounds

Because we granted Patent Owner’s request to cancel the Challenged Claims, we analyze only the challenges to the patentability of the Substitute Claims. Petitioner challenges the patentability of the Substitute Claims on the following ground (RMTA Opp. 1–23):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
11–19	103	Torrence, ² Piepho ³

II. REVISED MOTION TO AMEND ANALYSIS

A. Legal Standards

1. Motions to Amend

In an *inter partes* review, amended claims are not added to a patent as of right, but rather must be proposed as a part of a motion to amend. 35 U.S.C. § 316(d). The Board assesses the patentability of proposed substitute claims “without placing the burden of persuasion on the patent owner.” *Aqua Prods., Inc. v. Matal*, 872 F.3d 1290, 1328 (Fed. Cir. 2017) (en banc); *see also Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 at 3–4 (PTAB Feb. 25, 2019) (precedential). Subsequent to the issuance of *Aqua*

² U.S. Patent No. 3,813,047, issued May 28, 1974 (Ex. 1011 and Ex. 1050, “Torrence”).

³ U.S. Patent No. 6,270,026 B1, issued August 7, 2001 (Ex. 1018, “Piepho”).

Products, the Federal Circuit issued a decision in *Bosch Automotive Service Solutions, LLC v. Matal*, 878 F.3d 1027 (Fed. Cir. 2017) (“Bosch”), as well as a follow-up Order amending that decision on rehearing. *See Bosch Auto. Serv. Sols., LLC v. Iancu*, No. 2015-1928 (Fed. Cir. Mar. 15, 2018) (Order on Petition for Panel Rehearing).

In accordance with *Aqua Products*, *Bosch*, and *Lectrosonics*, a patent owner does not bear the burden of persuasion to demonstrate the patentability of the substitute claims presented in the motion to amend. Rather, “the petitioner bears the burden of proving that the proposed amended claims are unpatentable by a preponderance of the evidence.” *Bosch*, 878 F.3d at 1040 (as amended on rehearing); *see Lectrosonics*, Paper 15 at 3–4. In determining whether a petitioner has proven unpatentability of the substitute claims, the Board focuses on “arguments and theories raised by the petitioner in its petition or opposition to the motion to amend.” *Nike, Inc. v. Adidas AG*, 955 F.3d 45, 51 (Fed. Cir. 2020).

Patent Owner’s Substitute Claims, however, must meet the statutory requirements of 35 U.S.C. § 316(d) and the procedural requirements of 37 C.F.R. § 42.121. *Lectrosonics*, Paper 15 at 4–8. Accordingly, Patent Owner must demonstrate: (1) the amendment proposes a reasonable number of substitute claims; (2) the proposed claims are supported in the original disclosure (and any earlier filed disclosure for which the benefit of filing date is sought); (3) the amendment responds to a ground of unpatentability involved in the trial; and (4) the amendment does not seek to enlarge the scope of the claims of the patent or introduce new subject matter. *See* 35 U.S.C. § 316(d); 37 C.F.R. § 42.121.

2. *Obviousness*

A proposed substitute claim may be unpatentable under 35 U.S.C. § 103(a) “if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains.”

35 U.S.C. § 103; *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 skill in the art; and (4) when in evidence, objective indicia of non-obviousness (i.e., secondary considerations). *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

The Supreme Court explained in *KSR* that

Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.

550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (“[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” (alteration in original))).

“Whether an ordinarily skilled artisan would have been motivated to modify the teachings of a reference is a question of fact.” *WBIP, LLC v.*

Kohler Co., 829 F.3d 1317, 1327 (Fed. Cir. 2016) (citations omitted). “[W]here a party argues a skilled artisan would have been motivated to combine references, it must show the artisan ‘would have had a reasonable expectation of success from doing so.’” *Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1360–61 (Fed. Cir. 2017) (quoting *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1068–69 (Fed. Cir. 2012)).

B. Requirements for a Motion to Amend

“Before considering the patentability of any substitute claims, . . . the Board 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.” *Lectrosonics*, Paper 15 at 4. Patent Owner bears the burden of persuasion to show, by a preponderance of the evidence, that the RMTA meets those requirements. 37 C.F.R. § 42.121(d)(1).

1. Reasonable Number of Substitute Claims

A motion to amend must “propose a reasonable number of substitute claims.” 35 U.S.C. § 316(d)(1)(B); *see also* 37 C.F.R. § 42.121(a)(3) (“A motion to amend may cancel a challenged claim or propose a reasonable number of substitute claims.”). “There is a rebuttable presumption that a reasonable number of substitute claims per challenged claim is one (1) substitute claim.” *Lectrosonics*, Paper 15 at 4; *see also* 37 C.F.R. § 42.121(a)(3). Here, Patent Owner proposes no more than one substitute claim for each challenged claim. RMTA App. A; *see also supra* § III.A. Petitioner does not contend that the number of substitute claims is unreasonable. *See generally* RMTA Opp.

After reviewing the record, we determine that this requirement is met.

2. Responsive to Ground of Unpatentability

“A motion to amend may be denied where. . . [t]he amendment does not respond to a ground of unpatentability involved in the trial.” 37 C.F.R. § 42.121(a)(2)(i). The Petition asserts that claims 1–10 are unpatentable over prior art. Pet. 5. As shown above, through the Revised Motion to Amend, Patent Owner has sought to change the substantive features of challenged independent claim 1. *See* RMTA 3–5. The proposed amendments to the other challenged dependent claims make them depend, directly or indirectly, on proposed substitute claim 11. *Id.* at 41–43 (App. A). Petitioner does not contend that the proposed amendments fail to respond to a ground of unpatentability in this trial. *See generally* RMTA Opp.

After reviewing the record, we determine that this requirement is met.

3. Enlarge Scope

An amendment may not enlarge the scope of the claims of the patent. 35 U.S.C. § 316(d)(3); 37 C.F.R. §§ 42.121(b)(1), 42.121(b)(2). Patent Owner asserts that the Substitute Claims (claims 11–19) do not enlarge the scope, but rather narrow the scope of claims 1–10. RMTA 2. Petitioner does not contend that any proposed substitute claim enlarges the scope of any of the Challenged Claims. *See generally* RMTA Opp.

After reviewing the record, we determine that this requirement is met.

4. New Matter

An amendment may not introduce new matter. 35 U.S.C. § 316(d)(3); 37 C.F.R. §§ 42.121(b)(1), 42.121(b)(2). New subject matter is any addition to the claims that lacks sufficient support in the subject patent’s original disclosure. *See TurboCare Div. of Demag Delaval Turbomach. v. Gen. Elec. Co.*, 264 F.3d 1111, 1118 (Fed. Cir. 2001) (“When [an] applicant adds

a claim . . . , the new claim[] . . . must find support in the original specification.”). Patent Owner also is required to show written description support in “the original disclosure of the patent for each claim that is . . . amended,” and in “an earlier-filed disclosure for each claim for which benefit of the filing date of the earlier filed disclosure is sought.” 37 C.F.R. §§ 42.121(b)(1), 42.121(b)(2).

Proposed Substitute Claim 11 recites “wherein the second end of the shaft body is configured to be supported by a top bearing assembly such that the second end is rotatable eccentrically and freely rotatable about a longitudinal axis of the shaft within the bearing assembly.” RMTA 4.

Petitioner contends that “the shaft being ‘freely rotatable’ is not taught in the ‘568 patent.” RMTA Opp. 7. Petitioner asserts that “the ‘568 Patent does not state ‘freely rotatable’ anywhere in the specification.” *Id.* at 17; Amended RMTA Sur-reply, 10 (“[N]o such language is found anywhere in the original specification describing the shaft is freely rotatable.”).

In the Revised Motion to Amend, Patent Owner cites to “Exs. 2003 & 2004: 3:67–4:1⁴; FIGS. 1–2” as support for this limitation. RMTA 4. Patent Owner argues that “the original disclosure describes that a ‘very uppermost end 117 of shaft 107 is maintained in an axially rotatable position by a top bearing assembly 112.’” *Id.* at 6 (citing Ex. 2003, 6:3–5; Ex. 2004, 3:67–41). Patent Owner also provides annotated versions of Figures 1 and 2 of the original disclosure to illustrate its contentions. *See id.* at 7–8.⁵ Patent

⁴ This citation appears to be a typographical error because no line 67 appears on page 3 of either exhibit.

⁵ Patent Owner incorrectly cites to Exhibit 2001 as the source of the drawings. RMTA 7–8. However, this is a typographical error as the original drawings are part of Exhibits 2003 and 2004.

Owner argues that an ordinarily skilled artisan “looking at the disclosure of the ’568 patent, would understand the second end of the shaft is rotatable eccentrically and freely rotatable about a longitudinal axis of the shaft within the bearing assembly.” *Id.* at 8–9 (citing Ex. 2018, 36:13–37:4).

“[T]he test for sufficiency is whether the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Ariad Pharms., Inc. v. Eli Lilly and Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc) (citing *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1562–63 (Fed. Cir. 1991)). “[T]he hallmark of written description is disclosure.” *Id.* “[T]he test requires an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art. Based on that inquiry, the specification must describe an invention understandable to that skilled artisan and show that the inventor actually invented the invention claimed.” *Id.* “In order to satisfy the written description requirement, the disclosure as originally filed does not have to provide *in haec verba* support for the claimed subject matter at issue.” *Yingbin-Nature (Guangdong) Wood Ind. Co., Ltd. v/ Int’l Trade Com’n*, 535 F.3d 1322, 1334 (Fed. Cir. 2008).

“[T]he level of detail required to satisfy the written description requirement varies depending on the nature and scope of the claims and on the complexity and predictability of the relevant technology.” *Ariad*, 598 F.3d at 1351 (citing *Capon v. Eshhar*, 418 F.3d 1349, 1357–58 (Fed. Cir. 2005)). “This inquiry . . . is a question of fact.” *Id.* (citing *Ralston Purina Co. v. Far-Mar-Co, Inc.*, 772 F.2d 1570, 1575 (Fed. Cir. 1985)). Further, inventions in the mechanical and electrical-based arts usually involve predictable factors and can be more predictable than other fields, such as chemistry and biology. *See In re Fisher*, 427 F.2d 833, 839 (CCPA 1970);

Burroughs Welcome Co. v. Barr Labs, Inc., 40 F.3d 1223, 1228 (Fed. Cir. 1994).

The crux of Petitioner’s argument is that the text in Exhibits 2003 and 2004 does not explicitly contain the phrase “freely rotatable.” RMTA Opp. 7, 17. We agree with Petitioner, but, that fact is not determinative. *Yingbin-Nature*, 535 F. 3d at 1334. Rather, the question is whether the specification describes the invention such that an ordinarily skilled artisan would have understood that the inventor actually invented the claimed invention. *See Ariad*, 598 F.3d at 1351. For the following reasons, we find that a person of ordinary skill in the art reviewing the written description and drawings would understand that the inventors were in possession of a main shaft that is “rotatable eccentrically and freely rotatable about a longitudinal axis of the shaft within the bearing assembly.”

First, the claimed invention is in the mechanical arts which is a generally predictable field. Second, in addition to Figures 1 and 2 of the original disclosure, both priority documents specifically state that “[a] drive . . . is coupled to main shaft 107 via a drive shaft 108 and suitable gearing 116 so as to rotate shaft 107 eccentrically about longitudinal axis 115” and “[a] very uppermost end 117 of shaft 107 is maintained in an axially rotatable position by a top bearing assembly 112.” Ex. 2003, 5:30–31, 6:3–4; Ex. 2004, 5:30–31, 6:3–4). Thus, the Specification explicitly discloses that “the second end of the shaft body is configured to be supported by a top bearing assembly” and “the second end is rotatable eccentrically . . . about a longitudinal axis of the shaft within the bearing assembly.” Although the term “freely rotatable” does not explicitly appear in the written description, Petitioner does not cite to any record evidence that would support a finding that a shaft described as “*rotatable eccentrically* . . . within the bearing

assembly” as shown in Figures 1 and 2 is not “*freely* rotatable.” See RMTA Opp. 7, 17. In point of fact, Petitioner’s declarant, Mr. Smith, contradicted Petitioner’s position:

Q. What I’m trying to ask is, would a person of ordinary skill in the art looking at Figure 2 of the ’568 patent understand that conical region 113 of the shaft rotates about itself freely with respect to bearing assembly 112?

A. Yes, I think that’s correct, that 113 will rotate within bearing 112.
Ex. 2018, 36:23–37:4.

For all of the foregoing reasons, we are not persuaded by Petitioner’s contentions and find that Patent Owner met its burden on this issue.

After reviewing the evidence in light of Petitioner’s contentions, we find that a person of ordinary skill in the art would understand that the priority documents, Exhibits 2003 and 2004, provide written description support for claim limitation [11f].

Thus, we determine that this amendment does not introduce new matter.

C. Level of Ordinary Skill in the Art

The level of ordinary skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). The person of ordinary skill in the art is a hypothetical person presumed to have known the relevant art at the time of the invention. *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). In determining the level of ordinary skill in the art, we may consider certain factors, including: “(1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of active workers in the field.” *Best*

Med. Int'l, Inc. v. Elekta Inc., 46 F.4th 1346, 1353 (Fed. Cir. 2022) (quoting *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007)).

Petitioner argues that a person of ordinary skill in the art relating to the '568 patent would have had “a bachelor’s degree in mechanical engineering or a related field, and at least 2 years of experience with industrial equipment design and development.” Pet. 5 (citing Ex. 1002 ¶ 30). Petitioner also contends that one of ordinary skill “may also have a combination of more formal education and less work experience or a combination of less or different formal education and more work experience.” *Id.*

In its Revised Noncontingent Motion to Amend, Patent Owner states that it “does not object to Petitioner’s proposed level of skill in the art.” RMTA 9.

We apply Petitioner’s proffered level of skill in the art because it appears consistent with the problems addressed in the '568 patent and the prior art.

D. Claim Construction

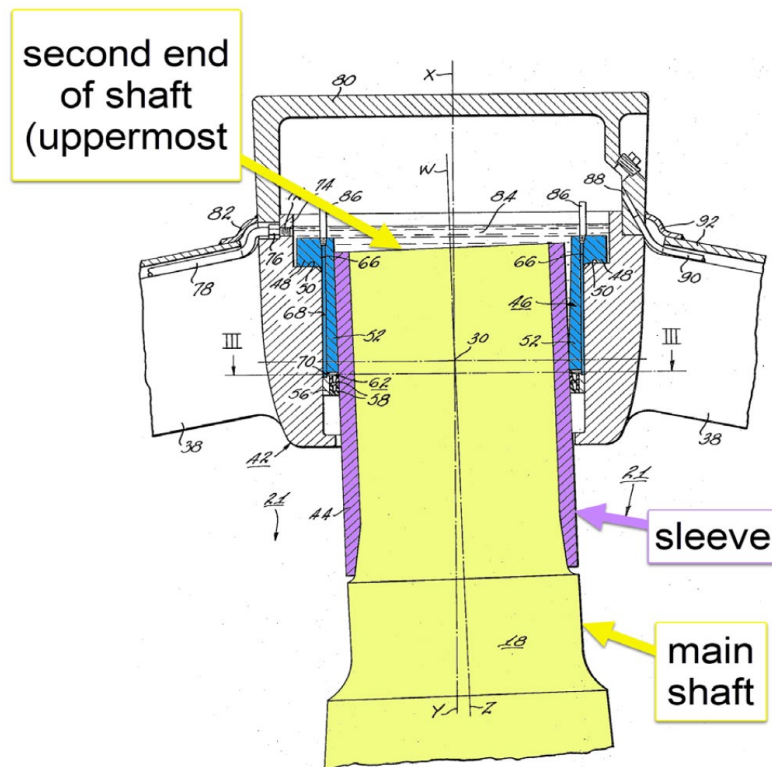
We determine that no express construction of any claim term is necessary for purposes of this Decision. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (noting that “we need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’”) (citing *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

E. Petitioner's Ground of Unpatentability

1. Overview of the Asserted References

a) Torrence (Ex. 1011)⁶

Torrence discloses a “spider bearing assembly for a gyratory crusher” that includes “a flanged bushing” and “a bearing sleeve projecting downwardly between the top of a gyrating shaft and a spider hub.” Ex. 1011, code (57). We reproduce an annotated version of Torrence’s Figure 2 from Petitioner’s RMTA Opposition to illustrate the main shaft in Torrence’s device.



RMTA Opp. 10. Figure 2 is an “enlarged fragmentary view partly in section” depicting a centrally located hub 42 and a shaft 18. Ex. 1011, 2:63–

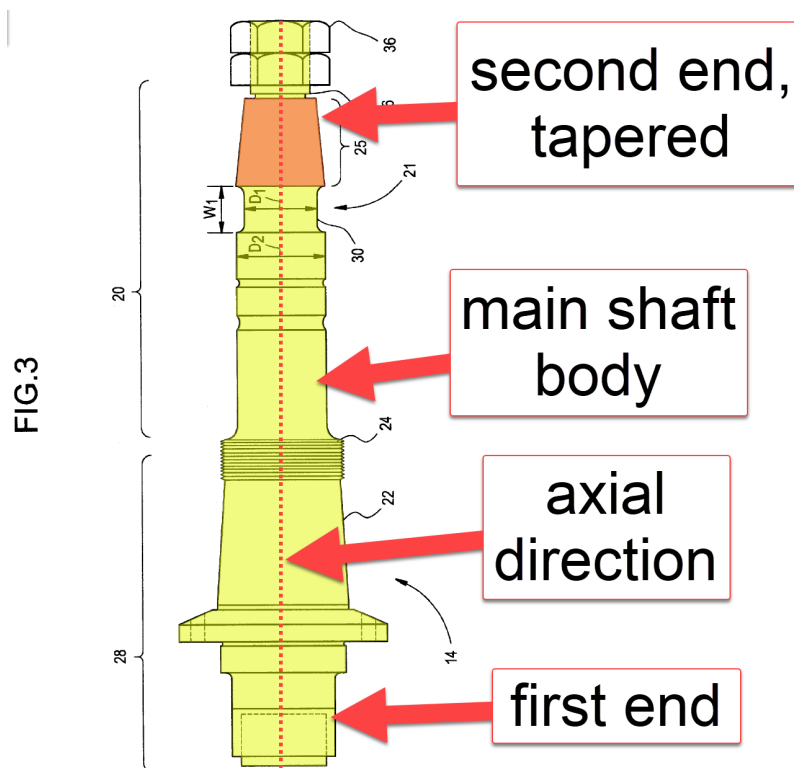
⁶ Torrence has also been entered into the record as Exhibit 1050.

64, 3:28–39. Petitioner annotates Figure 2 by, *inter alia*, highlighting shaft 18 in yellow and sleeve 44 in purple.

“Shaft 18 is fitted with a replaceable wear sleeve 44.” Ex. 1011, 3:48. Torrence describes that “[t]he bearing assembly for shaft 18 and wear sleeve 44 includes a bushing 46 having a radial flange 48 which is seated upon a generally horizontal shoulder 50 of hub 42” and “[a] bearing sleeve 52 projects downwardly from the flange 48 and between wear sleeve 44 and hub 42.” *Id.* at 3:49–54.

b) Piepho (Ex. 1016)

Piepho discloses “[a]n improved main shaft for a coal pulverizer” that “provides improved fretting resistance.” Ex. 1016, code (57), 2:19–20. We reproduce an annotated version of Piepho’s Figure 3 from the Petition to illustrate the main shaft in Piepho’s device.



Pet. 21. Figure 3 depicts a side view of shaft 14, with four annotations added by Petitioner, including “second end, tapered” and “main shaft body.” Pet. 21; Ex. 1016, Fig. 3. The “second end, tapered” label points to a section of shaft 14 corresponding to “shaft end (25),” which Petitioner highlights with orange coloring. *See* Pet. 21, Ex. 1016, 3:23–24.

Piepho describes “an intervening material between the shaft end (25) and the mating bore in the yoke bushing (18) fitted within the bore of yoke (12) to prevent fretting damage.” Ex. 1016, 3:23–26. Piepho also describes a “joint (21) . . . capable of accepting radial, axial, and bending or overturning loads” where “joint 21 is a tapered joint with the tapered end (25) of shaft (14)” and “yoke bushing (18) has a mating bore similarly tapered.” *Id.* at 3:26–32. Piepho further states that “shaft end (25) alternatively may be cylindrical rather than tapered.” *Id.* at 3:33–34.

2. Analysis of Proposed Substitute Claim 11

Petitioner provides limitation by limitation contentions for claim 11 along with reasons why an ordinarily skilled artisan would have been motivated to combine Torrence and Piepho. RMTA Opp. 9–19.

We focus our analysis on limitation [11a] because, as discussed below, we find that Petitioner fails to establish that the combination of Torrence and Piepho teaches this limitation.

a) Limitation [11a]

Petitioner contends that the combination of Torrence and Piepho teaches “a thickness of the shaft body being tapered in an axial direction of the main shaft at a tapered region of the second end so as to decrease in cross-sectional area” and that “combining the tapered region of Piepho with the shaft of Torrence, the tapered region would extend from an uppermost extremity of the shaft.” RMTA Opp. 9 (citing Ex. 1049, 46). Petitioner

argues that “the main shaft of Torrence has a first end and second end” and a “protective sleeve covers the second end and extends from the uppermost extremity of the shaft.” *Id.* (citing Ex. 1011, Fig. 2). Petitioner next argues that Piepho’s second end “is tapered . . . in an axial direction” which according to Petitioner results in “the cross-sectional area of the shaft body decreas[ing].” *Id.* at 10 (citing Ex. 1016, 3:23–31, Fig. 1). Petitioner concedes that Piepho’s tapered region “does not extend to the extreme end of the shaft” but argues that a person of ordinary skill in the art “modifying Torrence with Piepho would implement the taper to the very extremity of the shaft, where the sleeve contacts the shaft.” *Id.* at 11 (citing Ex. 1049, 48).

Petitioner contends that an ordinarily skilled artisan “would have been motivated to combine the tapered end on the main shaft of Piepho with the main shaft on Torrence” because this “would have been nothing more than combining known elements according to known methods to yield predictable results.” RMTA Opp. 11. Petitioner next contends that an ordinarily skilled artisan would have been further motivated “as Piepho describes, as the tapered shaft aids in accurate alignment which is notoriously more difficult with purely cylindrical shafting” and “the shaft of Torrence does not include threads for a nut above the sleeve, thus a POSITA would recognize that the taper would extend from the upper most extremity of the shaft.” *Id.* at 11–12 (citing Ex. 1049, 48); *see also id.* at 18–19 (citing Ex. 1049 ¶ 61) (repeating substantially similar motivation to combine arguments)).

b) Patent Owner’s Contentions

Patent Owner argues that Petitioner engaged in improper hindsight and has not met its burden to establish motivation to combine Torrence and Piepho. RMTA Reply 9–10. Patent Owner specifically argues that “Mr. Smith testified that he did not consider Piepho beyond its disclosure of a

tapered shaft.” *Id.* at 9 (citing Ex. 2021, 65:5–16). Patent Owner further contends that “Petitioner and Mr. Smith’s use of hindsight is also reflected in their limited motivation analysis” where they “provide generic *KSR* language without explication or say it would have been ‘notoriously more difficult to align with a cylindrical joint.’” *Id.* at 9–10 (citing RMTA Opp, 11–12; Ex. 1049, 48. 59). According to Patent Owner, “Piepho itself notes a cylindrical joint is an alternative to a tapered joint.” *Id.* at 10 (citing Ex. 1016, 3:33–35).

c) Analysis

Petitioner provides the following annotated version of Torrence’s Figure 2:

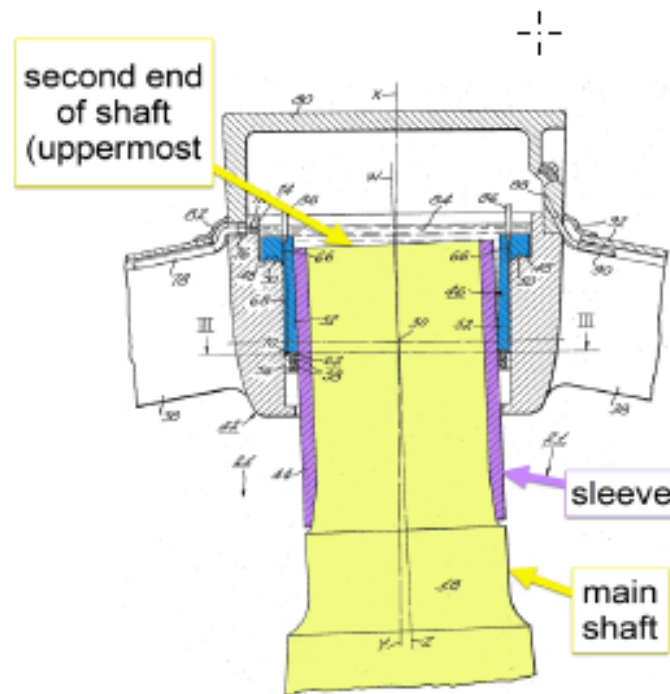


Figure 2 “is an enlarged fragmentary view partly in section, showing the spider bearing assembly.” Ex. 1011, 2:64–65. Petitioner annotates Figure 2 by, *inter alia*, highlighting main shaft in yellow and sleeve in purple.

RMTA Opp. 10.

Petitioner argues that Torrence has a “straight shaft and wear sleeve.” Amended RMTA Sur-reply 9. We disagree with Petitioner. Based on our review of Figure 2, we find that Torrence’s main shaft includes a tapered region that mates with a corresponding taper on sleeve 44 near the bottom of the sleeve. *See* Ex. 1011, Fig. 2.

Petitioner argues that if a person of ordinary skill in the art were to “[c]ombin[e] the tapered region of Piepho with the shaft of Torrence, the tapered region would extend from an uppermost extremity of the shaft.” RMTA Opp. 9. But, Petitioner concedes that neither reference discloses a tapered region extending from the uppermost extremity. Petitioner argues that Torrence’s shaft is straight (Amended RMTA Sur-reply 9) and that “[t]he tapered region of Piepho *does not extend* to the extreme end of the shaft.” RMTA Opp. 11 (emphasis added). Because neither Torrence nor Piepho discloses a shaft with a tapered region that “extends from an uppermost extremity of the shaft,” we find that the combination of Torrence and Piepho does not teach limitation 11[a].

We now analyze whether Petitioner provides reasoning with a rational underpinning why a person of ordinary skill in the art would have been motivated to modify Torrence with Piepho to extend Torrence’s taper from the upper extremity of its shaft.

Petitioner argues that Piepho discloses that tapered end 25 aids in alignment. RMTA Opp. 11; Pet. 21. Petitioner provides the following annotated version of Piepho’s Figure 3 (Pet. 21):

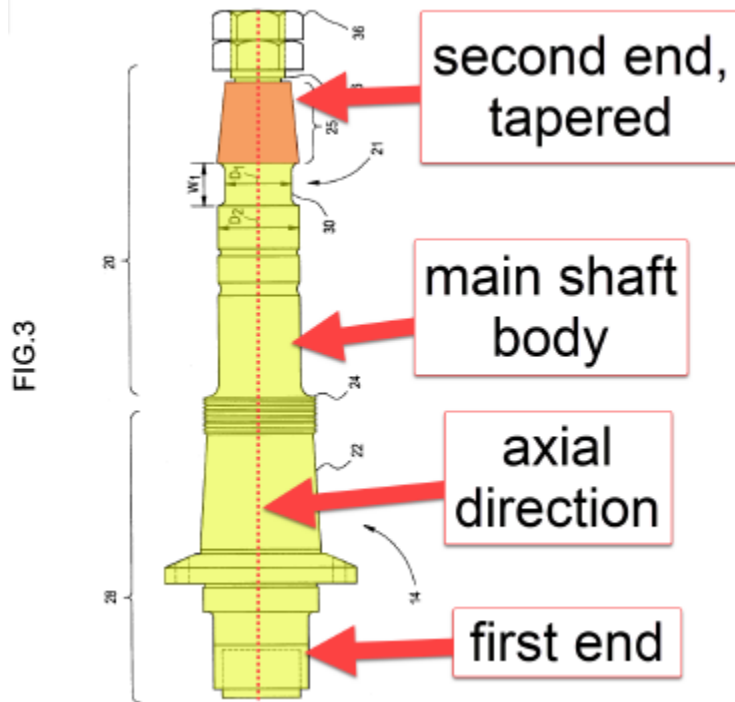


Figure 3 is “an external view of a main shaft employed in” Piepho’s pulverizer. Ex. 1016, 2:45–46. Petitioner annotates Figure 3, *inter alia*, by highlighting tapered end 25 in orange and the remainder of the shaft in yellow. Pet. 21.

Petitioner relies on the following text in Piepho to support its argument that Piepho teaches that a tapered shaft aids in alignment:

The present invention provides an intervening material between the shaft end (25) and the mating bore in yoke bushing (18) fitted within the bore of yoke (12) to prevent fretting damage. *For accurate alignment* and for reliable support of the yoke, *this joint* (21) must be capable of accepting radial, axial, and bending or overturning loads. Preferably, the joint (21) is a tapered joint with the tapered end (25) of shaft (14). The yoke bushing (18) has a mating bore similarly tapered. Shaft end (25) may be constructed for either a keyless or keyed fit. Also, *shaft end (25) alternatively may be cylindrical rather than tapered* as seen in FIG. 4

Ex. 1016, 3:23–35 (emphasis added).

This paragraph discusses “accurate alignment” in connection with joint 21 not tapered end 25. Ex. 1016, 3:23–35. The paragraph subsequently states that both joint 21 and end 25 are tapered but that shaft end 25 may alternatively be cylindrical. *Id.* We also find nothing in this paragraph supporting Petitioner’s assertion that alignment “is notoriously more difficult with purely cylindrical shafting” (Amended RTMA Opp. 11–12).

In order to support its position, Petitioner improperly conflates separate statements in this paragraph, i.e., joint 21 provides accurate alignment, joint 21 is tapered, and end 25 is tapered. Petitioner makes an unsupported logical leap that the result of these three statements is that tapered end 25 provides accurate alignment. However, Petitioner fails to reconcile this argument with the final sentence in this paragraph that shaft 25 may also be cylindrical as shown in Figure 4.

Figure 4 of Piepho is reproduced below:

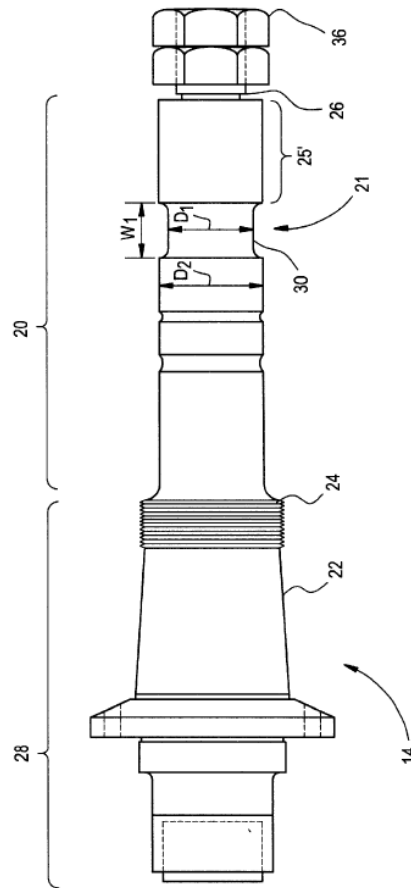


Figure 4 “is an external view of another embodiment of” Piepho’s shaft. Ex. 1016, 2:49–50. In Figure 4, joint 21 has the same tapered configuration as shown in Figure 3 but end 25 is not tapered. Based on our review of Piepho’s Figures 3 and 4, we find that Piepho’s reference to “accurate alignment” refers to joint 21 and not to tapered end 25.

Mr. Smith relies on the same paragraph from Piepho in support of his testimony on this claim limitation. Ex. 1049, 47–48. Because the testimony essentially parrots the Petition and is inconsistent with Piepho’s disclosure and our finding, his testimony is entitled to little, if any, weight.

Even if we were to agree with Petitioner that Piepho teaches that tapered end 25 aids in accurate alignment, Petitioner ignores the taper on

Torrence's shaft shown in Figure 2 and, by doing so, fails to explain why the existing taper on Torrence's shaft, would be insufficient for alignment purposes such that a person of ordinary skill in the art would have been motivated to extend the taper from the upper extremity of the shaft.

Petitioner additionally argues that a person of ordinary skill in the art would extend the taper to the upper most extremity" of Torrence because "the shaft of Torrence does not include threads for a nut above the sleeve." RMTA Opp. 12. Although, based on this assertion, it appears that an ordinarily skilled artisan could have extended the taper to the upper most extremity of Torrence's shaft, Petitioner fails to provide persuasive evidence or argument why the lack of a nut or threads above Torrence's sleeve would have motivated an ordinarily skilled artisan to extend Torrence's existing shaft taper to the upper most extremity of the shaft. Petitioner cites to Mr. Smith's testimony for this assertion but his testimony essentially parrots the Petition on this point and is entitled to little, if any, weight. *See* Ex. 1049, 48.

In the Amended RTMA Sur-reply, Petitioner provides additional arguments to support motivation to combine. Amended RTMA Sur-reply 9–10. Patent Owner argues that these additional arguments are beyond the proper scope of a Sur-reply. Paper 50, 2–3.

Petitioner first argues that "it is evident that a POSITA would understand that the tapered shaft is preferable because it makes it easier and faster to replace a bushing with less damage to the main shaft" and "[f]or that reason also lends itself to consideration and solving the problem addressed by the '568 Patent" of increasing the main shaft life. RMTA Sur-reply 9. Petitioner further argues that "[a] POSITA trying to increase the life of a main shaft, and/or reduce down time when performing maintenance on a

main shaft assembly would be motivated to combine the straight shaft and wear sleeve of Torrence with the preferable sleeve of Piepho as tapered shafts improve the ease of removal and prevent damage to the shaft. *Id.* at 9-10 (citing Ex. 1033, 1:13–15, 1:35–42; Ex. 1032, 1:15–24; Ex. 1031, 3:15–22). We are not persuaded by these arguments for the following reasons.

First, the arguments are not persuasive because they suffer from the same defect as arguments in the RMTA Opposition discussed above, i.e., Petitioner ignores the taper on Torrence’s shaft and fails to provide a reason why a person of ordinary skill in the art would have been motivated to modify Torrence’s by extending its taper from the upper extremity of the shaft. Second, even if these arguments were persuasive, we agree with Patent Owner that these arguments are improper because they raise a new “rationale to combine the prior art references that was not expressed in the petition.” Consolidated Trial Practice Guide, 74 (PTAB Nov. 2019) (citing *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369–70 (Fed. Cir. 2016)).

For the foregoing reasons, we determine that Petitioner has not shown by a preponderance of the evidence that claim 11 would have been obvious over Torrence and Piepho.

Substitute Claims 12–19 all depend directly or indirectly from claim 11. RMTA 41–43. Petitioner provides separate arguments and evidence for claims 12, 18, and 19. RMTA Opp. 19–23. Petitioner did not provide separate arguments for claims 13–17. *See* RMTA Opp. 1–23.

We have reviewed Petitioner’s contentions and evidence for claims 12, 18, and 19 and find that the contentions and evidence do not cure the deficiencies just discussed for claim 11. Consequently, we determine that

Petitioner has not shown by a preponderance of the evidence that claims 12–19 would have been obvious over Torrence and Piepho.

F. Petitioner’s Motion to Exclude

Petitioner moves to exclude certain paragraphs of Mr. Kytomaa’s Declaration, Exhibit 2022, and Exhibits 2023 and 2024. MTE, 3–12. Patent Owner opposes. MTE Opp.

Because we do not rely on any of the evidence that Petitioner seeks to exclude, we dismiss Petitioner’s Motion to Exclude as moot.

III. CONCLUSION

For the foregoing reasons, we cancel claims 1–10 of the ’568 patent and grant Patent Owner’s motion to amend the ’568 patent to add proposed substitute claims 11–19.

In summary:

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not shown Unpatentable
1–8	103	Polinski, ⁷ Piepho		
9	103	Polinski, Piepho, Bratt ⁸		
10	103	Polinski, Piepho, Pollak ⁹		
Overall¹⁰ Outcome				

Motion to Amend Outcome	Claim(s)
Original Claims Cancelled by Amendment	1–10
Substitute Claims Proposed in the Amendment	11–19
Substitute Claims: Motion to Amend Granted	11–19
Substitute Claims: Motion to Amend Denied	
Substitute Claims: Not Reached	

⁷ U.S. Patent No. 4,410,143, issued October 18, 1983 (Ex. 1015, “Polinski”).

⁸ U.S. Patent No. 2,764,437, issued September 25, 1956 (Ex. 1034, “Bratt”).

⁹ U.S. Patent No. 4,060,205, issued November 29, 1977 (Ex. 1017, “Pollak”).

¹⁰ As discussed above, because we grant Patent Owner’s request to cancel original claims 1–10, we do not determine whether Petitioner has shown that original claims 1–10 are unpatentable.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Patent Owner's Revised Non-Contingent Motion to Amend (Paper 23) is granted as to its non-contingent request to cancel claims 1–10;

FURTHER ORDERED that claims 1–10 of the '568 patent are cancelled;

FURTHER ORDERED that Patent Owner's Revised Non-Contingent Motion to Amend (Paper 23) is granted as to adding substitute claims 11–19;

FURTHER ORDERED that Petitioner's Motion to Exclude is dismissed as moot; and

FURTHER ORDERED that any party seeking judicial review must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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Patent 9,827,568 B2

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